

Wolfe & Green Lakes Vision and Overview

Sharing a vision, describing the Wolfe and Green Lake environments, reporting on Association activities and presenting a framework for action.

Multiple Authors & Contributors from the Wolfe Lake (Westport) Association

6/30/2013

Note:

This document is available via the Association website at <http://wolfelakeassociation.org>

Acknowledgments: Information for this Vision document came from diverse sources. This includes other lake plans from which we acquired inspiration and concepts upon which to base our work. The Bob and Crow Lake Association Plan was particularly helpful. In addition, Appendix 7, 'How Human Activity Affects Water Quality', is included with the permission of The Adams Lake Property Owners' Association. Margie Manthey of Wolfe Lake, with the help of Green Lake cottagers, was largely instrumental in gathering information and writing Appendix 4 on Wolfe and Green Lakes' Natural Environment. Other information was obtained from Rideau Lakes and South Frontenac townships and from the Rideau Valley Conservation Authority. Board members involved in drafting, reviewing, editing, and debating are too numerous to list fully, but we thank Glen Ewen for getting us rolling and doing much of the early work to gather great material, Betty Jo MacDougall for editing and Sharon Carr for the final compilation.

WOLFE AND GREEN LAKES – VISION and OVERVIEW

June 2013

TABLE OF CONTENTS

1. Introduction and Vision
2. Water Quality (summary; see also Appendix 6)
3. Sustainable Fishing
4. Safe Boating and Recreation
5. Natural Lake Environment
6. Emergency and Government Services
7. Development on the Lakes
8. Mining
9. Community & Communication

APPENDICES

1. Our Mandate: Results of the Lake Vision Survey for Wolfe and Green Lakes, June 2009
2. Maps of Wolfe and Green Lakes
3. Facts and Figures on Wolfe and Green Lakes
4. Natural Environment of Wolfe and Green Lakes
5. Main Fish Species in Wolfe Lake
6. Water Quality in Wolfe and Green Lakes
7. How Human Activity Affects Water Quality
8. Boating Regulations on Wolfe Lake
9. Zoning and Building Bylaws Governing Shoreline Properties in Rideau Lakes and South Frontenac Townships
10. Private Lane Construction Specifications Required to Allow Safe Passage of Emergency Vehicles

1. INTRODUCTION AND VISION

The purpose of this document is to describe the current state of Wolfe and Green Lakes, present an overview of the activities of our Association and share a vision of our lake community and environment: what they are and what they can be.

The Wolfe Lake (Westport) Association is a volunteer organization initially formed in 1988 “for the protection of Wolfe Lake” and has since expanded to include neighbouring Green Lake. Its mandate is to maintain and enhance the natural beauty and pristine state of Wolfe and Green Lakes, to protect their natural areas, fish and wildlife and to promote their welfare, by providing information on environmental issues, working to prevent pollution, improve fishing and ensure responsible development, and assisting in the conservation and protection of the lake waters, shoreline, vegetation and wildlife.

A membership survey in 2009 and ongoing discussions reveal a general consensus about the need to preserve the natural beauty of our lakes as a refuge from the sometimes hectic pace of our urban environment. This means maintaining our natural shorelines, lake water quality, co-existence with the natural environment, including animals, birds, plants and scenic views, and our opportunities to enjoy lake activities such as boating, swimming and fishing. The peace, quiet and solitude of the natural environment have been identified as cherished features that attract many of us to the lakes. We will maximize the chance of influencing this if we act together as a ‘community’.

Association Objectives

This brings us to two high-level objectives of the association: 1) Foster a strong lake community, and 2) Monitor and act on issues that threaten the sustainable enjoyment and health of our lakes and surroundings. The hope and expectation is that these are fundamental enough to stand the test of time, and the coming and going of volunteers on our team in the Association. The following points provide an overview of how we plan to move ever closer to achieving these objectives, as detailed in this document and appendices.

1) Foster a strong lake community

- a. Operate in a transparent and professional manner. This includes sound practices in electing board members, appropriate scrutiny and reporting of all accounts and activities, and hosting regular board and annual meetings.
- b. Engage with and represent the community of cottagers and residents of Wolfe and Green Lakes to the extent reasonable for a volunteer organization.
- c. Maintain and archive information about the lakes and their environments, and activities and history of the association.

- d. Engage cottagers by soliciting information and communicating via the annual printed newsletter, e-mail communication, our website, social media, signage, meetings, events, periodic reports and questionnaires. Two-way communication is essential.

2) **Monitor and act on issues that threaten the health of our lakes and surroundings and promote sustainable enjoyment.**

- a. Identify and consider responses to issues that may impact the lake community, environment or recreation. This may include community stewardship efforts, soliciting expert advice, supporting educational and research initiatives, providing information about best practices (e.g. Appendix 7), and motivating lake property owners to take individual action.
- b. Work to help preserve the environmental and recreational integrity of the lakes and their shorelines, including water quality, shoreline restoration, sustainable fishing, and wildlife habitats.
- c. Promote community safety and boating safety, the latter including maintaining marker buoys, providing boating regulations, lake maps and other information in the newsletter.
- d. Represent our community with respect to municipal matters such as emergency services, septic tank inspections, road maintenance, and waste management.

These points are consistent with both the constitution (2006) and the most recent survey (2009), but are represented in this document with different words and organization.

Highlights of the Association's Efforts on Behalf of the Lake Community

For a quarter century the Association has worked on behalf of the community. Programs and activities include:

- Publication and hand-delivery of a free annual newsletter to all residents (including members and non-members) on water quality, wildlife and environmental issues affecting Wolfe and Green Lakes.
- Annual placement, removal and maintenance of buoys on shoals and dangerous areas of Wolfe Lake.
- Posting of signs providing information on boating safety, fishing regulations and loon protection.
- Provision of educational speakers on numerous environmental issues at annual meetings.
- Successful efforts to restrict the development of a proposed high-density complex on the site of what was at that time one of only three bald eagle nests in Southern Ontario.
- Cooperation with the Bedford Mining Alert, Citizens' Mining Advisory Group and other organizations in an intense decade-long effort to amend the outdated Ontario Mining Act in response to the staking of several sites on Wolfe and Green Lakes. In 2009, the Act was finally amended, with vastly improved protection for surface-rights-only owners and environmental safeguards.

- Continuing measurement and monitoring of water quality in both lakes, in cooperation with the Rideau Valley Conservation Association and Ontario's Lake Partner Program. Hours of volunteer effort every year for over two decades have produced a detailed database of information on such factors as water clarity, total phosphorus, pH, temperature, conductance, dissolved oxygen, E. coli, algae, benthic invertebrates and invasive species. The information is distributed to all property owners around the lakes, a number of whom have updated their septic systems as a result.
- Continuing participation in Bird Studies Canada's Southern Ontario Bald Eagle Monitoring Project in collecting and reporting data on Bald Eagle nesting chronology, activity and productivity.
- Baseline surveys of local geology, plant life, bird life and wildlife, and videotape survey of the entire shoreline of Wolfe Lake for reference purposes.
- Removal of Purple Loosestrife from a badly-infested area of Wolfe Lake, resulting in successful repopulation by native species.
- Successful rehabilitation of a fish spawning site at Scanlon Creek.
- Long-term participation in the Canadian Lakes Loon Survey.
- Negotiation of a solution to a problem involving contamination of the lake by cattle.
- Testing for the presence of zebra mussels and spiny waterflea, monitoring of zebra mussel levels following their identification in Wolfe Lake, and education of residents on methods of control.
- Identification and monitoring of the Eurasian water milfoil infestation, research and education on methods of control, and initiation of a milfoil control program.

Notes:

For the purposes of this Vision statement, any reference to our lakes includes the entire lake watershed, including the streams that flow into and out of the lakes, the shoreline, landscape and adjacent wetlands.

In each subsequent section, you will find actions representative of the date of publication. The more detailed they become, the more they may vary over time, but the directions and spirit are likely to remain the same.

Association Membership and Participation:

Please get involved to the degree you can, and no matter what...please be an active member of this great community by joining the association! When a majority of property owners are members of the Association it adds much weight to our lobbying efforts on behalf of the community. Over the years, the Directors and other volunteers have contributed countless hours annually to the governance of the Association and the projects summarized in this report. Your support provides the impetus for all these activities, so please come aboard if you are not already a member.

2. WATER QUALITY

Water Quality Monitoring in Wolfe Lake

The Wolfe Lake (Westport) Association began regular systematic testing of water clarity in Wolfe Lake based on Secchi disc visibility in the summer of 1990. In 1996, the Ontario Ministry of Environment began analyzing total phosphorus (TP) in deep-water samples taken by Association volunteers, through what is known as the Lake Partner Program. These samples were usually taken 3 times each summer at three deep-water sites. In 2001, it was decided to test shallow-water samples at 9 different near-shore sites as well. These sites were selected on the basis of cottage density and the probability that they might be problematic after a rain. Samples were taken to a private laboratory in Kingston or to the Centre for Sustainable Watersheds in Portland for analysis for TP on a fee-for-service basis. This practice continued until 2004. In addition to our ongoing testing, in the summer of 2002 the Centre for Sustainable Watersheds conducted a more detailed analysis of water quality in Wolfe Lake. Deep- and shallow-water samples were taken on two occasions and analyzed for a number of variables including total phosphorus, dissolved oxygen and E. coli.

In 2004, in addition to our normal water testing for TP through the Lake Partner Program, we began a testing program in collaboration with the Watershed Watch Program of the Rideau Valley Conservation Authority (RVCA). Through this arrangement, samples are taken at both deep- and shallow-water sites three or four times each summer (some years more frequently) and analyzed for a number of chemicals in addition to total phosphorus. Because of this partnership with the RVCA, we were able to sample more frequently and to test more variables than our budget normally permitted. (Our Association supplies the boat, motor and guide but testing is done by RVCA biologists and the RVCA covers all laboratory costs.) For the past seven years, water quality monitoring has proceeded along two lines: (1) deep-water TP testing three or four times each summer through the Lake Partner Program, and (2) more detailed testing of both deep- and shallow-water samples through the RVCA. On several occasions technicians from the RVCA have also sampled benthic invertebrate numbers and diversity as indirect markers of water quality.

Summary of Results

Water clarity in Wolfe Lake

Wolfe Lake has long been one of the clearest lakes in Southern Ontario. Since nutrient levels tend to track TP concentrations, under normal conditions there is a fairly close inverse correlation between Secchi disc readings and TP concentrations (i.e., the lower the TP, the greater the clarity). Since 2009, there has been a sudden increase in Secchi disc readings. There is little question that this increase in clarity can be attributed to the explosion in zebra mussel numbers that began in 2008. As a result, Secchi disc readings can no longer be assumed to reflect TP concentrations or water nutrient status.

Water chemistry in Wolfe Lake

Over the period 1996-2012, chemical analysis has found TP concentrations averaging approximately 10 µg/L and ranging from approximately 6 to 15 µg/L. On occasion, some near-shore sites have been as high as 25µg/L. In the two instances when consistently higher values were brought to the attention of residents near those sites, their response of upgrading their wastewater systems appears to have resolved the problem.

Near-shore testing for *E. coli* is an effective method for determining whether there may be faulty septic systems in the vicinity or contamination from upstream livestock. Over the past seven years, all samples tested for *E. coli* have been well within the safe limit (under 100 colony forming units, or cfu, per 100 ml). In the few instances where values at some sites were in the 20-30 cfu/100 ml range, subsequent re-testing showed that values were at very low or undetectable levels, suggesting that the higher reading was due to local and short-term contamination from a source such as waterfowl.

Zebra Mussels in Wolfe Lake

Wolfe Lake was first tested by the Ontario Federation of Anglers and Hunters for the presence of zebra mussels on several occasions during the summer of 2004. On one of these occasions, one net sample yielded a single microscopic larva. The first adults started appearing in the summer of 2006. Over the next four years there was an exponential increase in numbers. By 2010, there appeared to be no further increase in numbers, suggesting that they may have reached their ecological balance point. This situation occurs when they have filtered the water to the point that there is not enough plankton to support further expansion in reproduction. It will be a number of years before the true ecological impact of this extremely rapid addition of an invading species becomes apparent in a lake that has been evolving over centuries. Immediate effects that we are aware of include changes in water clarity, water odour, fish patterns and the appearance of new aquatic vegetation.

Eurasian Water Milfoil in Wolfe Lake

Eurasian water milfoil (EWM) is a submerged aquatic plant that poses a serious threat to our lakes' native aquatic plants and the animals that depend on their diverse ecosystems. The plant can grow up to two inches a day, forming thick underwater stands of tangled stems and vast mats of vegetation at the water's surface. It can shade and crowd out native plants and become so thick that larger fish cannot swim through the tangled mats, while boats and swimmers need channels to allow access from the shoreline out into deeper water areas. Excessive growth also reduces the aesthetics of the lake.

EWM has recently established itself in Wolfe Lake and has begun to present the problems described above. As a result, at the August 13, 2011 Annual General Meeting of the Association, a committee of three directors was established to investigate and recommend responses to the infestation. The committee identified harvesting and the use of herbicides as two possibilities to deal with the infestation. Both methods are expensive, provide only temporary results and have negative impacts on the surrounding ecosystem.

Since EWM is not native to Ontario or Canada, it has very few natural predators. However, biological control using one such predator, the milfoil weevil, has been tested throughout the United States since the 1990s and has received growing interest in Ontario. This insect is native to North America, feeds specifically on milfoil and is commercially available as a biological control agent. During the summer of 2012, the committee embarked on a pilot project to test the effectiveness of the milfoil weevil as a biological control for invasive EWM. Results by the end of the summer were inconclusive and testing continues in 2013.

Water Levels in Wolfe Lake

The water from Wolfe Lake and many other lakes is used to help maintain navigable water levels in the Rideau Canal system. The Government of Ontario assigns a high level of priority to maintenance of navigation on the Rideau Canal. A dam at the southeast end of Wolfe Lake is controlled by Parks Canada and other Rideau Canal authorities for this purpose. Water flows from Wolfe Lake through a series of ponds, Sand Lake and Westport Pond to Upper Rideau Lake. Lake water levels are constantly monitored from the Parks Canada remote gauge station located adjacent to the boat launch off Concession 11 Road. Wolfe Lake water levels are kept as close as possible to full throughout the summer, depending upon minimum downstream flow requirements and priorities. Appendix 6 shows typical water levels in Wolfe Lake throughout the season:

Updated Wolfe Lake water levels can be found on the RVCA authority website at www.rvca.ca. Click on Streamflow & Water Level Conditions and select the Wolfe Lake dam.

Water Quality Monitoring in Green Lake

Green Lake is a small spring-fed lake, feeding into Wolfe Lake from the west. For the most part, this flow is blocked by beaver dams.

Under the Lake Partner Program, two phosphorus samples are taken each spring and water clarity is measured twice monthly, May through October, at one deep-water site. In addition, the Rideau Valley Conservation Authority has sampled Green Lake up to four times a year since 2005, looking at additional water quality factors and for evidence of invasive species. The results show total Kjeldahl nitrogen, total phosphorus and calcium readings well below half the province's and RVCA's acceptable standards, and Secchi depth (clarity) readings well above these standards.

In 2007, water samples were taken in Green Lake to determine zebra mussel activity. Results showed that no larvae were present in the lake and, in fact, that the water chemistry (calcium concentration) would not support zebra mussel production.

Beaver Ponds

Beavers dam natural streams to create ponds for protection from predators and easy access to winter food. These ponds trap and hold back high concentrations of nutrients and produce wetlands that are among the most biologically productive ecosystems in the world. If a dam is abandoned or falls into disrepair, the nutrient-laden water will escape slowly, enriching the surrounding land and filtering gradually into the watershed. However, if a dam is suddenly broken or destroyed, the large quantities of nutrients that are released all at once into the nearest lake can promote excessive weed growth and damage fish spawning areas. Draining problem beaver ponds should always be done gradually to prevent damage to the lakes downstream.

Action Lakefront Property Owners Can Take to Protect Water Quality

Lakefront and property owners are encouraged to be aware of the importance of natural shoreline vegetation to water quality and to the health of the lake, its fish and wildlife. Native vegetation allowed to grow on the lakefront can benefit the watershed and lake ecosystem by:

- discouraging the growth of algae and aquatic plants;
- preventing erosion and runoff;
- trapping nutrient-rich precipitation runoff and sediments;
- enhancing water quality;
- providing shelter and food for wildlife;
- supporting spawning beds for fish;
- shading and cooling the water.

Property owners are encouraged to consider rehabilitating and re-naturalizing manicured shorelines. Changes may upset the balance of aquatic and shoreline ecosystems and alter key wildlife habitat, thus destroying the natural beauty and character of our lakes and rivers.

Property owners should avoid:

- removing native plant species such as cattails and bulrushes;
- establishing manicured lawns and non-native plants in the vicinity of the shoreline;
- building retaining walls, boathouses and seawalls;
- using health and cleaning products that are not biodegradable.

The Cottage Association's Efforts in Water Quality

To improve current water quality standards, the efforts of the Lake Association at the time of publication include:

- monitoring water quality;
- monitoring invasive plant and aquatic species such as Rusty Crayfish (from US), Loosestrife (From Asia, Europe), Eurasian Milfoil and Zebra Mussels, and possibly working to mitigate;
- initiating action to promote timely septic tank inspections by municipal authorities;
- educating property owners and users concerning best practices;
- liaising with Rideau Canal authorities regarding the maintenance of water levels in Wolfe Lake.

For a more detailed version of this report on water quality, including figures and data, see Appendix 6. In addition, Appendix 7 contains information on how human's impact lake water quality and simple actions we can all take to reduce lake pollution, weed and algae growth.

3. SUSTAINABLE FISHING IN WOLFE LAKE

Overview

Wolfe Lake contains a wide variety of fish, including walleye (often called pickerel in Canada), smallmouth bass, rock bass, northern pike, largemouth bass, perch, ling, whitefish, several species of suckers, sunfish (both bluegill and pumpkin seed), black crappie, bullhead catfish, and a wide variety of bait fish. Some of the primary species are described in detail in Appendix 5. Our objective is to protect the natural elements on which fish depend to ensure a healthy population and to provide a sustainable fishery for anglers.

The primary game fish in the lake are walleye, smallmouth and largemouth bass, and northern pike. The size of the fish population is uncertain because the Ministry of Natural Resources has not conducted a population survey since the mid-1990s. Generally, the bass and panfish populations are believed to be stable. The pike population too has remained constant. The walleye population may have decreased, possibly as a result of the zebra mussel infestation, although there is no scientific data to confirm this observation. Other lakes experiencing zebra mussel infestations have seen the walleye population rebound five to ten years following development of the infestation.

Full details on Ontario fishing regulations, characteristics and opportunities can be found online at ontario.ca/fishing.

Fisheries Summary

Wolfe Lake is considered one of the best fishing lakes in the region. The relatively low density of cottagers and other residents on the lakes and limited public access protect our fisheries. The only significant fishing pressure comes from walleye anglers.

The species of fish that live in Wolfe Lake are affected differently by habitat characteristics, including lake depth, water temperatures, dissolved oxygen levels, presence of in-water structures for refuge, such as plants, rocks, or woody debris, spawning schedules and habitats (e.g., muck vs. rubble), prey and predators, including humans.

The Association's Efforts on Sustainable Fishing

Fishing in Wolfe Lake remains good, especially for bass, panfish and northern pike. Fishermen continue to target walleye, but their catches are less rewarding than they once were and many would like to see improved numbers. Stocking is a possibility, but improving spawning sites may prove to be the most effective approach. Efforts being considered at the time of publication include:

1. improving and promoting education on the merits of managing a sustainable fishery;
2. working with the Ministry of Natural Resources (MNR) and other groups to identify, rehabilitate, monitor and maintain fish spawning grounds;
3. working with MNR to encourage enforcement of existing fishing regulations;
4. establishing a local education program to:
 - a. promote catch-and-release fishing;
 - b. promote the use of barbless hooks;
 - c. discourage the use of lead sinkers and weights;
 - d. encourage fishermen to complete angler diaries;
 - e. encourage people to report poaching;
 - f. work with the municipalities and planning agencies to ensure that approvals for new development take into consideration the protection of fish habitat, including near-shore nursery and spawning areas;
 - g. encourage all those fishing in the lakes to be aware of and adhere to fishing regulations;
5. educating shoreline owners about near-shore and in-water activities that damage or destroy fish habitat: removal of rock rubble substrates, removal of submerged wood materials, removal of aquatic plants, and creation of sandy swimming areas over spawning sites for bass and other species.

4. SAFE BOATING AND RECREATION

Fishing, swimming, hiking, hunting, nature exploration and winter sports such as skating, snowshoeing and cross-country skiing are popular activities on and around Wolfe and Green Lakes. In addition, boating is a major activity. Note that the Canadian boating regulations applicable to boating on Wolfe or Green Lakes are detailed in Appendix 8. Only non-motorized watercraft are used on Green Lake, but canoeing, kayaking, and motor boating of all types, including water skiing, are important forms of recreation on Wolfe Lake. There are three boating launching sites available to the general public. A substantial percentage of boating activity on Wolfe Lake is believed to involve members of the public who have no property on the lake. Fishing is the main attraction for these boaters. Lake Association signage at each boat

launch site displays information on boating and fishing regulations and on environmental concerns, including precautions to prevent the introduction of invasive species.

Fortunately, because of Wolfe Lake's expansive open area, visibility for boaters is good. There are few narrow channels and boating traffic is normally relatively light. The main boating hazards are submerged rocks, logs and shoals. Known obstructions have been marked with floating buoys, although these can be displaced by storms and vandalism.

Anyone launching a boat into the lake should make every effort to prevent introducing foreign species into the lake. These species may contaminate boat hulls, bait pails or engine water intakes if the boat has recently been used in contaminated waters. Boats may have to be cleaned and bait pails emptied well onshore before launching. Zebra mussels are believed to have entered Wolfe Lake from a contaminated boat.

According to Ontario Provincial Police (OPP), drinking alcohol while boating is a common offence. Other frequent issues include speeding, particularly along shorelines, exceeding boat passenger limits, towing water skiers and tubes without a dedicated lookout person in the boat, general lack of awareness of boating regulations, and insufficient concern for the safety of swimmers, canoeists, kayakers, other motor boaters and wildlife. The OPP also express concern that most boaters do not wear their life jackets. Statistics show that, in 9 out of 10 boat-related drownings, the victims were not wearing life jackets even when they were available in their boat.

Concerns expressed by lake property owners include excessive boat speed and large wakes close to shore. By law, the speed limit within 30 metres of the shoreline is 10 km/h. Another concern relates to the use of some personal watercraft because of excessive speed and noise and, in some cases, aggressive driving. In general, boating on Wolfe Lake is a positive experience. With due regard by all boaters for the safety and well-being of other lake users, this will continue to be the case.

The Association's Efforts on Safe Boating and Recreation

To help ensure the safety and enjoyment of boating and recreation activities on our lakes, the Association's efforts at the time of publication include:

- posting and maintaining signage at the three public launch sites on Wolfe Lake;
- placing and maintaining shoal markers in Wolfe Lake;
- providing educational materials;
- encouraging all property owner to brief visitors on boating regulations and safety concerns.

5. NATURAL LAKE ENVIRONMENT

As the Wolfe/Green Lakes survey of June 2009 indicates, our membership's primary concern is preservation of the natural environment. While many of us may be unaware of the details of our environment, we all share a deeply-felt appreciation for it. People come to the lake to relax, enjoy the scenery and escape from the stress of our normal routines. We need to be aware of the fragility of the lake environment that we find so attractive. Habits and practices that are routine in our town lives may be inappropriate and destructive to the lake environment.

For example:

- . It is important to recognize the environmental desirability of having a natural shoreline with native vegetation. This means not removing healthy trees and avoiding the use of fertilizers and pesticides that can leach through lawns into the water. Green and natural products are now available to replace products that can impact the health of the lake.
- Faulty sewage systems can result in the presence of E. coli and other harmful bacteria in swimming and drinking water. Leaking or substandard septic systems provide nutrients that inevitably lead to excessive algae and weed growth in the lakes. Replacing or repairing defective systems is far more cost-effective in the long run than cleaning up degraded lakes.
- It is important to be alert to the danger of invasive species. We are already familiar with the negative impact of zebra mussels in Wolfe Lake. The long-term impact on fishing and the general lake environment is not yet known. A problem that first became evident in 2010 is Eurasian Milfoil, a rapidly-growing water weed that clogs shallow water so thickly that swimmers and boaters cannot pass through. Eradication of these invasive species can be expensive and in some cases impossible.
- Perhaps if we are more informed and aware of our natural environment we may become more protective and appreciative of it. Appendix 4 provides details on our natural environment, its importance and diversity. This appendix also describes the plant, bird and animal life in the Wolfe and Green Lakes area.

6. EMERGENCY AND GOVERNMENT SERVICES

Overview

Wolfe Lake is located within both Rideau Lakes and South Frontenac Townships; Green Lake lies entirely within South Frontenac. Each municipality has its own Official Plan, which is revised approximately every five years and submitted to the Ontario Government for approval.

These plans are prepared with public consultation to ensure that future planning and development will meet community requirements. The plans form the basis for the municipal regulations governing the zoning and development of commercial and private land, and municipal services such as roads, garbage disposal, tax structures, septic tank inspections, emergency and other services. Significant differences exist between the two municipal plans, complicating land use and development on Wolfe Lake.

Emergency Services and Road Safety

Lake residents consider fire, police and medical services as essential services. Service delivery can be a challenge, as many homes and cottages are located on long, rough or narrow private access roads, or on islands and in other isolated locations, and our summer population is constantly expanding.

Fire: Because Wolfe Lake lies within two jurisdictions, delays in providing fire protection for some properties could easily be an issue. Fortunately, both townships have agreed to respond to fire calls regardless of location, depending on which fire unit is in the best position to respond effectively. This procedure applies to Green Lake as well. The fire station for Rideau Lakes Township is located in Westport at 31 Spring Street, and the Bedford District Fire Department just south of Burridge on Burridge Road. Dial 911 for fire emergencies.

Police Services: These services are handled by the Ontario Provincial Police, 441 Highway 15, just south of Smiths Falls. Dial 911 or 1-888-310-1122.

Roads: Safe driving is an issue on narrow roads and lanes, steep hills and sharp turns, particularly where visibility may be restricted. Where vision is limited, precautions, including reducing speed, sounding horns and keeping to the far right side of the road, are strongly recommended. Warning signs may be required, particularly for cottage visitors who are unfamiliar with the road conditions. Most township roads are gravelled and are subject to washboarding and potholes, requiring frequent maintenance. The Association will continue to consult with the townships about road quality.

All cottage owners should be aware of township fire protection guidelines and ensure that their private lanes meet the requirements so that fire and other emergency vehicles can respond to cottage emergencies without any delays or restrictions in service. Minimum standards for the construction and maintenance of private lanes in South Frontenac are given in Appendix 10. Similar standards apply to lanes in Rideau Lakes.

Septic Inspection Programs

In 2008, Rideau Lakes Township adopted a schedule to inspect septic systems on all lakes over a five-year period, and has extended the program to 2014. Septic systems were first inspected on Wolfe Lake in 2009. Reports from previous years' re-inspection programs can be found at www.twprideaulakes.on.ca/development/septic-reinspection.html. To date, no similar septic inspection program has been implemented by South Frontenac Township. The Lake Association will continue to communicate its concerns to the township.

Waste Management

In Rideau Lakes Township, garbage is picked up by the municipality at private lane sites along Wolfe Lake every Monday from Victoria Day weekend until Thanksgiving. Only clear bags may be used, with bag tags costing \$2 a bag and a limit of two bags per week. In addition, there is a limit of 10 clear blue bags per week for recycled materials. Wolfe Lake cottagers in Rideau Lakes may also take their garbage to the Rideau Lakes dump site in Portland for an additional minimum dump fee of \$10. This system appears to operate satisfactorily.

In South Frontenac, private-lane garbage pickup was initiated in late 2010. Garbage pickup for Wolfe Lake is currently scheduled for Thursdays. This means that weekend cottage users must either transport their garbage to local dump sites as in the past, take it home, or build or purchase animal-proof garbage containers at the end of their private lanes. At some point they may no longer be permitted to use the local dump sites. The Lake Association will continue to communicate our members' concerns on this issue.

The Association's Efforts on Municipal Services

While lake residents generally receive good service from both municipalities, close interaction between the municipalities and the Lake Association is essential to ensure that this level of service continues and improves in certain critical areas. This interaction may take many forms, including attendance at selected municipal council meetings, dialogue with local council representatives, written submissions to council and communication with fire and police services to ensure that they are aware of local situations and concerns and the need for improved or modified services

7. DEVELOPMENT ON THE LAKES

Wolfe and Green Lakes are essentially recreational areas, dedicated to activities such as fishing, boating, water skiing, swimming, hiking, cross-country skiing, or simply savouring the peaceful

beauty of our natural surroundings. We also have growing numbers of permanent residents who are either retired or, as a result of recent improvements in communications, able to work from their lakeside homes or cottages. In addition, there are a number of commercial developments and farms on or adjacent to our lakes, as described below. In the past, a number of mines operated in the vicinity and lumbering was once a major commercial activity. At present, a gravel pit is operating at the west end of Wolfe Lake. To date, no adverse environmental impacts have been reported as a result of this operation.

Development of Private Property

Development can be defined as the construction, expansion or renovation of any type of building, including boat houses, docks, decks, sheds, etc. It also includes shoreline development, tree removal, the establishment of lawns and other measures that could have a serious adverse impact on lake water quality, and the growth of weeds and algae in the lakes. At times, family cottages are converted to full-time residences, creating an even greater impact on the lake environment than seasonal cottages.

Waterfront development accounts for 70% of all development in Rideau Lakes Township. These changes place increasing pressures on the lake environment. When development exceeds the capacity of the lakes to adapt, it can have a negative impact on the lake environment and quality of life for us and for future generations. Models have been developed to determine the maximum allowable development that can occur on the shorelines of a lake without seriously impairing water quality. When lake capacity nears its upper limit, even a very small increase in pollutant inflow can generate a large and not readily-reversible increase in algae and weed growth.

A number of government departments, including the Ontario Ministry of the Environment and the Ministry of Natural Resources, have regulations regarding shoreline development. The Federal Department of Fisheries and Oceans also has jurisdiction over work performed near the water, including building docks, cleaning the waterfront or altering the shoreline. DFO is particularly concerned with any lake development that may potentially harm fish habitat. The Ontario Ministry of Environment limits the materials that can be released onto the soil surface and into the groundwater. The Ontario Ministry of Agriculture, Food and Rural Affairs sets standards for manure and fertilizer runoff from farms. The Rideau Valley Conservation Authority and the Centre for Sustainable Watersheds in Portland offer programs and education materials promoting responsible environmental lake shoreline development.

The Official Plans of both Rideau Lakes and South Frontenac Townships are directly responsible for decisions relating to the development of commercial and private properties in the Wolfe and Green Lake watersheds. The Townships' Official Plans and zoning by-laws are the main planning tools used to control and regulate building and land use within the municipalities. All

development must conform to these Official Plans. Since each municipality develops its own Official Plan and zoning bylaws, there are sometimes significant differences between them. The Official Plans of both townships attempt to maintain a healthy environment by regulating the density of private construction and commercial development. Full details on the Official Plans, bylaws, building permit application forms, fees, etc., for each township may be obtained by visiting the appropriate website: for Rideau Lakes, www.twprideaulakes.on.ca, and for South Frontenac, www.township.southfrontenac.on.ca.

The table in Appendix 9 outlines the basic regulations governing building in the two townships. Both townships face continuous pressure from various sources to amend their Official Plans or to grant variances or exceptions. Waterfront properties are limited and in high demand. Developers may seek to increase density with back-lot, campground and fractional-ownership developments. Back lots with lake access may have fewer bylaw restrictions and be more profitable and marketable for a developer. At the same time, the threat to the lake in terms of more pollution, shoreline erosion, boat traffic and loss of privacy, peace and quiet may be increased exponentially. Because these developments offer the township higher property tax revenues, politicians may approve them in an effort to keep overall tax rates low. Lake residents may proceed with construction projects without permits or replace shoreline vegetation with lawns without considering potential fines and harmful environmental impacts. The Association must therefore continue to monitor and respond to changes in federal, provincial and township regulations and the degree to which they are enforced.

Commercial Operations

A number of commercial operations are currently being conducted on Wolfe Lake. These operations include a golf course, a 16-unit fractional-ownership resort, a 16-unit trailer park and approximately five cottage rental properties offering about 25 rental units. There are three public boat launch sites. While lake residents were initially concerned about commercial development, the fractional-ownership development on Wolfe Lake, which replaced a rental cottage/lodge/restaurant facility, has resulted in an overall improvement in the lake environment. The upgraded septic system and reduced fishing have been major factors in this improvement.

There are several family farms bordering Wolfe Lake or adjacent to streams that flow into the lake. The incidence of cattle wading into the lake has been reduced. A single cow relieving itself in the lake may have the same adverse impact as a faulty septic bed.

Appendix 7 describes how water quality is affected by human activity, both residential and commercial, and how, once a lake's phosphates and nutrient levels become critical, even a very small additional amount can quickly result in rapid and excessive algae and weed growth.

The Association's Efforts Regarding Development

At the time of publication, association efforts include:

1. Liaising with the two municipalities to develop policies for land use and sustainable development. This will require the Association to monitor the townships' Official Plans on a regular basis and to attend meetings and public hearings to ensure that our lakes' requirements are given serious consideration. In particular, the Township of South Frontenac must be encouraged to initiate septic inspections and to control high-density (e.g., back-lot and fractional-ownership) development.
2. Liaising with the municipalities to ensure that garbage and recycling services address the unique needs of lake residents.
3. Supporting the efforts of organizations such as the Federation of Ontario Cottage Associations (FOCA) (e.g. lobbying for changes to municipal tax laws to ensure that waterfront residents do not bear an inequitable share of the local tax burden in relation to services received).
4. Liaising with the municipalities to ensure satisfactory road access and continued maintenance.
5. Providing easy access to relevant information from municipalities including regulations and bylaws. This may take the form of printed material or summaries, and links on the association webpage.
6. Liaising with the township planning departments to ensure that we are made aware of all major planned developments on a timely basis, providing opportunity for input and action as appropriate.

8. MINING

Mining operations have been conducted in the Wolfe and Green Lake watersheds for well over a century. Recently, concerns have arisen about the impact of new claims, exploration activity and the potential for further mining in this area. Potential impacts include noise, dust, increased traffic, excessive water use, removal of trees, open pits and the possible release of pollutants and toxins into the land, air and watershed. In 2012, over 40 active mining claims in the area were held by MEGA Graphite Inc., a company that mines, processes and purifies natural flake graphite.

As a result of a decade of pressure on the government to change staking regulations on private property, the Mining Act was amended on October 28, 2009. Private lands in Southern Ontario on which mineral rights belonged to the Crown and surface rights to a private owner were

withdrawn from prospecting and staking. As many property owners on the lakes own only surface rights, this amendment was a significant milestone, eliminating the right of prospectors to stake property, remove trees and up to 1000 tonnes of material and even establish a mine without the owner's permission. The Bedford Mining Alert (bedfordminingalert.ca) and other volunteer organizations have worked hard for a number of years lobbying to change the Mining Act, which treated mining as a priority industry superseding the Environment Act, individual property rights, other commercial endeavours such as tourism, and the plans developed by local governments. Crown lands, however, are still open to staking unless withdrawn for environmental reasons. UNESCO sites have already been withdrawn from staking; it is in the interest of our Lake Association to have Crown lands as well designated as conservation and environmentally-sensitive areas.

Legislation will be developed over the next five years to establish general regulations for mine exploration, development and closure. Until this is accomplished, it is essential that our Lake Association remain in contact with organizations such as Bedford Mining Alert, which is closely monitoring the process, providing input and liaising with the Government on this legislation.

9. COMMUNITY & COMMUNICATION

The Oxford dictionary defines **Community**, in part, as:

“A group of people living in the same place or having a particular characteristic in common.”

Much of the text of this document and the legacy of the Association focuses on issues that threaten the health of our lakes and surrounds. One thing is clear: when we act as a community we have a much higher probability of influencing those issues, or anything else for that matter, than if we think and act fully independently.

Because Wolfe Lake, and Green Lake in particular, are quiet lakes relative to many, it is understood that many people who choose such a setting may not be interested in frequent get-togethers, parties, etc. Acting as a community is not only about being together face to face. Certainly some degree of personal camaraderie is a key component for many, but there are other ways to be an active community member. Some ways include keeping your membership paid up, providing up-to-date contact information (mail & e-mail), speaking up on issues that matter, paying attention to what is going on in our community, and getting actively involved when the time is right.

Communications

Effective communities communicate. At the time of publication, we are in the midst of a momentous swing in how humans communicate. It is important for the association to remain current while respecting traditions. For this reason, for some time to come, there may be multiple forms of communication. Trends may simplify this over time.

Inbound communication (Members to the Association) can be effective through the use of a variety of methods, including these that are active at the time of publication:

- attending the Annual General Meeting or other events to voice an opinion
- contacting board members directly about important issues. Contact information is available on the website and in the printed newsletter.
- posting on social media sites, including the Association's Facebook page.

Outbound communication (Association to Members) can be effective through the use of a similar variety of methods, including these that are active at the time of publication:

- the annual printed newsletter.
- the Annual General Meeting or special meetings of members as required
- e-mail newsletters. The board has committed not to overuse such a tool, and to this point frequency is 2-4 times per year.
- signage. Large permanent signs are being erected on which newsworthy items can be posted, complementing permanent presence of the website URL.
- association website (wolfelakeassociation.org). There is a clear societal trend to looking for things online and this gives the association an opportunity to become the place (site) where people start when looking for something related to the lake community.
- social media. New in recent years, the degree to which communities are coming together on Facebook, Twitter and other places is staggering. Our association needs to stay current in these ways while not abandoning traditional methods too quickly.

Representing You and Staying Current

This Lake Vision is intended to reflect a consensus of lake residents on the issues that are important to them, and on problems and feasible solutions. Every effort will be made to ensure that this is a community Vision, by consulting widely and creating multiple opportunities for residents to provide input. Having a plan in place will enable us to coordinate our actions and work together to maintain and improve the quality of life we enjoy on Wolfe and Green Lakes.

Life on the lake is no longer just a summer event. Many residents enjoy living on the lake year-round and have deeper roots within the community as a whole. Whether seasonal or full-time residents, we are extremely fortunate to own property on easily accessible lakes blessed with excellent water quality and natural beauty. These attributes, however, cannot be taken for granted, and each of us has a responsibility to become involved and to cooperate in working towards our common goals. As members of the Wolfe and Green Lakes community, we are an essential part of this process. We must assume personal responsibility for lake stewardship, be sensitive to our neighbours, and appreciate and protect the mutual values that we have identified and cherish. Together, we can preserve and enhance this beautiful area not only for ourselves but for generations to come.

The Wolfe and Green Lake community is comprised of a diverse group from various locations, with a wide range of priorities, skills, interests and lake time. The community is nurtured by involvement and respect and must be expanded by effective and varied means of communication. The Association will continue to plan new programs and events to enable individuals and families to meet and interact and thus develop a true sense of community.

APPENDICES

APPENDIX 1: OUR MANDATE RESULTS OF THE LAKE VISION SURVEY FOR WOLFE AND GREEN LAKES, JUNE 2009

Themes: A review of the survey indicates overwhelming support for two primary themes: preservation of the environment and enjoyment of the sanctuary provided by living and relaxing on our lakes. The preservation theme includes water quality, shoreline, vegetation, wildlife, and personal safety. The sense of sanctuary could be negatively impacted by additional high-density commercial development, mining issues, back-lot development, lawns extending to the lake edge, and noise pollution, e.g., by jet skis and snowmobiles..

Respondents: A total of 49 Wolfe and Green Lake property owners responded to the Lake Vision Survey from a total population of 177, not including the fractional owners at Wolfe Springs. Of the respondents, 73% were seasonal residents and 23% principal residents, with the balance being made up of vacant lot owners and occasional visitors. Approximately 35% of the respondents occupy four-season residences, 60% have seasonal properties with no plans to convert to full-time use, and 5% occupy seasonal properties but contemplate conversion to full-time or four-season residences. Some 33% of the property owners occupy their seasonal homes for 1 to 4 months a year, 23% are full-time residents and 15% occupy their properties 4-8 months a year, with the remainder visiting primarily on summer weekends. Families with children and grandchildren account for 42% of the respondents, with 40% indicating that they are over 50 and 10% that they are between 30 and 50.

Where We Live: Ninety percent of the respondents live on Wolfe Lake, and the remaining 10% on Green Lake. Members of the Lake Association accounted for 95% of the respondents.

About Our Properties: Some 43% of respondents obtain their water from wells, 30% bring drinking water with them, 20% use lake water, and 7% are on town water systems. Approximately 65% of the respondents use lake water for non-drinking purposes, 32% use wells and 3% use town water. About 79% of the respondents utilize septic systems, 14% use holding tanks, and the remaining 7% rely on outdoor toilets.

What We Like to Do: Water related activities tend to dominate recreational activities. Popular water-related activities, in order, are: swimming, boating, canoeing, tubing, fishing, water skiing, scuba diving, ice fishing, and ice skating. Other popular activities include observing nature, cross-country skiing, jogging, hiking, arts and crafts, bird watching, reading and just relaxing. Hunting, jet skiing, and snowmobiles receive the least emphasis in terms of recreation.

What's Important to Us and What Concerns Us: The factors that respondents valued the most were water quality, swimming, general enjoyment of nature, the tranquil environment, boating, fishing, canoeing, the existence of large areas of undeveloped land, and limited public access to the lake environment. Ranked in order of importance, these factors can be summarized as:

- water quality
- natural trees and vegetation
- wildlife and birds
- retention of natural shorelines
- good swimming
- privacy
- a gathering place, and
- safety of property.

Areas of major concern included preservation of water quality, escalating property taxes, high-density development, invasive species, and preservation of shorelines and vegetation. Other areas of concern were lack of police protection and road maintenance for cottage access. The factors most likely to have a negative impact on respondents' enjoyment of Wolfe and Green Lakes, ranked from most negative to least negative, are:

- high-density commercial development;
- jet skis;
- lawns extending to the lake edge;
- mining issues;
- heavy automobile traffic;
- outdoor light pollution;
- increasing residential development; and
- public access to the lakes.

Some 43% of the respondents indicate they are concerned about further development of the lakes, citing damage to the environment and potential harm to water quality as their reasons, while 57% expressed no concern over additional development. There was very strong agreement that the townships' Official Plans should exercise strict control over high-density commercial development and back-lot development. Respondents agreed with the need to limit the percentage of a lot that can be covered by buildings and to minimize boat houses, and disagreed with the suggestion that too many rules were impacting enjoyment of property.

Lake Association Priorities: Respondents indicated that the Lake Association's primary goal should be to protect and preserve the overall lake environment. Additional priorities include political action to impact regulations on the development of lake property, influence property

taxes, and work with the townships on issues affecting the quality of life of our lake community. Other potential priorities for the Lake Association include environmental stewardship, communicating with lake residents on matters of importance, development, mining, invasive species, and taxation.

APPENDIX 2: MAPS OF WOLFE AND GREEN LAKES



APPENDIX 3: FACTS AND FIGURES ON WOLFE AND GREEN LAKES

Wolfe Lake

- Location: centered at 44 40' N and 76 31' E in South Frontenac Township, Bedford District, and in Rideau Lakes Township, North Crosby District
- Perimeter: 29.92 km
- Surface area: 954.248 ha
- Elevation: 136.245 m
- Maximum depth: 31 m
- Mean depth: 10.45 m
- Shoreline: 30.0947 km
- Water inflows: from Barr's Creek, Scanlan's Creek and the creeks at Fermoy draining Long Pond Lake and Canoe Lake
- Water outflow: Mary Jane's Creek from the Wolfe Lake dam to Sand Lake and Upper Rideau Lake
- Shoreline: 58% wooded, 6% rock, 2% marsh and 34% cottage/farm/commercial/semi-cleared treed frontage.

Green Lake

- Location: centred at 44 41' N and 76 30' 53.5" W in South Frontenac, Bedford District
- Perimeter: about 2 km
- Surface area: 32 ha
- Elevation: 176 m
- Maximum depth: 30 m
- Shoreline: almost entirely natural.

APPENDIX 4: NATURAL ENVIRONMENT OF WOLFE AND GREEN LAKES

I. What Are Wetlands and Why Are They Significant?

The land surrounding Wolfe and Green Lakes contains a number of vital areas that can be classified as wetlands. Wetlands are defined *as lands that are saturated with water long enough to cause the formation of waterlogged soils and the growth of water-loving or water-tolerant plants*. They are transitional habitats, often forming the connection between aquatic and terrestrial ecosystems.

Four major types of wetlands are found in Ontario:

- **Marshes:** these wetlands are periodically or permanently flooded with water. Marsh vegetation typically consists of non-woody plants such as cattails, rushes, reeds, grasses and sedges. Open-water marshes contain floating and submerged plants such as water lilies and pondweeds. Marshes are fairly common throughout Ontario.
- **Swamps:** these are wooded wetlands that are often flooded for a portion of the year. Swamp vegetation is dominated by trees, including both coniferous and/or deciduous species, and shrubs such as willows, dogwood and alder. Swamps are common throughout Ontario and are incredibly diverse, exhibiting a wide array of vegetation, age and ecological settings.
- **Bogs:** these are peat-filled depressions that receive their water and nutrients from rainfall. Peat consists of partially decomposed plants. Bogs are extremely low in mineral nutrients and tend to be strongly acidic. They are typically covered with a carpet of sphagnum mosses. Other vegetation includes stunted black spruce trees, laurels, blueberries and carnivorous plants such as sundews and pitcher plants. Bogs can take thousands of years to form and are extremely rare in the southern part of Ontario, though common throughout the northern part of the province.
- **Fens:** like bogs, these are peat lands. They are located in areas where groundwater discharges to the surface. Fens typically have more nutrients than bogs and the water is less acidic. Typical vegetation includes sedges and mosses, grasses, reeds, low shrubs, tamarack and white cedar, sundews, pitcher plants and orchids. They are fairly rare in southern Ontario, but quite common in northern Ontario.

Wetlands play an essential role in maintaining a healthy and functioning watershed by acting as a filter that removes sediments. They absorb nutrients while biologically changing many chemicals into less harmful forms. They can reduce flooding by holding back peak water flows when levels are high and storing water, thus permitting a more gradual discharge of water and protecting downstream property owners from flood damage. Wetland vegetation can reduce

erosion while improving water quality. Wetlands also provide critical habitat vital to the survival to a vast number of species of mammals, birds, reptiles, amphibians, fish, insects, invertebrates and even some rare and unique species of plants.

We now know that “everything is connected”. *Conserving a wetland and its many functions also means protecting a portion of the landscape surrounding the wetland.* For example, the forested upland surrounding a wetland may provide essential foraging habitat for the hawks that nest in the wetland, while many turtles that are dependent upon the wetland for food and shelter will nest in nearby upland areas. Some studies indicate that disrupting adjacent upland areas can reduce wetland biodiversity to the same extent as losing one half of the wetland itself.

II. Striving for a Healthy Watershed: What Is the “Ribbon of Life”?

Ninety percent of all lake life is born, raised and fed in the area where land and water meet. The shallow water and the first 10-15 m of shoreland forms a “ribbon of life” around lakes and rivers that is essential to the survival of many species of living things. It is a rich and complex habitat that supports plants, micro-organisms, insects, amphibians, birds, mammals and fish, and can be broken down into three sections:

- the *riparian zone* is the land closest to shore;
- the *shoreline* is the place where land and water meet; and
- the *littoral zone* extends from dry land to the depth at which sunlight can no longer penetrate to the bottom of the water.

Each of these three zones plays a key role in helping to maintain a healthy watershed.

III. How Do People Impact Aquatic Ecosystems by Transforming the Lakefront?

Many lakefront and land owners are unaware of the importance of shoreline vegetation and choose to clear and transform the lakefront into an urban landscape. Native plant species such as cattails and bulrushes are removed and replaced with manicured lawns and non-native plants. Retaining walls, boathouses and seawalls are constructed. These changes all destroy the balance of the aquatic and shoreline ecosystems and alter key wildlife habitat. In addition, the natural integrity, beauty and character of our lakes and rivers are lost.

Consider rehabilitating and re-naturalizing your manicured shoreline. Native vegetation allowed to grow on your lakefront can benefit the watershed and lake ecosystem by:

- preventing erosion and runoff;
- trapping nutrient-rich precipitation runoff and sediments;
- enhancing water quality;

- providing shelter and food for wildlife;
- supporting spawning beds for fish;
- shading and cooling the water;
- discouraging the growth of algae and aquatic plants.

IV. Environment Canada Guidelines for an Ecologically Healthy Watershed

1. 10% of the watershed should be wetlands, with natural vegetation for 100 m around their margins.
2. 75% of the lengths of all streams should have at least 30 m of natural vegetation along their banks.
3. Less than 10% of the area should be impervious to rainfall infiltration.
4. At least 30% of the watershed should be under forest cover.
5. There should be at least one forest patch that is at least 200 ha in area and at least 500 m at its smallest dimension.
6. At least 5% of the interior forest cover should be at least 200 m from the forest edge.
7. Forest patches should be within 2 km of each other or other supporting habitat structures.
8. Forest types should be representative of forests at that latitude.

V. Plants and Animals Found around Wolfe and Green Lakes

TREES

American Mountain-Ash	Eastern White Cedar	Shagbark Hickory
American Beech	Eastern White Pine	Showy Mountain-Ash
Balm of Gilead	Gray Birch	Silver Maple
Balsam Fir	Jack Pine	Sugar Maple
Bitternut Hickory	Longtooth Aspen	Tamarack
Black Cherry	Peachleaf Willow	Trembling Aspen
Black Spruce	Pin Cherry	White Ash
Bur Oak	Red Maple	White Birch
Cottonwood	Red Oak	White Oak
Eastern Hemlock	Red Pine	White Spruce

MAMMALS

American Black Bear	Deer Mouse	Fisher
American Mink	Eastern Cottontail Rabbit	Flying Squirrel
Beaver	Eastern Cougar*	Hairy-tailed Mole
Big Brown Bat	Eastern Gray Squirrel	House Mouse

Least Chipmunk
Least Shrew
Least Weasel
Little Brown Bat
Masked Shrew
Meadow Jumping Mouse
Meadow Vole
Moose*
Muskrat
North American River
Otter

Northern Long-eared Bat
Northern Mink
Northern Raccoon
Porcupine
Pygmy Shrew
Red Bat
Red Fox
Red Squirrel
Rock Vole
Silver-haired Bat
Small-footed Bat

Smoky Shrew
Southern Red-backed Vole
Star-nosed Mole
Striped Skunk
Virginia Opossum
Water Shrew
White-footed Mouse
White-tailed Deer
Woodchuck
Woodland Jumping Mouse
Woodland Vole

* occasional sightings

BIRDS

American Bittern
American Crow
American Goldfinch
American Robin
American Woodcock
Bald Eagle
Barn Swallow
Barred Owl
Belted Kingfisher
Black and White Warbler
Black-billed Cuckoo
Black-capped Chickadee
Blue Jay
Broad-winged Hawk
Brown Creeper
Brown Thrasher
Bufflehead
Canada Goose
Caspian Tern
Cedar Waxwing
Chipping Sparrow
Common Goldeneye
Common Grackle
Common Loon
Common Merganser
Common Nighthawk
Common Yellowthroat
Dark-eyed Junco
Double-crested Cormorant
Downy Woodpecker
Eastern Bluebird

Eastern Kingbird
Eastern Meadowlark
Eastern Phoebe
Eastern Screech Owl
Eastern Wood Pewee
European Starling
Field Sparrow
Gray Catbird
Great Blue Heron
Great Crested Flycatcher
Great Horned Owl
Green Heron
Hairy Woodpecker
Hooded Merganser
House Sparrow
House Wren
Indigo Bunting
Mallard
Northern Cardinal
Northern Flicker
Olive-sided Flycatcher
Osprey
Ovenbird
Philadelphia Vireo
Pileated Woodpecker
Pine Warbler
Purple Martin
Raven
Red-breasted Merganser
Red-breasted Nuthatch
Red-eyed Vireo

Red-shouldered Hawk
Redstart
Red-tailed Hawk
Red-winged Blackbird
Ring-billed Gull
Rose-breasted Grosbeak
Ruby-throated
Hummingbird
Ruffed Grouse
Rufous-sided Towhee
Scarlet Tanager
Song Sparrow
Surf Scoter
Tufted Titmouse
Turkey Vulture
Veery
Warbling Vireo
Whip-poor-will
White-breasted Nuthatch
Wild Turkey
Wood Duck
Wood Thrush
Yellow Warbler
Yellow-bellied Sapsucker
Yellow-billed Cuckoo

VI. Wildlife at Risk in the Wolfe and Green Lakes Area

Ontario has over 30,000 species of plants and animals, but this biodiversity (the variety of different habitats and types of plants, animals, fish and insects) is threatened. More than 190 of Ontario's wild species are considered to be at risk. Species may be at risk for a number of reasons, including habitat loss, pollution, land use and resource management activities, as well as the spread of invasive species. When there is concern about a species in Ontario, it is reviewed by the Committee on the Status of Species at Risk in Ontario (COSSARO). If the species is classified as being "at risk", it is added to the list of Species at Risk in Ontario (SARO) in one of four categories, depending on the degree of risk:

1. ***Extirpated***: a native species that no longer exists in the wild in Ontario, but still exists elsewhere.
2. ***Endangered***: a native species facing extinction or extirpation.
3. ***Threatened***: a native species at risk of becoming endangered in Ontario.
4. ***Special Concern***: a native species that is sensitive to human activities or natural events that may cause it to become endangered or threatened.

Species at risk in the Wolfe and Green Lakes area:

- Bald Eagle
- Cerulean Warbler
- Eastern Ribbonsnake
- Map Turtle
- Milksnake

Threatened species in the Wolfe and Green Lakes area:

- Black Ratsnake

Provincially significant species in the Wolfe and Green Lakes area:

- Blue-spotted Salamander
- Northern Harrier
- Pied-billed Grebe
- Red-shouldered Hawk
- River Otter

Regionally significant species in the Wolfe and Green Lakes area:

- Common Loon
- Green-backed Heron
- Osprey
- Swamp Sparrow
- Virginia Rail

If you see a species at risk, or think there is one on your property, the Ontario Ministry of Natural Resources (MNR) would like to hear from you. Call your local MNR office and talk to a biologist or ecologist to report your sighting and learn more about species at risk in your area.

VII. Invasive Species: What's the Worry?

Invasive species come from other countries or regions and are considered “exotic” or “alien” when they move outside their native habitat. Not all exotic species are harmful, but those that threaten our environment, economy or society by disrupting local ecosystems are known as “invasive species”. Invasive species can harm native species and are a serious threat to indigenous biodiversity. They destroy habitat, disrupt food webs and lead to the introduction of parasites and disease. Most invasive species are introduced by human activities. That's why each of us has a part to play in preventing and controlling them.

Invasive species occur both on land (e.g., the emerald ash borer beetle) and in water (e.g., zebra mussel). **Terrestrial invasive species** enter and spread across Ontario in a variety of ways. They stow away in our luggage when we travel and in packaging material when we import products into Ontario. They spread when we transport raw wood and other forest products or animal carcasses. Some escape from gardens. **Aquatic invasive species** enter our inland lakes and rivers via canals, or are carried in bait buckets, on boats, and in ballast water. With hundreds of thousands of rivers, lakes and streams in Ontario, aquatic invasive species pose a major threat to our environment. As of 2009, 186 non-native species were present in the Great Lakes Basin. These include invasive species like the sea lamprey, zebra mussel, round goby, spiny water flea and purple loosestrife.

Invasive Species Currently Found in Wolfe Lake:

- Eurasian Milfoil
- Rainbow Smelt
- Zebra Mussel

Invasive Species Requiring Preventive Measures in Wolfe and Green Lakes:

- Giant Hogweed
- Round Goby
- Rudd
- Spiny Water Flea

Here are a few ways we can all help stop the spread of invasive species:

- When planning your gardening or landscaping, choose native species.

- When camping, don't transport firewood. Buy it locally, and leave what you don't use at your campsite.
- When fishing, don't empty your bait bucket in or near the water: it's not only dangerous, it's against the law.
- When boating, wash your boat before you move to another lake or river.
- When hiking, clean visible mud, plants and seeds from your boots and other equipment.
- Don't release pet fish into the wild, and don't flush dead fish down the toilet. Put them in the garbage or compost.
- If you have a turtle or other small reptile that is no longer wanted, don't release it into the wild. Contact a reptile rescue society like **Little RES Q** for help.
- When travelling, don't take plants, plant parts, seeds or fruits across borders.

DID YOU KNOW?

\$\$ Invasive Species Cost Money! \$\$

Every year invasive plants cost the agriculture and forest industries in Canada about \$7.5 billion. In the Great Lakes, damage associated with zebra mussels has cost between \$3 billion and \$7.5 billion.

APPENDIX 5: MAIN FISH SPECIES IN WOLFE LAKE

Walleye



The only scientific studies conducted to date are the Fall Walleye Index Netting (FWIN) exercises that were performed with the assistance of the Ministry of Natural Resources in 1997. Since the Zebra Mussel infestation, the volume of Walleyes being caught by anglers has declined significantly. It is not known if the decline in catch rates is attributed to a declining population, changes in feeding habits, the inability of fishermen to adapt to water clarity, or physical relocation of the Walleye to habitats with lower levels of light penetration. The overall fishing pressure on Wolfe Lake has fallen dramatically as a result of the closure of several commercial fishing camps on the lake. The reduced catch rate may be more anecdotal because of the lower number of fishermen and less viable means of collecting data now that these camps are no longer in operation.

The main challenges to maintaining a sustainable Walleye fishery are poor or degraded spawning areas, inadequate food supply, over-harvesting and poaching. Walleye spawn in the spring in cool water streams with rocky shoals, and require good access to streams with clean, well-oxygenated water, and undamaged streambeds without excessive sediments or aquatic plants. Decreasing the limits on the number of fish caught and raising the minimum allowable size could benefit the Walleye population by allowing younger fish to reach spawning age.

WERE YOU AWARE?

MNR has shown that stocking Walleye within an existing naturally-reproducing Walleye population is only a band-aid solution and will not improve numbers in the long run. The best approach to increasing and maintaining a healthy stock is improving Walleye spawning areas.

Bass



The primary native species in Wolfe Lake is the Smallmouth Bass. Conditions in the lake have historically been favourable for the production of significant numbers of fish, and environmental factors, including an abundance of bait fish, have allowed Smallmouth to grow to significant size, with many being caught each year over 2 kg. Wolfe Lake also has a small but self-sustaining population of Largemouth bass that first appeared in the late 1980s. While the species' typical shallow, warm-water habitat is limited, they have survived and continue to spawn. Largemouth are not caught in significant numbers but skilled anglers fishing the right habitat can achieve reasonable success, especially in the fall.

The Bass population appears to be reasonably stable, but residents express concern over the practice of fishing Bass before the season opens. While the season for other species opens in mid-May, Bass season does not begin until late June because of the nesting habits of Bass (male Bass build nests close to shore and protect their young). Many anglers target Bass out of season, arguing that catch-and-release does no damage. Scientists, however, believe that removing adults from nests, even for a few seconds, exposes the fry to waiting predators such as Rock Bass. Based on the “catch rule”, however, the Bass fishery in Wolfe Lake is adequate.

DID YOU KNOW?

The various species of fish that live in Wolfe Lake are affected differently by habitat characteristics, including:

- lake depth
- water temperatures
- dissolved oxygen levels
- presence of in-water structures for refuge, such as plants, rocks or woody debris
- spawning schedules and habitats (e.g., muck vs. rubble)

Panfish



The term “Panfish” refers simply to any edible fish small enough to cook in a pan. Examples in our lakes include Rock Bass, Yellow Perch, Crappie and Sunfish (Bluegill and Pumpkinseed). While Panfish are generally considered less desirable as sport fish, many people fish for them and they are an important element of species diversity. The fishing season is open year-round. Sunfish spawn at around the same time as Bass, favour the same habitat, and have similar nests. As a result, people fishing Bass out of season sometimes claim to be fishing for Sunfish and simply catching Bass accidentally. The overall population of the various species classified as Panfish appears (although without scientific data) to be increasing as temperatures in shallow water rise, water clarity and weed density increase and the habitat favourable to Panfish and bait fish expands. Many visitors to the lake consider fishing for Panfish an exciting adventure for young or novice fishermen.

Northern Pike



Northern Pike spawn before Walleye in the spring, generally between March and May, when water temperatures reach 6 to 13° C, in weedy and muddy areas and wetlands. Pike migrate to their spawning habitat, and if access to these areas is obstructed by man-made structures or low water levels, spawning is impeded. Wolfe Lake has experienced no significant issues with poaching or problem water levels.

APPENDIX 6: WATER QUALITY IN WOLFE AND GREEN LAKES

Introduction

Based upon their total phosphorus (TP) content, lakes in Ontario are typically classified as *oligotrophic* (where TP concentration is less than 10 µg/L), *mesotrophic* (where TP concentration is between 10 and 20 µg/L) or *eutrophic* (where TP concentration is greater than 20 µg/L). Wolfe Lake can be classified as falling at either the extreme upper limit for an oligotrophic lake or the extreme lower limit for a mesotrophic lake. Because phosphorus is the main nutrient for algal growth, the lower the phosphorus concentration, the clearer and more weed- and odour-free the water in that lake. As a result, oligotrophic lakes are normally very clear and algae-free, but because of their lower aquatic organism and plant life cannot support the same fish population as more enriched lakes. Mesotrophic lakes, on the other hand, have a greater density of fish and aquatic invertebrates but are less clear and are prone to having a weedy odour. For many, Wolfe Lake may thus be considered as having the best of both worlds, since we are blessed with generally clear water with enough nutrient enrichment and biodiversity to make our lake interesting and to keep our fishermen happy. Green Lake is well within the oligotrophic classification due to its isolation and low level of shoreline development. Green Lake also has very low levels of dissolved calcium, inhibiting the growth of Zebra Mussels.

WOLFE LAKE

A brief history of water quality monitoring in Wolfe Lake

Our Lake Association began regular systematic testing of water clarity based on Secchi disc visibility in the summer of 1990. In 1996, the Ontario Ministry of Environment began analyzing total phosphorus (TP) in deep water samples taken by Association volunteers, through what is known as the Lake Partner Program. These samples were usually taken 3 times each summer at sites A, B and C (see Figure 1). In 2001, it was decided to test shallow-water samples at 9 different near-shore sites as well. These sites (1 to 9) were selected on the basis of cottage density and the probability that they might be problematic after a rain. Samples were taken to a private laboratory in Kingston or to the Centre for Sustainable Watersheds in Portland for analysis for TP on a fee-for-service basis. This practice continued until 2004. In addition to our ongoing testing, in the summer of 2002 the Centre for Sustainable Watersheds conducted a more detailed analysis of water quality in Wolfe Lake. Deep- and shallow-water samples were taken on 2 occasions and analyzed for a number of variables including total phosphorus, dissolved oxygen and E. coli.

In 2004, we also began a testing program in collaboration with the Watershed Watch Program of the Rideau Valley Conservation Authority (RVCA). Through this arrangement, samples are

taken at both deep- and shallow-water sites 3 or 4 times each summer (some years more frequently) and analyzed for a number of chemicals in addition to total phosphorus. Because of this partnership with the RVCA, we were able to sample more frequently and to test more variables than our budget normally permitted. (Our Association supplies the boat, motor and guide but testing is done by RVCA biologists and the RVCA covers all laboratory costs.)

For the past 7 years, water quality monitoring has proceeded along 2 lines: (1) deep-water TP testing 3 or 4 times each summer through the Lake Partner Program, and (2) more detailed testing of both deep- and shallow-water samples through the RVCA. On several occasions, technicians from the RVCA have also sampled benthic invertebrate numbers and diversity as indirect markers of water quality.

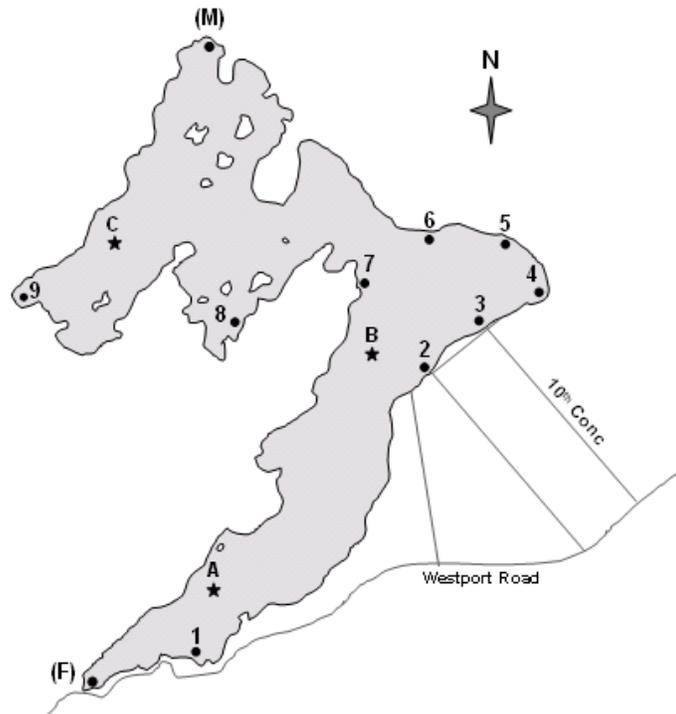


Figure 1
Sampling Sites for Water Testing in Wolfe Lake

Summary of Results

Water clarity

A Secchi disc reading greater than 5 m is generally considered to indicate “excellent” clarity. As Figure 2 indicates, Wolfe Lake continues to be one of the clearest lakes in Southern Ontario. Since nutrient levels tend to track TP concentrations, under normal conditions there is a fairly close inverse correlation between Secchi disc readings and TP concentrations (i.e., the lower the TP, the greater the clarity). Since 2009, there has been a sudden increase in Secchi disc readings, with values jumping into the 8 to 10 m range. There is little question that this increase in clarity can be attributed to the explosion in zebra mussel numbers (see below) that began in 2008. As a result, Secchi disc readings can no longer be assumed to reflect TP concentrations or water nutrient status.

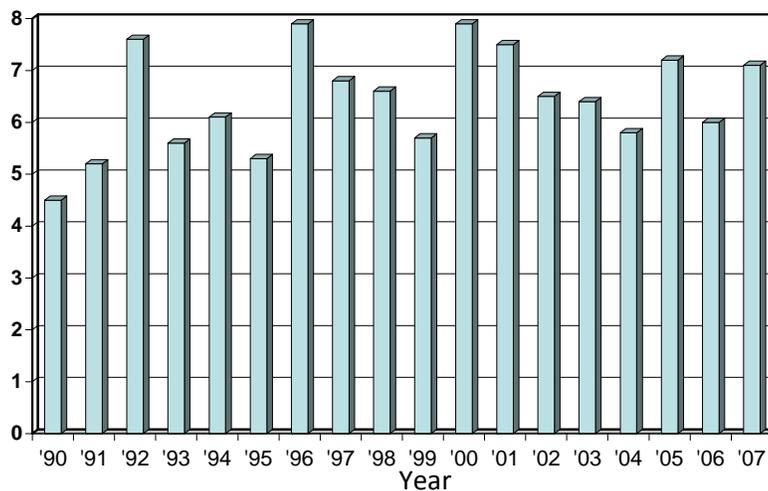


Figure 2
Secchi Disc Readings (July), m

Water chemistry

Mid-summer (July) values for deep-water TP over the period 1996-2012, as determined by chemical analysis, are shown in Figure 3. As can be seen, over these 17 years the average TP concentration has been approximately 10 µg/L and has ranged from approximately 6 to 15 µg/L. On occasion, some near-shore sites have been as high as 25 µg/L. In the two instances when consistently higher values were brought to the attention of residents near those sites, their response of upgrading their wastewater systems appears to have resolved the problem.

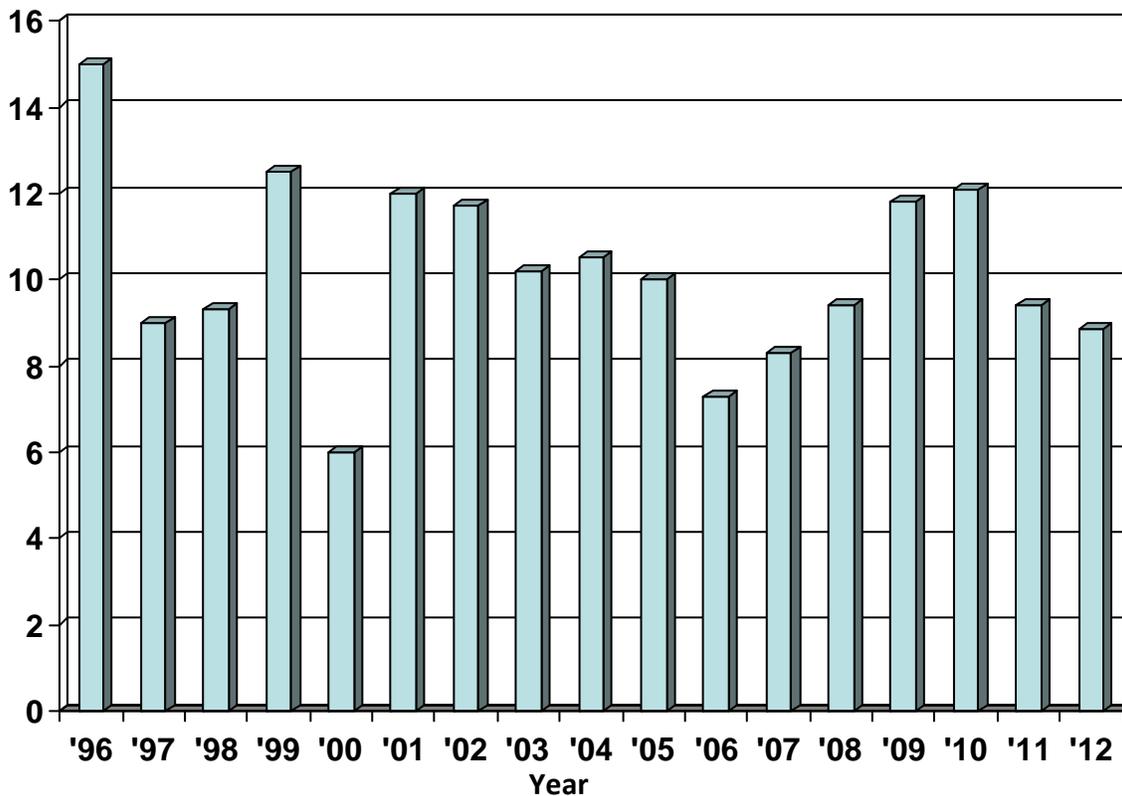


Figure 3
Deep Water Total Phosphorus Concentration (July), µg/L
 (Lake Partner Laboratory Data)

Near-shore testing for *E. coli* is an effective method for determining whether there may be faulty septic systems in the vicinity or contamination from upstream livestock. Over the past 7 years, all samples tested for *E. coli* have been well within the safe limit. (In Ontario, the limit above which public beaches are closed to swimming has been set at 100 colony forming units, or cfu, per 100 ml.) In the few instances where values at some sites were in the 20-30 cfu/100 ml range, subsequent testing showed them to be back to very low or undetectable levels, suggesting that the higher reading was due to contamination from a waterfowl source.

Zebra Mussels

In partnership with the Ontario Federation of Anglers and Hunters, our lake was tested for the presence of zebra mussels several times during the summer of 2004. On one such occasion, one net sample yielded a single veliger (microscopic larva). The first adults started appearing in the summer of 2006. Over the next 4 years there was an exponential increase in numbers. By 2010, there appeared to be no further increase in numbers, suggesting that they may have reached their ecological balance point. This situation occurs when they have filtered the water to the point that

there is not enough plankton to support further expansion in reproduction. It will be a number of years before the true ecological impact of this extremely rapid addition of an invading species becomes apparent in a lake that has been evolving over centuries. Immediate effects that we are aware of include changes in water clarity, water odour, fish patterns and the appearance of new aquatic vegetation.

Beaver Ponds

Beavers dam natural streams to create ponds for protection from predators and easy access to winter food. These ponds trap and hold back high concentrations of nutrients and produce wetlands that are among the most biologically productive ecosystems in the world. If a dam is abandoned or falls into disrepair, the nutrient-laden water will escape slowly, enriching the surrounding land and filtering gradually into the watershed. However, if a dam is suddenly broken or destroyed, the large quantities of nutrients that are released all at once into the nearest lake can promote excessive weed growth and damage fish spawning areas. Draining problem beaver ponds should always be done gradually to prevent damage to the lakes downstream.

Eurasian Water Milfoil

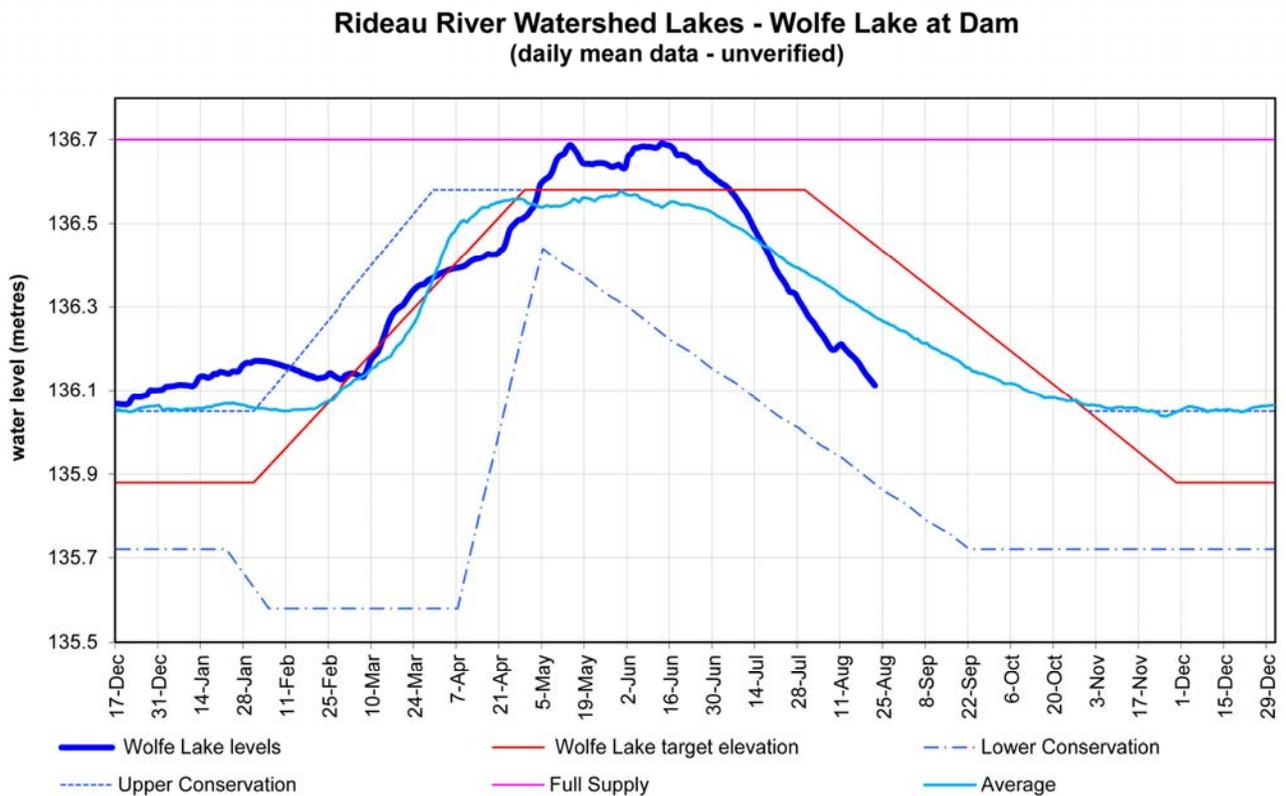
Eurasian water milfoil (EWM) is a submerged aquatic plant that poses a serious threat to our lakes' native aquatic plants and the animals that depend on their diverse ecosystems. The plant can grow up to two inches a day, forming thick underwater stands of tangled stems and vast mats of vegetation at the water's surface. It can shade and crowd out native plants and become so thick that larger fish cannot swim through the tangled mats, while boats and swimmers need channels to allow access from the shoreline out into deeper water areas. Excessive growth also reduces the aesthetics of the lake.

EWM has recently established itself in Wolfe Lake and has begun to present the problems described above. As a result, at the 2011 Annual General Meeting of the Association, a committee of three directors was established to investigate and recommend responses to the infestation. The committee identified harvesting and the use of herbicides as two possible approaches for dealing with the infestation. Both methods are expensive, provide only temporary results and have negative impacts on the surrounding ecosystem.

Since EWM is not native to Ontario or Canada, it has very few natural predators. However, biological control using one such predator, the milfoil weevil (*Euhrychiopsis lecontei*), has been tested throughout the United States since the 1990s and has received growing interest in Ontario. This insect is native to North America, feeds specifically on milfoil and is commercially available as a biological control agent. During the summer of 2012, the committee embarked on a pilot project to test the effectiveness of the milfoil weevil as a biological control for invasive EWM. Results by the end of the summer were inconclusive and testing will continue in 2013.

Water Levels

The water from Wolfe Lake and many other lakes is used to help maintain navigable water levels in the Rideau Canal system. The Government of Ontario assigns a high level of priority to maintenance of navigation on the Rideau Canal. A dam at the southeast end of the lake is controlled by Parks Canada and other Rideau Canal authorities for this purpose. The water flows from Wolfe Lake through a series of ponds, Sand Lake and Westport Pond to Upper Rideau Lake. Lake water levels are constantly monitored from the Parks Canada remote gauge station located adjacent to the boat launch off Concession 11 Road. Wolfe Lake water levels are kept as close as possible to full throughout the summer, depending upon minimum down stream flow requirements and priorities. This chart shows typical Wolfe water levels throughout the season:



Water Levels in Wolfe Lake

Updated Wolfe Lake water levels can be found on the RVCA website at www.rvca.ca. Click on Streamflow and Water Level Conditions and select the Wolfe Lake dam.

GREEN LAKE

Green Lake is a small spring-fed lake, feeding into Wolfe Lake from the west. For the most part, this flow is blocked by beaver dams.

Lake Partner Program: Two phosphorus samples are taken each spring and water clarity is measured twice monthly from May through October at a deep-water site. Total phosphorus and water clarity readings are shown below for the noted years.

Year	Total phosphorus readings (µg/l)	Average Secchi depth (m)
2004	5.0 and 5.4	6.3
2005	5.2 and 5.5	7.3
2006	5.0 and 4.2	6.6
2007	6.5 and 6.1	6.7
2009	7.8 and 7.8	6.2
2010	5.0 and 5.4	6.3
2011	7.2 and 6.8	6.1

Rideau Valley Conservation Authority: The RVCA has sampled Green Lake up to four times a year since 2005, looking at additional water quality factors and for evidence of invasive species. Summary results are shown below:

Factor	Sample size	Average reading	Provincial/RCVA acceptable standard
Total Kjeldahl nitrogen (TKN) (µg/l)	18	294	500
Total phosphorus (µg/l)	18	9	20
Calcium (mg/l)	7	4	20
Secchi depth (m)	18	6.5	2

In 2007, water samples were taken in Green Lake to determine zebra mussel activity. Results showed that no larvae were present in the lake and, in fact, that the water chemistry (calcium concentration) would not support zebra mussel production.

Actions Lakefront Property Owners Can Take to Protect Water Quality

Lakefront and property owners are encouraged to be aware of the importance of natural shoreline vegetation to water quality and to the health of the lake, its fish and wildlife. Changes may upset the balance of aquatic and shoreline ecosystems and alter key wildlife habitat, thus destroying the natural beauty and character of our lakes and rivers.

Property owners should avoid:

- removing native plant species such as cattails and bulrushes;
- establishing manicured lawns and non-native plants in the vicinity of the shoreline;
- building retaining walls, boathouses and seawalls.

They are encouraged to consider rehabilitating and re-naturalizing manicured shorelines. Native vegetation allowed to grow on the lakefront can benefit the watershed and lake ecosystem by:

- discouraging the growth of algae and aquatic plants;
- preventing erosion and runoff;
- trapping nutrient-rich precipitation runoff and sediments;
- enhancing water quality;
- providing shelter and food for wildlife;
- supporting spawning beds for fish;
- shading and cooling the water.

The Association's Water Quality Objectives

To improve current water quality standards, the Lake Association is committed to:

- continuing water quality monitoring, possibly modified to include additional criteria;
- working to control invasive plant and aquatic species such as Eurasian Milfoil and Zebra Mussels;
- initiating action to promote timely septic tank inspections by municipal authorities;
- educating property owners and users concerning best shoreline practices;
- liaising with Rideau Canal authorities regarding the maintenance of water levels in Wolfe Lake.

APPENDIX 7: HOW HUMAN ACTIVITY AFFECTS WATER QUALITY

Water Quality Is Determined by What Is in the Lake: Water quality is determined by what is in the lake besides water. Lakes can contain animal life, weeds and algae, chemical nutrients (e.g., nitrogen, oxygen, and phosphates), bacteria (both useful and dangerous), and toxic wastes, such as gasoline. A certain level of chemical nutrients and bacteria is natural and contributes to maintaining the ecology of the lake. We want fish and wildlife, we enjoy seeing a few lily pads, and are glad to have dragonflies eating the mosquitoes. But when the contents of the lake get out of balance, water quality suffers. Since weeds and algae use chemicals as nutrients, too many chemicals mean a murky lake full of algae, choked with weeds or so polluted with bacteria or toxic wastes that swimming is impossible.

How Do Pollutants Enter the Lake? Much of the nutrient loading in a lake is natural. Phosphates enter the lake when runoff from rain and snowmelt dissolves phosphates in the decaying vegetable matter around the lake. Nitrogen enters the lake through runoff, precipitation, fixation of atmospheric nitrogen, and animal waste. Oxygen is dissolved when water comes into contact with air, aided by wind and wave action. Runoff from the watershed around the lake carries bacteria and pathogens, plant debris and soil particles, which carry phosphates and other chemical elements into the water. The natural digestive activities of wildlife in and around the lake ensure that bacteria are present in the water.

The nutrients required for plant and algae growth are carbon, nitrogen, potassium and phosphates. Given a certain minimum level of each of these nutrients in the water and favourable environmental conditions (e.g., sunlight and water temperature), algae and plants will grow. Most of these nutrients, with the exception of phosphates, are available in abundance in lake water. Phosphates are the growth-limiting nutrient and hence the factor most strongly affecting water quality. Increases in phosphates can result in significant increases in aquatic vegetation. Therefore, phosphates are the factor of most importance to lake residents, and the factor on which the Lake Vision has focused.

How Does the Lake Cope with Pollutants? The lake has some protection from excessive runoff. Plant cover on the watershed, such as forests and meadows, absorbs and uses the phosphates for its own nutrition, preventing a great deal of phosphate from reaching the lake. The lake also has a barrier along the shoreline, known as “the ribbon of life”, to prevent excessive natural runoff of phosphates and other nutrients into the lake. It is in the shallow waters and the first 10-15 metres of shoreland at the edge of the lake that 90% of all plant and animal life around a lake is born, raised and fed. This ribbon with its mass of living things absorbs and uses much of the nutrient runoff from the land to sustain itself.

Some nutrients will eventually get into the lake, regardless of whether the land has been cleared, and regardless of the condition of the “ribbon of life”. The lake copes with the excess nutrients that get past this barrier in three ways:

- some may flow out of the lake, if there is a connection to another watercourse and sufficient water current to flush some of the nutrients out;
- some will sink to the bottom of the lake and adhere to sediments there. Some of these nutrients are brought up from the bottom in the spring, or may be released if excessive decaying matter on the lake bottom robs the lower levels of the lake of oxygen. (Oxygen keeps the phosphates locked in the sediment.)
- whatever is left over - and this may be a large quantity - stimulates the growth of plants and algae. The more nutrients are available, the more the lake will fill up with weeds and algae. Plants and algae will expand to use up all the available nutrients (phosphates) until the lake again reaches the point of equilibrium at which weed and algae growth balances phosphate inflow.

Lakes can exist in one of three types of equilibrium, or trophic states. Lakes with very low phosphate levels are very clear and have few if any weeds. They tend to have stony or pebbled bottoms and lots of oxygen to support cold water fish and trout. These are described as *oligotrophic* lakes.

Other lakes with an abundant supply of phosphates are weed-choked, full of algae, and oxygen-poor. The water is murky because of the high concentration of phytoplankton (microalgae). In extreme cases, these lakes will become swamps or bogs. They have low water quality and little recreational value. These lakes are described as *eutrophic*. Extreme cases are *hypereutrophic*.

Lakes between these two extremes, with a moderate but not excessive supply of phosphates, have moderately clear water, some weeds, and algal blooms in summer, but also exhibit a healthy variety of plant life and fish, and are generally regarded as having high recreational value. Such lakes are termed *mesotrophic*, and Wolfe Lake and Green Lake, at this point in time, fall into this category.

Lakes do not automatically assume one status and stay that way. They can evolve from one state to another, although in nature this evolution can take many hundreds of years. The gradual change of a lake from oligotrophic to eutrophic is known as eutrophication. Lakes can also remain in one state virtually forever, if conditions are right. There is nothing inevitable about eutrophication. However, careless human activity can make a big difference, as we shall see below.

Lakes cope with toxic bacteria and pollutants by becoming toxic and polluted and unhealthy to swim in. There are no automatic mechanisms by which lakes get rid of toxic materials except

letting them sink to the bottom or flow out into someone else's lake. E. coli from a minor septic system spill may eventually disperse into the ecosystem and assume harmlessly weak concentrations, but continuing spillage will create a health hazard to all who use that area of the lake.

Human Activity Can Unbalance the Lake's Coping Mechanisms: Human activity can affect a lake in three ways. We introduce new sources of phosphates and bacteria to the lake; we make runoff easier so that more phosphates and bacteria enter the lake than would be the case in a completely natural setting; and we break holes in the "ribbon of life", the natural shoreline barrier that acts as a nutrient buffer for the lake.

Introducing New Sources of Phosphates: Septic systems treat sewage and grey water and eliminate harmful bacteria. Properly operating septic fields should ensure that no contaminating bacteria ever reach the lake. But the treated water still enters the watershed, and some of its ingredients, such as the detergents that people use for laundry and dishwashing, contain phosphates that become part of the runoff into the lake. Improperly sited or functioning septic systems, of course, not only release more phosphates into the ground but also create the possibility that harmful bacteria such as E. coli will reach the lake. Fertilizing the lawn or garden also releases phosphates onto the land, and some will wash into the lake. Similarly, other activities, such as washing a car or boat or shampooing in the lake, add to the amount of available phosphates. Even the roads we build contribute dust in the summer and de-icers in the winter. Improper use of toxic chemicals (e.g., spilling gasoline while filling a lawnmower or a boat motor, or spilling pesticides while caring for a lawn) increases the risk of toxic pollutants getting into the lake.

Making Runoff Easier: Just as important, however, is the removal of vegetation that often occurs when people build houses, establish lawns and gardens, install septic fields and clear land to improve their view. Clearing the forest and meadow plants that grow naturally on the watershed and leaving open spaces and lawns reduces the capacity of the land to absorb and use the nutrients that nature releases naturally. At the same time, it hinders absorption of all the phosphate-rich runoff from septic fields and lawn fertilizers that humans introduce.

Breaking Holes in the Ribbon of Life: People also clear some of the "ribbon of life" or shoreline plants beside the lake (altering the waterfront with lawns, creating access to docks, building retaining walls, pouring sand to create beaches, building patios or decking too close to the lake or simply clearing to improve the view). As a result, unfiltered water runoff increases, and nutrient and contamination concentrations in water reach levels that threaten the health of aquatic ecosystems.

New Residences Do All Three at Once: New cottages and homes being built where they did not exist before, and the consequent clearing of new land, increase all three of these tendencies.

The trend for families to live on the lake year-round instead of merely for the brief summer season also increases the amount of phosphates available for runoff into the lake. The same can be said of septic systems and bacteria. The more people who use the lake and the longer they spend there each year, the greater the possibility of contamination from improperly sited and functioning septic systems.

Some of this human activity is necessary and inevitable, of course, or there could be no homes on the lake and no one to enjoy the water quality. Fortunately, lakes have a capacity to absorb phosphates and other nutrients without degrading water quality, but that capacity has its limits.

What Happens When Human Activity Unbalances the Lake's Coping Mechanisms: Human activities greatly accelerate the process of eutrophication. A lake can change from mesotrophic to eutrophic in as little as ten years. As we have seen, the operation and development of existing residences on the lake, or the construction of additional homes, means more sources of phosphates and increased destruction of the natural barriers that absorb runoff before it reaches the lake. More nutrients entering the lake mean more weeds and algae in the lake. If enough additional phosphate enters the water, the lake can change from mesotrophic to eutrophic very quickly, and we wake up one morning to face a weed- and algae-choked lake with water quality so low it is of very little recreational value.

Worse, there is a growing body of evidence that the transformation does not necessarily occur gradually, with slow increases in weeds and algae like those we have been seeing over the past few years. Instead, weeds and algae reach a certain concentration and suddenly, within one or two seasons, the lake suddenly tips over into a eutrophic state. The final tiny addition of phosphate, harmless in itself, is the straw that breaks the camel's back.

Without phosphates, few aquatic plants or algae can grow. However, even minute amounts of phosphates - a few parts per billion - can cause tremendous increases in growth. Plants and algae consume oxygen as they grow, and when they die, bacteria and fungi consume oxygen to bring about their decomposition. As the biomass increases, the lake's oxygen level can drop dramatically, killing fish and insects. If the lake loses oxygen faster than it can replace it by photosynthesis and atmospheric exchange, the lake may become anoxic (having no oxygen). When this occurs, a chemical reaction in the sediments on the bottom of the lake releases sediment-bound phosphates into the water column. The additional phosphates accelerate plant and algae growth. At the same time, the increase in algal blooms floating on top of the water cuts off sunlight to the plants below. When the algal mass reaches a critical point, the weeds begin to die. All at once, the lake loses several of its mechanisms for absorbing the phosphate in the water and more thus becomes available for algae. The conjunction of these effects means that the algae experience a windfall of nutrients and can suddenly increase exponentially. Almost overnight, the quality of the lake water changes for the worse. The bad news is that once the tipping point is reached and the lake suddenly becomes eutrophic, it is very hard to restore

the previous high-quality conditions without massive expense and disruption. A half-full bottle may be relatively stable, but once it has been knocked over, it is much more difficult to right it and get the contents back in.

High-speed boating in shallow water and near shore may also release phosphates from the bottom sediments by churning up layers of sludge. People often notice an increase in weeds around their dock when they get a more powerful motor, but fail to relate the two events.

APPENDIX 8: BOATING REGULATIONS ON WOLFE LAKE

Motor boating is not permitted on Green Lake. Since Wolfe Lake is self-contained, boating regulations are comparatively simplified.

Canadian boating regulations applicable to Wolfe Lake are summarized as follows:

- **Licensing:** Ontario's provincial boating regulations require that all boat operators be properly trained and competent. This requirement helps ensure that all craft are operated safely, and that operators are familiar with all laws related to boating. To enforce this rule, operators of motorized pleasure craft must carry proof of competency at all times. Three different items qualify as acceptable proof: a Pleasure Craft Operator's Card, which can be obtained by completing a boating safety course; a certificate indicating completion of a boating safety course prior to April 1999; or a completed safety checklist from a boat rental agency. American visitors must carry proof of U.S. residency and boat registration and, if they are operating a boat for more than 45 consecutive days, Canadian or American proof of competency.
- **Life Jackets or Personal Flotation Devices (PFDs):** Life jackets and PFDs are designed to keep people afloat even when cold water or injury limits their ability to swim. Ontario requires that one approved PFD per person be on board every boat. In order to be considered an approved PFD, a flotation device must be wearable. Cushions, such as those designed for boat seats, do not qualify. Any flotation device certified by the Canadian Coast Guard as a PFD will be tagged with an official Coast Guard approval number. Children under the age of 11 are required to wear their PFD at all times while boating. Older passengers are not required to wear their life jacket, but are strongly encouraged to do so by the Canadian Coast Guard.
- **Speed Limit:** The standard boat speed limit in Ontario is 10 km/h or less whenever a boat is operating within 30 metres of shore. Boaters can be fined a maximum of \$500 for violating this speed limit. Boat speeds offshore must take into consideration such safety factors as water conditions, other boats and visibility.
- **Alcohol:** Just as laws regarding the consumption of alcohol help save drivers' lives, regulations limiting alcohol use on the water are important for boating safety. Alcohol interferes with the ability to make sound judgments and to move with coordination. In Ontario, the limits and penalties for alcohol consumption while boating are the same as while driving on land. If an operator's blood alcohol level is between 0.05 and 0.08 percent, his driver's license can be suspended for up to one

month. An operator with a blood alcohol level of over 0.08 percent will have his license suspended immediately, and will face criminal prosecution.

- **Boat Equipment Requirements:** In addition to life jackets, all boats operating in Ontario are required to carry the following equipment: a floating heaving line or rope at least 15 m long; a re-boarding device, such as a ladder or swim platform; a manual propelling device, such as a paddle, or an anchor with at least 15 m of attached rope; a watertight flashlight or three signal flares; and a sound-signalling device. The navigation lights on the bow and stern of the craft must operate properly. Modified rules apply to smaller craft such as paddleboats, canoes, kayaks, sailboards and personal watercraft, and additional requirements to larger boats and boats operating at night.
- **Age Restrictions:** Children under the age of 12 may not operate a pleasure craft powered by a motor over 7.5 kW (10 hp) without adult supervision. In addition, children between 12 years and 16 years of age may not operate a pleasure craft powered by a motor over 30 kW (40 hp) without adult supervision. Children under the age of 16 may not operate a personal watercraft, regardless of supervision.
- **Avoiding Collisions:**
 - If a boat under power approaches you on your port (left) side, maintain your course and speed with caution.
 - If a boat under power approaches you on your starboard (right) side, move to the left to keep clear of it.
 - If two boats under power are approaching head on, each should change course to starboard, and pass port to port.
 - A boat overtaking another boat must keep clear of that boat. Sound your horn: one blast to pass on starboard, two blasts to pass on port. A good boater will slow down his vessel to let the other pass him.
 - A vessel under power should keep clear of unpowered boats (a sailboat under sail, rowboat or canoe).
 - Keep a close lookout at all times for swimmers. Swimmers should swim close to shore, tow a brightly coloured float and wear a brightly coloured swim cap and clothing, unless accompanied by an escort boat.

**APPENDIX 9: ZONING AND BUILDING BYLAWS
GOVERNING SHORELINE PROPERTIES
IN RIDEAU LAKES AND SOUTH FRONTENAC TOWNSHIPS**

	Rideau Lakes Residential Shoreline	South Frontenac Residential Shoreline
Lot area	0.40468 ha (1 acre)	1 hectare (2½ acres)
Lot shoreline frontage	60 m (200 ft)	91 m (300 ft)
Lot coverage (% of lot covered by structures):		
main building	10% combined total	5%
shed		5%
Setbacks from property line:		
shoreline	30 m (100 ft)	30 m (100 ft)
side yard, main building	6 m (20 ft)	3 m (10 ft)
Maximum building height:		
main building	10 m (32 ft)	11 m (36 ft)
shed	6 m (20 ft)	6 m (20 ft)

**APPENDIX 10: PRIVATE LANE CONSTRUCTION SPECIFICATIONS
REQUIRED TO ALLOW SAFE PASSAGE OF EMERGENCY VEHICLES**

The following private lane standards were obtained from South Frontenac Township. Similar standards would be applicable to lanes in Rideau Lakes Township as well.

Item	New Private Lane	Upgrades to Existing Private Lane
Right of way width	20.0 m	waived
Width of clearing	9.0 m	20 ft
Surface width	4.5 m	13 ft
Surface material	crushed stone	crushed stone
Depth of material, minimum	100 mm	100 mm
Shoulder, including rounded shoulder	nil	nil
Crown, minimum	1%	1%
Cross culvert, minimum	400 mm	no flooded areas
Culvert material	corrugated steel pipe	corrugated steel pipe
Ditches, minimum depth	0.5 m	top of road 1 ft minimum above existing grade