

Ontario's Great Lakes Strategy



2012



Prepared by:

The Government of Ontario

December 2012

For more information on Ontario's Great Lakes Strategy, visit the Ministry of the Environment at: Ontario.ca/environment or call 1-800-565-4923

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PIBS 9198e

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■ ONTARIO'S GREAT LAKES STRATEGY

Preface

THE GREAT LAKES ARE VITALLY IMPORTANT TO ONTARIO FAMILIES. THEY PROVIDE US WITH DRINKING WATER, QUALITY OF LIFE, AND PROSPERITY. WE NEED TO KEEP THE GREAT LAKES HEALTHY NOW, AND FOR OUR CHILDREN, GRANDCHILDREN, AND FUTURE GENERATIONS. WE NEED GREAT LAKES THAT ARE DRINKABLE, SWIMMABLE AND FISHABLE.

That is why the Government of Ontario has created Ontario's Great Lakes Strategy. The Strategy focuses on empowering action by all partners on Great Lakes – from provincial ministries to local service clubs – and on restoring Great Lakes water, beaches and coastal areas. It aims to conserve biodiversity and deal with invasive species. The Strategy supports science to guide our Great Lakes work and addresses the need for climate change adaptation.

Swimming at Provincial Parks.
(Ontario Tourism Marketing Partnership)



This Strategy builds on engagement with a wide variety of Great Lakes experts, First Nations and Métis communities and Great Lakes stakeholders, on the feedback received since the release of Ontario's Draft Great Lakes Strategy in June 2012, and on the 2009 discussion paper, Healthy Great Lakes, Strong Ontario.

This Strategy responds to what we heard from people across Ontario. We have heard about the need to protect shorelines, beaches and wetlands, reduce impacts of sewage and runoff, tackle algae problems and provide opportunities for people to clean up their corner of the Great Lakes. We heard that when it comes to the Great Lakes, there is no “one-size-fits-all” solution; there are different Great Lakes issues and opportunities in different parts of the province. It is important to set priorities and target our action, building on existing frameworks and partnerships. We heard that public engagement and cooperation are essential to success. We also heard about the importance of science and information to make good decisions and monitor progress.

The Strategy is a living document. It belongs to all Ontarians, and Ontarians will have opportunities to participate in action.

OVERVIEW



CONTAINING NEARLY 20 PER CENT OF THE EARTH'S FRESH SURFACE WATER, THE GREAT LAKES ARE A GLOBAL TREASURE. THE COASTLINES OF THE GREAT LAKES AND ST. LAWRENCE RIVER STRETCH FROM BEYOND THUNDER BAY IN THE WEST TO ATLANTIC OCEAN IN THE EAST. THESE WATERS UNDERPIN ONTARIO'S HIGH QUALITY OF LIFE.

The Great Lakes support a diverse array of plants and animals, with rich ecosystems that are unique in the world. The lakes provide us with fresh drinking water, food and recreational opportunities. They also supply the province with sources of electricity and numerous other economic advantages that give Ontario a valuable competitive edge.

The story of our province has been written through our connection to – and our dependence on – the Great Lakes.

Ontarians love their Great Lakes. Clean and beautiful beaches matter to Ontario families spending a day at the water's edge. The lakes provide enjoyment to cottagers, boaters, divers and campers. Their health is important to Ontario's municipalities who work to keep the water protected and safe to drink. They support a productive freshwater fishery. The lakes are vital to support manufacturing, agriculture and the transportation of Ontario's goods. For all these reasons, and for the intangible value these immense bodies of water give to our people, the Great Lakes

OVERVIEW



are the foundation for Ontario's strength and success. We must protect them and, when we find them in jeopardy, we must restore them to good health.

The Ontario government, along with many partners, has been taking action to protect, conserve and restore the Great Lakes. This Strategy maps out how the Government of Ontario proposes to work with partners, individuals and communities to support the vision of **healthy Great Lakes for a stronger Ontario – Great Lakes that continue to be drinkable, swimmable and fishable.**

Ontario's Strategy is designed to focus provincial resources across ministries, and to enhance collaboration and engagement with other governments and the broader Great Lakes community. Ontario's Great Lakes partners include First Nations and Métis communities, municipalities, conservation authorities and watershed groups, environmental organizations, the scientific community and academia, the industrial, agricultural, recreational and tourism sectors, and the general public. We will continue to strengthen existing partnerships and pursue new opportunities to achieve our shared Great Lakes protection goals.

OVERVIEW

The Strategy includes Ontario's portion of the geography of Lakes Superior, Huron, Erie and Ontario, their connecting rivers, the St. Lawrence River, the Ottawa River and surrounding watersheds and groundwater.

In the following pages, we discuss what we have done to protect the Great Lakes in the past, what we are doing now, and our actions for the future. Future actions to protect and restore the Great Lakes-St. Lawrence River Basin ecosystem are organized around our Great Lakes Goals: engaging and empowering communities; protecting water for human and ecological health; improving wetlands, beaches and coastal areas; protecting habitats and species; enhancing understanding and adaptation; and, ensuring environmentally sustainable economic opportunities and innovation.

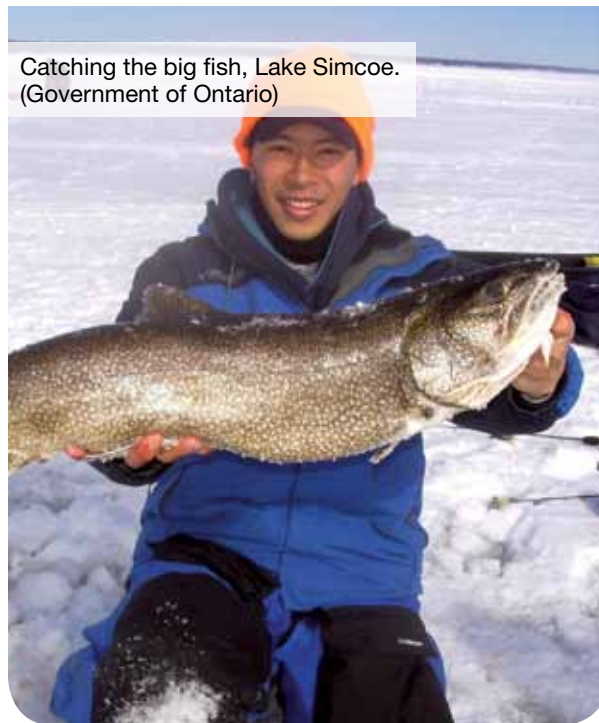
The Strategy also indicates how we will be measuring performance against these goals. We will report on our progress after three years, and review the Strategy in year six. This timing aligns the Strategy review with Great Lakes binational program timeframes. Regular reviews of the Strategy will allow us to respond to emerging issues and new science, and to establish new milestones on the way to reaching our Great Lakes Goals. In an ever-changing world, strong science will continue to be essential to defining issues and suggesting solutions. Research and monitoring partnerships provide the knowledge to set priorities, establish Great Lakes targets, and guide effective Great Lakes protection and restoration.

Many Ontario government ministries work together as caretakers of the Great Lakes. Provincial ministries work together at all levels to integrate government policy and programs on Great Lakes. For example, several Ontario

ministries share resources and coordinate efforts and science to implement agreements on Great Lakes. This Strategy builds on that work. The actions in this Strategy will be led by the Ministries of: Environment, Natural Resources, Agriculture, Food and Rural Affairs, Municipal Affairs and Housing, Infrastructure, Aboriginal Affairs, Economic Development and Innovation, Tourism, Culture and Sport, Health and Long-Term Care, Transportation and Intergovernmental Affairs. Input to this Strategy was also provided by Ministries of Education, Northern Development and Mines, Energy.

We encourage you to read Ontario's Great Lakes Strategy and get involved. By working together to implement Ontario's Great Lakes Strategy we can all become guardians of the Great Lakes, moving forward on actions to ensure clean, healthy and resilient Great Lakes, and a strong environmental legacy for future generations to enjoy.

Catching the big fish, Lake Simcoe.
(Government of Ontario)



WHY WE NEED ACTION TO PROTECT THE GREAT LAKES

Some successes...

In the 1970s, it became clear that the health of the Great Lakes was in jeopardy. Pollution and other pressures were taking their toll. During the 1970s, 80s and 90s, we achieved some significant success in restoring and protecting the Great Lakes, including:

- cleaning up several highly polluted harbours, bays and waterfronts
- dramatically reducing many toxic chemicals that were harming fish and wildlife
- beginning to see the return of Bald Eagles, lake trout and other imperilled species, thanks to pollution reductions and focussed species and habitat rehabilitation, and
- reducing Lake Erie algae problems by banning phosphate detergents, upgrading sewage treatment and enhancing adoption of environmental farm practices, to reduce nutrients entering the lake.

But new problems are overwhelming old solutions

Regrettably, today's pressures are overwhelming some of these past successes. The cumulative impacts of many pressures are hurting the Great Lakes' ability to naturally adapt to changes and stresses. Many scientists have warned that the Great Lakes are at a "tipping point" of irreversible

decline.¹ Lake Superior is in generally good condition due to its larger size and relatively lower development pressure, and it is important to protect this lake, which is the headwaters to the other Great Lakes. Many indicators of lake health suggest that Lakes Huron, Ontario and Erie are in decline.²

For example, on Lake Erie, binational State of the Lakes Ecosystem Reports note that phosphorus concentrations frequently exceed binational water quality targets, and conditions are deteriorating. Ontario scientists have found increasing nitrate levels at Lake Erie water intakes. Blooms of potentially toxic blue-green algae (Cyanobacteria) have been increasing since the mid 1990s, and are reaching levels that some specialists compare to the problems of the 1960s and 1970s before phosphorus controls were first introduced. In eastern Lake Erie (and parts of Lakes Ontario and Huron), a green algae called *Cladophora* is a widespread problem. Ontario scientists have found that two of the most toxic Great Lakes pollutants, mercury and PCBs, which were both successfully being reduced in the 1970s and 1980s, are again starting to increase in Lake Erie sport fish.³

Some of the challenges in the Great Lakes today

- **Growth:** Ontario's future population growth is expected to be concentrated around the Great Lakes. At an annual growth rate of six per cent, ours is the

1. Bails, et. al. 2005. Prescription for Great Lakes Ecosystem Protection and Restoration: Avoiding the Tipping Point of Irreversible Changes.

2. Indicators of Great Lakes health are tracked by the Province and many partners – see State of the Lakes Ecosystem Reports coordinated and released by Environment Canada and the U.S. Environmental Protection Agency.

3. Bhavsar et. al. 2007. Are PCB Levels in Fish from the Canadian Great Lakes Still Declining? *Journal of Great Lakes Research*. 33:592-605. Bhavsar et. al. 2010. Changes in Mercury Levels in Great Lakes Fish Between 1970s and 2007. *Environmental Science and Technology*. 44:3273-3279.

WHY WE NEED ACTION TO PROTECT THE GREAT LAKES

fastest-growing population among Great Lakes jurisdictions.⁴ While growth can bring economic benefits, it can also put stress on the ecosystem. For example, insufficiently treated urban stormwater, and even treated sewage, put unwanted phosphorus and contaminants into the Great Lakes. Some Great Lakes watersheds are under stress from growing water demand. Growth that is not properly managed can lead to the loss of important Great Lakes habitats, such as wetlands.

- **Natural heritage:** Loss of fish and wildlife habitats such as wetlands are affecting ecosystem health and costing us commercial and sport fishing opportunities and natural and cultural heritage. The populations of some Great Lakes species have declined to the point where they are now at risk in Ontario and are protected

under the Endangered Species Act, 2007 (ESA).

- **Invasive species:** Invasive species are causing significant ecosystem disruption. Some populations of native fish species have declined dramatically. Invasive zebra and quagga mussels have reduced the amount of food available for fish, while causing increases in unwanted algae along shorelines. They have caused clogging problems at drinking water and industrial water intakes, and damaged the fragile heritage shipwrecks popular with recreational divers. Invasive plants have taken over some shoreline areas. The threat of an Asian carp invasion is a major concern. Asian carp could devastate ecosystems and fisheries. Work with our federal and U.S. partners is essential to address these threats.

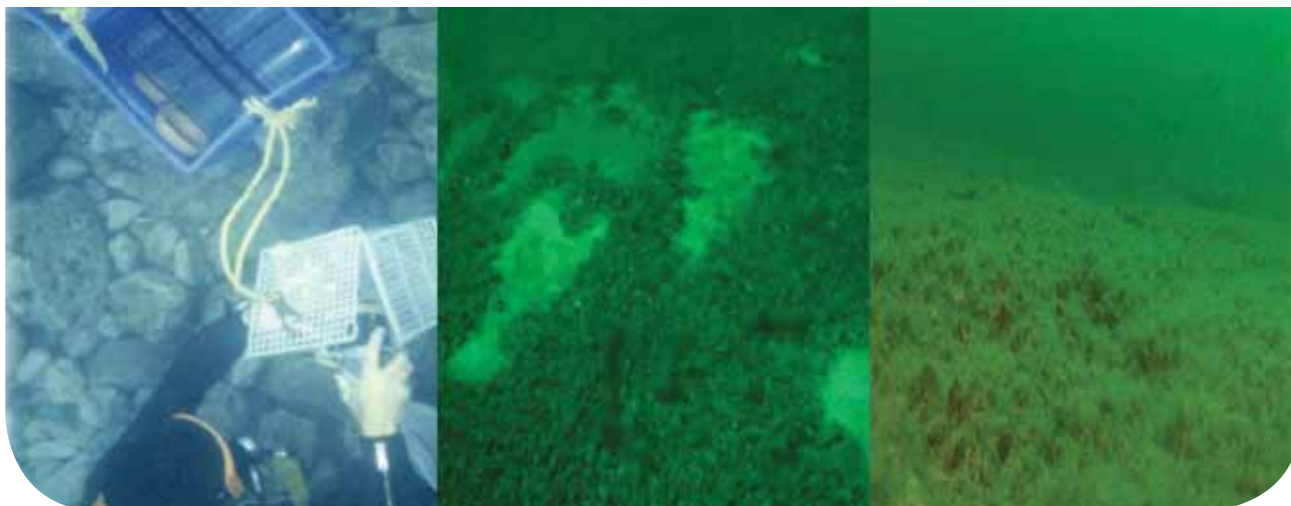
GREAT LAKES HEALTH AND THE “NEARSHORE SHUNT”

Have you seen changes in your Great Lakes beach over the past decade? Sharp mussel shells underwater when you swim, sand that is becoming whiter from crushed shells, or bad-smelling masses of algae washing up on the shore – these changes are features of the “nearshore shunt.” Ontario scientists are leaders in identifying and explaining this phenomenon.

Zebra and quagga mussels are invasive species that now dominate Great Lakes nearshore ecosystems. They blanket the bottom of the lakes in staggering numbers across much of the Great Lakes. Mussels filter the water to get their food, with dramatic effects on the ecosystem. The water gets clearer, and more sunlight reaches the lake bed so more algae can grow there. Mussels also make the lake bed harder, so more algae can anchor to them. Finally, by trapping nutrients along the lake bed, mussels seem to supply “fertilizer” for the algae, which grow in abundance on the mussels, break off and wash ashore.

What is harder to see from the beach is the impact of these changes out in deeper water. As nutrients like phosphorus from Great Lakes watersheds are “shunted” or focused into the nearshore water, there is not enough phosphorus in the middle of the lakes. The offshore ecosystem is starved for nutrients. Offshore fish have lost important food sources and some fish populations have declined.

4. Sources: Ontario Ministry of Finance’s Ontario population projection (2010) and U.S. Census Bureau’s state population projections (2005).



1981: rocky lake bottom

2003: invasive mussels

2007: excess algae

Invasive zebra and quagga mussels have colonized the bed of Lake Ontario, leading to dramatic increases in algae growth. (Ministry of the Environment)

- **Climate change:** Impacts such as less ice cover, more evaporation and bigger storms, changing water levels, and high summer temperatures pose risks for Great Lakes communities and the ecosystem. For example, bigger storms lead to more water runoff, which sends pollution into the Great Lakes and also poses risks to public safety such as threatening needed infrastructure and increasing basement flooding problems.
- **Chemicals of emerging concern:** There are increasing concerns about newer chemicals, such as some flame retardants and pharmaceuticals, from urban, industrial and agricultural sources. Sewage treatment facilities were not designed to remove some chemicals, so keeping them out of sewers is the best approach.
- **Water levels:** Changing water levels in the Great Lakes are having social, economic and environmental impacts. These impacts include access to water for lakefront property owners, recreational boating and commercial shipping on the lakes, and reduced habitat for aquatic species. In addition, artificial controls of the waters in Lake Ontario and the upper St. Lawrence River are a stress on wetlands, which rely on periodic high and low waters.
- **Algae:** More algae is growing in Great Lakes waters. Some shorelines are covered by slimy masses of nuisance algae, which degrades the quality of waterfronts. On Lake Erie, the fall of 2011 saw record levels of potentially toxic blue-green algae. Some bays in other parts of the Great Lakes, such as the Bay of Quinte, also experience problems with these blue-green algae blooms.
- **Beaches:** Some of Ontario's beautiful Great Lakes beaches are not only affected by aesthetic problems from excess algae, but also by excessive bacteria levels that make the waters less safe to swim. Bacteria at beaches can come from a variety of sources, such as sewage and septic systems, waterfowl, and runoff from rural and urban areas. This is

WHY WE NEED ACTION TO PROTECT THE GREAT LAKES

particularly a problem after heavy rains. When beaches are posted as unsafe to swim, individuals lose their opportunity to enjoy the Great Lakes. These beach-

use advisories also have costs to the economies, reputations and quality of life of shoreline communities.

GREAT LAKES FACTS

- More than 80 per cent of Ontarians get their drinking water from Lakes Superior, Huron, Erie and Ontario. The Great Lakes Basin is home for 40 million people, including 98 per cent of Ontarians and 40 per cent of Canadians.
- There are over 4,000 species of plants, fish and wildlife in the Great Lakes Basin.
- The Great Lakes contain nearly 20 per cent of the fresh surface water on the planet. If that water were spread evenly across North America, it would cover the continent to a depth of over 1.5 metres.
- Great Lakes waters replenish slowly, at a rate of less than one per cent per year.
- It takes 300 years for a drop of water to travel from Lake Superior through Lakes Huron, Erie, Ontario and the St. Lawrence River to the ocean.
- Ontario has over 10,000 kilometres of Great Lakes and St. Lawrence River shoreline – more than all eight of the Great Lakes States combined.



Retrieving a passive water sampler, Lake Erie.
(Government of Ontario)

WHY THE GREAT LAKES MATTER TO THE PEOPLE OF ONTARIO

Drinkable, swimmable, fishable Great Lakes give us a high quality of life. The lakes recycle and purify our drinking water. They provide us with food and electricity, and moderate our climate. Their natural beauty nourishes our spirits.

The Great Lakes region is one of the most ecologically diverse in North America. Variations in lake depth, climate, and geology help sustain a rich diversity of ecosystems, and plant and animal species. Some of these species are found nowhere else on Earth.

The Great Lakes have always been at the heart of North America's economy. These lakes are a job-creation engine. If the Great Lakes Region (Ontario, Québec and the Great Lakes States) were a country, it would be the world's fourth largest economy. For example, these watersheds are home to nearly 40 per cent of Canadians, as well as 75 per cent of Canadian manufacturing. A third of Canada's employment in agriculture and food processing is in Ontario, and almost all of this is in Great Lakes watersheds. Lake Erie supports one of the world's most valuable freshwater commercial fisheries as well as a popular sport fishery.

The state of the Great Lakes and St. Lawrence River Basin ecosystem matters not only to Ontario, but to Québec and to Canada as a whole.

For millennia, First Nations peoples have lived in the Great Lakes Basin – fishing, hunting, farming and trading, and maintaining a spiritual and cultural relationship with the Great Lakes. First Nations communities living with the Great Lakes basin have expressed a shared responsibility to protect these waters.

Indigenous cultures recognize, honour and respect water as a sacred gift that sustains all life. Women have a traditional role and responsibility to protect the waters. As an example, in Ontario, the Annual Mother Earth Water Walk evolved through the efforts of two Anishinawbe grandmothers who walk the perimeters of the Great Lakes to raise awareness about the importance of water, including the health of the Great Lakes. Cultural identities, traditional and sacred laws and customs govern First Nations' perspectives and influence their relationship and stewardship responsibilities with the water and natural environment.

The Great Lakes also matter to our U.S. neighbours, who depend on the health of this shared global treasure and are investing significantly in its restoration.

Many of Ontario's earliest communities are located along these lakes. The Great Lakes are considered a world underwater heritage resource, with the world's best freshwater collection of more than 4,700 shipwrecks

ECONOMIC IMPORTANCE OF GREAT LAKES

Shared by Canada and the U.S., the Great Lakes and St. Lawrence River region supports 56 million jobs and a GDP of \$5.1 trillion. Great Lakes waters help to generate 80 per cent of Ontario's electricity, including hydro-electricity and cooling water for power plants. In 2011, Ontario's commercial Great Lakes fishing industry contributed about \$234 million to Ontario's economy. Great Lakes recreational anglers contribute more than \$600 million to Ontario's economy each year in consumable goods and equipment. Over 95 per cent of Ontario's agricultural land is in Great Lakes watersheds. In 2010, Ontario welcomed over 73 million tourist visits in the Great Lakes Region with estimated spending of \$12.3 billion.

WHY THE GREAT LAKES MATTER TO THE PEOPLE OF ONTARIO



A SCUBA diver explores a historic shipwreck at Tobermory. (Ontario Tourism Marketing Partnership Corporation)

from the 1700s to recent times. This includes the storied SS Edmund Fitzgerald, which is protected under Ontario legislation. At Great Lakes historic sites, Ontario is marking the bicentenary of the War of 1812, which was fought largely along the Great Lakes and helped shape the country.

Over the centuries, people from all over the world have been drawn to the growing communities along Ontario's Great Lakes shores. The lakes continue to stimulate Ontario's economy and give Ontario a competitive edge. Manufacturing and other Ontario industries such as food processing rely on clean, cool Great Lakes water. Great Lakes shipping routes help move goods and products, stimulating \$15.9 billion in annual economic activity in Ontario and Québec.

The Great Lakes and St. Lawrence River contribute to the province's tourism sector. They are icons that help make Ontario a natural tourist destination for local and international visitors. Great Lakes waters form a natural environment for waterfront festivals and heritage attractions that strengthen communities, build local economies, and present opportunities for families to vacation close to home.

Ship entering the Welland Canal. (St. Lawrence Seaway Management Corporation)





A family hikes along the Lake Superior coast at Pukaskwa National Park. (Ontario Tourism Marketing Partnership Corporation, Darren McChristie)

The Great Lakes also help us enjoy healthy active lifestyles. The lakes and their wetlands, marinas and waterfronts offer many different recreational opportunities. Great Lakes coasts and beaches attract bird watchers, anglers, boaters, beach lovers and cottagers who flock to Great Lakes shores in the summertime. Great Lakes coastal trails draw walkers, hikers and cyclists. Families enjoy festivals, picnics and outdoor theatre at Great Lakes waterfront venues and parklands. Ontario's provincial parks, including 30 operating along the Great Lakes, attract 10 million visits every year. Over 100,000 annual visits are made to new provincial park visitor centres on Lake Superior, Georgian Bay and the French River. To many Ontarians, Great Lakes nature holds spiritual significance as well.

Economic studies⁵ demonstrate that Great Lakes restoration and protection provide a high return on investment (see

text box, page 57). For example, research on innovative, low impact development that minimizes stormwater runoff indicates an average 2:1 return on investment, compared to traditional development practices. Protection of coastal wetlands provides even higher economic return ratios while helping to sustain Great Lakes ecosystem health. As the global demand for water-related technology increases, Great Lakes restoration can also play a role in generating jobs and prosperity through the development of marketable water innovations.

Ontario's Role as a Great Lakes Guardian

With nearly 20 per cent of the world's fresh surface water and many unique ecosystems and species, the Great Lakes are a global treasure.

These lakes touch the lives of people across Ontario.

5. ICF Marbek. 2010. Assessing the Economic Value of Protecting the Great Lakes Ecosystem. For details visit the "Library and Links" section of ontario.ca/healthygreatlakes; Austin, J.C., et. al. 2007. Healthy Waters, Strong Economy: The Benefits of Restoring the Great Lakes Ecosystem. The Brookings Institution.

WHY THE GREAT LAKES MATTER TO THE PEOPLE OF ONTARIO

Mississagi River delta in the north channel of Georgian Bay.
(Ministry of Natural Resources, W. Bakowsky)



Ontario is one of many custodians of these precious waters. At the same time, we hold a unique role.

Ontario borders run through four of the five Great Lakes and part of the St. Lawrence River. Ontario has the longest freshwater coastline in the world. This province has more of the Great Lakes and St. Lawrence River's water, and more of its coastline, than any other province or state.

Within Canada, Ontario shares constitutional jurisdiction for the Great Lakes with the federal government, and also works with Aboriginal peoples, municipalities and other partners. We have an important part to play in restoring, protecting and conserving the Great Lakes for our own benefit, and for future generations of Ontarians.

Over the years, the Government of Ontario has been purposeful in introducing legislation, policies and programs that contribute to Great Lakes protection. This helps ensure that Ontario families can enjoy

Great Lakes beaches and shorelines, that fisheries are restored and sustained, and that our tap water remains some of the highest-quality drinking water in the world.

Ontario's Great Lakes Strategy will help us address new and ongoing challenges, and take advantage of Great Lakes opportunities.



Making "fish prints" at Lake Superior Day, 2011 in Thunder Bay. (EcoSuperior, Jim Bailey)

BUILDING ON ONTARIO'S GREAT LAKES ACCOMPLISHMENTS

A wavy day in Georgian Bay.
(Ontario Tourism Marketing Partnership Corporation, J. Speed)



Where we have been

Ontario has a set of programs and laws that support Great Lakes protection.

In previous decades, the Ontario Water Resources Act and Environmental Protection Act established permit and approval systems to manage water quality impacts of municipal and industrial sewage and stormwater. Ontario also introduced permits to manage large water takings and protect water quantity.

The Province established resource management laws and a network of provincial parks and protected Crown lands. Conservation authorities were created for many watersheds to prevent natural hazards such as flooding.

Collaboration has long been central to Great Lakes protection. Ontario and Canada signed their first agreement on shared Great Lakes protection over 40 years ago, in 1971.

Phosphorus pollution was one of the main problems tackled under the first Canada-Ontario Agreement of 1971, and the first Canada-U.S. Great Lakes Water Quality Agreement of 1972. Governments launched major programs to improve sewage treatment and reduce the amount of phosphorus flowing into the lakes. Phosphorus in laundry detergents was restricted as well.

This resulted in one of the most successful ecosystem clean ups in North America. For example, despite a constantly increasing population, phosphorus levels in Lake Ontario declined dramatically – levels dropped 44 per cent between 1973 and 1982. In Lake Erie, where the problem was most severe, the phosphorus in Canadian municipal sewage discharges was reduced by 82 per cent. Lake Erie went from being declared “dead” in the media, to once again being a healthy lake with good water quality, supporting economically important fisheries, and

boasting beautiful beaches and coastlines for Ontarians to enjoy.

Another example of shared success on Great Lakes was in toxic chemical reductions. For example, DDT became widely used as a pesticide after World War II. However, DDT and its residues washed into nearby waterways where aquatic plants and fish absorbed it. Bald Eagles were poisoned with DDT when they ate the contaminated fish, causing their eggshells to be so thin that chicks often didn't survive to hatch. In the 1960s, the species was in danger of extinction. As the danger of DDT became known, its use was restricted in Ontario starting in the early 1970s, and banned in 1988. DDT levels in Great Lakes sediment and fish declined dramatically and Bald Eagles staged a remarkable population rebound. Other chemicals such as mercury, PCBs and mirex were also a focus for successful Great Lakes protection and restoration through the 1970s and 1980s. In the early 1990s, the Province brought in new regulations on wastewater from most industrial sectors under the Municipal-Industrial Strategy for Abatement, and these industries achieved dramatic decreases in loadings of harmful pollutants, such as lead, arsenic and cyanide.

These achievements prove that, while complex, Great Lakes issues can be solved. With collective action sustained over time, we can accomplish great things for our Great Lakes.

Where we are now

Ontario is working with partners to implement many new Great Lakes protections.

Source-to-tap drinking water protections:

Ontario is now recognized around the world as a leader in drinking water safety. The Province has implemented all 121 of Justice O'Connor's 2002 Walkerton Report recommendations, creating an award-winning drinking water safety net for protecting drinking water from source to tap. In 2010-11, of over 500,000 drinking water quality tests, 99.9 per cent of results from municipal residential systems met Ontario's drinking water standards. In cases where standards were not met, drinking water inspectors and public health inspectors worked with the system owner or operator to make sure that appropriate corrective actions were taken to resolve the situation. Small drinking water systems (such as those used by bed and breakfasts, churches, community halls, mobile home parks, motels and airports) are also regulated, with testing and treatment oversight by the province together with local public health units.

Watershed-based source water protection under the Clean Water Act, 2006, is an essential element of Ontario's drinking water safety approach. The goal is to protect sources of drinking water – lakes, rivers and underground aquifers – by identifying and managing risks to the quality and quantity of municipal sources of drinking water.

Under the Clean Water Act, 19 local source protection committees (18 of which are in the Great Lakes Basin) were established in watersheds across Ontario. The committees representing a broad range of stakeholders, developed local source protection plans through a collaborative, locally driven, science-based approach.

ONTARIO CLEAN WATER AGENCY

Ontario Clean Water Agency (OCWA), a provincial Crown Agency, is committed to ensuring all Ontarians have access to a provider of safe and reliable water and wastewater services.

- **Operations:** As the operator of over 200 wastewater treatment plants in Ontario, many within the Great Lakes Basin, OCWA ensures facilities contribute to Great Lakes protection.
- **Emergency Support:** Emergency response teams can be deployed at any time for water or wastewater emergencies.
- **Safety First:** Demonstrating outstanding safety training expertise, OCWA ranked 'First in Safety' at the 2011 Water Environment Federation's Technical Exhibition and Conference.
- **Future Focus:** Innovation and partnerships in Ontario and globally to promote the development, testing, demonstration and commercialization of water/wastewater technologies and services in support of the Water Opportunities Act, 2010.

The development of these plans has been supported by over \$200 million in Ontario investments in watershed science, assessment and planning. The Province has also provided funding to help landowners and businesses take early on-the-ground actions to protect water sources. Provincial ministries, municipalities, conservation authorities and individual property owners all have roles in helping implement these plans.

This watershed-based approach focuses on local communities and the protection of their drinking water supplies. Conservation authority staff and source protection committee



The Great Lakes are a source of some of the best quality drinking water in the world. (Ministry of the Environment)

members have been working to assess and plan for source water protection. A source protection committee's membership is representative of the particular watershed, with one third municipal representation, one third from local sectors such as agriculture and business, and one third from the broader public.

First Nations communities that have reserves within source protection areas can appoint First Nations representatives to a source protection committee. In addition, the Chippewas of Rama First Nation, the Chippewas of Kettle and Stony Point First Nation, and Six Nations of the Grand River have all opted to include their drinking water systems in source protection plans.

Lake Simcoe: The Lake Simcoe watershed is home to more than 350,000 people and offers many benefits: water to drink and play

in, fish to eat, a beautiful natural environment, and many economic benefits such as farming and recreation.

The Lake Simcoe Protection Act, 2008, provides a legal framework for protecting the Lake Simcoe watershed. The act includes clear objectives, and requires the development of a Lake Simcoe Protection Plan with legally binding policies. It also establishes committees to provide advice, and legal authority to regulate protection of the shoreline.

The Lake Simcoe Protection Plan was developed with the help of watershed protection scientists, many local people, and groups including the Lake Simcoe Region Conservation Authority, Chippewas of Georgina Island First Nation, municipalities, agricultural and conservation groups, developers, and tourism and recreation operators, through a collaborative process. The plan is a model for integrated watershed planning to restore the health of the lake and can help inform our approach on the Great Lakes and their watersheds. It focuses on Lake Simcoe's most critical issues, including the health of fish and other aquatic life, water quality and phosphorus reductions. It also addresses protecting and rehabilitating important natural areas such as shorelines, water quantity stresses, and the impacts of invasive species, climate change and recreation.

Ontario's strategy to reduce phosphorus levels in Lake Simcoe will help ensure the long-term protection of the lake ecosystem. Targets call for reducing the high phosphorus levels in the lake by almost 40 per cent, to improve water quality and protect coldwater fish. Based on a vision of shared responsibility, it seeks continued phosphorus

reductions over time. It is a long-term approach to address cumulative impacts.

Greenbelt: Ontario has established provincial plans to provide strong protection for some other significant environmental areas within the Great Lakes Basin. The Greenbelt Plan, for example, provides for the world's largest expanse of protected agricultural and environmentally sensitive landscapes: 720,000 hectares spanning across the Greater Golden Horseshoe and extending to the tip of the Bruce Peninsula.

The Greenbelt is helping to manage growth, build a sustainable green economy and protect the environment – all of which will help to build prosperous and more liveable communities for Ontarians. It uses a watershed approach, and protects headwaters and many river valleys that flow to Lake Ontario and Georgian Bay.

Toxic chemicals: Ontario is helping to reduce toxic chemicals that impact the Great Lakes.

By eliminating coal-fired electricity generation in Ontario by 2014, the Province will reduce mercury and other pollution, making our air safer to breathe and Great Lakes fish safer to eat. A local air quality regulation established in 2005 also helps reduce the contaminants that ultimately reach the lakes.

In 2009, Ontario introduced the Toxics Reduction Act, 2009, and launched a Toxics Reduction Strategy. Ontario's manufacturing and mineral processing facilities are now developing plans to reduce their use and creation of toxic substances. Ontario is also promoting innovative "green" chemistry and engineering strategies for industries in Ontario to drive cleaner production. For example, in 2009, Ontario announced



MOE field staff collecting samples of benthic invertebrates (sediment-dwelling bugs) in the Whalesback Channel downstream from the Spanish River, Lake Huron. (Ministry of the Environment)

\$13.6 million in funding for GreenCentre Canada, to help connect green chemistry discoveries in Ontario universities to companies in order to bring safer alternatives to the marketplace faster. Ontario also established Chairs in Green Chemistry and Engineering at Queen's University and Trent University. A tool for assessing safer chemical alternatives was developed and is available on the Ministry of the Environment's website.

Ontario banned the use of cosmetic pesticides in 2009. A before-and-after study of 10 urban streams across the province showed 80 per cent decreases in three pesticides commonly used in lawn care products.



Containing a spill on Bronte Creek, a Lake Ontario tributary. (Ministry of the Environment)

To improve spill prevention, Ontario introduced regulations for spills prevention and contingency planning requirements as well as environmental penalties, in 2007, so that communities along the St. Clair River and in other parts of Ontario are better protected from toxic spills. Nine industrial sectors face penalties if they violate Ontario's water protection rules. As of October 2012, over \$920,000 in penalties have been collected. This money is funding local community projects to clean up and improve waterways, restore habitat for species at risk, and engage people in water quality protection. To find out if your community is currently eligible for funding under the Community Environment Fund, please refer to the Ministry of the Environment website at: www.ene.gov.on.ca/environment/en/funding/community_environment_fund

All of these initiatives will help to prevent toxic chemicals from entering the Great Lakes.

SPILLS ACTION CENTRE

If you see a spill or other environmental emergency, call the Spills Action Centre's toll-free number at 1-800-268-6060. Environmental officers are there 24 hours a day, to activate emergency response and provide other advice and information.

Water innovation: Ontario is committed to becoming a continental leader in water innovation. The Water Opportunities Act, 2010, set the stage for innovation to create economic opportunities and clean-technology jobs, and to conserve and sustain Ontario's water resources.

The Water Technology Acceleration Project is promoting the development of Ontario's water and wastewater sectors. This water technology hub is bringing together industry, academia and government to develop Ontario's water technology and services sector and promote it abroad. A \$17 million program called Showcasing Water Innovation supports leading-edge solutions for drinking water, wastewater and stormwater in Ontario communities. Ontario is also partnering with universities, equipment vendors, the federal government, IBM Canada and others on the Southern Ontario Water Consortium, which had raised \$60 million as of 2012 for water research and technology development, testing and demonstration. The WaterSense labelling system for water-efficient household products, introduced in 2012, will help families conserve water and save money. These projects will help Ontario communities manage water systems in an integrated way and find innovative, less costly solutions to protecting water.

To help improve water infrastructure, provincially-funded collaborations are also

supporting evaluations of new pollution removal technologies and other infrastructure innovations.

Water infrastructure: Municipal water infrastructure has been supported by major provincial investments. Since 2007, the Province has committed more than \$660 million to wastewater and stormwater infrastructure projects that will significantly reduce pollution into the Great Lakes. This includes \$50 million so the municipalities of Red Rock, Nipigon, Owen Sound, Cornwall and South Dundas can upgrade their sewage treatment plants to meet standards. In addition, in 2011, Ontario committed more than \$40 million from Phase Three of the Ontario Small Waterworks Assistance Program to help 85 small rural and Northern communities receive clean, safe and affordable water and wastewater services.

Ontario signed the Canada-wide Municipal Wastewater Effluent Strategy in 2009. The federal wastewater strategy builds on many years of input from the provinces and territories, to set Canada-wide standards for the traditional wastewater quality measures, as well as future reductions in harmful pollutants, combined sewer overflows and sewage treatment plant bypasses.

Through inspections and compliance work, Ontario encourages development of municipal Pollution Prevention Control Plans to reduce bypasses and overflows.

A review of stormwater policies completed in 2010 revealed the need for greater emphasis on "green infrastructure" or low impact development such as constructed wetlands, combined with conventional stormwater systems such as storm sewers and ponds. Stormwater improvements help communities adapt to impacts of climate change, and

BUILDING ON ONTARIO'S GREAT LAKES ACCOMPLISHMENTS

reduce sewage overflows and bypasses. With partners such as conservation authorities, Ontario has initiated outreach and guidance on integrated stormwater practices.

Since 2003, the Province has supported local water and wastewater infrastructure by committing approximately \$1.8 billion in grants and \$1.9 billion in loans from Infrastructure Ontario, helping to ensure water and wastewater services.

Infrastructure planning, and in particular asset management, is required to prioritize where investments are most needed. In 2012, the Province released its new Municipal Infrastructure Strategy. To assist municipalities, the Province released a Guide for Municipal Asset Management Plans and an online asset management toolkit. The Province is providing \$60

million through the Municipal Infrastructure Investment Initiative, of which up to \$9 million will be used to help municipalities prepare asset management plans. Funding will be targeted to communities that are not able to pay for the proposed project without provincial assistance. Through Ontario's ten-year infrastructure plan, Building Together, the Province will work to ensure the financial and environmental sustainability of municipal water, wastewater and stormwater systems. Key activities include making improved asset management and financial management practices preconditions for provincial infrastructure grants and rolling out requirements under the Water Opportunities Act. The act provides for a more integrated approach to water, wastewater and stormwater infrastructure through the potential to develop Municipal Water Sustainability Plans.



Stormwater outfall to Lake Ontario, Lucas Point Park, Cobourg Ontario. (Ministry of the Environment, E. Chatten)

LOCAL COMMUNITIES

Ontario works with Great Lakes cities that are leading the way on stormwater and other water infrastructure challenges:

- The City of Welland (between Lake Erie and Lake Ontario) evaluated climate change risks to stormwater and wastewater systems, and updated the local predictions of expected rainfall intensity duration and frequency, to help prioritize infrastructure investments.
- The City of Hamilton (on Lake Ontario) completed a model approach to approving stormwater reuse and low impact development on private commercial and industrial property.
- The City of Oakville (on Lake Ontario) collaborated with Halton Region on integrated planning for sustainable water, stormwater and wastewater systems, including the assessment of climate change impacts and other risks.
- The City of Thunder Bay (on Lake Superior) is implementing changes to its wastewater and water treatment systems that promises to improve efficiency, reducing both energy use and wastewater volumes.

Water quantity: Ontario advanced Great Lakes water quantity protection in 2005 by signing the historic Great Lakes–St. Lawrence River Basin Sustainable Water Resources Agreement with Québec and the Great Lakes States. This agreement commits Ontario and its partner jurisdictions to:

- a virtual ban on water diversions
- a Basin-wide environmental standard for water uses
- better conservation measures, and
- an increased role for science in decision making.

Ontario adopted water conservation goals and objectives consistent with the Great Lakes Basin-wide goals and objectives, as required by each jurisdiction under the agreement. The Ontario Legislature amended the Ontario Water Resources Act to allow implementation of key commitments in this agreement. Ontario also introduced a charge for water use by companies that incorporate water into their products, such

as bottled water and food processors, so that water users help cover the costs of protecting water.

Ontario has also updated its Building Code to improve water conservation throughout Ontario, including the Great Lakes Basin. Revisions to the Building Code, effective January 1, 2014, will strengthen water conservation in two ways. First, revisions will enhance water efficiency requirements for toilets, urinals and showerheads. Second, they will expand the allowed uses of non-potable systems and set clearer requirements. For example, they will address the use of rainwater for general cleaning purposes, and the use of storm sewage or greywater for underground irrigation.

Under the Clean Water Act, source protection committees are evaluating risks to the quantity of their drinking water supplies, and developing water quantity protection policies where needed to protect drinking water sources.



The City of Thunder Bay is improving its wastewater and water treatment systems. (Darren McChristie)

Climate change adaptation: Climate Ready: Ontario's Adaptation Strategy and Action Plan, 2011, will help ensure climate change adaptation is integrated into Ontario's Great Lakes programs. Several provincial initiatives are helping Ontario communities adapt to climate change.

Source protection committees and source protection authorities are being provided with training and technical support to ensure water budgets, a key component of source protection plans, take adaptation into account.

A web portal called the Weather and Water Information Gateway has been developed to provide data that municipalities, conservation authorities and others can use to assess their water-related vulnerabilities to a changing climate, and facilitate community-level action.⁶

The Province has developed a user-friendly, interactive web-enabled municipal climate change risk assessment guide and workbook, designed for use by small and medium-sized municipalities to help them develop climate adaptation strategies. Over the past two

years, the Province has funded and supported numerous training sessions and tools to build adaptation knowledge and capacity to plan for climate change in communities across Ontario, including those in the Great Lakes Basin.

Ontario also participates in international studies that consider the role of adaptive management to better anticipate and respond to future Great Lakes water level changes primarily influenced by climate. Adaptation can help both the environment and our social and economic interests in the Great Lakes.

Land use planning: Improvements to the planning and land use framework include the 2005 Provincial Policy Statement, the foundation of Ontario's land use planning system, and the Places To Grow Act, 2005, which guides growth planning.

Municipal planning decisions are required to "be consistent" with the Provincial Policy Statement. This includes policies relevant to the Great Lakes, such as protection and management of natural resources like

6. This climate change adaptation tool can be accessed by going to www.mnr.gov.on.ca/en/Business/ClimateChange, and clicking on "adapt."

water and wetlands, and managing the development and growth of our communities. To support effective land use policy, the Provincial Policy Statement was reviewed and posted for public comment. The review examined whether land use planning policy changes are needed for environmental protection and other provincial interests. Key revisions which have been proposed in the draft Provincial Policy Statement, which would enhance protection for the Great Lakes, include additional references to the Great Lakes, direction for infrastructure planning to take environmental considerations into account, new policies to increase protection for coastal wetlands, improvements to policies related to shoreline areas, and references to ensure that land use planning authorities take Great Lakes agreements into consideration.

Ontario also introduced new rules to encourage the transformation of old unused industrial lands along our Great Lakes coasts, from “brownfields” into vibrant, healthy and active waterfronts.

Watershed programs: A watershed is the area of land around a lake or river, from which rain and snow drain into that lake. Because of the movement of water through watersheds, activities taking place upstream, even a significant distance from the Great Lakes, can play a role in the health of the lakes. Water quality and quantity in any particular spot – at a beach, a water intake, or out in the open water of a lake – depend on what is happening to the water upstream, throughout a watershed. Healthy watersheds give us healthy Great Lakes.

The Province supports watershed planning through many programs and policies including the Provincial Policy Statement, the

Lake Simcoe Protection Plan, the Greenbelt Plan, the Oak Ridges Moraine Conservation Plan, the Growth Plan for the Greater Golden Horseshoe and source protection planning. Conservation authorities in the Great Lakes Basin also have watershed management plans, strategies and/or monitoring programs to help protect and improve Ontario's water quality and quantity.

In areas of Ontario that have no municipalities or conservation authorities to help manage water resources, there are unique challenges for coordination. In some of these areas, local watershed-based groups and voluntary organisations are doing important watershed planning and protection work that contributes to the health of Lakes Superior and Huron.

Huron County landowner planting a vegetated buffer strip along a wetland. (Ministry of Natural Resources)



Farm stewardship actions: Ontario established a Nutrient Management Act, 2002 that helps to match nutrient application to crops' fertility needs and to keep excess nutrients and pathogens out

of waterways. Farmers are implementing nutrient management requirements under this act, and are taking voluntary action through the Environmental Farm Plan partnership program to improve farm environmental performance. From 2005/06 through 2010/11, Ontario farmers put nearly \$200 million into on-farm environmental improvements as part of cost-sharing programs supported by \$111 million in federal, provincial, conservation authority and private foundation funding.

Managing growth: The Places to Grow Act sets out the framework for where and how growth should occur. The act enables the establishment of growth plans in Ontario, with input from local officials, stakeholders and the public.

The first growth plan was developed in 2006 for the Greater Golden Horseshoe around the western end of Lake Ontario, one of the fastest-growing regions in North America. It is a 25-year plan that seeks to direct growth to existing communities to make the best use of infrastructure while limiting urban sprawl and its impacts on our natural, agricultural and water resources. It also promotes water conservation and efficiency. Recent analysis suggests that progress is being made, including more compact, mixed-use development and more transportation options.

The Growth Plan for Northern Ontario was developed in 2011 and includes the watersheds of Lake Superior and part of Lake Huron, including northern Georgian Bay. This plan aims to strengthen the economy of Northern Ontario by diversifying the region's traditional resource-based industries and stimulating new investment and entrepreneurship. It recognizes the importance of the Great Lakes as both valued environmental features and economic

resources. The Plan provides for the protection of water resources in Northern Ontario municipalities, with policies aimed at protecting surface water and groundwater features and promoting water conservation.

Habitats and Species: To protect the diversity of plants, animals and other living things, the first Ontario Biodiversity Strategy was released in 2005. The Provincial Parks and Conservation Reserves Act, 2006, and the Endangered Species Act, 2007 also help to conserve the Great Lakes' natural environment including native fish and birds, plants and insects, and the places they inhabit.

Ontario continued the fight against invasive species with a regulation in 2005 that made it illegal to possess live invasive fish, including Asian carp.



Ontario is working with partners to keep silver carp (seen here jumping after being disturbed by boats on the Illinois River) out of the Great Lakes. (Great Lakes Fishery Commission, Ted Lawrence)

The Ontario Biodiversity Council renewed Ontario's Biodiversity Strategy in 2011, strengthening Ontario's commitment to safeguard our amazing variety of species and ecosystems. Building on the positive achievements of Ontario's 2005 Biodiversity Strategy, the renewed Biodiversity Strategy lays out an ambitious but practical conservation agenda for years to come

GREAT LAKES WETLANDS

Coastal wetlands are recognized in Ontario and throughout the world as important natural areas. They provide habitat to sustain biodiversity, help reduce flooding and erosion, and can improve water quality. Ontario works with partners who are promoting wetland conservation through education and public outreach, land acquisition, land use planning and stewardship incentive programs.

“Provincially Significant Wetlands” are areas identified by the Province as being the most valuable. The protection of our wetlands has been strengthened by recent changes to provincial policies, regulations, and legislation, including the Provincial Policy Statement.

and was written to encourage and inspire participation from all sectors, government and individuals. The Government of Ontario has announced an Implementation Plan using the 2011 Biodiversity Strategy as a guiding framework. This Plan outlines key actions and supporting activities the Ontario government will take to conserve the province's biodiversity. Collectively, these actions and activities support the objectives and outcomes outlined in the Biodiversity Strategy and its overall vision, goals and targets. Other sectors, organizations and individuals are encouraged to develop their own implementation plans, recognizing that no one government, organization or sector can deliver the scale of change needed to conserve biodiversity on their own; we all have a role to play.



A Monarch on a Pitcher's Thistle
in a Great Lakes dune ecosystem.
(Ministry of Natural Resources, M. Wester)

In 2012, Ontario released its plan to combat invasive species. The Ontario Invasive Species Strategic Plan provides a framework to prevent, detect and respond to new invasive species, and manage and adapt to those invasive species already established in Ontario.

Controls on invasive plants such as Phragmites and purple loosestrife are being implemented in coastal wetlands, along with monitoring and assessment programs for invasive fish species in the Great Lakes. Ontario is collaborating with others around Lake Superior on a binational initiative called the Lake Superior Aquatic Invasive Species Complete Prevention Plan. For 20 years, Ontario has partnered with the Ontario Federation of Anglers and Hunters to deliver the Invading Species Awareness Program – educating the public on ways to prevent the introduction and spread of invasive species, such as monitoring for invasive species through citizen science, and providing a reporting mechanism for sightings. More recently, Ontario developed a coordinated plan for quick action to prevent Asian carp from spreading if they are found in Ontario's Great Lakes waters.



The threatened Fowler's toad breeds in and along Lake Erie. (Ministry of Natural Resources, Mike Oldham)

Islands of Life – A Biodiversity and Conservation Atlas of Great Lakes Islands, was released in 2010. This partnership with the Nature Conservancy of Canada builds on the 2005 Great Lakes Conservation Blueprints for Biodiversity that identified priority lands for conservation.

The Great Lakes Wetlands Conservation Action Plan, developed in 1994, brings government and non-government partners together to more effectively conserve wetlands and implement the 25-year Strategic Plan for Wetlands of the Great Lakes Basin.

In collaboration with Great Lakes States, federal agencies and other partners, we have developed binational biodiversity conservation strategies for Lakes Ontario and Huron. Through collaboration with federal agencies and many other partners, Ontario has made progress in protecting and restoring habitats and in rehabilitating native Great Lakes species. For instance, Ontario's Bald Eagle populations have recovered to the point where they are no longer listed as endangered. Other Great Lakes species such as lake sturgeon and American eel are protected under the Endangered Species

Act (ESA). The ESA also provides habitat protection for species that are threatened or endangered.

Tourism and recreation: Ontario continues to promote Great Lakes locales as tourist icons. This includes partnering with local communities and non-governmental groups to enhance tourism and cultural infrastructure along the Great Lakes. For example, Ontario has supported Lake Ontario's Waterfront Regeneration Trust and many local partners to expand trails, parks, and facilities so that Ontarians can enjoy waterfront experiences along the Niagara River and the Lake Ontario shoreline, from Lake Erie to Kingston.

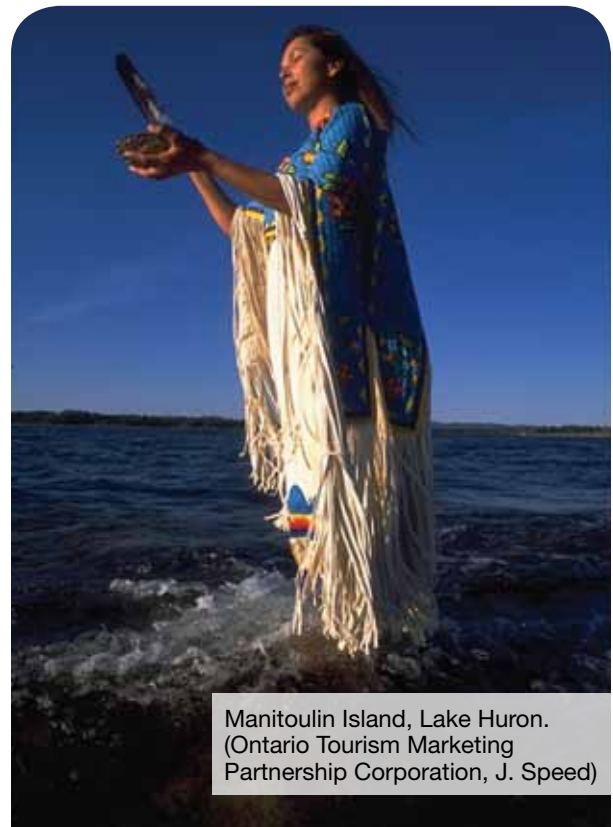
Exploring coastal hiking trail at Pukaskwa National Park, Lake Superior. (Ontario Tourism Marketing Partnership Corporation)



Partnerships, agreements and

collaboration: Collaboration is essential to make progress on Great Lakes protection.

A wide variety of agencies, organizations, communities and individuals – including First Nations and Métis communities, municipalities, conservation authorities and volunteer groups – all contribute important tools and expertise. For example, source protection committees continue to take a partnership approach to protecting drinking water sources across the Great Lakes Basin. Environmental organizations, the scientific community and academia, the industrial, agricultural, recreational and tourism sectors, and the general public have important expertise and an interest in Great Lakes. Ontario considers opinions and advice from the Great Lakes community when making decisions that impact the Great Lakes, and also works with other governments and with our Great Lakes and St. Lawrence River neighbours.



Manitoulin Island, Lake Huron.
(Ontario Tourism Marketing
Partnership Corporation, J. Speed)

ABORIGINAL COMMUNITIES

Aboriginal communities are important partners in implementing the Canada-Ontario Agreement for the Great Lakes (COA).

The Mohawk Council of Akwesasne is a signatory to and implementing partner on the administrative controls protocol of the Cornwall Sediment Strategy, which promotes long-term protection from historically contaminated sediments in the St. Lawrence River (Cornwall) Area of Concern.

The Six Nations of the Grand River and the Mississaugas of the New Credit are members of the Steering Committee that is updating the Water Management Plan for the Grand River watershed. This Plan will guide future water resource decision-making in the watershed. An updated Plan is anticipated by 2013.

As part of the Lake Huron Binational Partnership, local First Nations and Métis communities have been invited to participate in the Lake Huron Southeast Shore Initiative. The purpose of this initiative is to address nuisance algae concerns and promote safe, clean beaches and shorelines from Sarnia to Tobermory, which was identified as a priority area for action under the 2007 COA.

The Ojibways of the Pic River First Nation have been engaged in the development and implementation of the sediment remediation project in the Peninsula Harbour Area of Concern. Completed in the summer of 2012, it will improve water quality and help ensure the health of the harbour's natural habitat.

Agreements have been critical to past Great Lakes successes. Ontario partners with the Canadian and U.S. federal governments, Great Lakes States and others on lake-based management plans for each of Ontario's four Great Lakes. Other collaborations across borders include cooperative management of Great Lakes fisheries, a nutrient strategy for Lake Erie, and collaboration with Québec and the Great Lakes States on shared water quantity protection. Ontario participates in the Great Lakes Commission, and also supports the important work of the International Joint Commission, which provides binational advice and oversight on Great Lakes.

The Canada-U.S. Great Lakes Water Quality Agreement (GLWQA) sets out binational priorities. An amended GLWQA was announced in 2012 and includes a new focus on habitat and species, climate change impacts, and aquatic invasive species. These issues are also priorities for Ontario. Ontario encourages the federal government to commit the resources required to implement its commitments under this important binational agreement.

In Ontario, Canada-Ontario Agreement for the Great Lakes (COA) have contained commitments to help implement lake-specific plans, support hotspot clean ups, reduce harmful pollutants and address lake and basin sustainability. COA provides a framework for coordinating federal and provincial priorities and actions. Through COA, the governments discuss priorities and select projects. This is another tool to increase inter-ministry and multi-partner coordination on the Great Lakes.

Signed in 2007, the most recent COA (the seventh such agreement) was amended

in 2011 with new commitments to develop better planning for the Great Lakes nearshore, and to improve collaboration on spills prevention and response. Ontario committed approximately \$51 million to action under COA between April 2007 and March 2012.

A priority under COA has been collaborative restoration of 17 "Areas of Concern," (AOC) so that once-degraded harbours and waterfronts can again be safe, clean, healthy places for people, plants, fish and wildlife. Progress to date includes clean up of Collingwood Harbour, Severn Sound and Wheatley Harbour, and completion of planned clean up actions at Spanish Harbour and Jackfish Bay. These successes show how much governments and local partners can do together to make a difference for the Great Lakes and their communities. Work continues at the 12 other Areas of Concern.



Wheatley Harbour, on the north shore of Lake Erie, was delisted as an Area of Concern in 2010. (Ministry of Natural Resources)

From April 2007 to the end of March 2012, Ontario invested \$14.3 million on restoring the Areas of Concern. In 2012, Ontario provided \$1.6 million in funding towards contaminated sediment capping in the Peninsula Harbour Area of Concern. Sediment in Peninsula Harbour was contaminated from historical



Map showing binational Great Lakes Areas of Concern. (adapted from Environment Canada)

discharges from the local pulp mill, which closed in 2009. This project will accelerate natural recovery by reducing plant, animal and fish exposure to chemicals in the sediment, and reducing the spread of contaminated sediments to the rest of the harbour.

The most recent COA expired in June 2012. Ontario has continued to collaborate with federal agencies and local partners on Great Lakes protection projects while pursuing a new agreement. Ontario is currently negotiating with Canada, and seeking to have a new Canada-Ontario Agreement in place as soon as possible. Given national interests in the Great Lakes, it is important that Canada make strong commitments to the Great

Lakes together with Ontario through the next agreement.

Ontario continues to pursue opportunities to strengthen its relationship with First Nations and Métis communities through collaboration in developing and implementing Great Lakes protection initiatives. The *Water Declaration of the Anishinaabek, Mushkegowuk and Onkwehonwe in Ontario* articulates First Nations cultural values, perspectives and responsibilities linked to protection of the waters including the waters of the Great Lakes. Our shared environmental protection values provide a basis to pursue future dialogue and action with First Nations communities.

Cities are critical partners in identifying Great Lakes priorities and taking action. Since 2008, Ontario has been collaborating through a Memorandum of Cooperation with the Great Lakes and St. Lawrence Cities Initiative. This coalition of Great Lakes mayors is committed to sustainable water management practices and Great Lakes protection. Their “Declaration of Sustainable Municipal Water Management” addresses a suite of issues from water conservation to reducing salt contamination in streams, and from climate change adaptation to improving beach quality. Ontario also collaborates with municipalities directly, and through the Association of Municipalities of Ontario. Many Ontario municipalities have programs supporting efficient use of water resources, clean up of historic contamination, and other actions to protect and restore the Great Lakes.

Community-based groups, industries, private foundations, conservation authorities, and non-governmental organizations are all essential partners as well. Many sectors of Ontario society collaborate on Great Lakes protection.

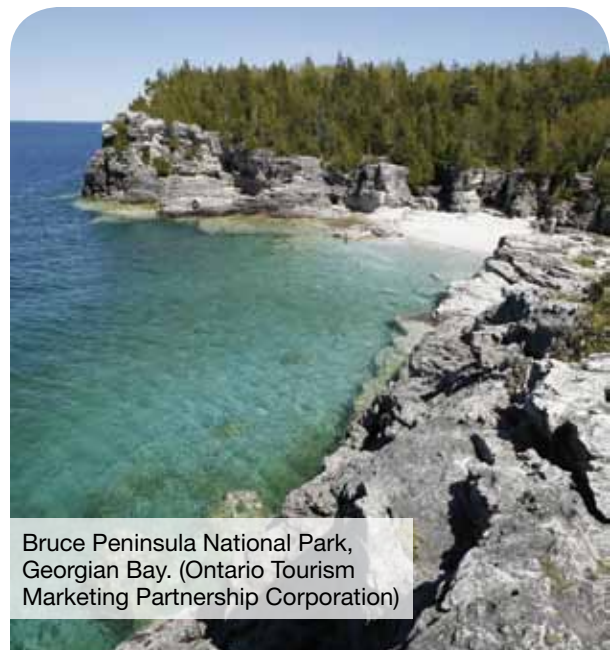
Proposed legislation: When Ontario’s Draft Great Lakes Strategy was released in spring 2012, the government also introduced a proposed Great Lakes Protection Act to restore and protect our Great Lakes. The proposed Great Lakes Protection Act could move forward if it is reintroduced or a motion is passed by the legislature in a new parliamentary session.

This Great Lakes Strategy provides the framework for Ontario’s priorities and commitments to action.

Shaping Future Action On Great Lakes

Healthy and resilient Great Lakes, their shorelines and their watersheds have an effect on virtually every aspect of life in Ontario. While we have been making real progress, we need to do more. We need to focus on the areas along the coastline that need priority attention. We need to work with and support the many partners who can play a vital role in protecting our shared Great Lakes.

The Strategy builds on a strong foundation to address the Great Lakes’ many complex and interconnected issues, and to improve Great Lakes protection. Ontario’s Great Lakes Strategy reflects the many comments received since the June 2012 release of the draft Strategy. It also builds on your advice in response to the 2009 *Healthy Great Lakes, Strong Ontario* discussion paper, and on many types of expertise across the Ontario government.



Bruce Peninsula National Park, Georgian Bay. (Ontario Tourism Marketing Partnership Corporation)

WHERE WE ARE HEADED: A GREAT LAKES STRATEGY FOR ACTION

ONTARIO'S GREAT LAKES STRATEGY CONTAINS A VISION AND GOALS, AND PRIORITIES FOR ACTION TO ACHIEVE THESE GOALS.

The Vision

Ontario's vision is one of healthy Great Lakes for a stronger Ontario – Great Lakes that are drinkable, swimmable and fishable.

Great Lakes Goals

To achieve this vision, the Province is seeking to protect and restore the ecological health of the Great Lakes and St. Lawrence River Basin. This Strategy addresses this vision through the Great Lakes goals below.

The six sections that follow describe Ontario's priorities in the coming years to address each of these Great Lakes Goals. Ontario will use a variety of tools to take action – including existing laws and programs, Great Lakes agreements, and other partnerships and collaborations. The Strategy will guide our work with local partners and with other governments around the Great Lakes.

Great Lakes Goals:	
Engaging and empowering communities	To create opportunities for individuals and communities to become involved in the protection and restoration of the ecological health of the Great Lakes-St. Lawrence River Basin.
Protecting water for human and ecological health	To protect human health and well being through the protection and restoration of the ecological health of the Great Lakes-St. Lawrence River Basin.
Improving wetlands, beaches and coastal areas	To protect and restore wetlands, beaches, shorelines and other coastal areas of the Great Lakes-St. Lawrence River Basin.
Protecting habitats and species	To protect and restore the natural habitats and biodiversity of the Great Lakes-St. Lawrence River Basin.
Enhancing understanding and adaptation	To advance science relating to existing and emerging stressors, such as climate change, that improves understanding and management of the Great Lakes-St. Lawrence River Basin.
Ensuring environmentally sustainable economic opportunities and innovation	To enrich the quality of life in communities in the Great Lakes-St. Lawrence River Basin through support of environmentally sustainable economic opportunities and innovation and through environmentally sustainable use of natural resources.

Principles

The following principles will guide efforts to achieve Ontario's Great Lakes Goals:

- **Ecosystem Approach** – recognize the intrinsic value of the Great Lakes and the interdependence of land, air, water and living organisms, including humans. The ecosystem approach uses best available science, considers cumulative impacts, encourages conservation of resources and promotes watershed and sub-watershed approaches.
- **Precautionary Approach** – caution will be exercised to protect the environment when there is uncertainty about environmental risks.
- **Accountability** – promote increased transparency by setting clear goals, reporting regularly on progress and sharing information.
- **Adaptive Management** – continuously improve and adapt our policies and management approaches by monitoring impacts, assessing effectiveness, and adjusting our actions while considering new science, Traditional Ecological Knowledge and innovative design, practices and technologies, and the need to adapt to a changing climate.
- **Collaboration and Engagement** – provide the Great Lakes community, including First Nations and Métis communities, municipalities, conservation authorities, environmental organizations, the scientific community and the industrial, agricultural, recreational and tourism sectors and the general public, with opportunities to discuss, to advise and to participate directly in Great Lakes activities.
- **Recognition of First Nations and Métis Communities** – Aboriginal communities within the Great Lakes Basin maintain a spiritual and cultural relationship with water. Their identity, cultures, interests, knowledge and traditional practices are considered.

Work will also be done in accordance with the principles expressed in ministries' Statements of Environmental Values.



A day of fishing.
(Anishinabek/Ontario
Fisheries Resource Centre)

Ontario's Great Lakes Goals

1 ENGAGING AND EMPOWERING COMMUNITIES

One of Ontario's Great Lakes Goals is broader engagement and empowerment, through providing opportunities for Ontarians to help take care of the lakes.

Today, stresses and threats facing the Great Lakes are increasingly complex. Individuals, communities and governments can all play a role in protecting the Great Lakes from the cumulative impacts of activities across the landscape. From conserving water and using non-toxic cleaners at home or work, to helping with a shoreline clean up or a marsh-

monitoring program, there are many ways for Ontarians to make a difference.

This Goal focuses on providing opportunities to enjoy, benefit from and connect with the Great Lakes. Great Lakes experiences are not only available in natural areas such as provincial parks, but also in our rural communities and our cities – along waterfronts and in urban forests and ravines. As Ontario continues to attract people from across Canada and around the world, these are opportunities to introduce new Ontarians

GREAT LAKES GUARDIAN COMMUNITY FUND

In July 2012, the government launched the \$1.5 million Great Lakes Guardian Community Fund. The Fund helps grassroots community groups, non-profit organizations and First Nations and Métis communities restore the lakes through local projects.

Some examples of community projects:

- On **Lake Ontario**, the Burlington Green Environmental Association will help youth and community volunteers in a clean up day and in planting of native trees, shrubs and seeds at an environmentally sensitive shoreline at Beachway Park on the shores of Lake Ontario in Burlington. The clean up and planting will help protect the sandbar and its wildlife.
- In the **Lake Erie** watershed, the Rotary Club of Stratford will involve 200 community volunteers and students to control erosion through bank stabilization and planting over 1,400 native shrubs, aquatic plants and wildflowers on the Avon River in Stratford. This project will improve water quality in the Thames River which flows into Lake St. Clair and then Lake Erie.
- On **Lake Huron**, provincial funding to the Lake Huron Centre for Coastal Conservation will engage students from Grand Bend Elementary School in planting dune grasses and learning about Lake Huron's shoreline beach-dune systems. Planting grasses improves dune stability which helps protect the natural coastline from erosion and provides habitat for wildlife.
- On **Lake Superior**, provincial funding to the Township of Red Rock will help establish an interpretive exhibit at the Red Rock Marina to educate visitors on Lake Superior including its biodiversity, fish habitat, invasive species and the importance of individual stewardship. The Township is partnering with the Red Rock Historical Society.

To learn more about the Great Lakes Guardian Community Fund, please visit:
www.ontario.ca/GreatLakesFund.

1: ENGAGING AND EMPOWERING COMMUNITIES

to Great Lakes' nature through recreation, cultural and heritage experiences.

Studies show that time outside in nature helps children in many ways beyond physical fitness – it can improve their ability to focus and concentrate, help the development of critical thinking and problem-solving skills, and can be effective as therapy for attention deficit disorders and depression. Adults' physical and mental health can also benefit from time spent enjoying nature.

Ontario's Strategy includes providing opportunities for communities to take action, strengthening public engagement, and improving governance. Improving collaboration across provincial ministries and with our many partners and stakeholders is an important element of this Goal. Another priority is collaboration between the Ontario government and First Nations and Métis leadership and communities – both on broad Great Lakes values and policy direction, and on specific local Great Lakes protection actions.

Individuals and communities can play a part on the Great Lakes by collaborating on setting direction, and by taking action. The engagement and empowerment Goal can help to achieve each of the other Goals of this Strategy – protecting water, improving beaches, conserving biodiversity and more.

Focus for Ontario's future action

Local community action program

- a) Fund small-scale local community actions to restore and protect the Great Lakes through the Great Lakes Guardian Community Fund. The program provides direct assistance to community groups and other local



Taking in a bit of local history at Awenda Provincial Park, Georgian Bay. (Government of Ontario, Vlade Shestakov, 2011)

organizations as well as First Nations and Métis communities to undertake numerous small-scale projects that:

- restore and protect the Great Lakes through activities like shoreline and beach clean ups and watershed improvements, and
- help people re-connect and enjoy the Great Lakes through local initiatives such as promoting and developing coastal and riverside trails and participating in wetland protection and restoration.

This program will support hundreds of local projects over the next several years.

Building awareness

- b) Create more opportunities for Ontarians, young and old, to experience the Great Lakes, and to build a sense of connection with the ecosystem and with Great Lakes history and culture – an important first step in building awareness. Actions will include:
 - connecting teachers and school boards with opportunities to use the Great Lakes and their watersheds as a context for teaching and learning, and

1: ENGAGING AND EMPOWERING COMMUNITIES

- encouraging families to take part in natural heritage education programs offered by Ontario's provincial parks, and by other groups such as municipalities, colleges, universities and conservation authorities.

Collaboration and partnerships

- c) Engage the Great Lakes community, including First Nations and Métis communities and organizations, municipalities, environmental organizations, conservation authorities, the scientific community, the industrial, agricultural, recreational and tourism sectors, and other interested groups, on Great Lakes matters, including:
- facilitating information sharing
 - identifying priorities for targeted action
 - discussing and developing targets
 - identifying potential partnerships
 - sharing updates on actions taken under the Strategy and progress towards achieving Great Lakes Goals
 - discussing Great Lakes issues such as renewal of the Canada-Ontario Agreement for the Great Lakes (COA)
 - collaborating in Ontario's participation in binational Great Lakes work
 - engaging on the updating and review of Ontario's Great Lakes Strategy.
- d) Explore the creation of new governance and engagement opportunities for the Great Lakes community as part of a new Canada-Ontario Agreement for the Great Lakes (COA).
- e) Continue to strengthen and build relationships with First Nations and Métis communities, including:
- exploring opportunities to collaborate on plans, protection initiatives and shared priorities



An Ontario Parks staff member helps children investigate a marsh at Presqu'île Provincial Park. (Ministry of Natural Resources, David Bree, 2008)

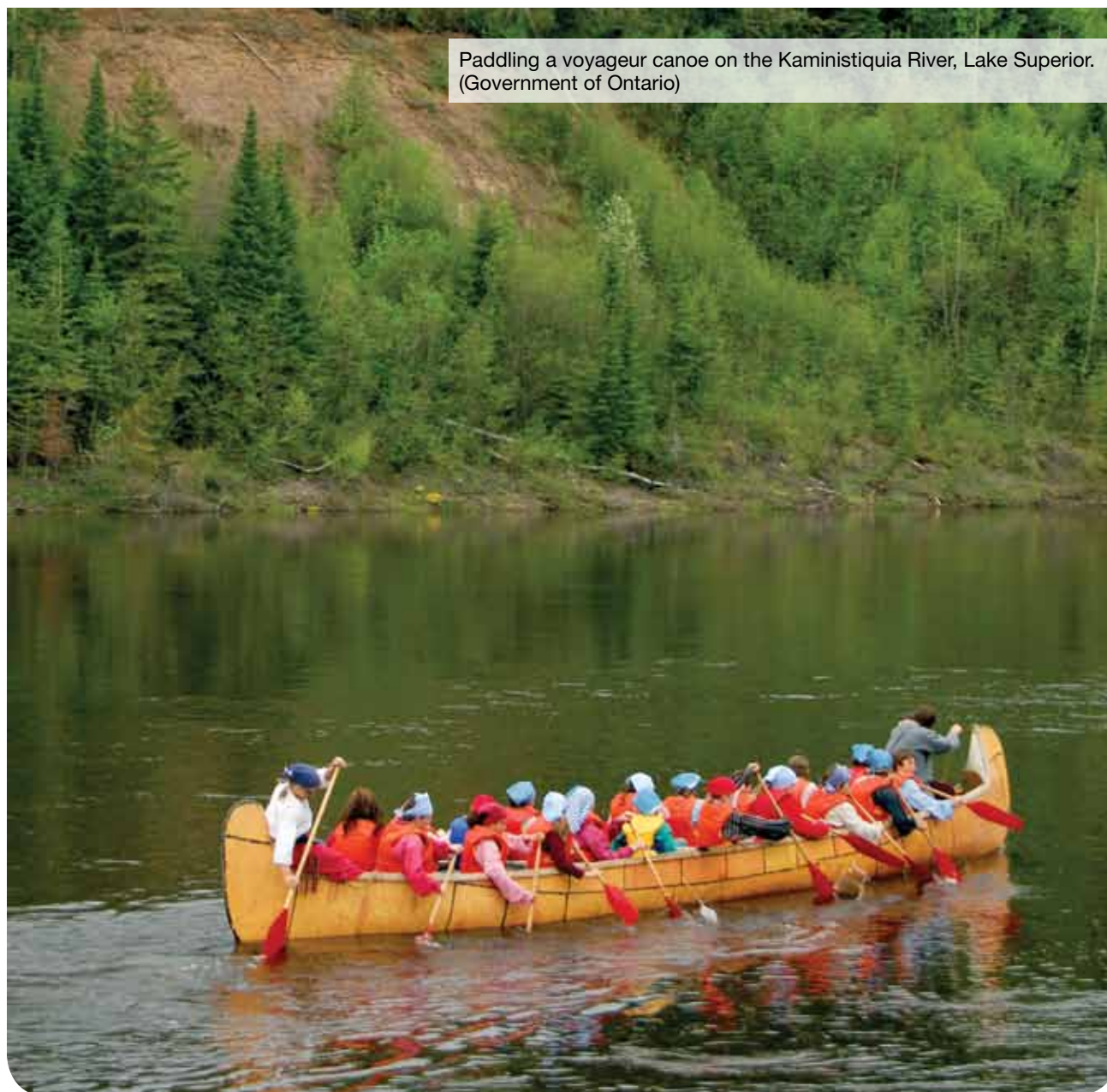
- supporting cross-cultural learning opportunities related to shared interests in protecting the Great Lakes.
- f) Partner with Great Lakes municipalities on shared Great Lakes priorities, including ongoing collaboration with the Great Lakes and St. Lawrence Cities Initiative and other groups.
- g) Partner with conservation groups, watershed organizations, environmental organizations, the public and others on projects to protect the Great Lakes, such as projects to reduce pollution, manage fisheries, conserve and restore wetlands, and recover species at risk.
- h) Coordinate Great Lakes activities, priorities and programs across provincial ministries through the Canada-Ontario Agreement and other inter-ministry governance forums.
- i) Work with the federal government by:
- negotiating a new Canada-Ontario Agreement for the Great Lakes (COA)
 - jointly implementing agreement which should help to coordinate actions of federal, provincial and local partners on the restoration and protection of the

1: ENGAGING AND EMPOWERING COMMUNITIES

Great Lakes, and help to deliver Ontario's priorities in this Strategy.

- j) Partner with U.S. Great Lakes jurisdictions, including ongoing work on binational lake plans, water quantity management, fisheries management, invasive species prevention and other shared interests.

- k) Continue to take a collaborative, locally-engaged approach to the protection of drinking water sources under the Clean Water Act.



Paddling a voyageur canoe on the Kaministiquia River, Lake Superior. (Government of Ontario)

2 PROTECTING WATER FOR HUMAN AND ECOLOGICAL HEALTH



Children play at Petticoat Creek Conservation Area, Lake Ontario, Pickering. (Ontario Tourism Marketing Partnership Corporation, Kas Stone)

Many Ontario actions help address the Great Lakes Goal of ecosystem restoration to protect human health and well-being. A key priority under this Strategy is protecting the quality and quantity of Great Lakes water and reducing toxic chemicals.

Ontario works to protect and conserve the interconnected system of watersheds and groundwater in the Basin, and the variety of life those waters support, from the cumulative impacts of threats such as climate change, urban growth, growing water use and large-volume water diversions.

Ontario also works to significantly reduce and, where possible, end the discharge of harmful pollutants into the water, air and land of the Great Lakes ecosystem. Our priority is preventing pollution and minimizing the creation of pollutants that can harm the environment.

Ongoing collaboration across borders is also essential to protect shared Great Lakes waters from threats to water quality and quantity.

Algae problems in the Great Lakes are fed by phosphorus. In recent years, invasive mussels have changed the ecosystem, making the lakes increasingly sensitive to phosphorus inputs from the land. This has led to a resurgence of algae problems. As the International Joint Commission and many Great Lakes experts have identified, non-point pollution from urban and agricultural watersheds are key sources of the excessive phosphorus loadings into Great Lakes nearshore waters.⁷ Phosphorus reaches the Great Lakes both from urban sources (including stormwater, sewage and industrial sources), and from rural sources (including agricultural activities). Reducing excess phosphorus is an essential element for improving Great Lakes water quality.

7. International Joint Commission. 15th Biennial Report. 2011.

2: PROTECTING WATER FOR HUMAN AND ECOLOGICAL HEALTH

As Ontario's population continues to grow, there is a need to continually improve our sewage treatment and stormwater management. A changing climate may make storms and runoff worse – another reason to focus on managing stormwater to reduce pollution and erosion. Conservation authorities such as Credit Valley and Toronto and Region are working to validate and promote Low Impact Development practices. There are opportunities to improve stormwater approaches, such as “green infrastructure”, including constructed wetlands.

SHOWCASING WATER INNOVATION

This \$17 million program includes provincial funding for stormwater innovation work that reduces pollution entering the Great Lakes. For example, on Lake Ontario, the Credit Valley Conservation Authority is receiving provincial funds to collaborate with public and private sector partners on projects that encourage low impact development approaches to managing stormwater and conserving water. The conservation authority is installing and testing green infrastructure to better understand how it performs, and producing green infrastructure guides that municipalities can use for their projects.

Ontario has begun to address cumulative impacts through watershed approaches, which could be used as a model for the Great Lakes. The Lake Simcoe watershed has some common challenges to those faced in the Great Lakes including: excessive nutrients, pollutants, invasive species, increasing pressures from human activities and a changing climate. The Lake Simcoe model is an integrated watershed planning approach, which combines voluntary stewardship, education and community engagement actions with regulatory approaches to help address the harmful and cumulative impacts of phosphorus inputs from a variety of sources, with the ultimate goal of reducing them over the long term.

Ontario's Great Lakes Strategy advances a number of priorities for water protection and pollution reduction, to help keep the Great Lakes drinkable, swimmable and fishable.

SHOWCASING WATER INNOVATION

In the St. Lawrence River watershed, Ontario is funding the Municipality of North Grenville to pilot test a new treatment process for municipal wastewater that could help reduce the amount of phosphorus entering the Rideau River while saving money for the municipality.

Protecting drinking water, from source to tap, continues to be central to Ontario's water protection programs – including a watershed-based approach to protect drinking water sources. Source protection committees across the province have assessed the risks to their drinking water supplies and developed source protection plans. The new watershed science developed to support drinking water source protection planning will also support other water protection programs.

Focus for Ontario's future action

Protect drinking water

- a) Collaborate with municipalities, conservation authorities, source protection committees and others to support effective and ongoing implementation of source protection plans under the Clean Water Act. Discuss with stakeholders whether continuous improvement of those plans could support better protection of the Great Lakes as sources of drinking water.
- b) Support culturally appropriate implementation strategies for drinking water source protection within First Nations communities, where relevant.
- c) Review other jurisdictions' experience with drinking water standards, review advice from Ontario's Advisory Council

on Drinking Water Quality and Testing Standards, work with stakeholders and consult with the public on proposed updates to Ontario's Drinking Water Quality Standards.

Reduce stormwater and wastewater impacts

- d) Assist municipalities, developers, the insurance industry and others in reducing the volumes and impacts of stormwater, including:
 - further supporting stormwater innovation demonstration projects including green infrastructure pilots, monitoring their performance and effectiveness, and communicating the results of water innovation pilots to a broad audience
 - updating Ontario's municipal wastewater policies to include stormwater, green infrastructure, construction runoff and sediment management

ONTARIO'S DRINKING WATER SAFETY NET

These actions are part of Ontario's multifaceted approach to protecting drinking water. Our drinking water safety net helps to ensure that our water is protected, every step of the way, as it travels from our lakes, rivers, streams and aquifers to the taps in our parks, workplaces and homes. Together, parts of the safety net work to prevent contamination, detect and solve water-quality problems, enforce laws and regulations, and increase public awareness of the importance of safe, high-quality drinking water. The eight facets of the drinking water safety net are:

- source-to-tap focus
- strong legislative and regulatory framework
- regulated health-based standards
- regular and reliable testing
- swift, strong action on adverse water quality incidents
- mandatory licensing, operator certification and training
- compliance improvement tool kit
- partnership and transparency

For more on Ontario's source-to-tap drinking water protection framework, see www.ontario.ca/drinkingwater.

2: PROTECTING WATER FOR HUMAN AND ECOLOGICAL HEALTH



A bioretention area reduces pollution from parking lot stormwater at the Earth Rangers Centre in Vaughan. (Toronto and Region Conservation Authority)

- engaging conservation authorities, municipalities, and other stakeholders to develop guidance by the end of 2014 to facilitate and remove barriers to the uptake of innovative source control measures that reduce stormwater volumes, such as green infrastructure and low impact development
 - enhancing the Province's approach to stormwater approvals with greater emphasis on effluent quality and quantity, in turn driving greater use of innovative source control measures
 - seeking environmental considerations such as use of low impact development and use of green infrastructure early in municipal planning decisions, so that stormwater is considered as part of project design and approvals, not after the fact
 - consulting on the development of overarching wastewater policy that includes stormwater, to support the Canadian Council of Ministers of the Environment wastewater strategy, and
 - promoting innovative and cost-effective approaches for managing nutrients in wastewater and stormwater (including green infrastructure and low impact development).
- e) Continue to work with municipalities and a broad range of stakeholders on solutions to minimize discharges of untreated sewage (such as overflows of combined sewers, and sewage bypassing a treatment plant) through:
- improving tracking and reporting of sewage overflows and bypasses, and continuing to monitor incidents and municipal work to minimize untreated sewage discharges
 - encouraging municipalities to complete Pollution Prevention Control Plans and to make progress on reducing overflow and bypass volumes, and
 - promoting stormwater and green infrastructure approaches described above.
- f) Reduce impacts of treated wastewater by:
- Working towards meeting Canadian Council of Ministers of the Environment commitments to a Canada-wide strategy for managing municipal and communal wastewater and reducing phosphorus discharges, including:
 - consulting with municipalities, water utilities, the wastewater treatment industry, environmental groups, and the public on development of necessary updates to policies and approaches that support implementation of federal standards, and
 - providing a one-window approach for municipalities to improve consistency with minimum standards set out in the proposed federal regulation on wastewater effluent standards for organic matter, chlorine, ammonia toxicity and sewer

2: PROTECTING WATER FOR HUMAN AND ECOLOGICAL HEALTH

overflow/bypasses, including monitoring and reporting and building expertise among wastewater operators.

- Supporting municipalities in water infrastructure asset management.
- Working with associations, to provide information and support to municipalities to foster the optimization of wastewater treatment plants, building on lessons learned in the Grand River watershed and other projects.
- Promoting priority actions to address contaminants (emerging and conventional) and pathogens from wastewater treatment plants, urban and rural stormwater, rural domestic septic systems and other rural sources.

SHOWCASING WATER INNOVATION

Ontario is supporting projects to help improve stormwater management. For example, a Toronto and Region Conservation Authority project is evaluating sustainable stormwater projects in new commercial and residential developments, with the goal of improving the water entering Lake Ontario and demonstrating how other urban communities can adopt these technologies.

- g) Consult broadly with municipal, water sector and community stakeholders on a Municipal Water Sustainability Plan Regulation under the Water Opportunities Act to:
 - promote consistency in the sustainability planning process for water services (including drinking water, wastewater and stormwater), and
 - promote consistency in development, measurement and reporting of performance indicators.

Reduce excessive nutrients

- h) Improve understanding of the effectiveness of agricultural stewardship programs and practices and enhance adoption of effective practices, including the development of community partnerships to encourage the uptake of effective agricultural best management practices.
- i) Seek opportunities to reduce nutrient inputs to the environment and advance monitoring of agricultural best management practices, in priority geographic areas and in agricultural production systems to enhance performance.



Installing an Environmental Farm Plan sign to show commitments underway.
(Ministry of Agriculture, Food and Rural Affairs)

- j) Evaluate the potential of using water quality trading in priority areas to reduce nutrient loadings, where economically and ecologically feasible and acceptable to community partners.
- k) Continue to promote rural and agricultural environmental stewardship practices, including water quality protection, water conservation, and the development



A vineyard's drip irrigation system.
(Ministry of Agriculture, Food and Rural Affairs)

and implementation of innovative practices related to water and nutrient recycling, agricultural drainage and green infrastructure.

- l) Work to better understand and reduce harmful and nuisance algal blooms, including effectively managing conditions such as excess nutrients that contribute to these blooms. This includes collaborating on the establishment of phosphorus loadings and concentration targets for Lake Erie, and on implementing phosphorus management plans and targets in priority watersheds of Lakes Huron, Erie and Ontario. This will help support actions under the Canada-U.S. Great Lakes Water Quality Agreement.

- m) Continue to work with partners to encourage the development, demonstration, and adoption of innovative technologies and approaches that reduce excess nutrients to the environment and foster the continued competitiveness of the agriculture and agri-food sectors, including support to the sector to understand the approval requirements for pilot/demonstration projects.

Protect water quality by reducing toxic chemicals

- n) Continue to reduce toxics, by:
- making publicly available on the ministry's website information on toxic substances used and created by regulated facilities, and summaries of facilities' plans to reduce toxics
 - reporting on the progress in implementing Ontario's Toxics Reduction Program
 - continuing to promote reduction initiatives and to support research on safer alternatives
 - bringing academics, industry and technology experts together through Green Centre Canada, to create green chemistry innovations, and
 - reviewing the lists of substances at least once every five years in consultation with experts and the public.
- o) Update water and air pollution regulations and standards as needed to protect the health of people and the Great Lakes environment.
- p) Research, monitor and report on chemicals of emerging concern in the Great Lakes, and adapt our standards, policies and programs as needed to address these pollutants.

2: PROTECTING WATER FOR HUMAN AND ECOLOGICAL HEALTH

- q) Continue working to ensure ongoing compliance with Ontario's water-related regulations and to improve spill prevention and response.
- r) Support opportunities for local groups to take action on water protection projects, for example through the Great Lakes Guardian Community Fund.
- s) Continue to collaborate with Canada on the reduction of harmful pollutants in the Great Lakes Basin, including the identification of joint priorities for harmful pollutants. Ontario will also continue to address priority pollution issues not addressed through the amended Canada-U.S. Great Lakes Water Quality Agreement.

Improve water quantity management

- t) Fulfill Ontario's commitments under the Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement. This could include:
 - assessing programs on meeting Ontario's water conservation goals and objectives, and reporting regularly
 - moving forward on an approach to manage large-volume transfers of water between one Great Lakes watershed and another, and
 - continuing to improve the way Ontario manages water takings under the Permit to Take Water program, for example, by incorporating the Agreement's criteria related to consumptive uses of water.
- u) Consider Ontario's approach to managing the cumulative impact of water takings in stressed watersheds in light of the new water quantity science produced by source protection committees under the Clean Water Act, and consulting broadly on any potential changes.
- v) Promote water conservation and efficiency as enabled under the Water Opportunities and Water Conservation Act, including:
 - establishing aspirational targets for water conservation
 - further promoting WaterSense labelling for water-efficient consumer products, and
 - developing and consulting with stakeholders on potential water conservation plans by public agencies (e.g., municipalities, universities, colleges, schools and hospitals).
- w) Review the current charge for industrial and commercial water takings and discuss with stakeholders potential changes to the charge framework.
- x) Work with the International Joint Commission as they consider how to manage lake levels to better balance ecological and economic interests on both Lake Ontario and the St. Lawrence River, and on the Upper Great Lakes, including work to better understand and adapt to lake level changes.

Ontario is also continuing to promote water innovation – see pages 57 to 62 of this document.

3 IMPROVING WETLANDS, BEACHES AND COASTAL AREAS



Hiking the Tobermory shoreline.
(Ontario Tourism Marketing Partnership Corporation)

One of Ontario's Great Lakes Goals is to restore and protect wetlands, beaches, shorelines and other coastal areas of the Great Lakes and St. Lawrence River.

Wetlands, beaches, waterfronts and other coastal areas are where people meet the lakes, but also where pressures on the lakes are most evident, in the form of unwanted algae, contaminated sediment, shoreline alterations and other impairments caused by human activity. Nearshore areas are the most biologically diverse and productive areas in the lakes – restoring and protecting them will have lake-wide benefits, for example by providing spawning habitat and reducing contaminant levels in Great Lakes fish.

The declining health of nearshore waters now has binational attention. It is a focus for Ontario communities and the Ontario government, as well as for the federal government and our neighbours to the south.

Ontario has many partnerships that help to protect our Great Lakes coasts and nearshore waters including work to reduce phosphorus, restore coastal wetlands, protect drinking water intakes and clean up contaminated sediment. For example, collaborative action in Great Lakes Areas of Concern is helping to clean up historic contamination at harbours, waterfronts and communities along the Great Lakes. In these communities, partners work together to set clear goals and take action to restore the use and enjoyment of Great Lakes resources.

Great Lakes coastal wetlands are important areas for a number of reasons. They provide habitat for a large number of plant, fish and wildlife species. They help reduce flood damage and erosion, and improve water quality by absorbing sediments and excess nutrients. They are essential to surface and groundwater recharge, and are popular places for recreation and tourism. The ecological goods and services derived

SHOWCASING WATER INNOVATION PROJECTS THAT HELP PROTECT THE GREAT LAKES

On Lake Erie, Ontario is providing water innovation funding to the Grand River Conservation Authority for projects that will help ensure sustainable water supplies, reduce flood damage, and improve water quality to maintain ecological health. This work will reduce the Grand River's impact on Lake Erie, and make the Grand more resilient to the impacts of climate change.

The Province is also funding work by the Upper Thames River Conservation Authority to understand climate change impacts on water quality and flooding. The project includes helping rural landowners find approaches that reduce nutrient discharges into the Thames River and the Lake Erie watershed.

On Lake Huron, provincial funding to the Ausable Bayfield Conservation Authority will develop an innovative rural stormwater management model and test it in five high priority watersheds along the southeast shore of Lake Huron.

from Great Lakes coastal wetlands are of significant economic value.

Beaches are also important focal points for Great Lakes action. Beaches support a diversity of wildlife habitats, numerous rare species, and globally significant features such as barrier beach-dune ecosystems, as well as valuable recreational opportunities. Recreational water quality can be influenced by many factors: rainfall, wave action, water and air temperatures, waterfowl, municipal and industrial wastewater, stormwater outflows, septic system discharges, and agricultural runoff. Ontario has nearly 300 public beaches along our Great Lakes coast. Many of these are signature tourist attractions such as Wasaga Beach, Grand Bend and Sauble Beach, which provide recreation and are the economic lifeblood of local communities. Ontario's provincial parks system also has many beautiful beaches such as Sandbanks, Awenda, The Pinery and Pancake Bay. Recently some municipalities and local partners have met international eco-certification standards so their Great Lakes beach can be recognized as a "Blue Flag" beach.

The focus on beaches and waterfronts in this Strategy also includes opportunities to promote the use and enjoyment of Great Lakes beaches and other coastal features, along with festivals and other coastal events.

Natural shorelines are vital to maintaining a healthy ecosystem. They help improve water quality by reducing erosion and pollutant runoff, and provide significant habitat for numerous species. Great Lakes shoreline areas are also important for their social and economic value. For example, shoreline protection helps protect the quality of our drinking water sources. However, shoreline areas are susceptible to many stresses, including the cumulative impacts of development and over-use, climate change, pollution, habitat alteration and invasive species. The Province intends to protect shoreline areas through existing tools and legislation.

There are opportunities to build on existing planning frameworks such as the Provincial Policy Statement, source protection plans, watershed plans by conservation authorities, Remedial Action Plans, and binational lake plans and strategies, to advance needed Great Lakes action in priority

3: IMPROVING WETLANDS, BEACHES AND COASTAL AREAS



Cooper Marsh, near Cornwall, following rehabilitation.
(Raisin Region Conservation Authority)

areas. Provincial plans for some sensitive ecosystems within the Great Lakes Basin, such as the Greenbelt, Lake Simcoe and the Oak Ridges Moraine, include elements that may be important for future work. As examples, some of these plans include goals, targets, wetland and shoreline protections, clear governance and engagement processes, and public reporting.

Ontario will work with partners to focus action on priority geographic areas. In these areas, existing programs, partnerships and science point to a need and opportunity for action. We will also work with our Great Lakes partners and communities to identify additional priorities on an ongoing basis. We will use several sources of information to help identify areas for action, including advice from local agencies and communities, ongoing monitoring of results, and potential priorities identified in binational work such as the Canada-U.S. Great Lakes Water Quality Agreement.

This Strategy recognizes the need to focus action and target different issues in different

ways, in different parts of the Great Lakes. The challenges in various priority areas include:

- On Lake Ontario, communities around the western basin are experiencing rapid population and urban growth, which is putting pressure on the lake. Stormwater management, excess algae and loss of habitat are all concerns. Building on existing work and partnerships, efforts could include a focus on enhanced coastal and watershed planning approaches.
- On Lake Erie, excessive algae and phosphorus are the major concern. To help meet current and future phosphorus targets, efforts will build on work underway in priority watersheds, including the Thames River and Grand River, focussing on priority sub-watersheds. Efforts could also expand the approach taken in Rondeau Bay and Long Point, using green infrastructure to mitigate nutrients, create habitat and enhance biodiversity.
- On Lake Huron, one of the top concerns is improving shorelines and beaches along the southeast shores. Efforts could continue on work with communities and other partners to understand bacterial contamination and shoreline algae and to advance action in priority watersheds. Protection of natural coastal areas is a major concern in Georgian Bay. Water levels are an issue on Lake Huron and Georgian Bay as well as other parts of the Great Lakes.
- On Lake Superior, ongoing Ontario support is needed to complete the proposed establishment of a National Marine Conservation Area. Concerns with toxic chemicals and with impacts of development are also local issues.

Focus for Ontario's future action

Beaches

- a) Work with partners to share successful and innovative best management approaches on beaches, wetlands and coasts.
- b) Explore opportunities to enhance adoption of the internationally recognized Blue Flag beach certification program at Great Lakes beaches.
- c) Work with partners, through small local projects, on opportunities to connect with Great Lakes coasts and beach ecosystems through dune restoration, beach education and other stewardship and education programs.
- d) Carry out and communicate research to improve understanding of sources of high E. coli and causes of other beach impairments such as algae, to guide beach management actions.
- e) Continue to work with public health units to improve the way safety of beach water is monitored and assessed.
- f) Work with partners to make information on beaches more available and to promote the use of enhanced beach management tools to improve beaches, potentially leading to more Great Lakes beaches being available to enjoy during more of the swimming season.

Wetlands

- g) Through the review of the Provincial Policy Statement, consider land use, water resource and natural heritage provisions which support Great Lakes protection – for example, prohibiting development in coastal wetlands, and enhancing

protection for shoreline areas and other natural features that are important to the health of the Great Lakes ecosystem.

- h) Continue to support strategic partnerships and collaborations that conserve and restore wetlands across the Great Lakes Basin, such as the Eastern Habitat Joint Venture and the Great Lakes Wetlands Conservation Action Plan.
- i) Conduct new and updated wetland evaluations and provide technical advice and information for municipal planning.
- j) Investigate opportunities to make use of wetland rapid evaluation tools to help support identification of provincially significant wetlands.
- k) Continue to update wetland data and mapping available through Land Information Ontario.
- l) Conduct workshops to profile wetland conservation successes, discuss challenges and identify future directions.
- m) Continue to promote municipal engagement in wetland conservation.



A walk along the beach at Pukaskwa National Park, Lake Superior. (Ontario Tourism Marketing Partnership Corporation)

3: IMPROVING WETLANDS, BEACHES AND COASTAL AREAS

- n) Continue to support binational efforts to regulate water levels in Lake Ontario and the St. Lawrence River to provide an ecological benefit to wetlands through more natural water levels.

Other coastal areas

- o) Identify priority areas for nearshore protection, and collaborate with Great Lakes partners on initiatives to improve nearshore areas.
 - p) Promote sustainable coastal recreation and tourism developments (e.g., parklands, beaches and trails) and activities associated with the lakes and their waterfronts and coasts.
 - q) Continue to consider opportunities for growing the Greenbelt and assess potential for enhancing provisions of the Greenbelt Plan to support Great Lakes protection during the scheduled review in 2015.
 - r) Address key challenges in Areas of Concern, such as non-point source pollution, contaminated sediment, habitat restoration and municipal wastewater loadings, through Ontario actions and collaboration with federal partners, First Nation and Métis communities and local partners. Ontario is poised to work with federal agencies and other partners to complete actions or achieve clean up at a number of Areas of Concern.
 - s) Represent Ontario's interests in binational efforts to manage, evaluate and improve regulation of Great Lakes water levels and flows – efforts that further consider coastal and shoreline environments, natural physical features and processes in shoreline management, among other interests.
- t) Continue to implement the Lake Simcoe Protection Plan, including: ongoing monitoring and reporting, implementation of the Phosphorus Reduction Strategy, and finalizing the Recreation Strategy and Climate Change Adaptation Strategy.
 - u) Develop provincial shoreline guidance to support the provincial policy framework, and share best management practices on coastal protection and restoration.



Caspian Terns on the Lake Ontario shoreline.
(Ministry of Natural Resources)

4 PROTECTING HABITATS AND SPECIES

Ontario's Great Lakes Goal is to restore and protect the natural habitats, biodiversity and resilience of the Great Lakes and St. Lawrence River Basin ecosystem.

Biodiversity is the variety of life on earth and for the Great Lakes Basin this includes thousands of wetlands, unique ecosystems, more than 150 native fish species, and thousands of native plants. Some of these species are found nowhere else in the world. The State of Ontario's Biodiversity 2010 report recognizes habitat loss and invasive species as two of the main threats to biodiversity. Another concern is loss of connectivity of natural systems.

Habitat

Aquatic habitats in the Great Lakes range from deep offshore areas of the lakes to coastal wetlands and to the headwaters of tributary streams. Terrestrial habitats range from the Carolinian forest bordering the lakes in parts of southern Ontario to the boreal forest along the north shore of Lake Superior. Interspersed are Great Lakes islands, cobble



The endangered American eel is an important part of Lake Ontario's biodiversity. (Ministry of Natural Resources)

beaches, dune systems, alvars⁸ and tallgrass prairies, all of which provide important habitats for many species. Many habitats have been lost or altered due to urban, rural and industrial development. Coastal wetlands, nearshore areas and tributary systems in southern Ontario have been particularly affected.

Invasive Species

Invasive species are harmful alien (non-native) species whose introduction or spread threatens the environment, the economy, or society, including human health. Great Lakes invaders include: molluscs such as quagga and zebra mussels (see page 6); several species of fish, including round goby and sea lamprey; crustaceans such as the rusty crayfish and the spiny water flea; and a number of plant species, including Eurasian water milfoil and Phragmites.

ASIAN CARP

Ontario has developed a coordinated plan for quick action to help prevent Asian carp from spreading if they are found in Ontario's Great Lakes waters. Ontario is a member of the Asian carp regional coordinating committee. This committee facilitates enhanced communication and collaboration between Ontario, the U.S. federal government and the Great Lakes States.

It is illegal to possess live Asian carp in Ontario. The province's conservation officers work cooperatively with the Canada Border Services Agency to prevent illegal imports.

Since 2010, charges for possession of live Asian carp have resulted in total fines of \$130,000.

8. An alvar is a sparsely-vegetated limestone plain. For their size, alvars are rich with species. They support a distinctive community of native plant and animal species, many of which are rare globally.

4: PROTECTING HABITATS AND SPECIES

INVASIVE SPECIES STRATEGIC PLAN

In 2012, Ontario released the Ontario Invasive Species Strategic Plan. Many of the actions will require delivery through a partnership approach. Key mechanisms for delivery will include a new Invasive Species Centre and the new Canada-Ontario Agreement for the Great Lakes (COA).

Compared to other regions in Canada, Ontario has a higher risk of new invasive species entering and becoming established. A major international shipping channel, the Great Lakes and St. Lawrence Seaway affords direct access from the Atlantic Ocean, linking far-away ports with those of Ontario's Great Lakes coast.



Measuring invasive Phragmites.
(Ministry of Natural Resources,
Dr. J.M. Gilbert)

As of 2009, there were 186 non-native aquatic species in the Great Lakes Basin. Historically, the Seaway has been a major route for invasive species, though today concern is focused as well on artificial waterways linking to the Mississippi Basin and on other potential invasion routes. Invasive species move into Great Lakes ecosystems mainly through human activity, whether intentional (such as deliberately planting invasive plants) or unintentional (for example, species carried in the ballast water of ocean-going ships or on the bottoms of recreational boats). Over the last decade, the rate of invasions has declined, possibly as a result of new federal ballast water regulations and inspections. Along the shoreline, increasing urban development has caused widespread disturbance of natural habitats, making those regions particularly vulnerable to species invasions.

INVASIVE SPECIES CENTRE

In 2011, the Ontario Ministry of Natural Resources and the federal government agreed to coordinate their efforts to deal with invasive species. A key mechanism for this coordination is the Invasive Species Centre, a not-for-profit entity established in Sault Ste. Marie by Ontario and Canada.

The role of this Centre is to support coordination, collaboration and action on invasive species issues, so resources can be used in the most effective and efficient manner. (www.invasivespeciescentre.ca)

4: PROTECTING HABITATS AND SPECIES

Invasive Asian carp are now widespread in the Mississippi and Illinois River systems, and pose a major threat to the Great Lakes because of their prolific reproduction and voracious appetites.

Ontario and our Great Lakes partners know from experience that it is far less costly to prevent an invasion before it happens. Ontario closely monitors U.S. actions to keep Asian carp out of the Great Lakes, and supported Michigan's 2009 motion to the U.S. Supreme Court to close the Chicago canal that is the primary pathway for a potential carp invasion.

In 2011, Ontario developed an Asian carp response plan, with support from Fisheries and Oceans Canada, which outlines roles and responsibilities for action. Ontario also hosted simulation exercises with agency partners to test our preparedness in the event of Asian carp being detected in Ontario waters. Ontario works with commercial and recreational anglers as well as with federal and binational bodies to prepare to respond to a potential invasion.

INVASIVE SPECIES HOTLINE

If you find an invasive species on your property or in your community, please report it by calling the Invading Species Hotline at 1-800-563-7711.

Your information will help us prevent the spread of invasive species in Ontario.

Ontario's Great Lakes Strategy will support biodiversity protection, restoration and conservation, to address invasive species. We will seek to fill key gaps and pursue opportunities under this Goal.

Focus for Ontario's future action

Protect habitats and species

- a) Pursue opportunities to improve habitat protection and restoration methods to help decrease loss, degradation and fragmentation of Great Lakes Basin natural areas and landscapes that provide habitat for species and valuable ecosystem services.
- b) Complete binational biodiversity conservation strategies for Lakes Erie and Superior, and work to implement the binational biodiversity conservation strategies for each of Ontario's Great Lakes and their connecting rivers, to ensure that priorities are identified and acted upon.



Ontario Ministry of Natural Resources conservation officer seizes Bighead Carp at the Canada/U.S. border. (Ministry of Natural Resources)

4: PROTECTING HABITATS AND SPECIES

- c) Continue provincial collaboration with the Government of Canada and many local partners to support the establishment of the Lake Superior National Marine Conservation Area, the world's largest freshwater marine protected area. This will protect natural heritage such as bird habitats and species at risk, as well as cultural heritage such as Aboriginal archaeological sites, lighthouses and shipwrecks.
- d) Seek ongoing opportunities for the continued rehabilitation and maintenance of native Great Lakes species, communities and ecosystems, including through the use of incentives such as the Conservation Land Tax Incentive Program.
- e) Support community work on habitat and native species protection, such as rehabilitating wetlands and other natural habitats, through the Great Lakes Guardian Community Fund and the Species at Risk Stewardship Fund.
- f) Assess the status and improve our understanding of factors affecting the health of aquatic ecosystems, habitats, native species and food webs, including nearshore areas, to help to guide conservation efforts.
- g) Enhance the conservation of Great Lakes biodiversity through increased public awareness of its value and its contributions to Ontario's social, economic and environmental well-being.

Address invasive species in the Great Lakes Basin

A key action of the renewed Ontario's Biodiversity Strategy 2011 is to "continue and enhance measures for prevention of, early detection of, rapid response to, and effective management of invasive species."



The "Great Lakes Guardian", used for research and monitoring in Great Lakes nearshore waters. (Ministry of the Environment)

Ontario will implement the Ontario Invasive Species Strategic Plan. It focuses on the following priority actions for managing invasive species in the Great Lakes.

Prevent new invaders

- h) Work with governments to review and address gaps in laws governing invasive species in trade – live plants and animals that are sold for personal or commercial use, for example for use in aquariums, as live bait, in horticulture and water gardening, or as food fish.

4: PROTECTING HABITATS AND SPECIES

- i) Apply risk assessment tools to live plants and animals that are sold for personal or commercial use. This action will require continued collaboration with industry, governments, and academia, because our knowledge of these pathways is incomplete and additional research is required.
- j) Enhance existing coordination of invasive species research across the Great Lakes Basin and develop common research priorities. This action will require continued collaboration with existing forums such as the Canada/Ontario Invasive Species Centre, Canadian Aquatic Invasive Species Network, and Great Lakes Fishery Commission.
- k) Continue collaborative efforts on education and outreach to address gaps and improve communications regarding high risk pathways and to engage a wider range of interest groups.

Detect invaders that have entered Ontario

- l) Work with partners to develop and implement scientifically defensible surveillance activities in geographic areas at high risk of invasive species introductions.

Respond rapidly to new invasions

- m) Develop a rapid response framework that will assist Ontario in responding to new invaders.

Manage and adapt to the presence of invaders that have become established

- n) Where invasive species are established and eradication is not feasible, develop mitigation and adaptation measures, including guidance to partners and the public through fact sheets and best management practices.



Ministry of the Environment Field Officer.
(Government of Ontario)

5 ENHANCING UNDERSTANDING AND ADAPTATION

Monitoring and assessing Bay of Quinte region Lake Ontario fish populations. (Ministry of Natural Resources)



Ontario's Goal is to support science that improves the understanding and management of the Great Lakes and St. Lawrence River.

Sound science is the foundation for achieving each of the other Goals of Ontario's Great Lakes Strategy. Science is essential to target and prioritize actions to protect and restore the Great Lakes ecosystem. Great Lakes protection is a long-term challenge, so monitoring programs are also key to assessing progress, evaluating the effectiveness of policies, programs and partnerships, and adapting them as necessary over time.

Ontario works with other jurisdictions and partners to research the Great Lakes ecosystem and develop the knowledge to aid in decisions. Our science programs are

highly collaborative, relying on partnerships to advance the knowledge we need for Great Lakes action. For example, conservation authorities work with the Province in monitoring Great Lakes tributaries across Ontario. Ontario also has many joint projects with Great Lakes researchers at Ontario universities, and partnerships with scientists in other jurisdictions around the Great Lakes Basin and beyond. Ontario also collaborates with many other jurisdictions to support binational State of the Great Lakes Ecosystem reporting.

Over the past decades, we and our partners have made progress in Great Lakes science. However, the vastness of the Great Lakes and the stresses and threats they now face go beyond the capacity of current research to keep pace. Over time, we will need to

continue to make targeted investments in Great Lakes science to understand the ecosystem, identify issues, solve problems, and help set priorities. Our scientists must also explore new and innovative ways of obtaining, analyzing and communicating the most current information.

Science on the Great Lakes must also consider past, present and future stresses and their cumulative impacts. For example, we will continue to build our understanding of climate change. We will assess its impacts on the Great Lakes and design Ontario programs and infrastructure that actively take these impacts into account to help communities adapt – and to protect the lakes' natural resilience. The crosscutting nature of climate across sectors highlights the need for a comprehensive approach to increasing adaptive capacity in Ontario that considers both environmental and human health impacts. Action on Great Lakes climate change impacts is a priority under the Great Lakes Strategy.

TRADITIONAL ECOLOGICAL KNOWLEDGE

Many First Nations and Métis communities have expressed an interest in exploring the use of Traditional Ecological Knowledge alongside western science to inform discussions and advance understanding of ecosystem change in the Great Lakes.

Focus for Ontario's future action

Deliver needed science

- a) Continually assess and adapt Ontario's Great Lakes science priorities by optimizing research investments through

partnerships, and by sustaining long-term monitoring capabilities.

- b) Continue to undertake collaborative science, and enhance integration of different types of knowledge including Traditional Ecological Knowledge, socio-economic research, Great Lakes environmental and ecological monitoring and research, and drinking water source protection science into decision making.
- c) Make the best use of our significant investment in watershed science for drinking water source protection plans under the Clean Water Act, to support other Great Lakes-related programs.
- d) Improve understanding of the sources and pathways of non-point source pollution to ensure management practices and resources are focused appropriately.
- e) Undertake priority collaborative science so that management of fisheries and other natural resources, and biodiversity conservation work, can adapt to changing conditions.
- f) Continue to implement research and monitoring programs to understand Great Lakes ecosystem function, structure and change. For example, to address coastal



Odorous mats of algae fouling the Lake Erie shoreline in 2006. (Ministry of the Environment)

5: ENHANCING UNDERSTANDING AND ADAPTATION

water quality and algae, science resources as available will focus on assessing nutrient-algae relationships altered by invasive species impacts, collaboratively identifying priority watersheds, developing new nearshore and tributary water quality targets, and quantifying impacts of land uses and beneficial management practices.

- g) Improve understanding of the relationships between groundwater and surface water, and the role of groundwater in sustaining

Great Lakes water levels and tributary water flows.

- h) Continue to harness new technologies and approaches such as advanced sampling equipment, remote sensing and modelling, as resources are available.
- i) Sustain partnerships, data sharing, and other opportunities to help enhance science knowledge and capacity at conservation authorities, Ontario's universities, and among other Great Lakes research and protection partners.

Biologists inventory a Parry Sound, Lake Huron coastal wetland from a canoe. (Ministry of Natural Resources)



For example, collaborate on science that addresses barriers to using green infrastructure for stormwater management, such as development of design standards that are appropriate for Ontario soil conditions.

Sharing and communicating science

- j) Sustain, and improve the management, analysis and communication of Ontario's Great Lakes information and data. This includes sharing information publicly, and providing useful and timely knowledge to support action. We will improve Great Lakes reporting through reports on progress under this Strategy, regular reports on related topics such as Ontario's water quality, binational Great Lakes reporting, and other means such as government websites and social media.
- k) Support Great Lakes experts in sharing their results at key conferences, through publications and other communication opportunities.

Climate change impacts and adaptation

- l) Continue to implement adaptation actions under Climate Ready, including:
 - building climate adaptation into Great Lakes agreements and integrating climate change adaptation into Ontario's Great Lakes programs
 - examining climate change impacts on Great Lakes fisheries
 - increasing awareness of the health hazards associated with climate change, including emerging health issues associated with extreme weather
 - improving existing monitoring networks to detect climate change

- continuing to build our understanding of climate change and its impacts on the Great Lakes through investments in climate modelling and the development of rainfall intensity, duration and frequency curves.

- m) Work with Great Lakes partners to promote the use of adaptive management tools to encourage consideration of climate impacts in Great Lakes communities.
- n) Undertake a pilot infrastructure vulnerability assessment of the impacts of climate change on a municipal water treatment plant in southern Ontario in partnership with the engineering sector, municipal sector and others.
- o) Ensure climate science information, including regional climate modeling data related to the Great Lakes Basin, is available to decision makers in Great Lakes communities to support planning.
- p) Undertake an economic study to identify and quantify the economic impacts (challenges and opportunities) of climate change on key beneficial uses of the Great Lakes. The study will also quantify cost savings available through select adaptation actions.
- q) Conduct and support research to better predict the effects of climate change on new invasions and the spread of already established species.
- r) Work with partners on strategies that facilitate information sharing, collaboration, and adaptive management to further mitigate water level-related impacts along our Great Lakes shorelines.

6 ENSURING ENVIRONMENTALLY SUSTAINABLE ECONOMIC OPPORTUNITIES AND INNOVATION

Resolute Forest Products Mill on the Kaministiquia River in the Thunder Bay Area of Concern. (Darren McChristie)



Ontario's Great Lakes Goal is to enrich the quality of life in Great Lakes and St. Lawrence River watershed communities through environmentally sustainable economic opportunities, innovation, and sustainable use of natural resources.

This Goal recognizes that decisions about Great Lakes matter to both current and future generations. The Great Lakes and St. Lawrence River are the foundation of Ontario's economy and quality of life. Great Lakes and St. Lawrence River watersheds are Ontario's bread basket, and their waters are Ontario's most important drinking water source. This ecosystem also provides power generation, economic opportunities for industry and agriculture, key shipping routes and transportation links, and extensive recreational opportunities. Manufacturers including food processors rely on clean Great Lakes waters.

ECONOMIC RETURNS

Economic research such as the recent Ontario study (ICF Marbek, 2010) indicates significant economic returns from actions that keep the Great Lakes healthy. The study shows:

- We can expect an economic return of up to two dollars for every dollar we invest in actions to prevent high levels of nutrients from entering the lakes.
- Expected economic returns are up to 35 dollars for every dollar we invest in protecting coastal wetlands.
- The economic benefits of preventing invasive species from entering the Great Lakes easily outweigh the costs of dealing with the aftermath of an invasion.

The study looks at the benefits we get from the Great Lakes in terms of recreation, water use for residential, industrial, and agricultural purposes, property values, and other ecosystem services. Findings suggest that Ontario's investments to restore and protect the Great Lakes are wise investments that benefit the economy as well as the environment.

For details please see: www.ontario.ca/healthygreatlakes

Red Rock Marina in the Nipigon Bay Area of Concern. (Darren McChristie)



To achieve this Great Lakes Goal, Ontario has a number of priorities for action.

One priority is to support and foster water technology innovation services and practices. Ontario recognizes that protecting the Great Lakes is an opportunity for numerous sectors of the economy. Water technology innovation and conservation practices can provide economic

sectors with tools to improve the environmental sustainability of their activities, and at the same time help Ontario companies tap into the \$400 billion a year and growing global watertech market. Technology innovations and practices may address outcomes such as water conservation and efficiency, nutrient recycling and water quality protection.

INNOVATION IN WATER TREATMENT

In June 2010, the Walkerton Clean Water Centre opened its state-of-the-art learning centre that includes a new technology demonstration facility. This facility is focused on demonstrating the application of leading-edge treatment and distribution solutions and for dealing with water quality issues, particularly for small and rural drinking water systems, many of which are in the Great Lakes Basin.

The facility has a laboratory space as well as a drinking water pilot plant and distribution system. This provides a practical hands-on training tool, allows research, testing and evaluation of new technologies, and serves as a resource to help water facility operators, stakeholders and the public become aware of the variety of treatment and delivery systems and technologies available.

SHOWCASING WATER INNOVATION

Ontario is supporting innovative projects that address many of the Great Lakes Strategy's goals.

The Ontario Greenhouse Alliance project helps the greenhouse industry move toward its goal of recycling 100 per cent of the nutrient-bearing water its members discharge, which would improve water efficiency, competitiveness, and the quality of local water bodies.

Richmond Hill's project pioneers a new approach to manage stormwater that maximizes water treatment, protects habitat and extends the life of stormwater ponds.

Projects in Guelph address drinking water, wastewater and stormwater and will conserve water, improve wastewater quality, save energy, and also provide an opportunity for Ontario entrepreneurs to test a new water pressure monitor.

Through the Water Opportunities Act and related initiatives, Ontario is taking a broader view of water usage, and drawing connections between improvements in the management and quality of our water resources, and the promotion of innovative technologies and solutions from Ontario companies to address these issues. These two approaches, promoting responsible management of Ontario's water resources and supporting commercialization of innovative approaches, are interrelated and will provide significant benefits to Ontario's economy.

Another priority is to encourage sustainable Great Lakes tourism and recreation. From iconic, premier attractions such as Niagara Falls, to growing tourism and recreation niches such as bike trails and wineries, there are many opportunities to further harness the economic potential and quality of life benefits along the Great Lakes and St. Lawrence River. Great Lakes trails, natural areas, nature tours, cruising, heritage coastline, beaches, fishing and other activities present unique experiences that Ontarians and visitors can enjoy.

Ensuring that resource use and economic development are environmentally sustainable

is also a Great Lakes priority. Many of Ontario's economic sectors rely on the Great Lakes and have an impact on the ecosystem. There are opportunities to promote innovative approaches that improve both environmental and economic outcomes for businesses.

Focus for Ontario's future action

Support the development of innovative water technologies, services and practices

- a) Continue the implementation of the Water Opportunities Act and complementary measures. This includes supporting the work of the Water Technology Acceleration Project, which will help grow globally competitive companies and promote Ontario's water sector, while generating solutions that can help protect and improve the Great Lakes environment.
- b) Continue to support the research, development and demonstration of new innovative environmental technologies, services and practices.
- c) Support Ontario sustainable food production, jobs and innovation, decreasing reliance on phosphorus



Sir Adam Beck Generating Complex on the Niagara River. (Ontario Power Generation)

imports and improving efficient use of phosphorus for improved soil management and crop growth, through supporting opportunities to pilot new and innovative technologies for enhanced and improved nutrient recycling, including phosphorus recovery from sewage, manure and compost.

- d) Develop a long-term economic development strategy that will establish a series of goals and actions to make a cohesive and globally competitive water sector.
- e) Strengthen international linkages to support research, development and commercialization in the water field – by building alliances with jurisdictions, highlighting Ontario's strengths at trade shows and conferences, and participating

in national discussions on a proposed international environmental technology verification approach. Identify one or more international forums to showcase Great Lakes technology innovation and share lessons learned from various programs/projects (e.g., Showcasing Water Innovation), including implementation of innovative measures.

- f) Share success stories on community-based approaches, to encourage and support adoption of best practices. For example, the Showcasing Water Innovation Program has identified leaders in innovation and is fostering the transfer of knowledge between communities, in areas such as asset management/ water conservation, climate change risk assessment, and innovative integrated approaches to providing water services

including green infrastructure.

- g) Encourage implementation of lessons learned from innovative projects for water, wastewater and stormwater systems (e.g., Showcasing Water Innovation projects) including encouraging innovative and cost-effective Ontario water technologies and approaches in small and remote communities and partnerships among public, private and academic sectors to migrate innovations to potential commercial application and more widespread use.
- h) Explore opportunities to involve Aboriginal peoples in learning about innovative technologies and potential job opportunities in the water sector and environmental stewardship initiatives.
- i) Encourage industrial practices that minimize water consumption, recycle water, use reclaimed wastewater or stormwater for business operations or processing, and apply low impact development to stormwater management. (e.g., permeable pavement in parking lots).
- j) Encourage development and use of green technologies and demonstrate leadership in green building, green infrastructure such as coastal wetlands, and water and energy conservation.
- k) Work with other orders of government to promote investments that contribute to the growth of Ontario's green economy, including opportunities for research and commercialization of green technologies and practices.

Promote tourism and recreation opportunities

- l) Identify opportunities for participation, linkages and efficiencies to better implement waterfront revitalization and

The Province's "Celebrate Ontario" fund supports events in many of Ontario's Great Lakes communities. Festivals receiving support for Ontarians and visitors to enjoy in 2012 include:

- Redpath Toronto Waterfront Festival
- Toronto International Dragon Boat Festival
- Mississauga Waterfront Festival
- 1000 Island Extreme Sport Weekend
- Rideau Canal Festival
- Belleville Waterfront and Ethnic Festival
- Welland Rose Festival

increase community and visitor access to the waterfront.

- m) Promote and support waterfront venues, attractions and activities, including support for waterfront festivals, sporting events and heritage attractions that build Great Lakes engagement and foster shoreline sustainable use.
- n) Work with the cruise ship industry to capitalize on and further enhance the growing Great Lakes cruising industry to attract more visitors and generate more economic activity.
- o) Continue to promote sustainable waterfront trail systems that link communities and support local economies around the Great Lakes through walking, cycling and other trail activities, such as those along the Waterfront Trail, now being extended beyond Lake Ontario and the St. Lawrence River to include the shores of Lake Erie, the Detroit River and Lake St. Clair.
- p) Promote water-based tourism and development, led by Regional Tourism Organizations that border the Great Lakes and St. Lawrence River.

- q) Support cycling tourism for exploration of local communities while providing significant contributions to local economies located along the waterfront trails of the Great Lakes and the St. Lawrence River coasts.



Fishing near Pickering on Lake Ontario (Ontario Tourism Marketing Partnership Corporation, Kas Stone)

- r) Encourage increased public access to waterfront areas where possible, to enhance community and tourist appreciation for the Great Lakes as a focal point in the province.
- s) Encourage opportunities for sustainable public use of water-based, coastal and nearshore recreational, cultural and heritage resources.
- t) Conduct ongoing tourism marketing, locally and internationally, featuring the Great Lakes as a tourism icon, and enhancing marketing strategies to increase support for and enjoyment of Great Lakes-themed activities and festivals, through initiatives such as the Ontario Tourism Marketing Partnership Corporation, Regional Tourism Organizations, and Celebrate Ontario Grant Program.
- u) Promote “staycations,” encouraging families to vacation closer to home and to enjoy Great Lakes experiences.

Ensure environmentally sustainable resource use

- v) Continue support for the sustainable management and harvest of Ontario’s Great Lakes commercial and recreational fisheries resources that provide benefits to society associated with wholesome food, recreation, cultural heritage, employment, and a healthy aquatic ecosystem.
- w) Further explore the value of ecological services to Ontario’s economy. Ecological services are the many benefits that a healthy ecosystem provides. For example, the Great Lakes and St. Lawrence River ecosystem purifies our water and air, breaks down our wastes, provides food sources and recreation opportunities, reduces the risks of flood damage, and moderates extreme weather.
- x) Support improvements to agricultural and rural runoff management by enhancing adoption of environmental farm practices and plans. This may include working with researchers and industry to enhance the development and adoption of best management practices in key sectors and geographic regions.
- y) Encourage effective, sustainable soil management practices to maintain a healthy economy and environment throughout Ontario, including the Great Lakes Basin. The Province will develop a policy framework for soil management, including encouragement of best management practices to support the reuse of excess soil for beneficial uses, as long as it can be done in a way that protects human health and the environment.

MEASURING PROGRESS AND TRACKING RESULTS



The Island Queen cruise boat near Kingston. (Ontario Tourism Marketing Partnership Corporation, Bergeron)

To monitor progress on Ontario's Great Lakes Strategy, the province is developing performance measures. We will track and report on performance measures, and will refine these measures over time. We welcome your feedback as these performance measures are developed, and will seek opportunities to collaborate on measures that are also used binationally and to share data across organisations and partners.

Key results to be monitored and reported on every three years will include:

Engaging and Empowering Communities

- **Increased public awareness and engagement on Great Lakes issues** – as demonstrated by the number of community projects undertaken.

Protecting Water for Human and Ecological Health

- **Drinking water meets a high standard of safety** – as demonstrated by municipal residential drinking water systems meeting provincial drinking water standards.
- **Reduced levels of harmful pollutants in the Great Lakes ecosystem** – as demonstrated by declining fish tissue contaminant levels and fish consumption advisories, as well as localized improvements in priority areas where efforts are focused to address problems.
- **Measuring phosphorus trends and reducing the frequency and severity of algae blooms** in priority areas.



Commercial fishing on Lake Huron. (Ministry of Natural Resources)

Niagara Falls
(Ontario Tourism Marketing Partnership Corporation)



Improving Wetlands, Beaches and Coastal Areas

- **Great Lakes beaches are available for public use for more of the season** – as demonstrated by reduced beach postings.
- Continued progress on cleaning up Great Lakes Areas of Concern – as demonstrated by restoring impaired beneficial uses.

Protecting Habitats and Species

- **Habitats, including wetlands, and native species are identified, protected, conserved and restored** – supported by policies and programs to identify and take action on priority habitat, and by enhanced information.
- **The threat of aquatic invasive species to Great Lake ecosystems has been reduced** – supported by actions to reduce impacts of existing invaders and to prevent and respond to new arrivals.

Enhancing Understanding and Adaptation

- **Greater public access to monitoring results and scientific information on the Great Lakes** – as demonstrated by an increase in the number of publicly available Great Lakes studies and reports.
- **Ongoing implementation of the adaptation actions contained in Climate Ready: Ontario's Adaptation Strategy and Action Plan** – as demonstrated by progress updates contained in regular Climate Change Progress Reports.

Ensuring Environmentally Sustainable Economic Opportunities and Innovation

- **Growth in the water sector** – including innovative technologies and practices.

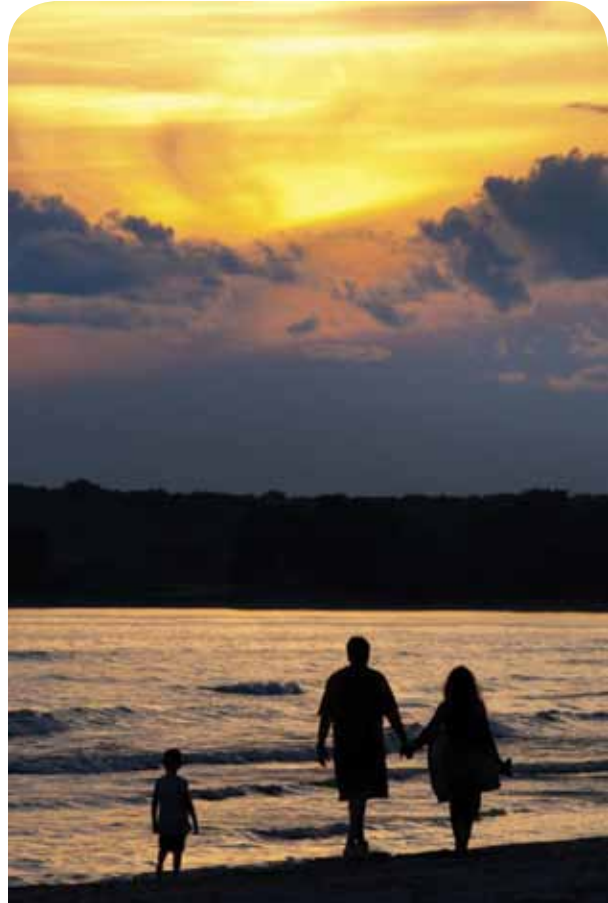
CONCLUSION

ALL ONTARIANS SHARE IN THE BENEFITS THAT THE GREAT LAKES AND ST. LAWRENCE RIVER, THEIR COASTS AND THEIR WATERSHEDS PROVIDE FOR US. WE ALSO SHARE A FUNDAMENTAL RESPONSIBILITY TO PROTECT AND ENSURE THEIR LONG-TERM HEALTH. THERE ARE WAYS THAT EVERY CITIZEN, EVERY BUSINESS, EVERY ORGANIZATION AND EVERY SECTOR CAN MAKE AN IMPORTANT CONTRIBUTION.

We hope that this Strategy reflects Ontarians' interests in the Great Lakes. Only by working together and cooperating with a shared focus and determination can we protect the Great Lakes.

All of our successes over the last four decades prove that while the Great Lakes may face complex challenges, working together, we can solve them. The people and the Government of Ontario have the vision, the Goals and the tools to help ensure the Great Lakes are healthy, strong and resilient. The stakes are great but so is our commitment.

This Strategy establishes Ontario's priorities for action to maintain Great Lakes that are drinkable, swimmable, and fishable, for our generation and for generations to come.



Sunset at Sandbanks Provincial Park, Lake Ontario. (Ontario Tourism Marketing Partnership Corporation, Bergeron)

■ BEING A GREAT LAKES GUARDIAN

ONTARIANS DEPEND ON THE GREAT LAKES FOR NEARLY EVERY ASPECT OF OUR HEALTH AND WELL-BEING. AND THE GREAT LAKES DEPEND ON ONTARIANS. EACH OF US HAS A RESPONSIBILITY TO KEEP OUR GREAT LAKES HEALTHY. WHY? WHEN THE GREAT LAKES ARE HEALTHY, ONTARIO IS STRONG – ABLE TO PROVIDE A HIGH QUALITY OF LIFE FOR INDIVIDUALS AND COMMUNITIES,

AND BE ATTRACTIVE TO BUSINESS AND VISITORS.

Each of us can take actions to help us leave the lakes in better shape than our generation found them. Whether you live in a busy city, on a farm or in a rural hamlet, wherever you are in Ontario, you can be a Great Lakes guardian, someone who voluntarily helps take care of the Great Lakes.

WHAT YOU CAN DO: TIPS FOR BEING A GREAT LAKES GUARDIAN

- Get involved in a clean up or restoration project in your community. Look for events to clean up beaches, wetlands, ravines and shorelines, or organize your own.
- Join a group that involves community members in monitoring local frogs, turtles, butterflies, wildflowers or songbirds – through a conservation authority or naturalist group. If you love fishing, consider getting involved in your local Fisheries Management Zone Advisory Council.
- Learn about invasive species that are threatening the Great Lakes so you can help identify new infestations and prevent unwanted invasive species from spreading. Call the Invading Species Hotline at 1-800-563-7711. Never release pet fish, turtles, baitfish or other live creatures into the natural environment. Always inspect your boat and boating equipment, and remove any plants or animals that are visible, before leaving a water body.
- If you own property, remember that what you put on your lawn, garden or sidewalk can all end up in the Great Lakes. Avoid over-using road salt in winter and fertilizers in summer. Ask yourself, “Can I use less of this product? Is there an environmentally friendly alternative?” Choosing soaps, cleaners or detergents that are non-toxic, phosphate-free and biodegradable is especially important for outside cleaning, because they could make their way into streams and lakes through storm sewers.
- Storm sewer grates on the road in front of your home lead to a nearby stream or lake. Never pour paint, engine oil, cooking oil or grease, unused pesticides or other household chemicals into the storm sewer grate.
- Safely get rid of products that can harm the environment, such as fluorescent bulbs (which have mercury) and electronics. Don’t flush unwanted medications down the toilet – return them to a pharmacy. Dispose of unused pesticides, antifreeze and other hazardous chemical containers at your local hazardous waste facility.
- If you see a spill, call the Spills Action Centre at 1-800-268-6060.
- Conserve water and energy – most of it comes in some way from the Great Lakes!
- If you’re a gardener, select non-invasive or native plants from reputable suppliers. Native plants will provide a variety of benefits to the ecosystem. For more information on how you can prevent the spread of invasives, check out the “Grow Me Instead” guide for non-invasive plants from the Ontario Invasive Plant Council.
- If there are children in your life, help them connect with the Great Lakes at a Children’s Water Festival, a fishing derby, a conservation program at the zoo – or just by giving them the chance to explore the nature around them.
- Learn about government agreements and programs to protect and restore the Great Lakes. Check out Ontario’s Environment Bill of Rights Registry for opportunities to have your say in public consultations on the Great Lakes (and other environmental issues).
- Most important of all – check out the Great Lakes themselves. A waterfront walk, a trip to the beach, a little fishing? These magnificent lakes will nourish your soul.

■ RESOURCES FOR LEARNING MORE ABOUT THE GREAT LAKES

To learn more about your drinking water, see: www.ontario.ca/drinkingwater

To learn more about local beach conditions, Lake Ontario Waterkeepers has a beaches app and website with beach descriptions and current conditions: www.theswimguide.org. To learn more about the beach “Blue Flag” program, see www.blueflag.org.

If you like fishing, the Ministry of Natural Resources’ Fish Ontario page is at ontario.ca/fishing. The Guide to Eating Ontario Sport Fish (www.ontario.ca/fishguide) explains how to safely eat the fish you catch.

The Ontario Ministry of the Environment’s Great Lakes website is ontario.ca/healthygreatlakes, and other Ministry of the Environment information can be found at ontario.ca/environment.

The Ontario Ministry of Natural Resources’ website at www.mnr.gov.on.ca is where you can learn about Great Lakes biodiversity, endangered species, wetlands, and invasive species.

The Ontario Ministry of Agriculture, Food, and Rural Affairs’ website can be found at www.omafra.gov.on.ca.

To learn more about the Ontario laws and regulations that relate to the Great Lakes, please visit Service Ontario’s e-lawswebsite (www.e-laws.gov.on.ca). Ontario’s Environmental Registry (www.ebr.gov.on.ca) contains notices about proposed changes to legislation, regulations and policies related to the environment, by provincial ministries covered by the Environmental Bill of Rights.

To learn about federal and Canada-U.S. programs on the Great Lakes, including State of the Lakes Ecosystem Reports and status of the Canada-U.S. Great Lakes Water Quality Agreement, some useful websites include Environment Canada (www.ec.gc.ca), the United States Environmental Protection Agency’s Great Lakes National Program Office (www.epa.gov/glnpo), and the two agencies’ shared Great Lakes website (www.binational.net). The International Joint Commission is another important group for a binational perspective on Great Lakes (www.ijc.org).

Another good website on Great Lakes is the Great Lakes Information Network (www.great-lakes.net).

To request a printed copy of Ontario’s Great Lakes Strategy in English or French, or in an alternative format, please contact the Ministry of the Environment’s Public Information Centre:

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