



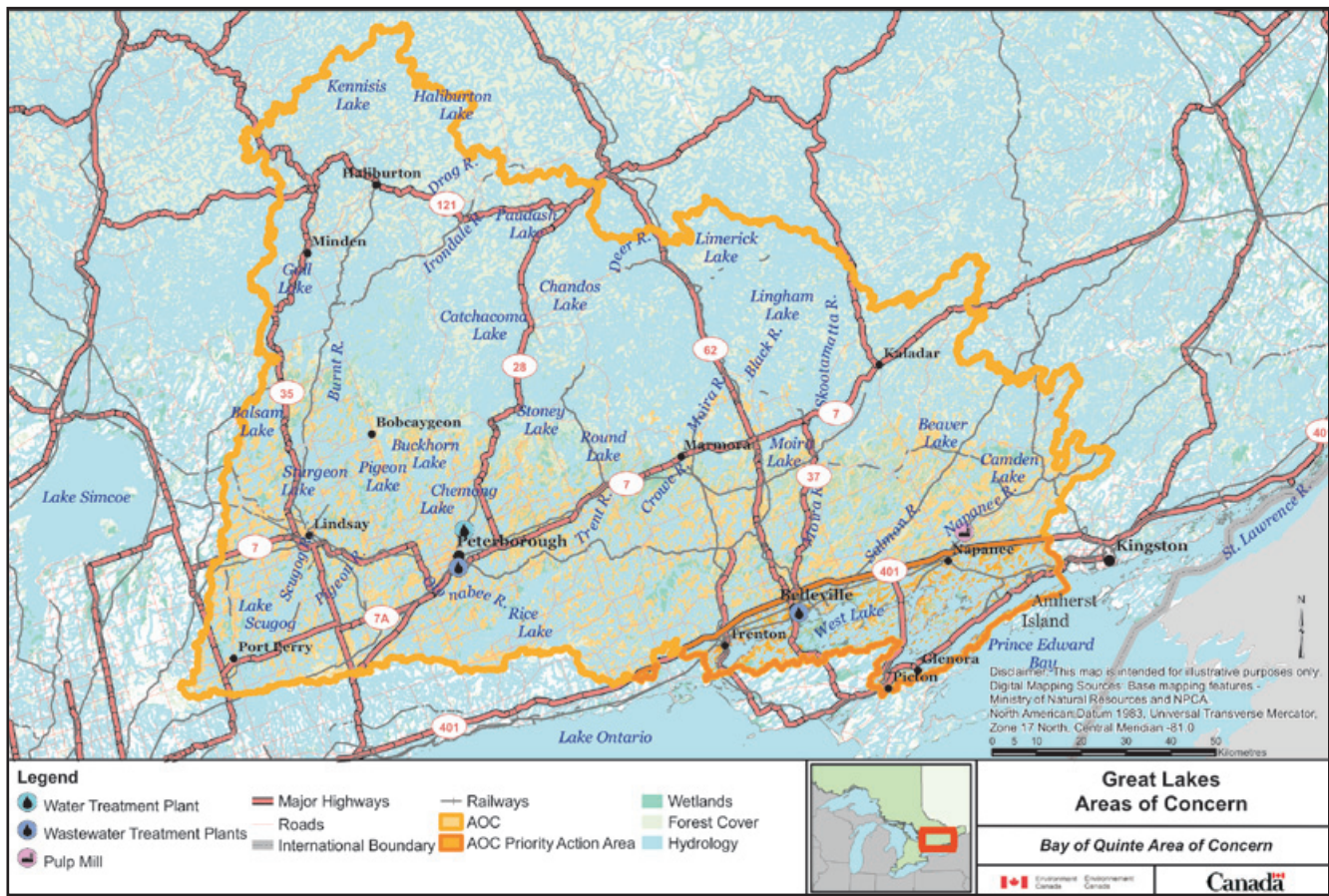
# Bay of Quinte Area of Concern

## Status of Beneficial Use Impairments

September 2010

The Bay of Quinte is a narrow inlet, about 100 km in length, on the north shore of Lake Ontario near the eastern outlet of the lake. The Area of Concern encompasses the bay and its 18 000 km<sup>2</sup> (1.8 million ha) drainage basin. The watershed includes the generally agricultural Prince Edward County on the south side of the bay and extends as far north as Algonquin Park. The Trent River is responsible for most of the flow through the bay. The shoreline of the bay includes 19 provincially significant wetlands. About 400 000 people live in the area, with the population around the bay concentrated in the cities of Trenton and Belleville, the towns of Napanee, Picton and Deseronto, and the Mohawk Tyendingaga Territory.

Environmental concerns in the Bay of Quinte Area of Concern have focused on excess nutrients, persistent toxic contamination, bacterial contamination and the loss or destruction of fish and wildlife habitat.



# PARTNERSHIPS IN ENVIRONMENTAL PROTECTION

The Bay of Quinte was designated an Area of Concern in 1987 under the Canada–United States Great Lakes Water Quality Agreement. Areas of Concern are sites on the Great Lakes system where environmental quality is significantly degraded and beneficial uses are impaired. Currently, there are 9 such designated areas on the Canadian side of the Great Lakes, 25 in the United States, and 5 that are shared by both countries. In each Area of Concern, government, community and industry partners are undertaking a coordinated effort to restore environmental quality and beneficial uses through a remedial action plan.

## Remedial Action Plan Partners

Environment Canada and the Ontario Ministry of the Environment coordinate the development and implementation of the remedial action plans to protect and restore these Areas of Concern in Canada. Since 1997, implementation of recommended actions for the Bay of Quinte Area of Concern has been facilitated by members of the Bay of Quinte Restoration Council. The Restoration Council is co-chaired by Lower Trent Region Conservation and Quinte Conservation. Other members of the Council, in addition to Environment Canada and the Ontario Ministry of the Environment, are (in alphabetical order) the Department of National Defence, Fisheries and Oceans Canada, the Mohawks of the Bay of Quinte, the Ontario Ministry of Agriculture, Food and Rural Affairs, the Ontario Ministry of Natural Resources and Quinte Watershed Cleanup Inc.

## Remedial Action Plan Process

The Great Lakes Water Quality Agreement requires that remedial action plans be developed and implemented in three stages:

### Stage 1: Identifying the Environmental Challenges

In Stage 1, the governments of Canada and Ontario, working with community stakeholders, undertook an extensive program of research and monitoring to assess environmental quality and identify the causes of degradation in the Area of Concern. The *Stage 1 Remedial Action Plan Report*, summarizing the outcome of these efforts, was completed in 1990. The report identified 10 environmental challenges needing to be addressed and known as *beneficial use impairments* in the Remedial Action Plan process. Their current status is described below in **Progress on Environmental Challenges**.

### Stage 2: Planning and Implementing Remedial Actions

In Stage 2, the governments of Canada and Ontario, working with community stakeholders, undertook a detailed review of potential remedial actions to restore, protect and monitor environmental quality in the Area of Concern. The *Stage 2 Remedial Action Plan Report*, which identified 80 recommended actions, was completed in 1993. An updated work plan, identifying the remaining priority actions to be undertaken, was developed for 2006–2011.

### Stage 3: Monitoring Actions and Delisting of the Area of Concern

The *Stage 3 Remedial Action Plan Report* and delisting of the Bay of Quinte as an Area of Concern will take place when monitoring confirms that the environmental challenges have been addressed successfully through the remedial actions. The target date for completion of the recommended remedial actions is 2013.



## PROGRESS ON ENVIRONMENTAL CHALLENGES

The federal and provincial governments and partners have made considerable progress in addressing environmental challenges in the Bay of Quinte Area of Concern. Direct discharges of industrial wastes have been substantially lowered. Beach closings occur less frequently. Over 27 000 ha of farmland have been converted from conventional to conservation tillage, and phosphorus inputs from rural sources have been lowered at source by more than 16 000 kg annually. At sewage treatment plants bordering directly on the Bay of Quinte, phosphorus loads have been greatly reduced as a result of sewage treatment plant optimization for 4 facilities within the watershed. Over 40 km of shoreline have been planted with native trees, shrubs and grasses to reduce erosion and improve habitats. Important wetlands and shoreline resources have been mapped. Over 800 ha of wetland have been either rehabilitated or protected. The numbers of nearshore and open water fish, coastal wetland fish, amphibians and marsh breeding birds are now present in numbers consistent with a stable, diverse and healthy aquatic ecosystem.

Looking ahead, further work is required to develop and implement a long-term phosphorus management strategy to ensure protection of the bay into the future from excess nutrient loading. The partners also will need to monitor the effects of the various remedial actions on the area’s water quality and fish and wildlife habitat.

### Status of Beneficial Use Impairments

The tables below summarize, for each of the 10 beneficial use impairments for the Bay of Quinte Area of Concern, their status as of September 2010; key actions taken by various partner agencies and organizations under the Remedial Action Plan; and future key actions planned by the partners as they work towards the full restoration of environmental quality and eventual delisting of the Area of Concern. Several of the beneficial use impairments identified below are currently undergoing a status reassessment, so even if the status is currently identified as *impaired*, the environmental data may support a change in status to *not impaired*.

## Status – IMPAIRED

### Beach Closings

Status: *Impaired*

Beaches are closed as a result of high levels of *E. coli* that pose a risk to human health. Recent monitoring has shown that Bay of Quinte beaches included in the current Remedial Action Plan targets were not posted for more than 20% of the swimming season, except where influenced by heavy rainfall events. Additional data is currently being collected to confirm this finding.

#### KEY ACTIONS

| COMPLETED   | REMAINING   |
|---|---|
| <ul style="list-style-type: none"> <li>▪ Conducted Clean Up Rural Beaches outreach program to reduce phosphorous loadings to the bay by 16 500 kg a year and sediment loadings by 12 000 t a year; these actions helped reduce bacterial contamination in the Bay of Quinte</li> <li>▪ Completed increased monitoring by regional health units of bacteria at active beaches</li> <li>▪ Initiated a 2-year study of water quality in open water and recreational areas to assess compliance with delisting criteria (2009)</li> </ul> | <ul style="list-style-type: none"> <li>▪ Review delisting criteria and supporting scientific evidence for changing status from <i>impaired</i> to <i>not impaired</i></li> <li>▪ Collaborate with Bay of Quinte area municipalities on the implementation of pollution prevention and control plans to reduce quantity and improve quality of stormwater runoff from municipal sources</li> <li>▪ Continue monitoring and source tracking studies at active beaches and open water and recreational areas</li> <li>▪ Complete sewage treatment plant upgrades in Picton, Deseronto and Napanee</li> <li>▪ Work with City of Belleville on wet weather flow issues at the Belleville sewage treatment plant</li> </ul> |

## Degradation of Aesthetics

Status: *Impaired*

Aesthetics are degraded as a result of the presence of periodic and localized algal blooms. Long-term monitoring of aesthetics at open-water locations in the bay has shown great improvement in overall water clarity.

### KEY ACTIONS

#### COMPLETED

- Implemented federal pulp and paper regulations and the provincial Municipal/Industrial Strategy for Abatement (MISA) regulations in the mid-1990s, which eliminated persistent toxic substances and addressed other problems associated with industrial discharges entering the Bay of Quinte
- Reduced discharges of nutrients through implementation of phosphorus loading limits on Bay of Quinte area sewage treatment plants
- Monitored aesthetics using algal species and biomass to determine frequency, duration and severity of algal blooms

#### REMAINING

- Assess new targets and measures
- Collaborate with Bay of Quinte area municipalities on implementation of pollution prevention and control plans to reduce quantity and improve quality of stormwater runoff from municipal sources
- Develop and implement a long-term phosphorous management strategy for the Bay of Quinte

## Degradation of Benthos<sup>1</sup>

Status: *Impaired*

Benthic communities are degraded as a result of excess nutrients (phosphorus), habitat alteration, invasive species (particularly Zebra Mussels) and contamination from toxic substances. Long-term monitoring demonstrates that the targets for benthic communities have been met.

### KEY ACTIONS

#### COMPLETED

- Completed annual benthic community surveys at open water locations in the bay, which showed a relatively healthy benthic community composition and structure
- Conducted studies on benthic communities and sediment toxicity, including a risk assessment for the Deloro/Moira River (2001) and a compilation and analysis of past contaminant studies for the Trent River (2005)
- Completed a study on historic benthic and toxicity studies that demonstrated that the overall benthic community was not impaired by toxic contamination (2007)
- Completed detailed risk assessment for the lower Trent River, which demonstrated no ecological or human health risk and therefore no justification for remediation of sediment at the mouth of the Trent River at this time (2007)
- Developed and implemented phosphorous control and management initiatives to reduce impacts on benthic communities

#### REMAINING

- Review delisting criteria and supporting scientific evidence for changing status from *impaired* to *not impaired*

<sup>1</sup> *Benthos* and *benthic community* refer to the invertebrate organisms, such as worms, nymphs and insect larvae, which dwell for all or part of their lives in the bottom sediments of lakes and rivers. Scientists often use the health and abundance of these organisms as indicators of contaminant toxicity and ecosystem health.



## Degradation of Fish and Wildlife Populations

**Status: *Impaired***

Fish and wildlife populations are primarily impaired by the loss and destruction of habitat (wetlands, nearshore, and shoreline areas). Based on long-term and recent surveys, the following communities likely are not impaired: nearshore and open water fish, coastal wetland fish, amphibians and marsh breeding birds. Additional data and confirmation of delisting criteria are required.

**KEY ACTIONS**

**COMPLETED**

- Implemented federal pulp and paper regulations and the provincial Municipal/Industrial Strategy for Abatement (MISA) regulations
- Reduced discharges of nutrients through implementation of phosphorus loading limits on bay area sewage treatment plants
- Implemented the Habitat Enhancement Program
- Completed Fisheries Management Plan and Fish and Wildlife Habitat Management Plans
- Completed Natural Heritage Reports and/or Strategies for Trent Hills, Quinte West, Belleville, Tyendinaga Mohawk Territory and Greater Napanee

**REMAINING**

- Review delisting criteria and supporting scientific evidence for changing status from *impaired* to *not impaired*
- Continue Habitat Enhancement Program, implement the Fisheries Management Plan and Fish and Wildlife Habitat Management Plans

## Degradation of Phytoplankton and Zooplankton<sup>2</sup> Populations

**Status: *Impaired***

Phytoplankton and zooplankton communities are impaired by impacts to the bay ecosystem. Long-term surveys have shown changes in community composition, particularly an increase in the proportion of blue-green algae that is associated with taste, odour and toxin impairments.

**KEY ACTIONS**

**COMPLETED**

- Implemented federal pulp and paper regulations and the provincial Municipal/Industrial Strategy for Abatement (MISA) regulations
- Reduced discharges of nutrients through implementation of phosphorus loading limits by Bay of Quinte area sewage treatment plants
- Undertook monitoring programs measuring algal species, populations, biomass, and community composition

**REMAINING**

- Review delisting criteria and supporting scientific evidence for changing status from *impaired* to *not impaired*
- Collaborate with Bay of Quinte area municipalities on implementation of pollution prevention and control plans and master drainage plans, and on upgrades to sewage treatment plants
- Develop and implement the long-term Phosphorous Management Strategy for the Bay of Quinte

<sup>2</sup> *Phytoplankton* and *zooplankton* are the collection of small or microscopic water-borne plant and animal organisms (respectively) that float or drift in great numbers, especially at or near the water's surface, and that serve as food for fish and other larger organisms.

## Eutrophication<sup>3</sup> or Undesirable Algae

Status: *Impaired*

Phosphorus inputs from rural sources have been lowered at source by more than 16 000 kg annually. At sewage treatment plants bordering directly on the Bay of Quinte, phosphorus loads have been greatly reduced, from approximately 215 kg/day to the current load of approximately 15 kg/day, as a result of sewage treatment plant optimization. Within the Bay of Quinte waters, phosphorus concentrations are approaching the Bay of Quinte RAP target of 40 µg/L. Water clarity is improving and the algal blooms are less severe. However, localized eutrophication exists and nuisance algal blooms have been reported.

### KEY ACTIONS

#### COMPLETED

- Implemented federal pulp and paper regulations and the provincial Municipal/Industrial Strategy for Abatement (MISA) regulations
- Reduced discharges of nutrients through implementation of phosphorus loading limits on bay area sewage treatment plants
- Conducted Clean Up Rural Beaches outreach program to reduce phosphorus loadings to the bay by 16 500 kg a year and sediment loadings by 12 000 t a year
- Completed nutrient budget and developed phosphorus model to determine appropriate loadings
- Completed studies of upgrades for municipal sewage treatment plants and pollution prevention and control plans for Quinte West and Belleville

#### REMAINING

- Develop and implement the long-term Phosphorous Management Strategy for the Bay of Quinte
- Update or complete municipal pollution prevention and control plans, Implement master drainage planning, complete upgrades to municipal sewage treatment plants

## Loss of Fish and Wildlife Habitat

Status: *Impaired*

Based on recent surveys, coastal wetland habitat in the bay is relatively healthy as indicated by unimpaired submerged aquatic vegetation and aquatic invertebrate communities. Coastal wetland water quality requires further assessment through ongoing data collection.

### KEY ACTIONS

#### COMPLETED

- Implemented the Habitat Enhancement Program: planted native trees, shrubs and grasses along 40 km of shoreline; rehabilitated or protected 800 ha of wetlands; carried out public outreach and education programs on shoreline protection and restoration
- Completed natural heritage reports or strategies for Trent Hills, Quinte West, Belleville, Tyendinaga Mohawk Territory and Greater Napanee
- Completed the Fish and Wildlife Habitat Management Plans and the Fisheries Management Plan

#### REMAINING

- Review delisting criteria and supporting scientific evidence for changing status from *impaired* to *not impaired*
- Continue the Habitat Enhancement Program
- Implement the Fisheries Management Plan and Fish and Wildlife Habitat Management Plans
- Complete the Natural Heritage Strategy for Prince Edward County
- Align or incorporate natural heritage strategies, fisheries, and fish and wildlife management plans into municipal official plans

<sup>3</sup> *Eutrophication* (or *eutrophic conditions*) is the process by which lakes and other water bodies are enriched by nutrients (usually phosphorus and nitrogen), which leads to excessive plant growth and oxygen depletion.



## Restrictions on Drinking Water Consumption, or Taste and Odour Problems

**Status: Impaired**

Drinking water systems regulated under the *Safe Drinking Water Act* are providing drinking water of a quality that meets the Ontario Drinking Water Quality Standards. However, levels of toxins produced by cyanobacteria (blue-green algae) have been detected above drinking water standards in raw water sources, and aesthetic taste and odour issues associated with algae have also been reported. Additional data and confirmation of delisting criteria are required.

| KEY ACTIONS   |  |
|---|--|
| COMPLETED   | REMAINING  |
| <ul style="list-style-type: none"> <li>Carried out surface water sampling to determine levels and dynamics of microcystins and taste and odour organic compounds</li> <li>Completed studies on drinking water taste and odour, and on toxic compounds in Bay of Quinte surface water</li> <li>Implemented the provincial Drinking Water Surveillance Program (DWSP)</li> <li>Implemented the <i>Safe Drinking Water Act</i>, <i>Nutrient Management Act</i> and the <i>Clean Water Act</i></li> </ul> | <ul style="list-style-type: none"> <li>Assess new targets and measures</li> <li>Continue to carry out surface water sampling to determine levels and dynamics of microcystins and taste and odour organic compounds</li> <li>Continue to implement the Drinking Water Surveillance Program</li> <li>Update or complete municipal pollution prevention and control plans</li> <li>Implement master drainage planning and complete upgrades to municipal sewage treatment plants</li> <li>Develop and implement a long-term Phosphorous Management Strategy for the Bay of Quinte</li> </ul> |

## Restrictions on Fish and Wildlife Consumption

**Status: Impaired, for fish consumption**

Fish consumption restrictions for the bay as a whole are the same or lower than non-impacted or control sites. However, recent studies identified two contaminant hot spots in the bay that resulted in more restrictive consumption advisories for adult yellow perch and brown bullhead due to elevated levels of PCBs,<sup>4</sup> dioxin-like PCBs, mercury, dioxins and furans. Actions are currently being implemented to address sources in the identified areas.

| KEY ACTIONS   |  |
|---|--|
| COMPLETED   | REMAINING  |
| <ul style="list-style-type: none"> <li>Implemented federal pulp and paper regulations and the provincial Municipal/Industrial Strategy for Abatement (MISA) regulations</li> <li>Undertook a human health risk assessment that concluded that there were no predicted effects on human recreational users from eating fish of the lower Trent River, provided they followed the restrictions in the annual <i>Guide to Eating Ontario Sport Fish</i> (2006)</li> <li>Completed detailed ecological risk assessment for the lower Trent River; determined that there was no justification for remediation of sediment at the mouth of the Trent River at this time</li> <li>Completed statistical analysis of 30 plus years of contaminant data collected through the provincial sports fish monitoring program</li> </ul> | <ul style="list-style-type: none"> <li>Review delisting criteria and supporting scientific evidence for changing status from <i>impaired</i> to <i>not impaired</i></li> <li>Continue with provincial sports fish monitoring program</li> <li>Continue to implement actions to address identified local hot spots</li> </ul> |

<sup>4</sup> Polychlorinated biphenyls (PCBs) are synthetic chemicals that have wide industrial applications. The manufacturing and importing of PCBs were banned in North America in 1977. PCBs are very persistent (long-lasting) in the environment and can be transported over long distances.



# Status – REQUIRES FURTHER ASSESSMENT

## Fish Tumours or Other Deformities

Status: *Requires further assessment*

Fish tumours and other deformities are linked to multiple contaminants and other factors that contribute to abnormal growth of fish tissue and organs; there will be no impairment when the incidence rate of fish tumours or other deformities in Brown Bullhead does not exceed rates found at Lake Ontario reference sites.

### KEY ACTIONS

#### COMPLETED

#### REMAINING

- Completed tumour assessments
- Change status of beneficial use impairment to *not impaired*

## FOR MORE INFORMATION

Environment Canada:

[www.ec.gc.ca/raps-pas](http://www.ec.gc.ca/raps-pas)

Bay of Quinte Remedial Action Plan:

[www.bqrap.ca](http://www.bqrap.ca)

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