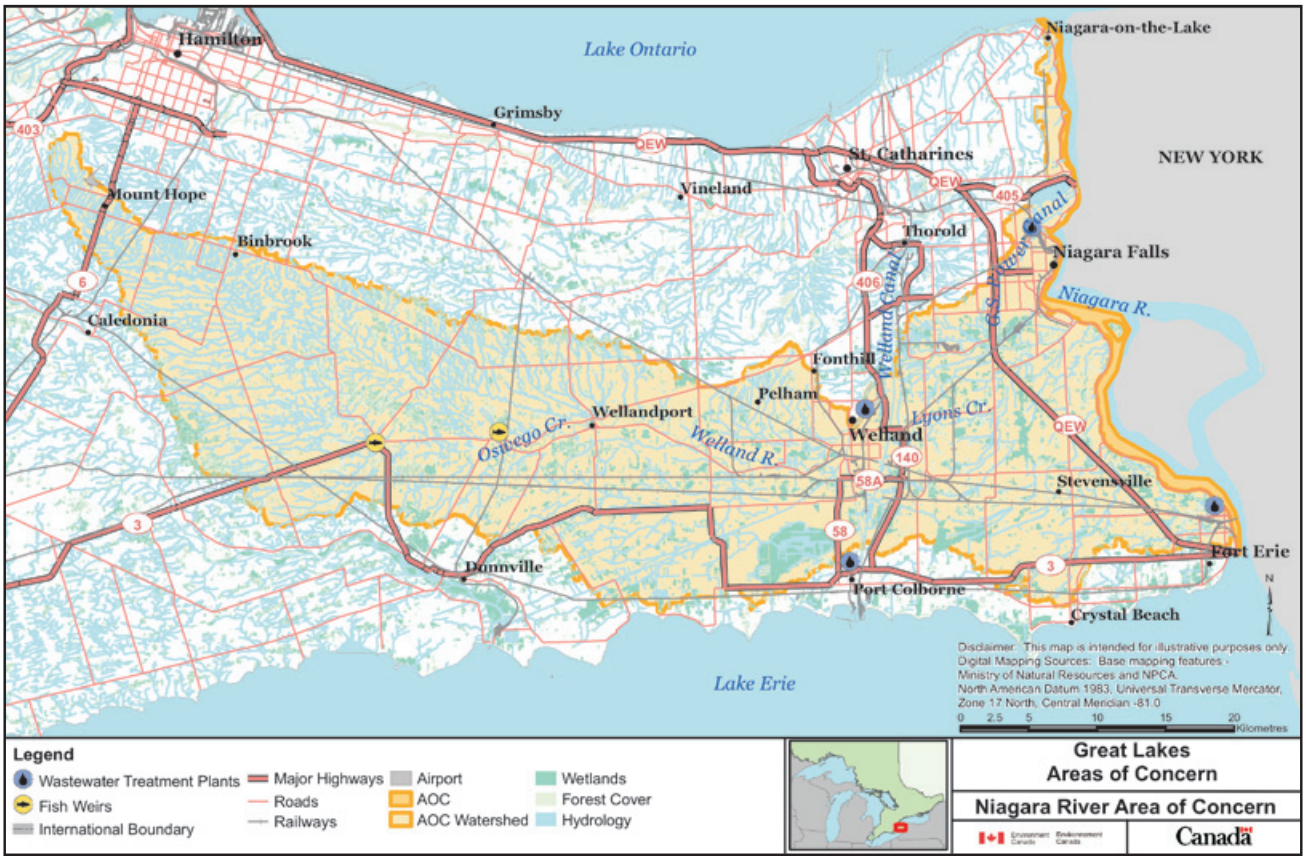
Niagara River
Area of Concern
Canadian Section
Status of Beneficial Use Impairments
September 2010

The Niagara River is a 58-km waterway connecting Lake Erie and Lake Ontario. The Canadian section of the Niagara River Area of Concern extends along the entire length of the Canadian side of the Niagara River, and includes the Canadian side of Niagara Falls and the Welland River watershed. The Niagara River drains extensive farmland on the Canadian side and passes through heavily industrialized, residential and parkland areas on the United States side. More than one half of the flow of the river is diverted for electrical power generation on both sides of the river. The river supports one of the largest and most diverse concentrations of gulls in the world, and its gorge and cliffs below the falls are habitat for some of the highest concentrations of rare plant species in Ontario.

Environmental concerns on the Canadian side of the Niagara River Area of Concern have focused on the loss and degradation of wetlands and fish habitat, and the resulting impacts on fish and wildlife populations that depend on this habitat. Most of these impacts are associated with non-point sources of pollution from rural areas of the Niagara–Welland River basin, particularly runoff of pesticides and nutrients. (By contrast, most of the environmental concerns in the United States section are associated with toxic contamination from past industrial management practices, particularly the seepage of toxic wastes from chemical dumps, and the discharge of municipal wastes.)



Ontario

Canada

PARTNERSHIPS IN ENVIRONMENTAL PROTECTION

The Niagara River 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 (including Niagara River) 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

Responsibility for the Niagara River Area of Concern is shared jointly by both Canada and the United States. Remedial action plans have been developed and implemented independently in Ontario and New York State, in partnership with the respective local communities.

Environment Canada and the Ontario Ministry of the Environment coordinate the development and implementation of the remedial action plans for all Areas of Concern in Canada. Other partners in the cooperative effort in the Canadian section of the Niagara River Area of Concern include (in alphabetical order) Bird Studies Canada, the City of Niagara Falls, the City of Welland, the Niagara Parks Commission, the Niagara Peninsula Conservation Authority, the Niagara River Restoration Council, the Ontario Ministry of Natural Resources, the Region of Niagara, and the towns of Fort Erie and Niagara-on-the-Lake.

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 1993 and updated in 1995. 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 37 recommended remedial actions, was completed in 1995. A work plan was developed to implement the recommendations. A Stage 2 update report on the implementation of the recommended actions and the development of delisting criteria and monitoring plans will be completed in 2010.

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

Completion of the ***Stage 3 Remedial Action Plan Report*** on the results of monitoring efforts to determine whether the environmental challenges have been addressed successfully through the remedial actions, is targeted for 2015. Delisting of the Niagara River (Canadian Section) as an Area of Concern can proceed following the report.

PROGRESS ON ENVIRONMENTAL CHALLENGES

The federal and provincial governments and partners have made considerable progress in addressing environmental challenges in the Niagara River Area of Concern. The Welland River watershed strategy has been developed and a rural watershed heritage strategy is being implemented. The latter has resulted so far in the planting of more than 96 000 trees, the installation of over 18 km of fencing to protect riparian habitat adjacent to watercourses, which reduces phosphorus entering local watercourses by more than 1500 kg per year. Contaminated sediments have been remediated in the Welland River. Also, through technology demonstrations, the City of Niagara Falls was able to identify a saving of $25 million for a low-cost, innovative and high-rate treatment of combined sewer overflows. The Region of Niagara also developed and is implementing the Niagara Water Quality Protection Strategy to protect sources of drinking water in the region.

Important work still remains to be completed before the Area of Concern can be delisted. Priority actions include addressing the sources of nutrients causing eutrophication of the Welland River and its tributaries; restoring and protecting fish and wildlife habitat, including unique habitats rarely found in other parts of the Great Lakes basin; implementing the monitored natural recovery strategy for PCB-contaminated sediment at Lyon's Creek East; and expanding efforts to promote landowner education and best management practices to reduce runoff pollution from non-point sources in rural areas. A further challenge will be for partners to secure the capital funding needed for major infrastructure upgrades to continue the efforts to reduce nutrients and other pollutants from combined sewer overflows.

Status of Beneficial Use Impairments

The tables below summarize, for each of the 10 beneficial use impairments in the Niagara River 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.

Status – IMPAIRED

Note that one of the challenges, *Restrictions on Fish and Wildlife Consumption*, appears under *impaired* (for fish) and *not impaired* (for wildlife), because the Remedial Action Plan partners agreed to consider the issues of fish consumption and wildlife consumption separately.

Beach Closings

Status: ***Impaired***

There are an excessive number of beach postings and an ongoing concern with *E. coli* at the Queens Royal Beach in Niagara-on-the-Lake.

KEY ACTIONS	
COMPLETED	**REMAINING**
▪ Completed assessment of the status of four beaches in the Area of Concern (2007)	▪ Complete data analysis of updated beach data and compare against delisting criteria

Degradation of Benthos[1]

Status: ***Impaired***

Studies have confirmed that the benthic community structure has been damaged at 14 identified contaminated sites.

KEY ACTIONS

COMPLETED	REMAINING
▪ Remediated the Welland River Atlas Reef site (contaminated with PAHs[2] and metals) (1995) ▪ Completed detailed assessment of 14 potentially contaminated sites and identified 2 sites for further investigation—Lyon's Creek West and Lyon's Creek East ▪ Completed an ecological risk assessment posed by PCBs[3] in the sediment and bank soil at both Lyon's Creek sites (2005) ▪ Initiated a monitored natural recovery approach to managing contaminated sediments at the Lyon's Creek East site, following public consultation on management options ▪ Removed arsenic-contaminated sediments from the Lyon's Creek West site, following a human health risk assessment (2007)	▪ Continue to refine the Lyon's Creek East Sediment Management Strategy, given that monitored natural recovery is the selected management option; this work will include developing administrative controls to ensure that there is no disturbance of the sediments; modelling sediment and PCB fate and transport for Lyon's Creek East; and undertaking outreach and education ▪ Investigate sediment management options at Lyons Creek West

Degradation of Fish and Wildlife Populations

Status: ***Impaired***

Welland River flow reversals, body burden levels of contaminants[4] and habitat pressures have adversely affected colonial nesting birds, fish populations and wetland wildlife.

KEY ACTIONS

COMPLETED	REMAINING
▪ Completed the angler diary project that sought to involve local citizens in reporting on fish findings and observations ▪ Initiated assessments of colonial nesting bird and wetland wildlife populations	▪ Continue fish community monitoring and assessments of colonial bird and wetland wildlife populations ▪ Complete data analysis of updated wildlife population to determine whether this component should be listed as impaired

[1] *Benthos* and *benthic community* refer to the invertebrate organisms, such as worms, nymphs and insect larvae that 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.

[2] *Polycyclic aromatic hydrocarbons* (PAHs) are chemical compounds found in oil, coal and tar deposits, and that also are produced as byproducts of fuel burning (whether fossil fuel or biomass). As pollutants, they are of concern because some compounds have been identified as carcinogenic.

[3] *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.

[4] *Body burden levels of contaminants* refer to concentrations in edible tissues within wildlife in the Area of Concern relative to reference sites or guidelines.

Eutrophication[5] or Undesirable Algae

Status: ***Impaired***

No impairment in Niagara River, though total phosphorus levels in the Welland River consistently exceed provincial guidelines; there also is anecdotal evidence of periodic algal blooms in the Welland River, possibly linked to elevated levels of phosphorus.

KEY ACTIONS

COMPLETED	REMAINING
▪ Initiated a detailed assessment of this environmental challenge under the Welland River Eutrophication Study ▪ Undertook 23 projects to remediate non-point pollution sources in the Welland River watershed since 1994, resulting in preventing nearly 82 000 m^3 of manure a year from entering area waters ▪ Completed comprehensive review of the City of Welland Official Plan and recommended incorporation of policies on the Remedial Action Plan's priority issues (combined sewer overflows, Lyon's Creek contaminated sediments, urban stormwater management) ▪ Commissioned a new wastewater treatment facility in Niagara Falls to capture and treat a major portion of the city's combined sewer overflows (2007—currently under operations evaluation)	▪ Complete assessment of this environmental challenge through the Welland River Eutrophication Study and develop delisting criteria in 2010 ▪ Monitor the combined sewer overflow high-rate treatment facility at Niagara Falls ▪ Monitor combined sewer overflows and investigate infrastructure needs in the City of Welland relating to wet weather issues to determine effective options to address priority overflows ▪ Complete environmental assessment for wet weather treatment in Welland

Loss of Fish and Wildlife Habitat

Status: ***Impaired***

Degradation of wetland, in-stream, shoreline and woodland habitats (in terms of size, quantity and composition) has been identified as one of the factors resulting in the reduction and loss of indicator fish and wildlife species.[6]

KEY ACTIONS

COMPLETED	REMAINING
▪ Completed the Welland River fish barrier program, which resulted in the mitigation or removal of 165 fish barriers, freeing up more than 800 km of potential fish habitat ▪ Created 147 ha of wetland; planted 54 km of shoreline vegetation and 338 ha of forest ▪ Implemented several Walleye restoration projects ▪ Completed the Natural Heritage Inventory for the Niagara River Area of Concern	▪ Develop specific habitat targets relative to reference sites outside the Area of Concern ▪ Continue to implement fish and habitat program with priorities as determined by the updated Stage 2 work plan

[5] *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.

[6] *Indicator species* are species whose presence, absence, or relative well-being in a given environment is a sign of the overall health of its ecosystem.

Restrictions on Fish and Wildlife Consumption

Status: ***Impaired, for fish consumption***

Restricted consumption of sport fish is advised due to elevated levels of PCBs, dioxins, furans, dioxin-like PCBs and mercury.

KEY ACTIONS

COMPLETED	REMAINING
▪ Implemented 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 point source discharges entering the Niagara River ▪ Confirmed that there are no known Canadian point-sources for mercury or dioxins or furans to the Niagara River, and identified, through the binational Niagara River Toxics Management Plan, that there has been an overall decrease of toxic chemicals discharged into the Niagara River ▪ Completed an assessment of the sport fish contaminant data ▪ Completed environmental and human health risk assessments for the Lyon's Creek East PCB-contaminated sediment site, which found no risk to human health	▪ Continue monitoring of contaminants in the Niagara River through the Niagara River Toxics Management Plan ▪ Continue to monitor sport fish ▪ Continue to monitor the status of sediment quality in Lyon's Creek East ▪ Continue to refine the Lyon's Creek East Sediment Management Strategy, including developing administrative controls to ensure that there is no disturbance of the sediments; conducting modelling of the sediment and PCB fate and transport for Lyon's Creek East; and undertaking public outreach and education

Status – REQUIRES FURTHER ASSESSMENT

Degradation of Phytoplankton and Zooplankton[7] Populations

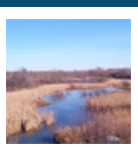
Status: ***Requires further assessment***

There is a need for further assessment to determine the status of this environmental challenge.

KEY ACTIONS

COMPLETED	REMAINING
▪ Initiated a monitoring study of *Chlorophyll a* under the Welland River Eutrophication Study	▪ Complete assessment for this environmental challenge

[7] *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.



Status – NOT IMPAIRED

Bird (or Other Animal) Deformities or Reproduction Problems

Status: *Not Impaired*

KEY ACTIONS	
COMPLETED	**REMAINING**
▪ Completed assessment of Snapping Turtles and Mink at the Lyon's Creek East contaminated sediment site; found no concerns with deformities/reproduction associated with contaminant exposure compared to reference sites (2007)	▪ No further action required

Fish Tumours or Other Deformities

Status: *Not Impaired*

KEY ACTIONS	
COMPLETED	**REMAINING**
▪ Collected data to update the status of this environmental challenge (2008 and 2009) ▪ Completed data analysis of updated fish tumour rates and compared against delisting criteria	▪ No further action required

Restrictions on Fish and Wildlife Consumption

Status: *Not Impaired, for wildlife consumption*

KEY ACTIONS	
COMPLETED	**REMAINING**
▪ Identified Snapping Turtles and migratory and resident waterfowl as target species requiring further investigation (see also *Degradation of Fish and Wildlife Populations* above) ▪ Found no evidence of human consumption of eggs of turtles or waterfowl; however, in response to anecdotal information regarding Snapping Turtle consumption, the provincial sport fish consumption guidebook now includes guidance on Snapping Turtle consumption	▪ No further action required

FOR MORE INFORMATION

Environment Canada:
www.ec.gc.ca/raps-pas

Niagara Peninsula Conservation Authority:
www.npca.ca/water-management/nrap/default.htm

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