

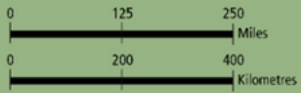


First signed in 1972 and updated in 1987 then in 2012, the Canada-U.S. Great Lakes Water Quality Agreement (GLWQA) commits both countries to working collaboratively to "restore and maintain the chemical, physical, and biological integrity of the Great Lakes system."

In 1987, 43 Great Lakes locations (named Areas of Concern) were identified through the GLWQA as severely degraded and requiring cleanup plans.

The Niagara River is one of these locations.

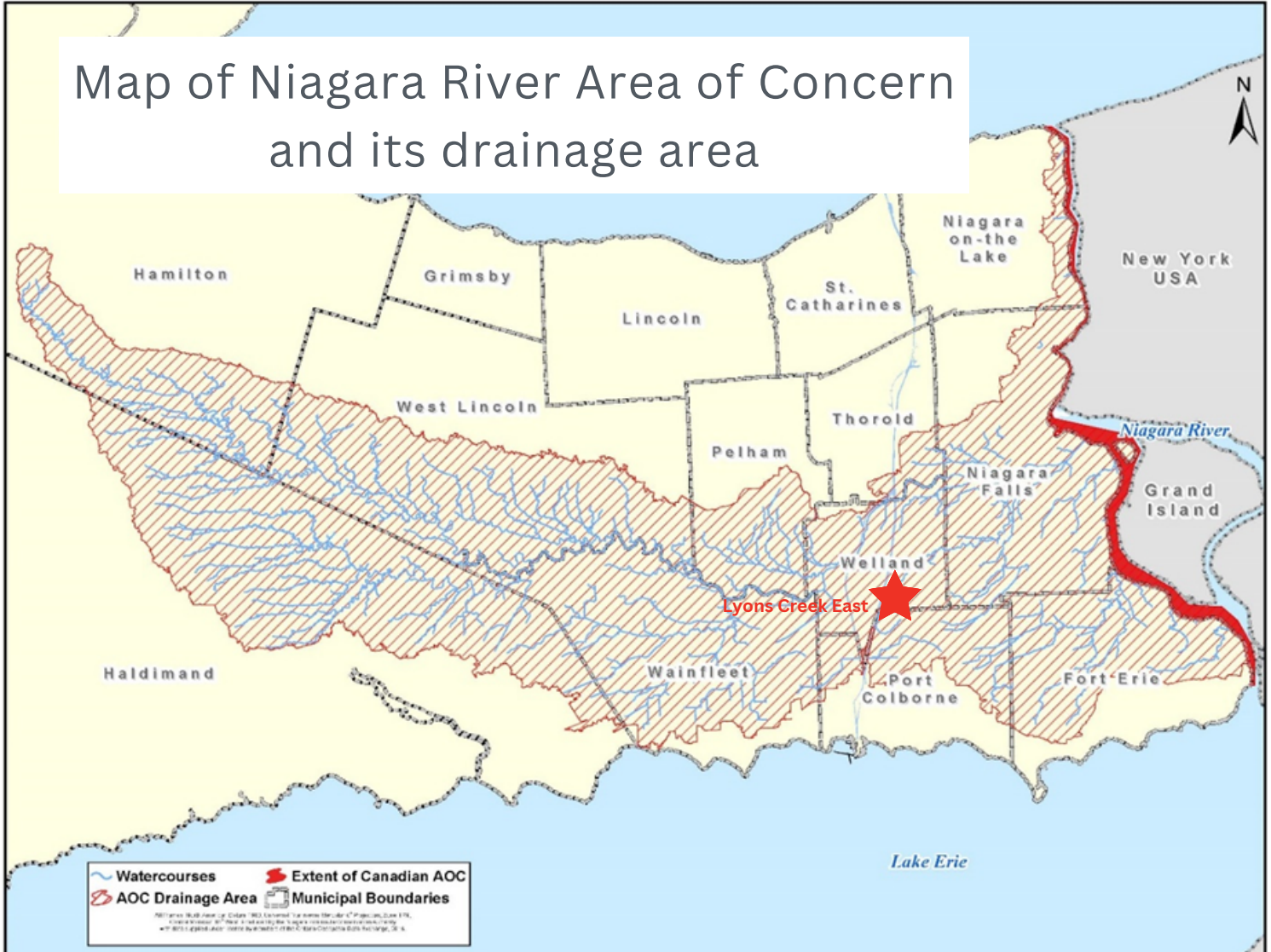
Great Lakes Areas of Concern



Canada

U. S. A.

Map of Niagara River Area of Concern and its drainage area



 Watercourses
 Extent of Canadian AOC
 AOC Drainage Area
 Municipal Boundaries

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There are 14 potential impairments linked to human, ecosystem or economic benefits to be addressed through the Remedial Action Plan

IMPAIRED



Loss of fish and wildlife habitat



Restriction on fish consumption



Degradation of fish and wildlife populations



Degradation of benthos

The benthos impairment is linked to the Lyons Creek East contaminated sediment site.

NOT IMPAIRED



Tainting of fish flavour



Degradation of fish and wildlife populations



Degradation of aesthetics



Restrictions on drinking water consumption



Degradation of plankton populations



Eutrophication or undesirable algae



Added costs to agriculture or industry



Fish tumours or deformities



Bird deformities or reproductive problems



Beach closings

Benthic invertebrates (benthos) are small bugs that live in sediments. They are good indicators of ecosystem health because of their close contact with sediments and linkage to animals further up the food chain.



Examples of Benthic Invertebrates



Decades of progress to restore the Niagara River's water quality & ecosystem health

- Niagara River identified as Great Lakes Areas of Concern
- Creation of Niagara River RAP partnership

1985 - 1989

1990 - 1999

- Problem identification
- Contaminated sediment sites prioritized
- 10,000 m³ contaminated sediment removed from Welland Reef site

- Implementation plan updated
- Three impairments removed (fish tumours, dredging, bird reproduction)
- Study shows 50% reduction of priority toxic chemicals in Niagara River

2000 - 2009

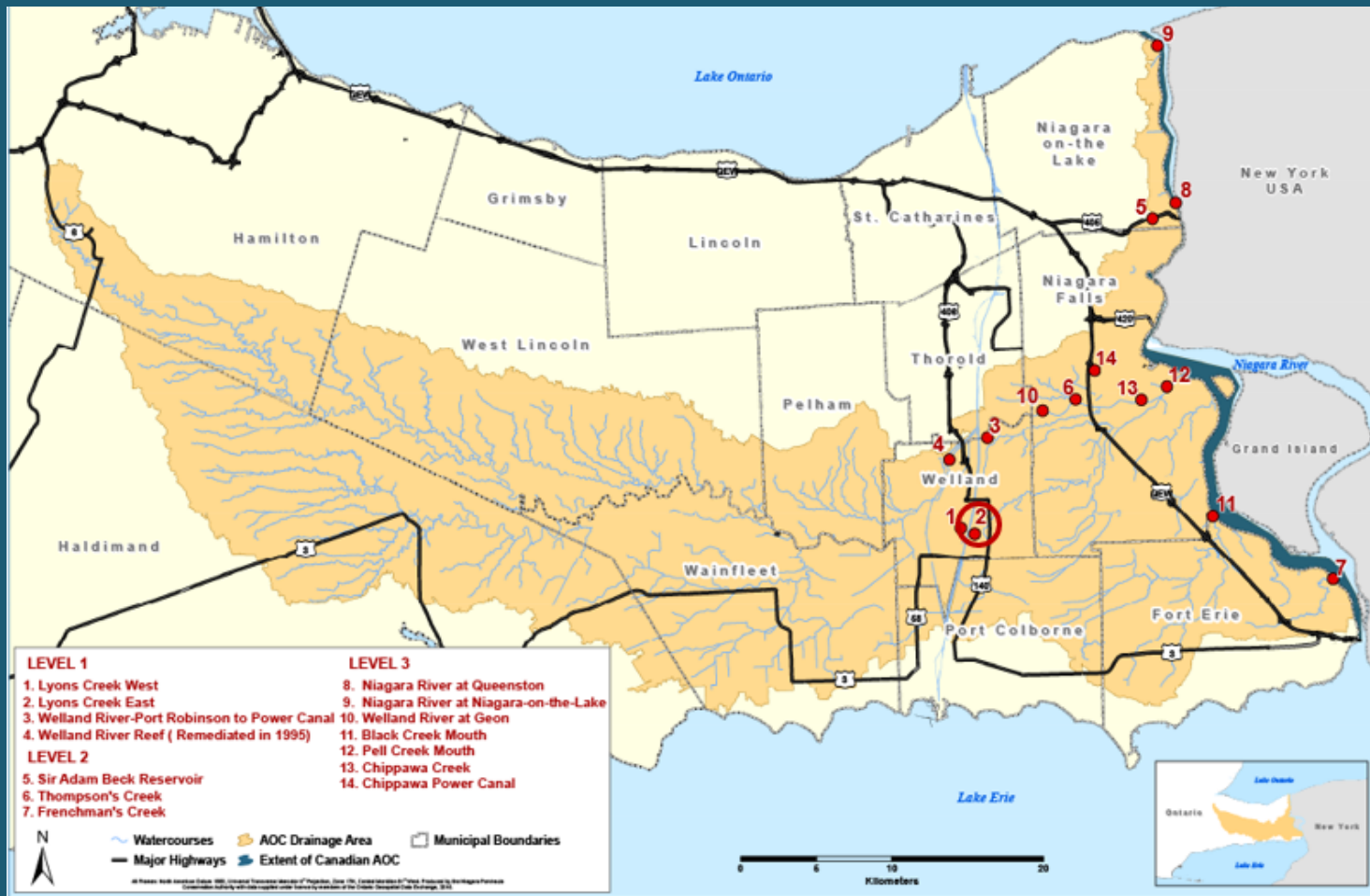
- Two impairments removed (algae & plankton)
- Monitored Natural Recovery at remaining contaminated sediment site
- Four coastal wetlands created

2010 - 2019

- 5-year Delisting Plan completed
- Beach closings impairment removal in progress
- Three coastal wetlands created

2020 - today

In the 1990s, 14 contaminated sediment sites were identified and prioritized through the Niagara River Remedial Action Plan program. Lyons Creek East is the last site requiring action.



History of Lyons Creek

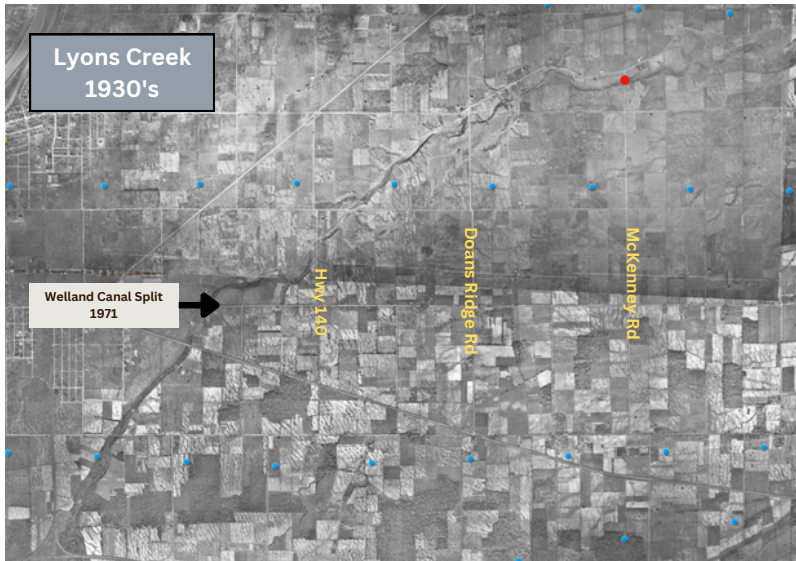
Lyons Creek was bisected in 1971 with the construction of the Welland Canal.

An investigation in the 1990s found polychlorinated biphenyls (PCBs) in Lyons Creek East.

The type and depth of the PCBs indicated that the contamination was in the creek from historic sources.

In 2008, monitored natural recovery was selected to manage the sediments.

Lyons Creek East is the last contaminated sediment site requiring cleanup as part of the Niagara River Remedial Action Plan.



What are Polychlorinated Biphenyls (PCBs)?

PCBs are human-made organic chemicals once used in hundreds of industrial applications.

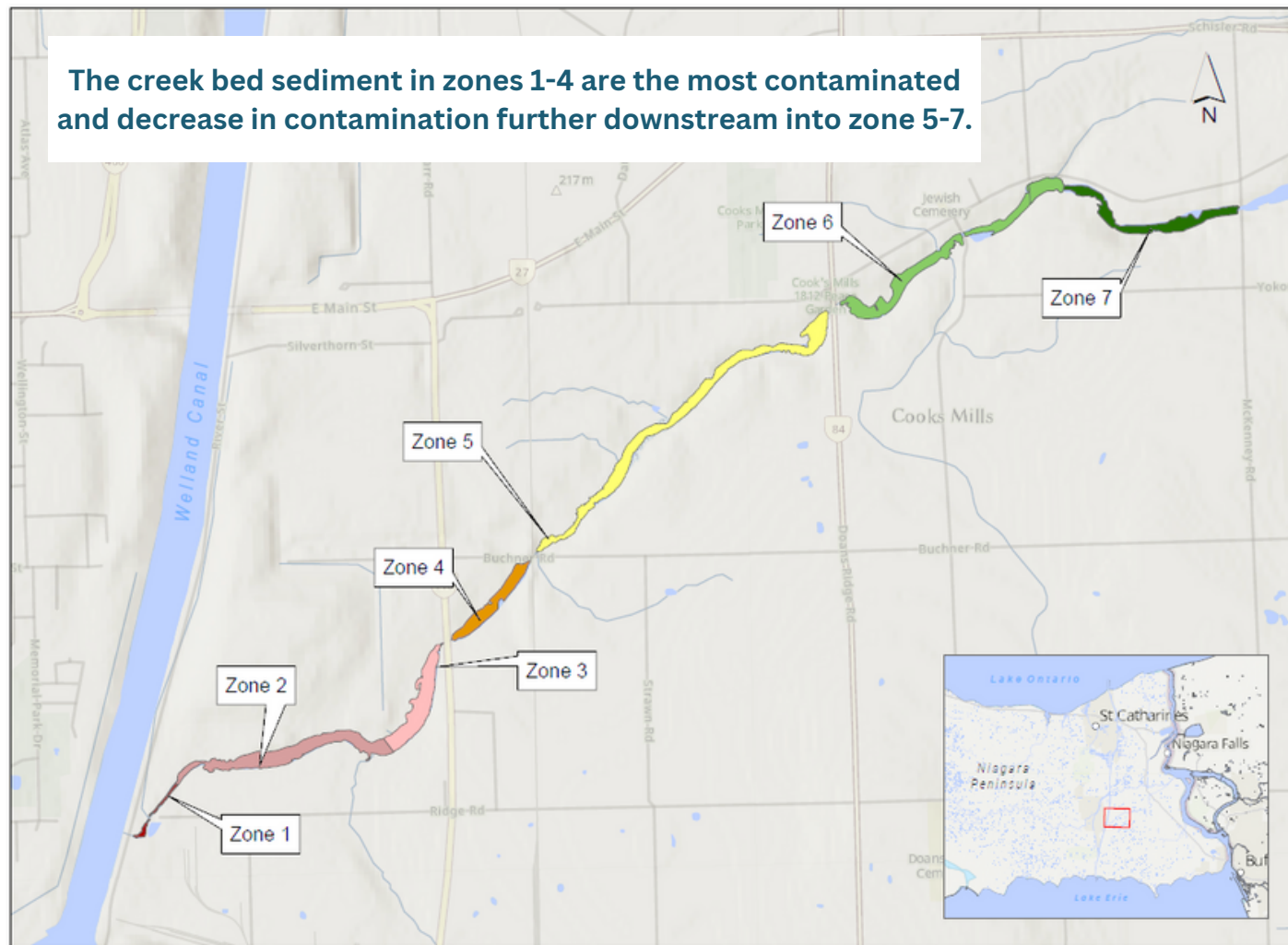
Introduced in the 1930s as dielectric fluids in electrical transformers and high temperature lubricants. They were broadly used after 1945.

PCBs were banned in 1977 for concerns regarding their persistence in the environment and demonstrated adverse health effects in humans and animals.



Sediment cores taken from Lyons Creek East for analysis. Note the black colour (PCBs) at the bottom of the cylinder compared to the light brown (cleaner) sediments near the top.

The creek bed sediment in zones 1-4 are the most contaminated and decrease in contamination further downstream into zone 5-7.



A lush green forest with a stream in the foreground, serving as a background for the text. The stream is calm, reflecting the surrounding greenery. The trees are dense and vibrant green, with some branches hanging over the water. The overall scene is a natural, serene environment.

Between 2005-2008, several studies were conducted to determine potential cleanup options (e.g., monitored natural recovery, enhanced Natural Recovery, capping, and removal) to manage the contaminated sediment in Lyons Creek East.

In consideration of scientific evidence and public consultation, the monitored natural recovery approach was the selected option with administrative guidance added to limit activities that could disturb the sediments.

Monitored Natural Recovery Approach



Cleanup target protects mink from contamination-related reproductive risks



Fish tissue is monitored for PCB concentration



Cleanup target protects the Kingfisher from contamination-related reproductive risks

↑
Time

Clean sediments are expected to accumulate over time to provide a barrier from contaminated sediments



Benthic invertebrates are monitored for PCB concentration, toxicity, and community structure



Snapping turtle eggs are monitored for PCB concentration

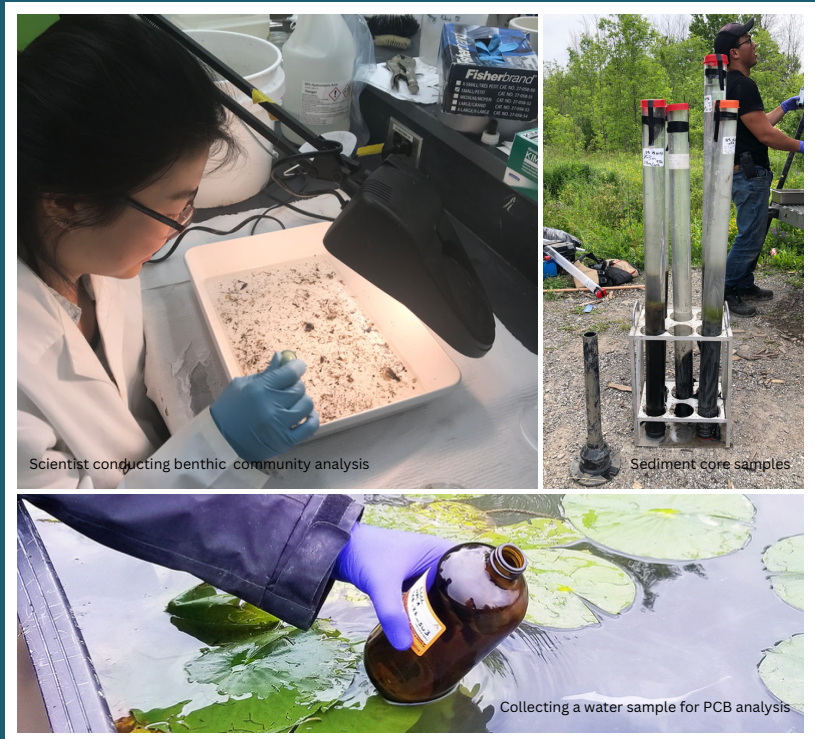
Sediment chemistry sampled to estimate natural recovery over time.



PCB Contaminated Sediment

Since 2008, various scientific lines of evidence have been monitored to understand if natural recovery is occurring, including:

- Sediment cores
- Fish tissue
- Benthic tissue
- Benthic community
- Water chemistry
- Snapping turtle eggs
- and more!



Monitoring indicates that natural recovery has not occurred in some portions of the creek.