NIAGARA RIVER
Remedial Action Plan

Delisting Strategy

Niagara River (Canadian) Area of Concern

2025-2029

Delisting Strategy: Niagara River (Canadian) Area of Concern 2025-2029

March 2026	Report presented to RAP Council for review
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July 2026	RAP Coordinating Committee acceptance of finalized document

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LAND ACKNOWLEDGMENT

The Niagara River, its shorelines, and watershed are steeped in the rich history of the Haudenosaunee, Attiwonderonk (Neutral), and the Anishinaabeg, including the Mississaugas of the Credit. There are many First Nations Peoples, Métis citizens and Inuit from across Turtle Island that live and work here today. This territory is covered by the Between the Lakes Treaty No. 3 (1792), Treaty No. 4 (Haldimand Tract 1793) and Treaty 381 (1781). The land is protected by the Dish with One Spoon Wampum Agreement and Two Row Wampum. This land acknowledgment is one way in which we can support reconciliation, shared stewardship of nature, and deep appreciation of Indigenous culture and history. As part of reconciliation, we are all Treaty people and have a responsibility to honour and uphold these agreements.

EXECUTIVE SUMMARY

In 1987, the Niagara River was listed as one of 43 Great Lakes Areas of Concern (AOC) requiring a locally developed and implemented Remedial Action Plan (RAP) mainly due to habitat loss and water quality issues.

Since then, tremendous progress has been made by Niagara River RAP partners to improve water quality and ecosystem health in the Niagara River and remove identified Beneficial Use Impairments (BUIs). In fact, when the first RAP Report was completed in 1993, eight out of fourteen BUIs were deemed impaired and two required further assessment. Today, only three BUIs remain impaired thanks to significant work done to identify priority actions required to meet delisting criteria. Completion of actions identified in the Delisting Strategy: Niagara River (ON) Area of Concern (NRRAP 2021) has resulted in the official re-designation of the *Beach Closings* BUI in 2023 and *Degradation of Fish and Wildlife Populations* BUI in 2025. The Canadian side of the Niagara River AOC is currently addressing the following three remaining BUIs:

- Restrictions on Fish Consumption
- Degradation of Benthos
- Loss of Fish and Wildlife Habitat

As of 2026, all recommended actions for the *Loss of Fish and Wildlife Habitat BUI* have been completed, and preliminary assessment indicates all criteria have been met. An assessment report and engagement period will be the next major steps to be completed for this BUI. If there is support for BUI status re-designation from local Indigenous communities, partners, and other interested organizations or individuals, the BUI will be submitted to Canada and Ontario for official re-designation, which is anticipated for 2027.

Progress on accomplishing remaining actions will continue for the other two BUIs: *Degradation of Benthos* and *Restrictions on Fish Consumption*. As work towards addressing these two BUIs continues, it is imperative that there is a clear and evidence-based course of action to guide involvement from partner organizations over the next 5 years (2025-2029). This latest version of the Niagara River (CDN) Delisting Strategy provides a current summary of BUIs, and remaining actions required to meet delisting criteria and sets the path forward to ensure continued, targeted efforts toward delisting the Niagara River (CDN) Area of Concern, together!

LEARN MORE ABOUT THE NIAGARA RIVER (CDN) REMEDIAL ACTION PLAN

Recommended Resources (linked to online documents and webpages)
Key Documents Delisting Strategy: Niagara River (ON) Area of Concern (2021) [Major RAP Report] Great Lakes Water Quality Agreement [Federal Government website] Canada-Ontario Great Lakes Agreement [Provincial Government website]
Niagara River Remedial Action Plan Website Niagara River (Ontario) Remedial Action Plan [Home page] About the Niagara River RAP Track the Progress of the Niagara River (Ontario) Area of Concern Document Library [Repository with report and information resources]
Recent BUI Re-designation Assessment Report(s) Degradation of Fish and Wildlife Populations Beneficial Use Impairment Assessment Report Beach Closings Beneficial Use Impairment Assessment Report Status Assessment Report: Phytoplankton and Zooplankton Populations in the Niagara River Area of Concern Re-Designation Report: Eutrophication or Undesirable Algae in the Niagara River Area of Concern
Niagara River AOC Reports Annual Progress Update (2017-2018) Niagara River AOC Update - 2012 [English] Niagara River AOC Update – 2010 [English] / Niagara River AOC Update – 2010 [French] Niagara River RAP Stage 2 Update Report (2009) Niagara River AOC Update – 2002 [English] Niagara River RAP Implementation Annex - 2000 Niagara River RAP Stage 2 Report: The Cleanup Connection - 1995 Niagara River RAP Stage 1 Update: Environmental Conditions and Problem Definition – 1995 Niagara River RAP Stage 1 Report: Environmental Conditions and Problem Definition – 1993

LIST OF ACRONYMS

AOC .....Area of Concern
BaP .....Benzo[a]pyrene
BAP .....Bioassessment Profile
BUI .....Beneficial Use Impairment
CDN .....Canadian
COA .....Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health
CWA.....Canada Water Agency (formerly ECCC)
ECCC .....Environment and Climate Change Canada
E.Coli .....*Escherichia coli*
GIS .....Geographic Information System
GLWQA .....Great Lakes Water Quality Agreement (between Canada and U.S.)
HCB .....Hexachlorobenzene
Hg .....Mercury
IJC .....International Joint Commission
LCE .....Lyons Creek East
MECP .....Ministry of the Environment, Conservation and Parks
MNR .....Ministry of Natural Resources
NPC.....Niagara Parks Commission
NPCA .....Niagara Peninsula Conservation Authority
NRPHU .....Niagara Region Public Health Unit
NRRAP.....Niagara River Remedial Action Plan
NRTMP .....Niagara River Toxics Management Plan
NYSDEC .....New York State Department of Environmental Conservation
NYSDOH.....New York State Department of Health
PCB .....Polychorinated biphenyl
QRB.....Queen's Royal Beach
RAP .....Remedial Action Plan
SMO .....Sediment Management Options
U/D .....Upstream/Downstream
U.S. .....United States of America
UNR .....Upper Niagara River
USACE.....United States Army Corps of Engineers
USGS.....United States Geological Survey

1 INTRODUCTION

The Niagara River is a 58 km bi-national connecting channel linking Lake Erie to Lake Ontario. It is unique from the other Great Lakes' connecting channels as it is naturally divided into two distinct upper and lower portions, created by the Niagara Falls—a 52-meter drop in elevation (**Figure 1**).

The Niagara River provides essential services and environmental features necessary for its distinct and vibrant ecosystems and is recognized as a Key Biodiversity Area and Important Bird Area supporting thousands of migrating birds each year. In 2019 it was designated by the United States as a Ramsar Wetland of International Importance for its unique ecological significance.

Humans continue to rely on the Niagara River as a source of drinking water, power generation, and a space to participate in recreational activities, such as fishing, sightseeing, and boating for the people living in the surrounding communities, as well as visiting tourists.

Figure 1. *Image of Niagara Falls showing the 52-meter waterfall with the Lower Niagara River at its base and the Upper Niagara River at the top. Photo by Simon Wilson/ Canadian Press Images.*

Why was the Niagara River designated as an Area of Concern?

In the 1870s, Niagara Falls was becoming a popular tourist destination but initially lacked controls to prevent privatization and commercial development. Concerns started to arise from members of the public, and in March 1885, Ontario Premiere Oliver Mowat introduced the

Niagara Falls Park Act, which established the Queen Victoria Park at Niagara Falls as the first provincial park in Ontario (Marsh 2006; Niagara Falls Info n.d.; Ontario Heritage Foundation 2005). The goal of the Act was to restore scenery around Niagara Falls, preserve the area from further deterioration and uncontrolled development, and maintain free access to observation points for all. These initial actions laid the foundation of the Niagara Parks Commission and future agreements that continue to ensure environmental protection and recreational enjoyment of the entire Niagara River corridor (Niagara Falls Info n.d.; Ontario Heritage Foundation 2005). Despite these efforts to protect the natural heritage features and public access along the Niagara River corridor, long-term water pollution and land use issues (both locally and throughout the Great Lakes) continued to impact the Niagara River's ecosystem health[1]. Following decades of work and commitments by the governments of Canada and the United States to improve the Great Lakes, the Niagara River was identified as one of 43 Great Lakes' Areas of Concern (AOCs) (**Figure 2**) in 1987 as part of the Canada-U.S. Great Lakes Water Quality Agreement (GLWQA).

Each AOC has its own locally developed and coordinated Remedial Action Plan (RAP), as required by the GLWQA, to guide cleanup efforts that support the restoration of a possible total of 14 Beneficial Use Impairments[2] (BUIs). The Niagara River is one of five bi-national AOCs.

[1] An overview of the history surrounding pollution and restoration in the Niagara River, including government agreements that led to the identification and corresponding remediation activities is found in **Appendix A: Historical Overview**.

[2] Beneficial Use Impairment (BUI) is defined as an ecosystem indicator that is related to the economic, human health, and environmental beneficial uses that are provided by the waters of the Great Lakes.

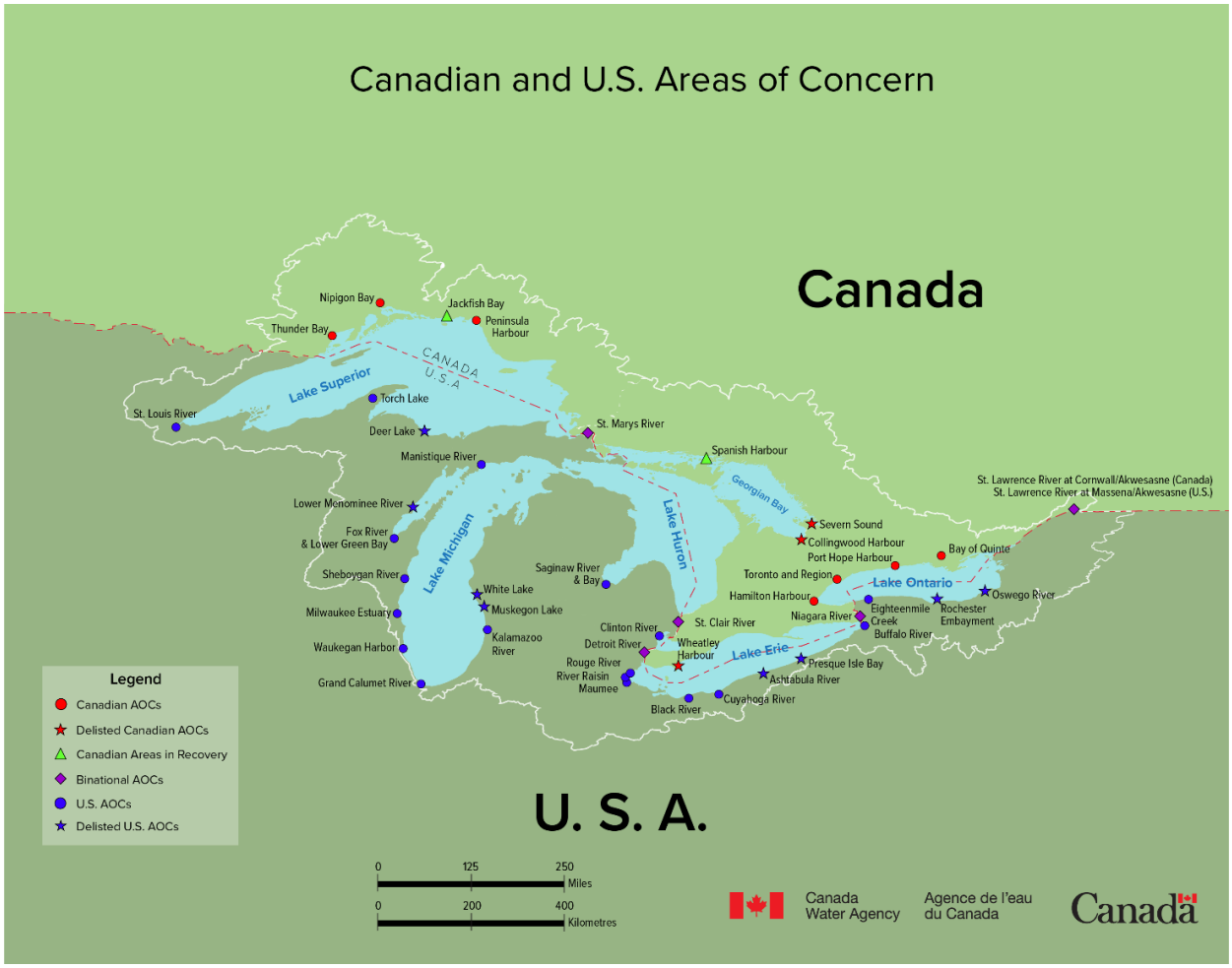

Figure 2. *Areas of Concern across the Great Lakes as identified in the Great Lakes Water Quality Agreement. Updated 2025. Image source: Canada Water Agency.*

Of the 14 possible BUIs, the Niagara River RAP Stage 1 Report (Environmental Conditions and Problem Definition) identified eight 'Impaired', two that required further assessment and four that were 'Not Impaired' (**Figure 3**). Actions to address each of these BUIs were determined and can be found in the 1995 Niagara River RAP Stage 2 Report (The Cleanup Connection). By 2009, in the Niagara River RAP Stage 2 Update Report, because of remediation efforts, three more BUIs were designated, 'Not Impaired'. Work continued to progress, resulting in the removal of two BUIs in 2019, leaving five BUIs 'Impaired'. Actions to address the remaining five BUIs were determined through a collaborative effort and can be found in the Delisting Strategy (NRRAP 2021).

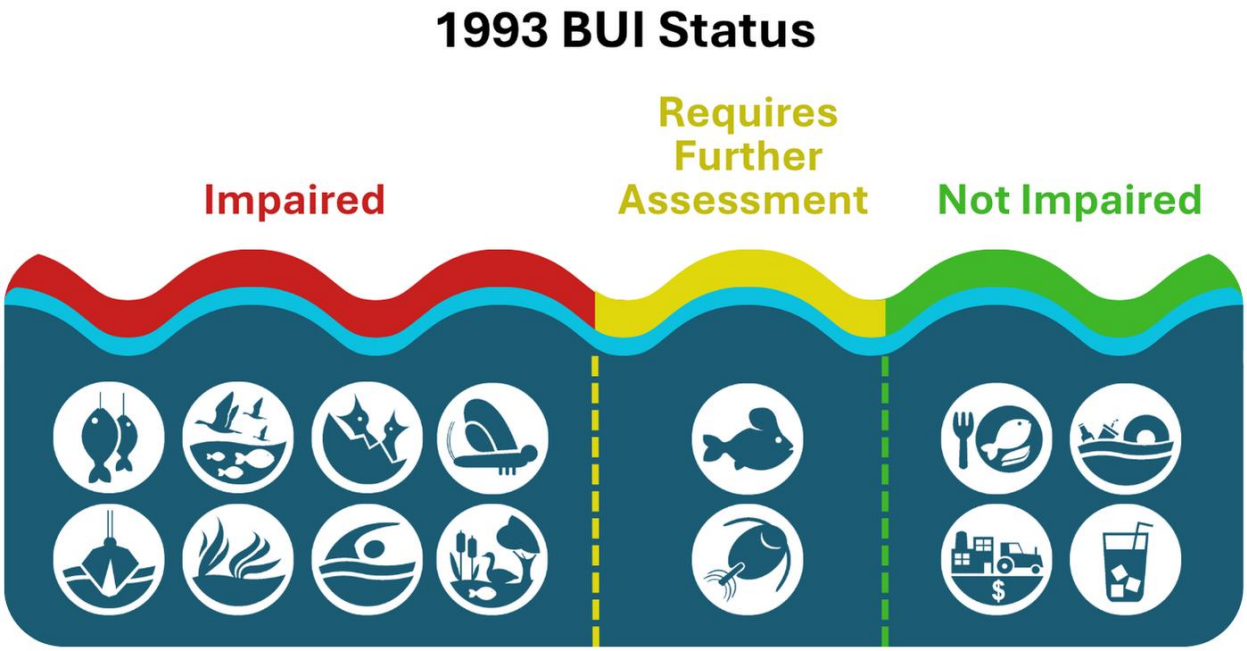

Figure 3. *BUI Status Niagara River (CDN) as of 1993. BUIs Impaired: Restrictions on fish consumption, Degradation of fish and wildlife populations, Bird/animal deformities or reproduction, Degradation of benthos, Restrictions on dredging activities, Eutrophication or undesirable algae, Beach closings, and Loss of fish and wildlife habitat. BUIs that Required further assessment: Fish tumours or deformities and Degradation of phytoplankton and zooplankton populations. BUIs Not impaired: Tainting of fish/wildlife flavour, Degradation of aesthetics, Added costs to agriculture or industry, and Restrictions on drinking water consumption.*

Tremendous progress has been achieved through extensive collaboration and combined efforts from all levels of government (federal, provincial, municipal), local Indigenous communities and partners, academic researchers, environmental organizations, and interested groups and members of the public. In 2023, the *Beach Closings* BUI was re-designated to 'Not Impaired' and in 2025, the *Degradation of Fish and Wildlife Populations* BUI was also re-designated 'Not Impaired'. Today, the Niagara River AOC has the following three remaining BUIs that are 'Impaired' (**Figure 4**):

- Restrictions on Fish Consumption
- Degradation of Benthos
- Loss of Fish and Wildlife Habitat

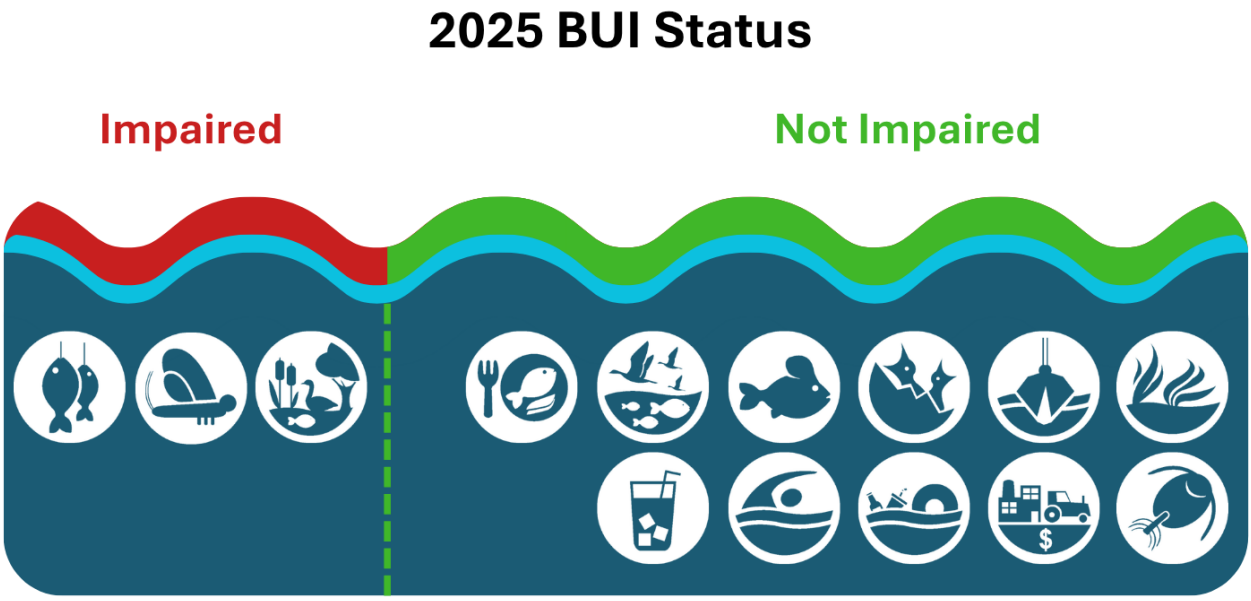

Figure 4. *BUI Status Niagara River (CDN) as of 2025. BUIs Impaired: Restrictions on fish consumption, Degradation of benthos, and Loss of fish and wildlife habitat. BUIs Not Impaired: Tainting of fish/wildlife flavour, Degradation of fish and wildlife populations, Fish tumours or deformities, Bird/animal deformities or reproduction, Restrictions on dredging activities, Eutrophication or undesirable algae, Restrictions on drinking water consumption, Beach closings, Degradation of aesthetics, Added costs to agriculture or industry, and Degradation of phytoplankton and zooplankton populations.*

Although the Niagara River is a shared, binational AOC, there are separate (but complementary) RAPs on both sides of the international border due to differing regulatory systems, issues, and required actions. Coordinated efforts by both Canadian and American agencies often benefit the entire Niagara River ecosystem. While the focus and information of this document are intended for the Canadian side of the Niagara River AOC, there is a section summarizing efforts by the U.S. RAP to address their remaining BUIs. For information about the efforts on the U.S. side of the Niagara River, visit www.epa.gov/great-lakes-aocs/about-niagara-river-aoc.

Though restoration to pre-industrial conditions is not possible through the Niagara River (CDN) RAP, extensive restoration has addressed and continues to address BUIs and restore the Niagara River ecosystem to a state that is comparable to nearby Great Lakes. An overview of the progress and milestones achieved by the NRRAP Team is outlined below.

PROGRESS AND KEY MILESTONES

1987

- Niagara River identified as one of 43 Areas of Concern requiring a Remedial Action Plan to guide ecosystem improvements

1993-1995

- Reducing loads of 18 priority industrial chemicals by up to 99% by 1995
- Completion of Stage 1 (1993) and Stage 1 Update (1995a) *Environmental Conditions and Problem Definition*
    - Reports noted that there were eight BUIs, two required further assessment, and four were considered 'Not Impaired' (**Figure 3**).
- Completion of Stage 2 RAP Report (1995b) entitled *The Cleanup Connection* which outlined detailed remediation actions.
- Contaminated sediment remediation project completed at Welland River Reef, with the removal of nearly 10,000m^2 of industrial mill scale metallic particles (1995).

1996-2009

- Completion of Stage 2 Implementation Annex (2000) and Stage 2 RAP Update (2009)
- Niagara Peninsula Conservation Authority begins leading NRRAP coordination (1999)
- Three BUIs are re-designated to 'Not Impaired' (2009)
- Contaminated sediment remediation projects completed:
    - Welland River Reef Project Assessment Report completed (1997)
    - Monitored Natural Recovery approach selection for Lyons Creek East including a robust long-term monitoring program collecting sediment and benthic invertebrates (2006-2022);
- Improved/removed 165 fish barriers to open 800 km of fish passage through the Welland River fish barrier program supporting fish migration routes

2010-2025

- Lyons Creek East, Welland
    - Administrative Controls Protocol signed and implemented (2011)
    - Decision to move forward with an alternate sediment remediation approach when it was determined natural recovery was not progressing in areas of the creek (2022)
    - Studies to assess the ecology of the area, sediment sampling, and geotechnical studies to determine a recommended approach for sediment removal
- Two BUIs re-designated to 'Not Impaired' (2019)
    - Addressing nutrient and pollutant runoff from rural lands into the watershed

    - Studies show no issues with algae and plankton that are important parts of the food chain
- Produced first Delisting Strategy (NRRAP 2021) with action plan for addressing five remaining BUIs
- Re-designation of *Beach Closings* BUI (2023)
    - Identifying and addressing sources of bacteria that impacted safe swimming at a local beach
- Re-designation of *Degradation of Fish and Wildlife Populations* BUI (2025)
    - Studies included: Assessment of fish populations (2015-2017) and sentinel bird populations (2018-2019)
- Angler survey project completed to determine fish consumption habits for the Canadian side of the Niagara River (2019-2023)
- Niagara River Coastal Wetland Restoration Projects that restored habitat at seven (7) specific coastal wetland areas along Upper Niagara River. These projects resulted in 7.5 hectares (18.5 acres) of wetland habitat, including a 1.5 hectare (4 acre) inland pond and marsh at Gonder's Flats; and restoration of nearly 2 km of shoreline with 30,000 native trees, shrubs, and wildflowers planted.
- Restored over 750 meters of eroding riverbank through Niagara Riverbank Stabilization Project.

2 PURPOSE

As progress to address remaining BUIs continues, it is imperative to have a clear, updated and evidence-based course of action and involvement from partner organizations. The purpose of the Niagara River (CDN) Delisting Strategy is to provide an up-to-date summary of information about the Niagara River's remaining BUIs, impart guidance on BUI removal through specific BUI delisting criteria, and to identify the recommended priority actions for each of the remaining BUIs.

While technical experts have done their best to identify all possible actions necessary to achieve BUI re-designation, it is possible that fewer or additional actions may be required to achieve the goals of the BUI delisting criteria. It is recommended that the RAP partners review this document and create work plans annually to ensure continued, targeted efforts toward delisting.

The information, BUI delisting criteria, and remedial and monitoring actions in this document supersede the information and recommendations in previous RAP reports and will be used for all future assessments pertaining to the Niagara River (CDN) AOC.

3 SUMMARY OF PROGRESS: 2019-2024

OVERVIEW

In 2021, the Niagara River RAP released its first 5-year delisting plan (NRRAP 2021) which included updated BUI delisting criteria, a list of key priority remedial actions to remove the remaining five BUIs, and guidance for conducting assessments of delisting criteria. Starting as early as 2019 (while the plan was being drafted) until 2024, technical working groups worked diligently in taking steps towards meeting the BUI delisting criteria, as required. This section provides a summary of progress for each of the five remaining BUIs noted in the Niagara River (ON) Area of Concern Delisting Strategy (NRRAP 2021) (i.e., Restrictions on Fish Consumption, Degradation of Fish and Wildlife Populations, Degradation of Benthos, Beach Closings, and Loss of Fish and Wildlife Habitat), including current status, a short description, and summary of achieved actions to date. A description of the delisting criteria required for re-designation from "Impaired" to "Not Impaired" for each BUI is outlined below in the **SUMMARY OF BUI DELISTING CRITERIA** table. For more information about these five BUIs, refer to the Delisting Strategy (2021).

SUMMARY OF BUI DELISTING CRITERIA

BUI Name	The BUI will no longer be impaired when:
BUI #1 Restrictions on Fish Consumption	1) Consumption advisories for fish of interest in the AOC are unrestricted; *OR* 2) Consumption advisories for fish of interest are no more restrictive than the advisories for suitable reference sites due to contaminants (PCBs and dioxin-like PCBs) from locally controlled sources; *OR* 3) Multiple lines of evidence indicate improving conditions over time and all feasible remedial actions are complete.
BUI #3 Degradation of Fish & Wildlife Populations	**Fish** 1) Multiple lines of evidence indicate similarity between the Niagara River fish community and expectations based on the adjoining Great Lakes. **Wildlife** 1) A monitoring plan is developed and there is a commitment confirmed by local partners for long-term implementation at suitable wetland sites along the upper Niagara River; *AND* 2) Breeding colonial waterbird populations within the Niagara River AOC are the same as (or better than) suitable reference sites; *AND* 3a) Temporal trends in contaminant concentrations in eggs, tissues, or whole-body burden of sentinel species in the Niagara River AOC are stable or declining; *AND* 3b) spatial comparisons show that contaminant concentrations in eggs, tissues, or whole-body burden of sentinel species in the Niagara River AOC are the same as (or better than) suitable reference sites; *OR* 3c) If the contaminant concentrations in 3a or b are not met, then they must not exceed established thresholds associated with potential population-level effects (i.e., reproductive impacts).
BUI #6 Degradation of Benthos	1a) acute and chronic toxicity, community composition, and abundance in the benthic community are similar to non-AOC reference sites, *AND* 1b) concentrations of biomagnifying contaminants (e.g., PCBs and dioxin-like PCBs) within benthic invertebrate tissues are comparable to a suitable non-AOC reference site; *OR*

BUI Name	The BUI will no longer be impaired when:
	2) if a contaminated site fails to meet criteria 1a and 1b, then benthic invertebrate tissue contaminant concentrations are greater than reference sites but below concentrations considered to impair the beneficial uses associated with the consumption of fish and wildlife. 3) if a contaminated site fails to meet the criteria above, then a risk based contaminated sediment management approach/strategy must be in place with appropriate monitoring and mitigation measures and/or administrative controls.
BUI #10 **Beach Closings**	1) Prominent sources of fecal pollution that could contaminate the beach or recreational waters are known and remedial actions to address known sources are identified and completed; *AND* 2) At least 80% of the geometric mean results of recreational water samples (when sampled at least once per week) meet the Ontario Ministry of Health Recreational Water Quality Guideline (≤200 CFU/100 mL) each swimming season for a minimum of three years; *AND* 3) Risk management actions (e.g., postings, signage, education, rain rule) are in place to protect human health.
BUI #14 **Loss of Fish and Wildlife Habitat**	1) 5-7 identified coastal wetland habitat projects on the Canadian side of the Upper Niagara River are complete; 2) at least 75% of the Niagara River (Canadian) shoreline is naturally vegetated; 3) there is a minimum 5-metre wide 'no mow' vegetated buffer along the publicly managed Canadian shoreline of the Upper Niagara River; and 4) the existing areal extent of unique wildlife habitat (i.e., Niagara Gorge) is at least 80% secured and managed for long-term conservation purposes.

3.1 BUI #1 RESTRICTIONS ON FISH CONSUMPTION

Status: *Impaired*

Anticipated Re-designation: *TBD*

Overview: In most AOCs, including the Niagara River, restrictions on fish consumption are due to legacy contaminants (e.g., polychlorinated biphenyls (PCBs)) that persist in the environment and can accumulate in fish tissue. The fish consumption beneficial use has been 'Impaired' for the Canadian side of the Niagara River since the completion of the RAP Stage 1 Report (1993). While contaminants in the Niagara River have declined over the past 30 years, the BUI remains impaired because certain chemicals limit consumption of certain species and sizes of fish (refer to *Guide to Eating Ontario Fish*: Lower Niagara River and Upper Niagara River).

Actions Taken 2019-2024

- Conducted online and in-person Niagara River angler surveys, with over 430 people participating. Data and summary reports were shared by local First Nations communities, and all data supported the identification of fish species being consumed from the Niagara River. Information about fish consumption behaviours, perceptions about pollution, and angler demographics was also collected.
- Created a comprehensive outreach and education "Eat Safe Fish" campaign to promote and incentivize the angler survey and help people understand which fish are best to eat from the Niagara River.
- Launched an annual 'Learn to Fish – Niagara River' event to raise public awareness of fishing best practices and safety, promote fishing along the shore of the river, and share more information about the Niagara River RAP.
- Ongoing relevant monitoring programs collected information on:
    - fish tissue contaminants, Ontario Fish Contaminants Monitoring Program (MECP);
    - water quality, Upstream-Downstream (U/D) Water Quality Monitoring (ECCC) as part of the Niagara River Toxics Management Plan (NRTMP);
    - U/D monitoring of contaminant trends over time (1986/87 to 2019/20) showed most contaminants generally decreasing at monitoring sites, with BaP, HCB, Hg, Mirex, and PCBs still exceeding the strictest agency guidelines[3] (Hill 2022);
    - sediment quality, Great Lakes Sediment Monitoring Program (ECCC).

[3] Agency guidelines came from five sources (CCME 2009; IJC 1987; NYSDEC 1998; OMOE 1994; USEPA 1999)

More information:

Guide to Eating Ontario Fish

Niagara River Toxics Management Plan (NRTMP)

Niagara River Mussel Biomonitoring Program: Long-term Water Quality Trends 2012-2018

3.2 BUI #3 DEGRADATION OF FISH AND WILDLIFE POPULATIONS

Status: *Not Impaired*

Re-designation Completed: *December 2025*

Overview: The *Degradation of Fish and Wildlife Populations* BUI is used to understand the impacts of human-induced legacy pollution (e.g., water and/or sediment pollution) on the overall fish community and health of fish-eating birds. Indicator species used to assess this BUI are those that rely on the waters of the Niagara River for breeding and feeding which would have regular exposure to potential in-river contaminants. Increased exposure to pollutants can result in disease, deformities, or other health issues that can negatively affect survival, growth, and the ability to reproduce, with subsequent population-level impacts. Studies assessing the composition of the fish community and health of colonial waterbirds, with comparison to suitable reference sites, were completed and concluded that BUI delisting criteria had been met.

Actions Taken 2019-2024

- Assessment of fish populations compared to adjacent Great Lakes (Ontario and Erie) and list of expected Niagara River fish were completed by scientists from the Department of Fisheries and Oceans.
- Assessment of wildlife populations was conducted to determine contaminant trends and populations for nesting colonial waterbirds within the Niagara River AOC compared to reference sites outside the AOC at appropriate locations.
- Long-term monitoring plan was finalized, and commitment was confirmed by local partners who will implement the plan beyond the life of the Niagara River RAP.
- All information from both studies was gathered and synthesized to assess the delisting criteria. With all criteria being met, the BUI was proposed for re-designation, and the formal engagement process was initiated in April 2024

Actions to Re-designate 2025

- After completing the engagement process (concluded in June 2025) and determining there was support from local Indigenous communities, technical experts, partners, and the public, the BUI was submitted for official re-designation.
- Re-designation was supported by the Canada and Ontario AOC leads, with official re-designation occurring in December 2025.

More Information

BUI 3 Re-designation Assessment Report, including technical studies (2025)

3.3 BUI #6 DEGRADATION OF BENTHOS

Status: *Impaired*

Anticipated Re-designation: *after 2030*

Overview: Toxic chemicals, such as polychlorinated biphenyls (PCBs) found in sediments can accumulate in benthos, a community of invertebrate organisms (e.g., crayfish, larval insects, worms), and move through the food chain as the organisms are eaten by fish and wildlife. Certain benthic species can tolerate living in polluted sediment (e.g., aquatic worms) while others are sensitive to pollution (e.g., stoneflies and mayflies). The presence of sensitive benthos is generally indicative of good water and sediment quality. Within the Niagara River AOC watershed, 14 potential sites were identified for further investigation in the Stage 1 RAP Update (1995a). Four of the 14 sites required remediation and Lyons Creek East is the last site due to legacy PCBs found in certain portions of the creek sediments.

Actions Taken 2019-2024

- Collection and analysis of sediment, pore water, surface water, vertical groundwater, hydrodynamics, and flow with comparison to a reference site, where required. Collection and analysis of tissues from benthic invertebrates, young-of-the-year fish, and snapping turtle eggs to measure PCB concentrations. Preparation of summary reports to support decision-making and determine whether natural recovery was successful following 15 years of monitoring.
- Conducted studies to determine the extent and depth of PCB contamination, as well as other data gaps when it was determined monitored natural recovery was not successful in some areas of the creek.
- Determined additional actions with input from experts, to shift to active remediation for areas of the creek not experiencing natural recovery, including review of administrative controls protocol, 4-season ecological study and the initiation of the sediment management options study.
- Gathered input from local Indigenous communities, technical experts, academic researchers, and the local community, and hosted two public information events to share results, next steps, and project progress, including formation of a public advisory group to ensure local perspectives were incorporated.

More Information

Lyons Creek East Get Involved Page (NPCA)
Collaborative monitoring of LCE using sediment, aquatic bugs, fish and wildlife (2019)
Ecological Study Report (2024)
PCB Trends in Snapping Turtle Eggs from Lyons Creek East (2024)
2022 Lyons Creek East Sediment Pore Water Survey
2021 Lyons Creek East Sediment Pore Water Survey

3.4 BUI #10 BEACH CLOSINGS

Status: *Not Impaired*

Re-designation Completed: *March 2023*

Overview: The *Beach Closings* BUI is meant to address water quality issues due to bacterial pollution from fecal pollution sources (e.g., sewage waste). This was one of the main environmental concerns when the Niagara River was first listed as an AOC. Swimming in waters with bacterial pollution increases the risk of infections of the ear, eye, nose, throat, and skin and may cause diarrhea if that water is ingested (Niagara Region, 2025). *Escherichia coli* (*E. coli*) is used as an indicator of fecal pollution for the purpose of beach monitoring across Ontario.

Actions Taken 2019-2024

- Improvements to storm and sanitary sewers were completed to address *E.coli* coming from human sources that was impacting water quality at Queen's Royal Beach (QRB), such as improper connections and infrastructure that was abandoned or in poor condition.
- A low-impact development was added at Simcoe Park to reduce bacterial loadings to the storm sewer system, including installation of signage to highlight the feature.
- Implementation of a maintenance plan for catch basins and storm drains to ensure they are free from sediment and debris (during project and beyond the RAP).
- Collection and monitoring of water samples from QRB three times a week during the swimming seasons between 2018-2020. Additional water monitoring was also done at nearby stormwater outfalls and catchment areas.
- Annual monitoring done by Niagara Region Public Health Unit (NRPHU) during the swimming season once per week to analyze water for *E.coli* (beyond the RAP).
- Communication using various methods (website, signage at the beach) to provide information about *E.coli*, including ways to stay safe (e.g., avoid swimming 24-48 hours after a rainfall, check NRPHU website before swimming).
- Following completion of all actions, all information was gathered and synthesized to assess the delisting criteria. With all criteria being met, the BUI was proposed for re-designation, and the formal engagement process was implemented.
- After determining there was support from local Indigenous communities, technical experts, partners, and the public, the BUI was submitted for official re-designation.
- Re-designation was supported by the Canada and Ontario AOC leads, with official re-designation occurring in March 2023.

More Information

Beach Closings Beneficial Use Impairment Assessment Report (2021)

3.5 BUI #14 LOSS OF FISH AND WILDLIFE HABITAT

Status: *Impaired, under assessment*

Anticipated Re-designation: *2027-2028*

Overview: The *Loss of Fish and Wildlife Habitat BUI* is intended to provide information about the physical integrity in Great Lakes AOCs and may link to other ecosystem issues such as changes in fish or wildlife community structure. The *Loss of Fish and Wildlife Habitat* BUI is one of the most common issues within AOCs (including the Niagara River). When the GLWQA was updated in 2012 to apply only on the "Waters of the Great Lakes" and not the entire watershed, a renewed focus on the Niagara River and current habitat issues within the revised bounds of the AOC emphasized identifying and addressing issues within these new parameters.

Actions Taken 2019-2024

- Surveys were completed (e.g., archeology, coastal wetland topographic and bathymetric) and coastal wetland habitats were constructed at Frenchman's Creek and Black Creek in collaboration with Niagara Parks Commission (NPC). These two projects were the final two of seven shoreline remediation projects that were completed along the Upper Niagara River (UNR) between 2017-2022. The other five habitat locations were: Ussher's Creek, Boyer's Creek, Baker's Creek, Gonder's Flats, and the Service Road 3 Wetland. Gonder's Flats remediation also included the construction of an inland marsh that enhanced habitats for bird and wildlife.
- These projects resulted 7.5-hectares (18.5-acres) of wetland habitat, including a 1.5-hectare (4-acre) inland pond and marsh at Gonder's Flats, and restoration of nearly 2-km of restored shoreline with native vegetation planted along the shoreline.
- Geographic Information System (GIS) data was combined with ground-truthing surveys to quantify the length of Canadian Niagara River shoreline that is naturalized.
- In collaboration with NPC, 26 low and high priority shoreline sites were identified along the UNR and enhancements to these coastal wetland areas were implemented in 2022-2024, including managing beyond the RAP. Five-meter no-mow vegetated buffers were planted with native vegetation and are managed by NPC, including education and communication with local residents.
- All actions were completed and an assessment of the delisting criteria is underway.

More Information

Restoring Our River Together: Binational Habitat Efforts
Bi-national Habitat Restoration

4 THE PATHWAY TO DELISTING: ACTIONS TO RE-DESIGNATE REMAINING BUIs 2025-2029

Under the Canada-Ontario Agreement, an Area of Concern (AOC) can be delisted when there are no longer any BUIs. BUIs with an 'Impaired' status require remedial actions that support and fulfill delisting criteria, whether via technical studies, assessments, remediation work, monitoring and/or other actions based on delisting criteria (NRRAP, 2021). Delisting criteria are determined with consideration for local conditions and established in consultation with the community (GLWQA 2012 p.22). In accordance with the Great Lakes Water Quality Agreement (GLWQA), an AOC cannot be delisted until all its 'Impaired' BUIs have had their delisting criteria met and have been officially deemed, 'Not Impaired' following the process outlined in **Appendix C: Delisting Framework.**

Within the Niagara River (CDN) AOC there remain three beneficial use impairments (BUIs), as of the end of 2024:

- Restrictions on Fish Consumption
- Degradation of Benthos
- Loss of Fish and Wildlife Habitat

This section provides a detailed description of the updated actions required to remove the remaining three impairments for the 5-year period (2025-2029). The updated actions were determined in consultation with technical expert working groups. A summary of the background information and respective delisting criteria is included in each section; however, it is recommended to refer to Delisting Strategy (NRRAP 2021) for a more detailed background on each BUI and its previous set of "Remaining Actions."

Details on work being done to address BUIs within the Niagara River (U.S.) AOC can be found in **Section 5: The American Connection** and online via U.S. Environmental Protection Agency **(Niagara River AOC)**

4.1 BUI #1 RESTRICTIONS ON FISH CONSUMPTION

Background

The *Restrictions on Fish Consumption* BUI in the Niagara River and other AOCs assesses whether legacy contaminants are driving fish consumption advisories. In 1984, the Niagara River Toxics Committee finalized a report which found 261 chemicals in the waters and sediment of the Niagara River (89% from sources on the U.S. side) (Hill & Klawunn n.d.; NRTC 1984). In 1987, under the Niagara River Toxics Management Plan (NRTMP), 18 priority toxins were targeted with the goal of achieving a 50% reduction for 10 specific toxins by 1996 (NRS 1999). While not specifically targeted to fish consumption restrictions or fish tissue concentrations, efforts of the NRTMP have been successful at reducing the amount of toxins found in Niagara River waters, thereby reducing fish exposure to them. By 1996, the targeted goal was achieved, and there was over a 50% reduction in the 18 priority toxins from known local sources; efforts continue to monitor toxins in both Canada and the U.S. (NRS 2007).

Contaminants in fish tissues are monitored, and consumption advice is shared publicly through the province-wide Fish Contaminant Monitoring Program led by the Ontario Ministry of Environment, Conservation, and Parks (MECP). The *Guide to Eating Ontario Fish* (*the Guide*) is a regularly updated resource that provides advice about fish consumption for lakes and rivers across Ontario, including the Great Lakes and its connecting channels, such as the Niagara River. The advice is grouped by geographic area, fish species, and divided based on the population of human consumers: general and sensitive (i.e., children and those who can and are of child-bearing age).

Within the Niagara River AOC, fish consumption restrictions linked to legacy contaminants are driven by polychlorinated biphenyls (PCBs), mercury, and dioxins/furans. PCBs and dioxin-like PCBs are manufactured chemicals and were first used in the 1920s in many industrial compounds (e.g., caulking, paint, coolants, electrical lubricants). Since the 1970s manufacturing and importing of these chemicals has been banned due to their impact on human and environmental health. PCBs, considered “forever chemicals”, do not break down in the environment, accumulate in sediment and can be consumed by lower trophic levels and move up the food chain as organisms are consumed. As per *the Guide* (June 2026), PCBs contribute to over 76% of advisories and 95% of advisories in the Upper and Lower reaches of the river, respectively. Though mercury and dioxins/furans are connected to some consumption advisories, mercury[4] has no known local sources and dioxins/furans are found only in specific species (Bhavsar et al. 2011; Gandhi et al. 2015; Mackay, 2007).

[4] Mercury is a is a global pollutant with its major source coming from atmospheric deposition (Bhavsar et al. 2011). Naturally occurring sources of mercury can be found in rocks, soil, and water bodies, and can also be released into the environment from human activities (e.g., coal-fire power generation, metal mining, waste incineration).

BUI Delisting Criteria

By using the tiered assessment framework (developed through the 2021 Delisting Strategy), *Restrictions on Fish Consumption* (BUI #1), will no longer be impaired when:

1) consumption advisories for fish of interest in the AOC are unrestricted; OR
2) consumption advisories for fish of interest are no more restrictive than the advisories for suitable reference sites due to contaminants (PCBs and dioxin-like PCBs) from locally-controllable sources; OR
3) multiple lines of evidence indicate improving conditions over time and all feasible remedial actions are complete.

Each delisting criterion is guided by an assessment tier, modified from Bhavsar (2018), to evaluate its status for the Niagara River. Based on the outcomes of the tiered evaluation(s), a recommendation is made to either maintain the 'Impaired' BUI status or to pursue the re-designation of the BUI to 'Not Impaired'. Not all the tiers need to be met for BUI removal.

For more details on the Delisting Criteria, see Delisting Strategy (NRRAP 2021). Details regarding the Tiered Assessment framework are in **Appendix D: BUI 1 Tiered Application Framework.**

BUI #1 - IMPLEMENTATION ACTIONS: 2025-2029

Item #	Recommended Action	2025	2026	2027	2028	2029	Lead(s)
1.1	Collect fish samples from the Niagara River to measure contaminants in fish tissues as part of the Ontario Fish Contaminants Monitoring Program.		●	●			MNR MECP
1.2	Gather information from ongoing water quality monitoring programs (e.g., Upstream-Downstream) to support the multiple lines of evidence required to assess the delisting criteria (i.e., contaminants related to fish consumption advisories).		●	●			ECCC CWA MECP
1.3	Gather information from ongoing sediment monitoring programs (e.g., NRTMP, Upstream-Downstream, Niagara Bar location) to support the multiple lines of evidence required to assess the delisting criteria (i.e., contaminants related to fish consumption advisories).		●	●			MECP ECCC CWA
1.4	Update and distribute 'Eat Safe Fish' educational materials (based on the Guide to Eating Ontario Fish) to share information about Niagara River fish consumption.		●	●			NPCA
1.5	Update the 'Eat Safe Fish' webpage on the Niagara River RAP website to share information about eating safe fish from the Niagara River.		●	●			NPCA
1.6	Design and install signage at key Niagara River fishing locations to inform anglers where to find information about fish consumption.			●			Niagara Parks
1.7	Compile all Niagara River fish consumption survey results and assess the BUI and delisting criteria using the tiered framework.	●	●	●			NPCA
1.8	Prepare a report that synthesizes and highlights key findings of the assessment with a BUI status recommendation.		●	●			NPCA
	If BUI status recommendation is 'Not Impaired', proceed with re-designation process (**Appendix B: Process for Re-Designating a BUI**)			TBD			NRRAP Council
	If BUI status recommendation is to remain 'Impaired', further discussions will be required for next steps.			TBD			

4.2 BUI #6 DEGRADATION OF BENTHOS

Background

Benthic invertebrates (or "benthos") are an important part of the food chain as a source of food for fish and aquatic birds. These bottom-dwelling organisms are also excellent indicators of local sediment and water quality conditions, because their limited mobility means they are continuously subjected to pollutants and environmental stream conditions within a small area. Certain benthic species can tolerate living in polluted sediment (e.g., aquatic worms, midge larvae) while others are very sensitive to pollution (e.g., caddisflies, stoneflies, and mayflies). The presence of sensitive benthic species is generally indicative of good water and sediment quality. Toxic chemicals such as polychlorinated biphenyls (PCBs) found in sediments of waterbodies can accumulate in benthic organisms and move up the food chain as they are eaten by fish and wildlife.

Specific to the Niagara River (CDN) AOC, the status of the *Degradation of Benthos* ecosystem indicator has been 'Impaired' since the completion of the Niagara River RAP Stage 1 Report, mainly because of contaminated sediments in the Welland River and other small tributaries near the Niagara River (NRRAP 1993). The Niagara River RAP Stage 1 RAP Report (1993) noted the Niagara River is not an ideal habitat for benthos due to its high-velocity water flow and lack of suitable substrate, but through the monitoring programs, it was determined benthos abundance and diversity in backwater areas were not impaired and habitat was suitable.

In the Niagara River RAP Stage 1 Update Report (1995a), 14 impacted sediment sites were identified, and each site was categorized based on severity, risk to human or environmental health, and whether remediation actions were required. Over the last two decades, several projects were undertaken to address the sites requiring cleanup. Today, only the Lyons Creek East contaminated sediment site remains as part of the Niagara River (CDN) RAP.

Lyons Creek is a tributary of the Welland River that eventually drains to the Niagara River. Specific areas of Lyons Creek East (LCE) (from the Welland Canal to Buchner Road) (**Figure 5**) contain high levels of historical sources of polychlorinated biphenyls (PCBs). Additionally, this portion of the creek is known to support species at risk (Lake Chubsucker and Grass Pickerel) and is considered a provincially significant wetland.

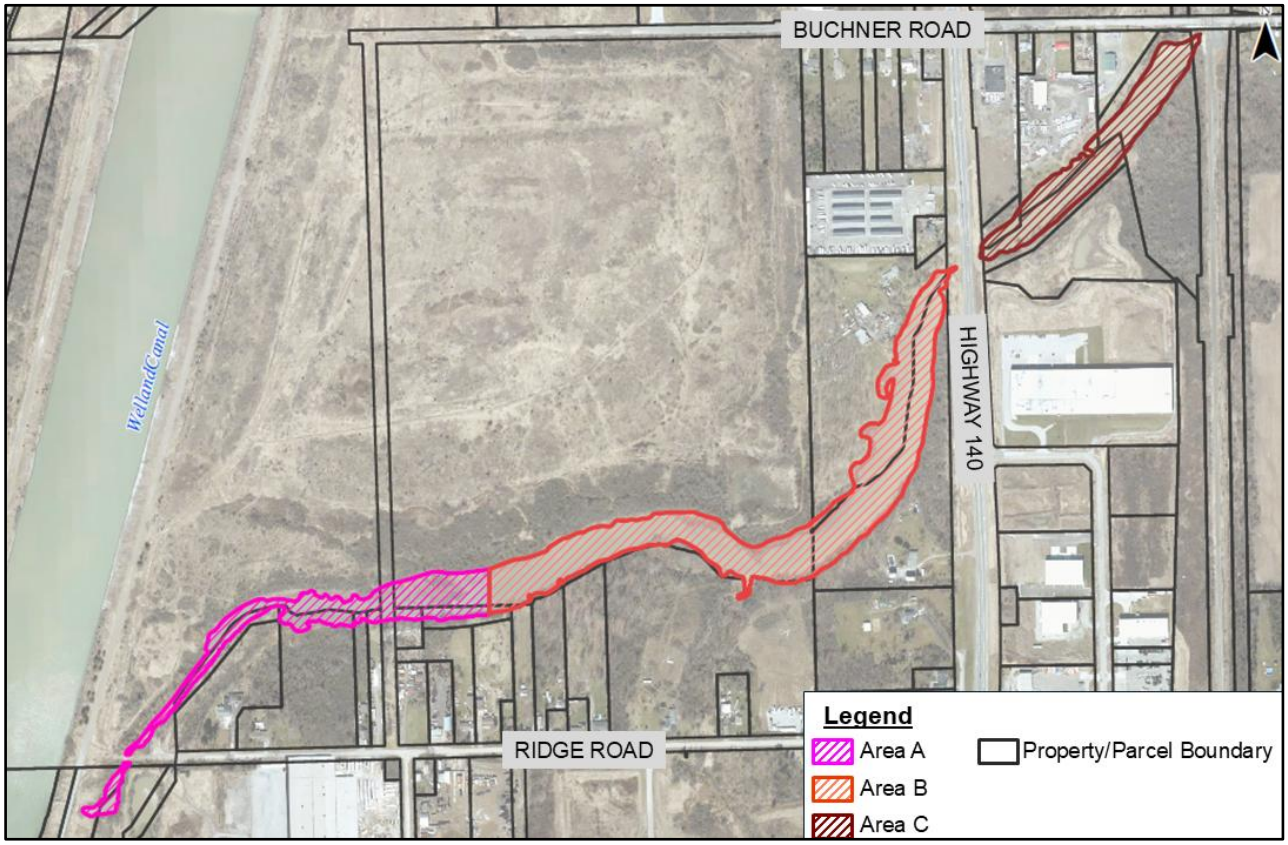

Figure 5. *Lyons Creek East contaminated sediment project site showing the three areas requiring remediation. The areas are differentiated by the concentration of PCBs found in each area with the highest PCB concentrations in Area A steadily decreasing to Area C.*

In 2008, monitored natural recovery was selected as the remediation approach for this site through the completion of many technical studies and in consultation with the community. Monitored natural recovery allows for the natural accumulation of sediment over the contaminated sediment, burying it further and further below the surface sediments. The success of this approach is determined by long-term monitoring of multiple lines of evidence (e.g., turtle eggs, water, sediment, benthic invertebrates, forage fish). In May 2023, partners informed the community [Slide deck] about the need to select a different cleanup approach after scientific information indicated natural recovery was not occurring in some areas of the creek particularly in areas close to the Welland Canal.

Since then, several technical studies and sampling have occurred, including a comprehensive four-season ecological study to inform decision-making on the selection of potential sediment management options. In 2025, a sediment management options (SMO) report [full report] was completed to provide recommendations on recommended cleanup approaches that address the contamination in parts of LCE that are not achieving natural recovery (**Figure 6**). More information

about this project, including previous studies and/or engagements can be found on the project website.

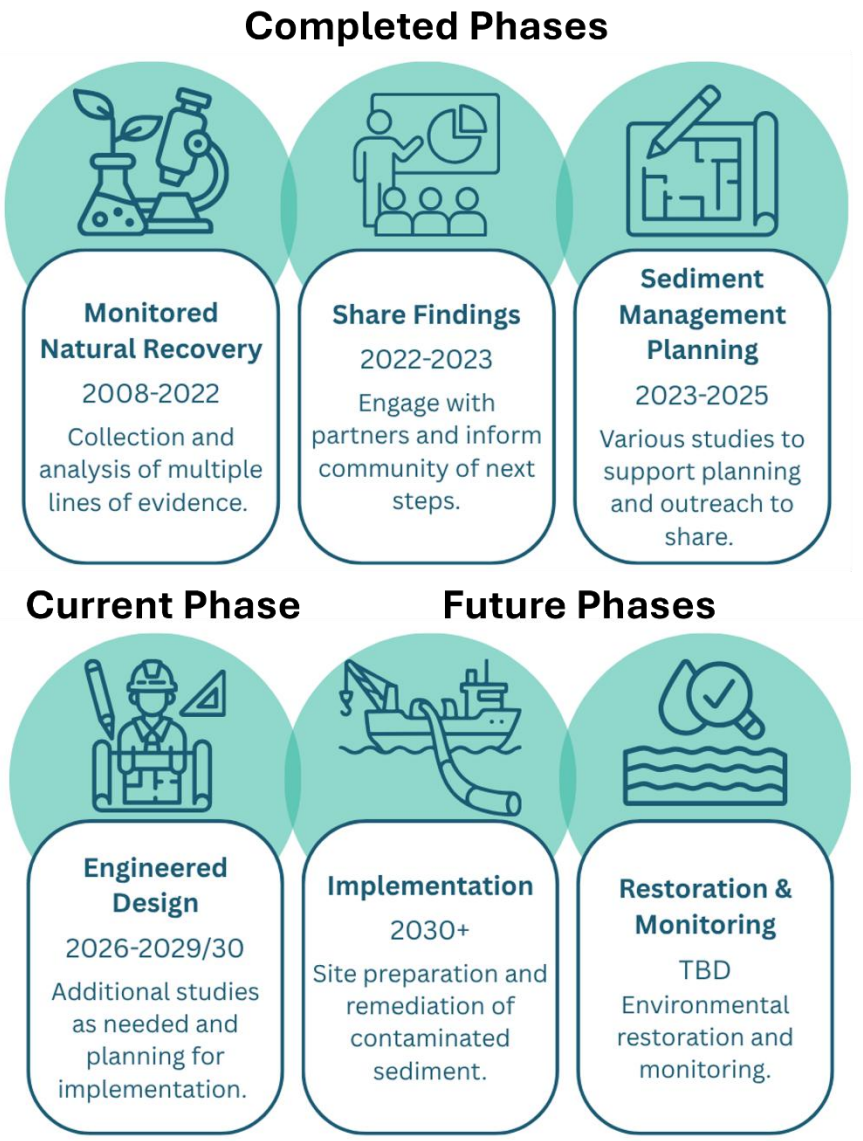

Figure 6. *Phases for Lyons Creek East Sediment Remediation Management Project. Several phases have been completed (Monitored Natural Recovery, Sharing Findings, Sediment Management Planning). The Engineered Design phase is currently in progress. Initiation of future phases and timing is conceptual and dependent on confirmation of funding.*

Collaborative efforts on remediating this last remaining contaminated sediment site as part of the Niagara River (CND) RAP continue. While excellent progress has been achieved so far, more work is required to meet existing BUI delisting criteria. The next phase of the project, expected to take 3-4 years to complete, involves several additional technical studies that will form the basis of an

engineered design required to prepare for the implementation of sediment cleanup actions conceptually planned for after 2030.

This section of the Delisting Strategy outlines the key implementation activities related to the LCE sediment management project over the next five years. While technical experts have done their best to identify activities to meet delisting criteria, additional studies and actions may be required. Any significant changes to the implementation actions within the timeframe noted will be communicated to the Niagara River (CDN) RAP, as needed.

BUI Delisting Criteria

Using a tiered assessment framework (**Appendix E: BUI 6 Tiered Application Framework**) the *Degradation of Benthos* BUI will no longer be impaired when:

1a) acute and chronic toxicity, community composition, and abundance in the benthic community are similar to non-AOC reference sites, *AND*

1b) concentrations of biomagnifying contaminants (e.g., PCBs and dioxin-like PCBs) within benthic invertebrate tissues are comparable to a suitable non-AOC reference site; *OR*

2) if a contaminated site fails to meet criteria 1a and 1b, then benthic invertebrate tissue contaminant concentrations are greater than reference sites but below concentrations considered to impair the beneficial uses associated with the consumption of fish and wildlife.
3) if a contaminated site fails to meet the criteria above, then a risk based contaminated sediment management approach/strategy must be in place with appropriate monitoring and mitigation measures and/or administrative controls.

BUI #6 - IMPLEMENTATION ACTIONS: 2025-2029

Item #	Recommended Action	2025	2026	2027	2028	2029	Lead(s)
Pre-engineered Design[5] – to inform engineered design							
6.1	Conduct additional bench scale dewatering tests on sediment cores (as required) to supplement information from SMO report and inform treatment options for sediment and wastewater.	●					CWA
6.2	Conduct bathymetric and sub-bottom profiling of the Lyons Creek East Sediment Management Areas A-C to inform future remediation actions.	●	●				CWA
6.3	Complete a topographical survey of the Lyons Creek East Sediment Management Areas A-C using LiDAR technology.	●	●				CWA
6.4	Undertake a geotechnical study within the proposed staging area(s) to understand site conditions and inform engineering design phase.	●	●				CWA
6.5	Complete an ecological study of the potential staging area(s) to inform engineering design phase.	●	●				CWA
6.6	Collect and analyze sediment cores from Areas A-C to update sediment volumes and classifications (i.e., hazardous and non-hazardous).	●	●	●			CWA
6.7	Conduct archeological assessment(s) of the Lyons Creek East study area and proposed staging area, as required.	●	●	TBD			CWA
6.8	Identify and address data gaps required by the Impact Assessment (e.g., environmental effects evaluation) or as determined by the Technical Working Group (e.g., fish study, screening-level Human Health Risk Assessment), including completing necessary requirements and respective environmental interactions.		●	●			CWA Consultant
Engineered Design[5]							
6.9	Determine Aquatic Sites Classification score as part of funding application process required by Federal Contaminated Sites Action Plan.	●	●				CWA
6.10	Prepare the engineering design package and all necessary specifications required to initiate implementation and post-construction restoration phases.				●		Consultant
6.11	Obtain required permits as necessary under various acts and organizations (e.g., Fisheries Act, Species at Risk Act, Environmental Protections Act, Ontario				●		CWA MECP

[5] While technical experts have done their best to identify activities to meet delisting criteria, additional studies and actions may be required. Any significant changes to the implementation actions within the timeframe noted will be communicated to the Niagara River (CDN) RAP, as needed.

Item #	Recommended Action	2025	2026	2027	2028	2029	Lead(s)
	Water Resource Act, by the Niagara Peninsula Conservation Authority) and determine appropriate actions and design strategies for remediation and restoration phases in alignment with delisting criteria.						
6.12	Finalize required project agreements (e.g., with landowners, for permits, to secure funding) required prior to sediment removal construction.				●	●	CWA MECP
6.13	Develop work plan for implementation phase, including all necessary components (e.g., ecological assessment, sediment disposal, on-site water treatment and discharge set-up, identification of traffic routes in/out and possible points of congestion).		●	●	●	●	Consultant
6.14	Conduct monitoring of Zone 5 (area between Buchner Road and Doan's Ridge Road, downstream of sediment management Areas A-C) to determine if the established criteria for monitored natural recovery (i.e., 1ppm) are met.			●	●		MECP CWA
Overall Project & Work Group Coordination							
6.15	Provide administrative support and project coordination for core project team to assist with meeting records, data and document management, etc.	●	●	●	●	●	NPCA
6.16	Coordinate, advertise, and plan public engagement efforts at key project milestones, including emails, newsletters, or public events.	●	●	●	●	●	NPCA
6.17	Review and update existing BUI delisting criteria to reflect current management strategy (i.e., change from monitored natural recovery to active management).		●	TBD			NPCA
6.18	Review and determine use-cases and/or required amendments for the multi-agency Lyons Creek East Administrative Controls Protocol document that reflect adaptive management and monitored natural recovery approaches in respective areas of the creek (i.e., Areas A-C and Zone 5).					●	NPCA
6.19	Determine next steps for long-term monitoring plan (monitored natural recovery & areas where thin-layer capping was done and post-restoration monitoring) in accordance with delisting criteria.				●	●	MECP
6.20	Prepare a report that synthesizes and highlights key findings of the assessment with a BUI status recommendation.				●	●	NPCA
	If BUI status recommendation is 'Not Impaired', proceed with re-designation process (**Appendix B: Process for Re-Designating a BUI**)				TBD	TBD	NRRAP Council
	If BUI status recommendation is to remain 'Impaired', further discussions will be required for next steps.				TBD	TBD	

4.3 BUI #14 LOSS OF FISH AND WILDLIFE HABITAT

Background

Habitat generally refers to the physical environment that is occupied by a plant or animal such as wetlands, forests, or grasslands. Suitable habitat is critical for supporting fish and wildlife survival, through all seasonal and life history stages (e.g., reproduction, feeding, overwintering) and is thus essential for overall ecosystem health. The *Loss of Fish and Wildlife Habitat* BUI is one of the most common issues faced by all Great Lakes' AOCs and typically associated with the loss of coastal wetland, riparian (shoreline) vegetation, and underwater fish habitat (IJC, 2019).

A study by the Ministry of Natural Resources (MNR) indicates that up to 75% of historic coastal wetlands on the Canadian side of upper Niagara River have been lost. Coastal wetlands are critical for spawning and rearing of young-of-the-year and forage fish. They are important to waterfowl nesting and stopovers and prevent erosion of the shoreline by slowing wave action. From 2016-2023, RAP partners (i.e., Niagara Parks, NPCA, MNR, ECCC, and MECP) worked together to complete seven priority coastal wetland habitat restoration projects, resulting in 7.5 hectares (18.5-acres) of restored wetland habitat including a 1.5-hectare (4-acre) inland pond and marsh at Gonder's Flats, as well as nearly two kilometers of restored shoreline that included planting of native vegetation. Additionally, from 1999-2012, many projects were undertaken within the Niagara River watershed including the removal of fish barriers, land acquisition, wetland creation, tree plantings, and other relevant water quality improvement projects.

Riparian habitat refers to the lands adjacent to streams and rivers. It is the interface between aquatic and terrestrial ecosystems. This transition area provides various benefits including serving as habitat for wildlife, mitigating erosion, and functioning as a buffer to improve the water quality of runoff. Past practices along the Niagara River (i.e., urbanization, cutting trees or mowing to the edge of the river) have resulted in erosion, poor slope stability, and have encouraged the establishment of invasive plant species. Subsequent shoreline hardening to mitigate these effects ultimately results in the loss of important shoreline habitat for various species such as insects, birds and amphibians, which rely on the native shoreline vegetation to thrive. A study conducted in 2021-2022 identified 26 priority sites where several remediation actions were recommended to improve the shoreline habitat, including:

- creating a gentler slope from the top of bank to the water;
- planting of native aquatic, semi-aquatic, and terrestrial vegetation;
- installing shoreline structures that slow wave action and enable sediment deposition; and
- changing management practices (e.g., cease mowing, anchoring fallen trees in the river) that allow for vegetation and shoreline habitats to establish (where possible).

Finally, a desktop GIS study examined the composition of the length of the Niagara River shoreline and indicated that the lower Niagara River has remained in a predominantly natural state, not requiring habitat restoration.

A collaborative approach is essential as the work to improve and maintain Niagara River habitats will extend beyond the life of the RAP program. Partners such as Niagara Parks and NPCA continue to focus on enhancing existing restored areas while ensuring that monitoring and adaptive management is implemented for ongoing success.

BUI Delisting Criteria

The *Loss of Fish and Wildlife Habitat BUI*, will no longer be impaired when:

1) 5-7 identified coastal wetland habitat projects on the Canadian side of the Upper Niagara River are complete;
2) at least 75% of the Niagara River (Canadian) shoreline is naturally vegetated;
3) there is a minimum 5-metre wide 'no mow' vegetated buffer along the publicly managed Canadian shoreline of the Upper Niagara River; and
4) the existing areal extent of unique wildlife habitat (i.e., Niagara Gorge) is at least 80% secured and managed for long-term conservation purposes.

BUI #14 - IMPLEMENTATION ACTIONS: 2025-2029

Item #	Recommended Action	2025	2026	2027	2028	2029	Lead(s)
14.1	Compile and summarize previous (2021) GIS data to determine and verify the length and width of vegetated / natural shoreline as per Criteria 2 & 3.	●					NPCA
14.2	Compile the most up-to-date information and confirm implementation of management actions (e.g., no mow or naturalization) of 26 priority riparian habitat sites.	●					NPCA Niagara Parks
14.3	Prepare a report that synthesizes and highlights key findings of the assessment with a BUI status recommendation.	●	●				NPCA
	If BUI status recommendation is 'Not Impaired', proceed with re-designation process (**Appendix B: Process for Re-Designating a BUI**)		TBD	TBD			NRRAP Council
	If BUI status recommendation is to remain 'Impaired', further discussions will be required for next steps.		TBD	TBD			

5 THE AMERICAN CONNECTION: REMAINING BUIs IN THE NIAGARA RIVER (U.S.) AOC

The Niagara River is one of five AOCs shared by the U.S. and Canada—the others are the St. Marys River, St. Clair River, Detroit River, and St. Lawrence River. Although the Niagara River is a bi-national AOC, there are different issues and separate (but complementary) RAP efforts on both sides of the border. Both RAP Teams ensure consistent information exchange and coordinate, where possible, on similar issues (e.g., habitat). There are six remaining BUIs on the U.S. side of the Niagara River.

- Restrictions on Fish and Wildlife Consumption
- Degradation of Fish and Wildlife Populations
- Bird or Animal Deformities or Reproductive Problems
- Degradation of Benthos
- Restrictions on Dredging Activities
- Loss of Fish and Wildlife Habitat

To highlight binational cooperation and collaboration, this section provides information on the BUI status on the U.S. side of the Niagara River. To learn more about the efforts to improve U.S. AOCs, including the Niagara River, visit www.epa.gov/great-lakes-aocs. A full list of remediation projects completed or underway is available online via the Niagara River (U.S.) RAP Stage 2 Addendum (NYSDEC 2012)[6].

Restrictions On Fish and Wildlife Consumption

In New York, the New York State Department of Environmental Conservation (NYSDEC) is responsible for fish sampling and analysis to provide the contaminant data that the New York State Department of Health (NYSDOH) uses in setting consumption advisories. The state of New York has general fish consumption advice that differs by fish species, and for some species by the size of the fish (NYSDOH Mar 2025). For certain specific waterbodies, NYSDOH issues more restrictive advisories. As of 2026, the *Restrictions of Fish and Wildlife Consumption* BUI in the Niagara River (U.S.) AOC is listed as 'Impaired' because the consumption advisory for Lake Trout from the lower river is more restrictive than the corresponding advisory for Lake Ontario and certain advisories for the Buffalo Outer Harbor section of the Niagara River AOC and for the upper river and several of its tributaries are more restrictive than corresponding advisories for Lake Erie. Further monitoring and assessment actions have been identified by the U.S. RAP Team, including continued periodic fish sampling and analysis (NYSDOH Mar 2025, NYSDEC 2012). The most recent sampling event for which results are available occurred during 2018. Based on the results, in 2023 NYSDOH added a new advisory to eat no fish from Scajaquada Creek due to PCB contamination. Additional fish

[6] The Niagara River (U.S.) RAP Stage 2 Addendum (2012) is currently being updated and will be available on the Niagara River AOC NYSDEC website when it is completed: Niagara River AOC NYSDEC.

sampling occurred during June 2026, with a focus on certain Niagara River tributaries that have not previously had sampling for this purpose.

The wildlife portion of this BUI is not considered impaired on the Canadian side of the Niagara River, but it is listed as 'Impaired' in the U.S. There are no wildlife consumption advisories specific to the U.S. side of the Niagara River but there are state-wide advisories for eating snapping turtles and wild waterfowl (NYSDOH Nov 2025). The NYSDOH recommends that people who may become pregnant (under age 50) and children under the age of 15 should avoid eating snapping turtles or soups made with their meat due to PCB contamination. All others should avoid eating snapping turtles that come from a waterbody with PCB advisories for fish, and when eating snapping turtles from other waterbodies, they can reduce exposure by carefully trimming away all fat and discarding the fat, liver, and eggs prior to cooking the meat or preparing soup. In addition, mergansers should not be eaten as they are the most contaminated of the waterfowl species (NYSDOH Nov 2025). People can eat up to two meals per month of other wild waterfowl, and the skin and fat should be removed before cooking and the stuffing discarded after cooking. Wood ducks and Canada geese are less contaminated than other wild waterfowl species and diving ducks are more contaminated than dabbler ducks (NYSDOH Nov 2025). Several remediation projects to address known sources of PCBs, mirex, and dioxins on the U.S. side of the Niagara River have been completed (NYSDEC 2012). According to the Niagara River (U.S.) RAP Stage 2 Addendum[7], remediation of 36 of 44 hazardous waste sites found to be potential sources of PCB, mirex, and/or dioxin contamination to the Niagara River have been completed.

Degradation of Fish and Wildlife Populations

At the time of the development of the Niagara River (U.S.) RAP, fish and wildlife populations in the Niagara River had declined from historic levels; however, this impairment was considered "likely Impaired" rather than, 'Impaired', due to a lack of sufficient evidence to show whether the habitat and toxicity issues specific to the AOC were significant enough to be the cause of the declines. The RAP stated that possible causes of declines in fish populations were human-induced alterations to the river such as significant water diversions and withdrawals, invasive species introductions, and contaminants. Possible causes for loss of wildlife populations were uptake of contaminants, loss and degradation of physical habitat, and human disturbance. With multiple possible contributing factors affecting fish and wildlife populations, assessing the causes for the declines was challenging and costly. As a result, due to insufficient evidence for AOC-related causes the RAP stated that no *likely* causes of declining populations were identified. Funding made available through the Great Lakes Restoration Initiative in 2011 provided an opportunity for the RAP to shift from evaluating potential causes for fish and wildlife population declines to focus on implementation actions to address the various causes. At this time, a decision was made to change this BUI's status to "Impaired" in December 2011 (NYSDEC 2012). Recovery of populations will

[7] The Niagara River (U.S.) RAP Stage 2 Addendum (2012) is currently being updated, as well as the report on the hazardous waste sites. For more information go to Niagara River AOC NYSDEC.

depend on completion of habitat restoration projects in the AOC (further discussed in the Habitat section below). Ongoing monitoring has shown that contaminant levels within the Niagara River have decreased since its designation as an AOC. Continued work to eliminate remaining sources of contaminants, especially in sediment, may also benefit fish and wildlife population levels.

NYSDEC and several federal agencies have formed a "Niagara River Populations BUI Group" that is considering several specific efforts to aid the recovery of certain populations. Although restoration of native mussels would require a timeframe well beyond the scope of the AOC Program, the Group may recommend some pilot efforts to inform possible future restoration under another program. Pilot efforts might include placement of propagated mussels in several locations followed by limited monitoring of their survival and growth.

The U.S. Fish and Wildlife Service is leading an effort to provide habitat for juvenile Lake Sturgeon in the upper river. Habitat for juveniles is likely to be an important factor in the eventual recovery of Lake Sturgeon populations in the Niagara River. In the meantime, monitoring of Lake Sturgeon (as well as other important fishes such as Muskellunge and Lake Trout) is ongoing.

Bird or Animal Deformities or Reproductive Problems

During development of the U.S. RAP, there was no evidence of bird or animal deformities or reproductive problems; however, the impairment was considered "likely Impaired" because both young-of-the-year and adult fish were found to have contaminants at levels higher than standards for the protection of wildlife. Similar to the *Degradation of Fish and Wildlife Populations* BUI, a decision was made to change the status of this BUI to "Impaired" in December 2011 (NYSDEC 2012). In place of the previous focus on contaminant levels in fish, the U.S. side now considers contaminant levels in Herring Gull and Double-crested Cormorant eggs and mink livers as a means of evaluating the status of this BUI. Egg contaminant data show the Niagara River (U.S.) AOC comparing favorably to other locations throughout the Great Lakes. However, despite the general improvement in contaminant levels within the Niagara River, the available mink data indicates that this impairment continues to exist. A 2014-15 mink study found average PCB levels in mink livers above the lowest observed adverse effect level (Haynes et. al. 2016); therefore, additional control of PCB sources is needed to address this BUI. After sources have been addressed, another mink contaminant study will be needed to re-evaluate the BUI status.

Degradation of Benthos

Since the development of the U.S. Stage 1 RAP, this impairment was found at certain tributary mouths and nearshore areas based on the observed macroinvertebrate community structure and sediment toxicity testing. The likely cause of the impairment was hexachlorocyclohexane and PCB contamination in the sediment (NYSDEC 1994). Benthos was noted as not impaired in the main channel of the Niagara River due to the absence of substantial deposits of fine-grained sediments; however, more recent information has shown that that the amount of fine-grained sediment

present is larger than anticipated. Therefore, the evaluation of the *Degradation of Benthos* BUI now includes much of the main channel of the upper Niagara River.

Over the past 30 years, several projects have addressed contaminated sediment in the Niagara River and its tributaries. In addition, many projects have addressed potential sources of contamination, including point sources and hazardous waste sites. Ongoing monitoring has documented significant improvements in water quality since the Niagara River's AOC designation in 1987. However, the extent of contamination remaining in sediment, and the degree to which it may be contributing to BUIs, is only now becoming better defined as a result of extensive sampling efforts that began in 2016. As of 2026, very limited additional sampling is needed to provide enough data to complete all necessary characterization of sediments. Actions to remediate contaminated sediment in certain areas will be necessary. The USEPA partners with non-federal sponsors to conduct sediment remediation projects. The Agency now has four such partnerships for the Niagara River AOC under which the partners will address seven areas requiring sediment remediation. NYSDEC anticipates additional agreements.

The most recent source of information regarding the status of benthos is a United States Geological Survey (USGS) study of sediment toxicity and the status of benthic macroinvertebrate communities. During 2019 and 2020, USGS collected samples from 60 locations in the upper river, selected based on sediment contaminant data that the U.S. Army Corps of Engineers (USACE) collected in 2018. Due to the difficulty in identifying a reference site for the Niagara River, the sampling locations included "within AOC reference sites" in areas where the 2018 data show negligible sediment contamination. NYSDEC Bioassessment Profile (BAP) scores for the macroinvertebrate assessment were poor across all areas sampled. In contrast, sediment toxicity results were generally in acceptable ranges, which suggests that BAP scores may not be useful for BUI evaluation. USGS later had macroinvertebrate samples analyzed for certain deformities. This analysis also showed that sediments were generally non-toxic. The overall study results may indicate that the poor BAP scores are not due to AOC-related issues (Baldigo et al. 2023). Evaluation of benthos in tributaries to the upper river is ongoing. In some cases, re-evaluation will be necessary following remediation of contaminated sediment.

Restrictions on Dredging Activities

On the U.S. side, this BUI's geographic scope focuses on the federal navigation channel that exists in the Buffalo Outer Harbor, the Black Rock Canal, and a portion of the upper Niagara River. Dredging of the navigation channel in some areas of the Buffalo Harbor and in the Black Rock Canal is necessary for the purpose of commercial navigation. When the U.S. RAP was published, open lake disposal of the dredged sediment was not possible due to the high levels of contamination. The condition of sediment has improved, and removal of the BUI may be possible within several years.

Much of the Buffalo Outer Harbor's federal navigation channel currently does not require regular dredging due to the large size of the Harbor and the fact that its use by commercial vessels is well

below historic levels. Areas that may need dredging are generally in good condition based on available information. A USACE evaluation of sediment in the sections of the Buffalo Outer Harbor where maintenance dredging is conducted indicated that these sediments would likely meet requirements for open-water placement.

In 2015, the USACE conducted a major dredging project within the federal navigation channel of the Black Rock Canal to remove contaminated sediment. The dredged channel has not been re-assessed since that time. Areas of the Black Rock Canal outside the navigation channel are known to require remediation; therefore, a reassessment should wait until remediation is complete. If at that point sediment within the navigation channel meets requirements for open-water placement, removal of this BUI may be considered.

Loss of Fish and Wildlife Habitat

Habitat loss on the U.S. side has occurred to a lesser degree in the lower River than in the upper River, where the loss has been dramatic due to physical disturbances associated with industrial and residential development. Examples of physical disturbances include bulkheading, filling, dredging, and the development of marinas and private docks along the shore. The diversion of varying amounts of water for power generation has also impacted habitat in the upper River.

Since the completion of the U.S. RAP in 1994, over 50 habitat protection and improvement efforts of varying scales have been initiated through multiple funding sources. Most of those projects are complete. In 2013, the Niagara River Remedial Advisory Committee formed a Loss of Habitat Working Group to identify remaining actions needed to restore habitat and remove this BUI. The Working Group spent considerable time evaluating additional potential habitat improvement projects and recommended a set of projects that, in conjunction with past projects, would bring about cumulative restoration sufficient to remove the *Loss of Fish and Wildlife Habitat* BUI. The list of projects was accepted by the full Remedial Advisory Committee. These projects, now referred to as the 'AOC Habitat Restoration Plan', will cumulatively restore approximately 100 acres of primarily shallow water/coastal wetland habitat. This habitat type was identified as critical for the Niagara River as it's related to AOC-specific causes and because it supports several of the River-dependent species linked to the *Degradation of Fish and Wildlife Populations* BUI.

Implementation of the Habitat Restoration Plan is well under way, in part because the USEPA was able to provide funding for some of the projects prior to the official adoption of the Plan. Nine projects are complete and one other has reached construction.

BINATIONAL STATUS OF NIAGARA RIVER AOC BUIs

GLWQA Beneficial Use Impairment	Canadian Status	U.S. Status
1. Restrictions on fish & wildlife consumption	Impaired for fish	Impaired
2. Tainting of fish & wildlife flavour	Not Impaired (1993)	Not Impaired (1994)
3. Degradation of fish & wildlife populations	Not Impaired (2025)	Impaired
4. Fish tumours or other deformities	Not Impaired (2009)	Not Impaired (2016)
5. Bird or animal deformities or reproduction problems	Not Impaired (2009)	Impaired
6. Degradation of benthos	Impaired	Impaired
7. Restriction on dredging activities	Not Impaired (2009)	Impaired
8. Eutrophication or undesirable algae	Not Impaired (2019)	Not Impaired (1994)
9. Restrictions on drinking water consumption, or taste and odour	Not Impaired (1993)	Not Impaired (1994)
10. Beach closings	Not Impaired (2023)	Not Impaired (1994)
11. Degradation of aesthetics	Not Impaired (1993)	Not Impaired (1994)
12. Added costs to agriculture or industry	Not Impaired (1993)	Not Impaired (1994)
13. Degradation of phytoplankton and zooplankton populations	Not Impaired (2019)	Not Impaired (1994)
14. Loss of fish and wildlife habitat	Impaired	Impaired

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7 APPENDIX A: HISTORICAL OVERVIEW

Year	Details, Agreements, Milestones
Early 1900s	Niagara River considered one of the most degraded places in North America due to chemical and industrial activities.
1900s-1970	Industrial expansion in the Niagara River area, including steel, chemical and petrochemical manufacturing, and grain milling.
1909	The International Joint Commission (IJC) was formed to prevent and resolve any water issues between Canada and the United States under the 1909 Boundary Waters Treaty.
1970s-80s	There is an increased awareness of the negative impacts of pollution across the Great Lakes (e.g., bald eagle population declining, burning rivers, algal blooms), including public health emergencies related to the Love Canal area in Niagara Falls, NY.
1970s	Canada-U.S. Great Lakes Water Quality Agreement (GLWQA) signed to commit both countries to restore and protect the waters of the Great Lakes (1972). For more information visit: Government of Canada, Canada Water Agency, *Canada-US Great Lakes Water Quality Agreement* . Canada and Ontario sign the first Canada-Ontario Great Lakes Water Quality and Ecosystem Health (COA) agreement (1971).
1981-84	Report prepared by the then named, Niagara River Toxics Committee, identified 261 different chemicals in the water and sediment of the Niagara River (of which 89% were from sources on the U.S. side).
1987	1987 Great Lakes Water Quality Agreement (GLWQA) identified 43 areas of concern (AOCs), 26 in the United States, 12 in Canada, and 5 binational. 8 of 14 BUIs in the Niagara River were identified as "Impaired" and 2 more required further assessment. Four Agencies (U.S. federal, Canadian federal, provincial, and State governments) signed a Declaration of Intent to reduce chemical pollutants in the Niagara River under the Niagara River Toxics Management Plan (NRTMP). The NRTMP identified 18 priority toxins that were found at unacceptably high levels, and of these 18 toxins, 10 were thought to have direct Niagara River sources and thus were targeted to be reduced by 50% by 1996.
1988-1989	Remedial Action Plan (RAP) Committees were established, including a public advisory committee (PAC) that includes members of the public and representatives from community groups, associations, industries and municipalities.
1993	Stage 1 Report was completed. *Niagara River Remedial Action Plan, Stage 1: Environmental Conditions and Problem Definition*.
1995	Stage 2 Remedial Action Plan. Completion of Stage 2 Report (*Niagara River Remedial Action Plan, Stage 2 Report: The Cleanup Connection*) and Stage 1 Update (*Niagara River Remedial Action Plan, Stage 1 – UPDATE: Environmental Conditions and Problem Definition*). Removal of 10,000 cubic meters of contaminated sediment from the Welland Reef site.
1999	The Niagara Peninsula Conservation Authority assumes responsibility for overseeing and coordinating the Niagara River RAP.
2007	Studies show a reduction of over 50% for the 10 priority toxic chemicals.

Year	Details, Agreements, Milestones
2009	Niagara River Remedial Action Plan Stage 2 Update, with recommended actions, status of BUIs and delisting criteria for impaired BUIs was identified. BUIs with no issues were re-designated to 'Not Impaired', including: Fish tumours or other deformities; Bird or animal deformities or reproduction problems; and Restrictions on dredging activities.
2012	Canada and United States amend GLWQA to update agreement details, such as binational management structure and to refocus scope of the Areas of Concern annex to addressing environmental matters affecting the *Waters of the Great Lakes* (i.e., watershed issues must be shown to have adverse impact on the Niagara River as part of the Waters of the Great Lakes). New additions included addressing "nearshore environment, aquatic invasive species, habitat degradation, and the effects of climate change" as well as "continued work on existing threats to people's health and the environment in the Great Lakes basin".
2015-2024	Monitoring of fish populations (2015-2017) in the upper and lower Niagara River and monitoring of bird populations (2018-2019) as part of the technical studies to assess the degradation of fish and wildlife populations BUI. Extensive outreach and engagement completed (2024). Construction of 5 coastal wetlands in upper Niagara River (2017-2021) to address loss of fish and wildlife habitat BUI; additional habitat restoration continued 2022-2025 to include 7 habitat sites and shoreline management improvements to limit mowing and add native shoreline vegetation. Canada-Ontario renew commitment to "restore, protect and conserve the Great Lakes by signing the Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health (COA), 2021." Niagara River has several actions outlined in AOCs Annex (**COA, 2025**). Niagara River Remedial Action Plan releases updated Delisting Strategy for remaining 5 BUIs (2021). Re-designation of Beach Closings BUI to not impaired (2023) following extensive infrastructure improvements at Queen's Royal Beach in Niagara-on-the-Lake to improve water quality and outdated combined stormwater overflows, including installation of a bioswale (2018-2020). It is determined that the contaminated sediments at Lyons Creek East (Welland, ON) are not successful with natural recovery after 15-years of monitoring. An alternate plan is communicated with the public on options to remove the contaminated sediment and includes an ecological assessment (2023-2024) and a sediment management options report (2025-2026).
2025	*Degradation of Fish and Wildlife Populations* BUI officially re-designated to 'Not Impaired'.

8 APPENDIX B: PROCESS FOR RE-DESIGNATING A BUI

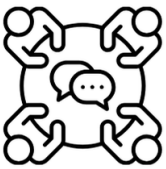
The following six steps outline the process for re-designating a BUI in the Niagara River (Canadian) AOC from 'Impaired' to 'Not Impaired'. The process has been modified from the Canada-Ontario re-designation process.

STEP 1: COMPLETE ALL ACTIONS

All actions are completed by RAP member organizations as noted in the Delisting Strategy. The RAP Coordinating Committee will initiate planning for the BUI assessment and inform the RAP Council of next steps.

STEP 2: ASSESS

All relevant information for the BUI is compiled and an assessment report is prepared to evaluate whether BUI delisting criteria are met. Technical review is completed, if required. The report will recommend proceeding with re-designation or completing further actions.

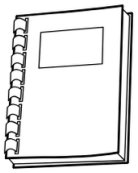


STEP 3: GET FEEDBACK

The assessment report is presented to the RAP Council and any technical teams for feedback and endorsement. If accepted, engagement is undertaken to seek input from RAP partners, local First Nations and other Indigenous partners, U.S. RAP agencies, and the public.

STEP 4: REVIEW AND REVISE

Review feedback received and revise the report, as required. Summarize the engagement activities, feedback, and results then append to the report. If BUI re-designation is supported, proceed with submission.



STEP 5: SUBMIT FOR APPROVAL

Submit the final assessment report to Canada and Ontario for review and approval.

STEP 6: OFFICIAL RE-DESIGNATION

Once the official re-designation is confirmed, the BUI is deemed 'Not Impaired' and RAP team can proceed with sharing the achievement.

9 APPENDIX C: PROCESS FOR DELISTING A CANADIAN AOC 2025

Context

The 2012 *Great Lakes Water Quality Agreement* (GLWQA) states that a Party shall remove the designation of an Area of Concern (AOC) when environmental monitoring confirms that beneficial uses have been restored in accordance with the criteria established in the Remedial Action Plan (RAP), and that a Party shall solicit review and comments from the State and Provincial Governments, Tribal Governments, First Nations, Métis, Municipal Governments, watershed management agencies, other local public agencies, the Public, and the International Joint Commission (IJC) prior to the removal of a designation as an AOC. See Appendix 1.

Background

This process outlines the steps that Canada will take to remove the designation of an AOC, also known as delisting an AOC. This process replaces the two previous guides in previous use, as described below.

In 2010, Environment and Climate Change Canada used an updated version of the guidance on the process to “delist” an Area of Concern that had been in place since 1997 to remove Wheatley Harbour from the list of Great Lakes Areas of Concern.

The GLWQA was subsequently revised in 2012. This document outlines the revised delisting process and supersedes any existing delisting process document including the "The Canada-Ontario Guide to Producing and Reviewing Remedial Action Plan Stage 2 and Stage 3 Reports." For binational AOCs, additional process steps may be warranted to ensure ongoing communication and coordination with the U.S.

Steps to Delist an AOC

Unless otherwise noted, progression is dependent on a satisfactory result at each step.

Step	Notes
1. Restore all Beneficial Uses; none shall remain designated *Impaired* or *Requires Further Assessment*.	If it is not possible to redesignate a beneficial use to “not impaired” the criteria for that BUI should be revised to ensure it is achievable. Canada will ensure this revision is done in cooperation with Ontario and in consultation with the local community.
2. Prepare a RAP Completion Report documenting that environmental monitoring confirms beneficial uses have been restored in accordance with the established delisting criteria, identifying the pending decision to “delist”, and the fulfillment of relevant GLWQA commitments. See Appendix 2.	Canada Water Agency (CWA) and Ontario’s Ministry of the Environment, Conservation and Parks (MECP) support the preparation of the report according to the structure of the specific AOC. The completion report should also show how any directly relevant COA commitments have been met and describe the process for engagement and its resulting influence over the recommendation to delist the AOC.

Step	Notes
	The completion report will aim to be prepared within two years of the redesignation of the last BUI.
3. Solicit review and comments from First Nations and Métis.	CWA and MECP support development and implementation of an engagement plan that details the process for soliciting review and comment from First Nations and Métis according to ECCC's *Practical Guide to Indigenous Consultation and Engagement* and CWA's *Principles of Engagement in AOC Decision Making*. The timeframe for this review is developed together with the First Nations and Métis, otherwise 60 days is assumed.
4. Solicit review and comments from Municipal Governments, watershed management agencies, other local public agencies, the Public, and the IJC.	CWA and MECP support development and implementation of an engagement plan that details the process for soliciting review and comment from: Municipal Governments, watershed management agencies, other local public agencies, non-government organizations and community groups, the Public, and the IJC or other federal agencies as required. For binational AOCs the EPA and relevant US State, if applicable, are also included. (60 days)
5. Solicit review and comments from Ontario.	CWA submits RAP Completion Report and engagement results to Ontario via the COA Executive Co-chair for review and comment. This review includes evaluation for completeness, review of engagement process and results, and reference to relevant COA commitments. (60 days)
6. Remove the designation of the AOC.	CWA provides the completion report and engagement summary to Global Affairs Canada and advises them to take such steps as are necessary for Canada to remove the designation of the area as an AOC (60 days) GAC will notify US Dept of State. This step does not require DoS approval, just acknowledgement of receipt of the report. The delisting is complete once GAC receives this acknowledgement from DoS.
7. Delisting is complete.	CWA may transmit the DoS acknowledgement letter to Ontario and the IJC with a cover letter to state that delisting is complete. CWA should work with Ontario to provide acknowledgement to First Nations, Métis, Municipal Governments, watershed management agencies, other local public agencies, and others who were engaged in the delisting decision (for binational AOCs, EPA and the relevant US State, if applicable, is also included) to confirm the AOC was delisted.

9.1 APPENDIX 1

Commitments for Delisting an AOC

GLWQA 2012

A Party shall remove the designation of an AOC or AOC in Recovery when environmental monitoring confirms that beneficial uses have been restored in accordance with the criteria established in the RAP.

A Party shall solicit a review and comments from the State and Provincial Governments, Tribal Governments, First Nations, Métis, Municipal Governments, watershed management agencies, other local public agencies, the Public, and the Commission:

1. *prior to the designation of an AOC in Recovery; and*
2. *prior to the removal of a designation as an AOC or an AOC in Recovery.*

COA 2021

Annex opening text, paragraph three, refers to "actions required to achieve delisting criteria and restore beneficial uses"

Result 3 Confirm restoration of beneficial uses and delist **Nipigon Bay**. Canada and Ontario will:	3(b) Finalize the Nipigon Bay RAP Completion Report 3(c) Undertake a process to engage local governments, First Nations, Métis and the public in the delisting of this AOC
Result 5 [Peninsula Harbour] Canada and Ontario will:	5(c) Undertake a process to engage local governments, First Nations, Métis and the public in decision-making for removal of beneficial use impairments, designating the AOC as an AOC in recovery and/or delisting this AOC.
Result 7 [Spanish Harbour] Canada and Ontario will:	7(c) Undertake a process to engage local governments, First Nations, Métis and the public in decision-making for removal of beneficial use impairments and delisting this AOC.
Result 10 [Niagara River] Canada and Ontario will:	10(d) Undertake a process to engage local governments, First Nations, Métis and the public in remediation and decision-making for removal of beneficial use impairments, designating the AOC as an AOC in recovery and/or delisting this AOC; and 10(e) Communicate as needed with federal and state agencies in the United States on matters that advance restoration and delisting of this binational area of concern.
Result 14 [Bay of Quinte] Canada and Ontario will:	14(c) Undertake a process to engage local governments, First Nations, Métis and the public in remediation and decision-making for removal of beneficial use impairments, designating the AOC as an AOC in recovery and/or delisting this AOC.
Result 15 [St Lawrence River] Canada and Ontario will:	15(c) Undertake a process to engage local governments, First Nations, Métis and the public in remediation and decision-making for removal of beneficial use impairments, designating the AOC as an AOC in recovery and/or delisting this AOC; and 15(d) Communicate as needed with federal and state agencies of the United States on matters that advance restoration and delisting of this binational area of concern.

9.2 APPENDIX 2

The AOC Completion report represents a summary of the completed Remedial Action Plan for the AOC. This should both document that AOC commitments were met and provide a resource for future ecosystem approaches. Each AOC is unique, and it is important that each AOC's completion report suit that AOC. However, while completion reports may differ in format, focus and authorship, each RAP completion report should include:

- A description of the remedial action plan including the status of BUIs, the criteria to restore them and approach to Indigenous and community consultation
- A summary of the implementation of remedial measures taken and a description of monitoring to confirm restoration of beneficial uses
- A description of related actions or monitoring that will continue, if appropriate
- An engagement approach

Example Table of Contents

10 APPENDIX D: BUI 1 TIERED ASSESSMENT FRAMEWORK

Tiered Assessment Framework for BUI 1 *Restrictions on Fish Consumption* for Niagara River Remedial Action Plan

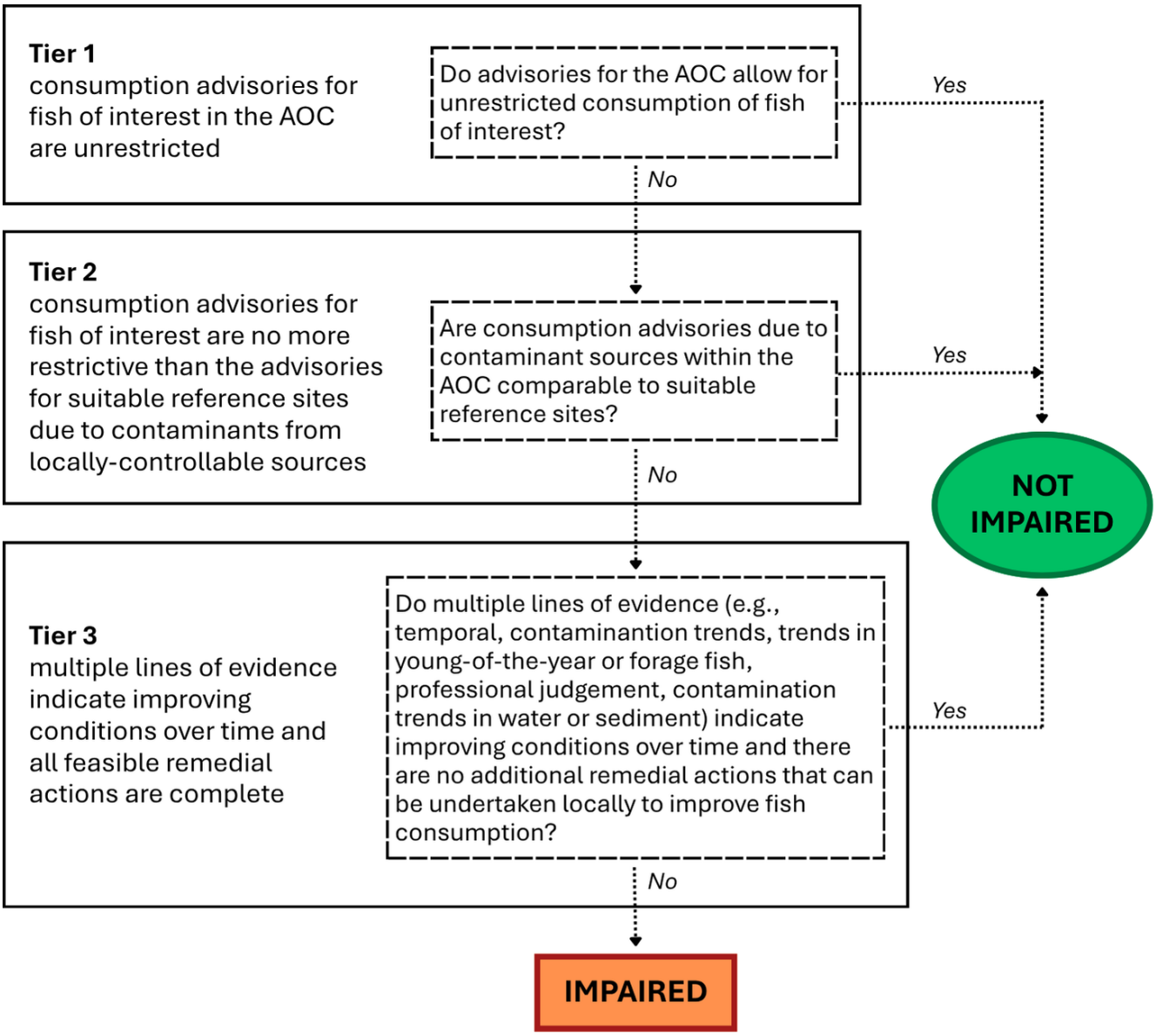


Figure 7. *Tiered Assessment Framework for BUI 1, Restrictions on Fish Consumption. Adapted from Bhavsar et al. (2018) for the Niagara River (CDN) AOC in the Delisting Strategy (NRRAP 2021).*

More Information and Application of the Tiered Assessment

Tier 1: According to Bhavsar et al. (2018), this component of the delisting criterion should be used to examine whether contaminant levels in fish at an AOC are resulting in restrictions for eating fish at a frequency that are below a desired level determined by consumption surveys of people fishing at the AOC. A method for calculating statistical comparison of advisories is described in Bhavsar et al. 2011. If the Tier 1 criterion is met, then the RAP Team may suggest proceeding with the BUI's status re-designation to 'Not Impaired' and the other tiers are not assessed.

Tier 2: Should Tier 1 fail, the second Tier examines the advisories for the fish of interest (from local survey of anglers) compared to a suitable reference site. Fish consumption advisories from each of the Upper Niagara River (Lake Erie to the top of the Niagara Falls) and Lower Niagara River (from the bottom of Niagara Falls to Lake Ontario) should be compared to relevant areas of the respective connecting Great Lake (e.g., Lower Niagara River to relevant non-AOC locations in the Western basin of Lake Ontario; and, Upper Niagara River to relevant non-AOC locations in the Eastern basin of Lake Erie). For example, the Upper Niagara River fish advisories (currently referred to as 'Lake Ontario 1a' in the *Guide*) could be compared to Lake Erie Zone 4 Eastern basin (from Long Point to the Niagara River). The Lower Niagara River consumption advisories (referred to as 'Lake Ontario 1b' in the *Guide*) could be compared to Lake Ontario Zone 2 (open water from Niagara River to Clarkson Harbour). The advisories given for the Niagara River AOC locations should be no more restrictive (no worse) than the appropriate reference sites noted. A description of locally-controllable sources of contaminants is explained in the rationale section. If the Tier 2 criterion is met, then the RAP Team may suggest proceeding with the BUI's status re-designation to 'Not Impaired' and the other tier is not assessed.

Tier 3: This level of assessment is conducted when Tier 1 and Tier 2 fail. This tier considers other quantitative and qualitative lines of evidence along with professional judgement to understand the current status of contaminants related to fish consumption restrictions in the AOC. The multiple lines of evidence suggested are temporal trends of fish contaminant levels, trends in young-of-the-year or forage fish in an AOC compared to a reference site (e.g., the nearby connecting Great Lakes), trends of the contaminant levels in sediments or water. Professional judgement could also include examining the ecological aspects of the fish of interest (such as their feeding ecology, growth, condition, and spatial movements) because these can be factors in how/where contaminants bioaccumulate and may confound cause-effect linkages between cleanup activities and the status of the BUI or of AOC-specific issues. If the multiple lines of evidence indicate that conditions are improving over time and there are no additional, feasible remedial actions that can be undertaken locally to improve fish consumption, then the RAP Team may suggest proceeding with the BUI's status re-designation. However, if more actions can be implemented to address local contaminant sources, then those should be identified and implemented through the RAP with the BUI remaining 'Impaired' until the delisting criteria can be met.

Fish of Interest: The re-designation of this BUI principally hinges on what local anglers are choosing to consume and whether the consumption of those "fish of interest" is more restricted than an appropriate reference location. Since preferences and patterns of eating fish could vary widely by location, type of fish and communities, a reliable fish consumption survey should be conducted to understand the potential use of the fish resources within the AOC. A survey was conducted in 1995-1996, led by Health Canada's Great Lakes Health Effect Program, to examine fish consumption at five different Areas of Concern, including the Niagara River (Sheeshka 1997). That comprehensive survey interviewed over 600 people about their shoreline fishing and fish consumption habits in the Niagara River. However, the survey focused only on shoreline fishers, did not specifically engage with Indigenous peoples or account for their traditional uses, and the information is now over 20

years old. Thus, beginning in 2019, the Niagara River RAP Team initiated a new fish consumption survey to understand which fish people are eating from the Niagara River, and how much they have eaten over the last year. The information gathered through the survey can be used to understand local fish consumption, properly define the "beneficial use", and to assess the delisting criteria relative to the advisories given for the fish species specifically consumed in the AOC (rather than all of the fish monitored).

Unrestricted OR no more restrictive: Fish consumption advisories are produced by the Ontario Ministry of the Environment, Conservation and Parks through its Fish Contaminant Monitoring Program (see the background section for more information). Not all the advisories published in the *Guide* result in restrictions to eating fish and there may be different levels of restrictions to different consumer populations (i.e., general or sensitive population). The level of restriction applies to Tier 1 and 2 of the criteria. When assessing the Tier 1 criterion, the goal is for unrestricted fish consumption (meaning 8 or more meals per month of a desired fish species). For the tier 2 criterion, the goal is for consumption advisories to be no more restrictive (i.e., no worse) than a reference site (see below for details on appropriate reference locations). The information in the *Guide* should be used to determine the level of restriction for the AOC and its appropriate reference sites. Bhavsar et al. (2018) suggests that the level of restriction and consumer population chosen for the BUI assessment should be consistent with, and based on, the degree of consumption in the local fishing community (e.g., from a local fish consumption survey). In other words, if the community survey indicates that most fish consumers in the AOC are in the general or sensitive population for certain fish, then the assessment should focus on the potential restrictions of fish consumption for that consumer population and types of fish consumed.

Comparison to reference site: The Niagara River, linking Lake Erie to Lake Ontario, is one of five bi-national connecting channels that hydrologically connect the Great Lakes. Connecting channels are unique environments in the world and outside of the Great Lakes these types of connecting channels are not common (Rozon et al. 2016), making finding an appropriate reference site challenging. Bhavsar et al. (2018) suggest that in situations where reference locations are limited (e.g., due to a paucity of comparable fish contaminant data for fish species and sizes of interest), it may be advisable to expand the comparison to locations within reasonable proximity of the AOC or consider multiple locations within the broader Great Lakes. Using this rationale, the Niagara River RAP suggests that the fish consumption advisories for the fish of interest (from a local survey of anglers) from each of the Lower and Upper Niagara River should be compared to relevant areas of each of its respective connecting Great Lakes (e.g., Lower Niagara River to relevant non-AOC locations in the Western basin of Lake Ontario; and, Upper Niagara River to relevant non-AOC locations in the Eastern basin of Lake Erie). This approach is similar to comparisons made for other Niagara River BUIs (e.g., fish populations) and may account for regional issues or conditions beyond the scope of the AOC program.

Contaminants from locally-controllable sources: Contaminants in the water that accumulate in fish tissue can come from various sources: direct (point sources such as effluent pipes) or indirect

(nonpoint sources such as runoff, atmospheric deposition). They can be natural or anthropogenic (human-made). The RAP program is intended to address sources that are human-made and within the Niagara River AOC that can be targeted for remedial action. The contaminants causing the majority of complete or partial fish consumption restrictions in the Niagara River are PCBs and dioxin-like PCBs. The RAP Team can utilize information from other sources such as the Niagara River Toxics Management Plan (e.g., Upstream-Downstream Monitoring Program and caged mussel biomonitoring) to determine if these contaminants are from locally-controllable sources. Any regional or upstream sources that are likely the cause of remaining restrictions on fish consumption in the AOC will be identified and referred to a broader regional program (i.e., Lake Ontario Lakewide Action and Management Plan, Lake Erie Lakewide Action and Management Plan, and/or Niagara River Toxics Management Plan).

11 APPENDIX E: BUI 6 TIERED ASSESSMENT FRAMEWORK

Tiered Assessment Framework for BUI 6 *Degradation of Benthos* for Niagara River Remedial Action Plan

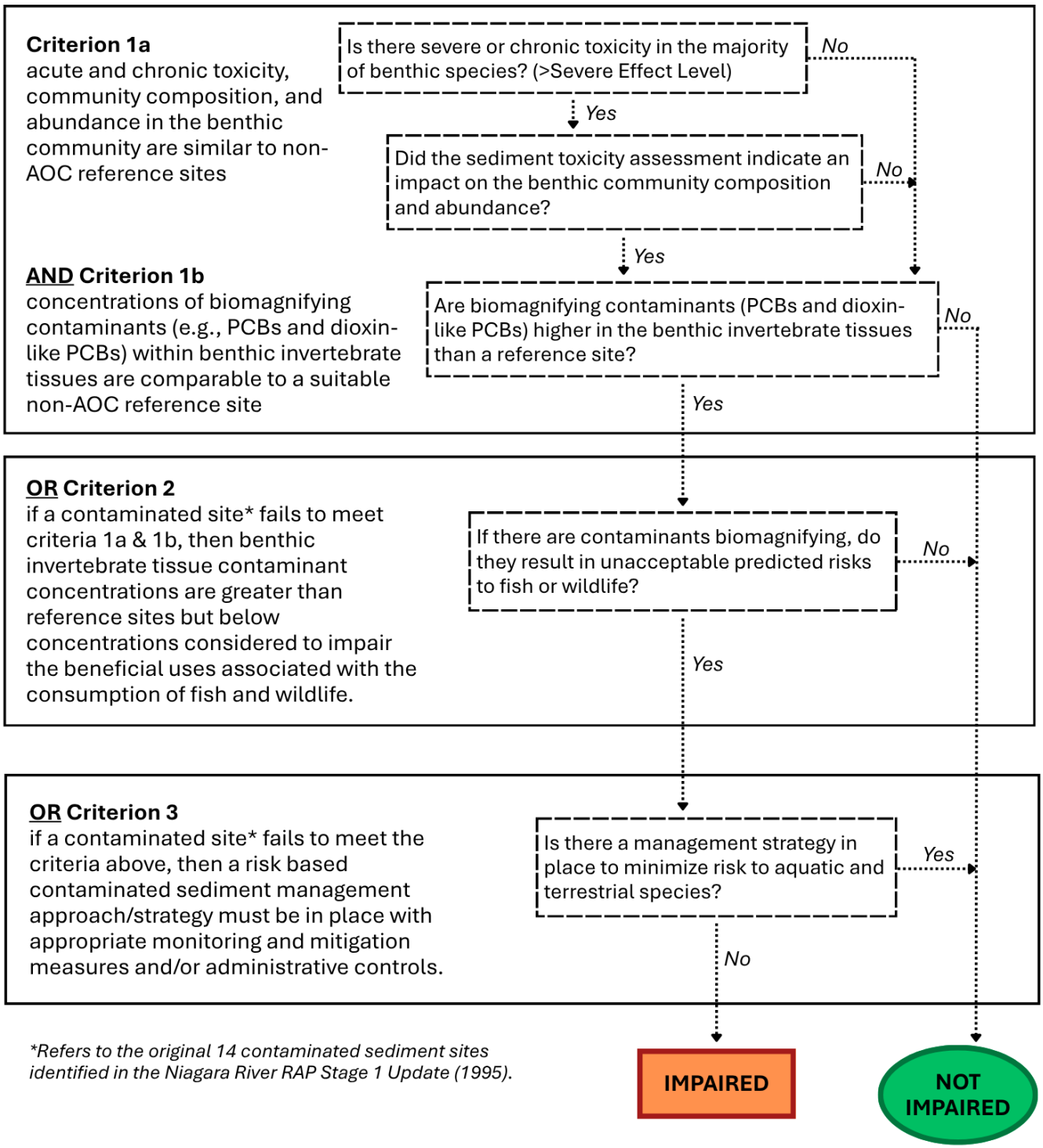


Figure 8. *Tiered assessment framework for BUI 6, Restrictions on fish consumption. Adapted from Golder (2013) for the Niagara River (Canadian) AOC in the Delisting Strategy (NRRAP 2021).*

More Information and Application of the Tiered Assessment

Criterion 1a - Acute/Chronic Toxicity: This criterion refers to two questions in the tiered assessment framework related to acute (short-term) and chronic (long-term) toxicity impacts on benthic invertebrates as well as the status of the benthic community composition and abundance compared to a non-AOC reference site.

Criterion 1b - Biomagnifying contaminants: The contaminants of concern relevant to this BUI are those that biomagnify (e.g., PCBs, dioxin-like PCBs). For this criterion, the concentrations of biomagnifying contaminants within benthic invertebrate tissues should be no different than a suitable non-AOC reference site. Benthic invertebrate tissue concentrations in reference areas are expected to be low for industrial compounds (e.g., PCBs, dioxin-like PCBs) as these substances do not occur naturally.

Criterion 2 - Predicted risk: This criterion is met if tissue residues of contaminants that cause acute or chronic toxicity, or which biomagnify are within ranges that do not result in predicted risk to fish or terrestrial consumers of benthic organisms. If unacceptable risks are predicted, then the assessment proceeds to evaluating the ability to meet Criterion 3. If Criterion 1a and b or Criterion 2 criterion are met, then the RAP Team may suggest proceeding with the BUI's status re-designation to 'Not Impaired' and Criterion 3 is not assessed.

Criterion 3 - Sediment Management Approach/Strategy: This criterion only applies should a contaminated sediment site (as per NRRAP 1995a) fail criteria 1-2 above. It is meant to ensure that there is a plan in place to manage sediment contaminants to minimize risks to aquatic and terrestrial species. If there is a sediment management approach (e.g., Monitored Natural Recovery) in place and the associated long-term monitoring indicates that the approach is achieving its targets/objectives, then the criterion is met and the BUI can be deemed 'Not Impaired' for the purpose of the RAP.