



# PATHWAY TO DELISTING

Updated: JUNE 2017



**DETROIT RIVER**  
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C L E A N U P

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## Beneficial Use Impairments



Restrictions on Fish and Wildlife Consumption



Tainting of Fish and Wildlife Flavour



Degradation of Fish and Wildlife Populations



Fish Tumours or other Deformities



Bird/Animal Deformities or Other Reproductive Problems



Degradation of Benthos



Restrictions on Dredging Activities



Eutrophication or Undesirable Algae



Restrictions on Drinking Water Consumption or Taste and Odour Problems



Beach Closings



Degradation of Aesthetics



Added Costs to Agriculture or Industry



Degradation of Phytoplankton and Zooplankton Populations



Loss of Fish and Wildlife Habitat

Legend

Impaired

Requires Further Assessment

Not Impaired

The Detroit River Canadian Cleanup (DRCC) is a community-based initiative launched in 1998 to cleanup, enhance, restore and sustain the Detroit River Ecosystem.

Partnerships within the DRCC aim to promote and implement the cleanup plan called a Remedial Action Plan (RAP) to protect, enhance and restore the Detroit River in order to remove it from the list of Great Lakes Areas of Concern. The DRCC's members provide leadership in identifying partnerships and funding opportunities to support and complete cleanup goals for the Detroit River.



Michigan Sea Grant

# Pathway to Delisting

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## Detroit River Canadian AOC Delisting Strategy 2013-2019

UPDATED June 2017



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## Introduction

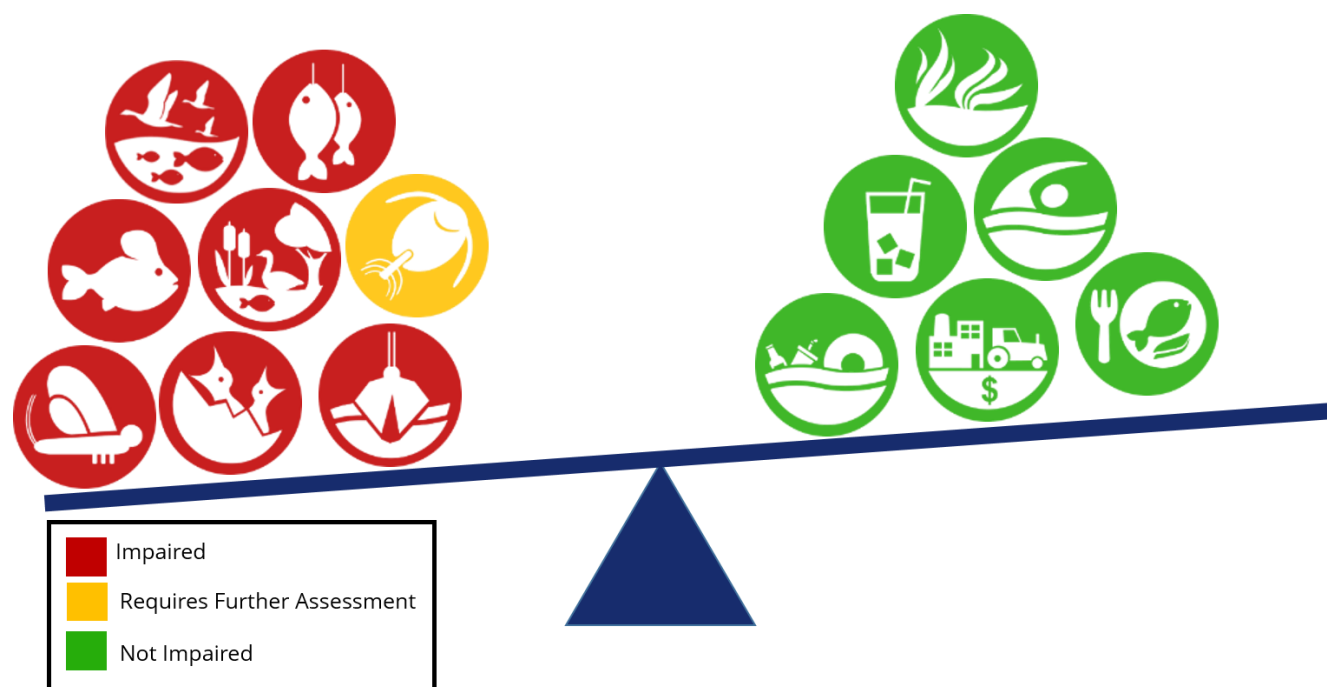
The 51 km long Detroit River is a connecting channel that, along with the St. Clair River and Lake St. Clair, link Lake Huron to Lake Erie. The Detroit River has an extensive history and has been used intensively for international shipping, industrial and agricultural development, recreation (fishing/boating) and as a source of drinking water. This intensive use and urbanization resulted in a degraded environment and, as a result, the Detroit River was designated as one of 43 Great Lakes Areas of Concern (AOC) in the Great Lakes Water Quality Agreement (GLWQA) Protocol of 1987. Canada's commitment to the GLWQA is also demonstrated through the implementation of the Canada-Ontario Agreement: Respecting the Great Lakes Basin (COA). Recognizing that each AOC suffers from different environmental problems, a locally-driven and defined Remedial Action Plan (RAP) is developed to guide restoration efforts in each location. The Detroit River Canadian AOC refers to the Canadian portion of the Detroit River proper (Fig. 1). The Canadian watershed is not part of the AOC itself but is identified as a potential source of impairment to the AOC and is the focus of certain implementation actions (Green et al. 2010).

Although the Detroit River AOC is technically considered bi-national, separate Canadian and American RAP implementation processes currently exist. Work on the Detroit River began as early as 1985 but a Stage 1 RAP Report was not produced until 1991. Soon after, work on a Stage 2 RAP was started but the report was never accepted by all RAP participants and was instead released as a RAP Update report in 1996. Since 1998 the Detroit River Canadian Cleanup initiative implements the Remedial Action Plan for the Canadian side of the Detroit River. A formal Stage 2 Report was completed by the DRCC in 2010 that updated in and provided recommendations for achieving delisting. The report was integral for the Detroit River AOC to guide and coordinate restoration efforts by several stakeholders; however, since the completion of the RAP Stage 2 Report, many important activities (projects, meetings, workshops) were implemented in the AOC resulting in a need to re-focus the RAP Team on current needs. **The purpose of this document is to identify the remaining actions necessary to delist the Canadian side of the Detroit River.**

Progress on the RAP is measured through the re-designation of beneficial use impairments (BUIs). A BUI is a reduction in the chemical, physical or biological integrity of the Waters of the Great Lakes sufficient to cause any of the following BUIs (Table 1). As of January 2017, the Detroit River Canadian AOC has 7 BUIs that are listed as impaired, 6 are not impaired, and 1 requires further assessment. The current (2017) status of the Detroit River's Canadian BUIs is listed in Table 1. The table will be updated as BUIs are re-designated. Once actions listed in this document are completed, then an assessment of the BUI should be conducted to determine its status. If a BUI is found to be impaired, then next steps for remediation need to be identified. If no further actions are necessary and the majority of evidence shows the BUI is on its way to recovery, then the BUI should be considered for re-designation. Appendix 1 provides information on delisting requirements and processes.

**Table 1.** The status of BUIs for the Detroit River Canadian Area of Concern as of January 2017.

BUI Name	Status	BUI Name	Status
1. Restrictions on Fish and Wildlife Consumption	Impaired for fish	8. Eutrophication or Undesirable Algae	Not Impaired
2. Tainting of Fish and Wildlife Flavour	Not impaired (May 2014)	9. Restrictions on Drinking Water Consumption or Taste and Odour Problems	Not impaired
3. Degraded Fish and Wildlife Populations	Impaired	10. Beach Closings	Not Impaired (January 2016)
4. Fish Tumours and other Deformities	Impaired	11. Degradation of Aesthetics	Not Impaired (January 2016)
5. Bird or Animal Deformities or Other Reproductive Problems	Impaired	12. Added Costs to Agriculture or Industry	Not impaired
6. Degradation of Benthos	Impaired	13. Degradation of Phytoplankton and Zooplankton Populations	Requires further assessment
7. Restrictions on Dredging Activities	Impaired	14. Loss of Fish and Wildlife Habitat	Impaired





**Figure 1.** A map of the Detroit River AOC and its Canadian watersheds.



## **Our Pathway to Delisting: Remaining Actions to Re-Designate BUIs**

The following 5-year work plan was developed by the DRCC's technical, expert work groups based on recent scientific information and recommendations given in the Detroit River Canadian Stage 2 RAP Report to clearly identify which actions are necessary to achieve re-designating each of the remaining BUIs. The work plan provides guidance for stakeholders to complete the implementation of short-term actions (to achieve delisting) and long-term actions (beyond delisting) for the Detroit River Canadian RAP in each fiscal year (April 1 - March 31; not calendar year). The actions listed in this section are for each BUI listed as 'impaired' or 'requires further assessment'; no further actions are necessary for BUIs whose status is listed as 'Not Impaired'.

The assessment, review and re-designation of BUIs should be based on the delisting guidance provided in the Detroit River Canadian Stage 2 RAP Report (Green et al. 2010). A summary of the principles are listed below. For a full description please refer to the Stage 2 RAP Report.

- Delisting should be based on the river as a complete ecosystem. That is, a significant portion of the river must be affected and should not be dependent on the complete elimination of all hotspots or issues in very small areas (unless they are severe).
- There are region-wide issues that are beyond the scope of the AOC program; therefore, the causes of beneficial use impairments must originate within the Detroit River AOC. If an impairment is identified, then the source need to be determined (e.g., active and anthropogenic, in-river vs. upstream/regional).
- Delisting/re-designating BUIs should be linked to the original reasons that the beneficial use was impaired in the first place (i.e., Stage 1 RAP).
- The RAP should deal with only those watershed issues that impact the river and are linked to specific BUIs.
- Once there is enough evidence to indicate that BUI is no longer impaired, the BUI should remain 'not impaired' unless monitoring shows a significant problem.
- The goal of the RAP is not to restore the River to a pristine, pre-settlement state. Rather, the achievement of delisting goals means the Detroit River is no longer the seriously polluted waterbody it once was—and no longer worse than other Great Lakes locations.
- When the AOC is delisted, monitoring and implementation of projects are expected to continue under the Lake Erie Lakewide Action and Management Plan (LAMP) and/or other existing programs.

The superscript letters next to an action refers to a particular dataset or existing monitoring program. Please see pages 19-21 for a list of programs with the corresponding letter. Moreover, an 'X' under year column indicates that the action needs to be completed while a ✓ indicates that it was done. The document will be updated annually.

***This document is anticipated to be the last work plan for the  
Detroit River Canadian AOC prior to delisting. It is a dynamic document and will be updated  
continually as actions are added and completed.***



Impaired


## Restrictions on Fish and Wildlife Consumption (BUI #1)

*..will be considered not impaired when consumption advisories for indicator fish species (e.g., walleye, brown bullhead, and smallmouth bass) given for the sensitive population in the AOC are similar to upstream and downstream non-AOC Great Lakes reference areas.*

Action	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
Recommend to the OMOE that sportfish monitoring in the Detroit River be implemented annually for the next 3 years.	✓							DRCC (M&R Work Group)
Collect the following information through existing monitoring programs in order to use as <b>data input</b> for assessments: <ul style="list-style-type: none"> <li>Fish tissue legacy contaminants (PCBs, dioxins, mercury) in Detroit River sport &amp; indicator fishes. <sup>d, n</sup></li> <li>Bioavailable water contaminants through caged mussel biomonitoring. <sup>b</sup></li> <li>Water contaminants in the Detroit River. Monitoring should be harmonized (spatially/temporally) with other programs (e.g., caged mussel and CSMI). <sup>c, h</sup></li> <li>Suspended and in-place sediment contamination. <sup>h</sup> <i>Suspended: annually</i> <i>In-place: 1999, 2008/2009, 2013, 2015/2016, 2025)</i></li> <li>Mercury-isotope tracers of fish movement, sediment and benthos</li> </ul>	✓	✓	✓	✓	X	X	X Lake Erie LAMP  X Lake Erie LAMP  X Lake Erie LAMP	ECCC (STB) MOECC/MNRF  GLIER City of Windsor  ECCC (STB)  EC (STB) GLIER  GLIER UMichigan
<b>Data compilation and assessment of BUI</b> as it relates to delisting criteria. <ul style="list-style-type: none"> <li>Trend analysis of legacy contaminants (PCBs, dioxins, mercury) in:               <ul style="list-style-type: none"> <li>Sportfish</li> <li>Indicator fish</li> <li>Water</li> <li>Sediments</li> <li>Benthos</li> </ul> </li> </ul>		✓		✓				DRCC (M&R Work Group)

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Action	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
<ul style="list-style-type: none"> <li>Input data into the Detroit River Bioaccumulation Model (GLIER) to predict fish contamination under various scenarios.</li> <li>Compile and compare Canadian water &amp; sediment data pre- and post-remediation activities (e.g., Turkey Creek PCB removal) to find out if there was an impact on Detroit River.</li> <li>Compile OMOECC fish consumption residues into Geodatabase and complete statistical assessment of contaminant residues in indicator species (Brown Bullhead, Smallmouth Bass, Walleye)</li> <li>Stakeholder workshop to review and consider modeling results generated from study</li> <li>Conduct upstream-downstream water quality monitoring</li> </ul>				✓				GLIER
	✓	✓						MOECC/EC
			✓	✓				GLIER
				✓				GLIER
					X			ECCC
<b>Review</b> all relevant data and <b>recommend</b> status of BUI based on delisting criteria. If an "Impaired" status results, identify next steps required to delist (if necessary).					X	X		DRCC (M&R Work Group)

 Not Impaired	<b>Tainting of Fish and Wildlife Flavour (BUI #2)</b> <i>..will be considered not impaired when survey results confirm that there is no statistically significant tainting of fish flavor when compared to fish from upstream of the Detroit River.</i>							
	<b>Action</b>	<b>13-14</b>	<b>14-15</b>	<b>15-16</b>	<b>16-17</b>	<b>17-18</b>	<b>18-19</b>	<b>Beyond</b>
Officially re-designate the BUI to 'not impaired' and host a celebration event.	✓							DRCC



Impaired

### Degradation of Fish and Wildlife Populations (BUI #3)

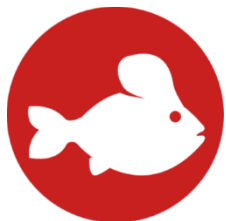
*..will be considered not impaired when environmental conditions support self-sustaining and healthy communities of indicator fish (e.g., walleye, bass, lake sturgeon, brown bullhead) and wildlife (e.g., black-crowned night heron, Northern leopard frog) species.*

Action	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
<b>FISH:</b> Recommend to the OMNRF that fishery/fish surveys for HEC and western Lake Erie continue at least every 5 years.							X	DRCC (M&R Work Group)
<b>FISH: Data compilation and assessment of BUI</b> as it relates to delisting criteria. <ul style="list-style-type: none"> <li>Write report on Detroit River fish populations (trends over time) using MNR &amp; DFO data.</li> </ul>	✓	✓						DRCC (support from MNR/EC/DFO)
<b>FISH: Review</b> above fish populations report and <b>recommend</b> status of BUI based on delisting criteria. If an "Impaired" status results, identify next steps required to delist (if necessary).		✓	✓					DRCC (M&R Work Group)
<ul style="list-style-type: none"> <li>Conduct creel survey</li> <li>Compile data from historical creel surveys from 1975 to present</li> </ul>			✓			X		MNRF USGS/ MI DNR/ MNRF
<ul style="list-style-type: none"> <li>Develop lines of evidence to support the fish populations delisting criteria and include a critical review of approaches being used such as the IBI</li> <li>GLAP sampling (potentially add more sampling locations in 2018/19 for more refined IBI)</li> </ul>			✓	X	X		X	DRCC (M&R Work Group)  DFO
<b>WILDLIFE:</b> Develop an assessment process to be used when sufficient data is compiled to re-assess the status of the wildlife component of this BUI. <ul style="list-style-type: none"> <li>Identify new indicator species or identify an IBI approach</li> </ul>	✓	✓	✓	X	X			DRCC (M&R and Habitat Work Groups)

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Action	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
<p><b>WILDLIFE:</b> Collect the following information through existing monitoring programs in order to use as <b>data input</b> for assessments:</p> <ul style="list-style-type: none"> <li>Conduct an aerial survey of the Canadian side of the Detroit River to locate other possible herring gull nesting locations (e.g., roof tops) that could be used as a new collection site for reproductive and populations BUIs.</li> <li>Continue monitoring at 4 coastal wetland sites in the Detroit River AOC to evaluate coastal wetland bird populations.<sup>j</sup></li> <li>Install Automated Recording Units to survey frogs and secretive marsh birds</li> </ul>	✓	✓						<p>ECCC (STB)</p> <p>ECCC (CWS)</p> <p>ECCC (CWS)</p>
<p><b>WILDLIFE: Data compilation and assessment of BUI</b> as it relates to delisting criteria.</p> <ul style="list-style-type: none"> <li>Refine the bird IBI to better represent wetland conditions in the HEC (2012 index is based on Lake Ontario).<sup>j</sup></li> <li>Re-assess coastal wetland bird IBI score using new disturbance index scores (noted above) to evaluate AOC wetland quality.<sup>j</sup></li> <li>Compare contaminant (mercury) levels (NOEL &amp; LOELs) in wildlife eggs to tissue residue guidelines for protection of wildlife health.</li> <li>Decadal colonial waterbird survey (# of active nests over 40 years) up to 2010 (EC). Compare Fighting Island (DR) with Middle Sister Island (LE) data over time.</li> <li>Compile waterfowl data</li> </ul>	✓	✓	✓					<p>ECCC (CWS)</p> <p>ECCC (CWS)</p> <p>DRCC (M&amp;R / Hab WG)</p> <p>DRCC</p>
<p><b>Review</b> all relevant data and <b>recommend</b> status of BUI based on delisting criteria. If an “Impaired” status results, identify next steps required to delist (if necessary). Focus assessment on population attributes (species richness and composition).</p>					X	X		DRCC



Impaired

### Fish Tumours or other Deformities (BUI #4)

*..will be considered not impaired when incidence rates of liver tumours in brown bullhead (aged 3-5 years) are not statistically different than the Great Lakes background rate (2%).*

Action	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
<b>Data compilation and assessment of BUI</b> as it relates to delisting criteria. <ul style="list-style-type: none"> <li>Obtain AOC fish tumor report by Paul Baumann and any specific data on PAHs and fish tumors from Hamilton Harbour and St. Mary's River to the M&amp;R Work Group to assist with model predictions of tumor incidence rates in the DR.</li> <li>Review contaminant (PAH) distribution of and exposure to Detroit River Canadian sediments to re-assess and determine next steps for this BUI. Input information in a model to predict tumor incidence rates.</li> <li>Collect 30-40 Brown Bullhead in the Lower Detroit River for liver analysis</li> <li>Analyze liver tumours</li> </ul>	✓							ECCC
	✓	✓						GLIER
				✓				GLIER & ECCC
					X			ECCC
<b>Review</b> all relevant data and <b>recommend</b> status of BUI based on delisting criteria. If an "Impaired" status results, identify next steps required to delist (if necessary).						X		DRCC (M&R Work Group)



Impaired

## Bird/Animal Deformities or Other Reproductive Problems (BUI #5)


*..will be considered not impaired when incidence rates of bird and animal reproductive problems in sentinel wildlife species do not exceed background levels at suitable reference sites elsewhere in the Great Lakes basin or suitable inland control populations for a minimum of three years; AND  
...when scientifically defensible wildlife bioassays of indicator species confirm that there are no reproductive problem and no significant toxicity from the water column or sediment contaminants or bioaccumulation.*


Action	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
Collect the following information through existing monitoring programs in order to use as <b>data input</b> for assessments:								
<ul style="list-style-type: none"> <li>Re-survey breeding bird colonies of black-crowned night herons in the Detroit River.</li> </ul>	✓							EC
<ul style="list-style-type: none"> <li>Identify potential Detroit River sampling locations for use in turtle and frog studies (below)</li> </ul>	✓	✓	✓					DRCC (M&R Work Group)
<ul style="list-style-type: none"> <li>Repeat snapping turtle hatching success and deformities study in Detroit River CDN AOC sites (mouths of tribs and/or islands) (follow up to 2007-2008 studies)</li> </ul>		✓	✓	✓				EC (STB)
<ul style="list-style-type: none"> <li>Repeat frog deformities study to re-assess status of local amphibian condition.</li> </ul>						X	X	EC (STB)
<ul style="list-style-type: none"> <li>Conduct an aerial survey of the Canadian side of the Detroit River to locate other possible herring gull nesting locations (e.g., roof tops) that could be used as a new collection site for reproductive and populations BUIs.</li> </ul>	✓	✓						EC (STB)
<ul style="list-style-type: none"> <li>If/when gull nesting locations are found, sample eggs for organochlorides and conduct hatching success studies (i.e., early embryo mortality) to help assess reproductive success and populations BUIs.</li> </ul>			✓	✓			X	EC (STB)
<ul style="list-style-type: none"> <li>Conduct a Tree Swallow study at ~4 locations along the DR to compare tissue concentrations to known effect levels and to measure population-level effects.</li> </ul>			✓	✓	X	X		EC (STB)


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Action	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
<b>Data compilation and assessment of BUI</b> as it relates to delisting criteria: <ul style="list-style-type: none"> <li>Review data from EC's frog reproductive success study to assess status of local amphibian condition.</li> <li>Literature review to determine threshold contaminant levels causing reproductive impairments in black-crowned night heron (or other colonial waterbirds) [Moore&amp;Martin, EC]</li> </ul>	✓	✓					X	DRCC (M&R Work Group)
<b>Review</b> all relevant data and <b>recommend</b> status of BUI based on delisting criteria. If an "Impaired" status results, identify next steps required to delist (if necessary).						X	X	DRCC



 <p>Impaired</p>	<b>Degradation of Benthos (BUI #6)</b> <i>..will be considered not impaired when the benthic community composition is temporally and spatially identified as non-impaired based on an objective and quantitative community analysis and/or a comparison to appropriate reference sites within the river; AND</i> <i>...when benthic organisms analyzed for persistent, bioaccumulative substances (e.g., PCBs and mercury) are below thresholds required to protect fish and wildlife.</i>							
Action	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
<p>Collect the following information through existing monitoring programs in order to use as <b>data input</b> for assessments:</p> <ul style="list-style-type: none"> <li>Contaminant (PCBs, mercury) levels in benthos (2008, 2009, 2013)</li> <li>Suspended and in-place sediment contamination.<sup>h</sup>  <i>Suspended: annually</i>  <i>In-place: 1999, 2008/2009, 2013, 2015/2016, 2025)</i></li> </ul>	✓							GLIER
<p><b>Data compilation and assessment of BUI</b> as it relates to delisting criteria:</p> <p>Implement weight-of-evidence approach to assessing toxicity and recovery of priority pollutants (an integrative assessment with these goals):</p> <ul style="list-style-type: none"> <li>Conduct a corridor-wide survey of sediment condition and benthos community composition.</li> <li>Develop a cumulative hazard score and identify contaminated sites and in-river reference sites using geostatistical techniques.</li> <li>Compile and compare Canadian sediment data at pre- and post-remediation activities (e.g., Turkey Creek PCB removal) to find out if there was an impact on Detroit River.</li> </ul>	✓	✓					X Lake Erie LAMP	EC (STB) GLIER
<p><b>Review</b> all relevant data and <b>recommend</b> status of BUI based on delisting criteria. If an “Impaired” status results, identify next steps required to delist (if necessary).</p>				✓	X			DRCC

 Impaired	<b>Restrictions on Dredging Activities (BUI #7)</b> <i>..will be considered not impaired when there are no limitations on the disposal of sediments removed for routine navigational dredging.</i>							
Action	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
Determine if dredging has occurred in the Canadian navigational channels of the Detroit River over the last 3 years.	✓							DRCC WPA
<b>Review</b> all relevant data and <b>recommend</b> status of BUI based on delisting criteria. If an “Impaired” status results, identify next steps required to delist (if necessary).			✓	✓	X			DRCC

 Not Impaired	<b>Beach Closings (BUI #10)</b> <i>..will be considered not impaired when the frequency of beach closures due to elevated counts of E. coli in the Detroit River (White Sands Conservation Area and McKee Park) does not exceed the frequency at upstream (Sandpoint) and downstream (Holiday) reference beaches.</i>							
Action	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
<b>Submit</b> re-designation report to COA and recommend the BUI as ‘not impaired’.	✓							DRCC

 Not Impaired	<b>Degradation of Aesthetics (BUI #11)</b> <i>..will be considered not impaired when the waters are devoid of substances at levels that produce persistent objectionable deposits, colours, turbidity, and/or odour.</i>							
Action	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
<b>Review</b> all relevant data and <b>recommend</b> status of BUI based on delisting criteria. If an “Impaired” status results, identify next steps required to delist (if necessary).	✓							DRCC
<b>Submit</b> re-designation report to COA and recommend the BUI as ‘not impaired’.		✓						DRCC



Requires Further Assessment

### Degradation of Phytoplankton and Zooplankton Populations (BUI #13)

*..will be considered not impaired when the composition and relative abundance of phytoplankton and zooplankton of the Detroit River reflect that of Lake Huron, and therefore represent primarily oligotrophic/mesotrophic conditions.*

Action	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
Conduct corridor-wide survey of phytoplankton community composition <ul style="list-style-type: none"> <li>Phytoplankton analysis</li> <li>Write phytoplankton report</li> </ul>		✓			X			EC
Conduct corridor-wide survey of zooplankton community composition <ul style="list-style-type: none"> <li>Zooplankton analysis</li> <li>Write Zooplankton report</li> </ul>			✓	✓				GLIER/EC
<b>Revise</b> the re-designation report and officially re-designate the BUI to 'not impaired'.					X			DRCC



Impaired

### Loss of Fish and Wildlife Habitat (BUI #14)

*..will be considered not impaired when*

Coastal wetlands: *Protect existing coastal wetland habitat and restore wetland function in priority areas of the AOC and its watershed (as identified in the 2007 Detroit River AOC Canadian Priority Habitat Sites and the 2013 Essex Region Natural Heritage System Strategy.*

Aquatic & riparian habitat: *Protect existing fish and aquatic wildlife habitat (deep water, coastal, nearshore) and restore ecosystem function of these priority areas in, and hydrologically connected to, the Detroit River.*

Terrestrial habitat: *Protect existing natural terrestrial corridors and restore ecosystem function between the Detroit River and the Ojibway Prairie Complex, the LaSalle Candidate Natural Heritage sites, and other major identified habitat sites (as identified in the 2007 Detroit River AOC Canadian Priority Habitat Sites, the 2013 Essex Region Natural Heritage System Strategy, and other fish and wildlife habitat assessments.*

Actions	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
Collect the following information through existing monitoring programs in order to use as <b>data input</b> for assessment: <ul style="list-style-type: none"> <li>Identify (baseline) physical characteristics of the Detroit River and fill knowledge gaps using various techniques (GIS, side-scan sonar, research) to identify priority <i>aquatic</i> restoration locations</li> </ul>	✓	✓	✓	✓	X			DRCC

...continued on following page

Actions	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
<ul style="list-style-type: none"> <li>Develop a fish list to conduct a probability analysis of fishes using the Detroit River to inform priority habitat restoration sites (Fish Habitat Suitability Model).</li> </ul>	✓	✓	✓	✓	X			DFO
<b>Develop an AOC Habitat Delisting Plan</b> to guide restoration efforts in the AOC <i>using the specific actions listed below to create the plan. Plan should include list of project to achieve delisting and list of actions to continue to implement after delisting.</i> <ul style="list-style-type: none"> <li>Develop short-term and long-term habitat delisting targets.</li> <li>Identify and prioritize target habitat sites for protection and/or restoration using GIS data and other resources (shoreline assessment, ERNHSS, MNR 1993...)</li> <li>Finalize the Essex Region Natural Heritage System Strategy (ERNHSS) to guide long-term AOC watershed restoration opportunities.</li> <li>Select priority habitat restoration sites based on Work Group recommendations.</li> <li>Conduct macrophyte study in wetlands</li> <li>Review GIS data (gathered through ERNHSS) every 5 years to examine habitat change in the AOC and its watershed to evaluate habitat gain and ensure no net loss.</li> <li>Finalize the 'Shoreline Design Options Manual' along with a decision-making matrix that describes the types (not location) of restoration options possible along the Canadian shoreline.</li> <li>Review Shoreline Assessment study and property ownership to identify any remaining shoreline softening opportunities</li> <li>Post-monitoring of restoration project and HEAT modeling to ensure 'gain' in habitat</li> <li>Conduct modeling project in Canard to determine areas to target to reduce turbidity</li> </ul>	✓	✓	✓	✓	X	X		DRCC RAP Coordinator with Work Groups)  DRCC (Habitat WG)  DRCC (Habitat WG)  ERCA  DRCC (S&IC)  GLIER  ERCA  ERCA/EC /MOECC  DRCC  DFO  GLIER / ERCA

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Actions	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
<ul style="list-style-type: none"> <li>Complete ecological criteria for matrix</li> </ul>					X	X		DFO
<b>Data compilation and assessment of BUI</b> as it relates to delisting criteria: <ul style="list-style-type: none"> <li>Complete GIS-based Common Reed (<i>Phragmites</i>) extent study and finalize report. (Assess current status of coastal wetland habitat &amp; baseline information for AOC wetland quality).</li> <li>Continue monitoring at 4 coastal wetland sites in the Detroit River AOC to evaluate wetland quality.<sup>j</sup></li> <li>Refine the SAV and macroinvertebrate IBIs to better represent wetland conditions in the HEC (2012 index is based on Lake Ontario).<sup>j</sup></li> <li>Re-assess coastal wetland IBI scores using new disturbance index scores (noted above) to evaluate AOC wetland quality.<sup>j</sup></li> <li>Further refine coastal wetland delisting criteria with guidance specific to DR wetlands</li> </ul>	✓							EC (CWS)
	✓	✓	✓	✓	X	X		EC (CWS)
	✓							EC (CWS)
	✓	✓						EC (CWS)
					X			EC (CWS)
Action	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
<b>Implement the AOC Habitat Delisting Plan</b> to guide restoration efforts in the AOC <i>using the specific actions listed below</i> to create the plan. <i>*contingent upon available funding and interested stakeholders.</i> <ul style="list-style-type: none"> <li>Expand Spawning Reef Expansion (1 acre) near Fighting Island.</li> <li>Restore shoreline fish habitat (315 m) at the Lafarge site in Windsor.</li> <li>Improve shoreline and aquatic habitat at Mill Street</li> <li>Collavino managed wetland</li> <li>Implement Clean Water ~ Green Spaces program (or similar program) to protect, restore and improve habitat quality &amp; quantity in priority areas of the AOC watersheds (identified in ERNHSS) via tree plantings, wetland restoration, buffer strips, and other agricultural BMP activities.</li> </ul>	✓						X	All Stakeholders, as needed
	✓							WPA
		✓			X			WPA/ MNRF ERCA
	✓	✓	✓	✓	X	X	X	ERCA

...continued on following page

Action	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
<ul style="list-style-type: none"> <li>Other opportunities as identified</li> </ul>							X	All
<b>Review</b> all relevant habitat data (related to fish/wildlife populations) and <b>recommend</b> status of BUI based on delisting criteria. If an “Impaired” status results, identify next steps required to delist (if necessary).						X	X	DRCC

## General RAP Goals

This section includes items that are important to RAP because they are linked to achieving delisting the AOC through administration, outreach, stewardship and public involvement. All of the actions below are very important but are not necessarily required to re-designate one particular BUI.

Action	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
Support the coordination / governance of the Detroit River Canadian RAP including office administration, work plan support, liaison, communications and outreach.	✓	✓	✓	✓	X	X		EC OMOECC ERCA
Update and maintain the Detroit River Delisting and Information System, which is a critical aspect of the DRCC's corporate memory and decision-making process.	✓	✓	✓	✓	X	X		EC OMOECC UWindsor
Encourage public involvement and Detroit River stewardship through public events, seminars, community plantings and cleanups.	✓	✓	✓	✓	X	X		DRCC
Public review and report on Detroit River Canadian RAP progress.		✓		✓		X		PAC
Advocate for the protection and enhancement of the Detroit River and implementation of the RAP (as needed).	✓	✓	✓	✓	X	X	X	PAC
Encourage the reduction of urban and rural non-point sources entering the Detroit River through various restoration/BMP and outreach techniques.	✓	✓	✓	✓	X	X	X	ERCA DRCC Municipalities

## Long-Term Goals & Recommendations

This section includes items that are important to RAP because they are linked to achieving delisting the AOC long-term planning and general water quality or habitat improvements. The actions benefit the entire region (not just delisting the AOC) and should be implemented at regional level by various stakeholders. These actions are recognized as important but are not necessarily required to re-designate a BUI or delist the AOC.

**Many of the projects or programs below are expected to be implemented after the AOC is delisted.**

Action	13-14	14-15	15-16	16-17	17-18	18-19	Beyond	Lead
Develop and implement a 'Post-Delisting' Monitoring Plan for the AOC.			X	X			X	DRCC (Habitat and M&R Work Groups)
Develop an interactive framework for an Integrated Watershed Management Plan (starting with the Canard River watershed as a model for others) to deal with development pressures, water quality management, etc.	✓							ERCA
Develop and implement the Integrated Watershed Management Plan (based on above framework) to guide municipalities and private landowners and achieve ongoing protection/restoration of local natural heritage features.							X	ERCA
Encourage the reduction of industrial/municipal point sources entering the Detroit River. Examples: <ul style="list-style-type: none"> <li>Optimize the operation of the Windsor Riverfront Retention Treatment Basin; analysis of CSO effluent.</li> <li>Continue to replace 'over-under' and combined sewer systems in Windsor, as needed.</li> <li>Continue to replace deteriorated separated sewer systems in Windsor and Amherstburg, as needed.</li> <li>Continue to monitor for new and amended Environmental Compliance Approvals concerning discharge to the Detroit River.</li> <li>Implement an "illegal connections eliminations" program in the AOC municipalities.</li> <li>Implement a downspout disconnection program in Amherstburg (in progress in Windsor)</li> </ul>	✓							Windsor OMOECC
							X	Windsor
							X	Windsor A'burg
	✓	✓	✓	✓	X	X	X	MOECC
							X	Windsor LaSalle A'Burg
							X	A'burg



## Existing Monitoring Programs

A number of existing, ongoing Canadian monitoring programs are implemented in the Detroit River Canadian AOC by various agencies. These programs, funded outside of the RAP, are very important for the DRCC as they provide key information/data required to assess and monitor the status of several BUIs. There is a strong need for long-term monitoring of fish, wildlife and water/sediment conditions in the Detroit River AOC to show improvements or deterioration of the ecosystem over time. Therefore, it is recommended (and expected) that these programs continue in the region even after the AOC is delisted. Below is a brief overview of each program implemented in the Detroit River (and other Great Lakes locations) including the timing and lead agency. For more information about a program, contact the lead agency.

**a) Angler Creel Survey Program – OMNRF**

Angler creel surveys provide information on angler harvest, effort, catch characteristics, harvest rate, target species effort and distribution. Occurs periodically.

**b) Caged Mussel Biomonitoring – GLIER & City of Windsor**

Mussels are deployed along most of the Windsor shoreline of the Detroit River (as well as in some locations in Little River and Turkey Creek) to measure the amounts of bioavailable chemicals in water. Occurs annually (since 1996).

**c) Detroit River Head and Mouth Water Quality Monitoring – EC (STB)**

Water monitoring program operated on a surveillance schedule to address key threats to water quality. Combined with the caged mussel biomonitoring program (above), this program will also advance knowledge of status and trends of key contaminants within the Huron-Erie Corridor. Schedule is being reviewed (2013).

**d) Great Lakes Fish Contaminants Monitoring Program – EC (STB)**

One of the flagship monitoring programs in the Great Lakes which currently operates yearly in the four Canadian Great Lakes. Whole fish (lake trout or walleye) samples are analyzed for contaminants and provide key status and trend data sets over time.

**e) Great Lakes Fish Population Assessment – OMNRF/DFO/University of Windsor**

Fish population assessments directly address the health of fish communities in the corridor. A number of programs have operated through the years: MNR fish assessment (1980s), COA (DFO-MNR) fish assessment (2002, 2003, and 2004), and MNR angler diary program (1980s-present). Occurs periodically.

**f) Great Lakes Herring Gull Egg Contaminant Monitoring Program – EC**

Program implemented since 1970 to understand the temporal and spatial trends of environmental contaminant levels in Great Lakes herring gulls. Sampling of gull eggs is done annually in a number of locations and results are compared with those from previous years.

- g) Great Lakes Marsh Monitoring Program – BSC/EC/ERCA/U.S. EPA/Volunteers**  
A binational monitoring program conducted in Great Lakes AOCs with volunteers to assess wetland status and identify long-term trends in wetland bird and amphibian populations. Ongoing annually since 1995.
- h) Great Lakes Surveillance Program – EC (STB)**  
Monitoring of nutrients and priority legacy contaminants (PCBs, dioxins, mercury) in Great Lakes water (various locations) to examine trends over time for the AOC. Data are typically provided within one year of the completion of sampling and samples are collected from the upper and lower Great Lakes in alternating years.
- i) Great Lakes Sediment Monitoring Program – EC (STB)**  
Monitoring of contaminants in Great Lakes sediment. One Canadian Great Lakes is done on the cycle of the Cooperative Science and Monitoring Initiative (CSMI). Data are typically provided within one year of the completion of sampling.
- j) Great Lakes Coastal Wetland Monitoring – EC (CWS)**  
Monitoring and assessment of coastal wetlands throughout the Canadian Great Lakes (for over a decade) to monitor wetland wildlife communities and their habitat. The biological condition of coastal wetlands is determined using indices for each biological community (marsh birds, aquatic macroinvertebrates and submerged aquatic vegetation) as well as water quality. Ongoing annually until 2015 in the AOC; every 3 years thereafter (starting in 2017).
- k) MISA Discharger Assessment and Reporting – OMOECC/Detroit River Dischargers**  
Ontario's Municipal/Industrial Strategy for Abatement (MISA) program requires direct dischargers in 9 sectors (e.g., inorganic chemicals, industrial, metal casting) to maintain detailed records of their regulated discharges, and report them to the OMOECC on a regular basis. Only the Canadian Salt Company is a MISA Operating Plant in the AOC. However, other direct dischargers are monitored through Environmental Compliance Approval (e.g., Ford Motor Company of Canada Ltd. (Windsor Engine Plant) and Honeywell ASCa Inc. (Amherstburg)).
- l) Provincial Water Quality Monitoring Network – OMOECC/ERCA**  
Surface water quality information collected from rivers and streams at nearly 400 locations in Ontario. Various water quality parameters are monitored at each PWQMN station, including chloride, nutrients, suspended solids, trace metals and other general chemistry parameters. Bacteria, pesticides and other contaminants are monitored in detailed water quality surveys in priority watersheds. Ongoing annually.
- m) Essex Region Surface Water Monitoring Program – ERCA/OMOECC**  
In addition to the 8 PWQMN stations (above), ERCA monitors surface water quality at 11 other sites across the region which includes 23 sub-watersheds and 5 nearshore water quality monitoring areas. Several of these are located in the Detroit River AOC watershed. Monitoring includes both regular weather and wet weather sampling complemented by flow measurements at certain strategic locations. Ongoing annually.
- n) Sport Fish Contaminant Monitoring Program – OMOECC/OMNRF**  
Monitoring of contaminants (mercury, PCBs, dioxins, mirex, and DDT) in the dorsal muscle

tissue of various sport fish in the Detroit River (and other province-wide lakes).

**o) Young-of-the-Year Fish Monitoring Program – OMOECC/OMNRF**

Forage fish such as the spottail shiner provide excellent temporal and spatial monitoring of contaminants. Generally, this program focuses on tributary inputs, and it should be expanded similar to the mussel biomonitoring program (on a 3-year cycle) to provide a more detailed spatial assessment of contaminants in fish than is available from the sportfish contaminant monitoring program.

## Acronyms

AIR	Area in Recovery (also sometimes AOCir)
AOC	Area of Concern
BSC	Bird Studies Canada
BUI	Beneficial Use Impairment
COA	Canada-Ontario Agreement: Respecting the Great Lakes Basin Ecosystem
CSMI	Cooperative Science and Monitoring Initiative
CWS	Canadian Wildlife Service (Environment Canada)
DDT	Dichlorodiphenyltrichloroethane
DFO	Department of Fisheries and Oceans Canada
DR	Detroit River
DRCC	Detroit River Canadian Cleanup
EC	Environment Canada
ERCA	Essex Region Conservation Authority
ERNHSS	Essex Region Natural Heritage System Strategy
GIS	Geographic Information System
GLIER	Great Lakes Institute for Environmental Research
GLWQA	Great Lakes Water Quality Agreement
HEC	Huron to Erie Corridor (also called St. Clair-Detroit River System)
IBI	Index of Biotic Integrity
LAMP	Lakewide Action Management Plan
LE	Lake Erie
LOEL	Lowest Observable Effect Level
MISA	Municipal Industrial Strategy for Abatement
NOEL	No Observable Effect Level
OMOECC	Ontario Ministry of the Environment and Climate Change
OMNRF	Ontario Ministry of Natural Resources and Forestry
PAH	Polycyclic Aromatic Hydrocarbon or polynuclear aromatic hydrocarbon.
PAC	Public Advisory Council
PCB	Polychlorinated biphenyl
PWQMN	Provincial Water Quality Monitoring Network
RAP	Remedial Action Plan
SAV	Submerged Aquatic Vegetation
S&IC	Steering and Implementation Committee (of the DRCC)
STB	Science and Technology Branch (Environment Canada)
US EPA	United States Environmental Protection Agency
WPA	Windsor Port Authority

## Definitions

### Area of Concern

A degraded area in the Great Lakes that fails to meet the General or Specific Objectives of the Canada-United States Great Lakes Water Quality Agreement, where such failure has caused or is likely to cause impairment of beneficial use or of the area's ability to support aquatic life.

### Area in Recovery (AIR)

An area, originally identified as an Area of Concern, where, based on community and government consensus, all scientifically feasible and economically reasonable actions have been implemented and additional time is required for the environment to recover.

### Beneficial Use Impairment (BUI)

A reduction in the chemical, physical or biological integrity of the Waters of the Great Lakes sufficient to cause any of the following:

- Restrictions on fish and wildlife consumption
- Tainting of fish and wildlife flavour
- Degradation of fish and wildlife populations
- Fish tumours or other deformities
- Bird or animal deformities or reproduction problems
- Degradation of benthos
- Restrictions on dredging activities
- Eutrophication or undesirable algae
- Restrictions on drinking water consumption, or taste and odour problems
- Beach closings
- Degradation of aesthetics
- Added costs to agriculture or industry
- Degradation of phytoplankton and zooplankton populations
- Loss of fish and wildlife habitat

### Delisting

Removal of an AOC from the list of Great Lakes Areas of Concern by meeting the criteria for the restoration of beneficial uses as defined by the RAP and agreed upon by the agencies and community.

### Re-designation of a BUI

Meeting locally defined delisting criteria designed to be specific, measurable, achievable, and scientifically defensible. Sometimes this process is also called delisting a BUI.

### Remedial Action Plan

A plan describing environmental problems, their causes and remedial actions required to restore beneficial water uses in the Area of Concern.

## APPENDIX 1: Delisting: What does it mean?

The term ‘delisting’ refers to the process whereby the designation of an AOC or Area in Recovery (AOCir) is removed and the implicated waterbody is taken off of the GLWQA’s list of Great Lakes AOCs. A decision-making approach for delisting is shown in Figure 1.

There are subtle—yet important—differences between the being listed as an AOC, AOCir, or a delisted area. According to the GLQWA (2012), the Governments of Canada and the United States “may elect to identify an AOC as an AOC in Recovery when all remedial actions identified in the RAP have been implemented and monitoring confirms that recovery is progressing in accordance with the RAP”. In other words, an AOC can be changed to “in recovery” even if there are still impaired BUIs—the AOC is not delisted *per se* but monitoring shows that it’s well on its way. Monitoring and further action may continue to restore remaining BUIs within and AOCir. Furthermore, the designation of AOC or AOCir shall be removed “when environmental monitoring confirms that beneficial uses have been restored in accordance with the criteria established in the RAP” (GLWQA, 2012). A brief summary is provided below.

AOC	AOC in Recovery	Delisted
<ul style="list-style-type: none"> <li>• Impaired BUIs according to local criteria;</li> <li>• RAP actions not completed;</li> <li>• Monitoring shows remediation still required.</li> </ul>	<ul style="list-style-type: none"> <li>• Impaired BUIs according to local criteria;</li> <li>• All RAP actions are completed;</li> <li>• Monitoring confirms recovery is progressing.</li> </ul>	<ul style="list-style-type: none"> <li>• No impaired BUIs;</li> <li>• All RAP actions are completed;</li> <li>• Monitoring confirms recovery is complete.</li> </ul>

### Principles for Delisting a Bi-national Area of Concern

Although the DRCC only implements a RAP for the Canadian side of the AOC, careful consideration needs to be taken for the bi-national aspect of the AOC. The Compendium of Position Papers offers guidance on delisting bi-national AOCs as part of the Four Agency Letter of Commitment. Delisting should be pursued on a case-by-case basis, domestic or bi-nationally, and in consideration of the following (Compendium, 2012):

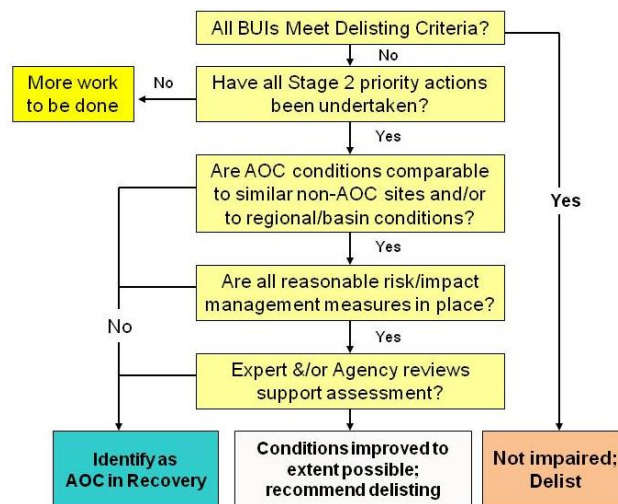
- all beneficial use impairments have been re-designated (e.g., delisting criteria met);
- the local community concurs that the actions taken have restored beneficial uses and supports the delisting of the AOC;
- environmental conditions based on sound science confirm restoration of beneficial uses with no trans-boundary concerns.

## Proposed Delisting Process for the Detroit River AOC

Using the 2012 Compendium of Position Papers as guidance, below is a detailed, proposed process for delisting the Canadian side of the Detroit River AOC.

Once there is evidence that the “principles for delisting” (above) have been met:

- The DRCC’s Steering and Implementation Committee shall prepare a recommendation to delist the AOC and form a writing team to prepare a draft Delisting Report (RAP Stage 3 Report) to substantiate the recommendation. The Writing Team, led by the RAP Coordinator, should include one representative from any interested Member Organization (refer to DRCC Framework and Terms of Reference) and members of the Canadian Public Advisory Council.
- The Delisting Report must be presented to, and endorsed (by consensus) by the Steering and Implementation Committee and Public Advisory Council.
- The report will be released for public review (through an open house or public meeting presentations to Municipal Councils, online). Comments will be reviewed by the Writing Team and the report will be revised, as necessary.
- The recommendation to delist along with the final report is to be submitted to the Four Agency Work Group and U.S. Public Advisory for review (bi-national consultation).
- The report is sent to the COA Annex 1 Implementation Committee for technical review and comment. Final revisions incorporated, as needed.
- A Final Draft Delisting Report will be forwarded to the COA Management Committee for official submission to the International Joint Commission.
- Submission of the Final Delisting Report to the Four Agency Management Committee for review and comments. Once the Four Agency Management committee is satisfied with the Final Delisting Report, a letter supporting the delisting of the AOC will be provided to the DRCC’s Steering and Implementation Committee for inclusion in the report.
- The U.S. and Canadian federal governments will officially remove the affected water body from the list of AOCs.
- The U.S. and Canadian federal governments will officially inform the U.S. and Canadian Co-chairs of the IJC that an AOC delisting has occurred; the Final RAP report is transmitted along with the official notification.



**Figure 1.** The decision-making approach for delisting provided by COA.





Canadian and US Areas of Concern, January 2014.

An Area of Concern, is a location in the Great-Lakes – St. Lawrence River Basin that has been identified as severely polluted or degraded. For more information about Great Lakes AOCs, visit [www.ec.gc.ca/raps-pas](http://www.ec.gc.ca/raps-pas) or [www.ontario.ca/environment](http://www.ontario.ca/environment).

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