



St. Clair River Area of Concern  
**2012 – 2017 Report of Accomplishments**





## Acknowledgements

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The authors would like to acknowledge the contributions made by the many partners and agencies involved in the development of this report.

### **Photo Credits:**

Page 2 – Blue Water Bridge, St. Clair River. *Nicole Drumm.*

Back Cover – Freighter on the St. Clair River. *SCRCA.*

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## List of Acronyms

AFN	Aamjiwnaang First Nation
AOC	Area of Concern
BPAC	Binational Public Advisory Council
BUI	Beneficial Use Impairment
CA	Conservation Authority
CCME	Canadian Council of Ministers of the Environment
CRIC	Canadian Remedial Action Plan Implementation Committee
CWS	Canadian Wildlife Service
CSO	Combined Sewer Overflow
DDT	Dichlorodiphenyltrichloroethane
DFO	Fisheries and Oceans Canada
DU	Ducks Unlimited
ECCC	Environment and Climate Change Canada
FOSCR	Friends of the St. Clair River
GLIER	Great Lakes Institute for Environmental Research
GLWQA	Great Lakes Water Quality Agreement
HCB	Hexachlorobenzene
HCBD	Hexachlorobutadiene
IJC	International Joint Commission
MMP	Marsh Monitoring Program
MST	Microbial Source Tracking
MTO	Ministry of Transportation
OCS	Octachlorostyrene
OMAFRA	Ontario Ministry of Agriculture, Food and Rural Affairs
OMOEC	Ontario Ministry of Environment and Climate Change
OMNRF	Ontario Ministry of Natural Resources and Forestry
OP	Official Plan
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PEL	Probable Effect Level
PWQO	Provincial Water Quality Objective
RAP	Remedial Action Plan
RLSN	Rural Lambton Stewardship Network
SCRCA	St. Clair Region Conservation Authority
SLEA	Sarnia-Lambton Environmental Association
WIFN	Walpole Island First Nation

## Foreword

The mandate of the St. Clair River Canadian Remedial Action Plan Implementation Committee (CRIC) is to restore Beneficial Use Impairments (BUIs) identified in the 1992 Stage 1 Remedial Action Plan (RAP) for the Canadian jurisdiction of the St. Clair River Area of Concern (AOC). The primary responsibility of the committee is to coordinate the implementation of remedial activities to restore BUIs to the status of delisting criteria defined for each impairment.

In 2012, the committee developed a work plan identifying the final remedial actions necessary to restore, and ultimately delist, the St. Clair River AOC. This document serves to report on the accomplishments related to the 2012 – 2017 Work Plan. Its purpose is to provide an overview of the recommendations identified in 2012, the status of priority actions as of March 31, 2017, highlight achievements over the 5-year period, and identify what actions are still outstanding.

The following list acknowledges the partners and agencies that, without their contributions, progress on the 2012 – 2017 priority actions would not have been accomplished.

Aamjiwnaang First Nation  
Canadian Wildlife Service  
City of Sarnia  
Environment and Climate Change Canada  
Fisheries and Oceans Canada  
Lambton County  
Municipality of Chatham-Kent  
Ontario Ministry of Agriculture, Food and Rural Affairs  
Ontario Ministry of Environment and Climate Change  
Ontario Ministry of Transportation  
Rural Lambton Stewardship Network  
Sarnia-Lambton Environmental Association  
St. Clair Region Conservation Authority  
St. Clair River Binational Public Advisory Council  
St. Clair Township  
Walpole Island First Nation



## Introduction

In 1987, the International Joint Commission (IJC) identified the St. Clair River as an AOC in the Great Lakes Basin as it did not meet the objectives identified in the 1972 Great Lakes Water Quality Agreement (GLWQA) signed by both the Canadian and the United States governments. The AOC program used fourteen beneficial uses, ranging from the ability to safely eat fish and wildlife to being able to drink and swim in the water to assess the status of these areas. Within the St. Clair River, elevated contaminant concentrations in the water, biota, and sediments, along with the loss of aquatic and coastal habitats, led to the impairment of some of these beneficial uses.



**Figure 1:** Map of the Canadian and U.S. Areas of Concern in the Great Lakes basin.

As part of the AOC process, a binational Stage 1 Report for the St. Clair River (1992) identified eight of the fourteen beneficial uses as "Impaired," four were classified as "Requiring Further Assessment," and two as "Not impaired." In 1995, the binational Stage 2 Report was completed and introduced a framework for restoring the environmental integrity of the St. Clair River by identifying 45 actions requiring completion. These actions were needed to restore impaired BUIs to a "Not Impaired" status and collect data or conduct studies to assess those that required further assessment. The Stage 2 Report is ultimately the guide to restore the St. Clair River and remove it ("delist") as an AOC.

In 2005, the St. Clair River CRIC was formed to further advance efforts to rehabilitate these BUIs on the Canadian side of the St. Clair River. The CRIC consisted of representatives from Environment and Climate Change Canada (ECCC), Ontario Ministries of Environment and Climate Change (OMOECC), Natural Resources and Forestry (OMNRF), Agriculture, Food and Rural Affairs (OMAFRA), the St. Clair Region Conservation Authority (SCRCA), the City of Sarnia, St. Clair Township, Sarnia-Lambton Environmental Association (SLEA), Aamjiwnaang First Nation (AFN), Walpole Island First Nation (WIFN), Rural Lambton Stewardship Network (RLSN), and the Binational Public Advisory Council (BPAC).

Through the CRIC, work plans were created to ensure restoration actions were assigned and completed by appropriate partners. The 2007 – 2010 Work Plan identified a total of 114 activities that were to be managed by the specific subcommittees created to address point source pollution sources, contaminated sediment, loss of fish and wildlife habitat, monitoring and research needs, and non-point source pollution. By the end of 2010, 85% of the tasks were either completed or had been initiated. Results of these efforts can be found in the *“St. Clair River Area of Concern Canadian Remedial Action Plan Implementation Committee – Work Plan 2007 – 2010 Report of Accomplishments”* published in 2012.



Ice formations captured along the St. Clair River shoreline. Doug McLean.

With tasks remaining, the CRIC developed the 2012 – 2017 Work Plan and this report provides a summary of those efforts. Of the 87 actions identified in the 2012 – 2017 Work Plan, 41 had been completed as of March 31, 2017 and another 26 were either in progress or ongoing.

## 2012 – 2017 Work Plan Highlights

During the implementation of the 2012 – 2017 Work Plan (ending March 31, 2017), two BUIs – *Added Costs to Agriculture and Industry* and *Degradation of Aesthetics* – were officially re-designated to a Not Impaired status in 2012 and 2016, respectively. The *Added Costs to Agriculture and Industry* BUI was re-designated to Not Impaired based on results of a survey with local industrial, agricultural, and commercial water users, none of which indicated any additional costs were incurred from using raw water from the St. Clair River. The *Degradation of Aesthetics* BUI was re-designated to Not Impaired based on surveys of St. Clair River water users, monitoring of aesthetics, water quality parameters, and the application of an aesthetic water quality index, which indicated the aesthetics of the river to be between fair and excellent, achieving the targets set out in the delisting criteria.

The CRIC also completed several status reports recommending a Not Impaired status for the following three BUIs: i) *Bird or Animal Deformities or Reproduction Problems*; ii) *Restrictions on Dredging Activities*; and iii) *Beach Closings*. At the time this report was written, the BUI status reports, and community and BPAC engagement were completed, but the approval process for re-designation was not. A description of the research conducted to support the re-designation of these BUIs can be found under their respective BUI section within this report.

A discussion paper on the *Restrictions on Drinking Water Consumption or Taste and Odour Problems* BUI was finalized in 2017. It explained the reasons the BUI was deemed Impaired, what actions had been completed to date, and summarized the public input on the delisting criteria. The report also included results of a survey done with industries that discharge directly to the river to learn more about the upgrades and spill prevention measures they implemented. To share the discussion paper and encourage public participation and input, meetings were held in the communities of AFN and WFN as well as in Sarnia and Wallaceburg.

To advance the *Loss of Fish and Wildlife Habitat* BUI, several significant habitat restoration and enhancement projects were successfully completed in Walpole Island and along the eastern shore of Mitchell's Bay. Combined, these projects enhanced 217 ha (420 ac) of valuable wetland habitat in an area of the AOC where there was significant loss and/or alteration of coastal wetlands. These projects, in addition to others completed upstream and elsewhere in the AOC, led to surpassing the restoration target of 155 ha (383 ac) for the AOC.















Another key achievement was the completion of a draft *Fish and Wildlife Habitat Restoration Report*. This report summarized the habitat restoration efforts within the AOC, identified maintenance requirements for several sites where restoration opportunities remained, as well as potential funding sources. It will serve as a valuable resource to local organizations with an interest in fish and wildlife habitat conservation.

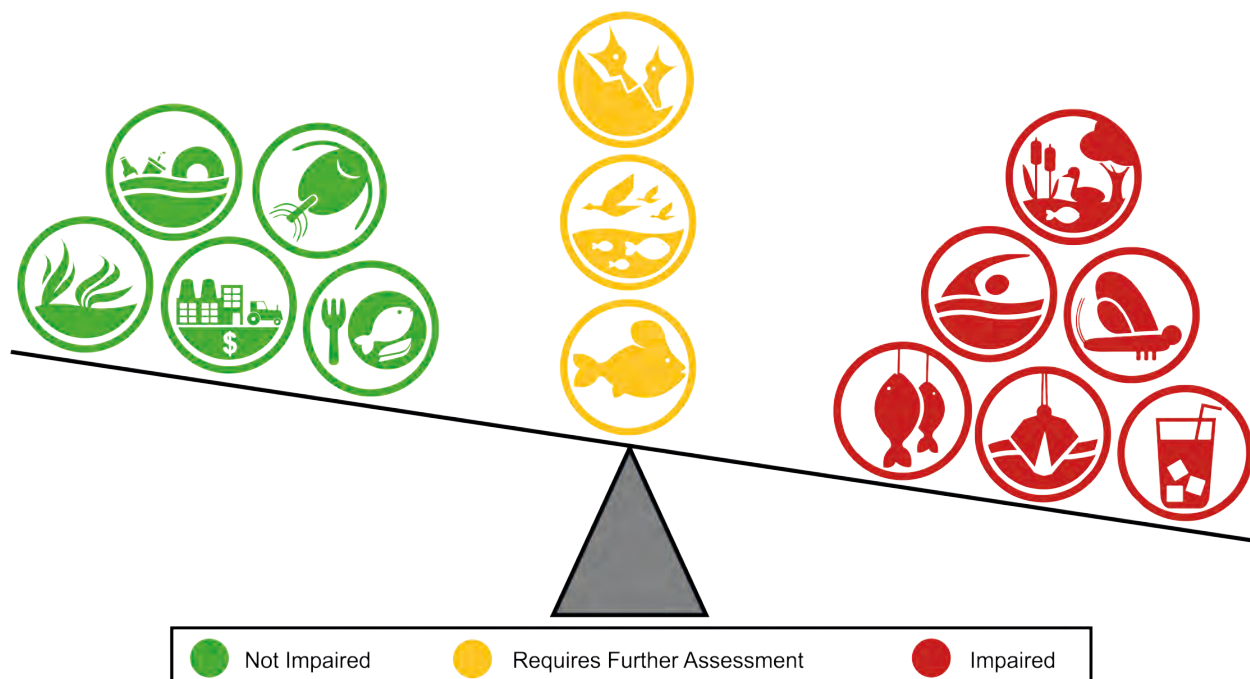
Lastly, four of the seven habitat goals (delisting criteria) to restore the *Loss of Fish and Wildlife Habitat* BUI were achieved and the remainder are well within reach.

As briefly outlined above, there was significant progress towards the completion of remedial actions identified in the 2012 – 2017 Work Plan and this report will describe how each action was addressed. A new and final work plan for the AOC will be drafted to identify all remaining actions, including the remediation of the remaining contaminated sediments in the river. When all remedial actions are complete and the remaining BUIs are successfully re-designated to Not Impaired, the St. Clair River can be removed from the list of AOCs under the GLWQA.



**Table 1.** The status of BUIs for the St. Clair River Canadian Area of Concern as of March 31, 2017.

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



# Restrictions on Fish and Wildlife Consumption

## Delisting Criteria:

This BUI will be considered restored when fish consumption advisories in indicator fishes (e.g., walleye, brown bullhead, and smallmouth bass) in the AOC are the same or less restrictive than the associated Great Lakes or appropriate reference sites and when the general guidance for the consumption of indicator wildlife (e.g., snapping turtles, geese) are no different than the non-AOC sites in the Great Lakes.

## Current Status: Impaired



Action	Status
Use the 2009 fish tissue survey results including a comparison of mercury levels in indicator fish (walleye, brown bullhead, and smallmouth bass) to levels reported in previous surveys to assess the status of fish consumption.	Completed

A paper in the Journal of Great Lakes Research titled *Temporal and Spatial Trends of Organochlorines and Mercury in Fishes from the St. Clair River/Lake St. Clair Corridor, Canada* presented spatial and temporal data for contaminants found in Lake St. Clair fish (catfish, northern pike, and smallmouth bass) and St. Clair River fish (walleye, yellow perch, and carp). Published in 2010, the article suggested that the decline of contaminants in fish will likely be slow due to the influence of contaminated sediment remaining in areas of the river.



Fishing boats docked on the St. Clair River. ECCC.

In 2013 and 2014, dorsal muscle samples of brown bullheads caught in the Walpole Island delta were submitted to the OMOECC for contaminant analysis to support the provincial Sport Fish Monitoring Program, which develops the fish consumption guidelines for Ontario. Most contaminants in the dorsal muscle sampled were below detection limits. Mercury levels resulted in consumption restrictions; however, trends indicate a decline (0.9 ppm to 0.2 ppm) in fish 30-35 cm long, meaning more meals can be eaten each month.

Action	Status
Conduct sport fish surveys every four years to monitor key indicator species and report on survey results until the survey is either replaced with another monitoring program or is no longer necessary for the AOC.	Ongoing

In 2015, the OMOECC, with sampling support from the OMNRF, conducted contaminant analysis on twelve species of fish from the upper, middle, and lower zones of the river in order to determine fish consumption guidelines for the Eating Ontario Fish Guide. The different species caught and analyzed for contaminants included brown trout, chinook salmon, common carp, freshwater drum, gizzard shad, northern pike, redhorse sucker, rock bass, smallmouth bass, walleye, white sucker, and yellow perch. The fish were analyzed for a number of different contaminants including mercury, PCBs, dioxin-like PCBs,

dioxins/furans, toxaphene, PFAS, selenium, arsenic, PBDEs, PCNs, chromium, photomirex, mirex, lead, and cadmium. The Eating Ontario Fish Guide can be found online at: [www.ontario.ca/page/eating-ontario-fish-2017-18](http://www.ontario.ca/page/eating-ontario-fish-2017-18)

Action	Status
Report on “head and mouth” river monitoring results for concentrations of metals and organic contaminants of concern from 2000 to 2012.	Ongoing

Since 1987, ECCC had been monitoring contaminant levels in the St. Clair River at Point Edward (upstream) and Port Lambton (downstream). Biweekly water and suspended sediment samples were collected at the two sites and analyzed for a variety of chemical parameters including nutrients, major ions, trace metals, and organic contaminants. The purpose of the “upstream/downstream” monitoring program was to assess the difference in water quality between these two locations. Point Edward is above the industrial complex in Sarnia and Port Lambton is downstream of the industrial complex. The detection of increases in contaminant concentrations between these two points indicated a “local” source. The monitoring also indicated the effectiveness of efforts to address point sources of contaminants to the river. As a result, it was instrumental in documenting declines in contaminant concentrations as well as metals since the 1980s, when environmental protection legislation and other remedial measures were implemented.

In 2005, the water quality monitoring results were summarized in a report by ECCC and indicated that several contaminants, including hexachlorobenzene (HCB), hexachlorobutadiene (HCBd), and octachlorostyrene (OCS), were on the decline as were concentrations of some organochlorine pesticides. Concentrations of PCBs in the suspended sediment suggested a decrease between the late 1980s and mid-1990s.

Since 2012, the concentrations of these contaminants in monthly water and suspended sediment samples, with the exception of mercury, had remained low and were below federal sediment quality guidelines. In fact, declines in these contaminants when compared to the concentrations in 1980 were quite significant. Mercury levels, however, fluctuated, resulting in an occasional exceedance of the federal sediment quality guidelines.

#### Resources:

*Upstream/Downstream Water Monitoring of Organic Pollutants and Mercury in the St. Clair – Detroit River Corridor, 2001 to 2006*, Environment Canada, D. Burniston, B. McCrear, P. Klawunn and G. Gomes, 2016.

*St. Clair River Sediment Study: Occurrence and Distribution of Contaminants*, Environment Canada, Water Quality and Monitoring and Surveillance Office, D. Burniston and D. Williams, 2008 (Unpublished).

Action	Status
Report on sediment chemistry from 2008 to current to determine trends in contaminants for use in BUI assessment and, if required, deploy sediment traps in the St. Clair River to determine spatial and temporal trends in contaminants in the AOC.	In Progress

In 2008, bottom sediment and their overlying water at 36 sites along the Canadian side of the St. Clair River were sampled. Water parameters measured included temperature, dissolved oxygen, pH, major ions, and nutrients. Bottom sediments were analyzed for pesticides, polycyclic aromatic hydrocarbons (PAH), PCBs, metals, mercury, and carbon. The study revealed that concentrations of nutrients and major ions in the water exhibited little variation along the river, although phosphorus had increased in the past few years. With respect to bottom sediments, concentrations of industrial by-product chemicals (HCBd, OCS, and HCB) were higher in the upper river adjacent to and downstream of the industrial property shoreline to Stag Island. With the exception of mercury, metals did not appear to constitute a problem. A report by ECCC/OMOECC on sediment quality in the upper St. Clair River compared data from the late 1990s and early 2000s to 2006-2011. Results indicated that concentrations of contaminants of concern were trending downward.

Since 1994, sediment traps were deployed in the river to monitor suspended sediment quality in the water column. Over the last five years, sediment traps were deployed around the three priority contaminated sediment zones to monitor sediment migration from these sites.

**Resource:**

*Trends in Suspended Sediment Quality in the Upper St. Clair River: Assessment of Large-Scale Remediation of Contaminated Sediments in a Dynamic Riverine Environment*, Aquatic Ecosystem Health & Management Journal, L. Richman, C. Marvin and D. Milani, 2016.

Action	Status
Management and remediation of three remaining contaminant sediment priority areas within the St. Clair River to reduce local risks to fish consumption. The following steps will be required:	
1) Develop sediment management options.	Completed

The final Sediment Management Options Report was received by the St. Clair River Sediment Technical Team from the consulting firm Environ in November 2013. This report examined several different options for managing contaminated sediments in the three priority areas. Three options of particular focus included capping, hydraulic dredging, and a blended remedy of both capping and dredging.

2) Conduct a Public, First Nation, and Stakeholder consultation to outline options.	Completed
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Consultation and engagement sessions with the public, First Nations, and key stakeholders were conducted from fall 2012 through to spring 2013. Sessions were held in Mooretown, Sarnia, Wallaceburg, AFN, and WIFN. Presentations and information meetings were also held with waterfront lot owners including Suncor, Shell Canada, Ethyl Canada, Enbridge, Union Gas, and the OMNRF. Opportunities to provide comment on the sediment management options report were available through the SCRC website.

3) Selection of preferred options for priority areas 1, 2, and 3.	Completed
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Based on results of the public consultation and a review by the St. Clair River Sediment Technical Team, the preferred option of hydraulic dredging was selected. This option was presented to the government agencies (OMOECC and ECCC) leading this project. A decision on completing this project is still under consideration.

4) Request funding for preferred management options, which includes detailed engineering design and environmental assessment on select preferred options.	Not Completed
5) Undertake detailed engineering design and environmental assessment on selected preferred options.	Not Completed
6) Review, tender, and award project and begin mobilization.	Not Completed
7) Implementation of preferred sediment management options.	Not Completed

Action	Status
Evaluate effectiveness of sediment remediation and implement adaptive management to improve effectiveness of remediation if necessary.	Not Completed

Action	Status
Undertake assessment of sediments for contaminants of concern in the Walpole Island delta and share results with the WIFN community.	Completed

The University of Windsor's Great Lakes Institute for Environmental Research (GLIER) conducted sediment sampling for organic contaminants and trace elements including mercury in 2012 at 30 sites within the Walpole Island delta and upper Lake St. Clair. None of the samples collected in 2012 had chemical concentrations that exceeded the OMOECC Probable Effect Level (PEL) for sediment quality guidelines. The study also compared concentration levels to samples taken from the same sites in 2005. For PCBs, HCB, PAHs, and total mercury, tests revealed that there were no significant changes in sediment contamination over the seven-year sampling interval. The final report was published in May 2014.

The results of the assessment conducted by GLIER were shared with the WIFN community in the fall of 2013. GLIER also summarized the findings at the First Nation Science and Monitoring Symposium held in March of 2016.

**Resource:**

*Contaminated Sediments in the Walpole Delta: Comparison of 2012 and 2005 Sediment Chemistry Surveys*, Great Lakes Institute for Environmental Research, University of Windsor, K.G. Drouillard, 2014.

Action	Status
Review and share with WIFN the waterfowl report summarizing the current and historic contaminant levels in waterfowl livers from the AOC.	Completed

Between 2008 and 2010, livers of 30 overwintering canvasback ducks were collected and provided to ECCO for contaminant analysis. Contaminant concentrations were compared to samples collected in 1985/86



Mallards and a Canvasback on the St. Clair River.  
Sharon Nethercott.

and revealed a significant decline in multiple contaminants of concern, which are illustrated in Table 2 below.

Table 2 shows concentrations of organochlorines (ng/g, wet weight) in livers of mallard ducks collected in 1985/86 and mean concentrations (SD) for three birds collected within the study area (Walpole delta) in November 2010 that were analyzed individually. The percent decline is relative to concentrations in pooled sample No. 2 and provides a conservative estimate of the relative change in concentrations between 1985/86 and 2010. More detail can be found in the 2014 report *Contaminants in Overwintering Canvasbacks (Aythya valisineria) and Resident Mallards (Anas platyrhynchos) in the Lake St. Clair/St. Clair River Area*, which summarized the study on the waterfowl livers.

**Table 2:** Contaminant Concentrations Comparison

Contaminant	1985/86 – Pooled Samples*		2010 – Individuals	Percent Decline
	No. 1	No. 2	3	1985/86 & 2010
Sum PCBs	434.56**	82.32**	4.51 (1.81)	94.5%
p,p'-DDE	42.00	18.00	1.38 (1.64)	92.3%
Sum DDT	49.00	20.00	1.43 (1.64)	92.9%
Sum Chlordane	28.25	6.75	0.47 (0.43)	93.0%
HCB	311.00	11.00	0.05 (0.06)	99.5%
Mirex	0.25	0.25	0.05 (0.05)	80.0%
Dieldrin	42.00	8.00	0.35 (0.45)	95.6%
Heptachlor Epoxide	13.00	5.00	0.10 (0.07)	98.0%
OCS	493.00	41.00	0.06 (0.04)	99.9%
* Pooled sample No. 1 consists of six birds collected in December/January 1985/86 and No. 2 consists of six birds collected in February 1986.				
** Estimated sum PCB concentration based on conversion factor of 0.56 for known Aroclor 1254:1260 PCB concentration (see text).				

**Resource:**

*Contaminants in Overwintering Canvasbacks (Aythya valisineria) and Resident Mallards (Anas platyrhynchos) in the Lake St. Clair/St. Clair River Area*, K.D. Hughes, P.A. Martin and S.R. DeSolla, 2014.



Action	Status
Report on existing consumption risk approaches and consumption guidelines that could be used to help evaluate this BUI (specifically around waterfowl, muskrat, and turtles).	In Progress

Unlike fish, there are no human consumption guidelines for wild meat, making it challenging to address the “wildlife” component of this BUI. Some approaches include using consumption guidelines for poultry (as a surrogate for waterfowl) or the Ontario sport fish consumption guidelines. While applying the fish consumption advisory benchmarks to wildlife is not a perfect solution, it does advance our understanding of potential risk (exposure) associated with consumption of wild game from within the AOC. For example, using Eating Ontario Fish Guide and applying the PCB advisory benchmark, one 70 kg adult could consume:

- Muskrat meat: 32 meals/month or approximately 0.5 lb daily.
- Mallard livers (based on local samples): 12+ meals/month for the general population and 8+ meals/month for sensitive population (women of child-bearing age and children under 15).
- Snapping turtle eggs: 0.5 lb of eggs every two weeks.



Muskrat. Sharon Nethercott.

Action	Status
Review all relevant data collected and undertake an assessment to determine current status based on delisting criteria and if an impaired status results, prepare an action plan.	Not Completed

## Degraded Fish and Wildlife Populations

### Delisting Criteria:

This BUI will be considered restored when environmental conditions support healthy, self-sustaining communities of desired fish and wildlife at predetermined levels of abundance that would be expected from the amount and quality of suitable physical, chemical, and biological habitat present. An effort must be made to ensure that fish and wildlife objectives for Areas of Concern are consistent with Great Lakes ecosystem objectives and Great Lakes Fishery Commission fish community goals. Further, in the absence of community structure data, this use will be considered restored when fish and wildlife bioassays confirm no significant toxicity from water column or sediment contaminants.

## Current Status: Requires Further Assessment



Action	Status
Coordinate technical analysis and summary of EC decadal waterfowl surveys.	Completed

In 2011 and 2012, Bird Studies Canada was contracted to assess the status and trends of waterfowl and other aquatic wildlife in the St. Clair River AOC by analyzing the best available data. For the purposes of this BUI, “wildlife” refers to waterfowl, marsh birds, amphibians, and muskrats. These wildlife groups are all reliant on wetlands and represent different trophic levels, providing a more complete assessment of aquatic wildlife populations within the AOC.

Thirty years of waterfowl survey data collected by ECCC were reviewed for sectors that were best aligned with the boundaries of the AOC as well as six areas surrounding the AOC. The analysis concluded that waterfowl populations (dabbling and diving ducks specifically) were as *good or better* within, or adjacent to, the AOC when compared to populations of the surrounding region. The surrounding region consisted of a 300 km radius around the AOC. In fact, the number of dabblers and diving ducks within the AOC during the surveys was the same as or higher than the mean number in each of the surrounding regions in most years between 1970 and 2003. This indicated that habitat conditions in the AOC were able to support ducks (waterfowl) equally as well as the surrounding region.

Based on the wildlife data compiled and analyzed, there was no apparent impairment to waterfowl populations (Ranking 2011; Tozer 2012). This finding was consistent with Crewe *et al.* (2007) which also found no differences in the status or trend of the number of species of breeding waterfowl within or adjacent to the AOC compared to the surrounding region.

### Resources:

*Assessment of Wildlife Population Status and Trends at the St. Clair River Area of Concern*, Bird Studies Canada, Robert W. Rankin, 2011.

*Assessment of wildlife status and trends within the St. Clair River and Detroit River Areas of Concern using Bird Studies Canada Data*, Bird Studies Canada, Doug Tozer and Myles Falconer, 2012.

*Migrant Waterfowl use of the St. Clair and Detroit River Areas of Concern*, Environment Canada, Paul Smith, 2013.

Action	Status
Collect and synthesize wildlife population reports for waterfowl, marsh birds, indicator amphibians, and turtles for the SCR area.	Completed

While there is evidence of change in the diversity and abundance of waterfowl, marsh birds, and frogs, the factors influencing the change include water level fluctuations and invasive species, both of which are beyond the scope of the AOC program to address. These and other

challenges within the Great Lakes are being addressed through other government-led programs as part of Canada's commitment to protect, restore, and conserve the Great Lakes.

With respect to contaminant levels (body burdens) in aquatic wildlife, the levels are below known thresholds associated with adverse reproductive effects (see *BUI Bird or Animal Deformities or Reproductive Problems*) and survivability (see *Contaminant Body Burdens in Wildlife Populations in the St. Clair River Area of Concern*, ECCC, 2015). Contaminants of concern as hexachlorobenzene (HCB), octachlorostyrene (OCS), and polychlorinated biphenyls (PCBs) have declined considerably in wildlife. Mercury concentrations have also declined.

**Resources:**

*Detroit River and St. Clair River Areas of Concern: Marsh Breed Bird 2015 Addendum*, Environment Canada, 2014.

*Contaminant Body Burdens in Wildlife Populations in the St. Clair River Area of Concern*, ECCC, 2015.

Action	Status
Collaborate with WIFN and AFN on science results and solicit input/Aboriginal Traditional Knowledge on findings.	Ongoing

In 2012, the Walpole Island Heritage Centre coordinated a community workshop with ECCC. The purpose of the workshop was to share wildlife information collected to date on the abundance of waterfowl and to listen to comments/input from community members, hunters, and elders about their observations of waterfowl populations over the last 25 years (1980s to 2010) and discuss factors that contributed to the change in abundance and/or diversity.

The workshop included a presentation of the decadal waterfowl surveys by ECCC's Canadian Wildlife Service (CWS) and shared the results of a report by Bird Studies Canada on waterfowl diversity and abundance within the AOC. The report indicated that waterfowl richness was excellent and abundance was higher in the AOC than outside. Community members commented that fewer ducks were due to various causes including having less food (corn) available, water level changes, and the establishment of sanctuaries, which drew waterfowl away from the marshes within WIFN. Other members suggested waterfowl populations were good with "a lot of ducks everywhere." There appeared to be acknowledgement that waterfowl population changes had occurred.

**Resource:**

Summary of comments provided by the Walpole Island Heritage Centre from the *St. Clair River Fish and Wildlife Populations Workshop* (at Walpole Island First Nation), 2012.

Action	Status
Assess wildlife population dynamics component of the BUI.	Completed

The population dynamic component of the BUI examined *abundance* and *diversity* of dabbling and diving waterfowl, marsh birds, muskrats, and frogs. Datasets included the decadal waterfowl surveys and marsh bird monitoring data collected by ECCC, provincial trapping and harvesting data on muskrats, and Bird Studies Canada data on amphibian monitoring. A draft report assessing the wildlife component of this BUI was completed and is under review.

Action	Status
Revise and/or replace "AOC yardstick" values.	Completed

The 1995 Stage 2 Report identified restoration targets for all impaired BUIs as well as specific numerical quality targets for sediment, water, and biota. These "yardsticks" were used to set goals and measure progress. Yardstick values were typically the lowest, most stringent threshold used by one of the five binational jurisdictions (i.e. Ontario, Michigan, Canadian and U.S. Federal Governments, and the IJC). In essence, the AOC-specific yardsticks represented the desired quality for the St. Clair River; they were initially helpful to the Remedial Action Plan (RAP) to identify contaminants of concern and loading targets, for example, and measure progress towards those goals.

Currently, both Canada and the U.S. scientifically established guidelines to assess water, sediment, and biota quality, so the yardsticks were outdated and no longer used by either country. On the Canadian side of the St. Clair River AOC, scientific guidelines used for BUI assessments include the Canadian Council of Ministers of the Environment (CCME) Guidelines, Provincial Water and Sediment Quality Guidelines, and the Fish Flesh Criteria for Piscivorous Wildlife. This decision was supported in the 2013 report by GLIER on the evaluation and use of yardstick guidelines.

**Resource:**

*2013 Assessment of St. Clair River Area of Concern 'Yardsticks' Guidelines*, Great Lakes Institute for Environmental Research (GLIER), 2013.

Action	Status
Review 2012 EC reports on reproductive health for frogs and turtles and share results. Determine next steps.	Completed

The reports on frog and turtle reproductive health were finalized in 2014. Each report summarized the studies, field surveys, and their findings of high hatching success (reproduction) and low deformity rates (development). With respect to contaminant burdens, levels were generally low for both frogs and turtles; however, more varied for the turtles. The levels could be influenced by where they were feeding.

Unlike colonial water birds, there are few known reproductive contaminant thresholds for reptiles, which includes turtles. However, based on other studies that observed adverse effects on reproduction in turtles, the levels that triggered these reproductive effects were 500 times higher than the levels documented within the St. Clair River AOC. This, combined with high hatching success in turtles from the AOC, indicates that contaminant burdens were not impeding reproduction. In summary, there was no evidence that conditions within the AOC were impairing reproduction, and therefore, with suitable habitat, populations of frogs and turtles should be self-sustaining.

**Resources:**

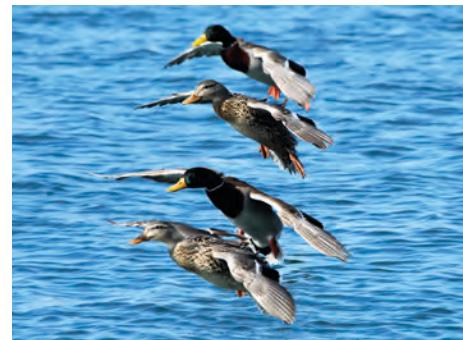
*Reproductive Health and Development in Northern Leopard Frogs (Rana pipiens) in the St. Clair River Area of Concern (Ontario)*, Environment Canada, Hughes et al., 2014.

*An Assessment of Reproductive Health and Development of Snapping Turtles (Chelydra serpentina) from the Walpole Delta in the St. Clair River Area of Concern*, Environment Canada, Hughes et al., 2015.

Action	Status
Review all relevant data collected and undertake an assessment to determine current status based on delisting criteria and if an "Impaired" or "Requires Further Assessment" status results, prepare an action plan.	In Progress

**Wildlife:** Wildlife population data was compiled and a draft report interpreting available data was prepared. The data suggested that wildlife diversity and abundance trends within the AOC were comparable to or better than outside the AOC. Furthermore, contaminant levels were below levels associated with adverse reproduction effects for animals.

**Fish:** Fish populations were described in the Stage 1 Report as abundant and diverse; however, there were insufficient data on contaminant burdens and their potential effects for local fish to be self-sustaining (grow and reproduce). In 2014 and 2015, shorthead redhorse sucker, yellow perch, and emerald shiners were collected from Lake Huron (above the Sarnia industrial complex), Stag Island, and Walpole Island/Chenal Ecarte area. Contaminant levels will be compared to levels in fish sampled in 2003 to determine whether body burdens in fish have declined. Fish morphological measurements, including the number of eggs, egg size, gonad size, gonad weight, fish length, and weight from fish collected in and outside the AOC, will also provide insight on whether contaminant burdens are adversely affecting the ability of fish from the AOC to be self-sustaining. A report summarizing the findings will be drafted by ECCC in 2019 and will be considered in the status assessment of this BUI.



Mallards over the St. Clair River. Sharon Nethercott.

# Fish Tumours or Other Deformities

## Delisting Criteria:

This BUI will be considered restored when the incidence rates of fish tumours or other deformities do not exceed rates at unimpacted control sites and when survey data confirm the absence of neoplastic or preneoplastic liver tumours in bullheads or suckers.

## Current Status: Requires Further Assessment



Action	Status
Conduct a workshop within the WIFN community to discuss fish health concerns, share research conducted to date within the AOC on incidence of fish tumours, and the possibility of conducting additional fish tumour research within the Walpole Island delta.	Completed

A community information session was held in August 2012 at WIFN to:

- Discuss scientific research conducted on fish tumours in the St. Clair River AOC;
- Answer questions and address community member concerns regarding fish tumours, their causes, etc.;
- Discuss the potential for additional research to be conducted in the Walpole Island delta;
- Collect information from local fishermen on the local incidence of fish tumours and fish populations, etc.; and
- Start initial planning for further fish tumour research in the delta.

The consensus of session participants was that additional studies in the delta should be carried out on brown bullheads (*Ameiurus nebulosus*) to support the assessment of the *Fish Tumours or Other Deformities* BUI.

### Resources:

*Fish Tumour Research Workshop at Walpole Island First Nation*, PowerPoint Presentation by Dr. Paul Beaumann, 2012.

Fish Tumour Research Project Information Session (Proceedings), 2012.

*Project Proposal for the Walpole Island Heritage Committee: Assessing Liver Tumours and Contaminants in Brown Bullheads within the Walpole Island Delta*, A. White, Environment Canada, 2012.

*Addendum Project Proposal for the Walpole Island Heritage Committee: Assessing Liver Tumours and Contaminants in Brown Bullheads within the Walpole Island Delta*, A. White, Environment Canada, 2012.

Action	Status
Plan and conduct the liver tumour study in the Walpole Island delta.	Completed

Brown bullheads were collected from channels and bays within the Walpole Island delta to assess the prevalence of cancerous liver tumours. Such tumours can develop due to chronic exposure to sediment containing PAHs, one of the contaminants identified within the St. Clair River. Brown bullheads were selected for this study because they had been used as an indicator organism for carcinogens throughout the Great Lakes and were known to be present within the local waters around WIFN.

Following the community information session in 2012, ECCC and the Walpole Island Heritage Centre jointly developed a plan to harvest 100 brown bullheads and extract their livers in order to examine them





Brown bullhead study participants. ECCC.

for neoplastic (cancerous) tumours. Using three community fishermen to capture the brown bullheads, ECCC set up a field laboratory to process the brown bullheads on site. Over the course of the two-year project, 60 brown bullhead livers were analyzed for tumours. No liver tumours were found.

**Resource:**

*Project Plan for the Brown Bullhead Fish Tumour Research Project at Walpole Island First Nation, A. White, Environment Canada, 2013.*

Action	Status
Analyze fish livers for tumours and report on results.	Completed

Of the 60 fish livers collected and analyzed, no liver neoplasms (cancerous liver tumours) were found. The external mouth and barbel lesions analyzed were also not cancerous and likely caused by a virus, which are easily transmitted during spawning.

In addition to analyzing the livers for neoplasms, a survey of sediment quality was also undertaken within the channels and bays of Walpole Island by GLIER. The result revealed that PAH concentrations were low and below levels associated with inducing cancerous liver tumours in benthic fish, such as brown bullheads. Based on the sediment chemistry results, no additional sampling of brown bullheads was warranted.

**Resources:**

*Final Histopathology Report, G. D. Marty, BC Ministry of Agriculture, 2016.*

*Data Analysis and Fish Tumour BUI Assessment for Lake Superior and the St. Clair Rivers AOCs, P. Baumann, 2010.*

*St. Clair River Fish Liver Tumour Study, A Report Prepared for Environment Canada, T. Hayes, 2002.*

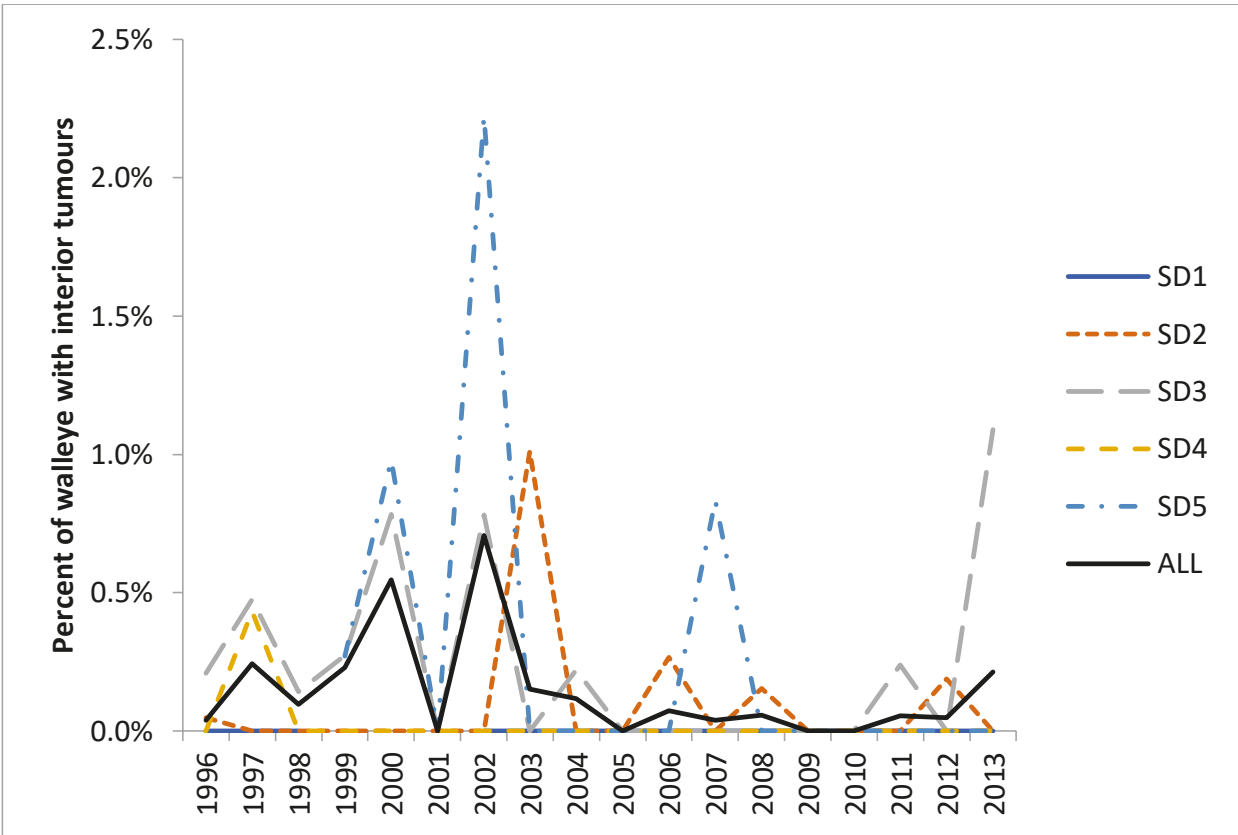


Studying brown bullheads. ECCC.

Action	Status
Collate and summarize OMNRF data on prevalence of skin lesions and liver tumours in walleye.	Completed

The OMNRF had been monitoring walleye since the 1990s to support annual harvest quotas. Part of the monitoring included observing internal and external lesions. Based on the sampling conducted for the west basin of Lake Erie, external lesions on walleye increased with age and were generally caused by the lymphocystis virus. For internal lesions, while they were not analyzed histopathically, they were assumed to be cancerous tumours (Drouin, R. pers. comm.). As indicated in Figure 2, the internal tumour rate for walleye was 0% in the west basin. This was likely the population that transits the Huron-Erie corridor, including the St. Clair River. The walleye tumour rate across the entire lake was 1%, which was very low.

Walleye are not sediment dwelling fish; they feed in the open water and, as mentioned previously, are transitory, making them less reflective of the local aquatic environment and less susceptible to tumour development than brown bullhead. Brown bullheads are the better indicator fish species for this beneficial use



**Figure 2:** Lake Erie Walleye Interior Tumour Rates (SD1 = West Basin; SD2 = West Central Basin; SD3 = East Central Basin; SD4 and 5 = East Basin).

impairment.

Action	Status
Review all relevant data collected and undertake an assessment to determine current status based on delisting criteria and if an “Impaired” or “Requires Further Assessment” status results, prepare an action plan.	Not Completed

The results of the work above support a Not Impaired status recommendation and a report will be completed in 2019.

## Bird or Animal Deformities or Reproductive Problems

### Delisting Criteria:

This BUI will be considered restored when the incidence rates of deformities (e.g. cross-bill syndrome) or reproductive problems (e.g. egg-shell thinning) in sentinel wildlife species do not exceed background levels in inland control populations.

## Current Status: Requires Further Assessment



Action	Status
Review and consult on findings of the two reports on reproductive health and development of snapping turtles and leopard frogs in the St. Clair River AOC.	Completed



Contaminant levels in leopard frogs were found to be low and declined over time. *Sharon Nethercott.*

To determine the status of *Bird and Animal Deformities or Reproductive Problems*, studies to assess hatching success and deformity rates in frog embryos and turtle hatchlings were completed by ECCC in collaboration with WIFN. Contaminant burdens in the frog and turtle eggs were also examined and compared to other Great Lakes sites and scientific

studies where toxic effects, including adverse effects on reproduction and development, were found.

Between 2006 and 2014, froglets (up to 100/site) were collected from six sites across the AOC and assessed for physical deformities. The rate of deformity was lower than the average 5% rate of deformities in the wild. Frog eggs raised in sediment and water collected from within the AOC had a 98% hatching success rate, mean percentages of embryos with a deformity were low to moderate (<7%), and rates of these two endpoints were statistically similar to rates reported at non-AOC reference sites. This suggested exposure to water and sediment from the AOC did not adversely affect frog hatching success.

In 2011, snapping turtle eggs collected from many locations throughout the Walpole Island delta were artificially incubated in a laboratory to assess hatching success of eggs and deformity rates of hatchlings. Consistent with the results found for leopard frogs, mean hatchling success of snapping turtle eggs was high (93.5%), the mean percentage of deformed hatchlings was low (7.7%), and no significant differences were found for either of these endpoints compared to rates found at the non-AOC reference sites.



Studying frog deformities in the AOC. *ECCC.*

Contaminant levels (body burden) for both frogs and turtles were low and declined over time, with the exception of mercury. While mercury levels detected varied, it did not appear to be adversely affecting reproduction or growth in either species and, based on the findings from these two studies, there was no evidence of reproductive impairment in the two sentinel species studied to assess this BUI.

The WIFN community wished to continue local monitoring of deformity rates in frogs, so in 2015, at the request of WIFN, biologists from ECCC conducted a workshop for community volunteers to demonstrate how to assess froglets for deformities. Two equipment kits were also provided to the Walpole Island Heritage Centre.



Common snapping turtle. Sharon Nethercott.

**Resources:**

*Reproductive Health and Development in Northern Leopard Frogs (Rana pipiens) in the St. Clair River Area of Concern (Ontario)*, Environment Canada, Hughes et al., 2014.

*An Assessment of Reproductive Health and Development of Snapping Turtles (Chelydra serpentina) from the Walpole Delta in the St. Clair River Area of Concern*, Environment Canada, Hughes et al., 2015.

Action	Status
Review all relevant data collected and undertake an assessment to determine current status based on delisting criteria and if an “Impaired” or “Requires Further Assessment” status results, prepare an action plan.	Completed

The results of the studies supported a Not Impaired status recommendation. The status report was completed with support from the CRIC and BPAC and will proceed through the re-designation approval process.

**Resource:**

*St. Clair River Area of Concern: Status Recommendation Report for BUI #5 Bird or Animal Deformities or Reproductive Problems*, Environment Canada, Hughes et al., 2016.



## Degradation of Benthos

### Delisting Criteria:

This BUI will be considered restored when the benthic community structure, diversity, and abundance are not significantly different to suitable, unimpacted reference sites within the AOC of comparable physical (sediment, grain size, water velocity) and chemical characteristics; and when benthic invertebrate tissue contaminant concentrations (body burdens) are comparable to suitable, unimpacted reference sites within the AOC or when all remedial options, recommended to address the areas of interest for contaminated sediment, have been completed and follow-up monitoring confirms their effectiveness.

## Current Status: Impaired



Action	Status
Undertake assessment of sediments for contaminants of concern in the Walpole Island delta.	Completed

In 2012, GLIER undertook a study in which 48 sediment samples were collected and analyzed from 30 discrete sampling stations located within the Walpole Island delta. The samples were analyzed for a suite of organic contaminants (PCBs, organochlorine pesticides, PBDEs, and PAHs) and trace elements, including mercury. None of the samples collected had concentrations that exceeded the OMOECC's PEL Sediment Quality Guideline. While no levels exceeded the PEL, PCBs, organochlorine pesticides, PAHs, PBDEs, mercury, and copper had higher concentrations in the Chenal Ecarte, Basset and Johnson Channels than in Lake St. Clair. Both Lake St. Clair and Goose Lake exhibited the lowest sediment contamination among the sites tested. The results of this sediment survey were also used to support the *Fish Tumours or Other Deformities* BUI.

### Resource:

*Contaminated Sediments in the Walpole Island Delta: A Comparison of 2012 and 2005 Sediment Chemistry Surveys*, Great Lakes Institute for Environmental Research, Drouillard et al., 2014.

Action	Status
Review all relevant data collected and undertake an assessment to determine current status based on delisting criteria.	Completed

In 2014, GLIER took 126 sediment samples within the St. Clair River to support the assessment of this BUI. The sampling was conducted to identify suitable non-impacted reference sites, which in previous studies had been the U.S. shoreline. This study confirmed the U.S. shoreline was a suitable reference site. The study also confirmed that benthic diversity and community structure on the Canadian side of the AOC was comparable to the reference sites. However, body burdens, mercury in particular, in benthic invertebrates on the Canadian side



Sediment sampling. ECCC.

were elevated and above the threshold associated with potential adverse effects for select fish species.

The delisting criteria for this BUI have not been achieved, and therefore, the BUI remains Impaired.



# Restrictions on Dredging Activities

## Delisting Criteria:

This BUI will be considered restored when there is no limitation on the disposal of dredging spoils from routine dredging in the St. Clair River.

## Current Status: Impaired



Action	Status
Review all relevant data collected and undertake an assessment to determine current status based on delisting criteria and if an "Impaired" or "Requires Further Assessment" status results, prepare an action plan.	Completed



Dredging in the St. Clair River. ECCO.

The *Restrictions on Dredging Activities* BUI was considered Impaired because dredged sediment did not meet the provincial criteria for open water disposal, which was the preferred and most economical disposal method in the 1980s. As a result, dredged material was disposed of in a Confined Disposal Facility, which was costly to proponents, and therefore, considered an impairment.

The 2012 delisting criteria developed by the local RAP team for the *Restrictions on Dredging Activities* BUI in the St. Clair River AOC stated, "This BUI will be considered Not Impaired when there is no limitation on the disposal of dredged spoils from

routine dredging in the St. Clair River." The dredging projects examined in the status assessment did have sediment samples with contaminant levels exceeding the Provincial Sediment Quality Guidelines for open water disposal. However, since the 1980s, when this BUI was deemed impaired, there were more disposal options for dredged material, including beach nourishment, asphalt production, and upland landfill. In fact, dredged material from the St. Clair River AOC had been re-used, and therefore, the limitations once imposed on the disposal of dredged material from the St. Clair River no longer exist as it can be re-used for a variety of other purposes.

The BUI assessment report focused on the following lines of evidence to support a Not Impaired status recommendation:

- Decreases in municipal and industrial discharges and spills and the implementation of more stringent legislation and regulations.
- Disposal or re-use of dredged material from the St. Clair River since the year 2000 was not prohibited based on sediment chemistry (i.e., no special handling or disposal in a hazardous waste facility was required).
- The disposal or re-use options implemented (e.g., beach nourishment, asphalt incorporation, fish habitat, commercial/industrial fill material) followed provincial and/or federal guidelines.

Future dredging projects in the St. Clair River will continue to abide by best management practices, appropriate provincial and/or federal guidelines, and regulations to ensure proper disposal of dredged material.

## Resource:

*The St. Clair River Area of Concern: Status of the Restrictions on Dredging Activities Beneficial Use Impairment*, D. Strang, Canadian RAP Implementation Committee, 2016.

# Restrictions on Drinking Water Consumption or Taste and Odour Problems

## Delisting Criteria:

This BUI will be considered restored when there are no treatment plant shutdowns due to exceedances of drinking water guidelines over a two-year period.

## Current Status: Impaired



Action	Status
<p>Review all relevant data collected such as:</p> <ul style="list-style-type: none"> <li>the nature and frequency of spills from vessels and land-based sources;</li> <li>the nature and frequency of communal water intake closures;</li> <li>river water quality;</li> <li>action taken by industries to prevent and reduce spills;</li> <li>water treatment processes; and</li> <li>loading of industrial and municipal discharges to the St. Clair River;</li> </ul> <p>and undertake an assessment to determine current status based on delisting criteria and if an “Impaired” status results, prepare an action plan.</p>	In Progress

The Status of the Beneficial Use Impairment *Restrictions on Drinking Water Consumption or Taste and Odour Problems* Discussion Paper was initiated in 2015 and completed in 2017. The CRIC commissioned this discussion paper to:

- Review the facts related to the frequency of spills over time;
- Outline overall improvements since the St. Clair River was listed as an AOC;
- Identify infrastructure improvements related to the protection of drinking water sources in the St. Clair River; and
- Promote thought and discussion amongst the public, First Nations, stakeholders, and agencies on several questions, including whether the current delisting criteria is acceptable.

In summary, the following tools and actions were employed as part of a multi-barrier approach to protecting the St. Clair River from contamination and ensuring safe drinking water:

- Enforcing regulations and applying penalties or other compliance promotion tools as appropriate;
- Requiring Environmental Compliance Approvals for wastewater treatment facilities;
- Imposing monitoring and reporting requirements for wastewater discharges;
- Mandatory monitoring of drinking water quality;
- Inspecting industrial facilities and drinking water treatment facilities to ensure compliance with all relevant requirements;
- Applying environmental penalties as appropriate;
- Timely, efficient, and effective response to spill incidents;
- Efforts by industry (and other stakeholders) to reduce spill potential and to improve containment and collection of polluted waters before it enters the St. Clair River; and
- Development of source water protection plans to protect drinking water intakes.

As part of the consultation effort on the Drinking Water BUI Discussion Paper, public meetings were held at:

- AFN Community and Youth Centre – June 8, 2016
- City of Sarnia Municipal Library – June 15, 2016
- Wallaceburg Canadian Belgian Dutch Club – June 22, 2016
- WIFN Community Cultural Centre (Sports Complex) – October 13, 2016

Questions, comments, and concerns were collected by the CRIC to help determine next steps to restore and ultimately re-designate the *Restrictions on Drinking Water Consumption or Taste and Odour Problems* BUI to a Not Impaired status.

**Resources:**

*The Status of the Beneficial Use Impairment Restrictions on Drinking Water Consumption or Taste and Odour Problems St. Clair River Area of Concern, Discussion Paper*, Avanti Insight, June 2017.

Community Input 2016, *Restrictions on Drinking Water Consumption or Taste and Odour Problems*, St. Clair River Area of Concern, Avanti Insight, 2017.

## Beach Closings

### Delisting Criteria:

This BUI will be considered restored when less than 20% of the geometric means of water samples collected over the swimming season, at identified beaches within the St. Clair River AOC, exceed the Provincial Water Quality Objective for *E. coli* or is similar to a suitable non-AOC reference site, when assessed over a period of at least three to five years.

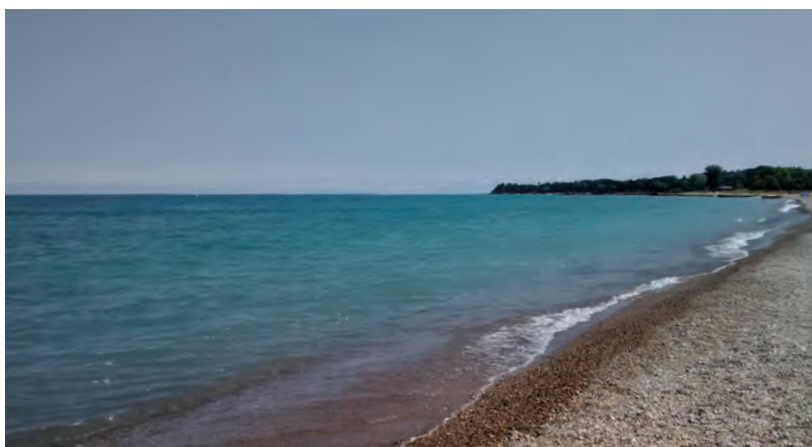
## Current Status: Impaired



Action	Status
Complete third year of river-wide assessment for <i>E. coli</i> along the St. Clair River.	Completed

Although there are only two beaches (Mitchell's Bay and Canatara Park) in the St. Clair River AOC defined as public beaches as per the Beach Management Protocol, the CRIC identified a number of sites where swimming was common but were not monitored by the Public Health Units. With the exception of Willow Park, all other sites originally used in the Stage 1 RAP Report to identify this BUI as Impaired were included in the river-wide assessment. For these areas, a project separate from the municipal Beach Monitoring Program was proposed. Beginning in 2011, the additional ten locations were sampled during the swimming season by Lambton Public Health with funding and logistical support provided by the OMOECC and SCRCA. This project was repeated in 2012 and 2013. Sample locations included: Blue Water Bridge, AFN Dock, Corunna Dock, Mooretown Dock, Courtright Dock, Seager Park, Terra Beach, Branton-Cundick Park, Port Lambton Dock, and Brander Park. In addition, data from three locations sampled as part of an annual monitoring program on WIFN by the Walpole Island Health Centre were provided. These sites included Ferry Beach, Roger's Dock, and Smith's Beach.

While annual variations were observed, low *E. coli* levels were recorded at the majority of swimming areas along the St. Clair River. Eleven of the 13 sites had less than 20% of samples with *E. coli* greater than the Provincial Water Quality Objectives (PWQO) with the other two narrowly exceeding the target (Brander Park – 20.5%; Terra Beach – 25.6%).



Canatara Park. ECCC.

No exceedances were observed at the AFN Dock, Ferry Beach, or Roger's Dock during the three-year period. Comparisons to Lake Huron reference sites indicated that these additional sites sampled along the St. Clair River had either lower or similar frequencies of PWQO exceedances for *E. coli*.

Action	Status
Review all relevant data collected and undertake an assessment to determine current status based on delisting criteria and if an “Impaired” status results, prepare an action plan, drawing on (as appropriate):	
<ul style="list-style-type: none"> <li>Identify data collection required to identify key sources that are still impacting on ability to achieve beach delisting criteria. Steps that might be considered will include: <ul style="list-style-type: none"> <li>DNA identification of <i>E. coli</i> sources at problem sites; and</li> <li>Conduct sampling “to determine if the AOC tributaries that enter into the river have a significant impact upon the presence and concentrations of <i>Escherichia coli</i>.”</li> </ul> </li> </ul>	Completed

The waters adjacent to Centennial Park had issues with high *E. coli* counts historically. In order to determine if an *E. coli* source remained and where it might be coming from, a Microbial Source Tracking (MST) analysis study was conducted in 2012 and 2013. MST analysis allows for the identification of fecal sources in surface water. Results of the two-year study identified waterfowl (geese and ducks) as the dominant source of *E. coli* at Centennial Park; however, an intermittent human signal was detected in close proximity to a storm water



Centennial Park Bay before the 2016 redesign. ECCC.

outfall. In response, the City of Sarnia investigated the storm water outfall as a possible source of the human signal and discovered a significant build-up of sludge from its historical connection to a combined sewer. The pipe was cleaned out by the City in late 2013. In 2016, as part of a larger park remediation project, the park’s shoreline was redesigned and an armour stone wall was constructed to eliminate access by ducks and geese to the water from the park lawn. Vegetation was planted to intercept storm water, acting as a pollution control barrier.

Results from the MST study can be found in the *Status of the Beach Closings Beneficial Use Impairment* report (Strang, September 2016).

<ul style="list-style-type: none"> <li>Complete key actions identified in the City of Sarnia Master Plan for Sewer separation, Sanitary Pumping Station Replacements, sewage treatment, which includes Wastewater Treatment Plant Hydraulic Improvement, Mitigation of Plant Bypasses, and CSOs.</li> </ul>	In Progress
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In 2012, the City of Sarnia completed the City’s *Wastewater Collection System Master Plan*, which will guide infrastructure improvements over the next 20 years.

As of 2012, sewer separation and plant upgrades had totalled a \$65 million investment since 2000. There were 39 kms of combined sewers requiring separation and approximately 15 kms of combined sewers had been separated between 2006 and 2014. The most recent sewer separation was at Exmouth and Christina Streets and future focus will be on Cromwell and Devine Streets (pers. comm. City of Sarnia Engineering Department, 2014). The City has a 10-year capital plan that identifies \$67 million for future sewer separation projects (Rawat, P., City of Sarnia, email, Jan. 14, 2016). Combined sewer overflow (CSO) discharges (including wastewater treatment plant bypasses) were reduced by 40%, with no CSO events into the St. Clair River occurring since 2010. While bypasses from pumping stations or the sewage treatment plant continue to be reduced, they have not been eliminated. To help monitor and manage wastewater flows into the City’s 56 pumping stations, the City of Sarnia initiated a \$700,000 project that will automate wastewater flows into the pumping stations, which will further reduce bypasses to the river.

In 2013, St. Clair Township, located downstream from Sarnia, completed its \$34.5 million wastewater treatment plant at Courtright and decommissioned the Corunna treatment plant. A pumping station and sewer systems were also installed to connect riverfront communities to the municipal sewer system. The new



pumping station services both Corunna and Courtright. The new wastewater treatment plant has sufficient capacity to support future community growth in the area.

In Wallaceburg, 95% of the CSO projects were completed as of 2015.

• Continue separation of combined sewers within the City of Sarnia Sanitary Drainage Area 1.	In Progress
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Approximately 15 kms of combined sewers were separated in the last 10 years. Sewer separation work in the Exmouth Drainage area was completed in 2009 and the East Street sewer separation project was completed in 2012. Sewer separation work in the Devine Street drainage area is in progress while future work will focus on Cromwell Street drainage areas.

• Evaluate municipal infrastructure upgrades on sewage treatment plants, combined flow treatment, and combined sewer overflows and facility optimization to determine what additional steps need to be undertaken.	In Progress
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The Sarnia Wastewater Collection System Assessment Master Plan was completed in 2012. The relevant recommendations from the Master Plans are being implemented by the City.

• Investigate private septic systems for homes within the St. Clair River watershed including the delta to determine if they are causing negative effects on the water quality of the St. Clair River.	Completed
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According to a 2012 report on First Nation Water and Wastewater Systems, approximately 95% of the WIFN community had holding tanks, septic systems, or another disposal method for wastewater. There were two communal sewage systems on the island: one serviced approximately 20 residences and the other serviced the community's strip mall. According to data collected, both collection systems had extended aeration with tertiary treatment and UV disinfection before discharging into a wetland and ditch respectively.

In collaboration with the Walpole Island Heritage Centre, it was determined that inspecting private septic systems within the community was going to be extremely difficult due to access, privacy, and liability concerns. Instead, bacteria monitoring data collected by the WIFN Health Unit was analyzed to determine whether there were any areas adjacent to the river that had excessive bacteria levels; an indication of a failing septic or holding tanks. No such sites were identified adjacent to the river, so no evidence that private septic or holding tanks within WIFN were adversely affecting the water quality of the St. Clair River. There were, however, some ditches and embayments within the community that do develop algae in the summer and the Heritage Centre is monitoring these sites to determine next steps.

• Support the ongoing maintenance of private sewage disposal systems, if it is concluded this is necessary for re-designation of this BUI.	Not Required
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As per above, there is no requirement to support ongoing maintenance of private sewage disposal systems within the WIFN community. This initiative is beyond the scope of the RAP.

All actions were completed and a BUI re-designation report was drafted entitled *The Status of the Beach Closings Beneficial Use Impairment* (Strang, September 2016). A Not Impaired status received endorsement from the CRIC and BPAC and is proceeding through the re-designation approval process.

**Resource:**

*St. Clair River Area of Concern Status of Beach Closings Beneficial Use Impairment*, D. Strang, 2016.

## Degradation of Aesthetics

### Delisting Criteria:

This BUI will be considered restored when the waters are devoid of anthropogenic substances at levels that produce a persistent objectionable deposit and/or odour.

## Current Status: Not Impaired



Action	Status
Complete river-wide survey of river aesthetics.	Completed

In 2014, an assessment of the St. Clair River aesthetics was conducted by the CRIC. Because aesthetics cannot be measured and its quality is based on individual perception, multiple approaches were used to determine overall improvements. These methods included: 1) monitoring of aesthetics water quality parameters; 2) application of an aesthetic water quality index; and 3) conducting surveys of St. Clair River water users. In total, 224 surveys were completed by local water users. The results of the aesthetics index and monitoring along the St. Clair River were positive. Overall, responses received through the water user surveys highlighted significant improvements in the water's appearance.

Action	Status
Review all relevant data collected and undertake an assessment to determine current status based on delisting criteria and if an "Impaired" status results, prepare an action plan, drawing on (as appropriate) those items listed under <i>Beach Closings</i> work plan.	Completed

As a result of the unpleasant deposits and odours described in the Stage 1 RAP Report, the *Degradation of Aesthetics* BUI was identified as Impaired in the St. Clair River. Improvements in the appearance of the river over the last two decades resulted from a number of actions that helped to address the original pollution sources responsible for the impaired aesthetic conditions. These actions included the implementation of municipal and industrial discharge regulations (i.e.: Municipal/Industrial Strategy for Abatement, Effluent Monitoring and Effluent Limits, Spills Prevention, and Contingency Plans Regulation), which resulted in dramatic improvements to municipal wastewater infrastructure and a significant reduction in spills.

An assessment of the status of this BUI was undertaken in 2012 and included the following actions:

- Surveys of St. Clair River water users;
- Monitoring of aesthetics water quality parameters over three seasons;
- Application of an aesthetic water quality index; and
- Assessment of the results against the revised delisting criteria.

Additionally, discussions and interviews were conducted with long-time residents along the St. Clair River to gain their perspectives and insights on changes in the aesthetic quality of the river.

The surveys and monitoring completed during this assessment indicated that the majority of local water users felt that the appearance of the St. Clair River had improved substantially and rated the aesthetic quality as "fair," "good," or "excellent." Aesthetic monitoring conducted since

2009 suggested that any observation of foam or oily materials were a result of natural processes and litter at monitoring sites was no different than that observed in any other water course in the Great Lakes Basin. Furthermore, the application of an aesthetic index to data from each monitoring site ranked the St. Clair River AOC water aesthetics from “fair” to “excellent” (7.4 – 9.4). The revised delisting criteria for the *Degradation of Aesthetics* BUI (2012) states “*This BUI will be considered restored when the waters are devoid of anthropogenic substances at levels that produce a persistent objectionable deposit and/or odour.*” Using the revised criteria, current evidence met the identified target and supported the change of status of this BUI from Impaired to Not Impaired. This BUI was officially re-designated in 2016.

**Resource:**

*St. Clair River Area of Concern: Status of the Degradation of Aesthetics Beneficial Use Impairment*, E. Carroll, SCRCA, 2014.



Enjoying the view of the St. Clair River. SCRCA.

## Loss of Fish and Wildlife Habitat

### Delisting Criteria:

1. Administrative and legislative mechanisms are in place to protect recognized aquatic, wetland and terrestrial habitats from destruction or degradation.
2. Wetland coverage within the sub-watersheds of Area 1A is 6-10%, or is restored to the extent possible, and 155 ha of wetland habitat is rehabilitated, created, or protected within the Chenal Ecarte, Walpole Island First Nation delta, or along the eastern shore of Lake St. Clair.
3. Habitat connectivity between the St. Clair River and Sydenham River and between Walpole Island First Nation, Bickford Oak Woods, and the Aamjiwnaang First Nation has been improved.
4. 50% of the major tributary lengths in Area 1A are buffered by a minimum width of 5 m of natural vegetation or buffered to the extent possible.
5. Nearshore and shoreline fish habitat has been enhanced at 6-12 priority sites along the St. Clair River to demonstrate the benefits of integrating shoreline protection with fish habitat enhancement.
6. Wetland habitat components (i.e. water quality, submerged aquatic vegetation, aquatic invertebrates, fish, and birds) achieve a quality ranking of "Good" or better based on Water Quality Index (WQI) and Indices of Biological Integrity (IBI) scores for a 3-year period, or when mean WQI/IBI scores within the AOC are shown to be statistically comparable to those outside the AOC for a 3-year period.
7. A long-term *Fish and Wildlife Habitat Management Plan* for Ontario is completed to facilitate habitat restoration and protection beyond AOC delisting.

## Current Status: Impaired



Action	Status
For the remaining time that the CRIC is in place it should continue to encourage Lambton County and its member municipalities within the AOC and the Municipality of Chatham-Kent to strengthen "Natural Heritage Policies" when amending their Official Plans (OPs) to provide greater protection to water quality and fish and wildlife habitat within the AOC.	Completed

Municipal Official Plans (OPs) are important documents that set out the objectives and policies to guide the short-term and long-term physical development of all lands within boundaries of the Plan. As a result, OPs can affect habitat availability and conservation. In April 2015, the Fish and Wildlife Habitat and Populations sub-committee drafted a letter to the County of Lambton encouraging the County to complete their review that had been ongoing for several years. The sub-committee also urged strengthening the Natural Heritage Strategy as it is an important tool for planning decision-making. In response, a new County OP was adopted by the Council on Sept. 6, 2017 and is pending provincial approval.

Chatham-Kent also completed a comprehensive review of its OP, and recognizing the importance of the remaining natural features, the 2015 OP now includes protection policies for wetlands and promotes conservation of aquatic habitats.

Action	Status
Create an updated Natural Heritage Strategy Report using the most current GIS resources and interpretive tools to identify wetland and forest coverage and feasibility for restoration within the sub-watersheds of the AOC.	Completed

The Fish and Wildlife Habitat and Populations sub-committee utilized the geo-spatial expertise of SCRCA to update the natural heritage features and summarized the results in a report. The *Natural Heritage Study Update Report* was completed in 2013 and was extremely valuable to the sub-committee in tracking progress towards its wetland coverage goal.

In the same year, SCRCA also created a report summarizing areas where there appeared to be a potential to either create or restore wetlands as these areas had wetland-like features (wet, shallow depressions, etc.). The areas were further defined using ortho-imagery. The result of this analysis was that there are less than 6 km<sup>2</sup> to consider for wetland creation.

### Resources:

*St. Clair River Area of Concern Natural Heritage Study Update: Methodology and Results – 2013*, St. Clair Region Conservation Authority, 2013.

*AOC Potential Wetland Assessment 2013*, St. Clair Region Conservation Authority, 2013.

Action	Status
Conduct a quantitative analysis of coastal wetland habitat change (loss/gain) since 1991.	Completed

Tracking wetland losses and/or gains may sound simple; however, it is difficult to do as there is no formal municipal mechanism or requirement to report individual wetland losses or changes. However, aerial photographic interpretation techniques do make it possible to compare wetland coverage between specific time frames. This kind of analysis/comparison was completed for five coastal wetland areas in the AOC (Chenal Ecarte Marshes, Lake St. Clair Marshes, Marshy Creek Marsh, St. Clair River delta marshes, and Stag Island Marsh) to assess changes in wetland habitat since AOC designation. Historical wetland data from 1978 were compared to wetland data from 2010. The analysis revealed a 2.5% increase in wetland habitat from 1978 to 2010.

Since the 1990s, coastal wetland loss within the AOC (i.e.: Mitchell's Bay) had been minimal; however, the infestation of non-native *Phragmites* was significant, so restoration of the remaining coastal wetland areas was a high priority for the CRIC. Over the past five years, there was a remarkable amount of wetland restoration work done by RLSN and other partners to eradicate this invasive plant and improve these sites through vegetation plantings.

All habitat projects since 2000 were geo-spatially mapped to facilitate tracking of the restoration goals for the *Loss of Fish and Wildlife Habitat BUI*.

**Resource:**

*Status of Coastal Wetland Habitat in the St. Clair River Area of Concern*, Environment Canada, 2014.

Action	Status
Prioritize wetland candidate sites in accordance with the 2007 <i>Updated Habitat and NPS Rehabilitation Priority Guidelines</i> .	Completed

Potential wetland creation/restoration project sites known to the CRIC were reviewed and ranked using six principles. Most of the prioritized sites were privately owned, so habitat restoration was dependent upon landownership cooperation. The Habitat sub-committee created these principles in 2007:

1. Coastal wetlands with direct hydrological connection to the St. Clair River & delta.
2. Shoreline softening of the St. Clair River and riverine habitat rehabilitation.
3. Other wetlands in Area 1A providing aquatic habitat.
4. Riparian buffers along the St. Clair River.
5. Riparian buffers in the tributaries of Area 1A.
6. Other habitat rehabilitation work that addresses improved water quality conditions, fish, and aquatic wildlife habitat in Areas 1A and 1B.

Action	Status
Engage landowners, seek funding, and plan and complete prioritized wetland restoration projects.	Completed



Wetland restoration project in the AOC. ECCC.

Potential wetland restoration projects were prioritized within the AOC, and over the past five years, several coastal wetland landowners were engaged and all projects were successfully completed. The wetland habitat restoration/enhancement/creation goal of 155 ha (383 ac) was surpassed.



Action	Status
Evaluate unevaluated wetlands for protection in municipal plans.	Ongoing



SCRCA staff completing wetland evaluations in the AOC. SCRCA.

Under the *Municipal Planning Act*, wetlands are afforded protection from destruction when they have been evaluated and are deemed to be either regionally or provincially significant. In the past five years, with funding from ECCC and OMNRF, SCRCA completed several wetland evaluations and recommendations for designation as “Provincially Significant” were made to OMNRF. If approved, these wetlands will be afforded protection under the *Municipal Planning Act*; directly contributing to the delisting criteria for this BUI.

Action	Status
Track progress on wetland goals for the AOC.	Ongoing

Using Geographic Information Systems to track habitat projects within the AOC, over 400 individual habitat projects were completed as of 2017. Over the past five years, there was a concerted effort to focus on coastal wetland restoration within the priority areas of the AOC. Between 2012 and 2017, seven wetland restoration projects were completed in areas where significant wetland loss and alteration had occurred historically. The wetland projects were:

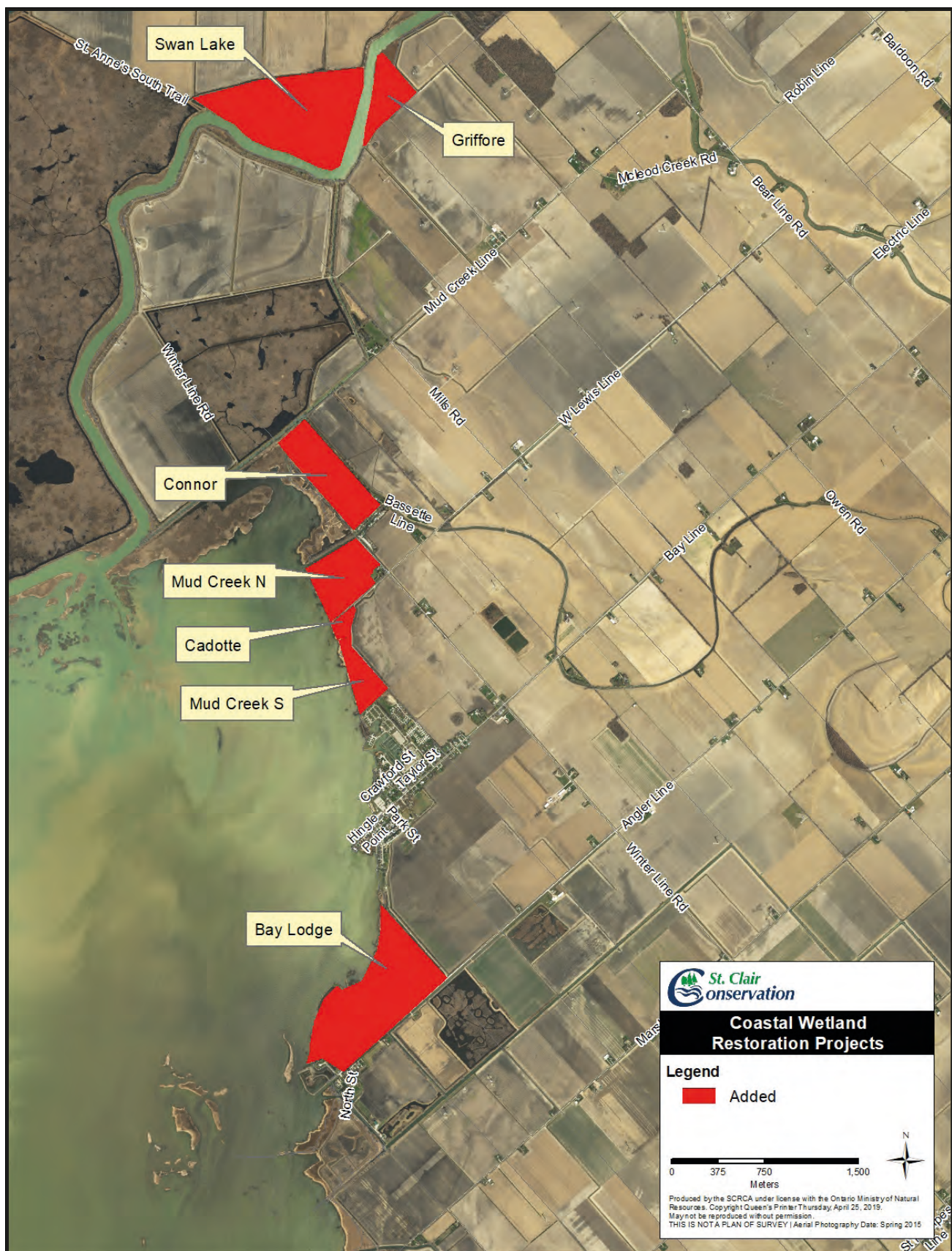
1. Swan Lake, a 68 ha (168 ac) wetland on Walpole Island, adjacent to the Snye River.
2. Griffore, a 13.7 ha (33.9 ac) wetland also on the Snye River, across from Swan Lake.
3. Mud Creek Club North is a 11.1 ha (27.4 ac) coastal wetland at the northern end of Mitchell's Bay.
4. Connor Marsh, a 23 ha (56.8 ac) wetland adjacent to Mud Creek Club North.
5. Cadotte, a 19.42 ha (48 ac) coastal wetland situated between the north and south sections of the Mud Creek Club.
6. Mud Creek Club South, a 9.5 ha (23.5 ac) coastal wetland adjacent to Mitchell's Bay Marina.
7. Bay Lodge, a 70.1 ha (173.2 ac) wetland in the southern end of Mitchell's Bay.

These projects enhanced/created 217 ha (536.2 ac) of coastal wetland in the priority area of the AOC; surpassing the 155 ha (383 ac) goal. This was made possible through landowner cooperation and their commitment to habitat conservation, and the hard work of conservation partners such as RLSN. See Appendix 1 for a summary of each project.



Habitat project sign. ECCC.





**Figure 3:** Coastal wetland restoration projects on Mitchell's Bay



Action	Status
Collaborate with MTO to access the remaining properties that will complete the Hwy 40 project, improving habitat connectivity between WIFN, the McKeough Floodway, headwaters of the St. Clair River tributaries, Bickford Oak Woods, and Aamjiwnaang First Nation forest.	Ongoing



Highway 40 Prairie Passage sign. ECCC.

Since 2002, RLSN led the creation of the Prairie Passage along Highway 40. In total, 71 ha (175.4 ac) of Ministry of Transportation Ontario (MTO) owned right of way along the highway was naturalized by planting native tallgrass prairie and approximately 28,000 trees and shrubs. Naturalizing Highway 40 improved habitat connectivity between AFN in the northern part of the AOC to WIFN in the south and key areas in between, including the McKeough Floodway and Bickford Oak Woods.

In 2016, RLSN provided several tours for MTO staff, outlining additional MTO owned right of way areas that could be naturalized. In the spring of 2017, 4 kms of roadside in Chatham-Kent along Highway 40 was planted with native prairie totalling 6 ha (14.8 ac), bringing the total area in the AOC to 77 ha (190 ac).

Action	Status
Map the corridors within the Official Plans for Chatham-Kent and Lambton and identify and implement opportunities to enhance connectivity where/if they exist.	Completed

An evaluation by RLSN concluded that the Highway 40 Prairie Passage created a 30 km long wildlife corridor and joined three regionally significant wildlife anchor areas identified in both County plans. WIFN is the farthest south connection to Highway 40 and is the largest and most biologically significant prairie habitat in Ontario. The farthest north anchor is 1000 hectares (2471 ac) of forest in the Aamjiwnaang First Nation community. Midway between AFN and WIFN is the Bickford Oak Woods complex – the largest upland/lowland forest complex on the St. Clair Clay Plain. Connecting these significant anchor areas was vital to the conservation and protection of biological diversity in the St. Clair River AOC.



Highway 40 Prairie Passage. RLSN.

Action	Status
Systematically identify public, private, and industrial land use and ownership adjacent to tributaries flowing directly into the St. Clair River where riparian coverage is less than 5 m.	Completed

In 2013, SCRCA completed a comprehensive analysis of land ownership adjacent to the tributaries with less than 5 m of natural vegetated buffer. This project facilitated a targeted outreach initiative promoting buffers.

**Resource:**

*Inventory of Property Owners with deficient Riparian Buffers within the St. Clair River AOC Subwatersheds*, SCRCA, 2013.

Action	Status
Create and implement a strategic <i>Riparian Habitat Enhancement Outreach and Implementation Plan</i> that promotes the ecological value of riparian habitat (vegetative buffers) within major tributaries and detail how the plan will be implemented over the next 3-5 years (to rehabilitate up to 20 km/yr of riparian habitat).	Completed

In 2014, RLSN created an outreach action plan to promote the benefits of vegetated buffers in tributaries of the AOC. An informative brochure (see Appendix 2) explaining the benefits of buffers and how landowners can seek assistance and financial support was printed and over 1000 were distributed locally. Partnering with a local pizza restaurant, RLSN also advertised the buffer initiative on over 5000 pizza boxes.

**Resources:**

*Riparian Habitat Enhancement Outreach and Implementation Action Plan*, Rural Lambton Stewardship Network, 2014.

*Riparian Buffer Program Brochure*, Ontario NativeScape, 2014.

Action	Status
Track and map riparian buffer projects to assess progress.	Ongoing

Geo-spatial and project information on all habitat projects in the AOC were provided to SCRCA where they were entered into a database. The goal for the AOC was to have 50% of the tributaries vegetated with a minimum buffer of 5 metres. As of 2014, nine of the eleven tributaries met this goal.

In 2014, an analysis by the SCRCA indicated that 58% of the tributary lengths in Area 1A and 1B of the AOC had a 5 m riparian buffer while 35% had a 30 m riparian buffer.

**Resource:**

*Determination of Riparian Buffers within the St. Clair River AOC Subwatersheds (Updated)*, SCRCA, 2014.

Action	Status
Develop an Integrated Shoreline Management Plan for the St. Clair River that will list the priority sites to be progressed in support of re-designation.	Completed

SCRCA completed an inventory of shoreline conditions and a 2017 report on progress made in restoring areas of the St. Clair River. The *Fish and Wildlife Habitat Conservation Plan* for the AOC will highlight additional shoreline and other areas where restoration opportunities exist.

Action	Status
Acquire necessary data layers to complete and apply <i>Fish Habitat Suitability Model</i> .	Ongoing

Fisheries and Oceans Canada (DFO) continues to compile the necessary data to complete the model, and once completed, the model will be valuable to assess benefits of future fish habitat restoration projects. The model will also be able to identify fish habitat quality based on habitat attributes and fish community data collected to date.

Action	Status
Encourage and seek out opportunities to promote the naturalization of the SCR shoreline.	Ongoing

SCRCA continues to collaborate and support municipal efforts to restore shoreline. Technical expertise to private landowners is offered by SCRCA on shoreline restoration options.

Action	Status
Conduct pre- and post-project implementation fish surveys at restoration sites and report on findings.	Ongoing



Fish habitat study. DFO.

DFO completed two years of fish surveys at several of the coastal wetland sites where habitat restoration had occurred in Mitchell's Bay. The DFO fish community surveys will indicate what fish species are utilizing these restored coastal wetlands. These fish community surveys mirrored the marsh bird surveys undertaken by CWS as part of the wetland health monitoring program. This data will be valuable when assessing habitat quality, which is a delisting criterion for this BUI.

Action	Status
Track shoreline projects and assess and report on progress.	Ongoing

While the delisting criteria specific to shoreline restoration were met, shoreline restoration projects continue to be tracked by SCRCA and will be summarized in the status report for this BUI.

In 2016, the Cathcart Park shoreline restoration was completed. The purpose of the undertaking was to provide shore stabilization, improve shoreline access, enhance aquatic habitat, and provide general improvements to the existing shore along the entire project site. About 400 metres of St. Clair River shoreline was restored on the south side of Clay Creek. Restoration included armour stone/rip rap revetment with three aquatic planting pods, and gravel beds were installed.



Cathcart Park shoreline project. SCRCA.



Cathcart Park shoreline project. SCRCA.



In 2016, with funding from ECCC and Indigenous and Northern Affairs Canada, engineered drawings and cost estimates to address four sections of WIFN shoreline were completed. These plans integrated shoreline erosion protection and fish habitat concepts. WIFN is pursuing partners for funding and implementation of this project.

**Resources:**

*St. Clair River Shoreline Restoration Report*, SCRCA, 2015.

*Design Summary Report (DRAFT): Walpole Island, Shoreline Restoration Sites 1-4*, Shoreplan Engineering Limited, 2017.

Action	Status
Review the results of the ECCC AOC Wetland Health Assessments, implement management recommendations where feasible, and report on progress.	Completed

ECCC had been monitoring wetland health since 2008, and after eight surveys, the condition of AOC wetlands monitored by CWS was comparable to non-AOC wetlands on the Great Lakes.

**Resources:**

*Detroit River and St. Clair River Areas of Concern: Coastal Wetland Habitat Assessment Report 2013 Update*, Environment Canada, 2014.

*Detroit River and St. Clair River Areas of Concern: Marsh Breeding Bird 2015 Addendum*, Environment Canada, 2016.

*St. Clair River Area of Concern: Coastal Wetland Habitat Assessment Report 2016 Update*, Environment Canada, 2017.

*Status of Coastal Wetland Habitat in the St. Clair River Area of Concern*, Environment Canada, 2013.

Action	Status
Conduct a wetland assessment at a select wetland within Walpole Island to compare with a reference wetland outside the AOC to determine if they are comparable as per the target and share results.	Not Completed

WIFN undertook fish and wildlife surveys at select marshes within the delta to guide restoration efforts locally. The Marsh Monitoring Program (MMP) protocols were provided and an information session was conducted to solicit support and volunteers from the community. Applying the MMP protocols to a select wetland has not yet been formally undertaken.

Action	Status
Write a Fish and Wildlife Habitat Management Plan.	In Progress

A Fish and Wildlife Habitat Conservation Plan was drafted for the AOC. It summarized restoration projects completed, ongoing management needs for these sites, and future habitat restoration opportunities. It also identified potential funding sources. The Plan was intended to be a local resource.

**Resource:**

*Detroit River and St. Clair River Areas of Concern: Coastal Wetland Habitat Assessment Report 2013 Update*, Environment Canada, 2014.

Action	Status
Review all relevant data collected and undertake an assessment to determine current status based on delisting criteria and if an "Impaired" status results, prepare an action plan.	Not Completed

## Public Outreach and Education

Action	Status
Raise public and youth awareness about the St. Clair River AOC progress via events, supporting programs, and media opportunities such as: <ul style="list-style-type: none"> <li>• Conservation Authority education program to school age children; and</li> <li>• Children's Water Festival</li> </ul>	Ongoing

The Friends of the St. Clair River (FOSCR) sponsored an educational program aimed at teaching elementary students about the St. Clair River AOC. This program was administered and delivered by the SCRCA



SCRCA staff delivering River RAP Program. SCRCA.

Education Department. Between 2012 and 2017, approximately 1800 school children participated in the program.

The St. Clair River RAP Coordinator attended the Chatham-Kent & Lambton Children's Water Festival as an activity leader. Approximately 1400 school children

attended this festival annually over a three-day period. Activities presented by the coordinator focused on water quality and issues facing the St. Clair River AOC.

The coordinator also attended Carolinian Canada's Go Wild Grow Wild Expo, Bluewater Anglers Kids Training Day, Sarnia Artwalk, and the SCRCA's Annual Bus Tour. These events enabled the coordinator to connect with the public to provide information and answer inquiries regarding the AOC.

Action	Status
Support BPAC outreach and celebration events such as BUI re-designations, boat cruises, and distribution of outreach information and display material.	Ongoing

Between 2012 and 2017, two BUIs were re-designated to Not Impaired on the Canadian side of the St. Clair River. Celebrations were held to recognize each of these milestones.

A celebration event was held in September 2012 to acknowledge the re-designation of the *Added Costs to Agriculture or Industry* BUI. The afternoon event took place at Cathcart Park, just north of Sombra. In 2014, the BPAC celebrated the re-designation of the Canadian *Degradation of Aesthetics* BUI with a boat tour along the St. Clair River Canadian shoreline. Various presenters spoke along the tour describing work that had been done in the AOC. Approximately 75 people attended the celebration.

During 2012 to 2017, a number of re-designation events also took place in Michigan, recognizing progress made on the U.S. side of the St. Clair River. In September 2012, events were held in Port Huron, Michigan, where both the *Added Costs to Agriculture or Industry* and the *Degradation of Aesthetics* BUIs were celebrated for their removal. In 2016, events were held to recognize the re-designation of the *Beach Closings* BUI on the U.S. side of the river. Representatives from the St. Clair River AOC program attended each of these events.

Action	Status
Support a BPAC biennial scientific symposium.	Ongoing

In June 2012, an AOC Symposium was held at Lambton College in Sarnia, Ontario, titled “The Path to a Healthy River – Working Towards Delisting the St. Clair River.” Approximately 100 people attended the one-day event with presentations spanning the themes of: 1) Historical Biological Impacts; 2) The River Bottom; 3) Water and People; and 4) Habitat. In addition, over 40 posters were displayed, highlighting actions and improvements to the river and watershed.

In September 2014, a second AOC Symposium organized by the Binational Public Advisory Council was held in Port Huron, Michigan. The symposium was titled “Bridging the Environment and Economy.” Approximately 100 people attended and listened to presentations by local experts on topics such as: 1) Contaminants in wildlife; 2) Regulatory Frameworks; 3) Population Dynamics; and 4) New Challenges.



2016 Science Symposia. WIFN.

Action	Status
Engage municipalities and First Nations by presenting biennial updates to: 1) Councils; 2) Environment committees; and 3) Environment department staff.	Ongoing

Updates on the St. Clair River AOC were provided to the following councils:

- St. Clair Township – September 9, 2013
- City of Sarnia – September 9, 2013
- Municipality of Chatham-Kent – September 23, 2013
- Village of Point Edward – September 24, 2013

The RAP Coordinator presented updates to local First Nation Environment Committees upon request. Notable presentations included:

- AFN Chief and Council – Update on status of the St. Clair River AOC – August 8, 2013
- AFN Environment Committee – Update on the status of the *Restrictions on Dredging Activities* BUI – September 16, 2014
- WIFN Heritage Committee – Update on the status of the *Restrictions on Dredging Activities* BUI – February 20, 2017
- WIFN Chief and Council – AOC Update Presentation – September 23, 2014

As well, between 2012 and 2017, three Science Symposia were jointly organized by the AFN Environment Committee, Walpole Island Heritage Centre, and ECCC.

The purpose of the Science Symposia was to share results on monitoring programs and research studies that had been conducted on water quality, coastal wetland habitat quality, and fish and wildlife populations. Approximately 80 people attended each of these Symposia.

Action	Status
Distribute newsletters and reports to First Nation households and/or through community centres, as recommended by AFN and WIFN communications outreach.	Ongoing

Newsletters, reports, and other communication products were distributed to First Nation households as directed by AFN and WIFN environment staff. Examples from the Walpole Island Heritage Centre Community Newsletter Nin.Da.Waab.Jig included:

- May 2013 – “Degradation of Aesthetics in the St. Clair River Area of Concern”
- November 2015 – “St. Clair River Area of Concern Restrictions on Dredging Activities”
- October 2016 – “Beach Closings Beneficial Use Impairment in the St. Clair River Area of Concern”

Action	Status
Plan with WIFN and AFN attendance at special/environmental events and meetings such as: Earth Days, Nin.Da.Waab.Jig Open House and Ecosystem Circles.	Ongoing

The St. Clair River RAP Coordinator was an active participant in numerous events at WIFN and AFN. Annual events attended included:

- WIFN Solidarity Day Celebration
- Walpole Island Heritage Centre Open House
- Walpole Island Heritage Centre Fall Fair
- AFN Earth Day Celebration
- AFN EnviroFest

The Coordinator took informative and interactive displays to these events as well as AOC fact sheets and educational material, and BUI Status Assessment Reports.

Action	Status
Consider signage opportunities on First Nation territories (e.g., Talfourd Creek).	Completed

A sign was designed and installed by AFN along Talfourd Creek where the Talfourd Creek Restoration Project was completed in 2013.

Action	Status
Expand contact list for industry to send update reports, E-Newsletters, notification of events or projects, etc.	Not Completed

Action	Status
Identify leading industries willing to be involved in AOC promotion.	Not Completed

Action	Status
Solicit and report on industry actions that are supportive of RAP objectives such as improved discharge quality, reduced connections to the river, etc.	Completed

To supplement the Status of the Beneficial Use Impairment *Restrictions on Drinking Water Consumption or Taste and Odour Problems* Discussion Paper, the CRIC developed and distributed a questionnaire to all SLEA member companies. This voluntary questionnaire gave industries the opportunity to provide information on

initiatives and/or investments made over the last 10 years to reduce wastewater effluent, improved pollution prevention measures, spill prevention protocols, and spill response capacity. Responses were received from all five SLEA member industries who discharge directly to the St. Clair River. Responses were published in the Discussion Paper.

Action	Status
Promote industrial staff participation in environmental opportunities (e.g., clean-up days, tree planting, etc.)	Not Completed

Action	Status
Contact Tourism-Sarnia/Lambton, river tour operators, and the Chamber of Commerce to expand distribution opportunities and networks for AOC-related documents.	Completed

The RAP Coordinator worked with numerous organizations to expand the distribution opportunities and networks for AOC-related documents.

- Submitted advertisement-like article for inclusion into the Sarnia-Lambton Community Connects E-Newsletter (August 2013 and December 2013).
- Provided Wallaceburg Chamber of Commerce with 50 copies of the 2007 – 2010 Accomplishments Summary Report along with 50 FOSCR business cards and submitted advertisement-like article for inclusion into their newsletter (November 2013 and March 2014).
- Provided 100 copies of the 2007 – 2010 Accomplishments Summary Report to the Duc d’Orleans II; information was incorporated into tour commentary.
- Sent advertisement-like document for posting at the Sarnia-Lambton Environmental Association office.
- Placed advertisement and submitted an article for the Earth Day edition of First Monday magazine (2015, 2016).
- Ran newspaper advertisements during 2015 and 2016 in local newspapers on the St. Clair River AOC (e.g., Sarnia Observer, etc.).

Action	Status
Produce display materials for use in outreach by BPAC, FOSCR, and other partners.	Completed

Numerous display materials were produced for use in outreach by BPAC, FOSCR, and other partners. These displays were used at a number of events including:

- AFN and WIFN community events (e.g., AFN EnviroFest, WIFN Solidarity Day)
- Go Wild Grow Wild Expo – London, Ontario
- Great Lakes – St. Lawrence Cities Initiative Conference
- BUI Re-designation Celebrations
- State of the Strait Conferences (e.g., Windsor 2013)

Appendix 3 contains a sample of display materials that were developed for outreach initiatives.

Action	Status
Continue the production of the FOSCR E-Newsletter, enhance distribution, and survey recipients for suggestions (request permission to distribute and contribute articles to the E-Newsletter by employees of local commercial and industrial facilities).	Ongoing

The FOSCR E-newsletter continues to be produced and distributed four times per year. Distribution of the newsletter increased from approximately 100 recipients in 2012 to 400 currently.

Action	Status
Post fact sheets about the AOC and best management practices at marinas, bait shops, and sporting goods stores and through Fish Derby registration packages and boat courses (e.g., Fish Consumption Guide).	Completed



A Marine Best Management Practices Fact Sheet (Appendix 4) was prepared in 2013 and distributed to the following organizations and retailers:

- Canadian Tire – Sarnia (Lambton Mall)
- Bridgeview Marine Services – Point Edward
- Bridgeview Yachting Centre – Sarnia
- T & M Marine – Sarnia
- Bridgeview Yachts Inc. – Sarnia
- Sarnia Bay Marina – Sarnia
- AFN Environment Department – Sarnia
- Bogey's Inn and Suites – Sombra
- WIFN
- Ed's Bait – Wallaceburg
- Eric's Pro Tackle and Bait – Wallaceburg
- Mitchell's Bay Marine Park – Mitchell's Bay

Action	Status
Investigate developing five-minute spots and/or run SMO animations for broadcast on local cable.	Not Completed

Action	Status
Meet with local journalists to educate and brief them on the goals and objectives of the RAP.	Completed

While direct meetings with journalists did not take place, a number of interactions with local media did occur. The RAP Coordinator submitted advertisements to local newspapers (e.g. Sarnia Observer) and radio stations updating the public on activities occurring in the AOC and accomplishments to date. An advertisement and article were published annually in the Earth Day edition of the First Monday magazine. This publication was distributed to all local Sarnia-Lambton businesses.

Radio and newspaper interviews were conducted with local outlets regarding the *Restrictions on Drinking Water Consumption or Taste and Odour Problems* BUI Discussion Paper and associated open houses.

Action	Status
Investigate the use of social networking tools (e.g., Facebook, Twitter).	Not Completed

A Facebook account was initiated for the St. Clair River Area of Concern to inform the public of progress. The RAP Coordinator was responsible for posting information on the page. However, due to workload requirements and priorities, the account was suspended.

A decision was made in 2017 to revamp the FOSCR website, which hosts information for the St. Clair River AOC. Once this redevelopment is complete, use of social networking tools will be explored again.

## Glossary

**Areas of Concern (AOC)** – Geographic locations recognized by the International Joint Commission (IJC) where water, sediment, and fish quality are degraded, and the objectives of the Great Lakes Water Quality Agreement (GLWQA) of local environmental standards are not being achieved.

**Beneficial Use Impairment (BUI)** – A change in the chemical, physical, or biological integrity of a Great Lakes System sufficient to cause any of the 14 use impairments.

**Combined Sewer Overflow (CSO)** – Combined storm and sanitary sewer systems.

**Delist** – The removal of an Area of Concern (AOC) from the list of AOCs achieved only when the criteria for the restoration of beneficial uses as defined by the Remedial Action Plan (RAP) are met and agreed upon by agencies and the local community.

**Environmental Remediation** – The removal of pollution or contaminants from environmental media, such as soil, groundwater, sediment, or surface water, for the general protection of human health and the environment.

**Great Lakes Water Quality Agreement (GLWQA)** – A joint agreement between Canada and the United States, which commits the two countries to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin ecosystem (from Article 2 of the 1978 GLWQA). Originally signed in 1972, the Agreement was amended in 1978, 1987, and 2012.

**Habitat** – An ecological or environmental area that is inhabited by a particular species of animal, plant, or other type of organism.

**International Joint Commission (IJC)** – A binational organization established in 1909 by the Boundary Waters Treaty. Through the IJC, Canada and the United States cooperatively resolve problems along their common border, including water and air pollution, lake levels, power generation, and other issues of mutual concern.

**Marsh Monitoring Protocol (MMP)** – The Great Lakes Marsh Monitoring Program is a binational, long-term, volunteer-based monitoring program that coordinates the monitoring of marsh birds and amphibian species using standardized protocols (methods) to contribute to the understanding of these species and their habitat needs.

**Microbial Source Tracking (MST)** – A method used to identify the dominant source of fecal contamination in water.

**Non-Point Source (NPS)** – Source of pollution in which pollutants are discharged over a widespread area from a number of small inputs rather than from distinct, identifiable sources.

**Point Source** – A source of pollution that is distinct and identifiable, such as an outfall pipe from an industrial plant.

**Probable Effect Level (PEL)** – The level above which adverse biological effects are expected to occur frequently.

**Provincial Water Quality Objective (PWQO)** – Provincial Water Quality Objectives are numerical and narrative ambient surface water quality criteria. PWQOs represent a desirable level of water quality that the MECP strives to maintain in the surface waters of the Province. PWQOs are set at a level of water quality which is protective of all forms of aquatic life and all aspects of the aquatic life cycle during indefinite exposure to the water.

**Remedial Action Plan (RAP)** – A document drafted with the purpose of restoring and protecting beneficial uses in the Areas of Concern (AOCs) within the Great Lakes Basin.

**Sediment** – The fines or soils on the bottom of the river or lake.

## Appendix 1: Coastal Wetland Project Summaries

Between 2012 and 2017, several large coastal wetland restoration projects were completed in the priority area of the AOC, which is the Walpole Island delta and along the eastern shore of Mitchell's Bay. These projects were instrumental in exceeding the AOC wetland restoration goal of 155 ha (383 ac).

### Swan Lake Marsh

The Swan Lake Marsh on WIFN is a 66 ha (163 ac) wetland on the Snye River that outlets to Mitchell's Bay. The marsh has been restored through water level and invasive species management, native plantings, and dyke repairs.



Swan Lake May 2013. SCRCA.



Swan Lake August 2013. SCRCA.



## Griffore

The Griffore coastal wetland is situated adjacent to the Snye River, which feeds directly into Lake St. Clair. It is also located directly across from the Swan Lake coastal wetland located on WIFN. A large portion of the existing wetland was overgrown with non-native *Phragmites*, resulting in poor habitat for wildlife. In the fall of 2014, RLSN applied a herbicide treatment to the entire area consisting of 18 ha (44.5 ac) and conducted a prescribed burn in March of 2015. In the dry summer months of 2015, two large wetlands were excavated with littoral zones and snake hibernacula were created on this 2.5 ha (6.2 ac) site. Native tallgrass prairie was planted on all exposed soil.



Aerial view of Griffore wetland after construction. *Darrell Randell.*



Griffore wetland after construction. *RLSN.*

## Mud Creek Club

The Mud Creek Club wetland consists of two properties, a north and a south section, both of which are north of Mitchell's Bay, just southeast of the mouth of the Snye River. The total area of these two sections is approximately 20.6 ha (50.9 ac), which was infested with non-native *Phragmites*. The restoration of this wetland involved two years of invasive species management followed by excavation of shallow depressions to create small ponds for aquatic wildlife. The design of the excavations enabled water to be retained on the land, providing aquatic habitat for the entire year. Two new ponds were created, a 0.82 ha (2 ac) in the north Mud Creek section and a 0.61 ha (1.5 ac) wetland in the south section. A 4 ha (9.9 ac) native prairie habitat was created on-site using the spoil from the excavation of the ponds.



Mud Creek Club construction. RLSN.



Pond creation at Mud Creek Club. ECCC.



## Connor Marsh

The Connor Marsh is situated adjacent to Lake St. Clair and has been an active waterfowl wetland since the early 1900s. A large portion of the wetland was overgrown with non-native *Phragmites*, degrading the habitat quality and accessibility by wildlife. In 2016 and 2017, 23 ha (56.8 ac) of *Phragmites* was addressed through multiple management techniques. A small berm with a culvert was installed to access the interior of the wetland to facilitate water movement and post-restoration management of the wetland. A 1.75 ha (4.3 ac) area was excavated to create a series of new ponds with littoral zones to create over-wintering habitat for frogs and turtles. Snake hibernacula, wood duck boxes, and Mallard hen nests were installed on the property. Lastly, RLSN frost seeded the 6 ha (14.8 ac) project site with tallgrass prairie to create upland habitat to support the many other aquatic wildlife species in the area.



Connor Marsh post-restoration. ECCC.

## Cadotte Marsh

The Cadotte Marsh is a 19.42 ha (48 ac) site along Mitchell's Bay and was created in the 1980s by Ducks Unlimited (DU). Over the years it was slowly overtaken with non-native *Phragmites*, impacting habitat quality. This project focused on eradicating the *Phragmites*, excavating the original fish channels created by DU, resulting in 2.24 ha (5.5 ac) of newly created fishways. Once the wetlands were completed, the surrounding



Cadotte Marsh. SCRCA.

4 ha (9.9 ac) area was seeded with native tallgrass prairie. The project also included construction of turtle overwintering, basking and nesting areas, as well as snake hibernacula. A 1.1 km trail was also created, providing pedestrians direct access to Lake St. Clair. The walking trail was made possible by the private landowners who worked jointly with Rural Lambton Stewardship Network to create the walking trail from the Mitchell's Bay campground to this property.



Aerial view of Cadotte Marsh. ECCC.



## Bay Lodge

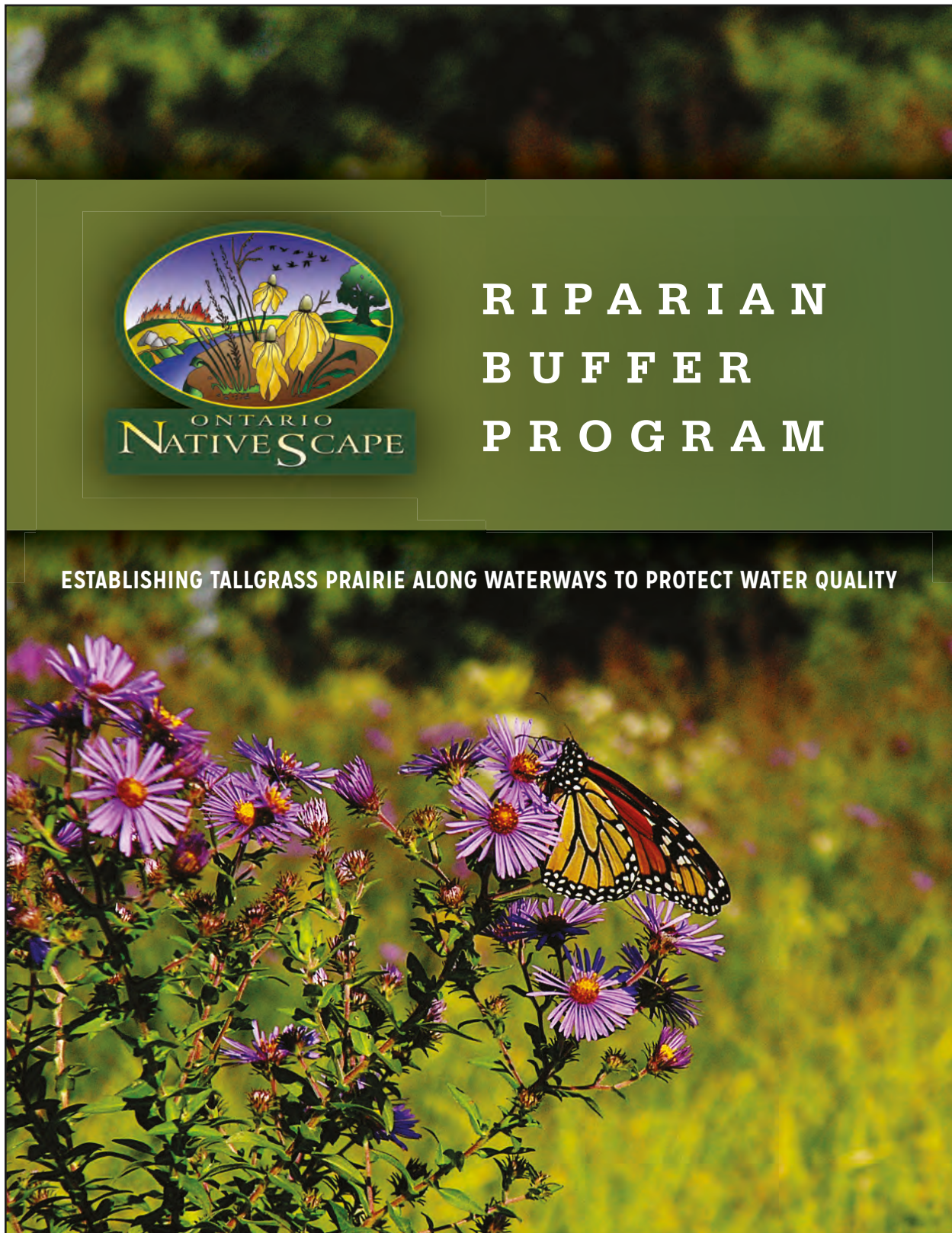
Bay Lodge is 70.1 ha (173.2 ac) with 2 kms of coastal wetland shoreline, at the south end of Mitchell's Bay. This property was a dense monoculture of non-native *Phragmites*. A restoration project was initiated and, following two years of invasive species management and two years of excavating new ponds and channels, improving existing berms, native plantings, and installing water control structures, the project was completed in 2013. Snake hibernacula, turtle nesting substrate, bat boxes, and waterfowl and bird boxes were installed as part of the project. This project was the first large-scale coastal wetland restoration project in the AOC and its success generated a lot of interest from adjacent coastal wetland landowners, which ultimately led to the completion of the projects described previously.



Aerial view of Bay Lodge. ECCC.

## Appendix 2: RLSN Riparian Buffer Program Brochure

RLSN Riparian Buffer Program Brochure – front cover





### WHAT IS A RIPARIAN BUFFER?

A riparian buffer is a strip of vegetation – usually a mix of grasses, wildflowers, shrubs and trees – planted along waterways like streams, creeks, drains and wetlands.

This program provides assistance for establishing native tallgrass prairie in riparian areas such as along streams, drains, ditches and wetlands to buffer adjacent land activities from waterways, protecting and improving water quality.



### WHY TALLGRASS PRAIRIE?

Prairie is the French word for meadow and includes a mixture of grasses and wildflowers. It is native to Ontario and therefore well adapted to climate and soil conditions. The grasses have extensive root systems (2.5 metres) which help them survive drought conditions, outcompete other unwanted vegetation and hold soil in place. The wildflowers have a long blooming period (May to September) providing excellent habitat for pollinators. Used as a buffer, it not only provides superior erosion control protecting soil and water resources, but excellent wildlife habitat.

Native tallgrass prairie buffers are easy to maintain, once established they require little maintenance or inputs such as mowing or spraying to control unwanted vegetation. They can complement many rural and industrial land use activities including many agricultural practices such as creating a harvest area of increased high quality forage for livestock, attracting beneficial pollinator insects and for manoeuvring agricultural equipment.

### WHY BUFFER? THE BENEFITS OF CREATING A BUFFER STRIP

Leaving or creating a riparian buffer along waterways can improve the water quality adjacent to your property by over 30%. It removes sediment and pollution such as chemicals, fertilizers, pesticides, bacteria and even road salt before they reach surface water. In addition, they provide other benefits such as:

• **Soil Health Improvement** - Soil health on your property will be improved as buffer strips will increase soil stability. The extensive root systems of native grasses and wildflowers and above ground growth will hold soil in place, reducing the impacts of soil and wind erosion. The increased organics and soil organisms will also contribute to overall soil health.

• **Stream Banks Stabilization** - Native grasses have extensive roots systems up to 2.5 meters in length holding soil in place preventing soil deposition into waterways. Stabilizing stream banks will not only protect water quality but prevent costly long-term drain maintenance costs.

• **Fish and Wildlife Habitat Creation** - A diversity of species depend on riparian habitat. The abundance of wildflowers provide critical nectaring and breeding habitat for many pollinators. While the improved water clarity and increased native vegetation provide excellent habitat for fish and other wildlife such as turtles and frogs.

• **Upland Habitat Creation** - Wildlife populations thrive in patches of tallgrass prairie because they provide quality nesting and rearing cover, winter survival cover and food. More native habitat creation on your property will translate into more wildlife.





**BUFFER BMPS –  
BEST MANAGEMENT  
PRACTICES**

Riparian buffers can range in width and be a mixture of vegetation types. However, research has indicated the following characteristics will be the most effective in benefiting your property.



**The Wider the Better.** Environment Canada recommends a 30 meter buffer. However, not all circumstances will allow a riparian buffer of this width. A minimum of 5 metres (16 ft.) will create a suitable buffer from adjacent land activities.

**Pollinator Plus.** Using a mixture of native wildflowers with grasses will not only improve aesthetics, it will attract more wildlife including beneficial insects such as bees and butterflies, important pollinators.

**Both Sides Buffered.** Ideally both sides of the watercourse should be buffered. Partnerships can be made with adjacent landowners if you do not own both sides.

**Use Native Plants.** Native grasses and wildflowers are adapted to local climate and environmental conditions allowing them to withstand drought conditions and pest infestations. Their extensive root systems hold soil and filter runoff before it enters a watercourse. Using native plants will protect adjacent crop lands from invasive non-native species from encroaching.

**Leave it Be.** Leave natural vegetation, rocks and gravel along shorelines. A diverse aquatic community helps improve water quality. Roots from plants help prevent streambank erosion and siltation. Overhanging vegetation provides food, shelter and shade for aquatic life. Rocks and gravel provide hiding places for organisms and provide spawning beds for fish.

**Be Biodiverse.** Having a diversity of grasses and wildflowers native to your area will attract more wildlife. If you have the space, adding shrubs and trees will increase the benefits of your buffer for soil health and water quality.

**Let it Grow.** Stop Mowing – Once established, tallgrass prairie requires little maintenance. You can reduce your mowing and spraying costs by creating native vegetation buffers.



### PHRAGMITES AUSTRALIS – AN INVASIVE SPECIES

Phragmites australis is a non-native, aggressive plant that invades areas of low water areas such as along drains and creeks and within wetlands. Phragmites australis not only degrades the quality of fish and wildlife habitat, it impedes the natural hydrological functions of waterways and wetlands. Once established it can be difficult to control and quickly invades other low lying areas.

Once Phragmites australis is under control, we can stabilize slopes quickly using specialized hydro seeding methods in these highly erodible areas.



### SIGN ME UP! HOW CAN I GET STARTED?

- ☐ Are you a drain manager?   ☐ Private landowner?  
☐ Industrial landowner?

Do you have a drain, creek, stream, river or any other type of surface water on your property?

#### WE CAN HELP BY:

- Creating a riparian buffer between land activities and a waterway
- Assisting in streambank stabilization projects after drain cleanouts or stream alterations
- Controlling invasive species such as Phragmites australis
- Funding and project management advice and experience for your project

Re-introduction of native plants back onto rural landscapes has to the potential to support multiple conservation goals. It starts with YOU! Start by contacting Ontario NativeScape to get more information. You may qualify for one of our voluntary grant programs!

Lindsay Buchanan (519) 809-5767   Jake Lozon (519) 809-5759  
<http://www.ontarionativescape.ca>  
[ons.rlsn@gmail.com](mailto:ons.rlsn@gmail.com)



*Ontario NativeScape is a not-for-profit organization that specializes in managing and completing habitat restoration projects that achieve and maintain a healthy and sustainable environment. Focused on restoring and safeguarding Ontario's native ecosystems and biodiversity, we have 20 years of experience planning, implementing and managing habitat and water quality restoration projects. As leaders in tallgrass prairie restoration to date we have managed and restored over 1400 hectares of tallgrass prairie habitat in Ontario.*

## Appendix 3: Outreach Materials

St. Clair River AOC Banner. SCRCA.

# The St. Clair River



In 1987, the International Joint Commission (IJC) identified 43 locations in the Great Lakes that failed to meet the water quality objectives of the Great Lakes Water Quality Agreement. These Areas of Concern (AOCs) all showed impairment of one or more of 14 beneficial water uses (BULs) identified by the IJC. The St. Clair River was identified as one of these AOCs due to contaminated sediments, pollutants from municipal and industrial discharges, urban and rural runoff and combined sewer overflows (CSOs).



Location and boundaries of the St. Clair River Area of Concern.



### Taking Action:

Working together, Canadian and U.S. government agencies announced a Remedial Action Plan (RAP) to address pollution concerns in the river. The following year, the St. Clair River Binational Public Advisory Council (BPAC) was created to work with and advise the agencies during development and implementation of the RAP. The BPAC consists of Ontario and Michigan citizens that represent federal, provincial and state governments, First Nations, Non-governmental organizations and the public living on both sides of the river.



### Accomplishments:

Through natural recovery processes and human cleanup efforts, environmental conditions in the St. Clair River have improved so that there are now:

- No additional costs to agriculture or industry to treat water taken directly from the St. Clair River
- No fish and wildlife flavour issues
- Less frequent CSOs and spill events
- Increased land cover consisting of wetlands, tall grass prairie, Carolinian forest and riparian buffers.

### Future Endeavours:

With this progress, the future of the St. Clair River is promising. In 2013, a work plan was published that outlined all remaining actions required to clean up the St. Clair River. Efforts continue to focus on:

- Managing contaminated sediment
- Protecting, restoring and rehabilitating fish and wildlife habitat
- Restoring all ecological issues through on-going control of pollution sources
- Addressing all listed BULs and identifying opportunities for continued improvement.

BPAC will continue to involve communities and citizens so that all individuals who work, live and recreate in the St. Clair River AOC understand their role and responsibility for a healthy, beautiful and bountiful river system.

To Learn More Visit Us Online at: [www.friendsofstclair.ca](http://www.friendsofstclair.ca)

Unless otherwise noted, all pictures provided by the St. Clair Region Conservation Authority



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

*On the Road to Recovery*



St. Clair River AOC Banner. SCRCA.



## Appendix 4: Marine Best Management Practices Fact Sheet

Marine Best Management Practices Fact Sheet – front

### Boating Best Management Practices for a Cleaner St. Clair River



We all enjoy spending sunny and warm summer days on the water. Whether it's paddling in a canoe or racing through the water in a motorized vessel, boating is a wonderful way to enjoy our Great Lakes. The scenic blue water of the St. Clair River attracts large numbers of boaters every year and also serves as a corridor linking Lake Huron and Lake St. Clair.

In 1987, the St. Clair River was identified as an Area of Concern or AOC. An AOC is an area where the environment has been severely damaged. For over 20 years, the government, local community, First Nations and industry have been working to improve the aquatic health of the river. Major improvements have been observed over the last two decades and efforts continue to reduce our footprint on the river.

As boaters, we have a responsibility to protect the waters we enjoy. This factsheet provides easy and efficient boating practices that will reduce our impact on the St. Clair River and all waters in the Great Lakes region.

#### Marina Pump-Out Facilities

Vessel sewage from sinks and toilets released from boats poses tremendous risks to the environment through the introduction of pathogens and nutrients to a water body. Nutrients feed algae and other plant life causing the eutrophication of water ways. Serious illness, such as diarrhea and hepatitis can result through the ingestion of *E. coli* and other pathogens by humans.

Beach closings result from high levels of *E. coli* (in Ontario concentrations greater than 100 colony forming units/100 mL lead to beach postings warning of the unsafe swimming conditions). Proper marine sewage discharge practices contribute to decreased *E. coli* concentrations and can lower the frequency of swimming and recreational restrictions along the St. Clair River shoreline.

#### How Do I Reduce My Impact?

Use pump-out facilities available at marinas to empty your sewage holding tank. These facilities will transport the sewage to water pollution control plants where it will be properly treated and disinfected. Additionally, take advantage of marina washrooms and showers to reduce the frequency of emptying onboard holding tanks.

#### REMEMBER:

**IT IS ILLEGAL TO RELEASE UNTREATED SEWAGE FROM A BOAT INTO CANADIAN WATERS.**



Boundaries of the St. Clair River AOC (SCRCA, 2012)

#### What is Eutrophication?

The excessive growth of algae and other plant life caused by nutrient enrichment in water bodies. It can cause the death of other plant and animal life due to the lack of sunlight and oxygen.



Pump-out station signs displayed at marinas



Published with co-operation of:



August 2013



## Scrape and Sand On Land

Scraping and sandblasting boat hulls creates dust and other paint and varnish residues that can be harmful to aquatic life. These materials can contaminate sediments and degrade water quality if not collected properly. No waste products from hull maintenance should be entering a waterway. To avoid this, a number of best management practices can be implemented:

1. Hull maintenance (sanding, scraping and painting) should occur when the boat is out of the water and on land
2. Use designated work areas located away from the shoreline
3. Use vacuum sanders with dust collection units
4. Avoid doing hull maintenance on windy days
5. Use protective sheeting to collect dust and scrapings; ensure waste materials are disposed of properly
6. Shop vacuum the area if all the dust or scrapings are not contained within the protective sheet. Do not water wash the area.

Water and sediment quality has improved substantially in the St. Clair River. These six steps will contribute to a healthier river.



## Filling Your Gas Tank

Gasoline is toxic to aquatic life. To avoid the spillage of gasoline into the water when you're filling up, estimate the amount of fuel you require and avoid "topping-off" your tank. Some suggest filling your gas tank to 90% of its capacity as the fuel will expand as it heats up. In addition, ensure absorbent pads or a container is under the fuel vent to collect any overflow.



**ONE LITRE of spilled gasoline can contribute to the CONTAMINATION of 20 000 LITRES of water**

### REPORT SPILLS!!

In the St. Clair River, spills can be reported to the Ontario Ministry of the Environment and Climate Change Spills Action Centre at **1-800-268-6060**.

### For More Information:

**Ontario Marine Operators Association**  
[www.boatingontario.ca](http://www.boatingontario.ca)

**Transport Canada Safe Boating Guide**  
[www.tc.gc.ca](http://www.tc.gc.ca)

**Ontario Invading Species Awareness Program**  
[www.invadingspecies.com](http://www.invadingspecies.com)

**Contact Information**  
St. Clair Region Conservation Authority  
205 Mill Pond Crescent  
Strathroy, Ontario  
N7G 3P9

(519) 245-3710  
[www.scrca.on.ca](http://www.scrca.on.ca)

### What else can I do?

- Secure all loose trash and recycling so it doesn't get blown overboard! Dispose of trash at appropriate garbage and recycling depots available at marinas.
- Use non-toxic and biodegradable soaps and detergents. Avoid those containing ammonia, bleach and/or phosphates.
- Throttle-down when approaching the shoreline to reduce erosion. Your boating neighbours will appreciate it as well!
- Don't discard fish waste into the water. Use a designated fish cleaning area.
- Use absorbent pads to keep bilge water as clean as possible.
- Pump all bilges and rinse down boats and trailers before moving to a different lake or river to avoid the spread of invasive species.

*Photo credits (left to right; top to bottom): Emer Dudley, Wallaceburg, ON; Kathy Popelka, Fort Gratiot, MI; Gord Camano, Sarnia, ON; Karlie Hobin, Sarnia, ON; John Staines, Kilworth, ON; Florida Department of Environmental Protection; Nevada Department of Wildlife; Lorraine Teper, Marine City, MI; Joanne Rumford, Port Huron, MI; Boat Owners Association of the United States*



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