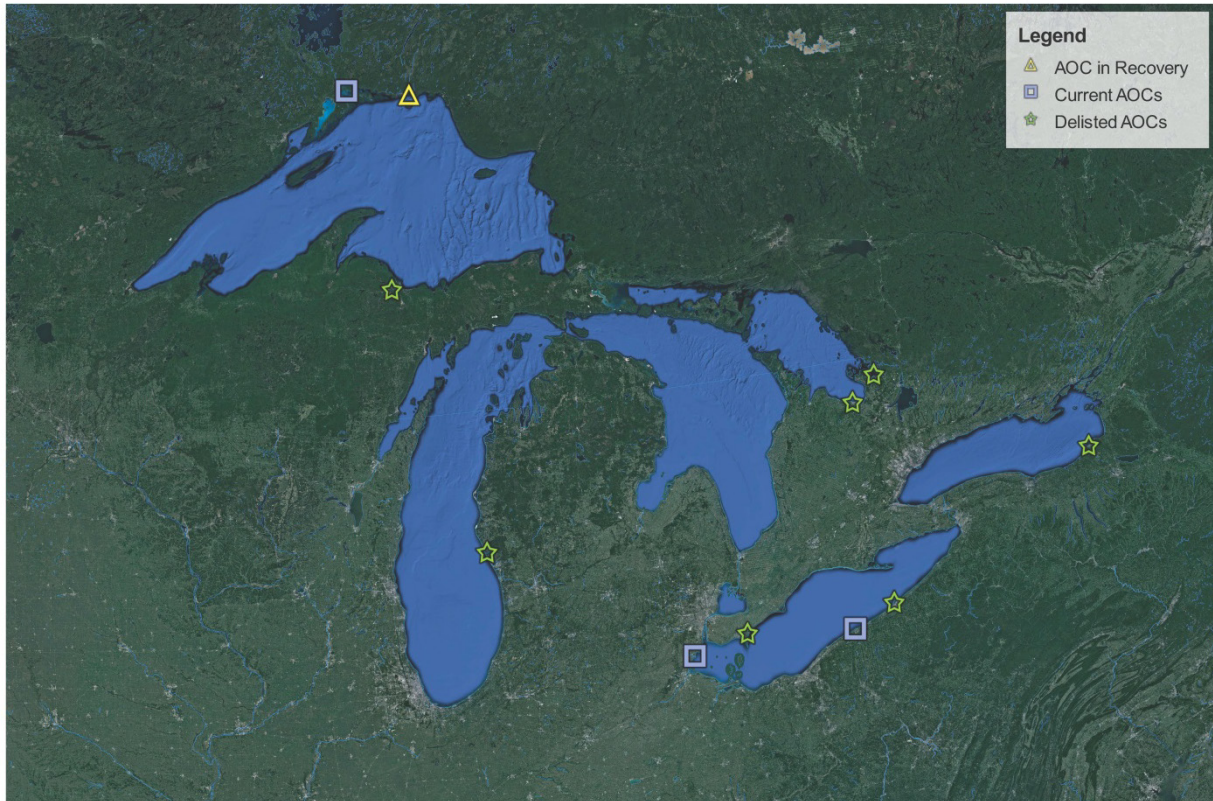


Great Lakes Areas of Concern: Life After Delisting



**An Investigation Conducted at the International Joint
Commission Great Lakes Regional Office**

**by
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Sea Grant Fellow 2015-2016**

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Table of Contents

Acknowledgements.....	ii
List of Tables	vii
List of Figures.....	vii
List of Abbreviations	vii
Executive Summary.....	ix
1 Introduction	1
2 Methods	3
3 Discussion.....	7
3.1 Monitoring and maintenance.....	7
3.1.1 Approaches and regional/basinwide programs that have been or could be used to support monitoring/maintenance efforts.....	7
3.1.2 Connection to academia.....	15
3.1.3 Supporting governance mechanisms and alternative funding sources	16
3.2 Community involvement and environmental stewardship.....	18
3.2.1 Evaluation of approaches to community involvement.....	18
3.2.2 Delisted AOCs' relationships to Lakewide Action Management Plans	23
4 Conclusion	24
4.1 Summary	24
4.2 Recommendations	26
4.3 Closing remarks.....	27
APPENDIX 1: Findings.....	28
1. Physical monitoring and maintenance	28
a. Approaches to monitoring and maintenance in delisted and current AOCs	28
i. Collingwood Harbour, Ontario (delisted).....	28
ii. Severn Sound, Ontario (delisted).....	30
iii. Oswego River, New York (delisted)	33
iv. Wheatley Harbour, Ontario (delisted)	34
v. Presque Isle Bay, Pennsylvania (delisted).....	35
vi. White Lake, Michigan (delisted).....	38
vii. Deer Lake, Michigan (delisted)	39

viii. Jackfish Bay, Ontario (in recovery).....	41
ix. Nipigon Bay, Ontario (near-term)	42
x. River Raisin, Michigan (near-term).....	42
xi. Ashtabula River, Ohio (near-term).....	43
2. Influence of regulations and funding post-delisting	44
a. Collingwood Harbour, Ontario (delisted)	44
b. Severn Sound, Ontario (delisted)	45
c. White Lake, Michigan (delisted).....	45
d. Presque Isle Bay, Pennsylvania (delisted).....	46
e. Oswego River, New York (delisted)	46
f. Deer Lake, Michigan (delisted).....	48
g. Wheatley Harbour, Ontario (delisted).....	48
h. Jackfish Bay (in recovery).....	48
i. Nipigon Bay, Ontario (near-term).....	49
j. River Raisin, Michigan (near-term)	49
k. Ashtabula River, Ohio (near-term).....	50
3. PAC/community involvement and continuing stewardship	51
a. Key approaches that have worked in delisted AOCs	51
i. Communities in which environmental stewardship thrived post-delisting	51
Severn Sound (delisted)	52
White Lake (delisted).....	53
ii. Communities in which the focus has shifted from environmental stewardship to other priorities	56
Presque Isle Bay (delisted).....	57
Collingwood Harbour (delisted).....	58
iii. Communities where AOC delisting / environmental stewardship has been led by government agencies.....	62
Deer Lake (delisted).....	62
Oswego River (delisted).....	64
Wheatley Harbour (delisted)	66
b. Communities of currently listed AOCs.....	67

i.	Jackfish Bay (in recovery)	67
ii.	Nipigon Bay (near-term)	68
iii.	River Raisin (near-term)	70
iv.	Ashtabula River (near-term)	71
4.	AOC community engagement with Lakewide Action Management Plans (LAMPs):	72
a.	Collingwood Harbour (delisted)	72
b.	Severn Sound (delisted)	72
c.	Oswego River (delisted)	72
d.	Wheatley Harbour (delisted)	73
e.	Presque Isle Bay (delisted)	73
f.	Deer Lake (delisted)	73
g.	White Lake (delisted)	74
h.	Jackfish Bay (in recovery) and Nipigon Bay (near-term)	74
i.	River Raisin (near-term)	74
j.	Ashtabula River (near-term)	74

List of Tables

Table 1: Delisted and current AOCs examined in this report with year delisted (if applicable) and BUIs	4
Table 2: BUI list key for Table 1	4
Table 3: Site abbreviation key for Table 1.....	5
Table 4: Monitoring Programs Implemented in Delisted AOCs	8
Table 5: Local and Regional NGOs Supporting Delisted and Current AOCs.....	22

List of Figures

Figure 1: Locations of delisted and current AOCs examined in this report.	3
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List of Abbreviations

Abbreviation	Full name
AIS	Aquatic Invasive Species
AOC	(Great Lakes) Area of Concern
BUI	Beneficial Use Impairment
CNR	Cliffs Natural Resources
COTE	Commission on the Environment and Water Quality
CSO	Combined Sewer Overflow
CWA	Clean Water Act
ECCC	Environment and Climate Change Canada (formerly Environment Canada; EC)
EN	Environment Network of Collingwood
ERCA	Essex Region Conservation Authority
GLLA	Great Lakes Legacy Act
GLRI	Great Lakes Restoration Initiative
GLWQA	Great Lakes Water Quality Agreement
HRDC	Human Resources Development Canada (contemporary equivalent: Employment and Social Development Canada)
IJC	International Joint Commission
LAMP	Lakewide Action Management Plan (formerly Lakewide Management Plan; LaMP)
LIAA	Land Information Access Association
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
MICorps	Michigan Clean Water Corps
MMP	Marsh Monitoring Program
MNRF	Ministry of Natural Resources and Forestry
MOECC	Ministry of the Environment and Climate Change

Abbreviation	Full name
NGO	Non-Governmental Organization
NOAA	National Oceanic and Atmospheric Administration (United States)
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service (United States)
NVCA	Nottawasaga Valley Conservation Authority
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
OMOEE	Ontario Ministry of the Environment and Energy
PA	Pennsylvania
PAC	Public Advisory Council (unless otherwise specified)
PADEP	Pennsylvania Department of Environmental Quality
PCB	Polychlorinated biphenyl compounds
PFBC	Pennsylvania Fish and Boat Commission
PGMN	Provincial Groundwater Monitoring Network
PLEW	Pennsylvania Lake Erie Watershed Association
RAP	Remedial Action Plan
RCRA	Resource Conservation Recovery Act
RIBS	Rotated Integrated Basin Studies
SMDHU	Simcoe Muskoka District Health Unit
SSEA	Severn Sound Environmental Association
SSRAP	Severn Sound Remedial Action Plan
TEHMP	Tributary Ecosystem Health Monitoring Program
U.S.	United States
USACE	United States Army Corps of Engineers
USEPA / EPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WLEN	White Lake Environmental Network
WRD	Water Resources Department

Executive Summary

The Great Lakes Area of Concern (AOC) program exists to turn the attention of communities and governments to areas within the Great Lakes that are so environmentally degraded that they require focused, long-term efforts to restore all beneficial uses to the ecosystem and humans. The AOC program provides a framework that directs funding and coordinates projects within AOCs which eventually lead to the cleanup of the contaminated sites. Generally, during the process of AOC delisting - or removing - AOCs from the list of sites, there is considerable concentrated activity towards cleanup of the site and organizing community involvement. Once the cleanup is over, however, communities are faced with the question of how to maintain the remediated site and continue community participation in environmental stewardship. The resources available for a community to conduct monitoring and maintenance of the site are not necessarily available in a neat package, and the sense of local environmental stewardship could wane without a tangible purpose behind which to organize. In addition, the momentum of communities with former AOCs could be harnessed to apply to lake-wide or region-wide cleanup efforts, such as those under the Lakewide Action and Management Plans (LAMPs). It should be noted that not all communities experience an increased sense of environmental stewardship during the delisting process, which is discussed in depth in the full report.

It was found that that most Remedial Action Plan (RAP) teams and/or Public Advisory Committees (PACs) for delisted and near-term AOCs compile a suite of monitoring activities from existing government programs. Near-term AOCs are AOCs at which remediation actions have been completed, but not all Beneficial Use Impairments (BUIs) have been removed; and the community and/or Remedial Action Plan team has not elected to redesignate the site as an Area of Concern in Recovery (which is an AOC for which all management actions have been completed but for which ecosystem recovery will take considerable time). Programs are applied by the RAP teams and/or the PACs to cover the monitoring needs of the former AOC, but they are not necessarily programs specific to the AOC. Involvement of academic researchers in the AOC delisting process, and consequently post-delisting monitoring and maintenance, varies widely (both in amount and activity). In general, it is too early to tell if any BUIs have recurred in any of the delisted or near-term AOCs; however, during interviews for this report it was learned that the removed/redesignated status of at least one BUI at three AOCs was disputed.

Existing regionwide regulatory structures have some impact on post-delisting site maintenance; however, generally interviewees responded that they did not think that regulations or legislation have played a significant role since delisting. Alternative funding sources were extremely varied among all of the investigated AOCs. In the currently active AOCs, funding sources mentioned include the Great Lakes Guardian Fund, the Great Lakes Sustainability Fund (which is specifically for AOCs), and a local stewardship network and community foundation.

Among the former and current AOCs explored, there was a range of community involvement and environmental stewardship during and after delisting. During the remediation process, citizen participation in many communities is robust. Among the delisted AOCs, community involvement tends to wane or change direction after delisting. Reasons for this decline in interest range from the community shifting its focus to other matters (such as economic revitalization) to broadening its area of environmental stewardship, to lack of direction after AOC delisting has occurred. Interviewees from three delisted AOC communities voiced a concern about a lack of support from government AOC program scientists and funding mechanisms post-delisting. It is also important to note that some communities are in a state of transition with community involvement because the AOC was delisted recently, and the PAC is currently being reorganized into another entity.

Generally, most of the delisted and current AOC communities are not engaged in their LAMPs. While in some cases this is due to lack of interest in or knowledge of the LAMP, in many cases this is also due to the fact that the Annex 2 process is currently undergoing changes. The governments of Canada and the U.S. are currently developing their public engagement strategies related to LAMPs, and are recruiting members for outreach and engagement committees of their binational Lake Partnerships (U.S. EPA and ECCO, 2016).

It was found that the major factor in determining if a delisted AOC remains in an improved state is community involvement, specifically community involvement that starts before the AOC is delisted. There appears to be a relationship between the amount of public participation in the delisting process and both the amount of public participation after delisting and the level of commitment to post-delisting monitoring. Generally, community involvement is a significant factor in ensuring sustained monitoring and maintenance and in obtaining funding for environmental restoration and stewardship efforts.

A major topic of concern not covered in this project is an in-depth assessment of the environmental conditions related to removed/redesignated BUIs. Through the interviews, it was discovered that the status of three removed/redesignated BUIs was in dispute between the community and the RAP team. Once a BUI is removed/redesignated, and particularly once an AOC is delisted, it is difficult for a community to find funding and expert resources to treat the source of the problem. A few interviewees said that they did not feel that they had access to expert resources after delisting.

Recommendations from this investigation include the following:

- For a fixed period of time (suggested: 6 months – 1 year), RAP personnel, particularly government AOC staff and resources, should be available to the former AOC community to field any recurrence of removed/redesignated BUIs, and make it clear to the community that they are doing so. It would be helpful if the governments established a program to help with the transition from listed to delisted status.
- The governments should consider establishing ongoing monitoring efforts that operate on time intervals that are better suited to detect potential recurrence of removed BUIs.
- The PAC or RAP team should explore opportunities to partner with academic institutions once they are writing their final delisting report. It may also be useful to partner with academic institutions during the remediation process, as has been demonstrated at AOCs both considered and not considered by this study. In addition, local and regional non-profit governance programs are extremely helpful to communities because they can

provide resources for ongoing monitoring programs and can usually support maintenance projects that arise.

- A high level of community involvement has the potential to carry over into the LAMP program; the mechanism of this transition should be explored further once the Canadian and U.S. governments solicit public input on the LAMPs. Government agencies at all levels should consider how to engage AOC communities, their knowledge, enthusiasm, resources- to be involved in the LAMP.
- Due to the recurrence (or lack of firm resolution in the first place) of issues which cause BUIs at three AOCs to now be in dispute, the criteria to delist existing BUIs should be re-evaluated for robustness. Improved public engagement on BUI removal/redesignation is also needed. Related, the IJC should conduct or sponsor a study on to re-evaluate the criteria.

Life after delisting for AOCs varies greatly, depending on both the environmental circumstances in and the character of the community around the AOC. The transition from AOC status to delisted status tends to be smooth if the community remains committed to environmental stewardship and protection of the local waterbody, and the RAP team stays available to help the community if problems do arise. The community of a delisted AOC has the unique opportunity to serve as an example of the relationship of environmental stewardship to restoration and economic development for other communities, and should consider using this opportunity to its advantage. Government agencies at all levels should maintain their status as resources to delisted AOC communities, and make it clear to the communities that they are doing so. Moving forward, when AOCs are approaching delisting, the issues discussed in this report should be taken into consideration.

1 Introduction

The AOC program exists to turn the attention of communities and governments to areas within the Great Lakes that are so environmentally degraded that they require focused, long-term efforts to restore all beneficial uses to the ecosystem and humans. The AOC program provides a framework that directs funding and coordinates projects within AOCs which eventually lead to the cleanup of the contaminated sites. Generally, during the remediation process, there is considerable concentrated activity supporting cleanup of the site and organizing the local community around it. Once the cleanup is over, however, communities are faced with the question of how to maintain the remediated site and continued community participation in environmental stewardship. For the purpose of this study, environmental stewardship refers to pro-environment attitudes and actions of people that are both directly related to the delisted (or current) AOC as well as related to the environment in general (i.e. not idling one's car in a parking lot, not littering, not dumping waste into the storm drains). The resources available for a community to conduct monitoring and maintenance of the site are not necessarily available in a neat package, and the sense of local environmental stewardship could wane without a tangible purpose around which to organize. In addition, it could be valuable to harness the momentum of communities with former AOCs for lakewide or regionwide cleanup efforts.

Article 7(1)(c)(ii) of the 2012 GLWQA provides the IJC with the responsibility to tender advice and recommendations to the Parties on matters covered under the annexes to the GLWQA, including AOCs, which are the subject of Annex 1. Article 7(1)(l) states that one of the IJC's responsibilities is "providing to the Parties, at any time, special reports concerning any problem relating to the quality of the Waters of the Great Lakes." This report is consistent with those responsibilities: it is designed to inform the governments of Canada and the U.S. of what happens when AOCs are delisted, and to serve as a guide for communities seeking to maintain restored conditions at a delisted AOC site.

This report addresses the issues of physical monitoring and maintenance, community environmental stewardship, communities' relationships to LAMPs, and regulations and alternative funding sources with regards to delisted AOCs. The findings from stage 3 / final delisting reports and interviews are presented in the discussion section; detailed findings are presented in Appendix 1.

2 Methods

To investigate life after delisting for former AOCs, it was first decided which AOCs would be explored for this research. The seven delisted AOCs were selected because it was determined they can potentially serve as examples of what AOCs that are currently in the remediation process can expect post-delisting. Because there are so far only seven delisted AOCs, it was decided to also research some of the AOCs in Recovery and near-term AOCs. One of the AOCs in Recovery and three near-term AOCs were selected based on whether or not all restoration activities have been completed and whether or not an interviewee could be found for those sites. Figure 1 and Tables 1-3 displays and describes all sites explored in this investigation.



Figure 1: Locations of delisted and current AOCs examined in this report.

Table 1: Delisted and current AOCs examined in this report with year delisted (if applicable) and BUIs (BUI code: R = removed/redesignated; N = not relisted/redesignated)

Site		CH	SS	OR	WH	PIB	DL	WL	JB	NB	RR	AR
Year Delisted (If Applicable)		1994	2003	2006	2010	2013	2014	2014	N/A	N/A	N/A	N/A
Beneficial Use Impairments	1	R	R	R	R		R	R	N		N	R
	2									R		
	3	R	R	R	R			R	N	N	R	R
	4					R			R	R		N
	5	R					R		R		N	
	6	R			R			R	N	N	N	N
	7	R	R		R	R		R	R	R	N	N
	8	R	R	R	R		R	R		R	R	
	9							R				
	10	R									R	
	11	R	R					R	N	R	R	
	12											
	13	R										
	14	R	R	R	R			R	N	N	R	R

Table 2: BUI list key for Table 1

1	Restrictions on Fish and Wildlife Consumption
2	Tainting of Fish and Wildlife Flavor
3	Degradation of Fish and Wildlife Populations
4	Fish Tumors or Other Deformities
5	Bird or Animal Deformities or Reproduction Problems
6	Degradation of Benthos
7	Restrictions on Dredging Activities
8	Eutrophication or Undesirable Algae
9	Restrictions on Drinking Water Consumption or Taste and Odor Problems
10	Beach Closings
11	Degradation of Aesthetics
12	Added Costs to Agriculture or Industry
13	Degradation of Phytoplankton or Zooplankton Populations
14	Loss of Fish and Wildlife Habitat

Table 3: Site abbreviation key for Table 1

CH	Collingwood Harbour
SS	Severn Sound
OR	Oswego River
WH	Wheatley Harbour
PIB	Presque Isle Bay
DL	Deer Lake
WL	White Lake
JB	Jackfish Bay
NB	Nipigon Bay
RR	River Raisin
AR	Ashtabula River

Once sites were selected, background research was conducted. The background research consisted of a review of final delisting / Stage 3 RAP reports and related material (such as Presque Isle Bay’s Watershed Management Plan). The information from the grey literature primarily provided the year of delisting, the BUIs that were removed/redesignated, insight regarding community involvement during the delisting process and sometimes projected post-delisting ongoing monitoring/maintenance activities. In addition to the grey literature search, internet searches were conducted to find information about the activities of the former PACs, if the PACs evolved into new groups based on the former AOC-based groups (and if so, what the activities of that current group are), and in general what the community attitude was and is towards environmental stewardship in terms of the former AOC.

Once the background search was conducted, interviewees for the subject sites were selected. IJC staff identified interviewees with whom they were familiar, though other suggestions were made by selected interviewees and taken into account throughout the interview process. The interviews generally provided the most updated information about the subject sites. Interview questions focused on four areas: 1. Monitoring and maintenance; 2. Post-delisting funding; 3. Community involvement; and 4. Relationship of the site to the Lakewide Action Management Plan (LAMP). Some information provided by the interviewees was verified with inquiries into the organizations mentioned. For example, in Collingwood Harbour, interviewees mentioned several specific monitoring activities that they knew went through at least 1996; but they were uncertain if those activities continue today. These were generally monitoring activities initially implemented by the

interviewees, but were then expected to be continued by provincial or federal agencies. To verify whether these activities continued, the author made inquiries into the agencies mentioned to find out what monitoring had been implemented after the interviewees stopped their activities, and if that monitoring continues today.

3 Discussion

3.1 Monitoring and maintenance

3.1.1 Approaches and regional/basinwide programs that have been or could be used to support monitoring/maintenance efforts

For every AOC examined in this report besides one, generally, the approach to post-delisting monitoring actions is to apply existing government programs from all levels that best fit the removed/redesignated BUIs. A list of the typical official programs mentioned in the interviews and RAPs in this report is found in Table 4 – other AOC-specific monitoring are found in Appendix 1 of this report. On its face, this appears a logical approach to continued monitoring in delisted AOCs – the expectation is that the environmental condition of delisted AOCs is no worse than non-AOC waters; therefore including delisted AOCs in existing routine monitoring programs should adequately evaluate non-AOC waters and result in the identification of any extraordinary conditions if they arise.

Table 4: Monitoring programs implemented in delisted AOCs

AOC	Entity	Program	Activity	Years	Source
Collingwood Harbour	OMOEE		Water Quality Monitoring	Several, most recent is 2015	(MOEECC, 2016)
Collingwood Harbour	OMOEE		Sediment Monitoring	2002, 2003, 2009	(MOEECC, 2016)
Collingwood Harbour	OMOEE		Sport Fish Contaminant Monitoring	2004, 2011, 2013	(MOEECC, 2016)
Severn Sound	Bird Studies Canada	Marsh Monitoring Program			(Sherman, 2002)
Severn Sound	Environment Canada	Marsh Monitoring Program			(Sherman, 2002)
Severn Sound	Long Point Bird Observatory	Marsh Monitoring Program			(Sherman, 2002)
Severn Sound	Georgian Bay Osprey Society	osprey monitoring			(Sherman, 2002)
Severn Sound	Wye Marsh Reintroduction Program (Ontario provincial program)	osprey monitoring			(Sherman, 2002)
Severn Sound	Canada Wildlife Service	Forest Bird Monitoring Program			(Sherman, 2002)
Severn Sound		Species at Risk Act (federal Canadian Program)			(Sherman, 2002)
Severn Sound	OMOEECC	Provincial Water Quality Monitoring Network			(http://www.severnound.ca/programs-projects/monitoring/provincial-groundwater-quality-monitoring-network)

AOC	Entity	Program	Activity	Years	Source
Oswego River	NYSDEC	Rotating Integrated Basin Studies (RIBS)	Water Quality Monitoring		(Zelazny, Interview, 2/2016)
Oswego River	USGS		Tributary water quality and pollutant loading		(Zelazny, Interview, 2/2016)
Oswego River	NYSDEC		Fish and wildlife habitat quality		(Zelazny, Interview, 2/2016)
Oswego River	USFWS		Fish and wildlife habitat quality		(Zelazny, Interview, 2/2016)
Oswego River	USGS		Fish and wildlife habitat quality		(Zelazny, Interview, 2/2016)
Oswego River	USEPA, NYSDCE, EC, OMOE	Lake Ontario LAMP	Continued reductions of contaminant inputs		(NYSDEC 2006)
Oswego River	NYSDOH		Determine human health advisories for fish consumption		(NYSDEC 2006)
Oswego River	Oswego County Soil and Water Conservation District		Water quality monitoring		(NYSDEC 2006)
Wheatley Harbour	ERCA, MOECC	Provincial Water Quality Monitoring Network	Water quality monitoring		(Stuebing, Interview, 2/2016; WHIT, 2010)
Presque Isle Bay	PFBC	Fish consumption advisory program			(PADEP, 2012)
Presque Isle Bay	PADEP	Water Quality Network			(PADEP, 2012)

AOC	Entity	Program	Activity	Years	Source
Presque Isle Bay	PADEP	Lake Erie LAMP	Sediment and contaminant loading, fish health, macroinvertebrate populations		(PADEP, 2012)
Presque Isle Bay	PA Sea Grant, PFBC, PADEP, Erie County Dept. of Health, Regional Science Consortium, Gannon University, Penn State Behrend, Mercyhurst University		“Conduct a watershed-wide physical, chemical, and biological assessment” (Kaczmarek, 2010)		(Kaczmarek et al, 2010)
Presque Isle Bay	PADEP, Millcreek Township, City of Erie, Greene Township, Erie County Department of Planning		“Identify and correct illicit discharges” (Kaczmarek, 2010)		(Kaczmarek, 2010)
White Lake	Bird Studies Canada	Avian and amphibian monitoring		2014-2016	(Cabala, Interview, 2/2016)
White Lake		MICorps			(Cabala, Interview, 2/2016)
White Lake	MDEQ	RCRA			(Cabala, Interview, 2/2016)
Deer Lake	MDEQ	Fish Contaminant Monitoring Program			(MDEQ, 2014a)

AOC	Entity	Program	Activity	Years	Source
Deer Lake	U.S. EPA		Sediment contaminant depth sampling	2014	(MDEQ, 2014a)
Deer Lake	USFWS		Bald Eagle nesting activity monitoring		(MDEQ, 2014a)
Deer Lake	MDEQ	NPDES			(MDEQ, 2014a)
Deer Lake	MDNR	Fisheries Management Program			(MDEQ, 2014a)
Deer Lake	State of Michigan (multiple departments)	Aquatic Invasive Species Program (AIS)			(MDEQ, 2014a)
Deer Lake	MDEQ Water Resources Division		Basin cycle inland lake and stream monitoring	2015	(MDEQ, 2014a)
Nipigon Bay	MOECC	Great Lakes Nearshore Index	Water quality monitoring	2017, every six years after that	(http://infosuperior.com/download/aocs/nipigon/Documents/nipigon%20bay%20monitoring%20plan%20%282015-08-21%29.pdf ; http://infosuperior.com/download/aocs/nipigon/Documents/nipigon%20bay%20monitoring%20plan%20%282015-08-21%29.2.pdf)

AOC	Entity	Program	Activity	Years	Source
Nipigon Bay	MOECC	Ontario Fish Contaminant Monitoring Program	Fish contaminant monitoring	Variable	(http://infosuperior.com/download/aocs/nipigon/Documents/nipigon%20bay%20monitoring%20plan%20%282015-08-21%29.pdf ;
Nipigon Bay	MNRF	Fish Community Index Netting Program	Fish population monitoring	2009–2016, every 5 years after 2016	http://infosuperior.com/download/aocs/nipigon/Documents/nipigon%20bay%20monitoring%20plan%20%282015-08-21%29.2.pdf)
Nipigon Bay	MNRF	Coaster Brook Trout Survey	Fish population monitoring	2011-2016, than at least every 5 years after 2016	(http://infosuperior.com/download/aocs/nipigon/Documents/nipigon%20bay%20monitoring%20plan%20%282015-08-21%29.pdf ;
Nipigon Bay	MNRF and Ontario Power Generation	Nipigon River System Water Management Plan	Fish habitat monitoring	Annual	http://infosuperior.com/download/aocs/nipigon/Documents/nipigon%20bay%20monitoring%20plan%20%282015-08-21%29.2.pdf)
Nipigon Bay	MNRF and Ontario Power Generation	Lake Sturgeon Monitoring	Fish population monitoring	Annual; 2014-2017	(http://infosuperior.com/download/aocs/nipigon/Documents/nipigon%20bay%20monitoring%20plan%20%282015-08-21%29.pdf ;

AOC	Entity	Program	Activity	Years	Source
Nipigon Bay	MNRF and Ontario Power Generation	Walleye Monitoring	Fish populations	2012-2016	http://infosuperior.com/download/aocs/nipigon/Documents/nipigon%20bay%20monitoring%20plan%20%282015-08-21%29.2.pdf
Nipigon Bay	ECDC	CSMI	Lower food web and water quality monitoring	Depends on focus of each monitoring cycle	(http://infosuperior.com/download/aocs/nipigon/Documents/nipigon%20bay%20monitoring%20plan%20%282015-08-21%29.pdf ;
Nipigon Bay	Superior Streams Initiative		Benthos, fish populations and fish habitat monitoring	2015	http://infosuperior.com/download/aocs/nipigon/Documents/nipigon%20bay%20monitoring%20plan%20%282015-08-21%29.2.pdf)
River Raisin	MDNR		Wetland monitoring		(Micka, Interview, 2/2016)
River Raisin	MDEQ		Water quality monitoring	Every 5 years	(Micka, Interview, 2/2016)
Ashtabula River	USACE		River depth monitoring		(Leitert, Interview, 2/2016)
Ashtabula River	OEPA		Benthos and fish tumor monitoring		(Leitert, Interview, 2/2016)
Ashtabula River	USEPA		Sediment Analysis		(Leitert, Interview, 2/2016)
Ashtabula River	USFWS		Fish tumor sampling	2016	(Leitert, Interview, 2/2016)

From the interviews, it was found that this assumption is valid only if the delisting/redesignation of BUIs was conducted in a robust manner. In two interviews, for two separate AOCs, it was mentioned that the changed status of a removed/redesignated BUI was questioned either at delisting or afterwards. In Presque Isle Bay, the fish tumors BUI is still being monitored because fish tumors still occurred at the time of delisting, and some members of the community questioned delisting the BUI because of the continued occurrence. In the Ashtabula River, the Restrictions on Dredging BUI have been “debated” because of the restriction on open-lake disposal of contaminated sediments. Several stakeholders, including the Ashtabula City Port Authority, the Ashtabula City Manager, the Ohio Environmental Protection Agency, the Ohio Department of Natural Resources and the U.S. Army Corps of Engineers have ongoing meetings to identify, evaluate, and hopefully implement beneficial uses of dredged sediments from the Ashtabula River and outer harbor. At each delisted or current AOC, it appears that each BUI in dispute is being carefully monitored or a management plan is being considered; however, it is not clear what the mechanism is to remediate a removed/redesignated BUI that recurs. The sites could apply for Great Lakes Restoration Initiative (GLRI) or Great Lakes Legacy Act (GLLA) funding, but these are competitive funding sources, therefore it is not guaranteed that funding will be available for further remediation. Whether or not further remediation occurs would rely entirely on the engagement of the former RAP team, which is variable among delisted AOCs.

In White Lake, it was found after delisting that there was evidence of potential recurrence of at least one removed BUI. A master’s student conducting a sediment study in White Lake found PCBs in the sediment column. The WLEN is working with the local university to determine if this occurrence of PCBs in the sediment is due to dispersal during dredging activities. While it is still not certain that the removed BUI has recurred, the interviewee did express concern that there is no mechanism to take remedial action if it has. As mentioned above, this site in particular could possibly seek GLLA funding, but this funding is not guaranteed. In addition, the interviewee mentioned that there needs to be a clearer connection to specific resources after delisting. By and large, when the AOC program is over, funding and support are gone unless there is an NGO or other infrastructure to continue environmental programming. It was expressed by four interviewees, particularly those who were former PAC members for their AOCs, that there was a general sense (at least among the community) of lack of forward

direction once the RAP team concluded their activities at the former AOCs; or otherwise a lack of understanding of what monitoring and maintenance activities would continue post-delisting. Two interviewees mentioned that it would be helpful if the governments established a program to help with the transition from listed to delisted status; this suggestion should be considered by the Canadian and U.S. governments.

3.1.2 Connection to academia

In some delisted AOCs, a local college or university (or in some cases multiple colleges/universities) plays an active role in continued monitoring activities. In Jackfish Bay (AOC in Recovery) and Nipigon Bay (all removal actions complete), Lakehead University wrote the recovery report, which examined ecosystem issues (Bailey, Interview, 2/2016). In White Lake, the White Lake Environmental Network (WLEN) has “an excellent working relationship with Grand Valley State University’s Annis Water Resources Institute. The WLEN will have the scientist who helped them develop delisting criteria for several BUIs help the PAC extrapolate new goals into the future (for maintaining and improving environmental quality associated with eutrophication and the benthic community)” (Cabala, Interview, 2/2016). In Presque Isle Bay, Pennsylvania Sea Grant, Pennsylvania State University, and Mercyhurst University are all scheduled to be involved in the implementation of the Presque Isle Bay Watershed Restoration, Protection and Monitoring Plan.

Partnerships with academia could be further explored by AOC communities. Academic institutions may have the capacity and means to conduct more in-depth studies than most government programs. Academic funding may also relieve some of the financial burden from the affected community. From this study, it is suggested that the PAC or RAP team explore opportunities to partner with academic institutions once they are writing their final delisting or stage 3 RAP report. It may also be useful to partner with academic institutions during the remediation process. In the U.S., state Sea Grant Programs can serve as good connections between communities and academia. State Sea Grant Programs may also be a good resource to connect communities to relevant existing government monitoring programs.

3.1.3 Supporting governance mechanisms and alternative funding sources

Many governance mechanisms support long-term monitoring and maintenance. Several delisted and near-term AOCs have partnerships with conservation districts and watershed groups that implement monitoring programs, and many times, enlist the local community for implementation. Local and regional non-profit governance programs are extremely helpful to communities because they can provide resources for ongoing monitoring programs and can usually support maintenance projects that arise. In some cases, these governance mechanisms can provide more thorough monitoring services to the community than local, state, and federal agencies. In terms of monitoring and maintenance, gaps in local and regional governance mechanisms tend to arise only in areas where governance does not exist. More evaluation of governance mechanisms in the context of supporting community involvement is discussed in Section 4.2.1: “Evaluation of approaches to community involvement.”

An ideal case of an autonomous governance mechanism for a PAC that wants to move forward beyond delisting is the Severn Sound Environmental Association (SSEA). SSEA is a joint municipal partnership that grew out of the RAP team and has strong partnerships with the entities that made up the PAC, and it is a highly functional non-profit organization that has in-house scientists who continue post-delisting monitoring activities. Because SSEA is a joint municipal partnership, much of its funding comes from the municipalities.

Alternative funding sources varied among all of the investigated AOCs. In Collingwood Harbour, an incorporated non-profit organization called Environment Network of Collingwood (EN) was formed. EN has struggled to stay funded, with the executive director having to seek funding through a government labor-funding grant rather than seeking funds for environmental restoration, since the latter did not exist. Specifically, EN applied for a grant to hire at-risk youth to implement environmental work through make-work and training programs. (Rich and Collis, Interview, 2/2016) Also in Collingwood Harbour, there are a few funding programs available to the public through the NVCA and MNRF Lake Simcoe and Southern Georgian Bay Stewardship Program. Both entities are continuing with public awareness campaigns/education and can provide funding opportunities to interested parties. The main funding source seems to be for naturalizing shorelines and river banks through bioengineering, riparian plantings, habitat

creation and natural shore protection. Funding to continue monitoring was difficult to obtain so monitoring programs were gradually reduced or became the responsibility of other agencies (Rich and Collis, Interview, 2/2016).

In Severn Sound, both monitoring and maintenance as well as community environmental stewardship activities are funded largely by the SSEA, which is a Joint Municipal Program. In White Lake, the White Lake Environmental Network is applying for funding for various monitoring and maintenance projects through Freshwater Future, the Muskegon Conservation District, and the Michigan Clean Water Corps. The interviewee for Presque Isle Bay was not aware of any alternative funding to ongoing monitoring and maintenance activities, but mentioned several non-profit and academic organizations involved with the Bay. He also mentioned a state program, Growing Greener, which provides protection and restoration grants to reduce sources of non-point source pollution and watershed improvement activities. In Oswego River, the interviewee was also not aware of private or non-governmental funding, and the funding that exists has been inadequate. He did mention that federal and state revolving loan funding is required for water infrastructure [(which could be used for purposes such as maintaining storm water infrastructure)] but significantly short in meeting the demand. Deer Lake is a unique case because monitoring and maintenance actions are the responsibility of a private company as identified by a court-approved consent Judgment. In the currently active AOCs, funding sources mentioned include the Great Lakes Guardian Fund (a program by the Province of Ontario to fund local projects that help protect and restore the Great Lakes (<https://www.ontario.ca/page/great-lakes-guardian-community-fund>)), the Great Lakes Sustainability fund (a program by ECCC that “provides technical and financial support to projects... that implement remedial actions to complete the clean-up and restoration in three key priority areas: fish and wildlife habitat rehabilitation and stewardship; contaminated sediment assessment and remediation; and innovative approaches to improve municipal wastewater effluent quality” (<https://www.ec.gc.ca/raps-pas/default.asp?lang=En&n=F328E319-1>)), and a local stewardship network and community foundation.

3.2 Community involvement and environmental stewardship

3.2.1 Evaluation of approaches to community involvement

Community environmental stewardship appears to be the largest determining factor in how successful environmental sustainability is at a delisted AOC, both during the delisting process and after it. For the purposes of this report, “community environmental stewardship” includes both to public participation in delisted AOC management activities as well as general activities that promote environmental sustainability (such as not littering, planting rain gardens, etc.). As demonstrated by the descriptions of community involvement at the different delisted and current AOCs, there is a wide range in the level of community involvement and environmental stewardship. It should be noted that community involvement is difficult to gauge in some of the delisted AOCs because the existing community organizations are at a state of transition due to recent AOC delisting (within the last 4 years).

The first category of continued environmental stewardship consists of communities in which environmental stewardship has thrived after delisting (or, in the case of current AOCs, is set up for success). In Severn Sound, an autonomous environmental association was created. The association involves the community in environmental activities, and encourages environmental stewardship through awards that are presented in an annual banquet every year. In River Raisin, though the AOC is not yet delisted, the PAC has reconstituted into the Commission on the Environment and Water Quality (COTE). This is an official city commission (in Monroe, MI), which will continue to steer environmental stewardship activities in the area. In White Lake, a deep sense of community pride was built during the delisting process. After delisting, the PAC reconstituted into the White Lake Environmental Network (WLEN); which is run entirely by volunteers. The WLEN is very active in engaging with more established environmental groups (such as the Muskegon Conservation District and Freshwater Future), and conducted a survey of community members to understand what their priorities are regarding environmental stewardship.

The next category consists of communities in which environmental stewardship is no longer the primary focus, but is still incorporated into other community development priorities. Presque Isle Bay is an example of a delisted AOC whose community is still relatively focused on environmental stewardship, but is expanding its focus on environmental stewardship beyond the original AOC boundaries, and is also incorporating this stewardship into development of the waterfront. Oswego River is similar to Presque Isle Bay. It should be noted that in Presque Isle Bay, the state department of environmental protection (PADEP), had been the leader in the remediation process, and they are now leading the effort to form a new community organization and expand its geographical focus beyond the former AOC boundaries. Collingwood Harbour was extremely difficult to gauge, as the responses to interview questions regarding community environmental stewardship varied widely. One interviewee described the community's stewardship as being ingrained into the community – that they remember well the remediation process and would be conscientious about activities that would threaten the environmental condition of the delisted AOC (Krantzberg, Interview, 2/2016). Another interviewee generally concurred with the first interviewee, stating that “the community attitude towards environmental stewardship has waned slightly, but the Nottawasaga Valley Conservation Authority (NVCA) and the Ministry of Natural Resources and Forestry (MNRF) strive to keep the public sector interested in environmental issues and opportunities to improve upon it” (Rich and Collis, Interview, 2/2016). A third interviewee for the same delisted AOC had a less optimistic view, stating that she struggled to involve community leaders in stewardship efforts about 5 years after delisting, and that she has struggled to keep the community's non-profit environmental organization going (Rich and Collis, Interview, 2/2016).

The third category consists of communities in which continued environmental stewardship is not appreciable before or after AOC delisting. Oswego River, Deer Lake and Wheatley Harbour are examples of communities that have not continued environmental stewardship activities in the former AOC. The community around Deer Lake was fairly involved with the AOC remediation process, but the former PAC chair moved out of state after the AOC was delisted; therefore the former PAC did not successfully evolve into a non-AOC community organization. The interviewee for the delisted Deer Lake AOC expressed interest in forming a post-delisting community group (Nault, Interview, 2/2016). Oswego River and Wheatley Harbour are examples of delisted AOCs where surrounding communities were minimally or not involved during the remediation process or after AOC delisting.

Finally, there are three current AOCs for which community involvement is in a state of transition. In Nipigon Bay, the PAC is trying to evolve into an ongoing environmental group, now that the RAP is concluding. The group has yet to put together a framework for Terms of Reference, and is in touch with an incorporated non-profit with its head office in Marquette, Michigan and is involved in monitoring, stream restoration, and related activities. Nipigon Bay is trying to partner with the incorporated non-profit organization, or become a chapter of the existing organization – if successful, the partnership could become binational. If community governance does not become incorporated, they could work with the Lakehead University Foundation. It is too early to tell exactly what the PAC is going to do (Bailey, Interview, 2/2016). In Jackfish Bay, The PAC has not met since the redesignation to AOC in Recovery. Once it resumes meetings, an approach similar to the one implemented in Nipigon Bay will be applied to Jackfish Bay. There has been no ongoing activity or ongoing public engagement. According to the Stage 2 Report for Jackfish Bay, the residents of Terrace Bay recommended that a cleanup not take place, for a number of practical reasons. Economic factors and the presence of a paper and pulp mill in one of the towns played a role which affected the attitudes of support and enthusiasm towards delisting. (Bailey, Interview, 2/2016) In Ashtabula River, the PAC has evolved over time with varying degrees of community involvement. The interviewee for Ashtabula River mentioned that he is not sure how much the community would still be interested in continued environmental stewardship with regard to the AOC, considering that there is not much left for the community to do and that they would need help writing grants. At some point, the local committee may need to meet as remaining BUIs are removed.

There are a number of local and regional organizations that assist delisted AOCs with both community environmental stewardship and monitoring and maintenance activities. A list of non-governmental organizations that are active in delisted AOCs is provided in Table 5:

Table 5: Local and Regional NGOs Supporting Delisted and Current AOCs

AOC	Non-Governmental Organizations
Collingwood Harbour	Environment Network of Collingwood
Collingwood Harbour	Blue Mountain Watershed Trust
Collingwood Harbour; Severn Sound	Nottawasaga Valley Conservation Authority
Severn Sound	Severn Sound Environmental Association
Wheatley Harbour	Essex Region Conservation Authority
Presque Isle Bay	Pennsylvania Sea Grant
Presque Isle Bay	Pennsylvania Lake Erie Environmental Forum (currently being formed)
Presque Isle Bay	Environment Erie
Presque Isle Bay	Erie County Conservation District
Presque Isle Bay	Pennsylvania Lake Erie Watershed Association
Presque Isle Bay	Regional Science Consortium at Presque Isle
White Lake	White Lake Environmental Network
White Lake	White Lake Sustainability Network
White Lake	White Lake Association
White Lake	Muskegon Conservation District
White Lake	Freshwater Future
White Lake	Bird Studies Canada
Jackfish Bay	Lakehead University Foundation
Nipigon Bay	Superior Watershed Partnership
Nipigon Bay	Red Rock Fish & Game Club
Nipigon Bay	Nipigon Historical Society
River Raisin	Ducks Unlimited
River Raisin	International Wildlife Refuge Alliance
River Raisin	River Raisin Watershed Council
River Raisin	Bolles Harbor Science Center
River Raisin	Monroe County Community Foundation

3.2.2 Delisted AOCs' relationships to Lakewide Action Management Plans

Delisted AOC community engagement with LAMPs was examined to give potential insight on whether AOC communities could use their experience to lead non-AOC communities within their LAMPs. It was found that AOC communities were not involved with the LAMPs for the following reasons: 1) the community did not have strong community environmental stewardship with regards to its delisted or current AOC; and/or 2) the governments are currently making changes to the Annex 2 process.

Existing regionwide regulatory structures have some impact on post-delisting site maintenance; however, generally interviewees responded that they did not think that regulations or legislation have played a significant role since delisting. In Presque Isle Bay, under NPDES and state water quality statutes and regulations, \$100 million was spent to eliminate combined sewer overflows to the Bay. Pennsylvania water quality standards are applied to Presque Isle Bay just as they are to any other waterway in the state; and PADEP will re-evaluate in 2018-2020 to make sure [all relevant] issues are examined in sufficient detail (Boughton and Bruno, Interview, 2/2016). In Oswego River, one particularly helpful regulation is the Ocean Great Lakes Ecosystem Conservation Act, which promotes ecosystem decision-making and is voluntary for municipalities. New York State's Regional Economic Development Initiative has also been helpful; it provides multiple regions around the state with funds for economic development, and it encourages the community to take advantage of the river as a public resource. Interviewees for the other AOCs investigated did not believe that existing regulatory structures played a role after delisting.

4 Conclusion

4.1 Summary

This study revealed that life after delisting is unique to each delisted AOC's community. It was found that most sites have a common approach to post-delisting monitoring and maintenance activities. At most delisted AOCs, monitoring and maintenance is achieved through applying a suite of existing government monitoring programs to the sites and tracking those results. Continued community environmental stewardship, both type and level, varied greatly among the delisted AOCs. Organized community environmental stewardship exists in the forms of official nonprofit organizations, watershed groups, and municipal organizations. In some cases environmental stewardship extends beyond the original AOC boundaries, in other cases environmental stewardship is incorporated into other community priorities such as economic development, and in other cases still community-wide efforts towards environmental stewardship wane (which does not necessarily mean that individual community members are not engaged in environmental stewardship). In the delisted and current AOCs explored in this project, it was found that existing regionwide regulatory structures have some impact on post-delisting site maintenance; however, most interviewees did not think that regulations or legislation have played a significant role since delisting. Alternative funding sources for activities in delisted AOCs varied greatly. Currently there is little, if any, activity connecting AOC communities to their LAMPs.

It was found that the major factor in determining the in how successful environmental sustainability is at a delisted AOC is community involvement that starts before the AOC is delisted. There appears to be a correlation between the amount of public participation in the remediation process and both the amount of public participation after delisting and the level of commitment to post-delisting monitoring. Community involvement can be the a significant factor in sustained monitoring and maintenance and in obtaining funding for environmental restoration and stewardship efforts, though in some communities the RAP team may be the largest driver for these activities instead. A high level of community involvement has the potential to carry over into the LAMP program; the mechanism of this transition should be explored further once the Canadian and U.S. governments solicit public input on the LAMPs.

Some communities that had a high level of environmental stewardship during their remediation processes experienced a change in priorities from environmental stewardship to economic development, and incorporated their stewardship into development. There are resources (Brookings Institution, 2007; GVSU, 2011; Avenue ISR, 2014) that discuss in more detail the connection from (AOC) cleanup and restoration to economic benefits, which may assist in ensuring that environmental stewardship is not lost in economic development. Finally, some communities never had a high level of environmental stewardship during the delisting process, and after the delisting process entrusted any required post-delisting monitoring and maintenance to government agencies; for some AOC communities this works well.

A major topic of concern not covered in this project is an in-depth assessment of the conditions of removed/redesignated BUIs. Through the interviews, it was discovered that the status of at least one delisted BUI in three AOCs were in dispute. When BUIs are removed/redesignated, it should mean that those beneficial uses should be fully restored for that waterbody, at least to the level of that beneficial use in the AOC's associated Great Lake. Once a BUI is removed/redesignated, and especially once an AOC is delisted, it is difficult for a community to find funding and expert resources to treat the source of the problem. A few interviewees did express that they did not feel that they had access to expert resources after delisting.

4.2 Recommendations

Several recommendations are made throughout this report and are summarized here:

- For a fixed period of time (suggested: 6 months – 1 year), RAP personnel, particularly government AOC staff and resources, should be available to the former AOC community to field any recurrence of removed/redesignated BUIs, and make it clear to the community that they are doing so. It would be helpful if the governments established a program to help with the transition from listed to delisted status.
- The governments should consider establishing ongoing monitoring efforts that operate on time intervals that are better suited to detect potential recurrence of removed BUIs.
- The PAC or RAP team should explore opportunities to partner with academic institutions once they are writing their final delisting report. It may also be useful to partner with academic institutions during the remediation process, as has been demonstrated at AOCs both considered and not considered by this study. In addition, local and regional non-profit governance programs are extremely helpful to communities because they can provide resources for ongoing monitoring programs and can usually support maintenance projects that arise.
- A high level of community involvement has the potential to carry over into the LAMP program; the mechanism of this transition should be explored further once the Canadian and U.S. governments solicit public input on the LAMPs. Government agencies at all levels should consider how to engage these communities, their knowledge, enthusiasm, resources, and how they can be involved in the LAMP.
- Due to the recurrence (or lack of firm resolution in the first place) of issues which cause BUIs at three AOCs to now be in dispute, the criteria to delist existing BUIs should be re-evaluated for robustness. Improved public engagement on BUI removal/redesignation is also needed. Related, the IJC should conduct or sponsor a study on to re-evaluate the criteria.

4.3 Closing remarks

Life after delisting for an AOC varies greatly, depending on both the environmental circumstances in and the character of the community around the AOC. The transition from AOC status to delisted status is smooth if the community stays committed to environmental stewardship and protection of their waterbody; and if the RAP team stays available to help the community if problems do arise. The delisting of an AOC does not mean that the impairments to beneficial uses are completely eliminated; it means that the level of impairment at the delisted AOC is no worse than the level of impairment of that beneficial use to the Great Lake to which the AOC is connected. However, the community of a delisted AOC has the unique opportunity to serve as an example of the relationship of environmental stewardship to restoration and economic development to other communities, and should consider using this opportunity to its advantage. Restoration of the Great Lakes goes beyond the borders of AOCs, and the concepts of coordinating concentrated efforts to restore water quality towards a fishable, swimmable, and drinkable condition can be applied to any waterbody. Government agencies at all levels should consider how to engage these communities their knowledge, enthusiasm, resources, and how they can be involved in the LAMP. RAP personnel should maintain their status as resources to delisted AOC communities, and make it clear to the communities that they are doing so. Moving forward, when AOCs are approaching delisting, governments and AOC communities should consider the issues discussed in this report.

APPENDIX 1: Findings

1. Physical monitoring and maintenance

a. Approaches to monitoring and maintenance in delisted and current AOCs

i. Collingwood Harbour, Ontario (delisted)

In Collingwood Harbour, much of the monitoring and maintenance was scheduled to be completed by the former RAP team and a combination of relevant provincial and federal programs. At the time of redesignation, the Stage 3 RAP report for Collingwood Harbour stated that continued monitoring would require commitments of funding and staff from several agencies. (Collingwood Harbour Action Team and Public Advisory Committee, 1994) Dr. Gail Krantzberg, formerly the Collingwood Harbour AOC RAP coordinator, now a professor at McMaster University, stated in an interview that the [Ontario] Ministry of the Environment and Climate Change (MOECC) has a Great Lakes Monitoring Program that is sufficient to the needs of Collingwood Harbour after delisting. Nottawasaga Valley Conservation Authority has also hired former RAP personnel to continue the effort to restore the health of the tributaries to the lake, and has implemented much of the engineering to do so (Krantzberg, Interview, 2/2016). A detailed summary of post-delisting monitoring and maintenance activities was provided by Jim Collis, currently of Collis Environmental Consulting and formerly of the Collingwood Harbour RAP:

- Water quality monitoring was to be conducted from 1992-1996 and every 5 years after 1996. Mr. Collis completed water monitoring up to 1996 for the Ontario Ministry of the Environment and Energy (OMOEE, now MOECC) and he assumes they have continued to do water quality monitoring every 5 years since. The only other water quality monitoring that he knows of takes place at the Collingwood sewage treatment plant (Rich and Collis, Interview, 2/2016). Follow-up with MOECC staff revealed that water quality monitoring has taken place at Collingwood Harbour in 2002, 2003, 2006, 2009 and 2015 as part of their index and reference monitoring program (MOECC, Email, 4/2016).

- Sediment surveys were completed by Mr. Collis in 1994-1995 and he is unaware of any monitoring that has taken place since, however, the Canadian Wildlife Service (CWS) may have done some monitoring since 1995 (Rich and Collis, Interview, 2/2016). Follow-up with MOECC revealed that sediment monitoring at Collingwood occurred in 2002, 2003 and 2009 (MOECC, 2016).
- Spottail Shiner and sport fish contaminant monitoring was completed by Mr. Collis in 1995-1996 and he does not know the status of this monitoring program since delisting occurred (Rich and Collis, Interview, 2/2016). Follow-up with MOECC staff revealed that sport fish from Collingwood Harbour have been collected and analyzed in 2004, 2011 and 2013 (MOECC, Email, 4/2016).
- Collection of baseline fisheries data was completed up to 1996 and if anyone has done any monitoring since it would be the Ministry of Natural Resources and Forestry (MNR). To his knowledge, [they] are still using Mr. Collis' baseline data from 1996 to make fish management decisions and in his opinion this needs to be updated since the Georgian Bay ecosystem has changed somewhat since 1996 (Rich and Collis, Interview, 2/2016). Project time constraints prevented the author from verifying this statement.
- Winter Creel Census was completed twice between 1994 and 1996; however, this was to be continued until 2000 and Mr. Collis does not know if this work was done. If it was, the Lake Huron Fisheries Assessment Unit would have taken it on so the status is unknown (Rich and Collis, Interview, 2/2016). Project time constraints prevented the author from verifying this statement.
- Electrofishing scheduled to take place from 1996 to 2000 is complete (Rich and Collis, Interview, 2/2016).
- Water temperature surveys scheduled to take place in 1994-1995 are complete.
- Fish sampling scheduled to take place in 1992-2000 may have been discontinued in 1996, according to Mr. Collis (Rich and Collis, Interview, 2/2016). Project time constraints prevented the author from verifying this statement.
- Amphibian and Breeding Bird Surveys are complete (Rich and Collis, Interview, 2/2016).
- The status of the contaminant analysis of bird eggs were unknown, but CWS may still have an ongoing program for this parameter (Rich and Collis, Interview, 2/2016). Follow-up with Environment Canada staff revealed that contaminant analysis of bird

eggs directly in the former Collingwood Harbour AOC no longer takes place (analysis ceased at the time of redesignation); but approximately 50 miles away on Chantry Island, there is a monitoring site for EC[CC]'s long-term herring gull monitoring program, which is monitored annually (ECCC, Phone Conversation, 4/2016).

ii. Severn Sound, Ontario (delisted)

In the Severn Sound RAP Stage 3 Report, post-delisting monitoring activities are outlined. The monitoring activities were mostly AOC-specific and are carried out by the Severn Sound Environmental Association (SSEA), which is an official non-profit organization with staff paid to conduct monitoring; though some activities were part of routine regional monitoring. Existing monitoring programs to cover some of the post-delisting monitoring in Severn Sound include:

- the Marsh Monitoring Program with MMP, Environment Canada, Long Point Bird Observatory and Bird Studies Canada
- osprey monitoring through the Georgian Bay Osprey Society; the Wye Marsh Reintroduction Program (Ontario provincial program); the Long-term [Canada Wildlife Service] Forest Bird Monitoring Program
- the Species at Risk program (Canadian federal program)

In addition, sewage plant sludge is monitored by municipal operators.

In some cases, the AOC-specific programs were modeled on existing regional programs. It appears from the Stage 3 Report that the wide variety of monitoring activities accounted for extensive continued tracking of the delisted BUIs. A more detailed description of ongoing monitoring activities is provided below.

- Severn Sound and Township of Tiny Beach Monitoring Program: “*The Severn Sound Environmental Association Beach Monitoring Program is a partnership between the Simcoe Muskoka District Health Unit (SMDHU), the Ontario Ministry of the Environment, the municipalities within the Severn Sound watershed, Parks Canada (Georgian Bay Islands National Park) and the SSEA. The purpose of the program is to provide regular monitoring of microbiological water quality at selected swimming areas within the watershed.*” (<http://www.severnsound.ca/programs-projects/monitoring/beaches>, 2/2016)
- Tributary Ecosystem Health Monitoring Program: “*The Tributary Ecosystem Health Monitoring Program (TEHMP) has been ongoing since 1996 and utilizes several standard biomonitoring protocols in the Severn Sound streams.*” (<http://www.severnsound.ca/programs-projects/monitoring/benthos>, 2/2016)
- Severn Sound Open Water Monitoring Program: “*In 1997, the Severn Sound Environmental Association (formerly the Severn Sound Remedial Action Plan) took over regular monitoring, which continues today. SSEA’s Open Water Monitoring Program monitors the open waters of Severn Sound for indicators of eutrophication.*” (<http://www.severnsound.ca/programs-projects/monitoring/open-water>, 2/2016)

- Provincial Groundwater Monitoring Network in the Severn Sound Area: *“Severn Sound Environmental Association (SSEA) has been participating in the Provincial Groundwater Monitoring Network (PGMN) for the past five years. The Ontario PGMN is a partnership between the OMOECC, 36 conservation authorities and 10 municipalities. The objective of the network is to collect and manage baseline groundwater level and quality information from key aquifers across Ontario. The PGMN program uses a standardized approach to monitor the 474 wells in the province wide system (February 2010.)”*
 (<http://www.severnsound.ca/programs-projects/monitoring/provincial-groundwater-quality-monitoring-network>, 2/2016)
- Severn Sound Stream Sampling: *“SSEA is an active partner in the Ontario Ministry of Environment and Climate Change, Provincial Water Quality Monitoring Network. Grab samples are collected from 12 strategically placed stream stations, eight times each year. The water samples are then sent to the MOE[CC] lab for analysis of several parameters including turbidity and concentrations of Total Phosphorus, Chlorides and Nitrates”*
 (<http://www.severnsound.ca/programs-projects/monitoring/tributary-water-quality>, 2/2016).

iii. Oswego River, New York (delisted)

A comprehensive post-delisting monitoring and maintenance plan was put in place for Oswego River as part of the Stage 3 RAP report. According to Don Zelazny of the New York State Department of Environmental Conservation, “The Stage 3 Remedial Action Plan (RAP) report included a plan for post-delisting monitoring that outlined what type of monitoring, by what agency and institutional program would attempt to conduct the proposed monitoring, as resources allowed. Most monitoring that has been done is based on re-assessing the state of the restored or deferred BUIs” (Zelazny, Interview, 2/2016). Mr. Zelazny continued to elaborate on the post-delisting activities related to the delisted BUIs:

“For Oswego River overall water quality conditions, water quality monitoring is done through the statewide Rotating Integrated Basin Studies (RIBS) program. This program is EPA-funded and delegated to the states.... In addition, USGS (United States Geological Survey) monitoring data is used to monitor water quality and pollutant loadings from major tributaries into Lake Ontario, including the Oswego and Niagara Rivers, per an interagency agreement between USGS and EPA” (Zelazny, Interview 2/2016).

“For fish and wildlife habitat BUI quality, monitoring is accomplished by a combination of specific and routine institutional programs by NYSDEC (New York State Department of Environmental Conservation), USFWS (United States Fish and Wildlife Service) and USGS. In addition, NYSDEC also considers anecdotal information collected by annual angler surveys.”

“Part of the monitoring activities are standard for the state. Some water quality and other specialized monitoring (such as that of habitat and population monitoring the eutrophication assessment) are done with GLRI (Great Lakes Restoration Initiative) money. Federal money has funded monitoring activities not funded by the state. The monitoring activities that currently take place are sufficient.” (Zelazny, Interview, 2/2016)

iv. Wheatley Harbour, Ontario (delisted)

No AOC-specific monitoring and maintenance activities are being implemented at Wheatley Harbour. According to the Wheatley Harbour Stage 3 Report, they were not needed:

“Rather, existing programs which routinely sample Wheatley Harbour for other purposes can be utilized. These include: (a) Ontario Sport Fish Contaminant Monitoring Program (Ontario Ministry of the Environment).... (b) Provincial Water Quality Monitoring Network (Ontario Ministry of the Environment).... (c) Small Craft Harbours Program (Department of Fisheries and Oceans Canada).” (WHIT, 2010)

The report adds that AOC-specific monitoring can be established later if it is deemed necessary. The Wheatley Harbour Stage 3 Report identified the federal and provincial leads as responsible for “coordinating the monitoring efforts among agencies and for ensuring these data continue to be collected and that they are provided to the RAP for review as they become available” (WHIT, 2010). The report goes on to say that the federal and provincial leads for the Wheatley Harbour RAP “will also ensure and coordinate the collation, interpretation, and communication of this information. Post-delisting monitoring information will be reported through: (1) Regular updates to the Canada-Ontario Agreement, (COA) Annex Implementation Committee; (2) Wheatley Harbour updates in future reports of the Lake Erie LaMP; and (3) Periodic newsletters to the local community.” (WHIT, 2010)

The Wheatley Harbour Stage 3 Report also addresses monitoring and maintenance of the delisted AOC with respect to the Lake Erie LaMP:

“Continued implementation of works to improve the quantity and quality of habitat in the Muddy Creek wetland area will be done under the auspices of the Lake Erie Lakewide Management Plan (LaMP). Upon delisting of the AOC, the Muddy Creek wetland and the associated watershed should become an area that continues to be improved as part of the LaMP goals of reducing nutrient inputs to Lake Erie and increasing natural areas cover in the Lake Erie Basin. The Muddy Creek wetland should be included in regional monitoring initiatives such as the regional wetland monitoring conducted by Environment Canada.” (WHIT, 2010)

Danielle Stuebing of the Essex Region Conservation Authority provided updated information about post-delisting monitoring and maintenance activities. According to Ms. Stuebing, not much has been done since delisting because there has not been much funding or public support. Government support stopped after delisting. The Essex Region Conservation Authority (ERCA) surface water quality monitoring program is part of a regular regional water quality monitoring program. The provincial water quality program provides support to ERCA to continue water quality monitoring. According to Ms. Stuebing, these monitoring activities are not at all sufficient, and ongoing support is absent (Stuebing, Interview, 2/2016). When asked if any BUIs have experienced backsliding, Ms. Stuebing responded that there is no way for anyone to know, because there is no protocol to investigate.

v. *Presque Isle Bay, Pennsylvania (delisted)*

Presque Isle Bay is an example of a delisted AOC with an extensive monitoring and expanded restoration plan. According to Lori Boughton of the Pennsylvania Department of Environmental Protection (PADEP) (and formerly of the Presque Isle Bay RAP team):

“beginning with the sediment work, the Department and PA Sea Grant developed a unique approach to studying and evaluating the 2 BUIs. Experts from federal agencies, universities, state agencies, and the private sector were convened to provide input and advice on the sampling events and interpretation of the results. Many participated in the actual sampling or conducted the analysis. The experts also met with the Public Advisory Committee to explain and answer questions. This collaboration made it possible for the Department to direct its sampling efforts more efficiently” (Boughton and Bruno, Interview, 2/2016).

More details can be found in the Presque Isle Bay Watershed Restoration, Protection and Monitoring Plan, specifically in Table 28 of the report which lists actions and the parties involved in implementing them. The main points are outlined in the Presque Isle Bay Area of Concern Final Stage 3 Remedial Action Plan: Delisting, and are summarized below:

- *“Future research, studies, and monitoring conducted in the bay will be reported through the Lakewide Management Plan [(LaMP)] for Lake Erie.”*

- *“Monitoring will continue in the bay’s watershed to document sediment and contaminant loading and the health of fish and macroinvertebrate populations. Activities related to the BUI monitoring will be reported through the Lake Erie... (LaMP).”*
- *“A citizens’ forum assists in the selection of priority and focus areas as well as outreach and education on the LaMP.”*
- *“PADEP will continue to report through the LaMP on the environmental status of the bay as well as efforts to restore, protect, and monitor the watershed. Should data trends indicate the delisting and ecosystem health targets are not being met, PADEP will use its existing statutory and regulatory authorities (e.g., Clean Air Act, Clean Water Act, Dam Safety and Encroachments Act, and Clean Streams Law) to ensure sources of pollution are addressed.” (PADEP, 2012)*
- *“... PADEP will continue to monitor water quality and fish tissue contaminants trends in Presque Isle Bay and in Pennsylvania’s open waters of Lake Erie through its Water Quality Network sampling program. Both Presque Isle Bay and Lake Erie are currently on the 303(d) list of impaired waters. The bay’s listing is a result of fish consumption advisories which are not related to either the restrictions on dredging activities or fish tumors or other deformities BUIs. Monitoring and advisories will continue under the PADEP and PFBC’s fish consumption advisory program.” (PADEP, 2012)*
- *“PADEP intends to turn the focus to non-AOC issues, emerging contaminants and supporting further research into the non-contaminant related factors playing a role in fish tumors. The post-delisting monitoring plan spans a ten year period and is considered a “living document” that will be periodically reviewed by the PADEP and PAC. Monitoring activities may be expanded, revised, or deleted over time. Specific activities and timeframes may be modified following consultation with the PAC due to resource constraints, advances in analytical methods, or new scientific research findings from other studies.” (PADEP, 2012)*

Lori Boughton presented details on monitoring and maintenance activities that have occurred since the delisting of Presque Isle Bay in 2012:

- *“The biggest improvement to the Bay resulted from a \$100 million upgrade to the City of Erie’s wastewater treatment, collection, and conveyance system. The improvements included moving the systems outfall from the Bay to the Lake, reducing the number of CSOs to 70, and improving the actual treatment process. These changes were agreed to in the late 1980s but the results were not seen until the late 1990s/early 2000s. It was determined that the sediment entering the Bay was cleaner than the historical sediments and [are] forming a clean cap on the >3,000 acre Bay. The Department along with the Public Advisory Committee decided to focus resources on the watershed to continue to reduce the amount of sediment and contaminants entering the Bay. Additionally, the rate of fish tumors continued to decrease. There were no big management actions; the natural cap was allowed to form. Fish were heavily sampled to measure a decrease (or lack thereof) in fish deformities. Sampling will take place every five years from 2008 – 2018.”* (Boughton and Bruno, Interview, 2/2016)
- Post-delisting monitoring of sediment related to the delisted Restriction on Dredging Activities BUI was completed in 2009 and 2015.
- The first post-delisting sampling on fish related to the Fish Tumor BUI was conducted in 2013. PADEP is still evaluating an extensive amount of data which includes emergent contaminants in the fish tissue, sediments and water column.
- *“While carrying out these monitoring efforts, much effort was focused on an integrated water resources management plan for the Bay’s watershed. The Watershed Management Plan includes a compilation of all known data on the physical, biological, and chemical state of the Bay’s tributaries as well as land use, impervious cover, and state permits. It prioritizes subwatersheds for restoration, protection, and monitoring. The plan is web-based with interactive maps and provides a road map for future work. The RAP team identified what is entering the bay and what needs to be done to continue to improve its condition. The plan is extensive.”* (Boughton and Bruno, Interview, 2/2016)

- *“At the same time that input to the bay from its tributaries the connecting creek was analyzed as part of the watershed plan, GLRI funds became available to address one of the main tributaries and Cascade Creek. All sampling work was funded by the EPA, GLRI, or the Coastal Management Program. The state provides modeling, staff and on-the-ground work.”* (Boughton and Bruno, Interview, 2/2016)

vi. White Lake, Michigan (delisted)

Post-delisting activities at White Lake are carried out by a combination of local and state government organizations and agencies, area residents and private companies. Activities planned at the time of delisting (October 2014) are summarized below:

- Avian and amphibian population monitoring scheduled for 2014-2016 has been conducted by the Muskegon Conservation District in consultation with Bird Studies Canada; and with the support of the Michigan Department of Environmental Quality (MDEQ) and the United States Environmental Protection Agency (U.S. EPA).
- White Lake Association members voluntarily monitor water quality parameters following protocols established through the Michigan Clean Water Corps (MICorps). “This includes tracking changes in the lake’s nutrient concentrations and trophic status, assessing the lake’s macrophyte community (including native and nuisance exotic species) and maintaining vigilance for potential introductions of invasive plant and animal species (including cyanobacteria)” (MDEQ, 2014b).
- *“The MDEQ’s Resource Conservation and Recovery Act (RCRA) program remains committed to active engagement in the ongoing remediation of the DuPont property [a former chemical plant that discharged chlorinated organic chemicals onto their site, which then discharged into White Lake via groundwater and surface water].... The RCRA program operates within a regulatory framework, where both the MDEQ and DuPont have legal obligations to assess and clean up the property.”* (MDEQ, 2014b)
- At the time of delisting, the City of Montague was working with the MDEQ to adopt an ordinance restricting domestic use of groundwater in a contaminated area near the delisted White Lake AOC. Occidental Chemical and DuPont continuously operate pump-and-treat systems that prevent contaminated groundwater from reaching White Lake.

Tanya Cabala of the White Lake Environmental Network provided a few additions to the above list:

- Achievements of the targets for the Fish and Wildlife Habitat and Populations BUIs are monitored through the Great Lakes Marsh Monitoring Program.
- There is an investigation to characterize remaining groundwater and soil sources, conduct any final remedial activities, and develop a consent agreement to encapsulate final closure activities and monitoring at the DuPont/Chemours site. State and federal agencies have provided funding for research and writing of a briefing paper on several contaminated sites, their remedial status, monitoring, and any remaining actions necessary to ensure that private and/or public drinking water sources (groundwater) were not impacted nor threatened in the runup to delisting. DuPont/Chemours has been and will continue to be asked to test a number of private drinking water wells in the vicinity of their site (Cabala, Interview, 2/2016).

vii. Deer Lake, Michigan (delisted)

Monitoring and maintenance activities at Deer Lake are implemented through a combination of an Amended Consent Judgment which holds Cliffs Natural Resources (CNR) responsible for many post-delisting activities and non-AOC-specific state programs. The activities are listed below from the Deer Lake Final Delisting Report:

AOC-Specific Programs:

- CNR will maintain the dam at a height to prohibit methylation of mercury (ACJ, 2006).
- CNR will maintain signage around the lake informing anglers of the mercury in the fish.
- CNR will monitor fish, water, and sediment at Deer Lake until 2034 and provide those results to the MDEQ
- CNR will monitor the mercury concentrations of Partridge Creek to ensure the newly constructed diversion is functioning properly.
- The MDEQ, as part of the Fish Contaminant Monitoring Program, will continue to collect fish from Deer Lake for mercury testing.

- Sediment samples will be collected by the U.S. EPA in 2014 to confirm depth of sediment cover and mercury levels.
- The USFWS will continue to monitor bald eagle nesting activities at Deer Lake.

Non-AOC-Specific Programs:

- The MDEQ's National Pollutant Discharge Elimination System (NPDES) permits program has responsibilities for point source dischargers to Carp Creek and the Carp River.
- MDNR's fisheries management program routinely conducts population surveys in Deer Lake and Carp Creek to determine health of the fishery.
- MDNR has held several public meetings to incorporate comments from the public and local stakeholders as to future management of the Deer Lake fishery.
- The State of Michigan's multi-departmental Aquatic Invasive Species Program (AIS) will continue to implement the State AIS Management Plan and work with local partners to prevent, monitor and control AIS in waters of the state.
- MDEQ Water Resources Division (WRD) conducts basin cycle monitoring in inland lakes and streams throughout the state – these efforts will track the health of Deer Lake, Carp Creek and the Carp River. The next survey will take place in 2015.
- WRD works with various partners on non-point sources, wetlands, inland lakes/streams, and watersheds. Michigan Coastal Zone Management Program supports sustainable and resilient coastal development and protection of sensitive ecological and cultural resources within the coastal zone (MDEQ, 2014a).

Peter Nault, formerly of the Deer Lake PAC, provided more details about monitoring and maintenance activities:

The DNR conducts fish surveys in all lakes in Michigan. The last fish survey was conducted in 2015, and Mr. Nault was not sure of the status of the results. According to Mr. Nault, the EPA recently conducted a sediment survey of the area – Mr. Nault thinks this took place last year (2015). Follow-up with the MDEQ revealed that sediment sampling was conducted by Cliffs Natural Resources (per the Amended Consent Judgement which holds Cliffs Natural Resources

responsible for fish, water and sediment monitoring until 2034 (MDEQ, 2014a; Casey, Phone Conversation, 5/2016). The sediment sampling is specific to Deer Lake, but the fish sampling is a routine DNR activity. Mr. Nault feels that the monitoring/maintenance activities that take place at Deer Lake are sufficient.

viii. Jackfish Bay, Ontario (in recovery)

According to Jim Bailey of Lakehead University and the Jackfish Bay RAP team,

“A suite of activities is scheduled for Jackfish Bay. In this situation, a 14 km stretch of Blackbird Creek (which flows into Jackfish Bay and is part of the AOC in Recovery) had been contaminated, so a suite of activities was put in place to demonstrate recovery (or lack thereof) of the creek and bay. Monitoring activities include fish and benthics [and other physical properties]. Recovery is very slow and gradual. Funding is provided by various agencies. Monitoring was carried out prior to Jackfish Bay being redesignated to an “Area of Concern in Recovery” and is still being carried out, subsequent to this redesignation.” (Bailey, Interview, 2/2016)

“The role of Lakehead University was significant in the case of Jackfish Bay. The university wrote the recovery report, which examined ecosystem issues and stated that the creek and bay were on the road to a very gradual recovery. The university has stayed involved at this site.” (Bailey, Interview, 2/2016)

Some environmental monitoring data is being collected. It is still too early to say if any BUIs are recurring. The recovery outlined in the Lakehead University report is not robust, and remains to be seen – so far monitoring shows a weak recovery – but all issues have been addressed. The conclusion stated in the report is “recovery is beginning”. It is unclear when the results of monitoring will be presented.” (Bailey, Interview, 2/2016)

ix. Nipigon Bay, Ontario (near-term)

According to Jim Bailey, RAP coordinator for the Nipigon Bay Area of Concern:

“Nipigon Bay is not yet delisted, but talk of monitoring came up over the past few years as the community realized delisting was approaching. The RAP team (Ontario Ministry of Natural Resources and Forestry (MNR), Ontario Ministry of the Environment and Climate Change (OMOECC), and Environment and Climate Change Canada (ECCC)) identified a suite of monitoring activities, and then the MOECC wrote a draft which was circulated to the PAC, agencies and Lakehead University. A wide variety of parameters was covered in the suite, including sediment and benthics. The monitoring activities would normally take place independently of the delisting. The RAP team pulled them into place and laid them out in a chart for the public. Activities include: nearshore community index fish netting; Coaster Brook, Lake Sturgeon and Walleye monitoring; sediment management; and routine Cooperative Science and Monitoring Initiative (CSMI) activities. The document identifies a wide range of activities identified, and there were no gaps in monitoring coverage. The plan was presented to the public for review and comment.” (Bailey, Interview, 2/2016)

“The role of Lakehead University has been important, positive and meaningful. The university had substantial input into the monitoring plan for Nipigon Bay and carried out an open public review process. EC[CC] wrote the completion report for Nipigon Bay.” (Bailey, Interview, 2/2016)

x. River Raisin, Michigan (near-term)

Monitoring on the sediment and on bird deformities (cross beaks) will be conducted for 5 years. The DNR constantly monitors the wetlands for invasive species. The MDEQ conducts water quality monitoring every 5 years. The USACE, USFWS, NPS [National Park Service], EPA and NOAA [National Oceanic and Atmospheric Administration] all conduct regular monitoring activities within the AOC (Micka, Interview, 2/2016).

Land Information Access Association (LIAA) created a post-delisting monitoring plan and set up the Resilient Monroe project (liaa.org, resilientmonroe.org). The Resilient Monroe Project is a land-use planning and community design project which includes proposed action items related to the River Raisin AOC. This program is sponsored by the City of Monroe, Frenchtown Charter Township, and Monroe Charter Township. The River Raisin AOC is part of the NOAA Michigan Coastal Community Working Waterfronts program. The River Raisin is also part of the Lake Erie LAMP. Because the River Raisin AOC is part of the International Wildlife Refuge and the Canadian Priority Natural Area, the delisted BUIs are well-monitored and have not recurred (Micka, Interview, 2/2016).

xi. Ashtabula River, Ohio (near-term)

The United States Army Corps of Engineers (USACE) is monitoring river depths. The Ohio Environmental Protection Agency (OEPA) and U.S. EPA are continuing their efforts to remove the three remaining BUIs. During 2016 the OEPA plans to sample for benthos, and conduct sampling for fish tumors, and the USEPA is expected to provide sediment analysis to address the restriction on dredging. During the summer of 2016, the USFWS will be involved in sampling regarding fish tumors. Mr. Leitert was not sure what monitoring and maintenance will be like post-delisting, especially with regards to sediments (Leitert, Interivew, 2/2016).

With the restriction on open-lake disposal of contaminated sediments, the Restrictions on Dredging Activities BUI is being “debated”. The Ashtabula City Port Authority, Ashtabula City Manager, OEPA, Ohio Department of Natural Resources (ODNR) and USACE are having on-going meetings to identify, evaluate, and, ultimately implement beneficial uses of dredged sediments from the Ashtabula River and outer-harbor (Leitert, Interivew, 2/2016).

2. Influence of regulations and funding post-delisting

a. *Collingwood Harbour, Ontario (delisted)*

According to Dr. Krantzberg, regulations [to guarantee the improved state of the redesignated Collingwood Harbour AOC site], both during and after the delisting process, were not necessary. The information was accepted by the town as necessary. The RAP did have dedicated funding in the early 1990s. Post-delisting, the town of Collingwood had to look harder to find funding – one source that could be used is the Great Lakes Guardian Fund of Ontario (a provincial fund set up to assist communities with actions to protect and restore their area of the Great Lakes) (Krantzberg, Interview, 2/2016). This history was generally supported by Ms. Rich, who stated that after Collingwood Harbour was delisted, all technicians and scientists left. She stated that Environment Network was run successfully immediately after delisting, but funding to EN stopped within a year after delisting due to a change in government. EN had to find significantly alternative funding. In order to receive funding from the government, Ms. Rich applied for a grant to hire at-risk youth to implement environmental work through make-work and training programs (Rich and Collis, Interview, 2/2016). Mr. Collis, however, cited that the NVCA has adopted new shoreline management strategies and changed some of its policies accordingly since the Collingwood Harbour AOC was delisted. He also mentioned that the MNRF has adopted new policies recently to further protect fish habitat. He went on to explain that there are a few funding programs available to the public through the NVCA and MNRF Lake Simcoe and Southern Georgian Bay Stewardship Program. Both agencies are continuing with public awareness campaigns/ education and can provide funding opportunities to interested parties. The main funding source seems to be for naturalizing shorelines and river banks through bioengineering, riparian plantings, habitat creation and natural shore protection.

Funding to continue monitoring was difficult to obtain, so monitoring programs were gradually reduced or became the responsibility of other agencies. The status of monitoring is unknown for many of the projects and there is no clear record of who assumed responsibility of monitoring programs after funding sources became unavailable to Collingwood Harbour RAP (Rich and Collis, Interview, 2/2016).

b. Severn Sound, Ontario (delisted)

The author was not able to conduct an interview with a representative for Severn Sound, thus does not have insight on any particular regulations or funding mechanisms that have been helpful to keep the SSEA going. Annual financial statements made on the SSEA website show that funding for the association comes from various sources, including: federal grants, municipal grants, provincial grants, community and private donations, projects and recoveries, funding from Conservation Authority, and interest earned. The largest funding source from 2010 – 2014 appears to be municipal grants, followed by the Lake Simcoe Region Conservation Authority.

c. White Lake, Michigan (delisted)

Tanya Cabala of the White Lake Environmental Network (WLEN) does not believe that regulations or legislation have played any roles post-delisting, and that more is needed:

“The State of Michigan does not have a program to properly address nearshore sewage issues. WLEN is currently applying for a Freshwater Future Great Lakes – Healing Our Water grant for the Muskegon Conservation District to prepare for obtaining federal restoration funds to remove nutrients from upstream celery farms recently acquired and restore them back into wetlands. [WLEN] is also applying for a Freshwater Future grant to educate the public on septic maintenance.” (Cabala, Interview, 2/2016)

MICorps provides funds and training for citizens to do water quality monitoring. Both WLEN and the local sustainability network group set up by Ms. Cabala and the White Lake Area Chamber of Commerce are run entirely by volunteers. Ms. Cabala stated that existing state and federal programs are not sufficient –she was not sure that they are in-depth enough, and feels that they are not robust. She noted a gap in regulating chemicals of emerging concern, and added that she is unsure if there is a sediment quality monitoring program that WLEN can tap into for future White Lake monitoring. Ms. Cabala stated that there needs to be a clearer connection to specific resources after delisting; by and large, when the AOC program is over, funding and support are gone unless there is an NGO or other infrastructure to continue environmental programming.

d. Presque Isle Bay, Pennsylvania (delisted)

According to Mr. Bruno of the Pennsylvania Department of Environmental Protection, there were never specific regulations for the AOC:

“The largest and most substantial impacts occurred under the National Pollution Discharge Elimination System (NPDES) and the [Clean Water Act]. Under NPDES and state water quality statutes and regulations, \$100 million was spent to eliminate combined sewer overflows to the Bay. PA water quality standards are applied to PIB just as they are to any other waterway in the state. PADEP will re-evaluate in 2018-2020 to make sure issues are examined in sufficient detail.” (Boughton and Bruno, Interview, 2/2016)

“Both federal Great Lakes Restoration Initiative (GLRI) and traditional state funding was used for projects in Presque Isle Bay. New challenges to PIB are urban stormwater influences. More monitoring is scheduled in 2018-2020. PADEP’s Growing Greener program provides protection and restoration grants to reduce sources of non-point source pollution and watershed improvement activities.” (Boughton and Bruno, Interview, 2/2016)

Mr. Bruno is not aware of non-governmental funding sources, but he did mention several organizations that are involved with restoration activities in Presque Isle Bay: Environment Erie (501c3), PA Lake Erie Watershed Association (PLEW), Penn State, PA Sea Grant, Gannon University, and Mercyhurst University.

e. Oswego River, New York (delisted)

According to Donald Zelazny, Great Lakes Program Coordinator of the New York State Department of Environmental Conservation:

“Regulations and legislation have helped to promote lake, river and watershed restoration and improvement in the ecological management of the whole community. One particularly helpful regulation is the Ocean Great Lakes Ecosystem Conservation Act. It

promotes ecosystem decision making and is voluntary for municipalities. There is little incentive to invoke it, however, because there are nominal funds available through a small grants program to support place-based or landscape-level efforts. A helpful piece of legislation is New York State's Regional Economic Development Initiative. It provides multiple regions around the state with funds for economic development, and it encourages the community to take advantage of the river as a public resource.” (Zelazny, Interview, 2/2016)

According to Mr. Zelazny, there have been no additional regulations or AOC-specific needs for them.

“None of the actions that were taken to restore Oswego River were federally-funded. The federal government only funded the scientific studies and the AOC coordinator. The federal and state Superfund programs funded the new hazardous waste site remediation. Federal and State RCRA's manage operating hazardous and solid waste management facilities; the State Pollutant Discharge and Elimination System [under New York State's Environmental Conservation Law] permit allowable amounts of waste effluent. The state funded local waterfront redevelopment revitalization effort offers planning assistance for sustainable, climate smart waterfront development. The state revolving fund provides low-interest loans for water infrastructure upgrades, green infrastructure and funds Low Impact Development.” (Zelazny, Interview, 2/2016)

According to Mr. Zelazny, there has not been private or non-governmental funding directly to restoration projects of which he is aware but there has been private investment of properties along the waterfront. There has been no private or non-governmental funding of which he is aware. There also has not been enough funding to address water infrastructure needs both within the former Oswego River AOC and in other watersheds in the state of New York.

f. Deer Lake, Michigan (delisted)

Mr. Nault does not know of any regulations that have anything to do with the AOC since delisting. One item to note is the Amended Consent Judgment on Cleveland Cliffs, which had a laboratory that discharged mercury into Deer Lake. The Amended Consent Judgment requires/required Cliffs Natural Resources to do the following:

- Maintain the water level in Deer Lake
- Establish a dam maintenance account
- Establish a restoration account
- Divert Partridge Creek
- Work with the State of Michigan to monitor fish
- Deed a lot of land to Ishpeming Township to develop a land conservancy.

The original Consent Judgment was created in 1984 and was amended in 2007.

g. Wheatley Harbour, Ontario (delisted)

Ms. Stuebing, in her interview, said that to her knowledge, regulations or legislation have not played a role since delisting. She did not think there has been any regulation pertaining to the Wheatley Harbour AOC since delisting, and this was confirmed by Mr. Child. There has been no funding for ongoing activities. The Great Lakes Guardian Fund is used for new projects, rather than maintenance, so Ms. Stuebing was not aware of any funding sources supporting Wheatley Harbour.

h. Jackfish Bay (in recovery)

When the RAP is closed, regulators do not cease action. Regulations will continue to be enforced; for example: a paper and pulp mill in Terrace Bay was fined in October 2015 for discharging contaminated effluent into the creek by the MOECC (Bailey, Interview, 2/2016).

There are alternative funds that are BUI related, but not RAP related. Other funds consider lakewide concerns, but they may be more limited or more difficult to secure – they may address lakewide concerns, or they may have nothing to do with the Great Lakes. Examples of funding sources, from all sources, not just alternative ones, include: Ontario Ministry of Environment and Climate Change (MOECC), Ontario Ministry of Natural Resources and Forestry (MNR), Environment and Climate Change Canada (ECCC), Great Lakes Guardian Fund (not BUI specific), and the Great Lakes Sustainability Fund (BUI-specific). MOECC and ECCC fund coordination, research and studies to determine the status of BUIs. MNR funds and implements monitoring to determine the status of BUIs which fall under their mandate, such as issues regarding fish, fisheries and wildlife. Specific funds, such as the Guardian Fund and the Sustainability Fund, are used for individual projects such as the construction of secondary wastewater treatment (Bailey, Email, 4/2016; Bailey, Interview, 2/2016).

i. Nipigon Bay, Ontario (near-term)

A concern raised by the Red Rock [City] Council – once recovery is complete, provincial and federal government involvement will stop, and if so, what does the community do if an environmental liability is found on the site (such as contamination at the former paper mill). The MOECC explained that regulations within the province still apply, and that MOECC staff will address any issues that arise; As with Jackfish Bay, there are alternative funds that are BUI related, but not RAP related (Bailey, Interview, 2/2016).

j. River Raisin, Michigan (near-term)

Because the River Raisin AOC is still listed, it is unclear what the role of regulations or legislation will play. Richard Micka cited several regulations that have helped throughout the delisting process to date, including the Great Lakes Legacy Act, the Superfund program, the Clean Michigan Initiative, RCRA, CWA, NEPA, MEPA, the Water Resources Development Act, and the Coastal Zone Management Program through MDEQ OGL. Alternative government funding programs supporting cleanup, maintenance or prevention activities in the former AOC include the Michigan Natural Resources Trust Fund and grants from NOAA, Sea Grant, and

local and state government agencies. Other funding sources include the Stewardship Network, the Monroe County Community Foundation, the USDA Farmer's Advisory Committee and the Soil Conservation Service (Micka, Interview, 2/2016).

k. Ashtabula River, Ohio (near-term)

According to Fred Leitert of the Ashtabula City Port Authority, for the BUIs that have been delisted to date, further regulatory controls are not needed. Many existing federal programs or agencies have supported cleanup, maintenance or prevention activities in the Ashtabula River AOC, including the GLLA, GLRI, CWA and USFWS (Leitert, Interview, 2/2016).

3. PAC/community involvement and continuing stewardship

a. Key approaches that have worked in delisted AOCs

From this investigation, it can be concluded that there are two key factors in maintaining a high level of environmental stewardship in the community of a delisted AOC: one is a high level of community involvement during the delisting process, and the other is establishment of an official community organization around the delisted AOC, whether this organization is a highly functional informal group of citizens or an officially-recognized non-profit. These factors increase the likelihood of stewardship but do not guarantee it.

i. Communities in which environmental stewardship thrived post-delisting

Successful stewardship during the delisting process tends to be associated with continuing stewardship after delisting. Dr. Gail Krantzberg, the former RAP coordinator for the delisted Collingwood Harbour AOC, mentioned that the most effective way to involve the community in the delisting process from the beginning is to charge them with deciding what the restoration goals are for the AOC. Speaking about Collingwood Harbour she said, “The PAC developed its goals for delisting – they decided whether or not to do something, and in what way. The RAP team provided the PAC with options but enabled the community to be decision makers” (Krantzberg, Interview, 2/2016). This method enables the community to take some ownership over the delisting process. Ideally this environmental stewardship continues after the delisting process.

The communities of the former Severn Sound and White Lake AOCs have maintained a high level of environmental stewardship since their AOCs were delisted. The approaches to and circumstances around stewardship in each of these two communities are significantly different from each other, but both communities are extremely engaged in activities related to maintaining the environment.

Severn Sound (delisted)

In the community of the delisted Severn Sound AOC, an officially recognized non-profit organization exists to support monitoring and maintenance of the former BUIs and community environmental stewardship activities. According to its website:

“The Severn Sound Environmental Association (SSEA) is a Joint Service Board under the Municipal Act (Section 202). It was originally founded in 1997 as a partnership between federal, provincial and municipal partners to support the completion of the Severn Sound Remedial Action Plan (SSRAP) and to provide a local, community-based environmental office in the Severn Sound watershed. The SSEA provides continuing support to the federal and provincial agencies, but particularly to the local municipalities, to sustain environmental quality and to ensure continued protection through wise stewardship of Severn Sound and its tributaries. Our agreement partners include: nine municipalities (Midland, Penetanguishene, Tiny, Tay, Springwater, Oro-Medonte, Georgian Bay, Severn, and Orillia). We also work with many other partners to develop cost effective environmental projects in the Severn Sound area to the benefit of the entire community.”
(<http://www.severnsound.ca/about>, 2/2016)

The author was not able to interview anyone from the delisted Severn Sound AOC; however, the SSEA website provided an abundance of information. According to the website, in general, the SSEA’s activities include the following:

- “Completion of the Severn Sound Remedial Action Plan and participating in ongoing water resource management plans
- Habitat Assessment and Management Plans
- Sustainability Plan for Severn Sound
- Source Water Protection including groundwater and surface water
- Rural programs to promote the implementation of Best Management Practices
- Plan Input and Review
- Public consultation and education
- Monitoring, analysis and reporting (Open water, Streams, Beaches, Groundwater, Benthos, Fish, Habitat)”

Since at least 2010, the SSEA has held regular meetings 4-5 times per year during which they discuss association activities and finances, and since at least 2011 SSEA has produced an annual report which highlights activities related to monitoring and maintenance of delisted BUIs and community stewardship activities. SSEA also holds an annual partners reception attended by residents, volunteers, local mayors and councilors, and SSEA staff. (SSEA, 2014). The fact that this information is readily available on the SSEA website shows a high level of transparency in the community, which at least implies a general sense of inclusion of the community to the SSEA's activities, and therefore a willingness to engage with the community as much as possible. At the organization's annual reception, awards are given by SSEA to members of the community for environmental stewardship. SSEA also runs an annual tree planting program and participates in a wide range of educational and engagement activities, ranging from community activities such as water festivals to professional conferences run by organizations such as the International Association for Great Lakes Research.

In addition to activities that revolve around the delisted Severn Sound AOC, in 2009, SSEA created the Severn Sound Sustainability Plan. This plan outlines goals under three "pillars": environmental sustainability, community well-being, and economic prosperity. Each pillar contains a set of goals, and each set of goals has a set of strategies. The vision behind the plan is stated as: "By 2050, the Severn Sound Watershed will contain a network of communities that have achieved a sustainable quality of life for all citizens by developing a common culture of environmental, economic and social balance." The existence of the Severn Sound Sustainability Plan shows that the community has expanded its focus beyond environmental stewardship, yet kept environmental stewardship a major priority for the community

White Lake (delisted)

The community around the delisted White Lake AOC also displays a high level of environmental stewardship. The community was deeply involved with the delisting process of the White Lake AOC. According to the Final Delisting Report for the White Lake AOC:

The White Lake PAC has a long history of involvement with the AOC program, dating back to before the development of the original 1987 RAP. A number of individuals

remain involved to this day, having spent nearly 30 years advocating for improved environmental quality in their communities. The White Lake PAC has diligently and successfully tried to include a diversity of stakeholder involvement in its membership ranks. PAC members are or have been: concerned citizens, local business owners, riparian property owners, local government officials, environmental advocates, retirees, farmers, and industry representatives, among others. (MDEQ, 2014b)

The White Lake PAC ultimately drove the effort to get the White Lake AOC delisted. According to the Final Delisting Report, “The White Lake PAC took an active role in developing local restoration criteria for seven of the eight BUIs associated with the White Lake AOC.” (MDEQ, 2014b) A public meeting was held to lead the removal process for each of the 8 BUIs in White Lake. When the White Lake AOC was ready to be delisted, the PAC hosted a public meeting attended by 40 people to explain the final delisting report, review progress made to date in the AOC and explain the delisting process (MDEQ, 2014b). In October 2014, the White Lake AOC was delisted. Tanya Cabala, formerly of the White Lake PAC and now of the White Lake Environmental Network (WLEN), observed that “...the majority of people are happy with the state of White Lake and take great pride in the restoration effort” (Cabala, Interview, 2/2016). According to Ms. Cabala,

The community has been able to keep environmental stewardship a priority since delisting – people in the community really felt like they were a part of the delisting process, so that engagement has carried over. Environmental stewardship will be the biggest piece of the reorganized group.... The last PAC support grant had a strategic planning element. As a result, the White Lake PAC reorganized into the White Lake Environmental Network, which started meeting in May 2015.... The group is finalizing its goals, objectives and tasks at this time.... A core group of original PAC members make up the new group, which has expanded to include all but one local governmental unit surrounding the lake, and the area’s largest industries..... WLEN has an executive committee made up of several former PAC members, the City of Whitehall city manager, and Chassix, a local industry. The Muskegon Conservation District has continued its involvement.... Some members of the reorganized group have chipped in small amounts of money when needed.... [In addition to the White Lake Environmental Network], there

is also a White Lake Area Sustainability Network sponsored by the White Lake Area Chamber of Commerce that is focusing on recycling/waste reduction and overall community sustainability (Cabala, Interview, 2/2016).

Within less than one year of its establishment, the WLEN has already been quite active.

According to Ms. Cabala,

The PAC has come up with a strategic plan and reorganized into the White Lake environmental Network. The plan states the vision, mission, goals and objectives for White Lake, 3-5 year outcomes, and includes an environmental quality goal, an environmental stewardship goal, and an economic goal.... [The WLEN] has already sponsored a workshop on the City of Whitehall's Green Street project and shoreline management methods, and hosted a public update meeting with [Michigan Department of Environmental Quality] and DuPont/Chemours on its site investigation [regarding groundwater contamination].... The WLEN is also applying for funding [from Freshwater Future] for the Muskegon Conservation District to turn celery fields above the lake back into wetlands. The city of Whitehall owns the property as part of a collaboration with the Muskegon Conservation District. The West Michigan Environmental Action Council will be a 501c3 sponsor for the Freshwater Future Grant. WLEN is also applying for [Freshwater Future] funds for a septic education project.” (Cabala, Interview, 2/2016)

The environmental stewardship displayed in the delisted White Lake AOC is an example of high community involvement during and after the delisting process. During the delisting process, the PAC took an active role in developing restoration criteria for seven of their eight BUIs, and involved a diverse set of stakeholders over a long period of time. This momentum carried over into life after delisting, which has so far seen the organization of the White Lake Environmental Network and its many environmental stewardship activities including the creation of the White Lake Strategic Plan; as well as the organization of the White Lake Sustainability Network. According to Ms. Cabala, “the biggest success is that the WLEN is still operating as all volunteers. It is still very active, making progress, and has a strategic plan. We are also receiving an award for “The White Lake Delisting Project” from the Michigan Hall of Fame in April” (Cabala, Interview, 2/2016).

ii. Communities in which the focus has shifted from environmental stewardship to other priorities

Presque Isle Bay and Collingwood Harbour are examples of delisted AOCs where the environmental stewardship was at a high level during the delisting process, but public involvement is now in flux or has changed direction. This is not to say that environmental stewardship no longer exists in these communities, but that the communities' priorities may have shifted to economic development around the former AOC or an expanded area.

Presque Isle Bay (delisted)

Presque Isle Bay is an example of an AOC that had a very high level of community involvement during the delisting process, and whose involvement is now in a state of transition. Out of the original 43 AOCs, Presque Isle is the only one placed into the program by public petition. Erie's citizens took the initiative to form the Erie County Environmental Coalition in 1983, which along with the Erie Harbor Improvement Council, petitioned for the inclusion of the bay on the AOC list (PADEP, 2012). The community went through the list of BUIs identified in the 1987 Amendment to the Great Lakes Water Quality Agreement and identified two of them (Fish Tumors or Other Deformities and Restrictions on Dredging Activities) (Boughton and Bruno, Interview, 2/2016). "Over the next twenty years, the PAC met quarterly providing advice to the Pennsylvania Department of Environmental Protection (PADEP) on priorities, studies, delisting targets, and other matters impacting the AOC." (PADEP, 2012) According to Tim Bruno of the Pennsylvania Department of Environmental Protection (PADEP), the Presque Isle Bay PAC (PIBPAC) never had funding; it was a volunteer organization convened by PADEP and run by a slate of officers. (Boughton and Bruno, Interview, 2/2016) The PAC was composed of a variety of citizens, including industry representatives, retirees, the Mayor of the City of Erie, PA, Erie Waterworks, staff from local legislators, academics, other state agencies, local agencies and non-profit organizations. (Boughton, Phone Conversation, 4/2016) The PAC conducted a variety of activities including creating an education brochure in 1991, reviewing the 1993 RAP and the 1995 RAP update, participating in public information meetings hosted by PADEP, serving as a peer review panel for the scientific studies conducted on the Bay's sediment and fish populations, and numerous education and outreach programs. (PADEP, 2012)

According to Mr. Bruno, "the community engagement is currently transforming from focus on the bay to nutrients, urban sprawl and stormwater management." (Boughton and Bruno, Interview, 2/2016) "Everyone is still focused on environmental stewardship, though now the focus is more on the tributaries, nearshore and open lake, rather than just the bay." (Boughton and Bruno, Interview, 2/2016) "The PIBPAC continued to meet up until the summer of 2015, but has not met since. This has happened because for a long time, the effort was focused on the watershed; but now PADEP is working with Pennsylvania Sea Grant (PA Sea Grant) to form a

new stakeholder group named the Pennsylvania Lake Erie Environmental Forum that will be focused on the Lake Erie basin and tributary issues. The new group will meet quarterly starting this year.” (Boughton and Bruno, Interview, 2/2016) Key players in local environmental stewardship since the Presque Isle Bay AOC was delisted include PA Sea Grant and PADEP as research and technological resources, Environment Erie, Erie County Conservation District, Pennsylvania Lake Erie Watershed Association, and the Regional Science Consortium at Presque Isle. “Several local groups continue monitoring and surveying. Each group has its own focus: Environment Erie focuses on stormwater retrofits. PA Sea Grant focuses on toxics and bay assessment.” (Boughton and Bruno, Interview, 2/2016)

According to Mr. Bruno, the greatest success of the delisted Presque Isle Bay community is that *“there has been an increase of public desire to spend time on the waterfront and an increase of investment of commercial and recreational activities. Investments along the waterfront include the Erie Convention Center, 1-3 hotels, and the former pier with a brownfield area is becoming a mixed recreation and residential area. Working through all the science is the biggest success.”* (Boughton and Bruno, Interview, 2/2016)

Collingwood Harbour (delisted)

The delisted Collingwood Harbour AOC is an example of a community that had a high level of environmental stewardship focused around the AOC during the delisting process, but whose focus has changed direction since the AOC was delisted. Collingwood Harbour was the first AOC in the entire program to be delisted. As stated earlier in this section, Dr. Gail Krantzberg, the former RAP Coordinator for the Collingwood Harbour AOC, attributes the success of Collingwood Harbour to the fact that the community was given control over the AOC restoration goals. The RAP team presented the PAC with options for restoration, but the PAC ultimately decided what they wanted to do to restore identified impaired beneficial uses.

According to Dr. Krantzberg, when Collingwood Harbour was first listed as an AOC, the community raised objections. When it was explained that the AOC program is a binational program, they realized that the delisting process would improve the community. The community

became deeply engaged. (Krantzberg, 2016) During the delisting process (which lasted from 1987 to 1994), the PAC and community were extremely engaged with RAP activities. Their activities revolving around the RAP included “...public meetings, efforts to provide the public with information on the RAP, presentations to community groups, newspaper coverage and all meetings of the public advisory committee and its subcommittee” (Collingwood Harbour Action Team and Public Advisory Committee, 1994). A member of the PAC started a weekly column called the “RAP rap” in the local newspaper, which gave recognition of local efforts regarding the delisting process (Krantzberg, Interview, 2/2016). The Town of Collingwood was very involved with the delisting process and continues to be a steward of the harbor. The deputy mayor of Collingwood was on the PAC and is also an industrial leader. The involvement of local politicians was beneficial to the process (Krantzberg, Interview, 2/2016).

It is important to note that Collingwood Harbour is a unique site in this investigation because it has been delisted for the longest period of time out of all the AOCs – 22 years. According to Dr. Krantzberg, there is considerable community pride that revolves around sustainability. The community members celebrate their successes and are proud of what they do (Krantzberg, Interview, 2/2016). According to her 2012 paper about Collingwood Harbour, Krantzberg writes,

“Years after the delisting of the Harbour, bringing people back to the revitalized waterfront has been a Town priority. Harbourlands Park was created in 2000 and is one of the most beautiful areas in the community. Residents and visitors alike are enjoying the rugged beauty of a once active shipping/grain storage area. The backdrop of the Collingwood Terminals with its huge white columns rises up from the once wasteland “spit area”, now a series of beautifully landscaped walkways and gardens with a history of the area on massive granite plinths. Harbourlands Park offers the ever-changing grandeur and scenic beauty of Georgian Bay for the many people who drive or walk to the Park. There are benches for reflective moments or to watch the quiet beauty of sailboats filling their sails as they make their way out of the historic Collingwood Harbour.” (Krantzberg, 2012; Krantzberg, 2006; Town of Collingwood, 2004).

In an interview, Dr. Krantzberg recounted a couple of anecdotes which demonstrated that the BUI-delisting activities are still very active in the minds of community members:

1. *“When redeveloping the shipyards into a mix-use community, Gail acted as an anonymous and potential buyer inquiring about the lack of boat access at the private properties. The real estate agents explained that a marina would degrade water quality and actions they have taken to restore fish habitat and actually show pictures of the fish in the habitat developed by the RAP team.*
2. *When a proposal to dredge a marina in the harbor was received by the town, the director of Parks and Recreation contacted Dr. Krantzberg for advice about the activity, remembering well the work accomplished during the delisting process.”*
(Krantzberg, Interview, 2/2016)

According to Dr. Krantzberg, the key players in local environmental stewardship continue to be the community, the Town of Collingwood, and Environment Network of Collingwood (Environment Network; EN). (Krantzberg, Interview, 2/2016) Environmental Network is an incorporated non-profit organization that supports community involvement and awareness, has expanded beyond the harbor, and has a storefront. EN was funded partly by grants from the town and partly from private and public sector partners.

For the delisted Collingwood Harbour AOC, the author was able to conduct two interviews, which offered different perspectives on continuing environmental stewardship in the community. In addition to interviewing Dr. Krantzberg, the author interviewed Michele Rich, the Executive Director of Environment Network of Collingwood. For her interview, Ms. Rich also consulted with Jim Collis, who was a senior environmental technician on the Collingwood Harbour RAP team and is now a consultant.

According to Ms. Rich, the community is less often making the connection between their recreational use of the harbor and contamination. In addition to this disconnect, there is a lack of environmental regulation. There was a very extensive initiative for about 5 years to create a sustainable community, but this initiative faltered due to a change in local government leadership. Ms. Rich believes this is due to a lack of education, which the EN is responsible for

providing; but EN has struggled to maintain momentum due to a lack of funding to and value on the organization (Rich and Collis, Interview, 2/2016). According to Mr. Collis, the community attitude towards environmental stewardship has waned slightly, but the Nottawasaga Valley Conservation Authority (NVCA) and the Ministry of Natural Resources and Forestry (MNRF) strive to keep the public sector interested in environmental issues and opportunities to improve upon it.

The PAC dissolved, but EN has stayed open. A former member launched an organization called Blue Mountain Watershed Trust which initiates more volunteer monitoring and receives sporadic funding to study water quality and habitat (Rich and Collis, Interview, 2/2016). Key players in local environmental stewardship since delisting have been the public health unit, the NVCA, the MNRF, the Canadian Wildlife Service and the Ontario Ministry of Environment and Energy.

The differing views on environmental stewardship at the delisted Collingwood Harbour AOC may be explained by the different positions held by each of the interviewees. The RAP Coordinator may have a more positive view of the community's environmental stewardship because she is able to quantify it, and observe that delisted BUIs have not recurred. However, the Executive Director of the nonprofit organization established to maintain environmental stewardship is more intimately involved in the ongoing effort, and has struggled to keep the organization and the community's positive attitude going. The viewpoint of the environmental technician helps to resolve the dispute: Mr. Collis believes the greatest habitat restoration program completed since delisting was the Pretty River restoration project completed in partnership with EN, Human Resources Development Canada (HRDC), and the Georgian Triangle Anglers Association. This particular project was completed in 2013, which demonstrates that despite struggles to instill good environmentally-conscious habits in residents, environmental stewardship is still alive.

iii. Communities where AOC delisting / environmental stewardship has been led by government agencies

Deer Lake (delisted)

Deer Lake is an example of a community with a delisted AOC in which environmental stewardship towards the site was a priority during the delisting process, but has waned since delisting. This is likely due to the PAC chair leaving the community after delisting occurred.

According to the Deer lake Area of Concern Final Delisting Report, the PAC was quite active during the delisting process:

The PAC has managed support grants and other grants in order to accomplish goals in the AOC. The PAC plays an important role in facilitating stakeholder participation in the decisions affecting Michigan's AOC program and is represented on a Statewide Public Advisory Council" (MDEQ, 2014a). The PAC and the MDEQ "...have consistently worked to both inform the affected communities in the AOC and to seek their input with regard to remedial activities and BUI removals. The same holds true during the process of delisting the AOC. At least one public meeting in the Deer Lake community was held to present evidence supporting each BUI removal and to seek public comment. The Deer Lake PAC held a public meeting on November 5, 2013 where they agreed to begin the delisting process, which includes reviewing and voting on the Final Delisting Report. (MDEQ, 2014a).

Also according to the final delisting report, the PAC intended to continue on as the Deer Lake Association after delisting; however, this has not happened. An interview with Mr. Peter Nault, a resident on Deer Lake and formerly of the Deer Lake PAC, revealed that Deer Lake PAC was a close knit group, and that many different stakeholder groups were represented on the PAC. He also mentioned that most of the community does not know what an AOC is and had no direct involvement with the cleanup efforts.

The interview also revealed information about what community involvement in environmental stewardship has been like post-delisting. Mr. Nault has seen the evolution of Deer Lake and the surrounding community over 40 years. The attitude of the public before the PAC was formed was that Deer Lake was a sewer lagoon. Through the delisting process, primary and secondary wastewater treatment were installed at the sewage discharge point. The installation of wastewater treatment greatly improved the lake's water quality, and along with it, also improved the attitude of the community towards the lake. The public attitude towards the lake has further improved since delisting – recreational use of the lake has increased - but Mr. Nault was not sure if there has been a focus on environmental stewardship since delisting (Nault, Interview, 2/2016).

Since delisting, all AOC-related / environmental stewardship activities have stopped. Much of the community action was driven by the former PAC chair, who no longer lives on Deer Lake for most of the year. Mr. Nault plans to bring more momentum to a currently very informal community group called Friends of Deer Lake, which consists of a small number of people. Before delisting, the PAC was active and was involved with the development of the RAP reports. Mr. Nault expressed concern about who is responsible for receiving data/information and taking action on results of state sediment and fish sampling if some type of governance does not exist for Deer Lake. He also noted that the former PAC still has some money left in its treasury. Mr. Nault said that there is a general feeling in the community of “it's over” and he is concerned that there will be no further effort to continue environmental stewardship, increasing the risk that the lake's health will decline (Nault, Interview, 2/2016).

The City of Ishpeming is reserving land for a conservancy on the lake. (Nault, 2016) Follow-up with the City of Ishpeming confirmed that the city “is working on (and about half way completed with) a conservation easement around a portion of Partridge Creek to secure the creek and surrounding area permanently as a protected place” (Slown, Email, 4/2016). The Michigan Department of Community Health (MDCH) posted signs around the lake as part of its Eat Safe Fish campaign warning anglers to catch and release only. No funding has gone towards community engagement (Nault, Interview, 2/2016).

According to Mr. Nault, the greatest success story is that the lake is now clean and that people can now use it. Lots of kayaking, fishing and mountain biking now take place at the lake (Nault, Interview, 2/2016).

Oswego River (delisted)

Oswego River was the first U.S. AOC to be delisted, in 2006. The community around the delisted Oswego River AOC entrusted the restoration of the Oswego River AOC to the RAP team. According to the Oswego River RAP Stage 3 – Delisting report, the public advisory council had two incarnations: the first was called a Citizen’s Advisory Council (CAC). The CAC was formed by the New York State Department of Environmental Conservation (NYSDEC) in 1987 for the purpose of defining the use impairments and identifying causes and remedial actions for the RAP, and “included residents of the Oswego River Basin, industry representatives, outdoor sports enthusiasts, research scientists, environmentalists, and local government persons. Once the use impairments, causes and remedial actions were defined, “...NYSDEC staff and the subsequently-formed Remedial Advisory Committee (RAC) [have] continued these efforts in the implementation of the Oswego River RAP.” (NYSDEC, 2006)

During the delisting process, the RAC was composed mostly of local and state government personnel. According to the Oswego River RAP Stage 3 – Delisting report,

Over the years, the Remedial Advisory Committee (RAC) conducted monthly, and later quarterly, meetings on RAP implementation. The committee has consisted of a diverse and multi-stakeholder representation with the task of identifying needed studies and remedial actions, seeking implementation, and then affecting these activities in the watershed and AOC. Reporting on progress and communicating this information to the public has been an objective of the committee. Recent efforts focused on defining the endpoints to address the use impairments and realizing that significant reductions in pollutant sources have been achieved. (NYSDEC, 2006)

To get an idea of what post-delisting life looks like for the community of the delisted Oswego River AOC, the author conducted an internet search and interviewed Donald Zelazny of NYSDEC. The internet search did not yield any information regarding post-delisting activities in the community of the delisted Oswego River AOC. Information obtained from Mr. Zelazny confirmed that no governance arrangement exists that is specifically relative to the delisted Oswego River AOC; though he did notice fairly strong community support at the delisting ceremony, because Oswego River was the first U.S. AOC to be delisted. Mr. Zelazny stated that the RAC/CAC disbanded after delisting, and that no governance arrangement currently exists that is specifically related to the AOC. There might be a community organization focusing on water-related activities, but Mr. Zelazny is not aware of anything specific to the City of Oswego. “The key players in local environmental stewardship have been the city and county governments, who promote uses of the river and act as guardians/stewards of the river. Local efforts are no longer focused on the AOC, they are now focused on the revitalization of the city and the waterfront – the AOC falls into this greater community or watershed focus.” (Zelazny, Interview, 2/2016)

According to Mr. Zelazny, there has been a shift in primary use of the Oswego River from industry to recreation:

“Events such as fishing tournaments and fireworks displays now take place on the river. New hotels have been built on the waterfront, the Port of Oswego has been enlarged and upgraded, new businesses have moved into waterfront property, there are more recreational boaters using the marina and at the river mouth. The river is used for commercial, industrial and recreational purposes. The river is now seen as a public asset rather than a public disgrace.” (Zelazny, Interview, 2/2016)

Wheatley Harbour (delisted)

Wheatley Harbour is an example of an AOC whose delisting process was driven entirely by the RAP team, with minimal participation by the surrounding community. According to the Wheatley Harbour Stage 3 RAP report,

Participants decided that, rather than having a formal Public Advisory Committee (PAC), they preferred to be kept informed via newsletters and public meetings; they felt this would allow for involvement by more individuals and, as a result, there would be no suggestion of conflict of interest.” “In the absence of a formal PAC, the Community Water Use Goals have been important for guiding the RAP’s planning and implementation, and for ensuring the public’s interest is considered in all RAP actions (WHIT, 2010).

An interview with Danielle Stuebing of the Essex Region Conservation Authority confirmed the minimal level of community involvement during the delisting process and revealed that community involvement in environmental stewardship at Wheatley Harbour since redesignation has ceased. According to Ms. Stuebing, there was some community involvement that was project-based during the delisting process, but since delisting there has been no community involvement. (Stuebing, 2016) Matthew Child, Physical Scientist at the International Joint Commission, and formerly of the Essex Region Conservation Authority clarified that the community did not feel that environmental degradation was an issue because Wheatley Harbour had always been a working harbor. (Child, Conversation, 2/2016) While Ms. Stuebing expressed concern that if recurrence of any of the delisted BUIs were to occur, no one would know about it until the recurrence was significant, Mr. Child explained that there is not really a danger of recurrence because the source control has been addressed.

b. Communities of currently listed AOCs

i. Jackfish Bay (in recovery)

In an interview, Jim Bailey of Lakehead University provided an abundance of information about community involvement at Jackfish Bay:

“Two towns are involved with Jackfish Bay: Terrace Bay and Schreiber. The PAC was made up of residents from both towns, but mostly from Terrace Bay. Economic factors and the presence of a paper and pulp mill in one of the towns played a role which affected the attitudes of support and enthusiasm towards delisting.” (Bailey, Interview, 2/2016)

“The PAC has not met since the redesignation to AOC in Recovery. Once it does start to meet again, an approach similar to the one implemented in Nipigon Bay (described below) will be applied to Jackfish Bay. Some details regarding the new governance can be formalized before the site is officially delisted.” If community governance does not become incorporated, the community could work with the Lakehead University Foundation. It is too early to tell exactly what the PAC is going to do. (Bailey, Interview, 2/2016)

“The most important players are individual residents – those who bring relationships and connections from other groups in the community. For example, in Jackfish Bay, one of the key players is the Director of Education for the school board, but his activities with the bay are from his own personal passion for Great Lakes stewardship.” Important organizations include the town council, individuals, and the pulp and paper mill. (Bailey, Interview, 2/2016)

There has been no ongoing community activity or ongoing public engagement. According to the Stage 2 Report for Jackfish Bay, the residents of Terrace Bay recommended that a cleanup not take place, because there was no road access to the site, the site itself (the Creek and Bay) are kilometers in length, bordering terrain is rugged, the cleanup could be extremely expensive, and no determination was made as to where contaminated material could be deposited. The residents decided that the cleanup was just not practical. Environmental recovery at this site will take time due to natural attenuation. Jackfish Bay is a case where some impacts occurred, but the site may never fully recover. (Bailey, Interview, 2/2016)

ii. Nipigon Bay (near-term)

In an interview, Jim Bailey of Lakehead University also provided an abundance of information about community involvement at Nipigon Bay:

Three communities are stakeholders: Lake Helen, Red Rock and Nipigon, and they are located in a close cluster. Community involvement in the RAP has been robust. Lake Helen became more involved towards the latter years of the process. “The Town of Red Rock did not have secondary wastewater treatment and requested a hold on delisting until they had secured funds to construct secondary wastewater treatment. The Province and federal government provided \$9 million for construction.” (Bailey, Interview, 2/2016)

Strong reservations were expressed about delisting from the residents and town councils, centering on the fact that funding for AOC-related projects might be decreased. The RAP agencies responded that the RAP program is not a funding program. Residents and town councils were also concerned about ongoing monitoring, which was addressed by numerous presentations on the topic. In particular, the MOECC gave a presentation to the Red Rock Town Council that explained that the province environmental regulations still stand, and that MOECC staff will address any issues that arise. (Bailey, Interview, 2/2016)

“Generally in Nipigon Bay there was good engagement, with some concerns. Evolution of the PAC is underway now that the RAP/PAC is closing – Lake Helen suggested that the PAC evolve into an environmental NGO for Nipigon Bay, Lake Superior and beyond – this process is underway. Red Rock is also encouraging the PAC to reorganize into an environmental group.” The community intends to continue environmental stewardship. (Bailey, Interview, 2/2016).

“The group has yet to put together a draft Terms of Reference framework for the NGO, and is seeking assistance the Superior Watershed Partnership. Superior Watershed Partnership is an incorporated non-profit with its head office in Marquette, Michigan and is involved in monitoring, stream restoration, and related activities. Nipigon Bay is trying to associate with the partnership, or become a chapter of the existing organization – if successful, the partnership could become binational. Nipigon Bay would receive strong support and be working off an existing mechanism.” (Bailey, Interview, 2/2016)

As with Jackfish Bay, if community governance does not become incorporated, the group could work with the Lakehead University Foundation. It is too early to tell exactly what the PAC is going to do. (Bailey, Interview, 2/2016)

Also as with Jackfish Bay, the most important players are individual residents who bring relationships with and connections to other groups in the community. Important organizations include the two town councils, the Red Rock Indian Band and residents, Lake Helen (mostly made up of residents), Red Rock Fish & Game Club, local schools, Ontario Power Generation and historical interests (e.g. Nipigon Historical Society, which were quite involved in the RAP). (Bailey, Interview, 2/2016)

The greatest success to date in Nipigon Bay is that the community members themselves support ongoing environmental stewardship. An important lesson learned is to create these ongoing environmental group partnerships before the AOC is delisted and these groups stop meeting. (Bailey, Interview, 2/2016)

iii. River Raisin (near-term)

Richard Micka, of the City of Monroe's Commission on the Environment and Water Resources, provided insight on what community involvement looks like at the River Raisin AOC:

The community only ever perceives the [river mouth area] as "industry" because they have never been able to reach Lake Erie; the goal is to increase access to the lake. In the 1950s, pollution in the harbor caused the harbor to catch fire. The site has gone from toxic landfill to wildlife habitat. However, the \$150 million worth of work that has been completed in the navigation channel is not apparent [because it is all underwater]. The recently defined goal of Commission on the Environment and Water Resources (COTE, explained below) is to create public access at the power plant's Raisin Point bottomlands, which is an eagle sanctuary. USFWS is trying to increase access at Plum Creek. The area is open twice a year, once for public viewing of eagles, and once for public viewing of lotus beds. Ducks Unlimited and the International Wildlife Refuge Alliance hold fundraising dinners. These organizations will help keep environmental stewardship a priority in the River Raisin AOC. (Micka, Interview, 2/2016)

The PAC has become the City of Monroe's Commission on the Environment and Water Quality (COTE). Because COTE is an official city commission, it will continue after delisting. To be clear, the PAC is a part of the COTE, which is part of the larger River Raisin Watershed Council (which deals with issues beyond the River Raisin AOC). The River Raisin Watershed Council has a watershed plan, and the mayor of Monroe is a delegate to the council. The 35 municipalities within the watershed fund the operation of the council. (Micka, Interview, 2/2016)

The AOC is small, but there are many key players in local environmental stewardship. Key players include the Land Information Access Association, the City of Monroe, Frenchtown Charter Township, Monroe Charter Township, the Bolles Harbor Science Center, COTE, Ducks Unlimited, the International Wildlife Refuge, the River Raisin Watershed Council, Monroe County, Monroe Public Schools, Monroe Intermediate Schools, Monroe County Community Foundation and DTE Energy. The following entities have contributed funding towards community engagement: Monroe County Community Foundation, LA-Z-BOY, DTE, Cabela's Monroe County Convention & Tourism, ITC, and Ford Motor Company. A major success of the

community related to the River Raisin AOC to date is the development of Resilient Monroe, which is a land-use planning document that includes priorities to preserve natural resources in the River Raisin AOC. (Micka, Interview, 2/2016)

iv. Ashtabula River (near-term)

Fred Leitert, of the Ashtabula City Port Authority, provided insight on what community involvement looks like at the Ashtabula River AOC:

“In 1988 the Ashtabula River Remedial Action Plan Advisory Committee (RAP) was formed under the leadership of the OEPA. In 1994 the Ashtabula River Partnership (ARP) was formed, which included local agencies and community members. Following completion of the remediation of the Ashtabula River in 2008, the ARP was retired, and a greater emphasis was placed on the RAP. In 2014 the OEPA renamed the RAPs as Local AOC Advisory Committee. The [community’s current environmental stewardship] efforts are focused on delisting the remaining three BUI’s, as well as, the beneficial use of dredged sediments.” (Leitert, Interview, 2/2016)

Mr. Leitert also mentioned that he is not sure how much the community would still be interested in continued environmental stewardship with regard to the AOC, considering that there is not much left for the community to do and that it would need help requesting grant funding.

Following completion of dredging, the partnership disbanded into the RAP. At some point, the local committee may need to meet as remaining BUIs are removed. In 2014, there was a celebration of the cleanup of the Ashtabula River (Leitert, Interview, 2/2016).

4. AOC community engagement with Lakewide Action Management Plans (LAMPs):

Generally, most of the delisted and current AOC communities are not engaged in their LAMPs. While in some cases this is due to lack of interest in or knowledge of the LAMP, in many cases it is also due to the fact that the Annex 2 process is currently undergoing changes. For all of the Great Lakes, the governments of Canada and the U.S. are currently determining how to engage the public (U.S. EPA and ECCO, 2016). More detailed comments about the involvement of delisted or current AOC communities are provided below.

a. Collingwood Harbour (delisted)

The LAMP program did not exist at the time Collingwood Harbour was delisted (Krantzberg, Interview, 2/2016). Since then, things have changed: the role of AOC communities in LAMPs is to serve as an example of both helpful and harmful actions regarding the environment and public health (Rich and Collis, Interview, 2/2016). Collingwood's and surrounding mayors are involved with the LAMP, and their involvement was self-initiated; however this is more opportunity for engagement (Rich and Collis, Interview, 2/2016).

b. Severn Sound (delisted)

The LAMP was not discussed on the website or Stage 3 report.

c. Oswego River (delisted)

According to Don Zelazny of the New York State Department of Environmental Conservation, AOCs should have a very strong voice in the LAMP and keep pressure on LAMP managers to push for progress. "They should stay engaged, and take actions locally to support the lake. The local scientific sector should stay involved – there is always a role for applied science assessments." Mr. Zelazny would like to see communities promote recent improvement. "It would be good for the community to promote the positive and not dwell on the negative." (Zelazny, Interview, 2/2016)

“The local community is not engaged in the LAMP process because the current Lake Ontario LAMP public outreach and engagement process is on hold, pending future guidance under the GLWQA Annex 2 process. The exception is engagement related to fisheries and harmful algal blooms. These are community involvement issues associated with the Lake Fisheries Committee.” (Zelazny, Interview, 2/2016)

d. Wheatley Harbour (delisted)

The local community is not engaged in the Lake Erie LAMP (Stuebing, Interview, 2/2016).

e. Presque Isle Bay (delisted)

According to Tim Bruno of the Pennsylvania Department of Environmental Protection, there is a lot of work to do:

“AOC communities in PA need to get up to speed on the issues in the western and central basins of Lake Erie, including the algal blooms.... Take people who worked on AOC issues and retask them to Lake Erie technical and public policy.... The LAMP process has recently been on hold and is just coming back into play with help from the GLRI and the 2012 GLWQA advancements.” (Boughton and Bruno, Interview, 2/2016)

Mr. Bruno plans to pull the community into the LAMP process through the PA Lake Erie Environmental Forum. (Boughton and Bruno, Interview, 2/2016)

f. Deer Lake (delisted)

Mr. Nault expressed that Deer Lake is a small lake in a small community; and that the role of the Deer Lake community is very small compared to other communities with larger AOCs. The local community is not currently engaged in the LAMP process, Mr. Nault was interested in becoming more involved (Nault, Interview, 2/2016).

g. White Lake (delisted)

If there was a viable program, the community could plug into it, but there currently is no program. Ms. Cabala used to be on the Lake Michigan Forum, but she has not been familiar with forum activities for a long time. The local community does not know what the LAMP is (Cabala, Interview, 2/2016).

h. Jackfish Bay (in recovery) and Nipigon Bay (near-term)

According to Jim Bailey of Lakehead University, PACs already exist in most communities on both the U.S. and Canadian sides of the lakes. Start with these groups and build from there, using these people who are likely already aware of LAMP and its process, PACs can play a strong role in creating support and ongoing participation in the LAMP for Lake Superior, and thus can expand the PACs' perspective to the entire lake. They also may be able to identify issues that can get funding as part of the LAMP. (Bailey, Interview, 2/2016)

The Binational Forum disbanded 4-5 years ago in Canada and last year in the U.S., so public participation in the Lake Superior LAMP is currently experiencing a lull while the governments determine how to reinvigorate the lakes' LAMPs. There are definitely opportunities for greater engagement. (Bailey, Interview, 2/2016)

i. River Raisin (near-term)

The community currently does not understand the LAMP – the community environmental groups are working on educating the public to enable them to participate in the LAMP later. (Micka, Interview, 2/2016)

j. Ashtabula River (near-term)

To Mr. Leitert's knowledge, the local community is not engaged in the Lake Erie LAMP process. (Leitert, Interview, 2/2016)

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