



## St. Marys River Remedial Action Plan

ONTARIO RAP OFFICE

# 2014 ANNUAL REPORT TO BPAC

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Prepared for: The St. Marys River Binational Public Advisory Council

Reporting Period: January 1 to December 31, 2014



Engaging the  
Local  
Community!

## Major Accomplishments in 2014

A major achievement in 2014 was the updating of the delisting criteria for the Beneficial Use Impairments that are deemed impaired in the St. Marys River AOC. Delisting criteria that are too broad, subjective, or immeasurable make the assessment of ecosystem health difficult. Therefore, in an effort to define meaningful targets, the delisting criteria have been updated to follow the **SMART** test, meaning they are **S**pecific, **M**easurable, **A**chievable, **R**elevant, and **T**ime-oriented. BPAC is currently providing feedback and review on these important updates. In addition, Environment Canada (EC), the Ministry of Environment & Climate Change (MOECC), and Algoma University have continued to support ongoing research projects including an analysis of sediment stability, water quality, wildlife population health, and habitat restoration within the Canadian portion of the AOC.

Outreach activities focusing on increasing public awareness of local ecosystem health and fostering stewardship for the St. Marys River continue to be an important focus for the RAP Team and BPAC. The BPAC gained new members, and the RAP Team at Algoma University saw some staffing changes, as well as the addition of a student position. The yearly Communications Strategy and Implementation Annex were updated, and a new documents including: outlining administrative controls for activities taking place in or along the St. Marys River; and the current status of the Beach Closures BUI were drafted.



## A. Delisting Criteria - Identifying Targets and Endpoints for Impaired Beneficial Uses

To assess progress in addressing the beneficial use impairments identified in the Stage 1 Remedial Action Plan report for the St. Marys River Area of Concern, the Stage 2 RAP report presented delisting criteria for each BUI. Delisting criteria are measurable targets for restoring beneficial uses, and ultimately the AOC, and establish a benchmark for when a beneficial use can be deemed no longer impaired. The initial delisting criteria for the St. Marys River were developed in 2002 and required revision to reflect current science and the approach of using indicators to measure ecosystem health.

Throughout 2012 - 2014, Environment Canada and the Ministry of the Environment & Climate Change worked closely with the St. Marys River RAP Implementation Committee (whose members include the Ministry of Natural Resources & Forestry, Department of Fisheries & Oceans, Algoma Public Health, Sault Ste. Marie Region Conservation Authority, and the City of Sault Ste. Marie, ON) to better define the delisting criteria for the St. Marys River AOC.

On June 17, 2014 Michelle McChristie (MOECC) and Mark Chambers (EC) led a discussion with the BPAC on the newly updated criteria, and provided the opportunity for suggestions / comments. Comments were received and incorporated into the criteria, which were shared with the BPAC on September 8, 2014. In an effort to ensure that all BPAC members had reviewed the newest criteria, a Survey Monkey was created by the RAP Coordinator (Corrina Barrett) and shared with BPAC members on October 9, 2014 asking whether members were comfortable with the criteria as currently worded.



The results from this survey will be shared with the BPAC in early 2015, with the RAP Implementation Committee sharing the most appropriate next steps.

## B. Personnel and Staffing:

RAP Supervisor, Dr. Martha Scott, resigned from her position in April 2014. Her dedication to the project, in addition to her effective oversight of major studies such as the water quality project, aided in the advancement of project goals as well as continued progress on outstanding actions identified in the Implementation Annex. We bid Dr. Scott a fond farewell and wish her the best in her future endeavours.

Ms. Carrie Ginou, of Algoma University, took over the role of RAP Supervisor in June 2014. She is now leading the local RAP team as well as overseeing the Water Quality project. Ms. Ginou has a background in aquatic biology and toxicology and is enjoying working with the RAP's various partners, including the BPAC, in supporting remedial actions in the St. Marys River.

An additional Algoma University RAP Team position was created this year - *Remedial Action Plan Research Assistant* - and the successful candidate was Ms. Angela Belleau, a 4<sup>th</sup> year AU Biology Student. Her past education includes a diploma from Sault College as a Natural Environment Technician, and her work experience include positions with Algoma University as a Community Ecology Research Assistant, the Ontario Forest Research Institute as an Assistant Forestry Technician, the Sault Region Conservation Authority as a Conservationist Assistant, the Garden River Health Centre as an Environmentalist, and the Great Lakes Forestry Centre as a Field Technician. Ms. Belleau's main duties include aiding with: public outreach initiatives; various research opportunities; and updating the RAP and BPAC social media outlets.

## C. Ongoing Research in the St. Marys River:

There were several projects that took place during the course of 2014. All projects were specifically addressing outlying actions as indicated by the Implementation Annex, specifically targeting the outstanding impaired beneficial uses. The following are examples of work done on the St. Marys River:

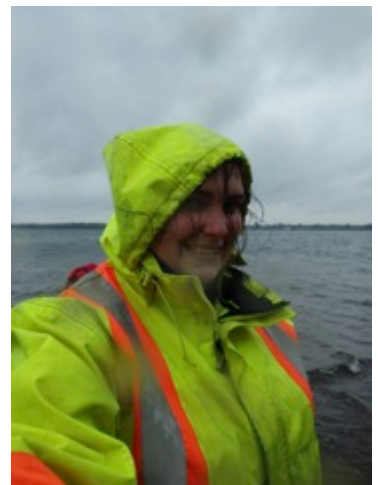
- Environment Canada hired *French Planning Services Inc.* to determine to what extent agriculture may be negatively impacting the water quality of the St. Marys River. This was linked directly to RAP action *NPS-6: Control of agricultural and other non-point sources of pollution*. In their 2014 report, the authors relied on agricultural data provided by the Ontario Ministry of Agriculture & Food and Statistics Canada to evaluate agricultural activities in the six municipalities that border the St. Marys River for 2001, 2006 and 2011 - noting the size, scale, type and location of agricultural operations in the area and the associated environmental impacts. Overall, the report concluded that impacts from agriculture in the St. Marys River AOC are low;
- Algoma University, with financial support from Environment Canada and the Ministry of the Environment & Climate Change, finished its second year of sampling during 2014 for the St. Marys River AOC water quality study. The study is an effort to evaluate the current status of the Degradation of Aesthetics and Eutrophication/Undesirable Algae BUIs;
- Fisheries & Oceans Canada (DFO) collected data during the summer of 2014 for its nearshore fish community survey, which will use an index of biotic integrity approach to assess the overall

health of the river's fish community. If needed, data collection may also take place in 2015, with a final report anticipated in 2016. Data analysis is currently underway and the DFO will present the study approach and preliminary findings to the BPAC in 2015;

- Environment Canada shared the results of its multi-year study of deformities, contaminant levels and reproductive health of birds - completed in 2014 - with the BPAC in March. An addendum to the report was shared in late 2014 as well;
- Environment Canada commissioned a study on the physical, ecological and economic feasibility of creating new or augmenting existing rapids on the Canadian side of the river is progressing. In July and October, the contractors (*Morrison Hershfield and Parish Geomorphic*) completed geomorphic, hydrologic and fisheries-related fieldwork. The study team will present their approach and results at a future BPAC meeting, with hope that this will begin discussions regarding the prospect of taking specific remedial actions to restore the Loss of Fish & Wildlife Habitat BUI;
- Work continued in 2014 on the Environment Canada study to collect data on sedimentation rate, transport and stability of sediment within the east of Bellevue Marine Park study area. Underway since 2012, the studies results are expected to aid Environment Canada and the Ministry of the Environment & Climate Change in identifying sediment management options.

## Water Quality at Selected Sites in the Canadian Waters

With financial support from Environment Canada and the Ministry of the Environment & Climate Change, Algoma University finished the second year of seasonal water sampling in the St. Marys River. The study will provide the data needed to assess and potentially re-designate the *Degradation of Aesthetics and Eutrophication/Undesirable Algae BUIs*. Year 2 was comprised of 11 sampling periods at each of the five sites that represent typical conditions (substrate, habitat type) within the AOC, and fully represent the geographical extent of the AOC. Samples were taken during a range of environmental conditions, including during and post periods of substantial rain. Results so far are generally positive. One more year of fieldwork is planned for 2015, with a final report expected in March 2016.



Left and right photos are of Ms. Ginou and Ms. Barrett (respectively) sampling during a rain event (September 10). Centre photo is of a bald eagle visiting the Bell's Point Camp sampling location during a rain event (June 24).



Photo on left depicts W.I. Park sampling location in Richards Landing (May 27), and photo on right depicts the 3 sample bottles, 1 from each sample session at W.I. Park (May 27).

Ms. Ginou (Field Technician and Project Supervisor) and Ms. Barrett (Onshore Supervisor) undertook field sampling on a biweekly basis from May through to October. They visited and took pictures at the 5 sites (Gros Cap, Topsail Island, Bells Point, Echo Bay bridge, and W.I. Park), as well as recording key features and land uses around each site. Three sets of samples were taken at each site during each sampling session, in addition to field notes, photos, GPS coordinates, temperature, pH, secchi disc and turbidity tube measurements.

Ms. Ginou and Ms. Barrett created and submitted a poster titled “Using water quality to measure the success of remedial actions in the St. Marys River Area of Concern” to the Municipal Wastewater Effluent Impacts and Remediation section of the 2014 Aquatic Toxicity Workshop (poster picture on next page). Having successfully been accepted to present, Ms. Ginou and Ms. Barrett travelled to Ottawa, Ontario in late September to present their poster to other interested individuals.

## New Evidence Concerning SMR Sediments

The Sediment Management Technical Team held meetings in February and September to discuss updates on fieldwork carried out by Mr. Hans Biberhofer and his team at EC on sedimentation rate, quality of sediment and stability of sediment for the area east of Bellevue Marine Park. The study is intended to answer 3 main questions: 1) What is the rate of accumulation of new sediments in the area of study; 2) How does this “new” sediment compare to in situ sediments with respect to sediment quality; and 3) Is the sediment deposit stable under current conditions. The group will be making a presentation to the BPAC in early 2015 to present the study results.

## Update on Wildlife and Habitat in the AOC

In June of 2013, Environment Canada presented the preliminary results from their multi-year study on deformities, contaminant levels and reproductive health of birds. The study was commissioned in an effort to assess the current status of the *Bird or Animal Deformities or Reproductive Problems BUI*, and at the time, the assumption was that there were no impairments directly attributed to the

# Using water quality to measure the success of remedial actions in the St. Marys River Area of Concern

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## Introduction

•The St. Marys River is a freshwater ecosystem in which municipal wastewater effluents have contributed to the historical deterioration of water quality through eutrophication (RAP1, 1992).



Figure 1: Study area with sampling sites marked.

•Since being designated an Area of Concern in 1987, a Remedial Action Plan has been developed and projects implemented to improve water quality (RAP2, 2002).

•Upgrades to municipal wastewater treatment in 2006 have led to reduced levels of nutrients entering the river (Barrett, 2013).

•Comprehensive data is currently not available in order to adequately assess the nutrient status of surface waters in the St. Marys River.

## Objective

•The objective of the current study is to measure surface water quality in the Canadian portion of the St. Marys River Area of Concern with the purpose of assessing the success of remedial actions designed to decrease nutrient inputs.

## Methods

•River water was grab-sampled while wading at five sites along the length of the St. Marys River (Figure 1).



Figure 2: Research methods included field observations, water sampling, and laboratory analysis.

•Samples were taken in triplicate, once in November 2013, and bi-monthly from May to August 2014.

•Field measurements and qualitative observations were recorded and water samples analyzed for chemical and physical properties in the laboratory.

•Data was analyzed statistically (Kruskal-Wallis, pairwise comparisons,  $p < 0.05$ ) and compared to water quality standards as well as previous studies.

## Results



Figure 3: Bars represent mean values for water quality parameters (n=3). Error bars are +/- standard error. CWQO: Canadian Water Quality Guidelines for the Protection of Aquatic Life; PWQO: Provincial Water Quality Objectives; RAP: Remedial Action Plan.

•Total ammonia was primarily ammonium. Samples from Gros Cap had significantly higher levels than those from Bell's Point (10-Jun,  $p=0.02$ ).

•Major contributors to total nitrogen were ammonium, nitrate and organic nitrogen. Nitrogen levels at Bellevue Park were significantly higher than those at Gros Cap (10-Jun,  $p=0.04$ ).

•Total phosphorus levels were significantly higher at Echo Bay (Nov 2013,  $p=0.02$ ; 6-Aug,  $p=0.04$ ) and Richards Landing (29-Jul,  $p=0.01$ ) compared to Gros Cap.

•For chlorophyll a, Richards Landing had significantly higher levels compared to Bell's Point (29-Jul,  $p=0.01$ ). The highest amounts were at Bellevue Park (27-May).

•Dissolved oxygen measurements were significantly higher at Gros Cap than at Richards Landing (29-Jul,  $p=0.03$ , 6-Aug,  $p=0.01$ ) and at Bellevue Park versus Echo Bay (14-May,  $p=0.01$ , 27-May,  $p=0.01$ , 10-Jun,  $p=0.03$ ).

## Discussion

•Turbidity was significantly higher at both Echo Bay (Nov 2013,  $p=0.01$ ; 14-May,  $p=0.01$ , 27-May,  $p=0.04$ ; 10-Jun,  $p=0.02$ ) and Richards Landing (14-Jul,  $p=0.01$ ; 29-Jul,  $p=0.01$ ; 6-Aug,  $p=0.01$ ) compared to Gros Cap.

•Levels of total ammonia in the headwaters at Gros Cap suggest that the impact of ammonia from municipal sources is low. Ammonia of  $>0.1$  mg/L is indicative of organic pollution (CCME, 2010) and may correspond to small-scale local inputs from human and canine sources.

•Measurements of nitrogen indicate oligotrophic ( $<0.7$  mg/L) to mesotrophic ( $0.7-1.5$  mg/L), but not eutrophic ( $>1.5$  mg/L), conditions (CCME, 2013). Highest levels may also be linked to human and canine activity.

•Highest phosphorus levels at Echo Bay and Richards Landing could indicate local agricultural based inputs.

•Elevated chlorophyll a levels corresponded to wave action and observations of floating algae.

•Dissolved oxygen levels showed no evidence of oxygen stress (CCME, 2007) although levels were lower in the slower-moving downstream sections.

•Spikes in turbidity readings corresponded to rain events, and higher readings at Echo Bay and Richards Landing may indicate localized agricultural impacts.

•Parameters measured were generally consistent with water quality guidelines and lower than levels that initially contributed to water quality impairment.

•High levels seemed to be attributable to localized events rather than broad scale impacts from municipal wastewater effluents.

•Further study will include an additional season of sampling and application of the results to a long-term monitoring plan for the St. Marys River.

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## Acknowledgements

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Environment Canada



Environment Canada



Ontario

Poster presented by Ms. Ginou and Ms. Barrett at the 2014 Aquatic Toxicity Workshop in Ottawa, Ontario, September 2014.

AOC. Since that time another year of chemical analysis has been completed, with a final report written and shared with the BPAC in March.

In addition, an addendum was prepared and shared with the BPAC in late 2014 which provided the results of further assessment of embryonic deformities in herring gull and common tern eggs collected from within the AOC and from outside reference colonies in 2013 and 2014, concluding deformities cannot be linked to either geographical area, or to contaminant burdens. No deformities within chicks or adult birds have been found. The additional results reinforce conclusions from the earlier assessment reports, and based on 4 years of study, it is clear there is *no evidence to suggest there are differences in developmental effects in herring gulls and common terns that could be associated with influences specific to the St. Marys River AOC*. As a result, Environment Canada has prepared a BUI Redesignation Report, which provides justification for an official BUI status change from "Requires Further Assessment" to "Not Impaired", and was shared with the BPAC Executive in December.

In an effort to assess the current state of coastal wetlands within the AOC, which would address actions under the *Degradation of Fish and Wildlife Populations* and *Loss of Fish and Wildlife Habitat*



*BUIs*, Environment Canada's Canadian Wildlife Service visited a subset of coastal wetlands in the St. Marys River, both within and outside the AOC. This included surveying for water quality, submerged aquatic vegetation, aquatic macroinvertebrates, amphibians, and marsh breeding birds. The second year assessment report was prepared in February of 2014.

EC's commissioned study on the physical, ecological and economic feasibility of creating new or augmenting existing rapids on the Canadian side of the river is progressing. The contractor, in collaboration with EC, Batchewana First Nation, Garden River First Nation, and other government agencies have completed the field work for 2014. Morrison Hershfield Inc. were the contractors hired, and they have partnered with another company - Parish Geomorphic (who specializes in bathymetric and geomorphic data collection) - to help with last Spring's fieldwork (which will include looking at Fort Creek, Whitefish Island, and Garden River). The study results (expected March 2015) will support future discussions with the Canadian RAP Implementation Committee and BPAC regarding the prospect of taking specific remedial actions to restore this BUI. It is linked to RAP action *FF-6: Remediation of Rapids Habitat*. EC is also working with the Batchewana First Nations to look at augmenting existing rapids habitat near Whitefish Island, as well as working with the Garden River First Nations to look into work with existing tributaries (i.e. Root River, Echo River or Garden River). This will all lead to a presentation to BPAC in spring of 2015 to discuss the results of the feasibility study.

Dr. Paul Baumann, a fish tumour expert hired as a consultant by Environment Canada, discussed the results of the 2009 EC-DFO fish tumour study with the BPAC during the March 2014 meeting. Dr. Baumann provided a summary of the biology of fish cancers/tumours and toxins as causal agents, as background to the technical study findings that the incidence of tumours attributable to historical sources of contamination remains elevated for the SMR AOC. This BUI will require further study that is planned for 2015.

## D. Ongoing Stewardship and Public Outreach

Ms. Barrett attended the Great Lakes AOC workshop in Burlington alongside Dr. Scott in March. The workshop focused quite a bit of time on discussing *BUIs*, their assessments, and delisting criteria. Ms. Barrett found the sessions on Beach Closures to be extremely informative, as well as those on "scope", and overall the workshop really helps everyone understand that many of the issues we deal with in the RAP are AOC wide, regardless of location.

Dr. Scott and Ms. Barrett presented a poster titled "Effectively communicating with the public and fostering stewardship for the St. Marys River Area of Concern through Bipartisan Collaboration" to the Real Property Institute of Canada's Contaminated Sites Conference, taking place in Ottawa from April 14-17.

Ms. Ginou and Ms. Barrett presented a poster titled "Using water quality to measure the success of remedial actions in the St. Marys River Area of Concern" to the Municipal Wastewater Effluent Impacts and Remediation section of the 2014 Aquatic Toxicity Workshop, taking place in Ottawa from September 28 - October 1.

Ms. Barrett presented on the RAP background and current activities to the Algoma University geography class entitled "The Great Lakes: Resources, People and the Environment" with focus on successes and current challenges. Ms. Ginou presented to the same class on the water quality project



as well. The class was extremely interested in the project and asked a number of questions of both Ms. Ginou and Ms. Barrett on the RAP process and public involvement opportunities.

Ms. Barrett attended the Spring Expo alongside Green Expo Organizing Committee members on March 21-23, 2014. Professional printed copies of the updated SMR Fact Sheet and 2014 Annual Report to the BPAC were handed out to expo goers, with public attendance being very good over the three days of exhibition.

Ms. Barrett aided Ms. Ginou in teaching a group of grade 4 and 5 students about water quality sampling in the St. Marys River. The trip included taking the class to sample at the end of Dacey Road. Groups of students were responsible for measuring water pH, temperature, making observations (odour, colour, visual debris), taking pictures, using a GPS, and noting local wildlife / environmental conditions (see lower photo on page 2).

Ms. Barrett aided with the Green Expo event setup on July 25<sup>th</sup>, and manned the RAP booth the day of the event on July 26<sup>th</sup>. With 25 vendors and over 1100 attendees making it to the event, the event was a great success. Ms. Barrett shared information on the RAP, AOC, factsheets, as well as the BPAC annual report, and information on how everyone can become water stewards in their own home.

Ms. Barrett participated in the Central Algoma Freshwater Coalition's (CAFC) Invasive Species Boat Wash on August 9<sup>th</sup>. The group had the opportunity to wash 3 boats, with about 20 people coming by to ask about invasive species and how to help prevent their spread throughout the Algoma region (see upper photo on page 2).

Ms. Barrett also continued to make regular postings to the RAP Facebook page and BPAC website which included: creating a "RAP Facebook Comment Policy" and posted it to the "About" section of the RAP Facebook Page; adding a "Projects" section to the BPAC website and added information pertaining to the Water Quality study (written by Ms. Ginou, included this information on the Water Portal as well); adding a "BUIs" section to the BPAC website; updating the "Quick Links" section of the BPAC website; ensuring all links on the BPAC website were working; reorganizing the "Downloadable Materials" of the BPAC website; and adding relevant news items to the BPAC website.

## E. New and Updated St. Marys River AOC Documents

The Implementation Annex, which was finalized in early 2014, was continually updated throughout the remainder of the year. To date, half of the actions have been completed or are already addressed (28/57), 15 are underway or ongoing, 8 are solely U.S. based, 2 are no longer applicable, and 4 are pending or under review for completeness.

In December, Ms. Barrett finished the first draft of the St. Marys River, Ontario Administrative Controls Protocol & Guidance Document. The St. Marys River Administrative Controls Protocol is an administrative tool that establishes principles and procedures to ensure that contaminated sediments (once delineated) located throughout the St. Marys River are not disturbed, exposed, or re-suspended. The draft document is currently being circulated among the Implementation Committee members for comments and review. The document will be shared with the BPAC for input in 2015.

In 2013, Ms. Barrett began drafting a Beach Closures Assessment document, and with the help of Ms. Belleau, and Ms. Ginou, Ms. Barrett was able to complete the first draft in December of 2014. The report provides an overview for why the Beach Closures BUI was originally deemed impaired in the St. Marys River, how delisting criteria were developed and what the current status is of the BUI. The report will be shared with the BPAC in early 2015.

## Looking Ahead to 2015

Funding for the Ontario RAP Office is provided by EC and the MOECC through grant funding agreements, both of which expire on March 31, 2015. As such, Algoma University has applied for funds through EC and has initiated discussions with MOECC. Ms. Barrett and Ms. Ginou would like to thank the BPAC for the Letter of Support they provided during the application process, along with the 6 other groups who also provided letters (including: Algoma University, Algoma Public Health, Central Algoma Freshwater Coalition, City of Sault Ste. Marie (ON), Sault College, and the Sault Ste. Marie Region Conservation Authority).

Future work indicated in the application included: leading local outreach initiatives related to water quality; continued support of the BPAC and the Environmental Summit; continued work with and support of the Green Expo; aiding with the last year of the AU Water Quality Study; fostering communication between the BPAC, local agencies and stakeholders; and aiding in the work on outstanding BUIs (just to name a few).