Niagara River RAP Beneficial Use Impairment (BUI) Status Sheet

Eutrophication or Undesirable Algae

Status of BUI:	• **Stages 1 & 2 reports: *Eutrophication* - Impaired (Welland River); Not Impaired (Niagara River)** ***Undesirable Algae*: Not Impaired (Niagara River Area of Concern)** • **Stage 2 Update report: Impaired for AOC (based on anecdotal evidence only re: algae in Welland R.)** • **2014 technical assessment of the Eutrophication or Undesirable Algae BUI to be undertaken in accordance with the terms outlined in the 2012 Great Lakes Water Quality Agreement Amended Protocol. Specifically, the BUI was assessed for the "waters of the Great Lakes", meaning the watersheds to the Niagara River were only considered in regard to causing any direct eutrophication or algae impacts on the Niagara River. This report contains the results of the assessment of the Eutrophication or Undesirable Algae BUI for the Ontario portion of the Niagara River AOC.**

Current RAP Delisting Criteria: A BUI evaluation method developed by the Toronto RAP was selected for the assessment of the Eutrophication or Undesirable Algae BUI in the Niagara River AOC. This framework provides a 'tiered' evaluation method. Based on the outcomes of these evaluations, a recommendation is made to the status of impairment and the potential re-designation of the beneficial use.
The tiers, in order of their application, are:

- Tier 1 – Comparing AOC conditions against acceptable guidelines or standards.
- Tier 2 – Comparing AOC conditions against appropriate reference sites.
- Tier 3 – Comparing AOC conditions against available data to form lines-of-evidence towards an overall assessment of the potential for impairment.

Status of BUI assessment:

Based on the weight-of-evidence, this assessment concludes that Eutrophication or Undesirable Algae is "Not Impaired" in the Niagara River (Ontario) AOC based on the following observations:

- Total phosphorus concentrations measured in the AOC did not unequivocally meet the Provincial Water Quality Objective criterion of 30 ug/L. However, this was attributed to sources upstream from the Niagara AOC and out of the scope of the Niagara River RAP.
- Phosphate and chlorophyll a concentrations in the Niagara River are generally equivalent to or less than those measured in unimpaired reference areas
- Soluble reactive phosphorus data were inconclusive.
- Dissolved oxygen concentrations in the Niagara River are generally above the Canadian Water Quality Guideline screening criterion of 6.5 mg/L for coldwater fish species. For the two observations that were below 6.5 mg/L, impact to biota was not expected.
- Historical Secchi disc depth values in the Niagara River are on par with or better than current day values in unimpaired reference areas.

These findings are consistent with other lines-of-evidence which suggest the lack of impairment for Eutrophication or Undesirable Algae in the Niagara River (Ontario) AOC. These include:

- Literature that suggests high flows, such as those in the Niagara River, are unlikely to support undesirable algal growth (Dodds, 2006; Maier et al., 2001);
- Lack of pervasive public opinion that algae is a problem in the Niagara River;
- The historical "Not Impaired" status of this BUI in the Niagara River (Ontario) AOC, and the lack of evidence that eutrophication indicators have changed since then; and
- The "Not Impaired" status for the Eutrophication or Undesirable Algae BUI in the Niagara River (New York) AOC.

IJC Listing Guideline: When there are persistent water quality problems (e.g. dissolved oxygen depletion of bottom waters, nuisance algal blooms or accumulation, decreased water clarity, etc.) attributed to cultural eutrophication.

Canadian/American AOC Comparisons: In the Niagara River (New York State) RAP, this BUI is designated "Not Impaired".

Lead agencies: Environment Canada, MOECC, NPCA, Niagara Region and City of Welland

What was the problem?

- The Stage 1 report (1993), Table A, stated that: "Accelerated eutrophication occurs in the Welland River and in parts of the Niagara tributaries. This is a result of a combination of low flow conditions and elevated nutrient levels in summer months."

- For undesirable algae, the Stage 1 report stated that: "Some algal species (principally *Cladophora)* are found in the Area of Concern but not at nuisance levels. Less desirable algae can be carried into the Niagara River from Lake Erie to Lake Ontario. This occurs occasionally, the latest occurrence was in summer of 1991."

What Do We Know?

- A 1985 IJC assessment indicated that the Niagara River did not suffer from eutrophication.
- The Welland River is the largest tributary to the Niagara River in the AOC. Considerable alterations have been made to the Welland River since European settlement for both shipping and hydroelectric production with the result that sediment and pollutant trapping and flow reversal patterns make it difficult to determine both the source and fate of sediment, phosphorous, bacteria and other pollutants entering the river.
- The Welland River exhibits all of the qualities of a degraded system: the greatest problem identified in the historic water quality dataset is the chronically high phosphorous concentrations and its related effects throughout the watershed.
- During the Stage 2 ten-year review, "Undesirable Algae" was re-designated as "Impaired" based only on anecdotal evidence.
- Niagara River water quality monitoring is carried out through Environment Canada's Niagara River Upstream/Downstream water quality monitoring program. Results for Total Phosphorous (TP) are generally below the Provincial Water Quality Objectives (PWQO) of 0.03mg/l.
- Environment Canada investigated phosphorus level data from upstream and downstream monitoring in the Niagara River and provided a summary report of the results in 2015.
- The Stage 2 Update reported an absence of key evidence of how the Welland River system is responding biologically to excess phosphorus.
- The Welland River Eutrophication Study Technical Working Group (TWG) reported Total P concentrations are 200% to 1500% greater than the PWQO, depending on the Welland River subwatershed. The tributaries contributing significant amounts of biologically available P to the Welland R. watershed are: Big Forks Creek, Beaver Creek, Oswego Creek and Tee Creek.
- The TWG concluded that there was insufficient data on specific parameters to determine delisting criteria for the Welland River, and recommended further water quality monitoring in the AOC. Monitoring continued during 2012 in the Welland River and tributaries with support from MOE and GLSF.
- Water quality monitoring is ongoing in the Welland River by the NPCA through collaborations with the City of Hamilton, Niagara Region, Environment Canada and MOE.
- The NPCA's GIS restoration database (initiated in 1991) contains data on restoration project types (Non-Point Source) and locations within the AOC (presented at Feb.15/12 implementers' session).
- The current NPCA's Water Quality and Habitat Improvement Program provides cost share grants to private landowner to improve water quality. Typical projects include fencing to keep livestock out of creeks, manure storage to prevent runoff, etc. (See Stage 2 Update report, Appendix 9).
- The City of Welland is undertaking STP/infrastructure upgrades & CSO separation as per preliminary capital budget (2011 – 2015). The actions are listed in the RAP work plan (2010-2015).
- A draft Environmental Assessment for a proposed High Rate Treatment facility at the City of Welland's Sewage Treatment facility is under review (reported by Niagara Region's project manager in Nov/12).
- 2012, the municipality of Queenston is seeking approvals for implementation of TP treatment to address issues with its Waste Water Treatment Plant.

What Has Been Done?

- The RAP Coordinator drafted Part 1 (background) of the BUI assessment report and the technical assessment (Part 2) was prepared by MOE's Environmental Monitoring & Reporting Branch in 2014. The draft BUI assessment report was peer reviewed by December 2014. The final report, 2015 recommended the Niagara River (Ontario) RAP change the status of Eutrophication or Undesirable Algae BUI to "Not Impaired".
- In 2012 the NPCA monitored the existing water quality stations in the Welland River watershed to track (temporal & spatial) nutrient concentrations and other water quality parameters. Eight samples were collected monthly at each sampling station beginning in April 2012 (see second bullet below).
- Two sub-watersheds (Beaver Creek and Big Forks Creek) of the Welland River were identified as contributing very high phosphorus loads to the Welland River watershed through the Welland River Eutrophication Study. In order to focus restoration efforts within these watersheds, the MOE and NPCA completed a nutrient track down to identify nutrient sources. MOE and NPCA staff identified fourteen water quality sampling stations in the Big Forks Creek and Beaver Creek watersheds. These stations were sampled biweekly by MOE and NPCA staff starting in March 2012 and concluding in November 2012. The MOE lab completed the analysis. MOE technical staff are currently analyzing the data for this project.
- In 2012, the NPCA initiated new water quality monitoring in the Lower Welland River watershed, the Chippawa Power Canal, and other non-Welland River AOC tributaries to characterize the nutrient and other water quality parameters.
- The NPCA produced Technical Reports (2009, 2010 and 2011) to summarize the results of the Welland River Eutrophication Study.
- In 2007, the RAP initiated the Welland River Eutrophication Study and established a multi-agency Technical Working Group (TWG) to carry out enhanced water quality sampling during 2008, 2009 and 2010 to specifically study the issue of eutrophication in the AOC. This monitoring continued during 2012 in the Welland River and tributaries with support from MOE and GLSF.
- 2007. The Niagara Region and the City of Niagara Falls completed construction of a new joint Central Pump Station – High Rate Treatment (HRT) facility, eliminating the Muddy Run CSO discharge to the Niagara River and significantly reducing CSO volume City-wide.
- The City of Welland has completed Pollution Control Plan studies and implemented infrastructure upgrades (projects of interest to the RAP are identified in the City's 5-year Sanitary Sewer Work Plan (2011-2015).

- The City of Welland's new Official Plan (2010) incorporates RAP supported policies for urban stormwater runoff & reduction of CSOs.
- Niagara Water Strategy conducted an audit and evaluation of CSOs in 2006. The CSO Management Action Plan was approved by Regional Council in 2007. The municipalities are obliged to report to MOE under Procedure F5-5 on progress on their CSO improvements.
- All AOC municipalities (i.e. Niagara Falls, Welland, Niagara-on-the-Lake and Fort Erie) have completed Pollution Control Plan studies & implemented facility upgrades, improved operations and used innovative technologies (e.g. Niagara Falls' High Rate Treatment Facility) to help reduce the number of discharges of untreated waste water to the environment (see Appendix 7, Stage 2 Update report).
- In 2004 & 2005, NPCA completed annual enhanced monitoring reports for the Niagara River AOC Tributary Monitoring Program.
- In 2001, the NPCA initiated a Water Quality Monitoring Program to collect long-term surface water quality data for AOC tributaries.
- In 1994 - present, Environment Canada, through the Great Lakes Cleanup Fund, provided funding to the NPCA to support the development of a rural non-point source monitoring and remediation program for the Niagara River (Ontario) AOC – the "Rural Clean Water Program".
- The Environmental Farm Plan (EFP) program was developed in 1993 by the Ontario Farm Environmental Coalition.
- The Stage 2 report (1995) presents Niagara Region Water & Wastewater projects completed since 1990 and those in progress under the 10 Year Capital Program at that time. An update to those projects is provided in Appendix 8 of the Stage 2 Update report (2009).
- In 1988, the Region of Niagara implemented a Sewer Use Program under the Municipal Act through the enactment of a Sewer Use Bylaw.
- Ambient water quality monitoring of the Welland River dates back to 1966, with samples collected by Provincial Water Quality Monitoring Network (PWQMN).

What Still Needs To Happen?

- To initiate public consultation, a public guidance document will be released to summarize the BUI assessment reports. The guidance document will explain how the assessment for each of the "Impaired" BUIs were completed, provide the rational for the "Not Impaired" re-designation and how to obtain more information. Following consultation with all stakeholders and the public, the RAP Coordinating Committee will complete a final evaluation and recommend whether or not all BUIs have been remediated or restored, resulting in the "delisting" of the AOC. The final decision to delist the Niagara River AOC will then be made by federal, provincial, and local RAP participants, with advice from the International Joint Commission.

When Will The Status Change?

- Goal 2017.

May 2016