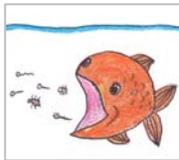


Hamilton Harbour RAP Beneficial Use Impairment (BUI)

i	ii	iii	iv	v	vi	vii	viii	ix	x	xi	xii	xiii	xiv
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DEGRADATION OF PHYTOPLANKTON & ZOOPLANKTON POPULATIONS



STATUS

2002 Status	Impaired	Requires Further Assessment	Not Impaired
2012 Status	Impaired	Requires Further Assessment	Not Impaired

APPROVED BY 2012 RAP STAKEHOLDER FORUM:

1. Beneficial Use xiii status remain "requires further assessment".
2. Beneficial Use xiii update be deferred until more information is available.

2002 HH RAP Delisting Objective:

When phytoplankton and zooplankton community structure does not significantly diverge from unimpacted control sites of comparable physical and chemical characteristics. Further in the absence of community structure data, this use will be considered restored when phytoplankton and zooplankton bioassays confirm no significant toxicity in ambient waters.

What Was the Original Problem in Hamilton Harbour?

The concern across many AOCs was various effluents entering the water, particularly phosphorous from sewage treatment plants and industrial contaminants, were creating chemically driven, unhealthy populations. Hamilton Harbour phytoplankton and zooplankton communities were described as being reflective of a eutrophic system due to their high numbers and their high level of activity. Studies of the toxicity of HH water to phytoplankton and zooplankton indicated no unusual toxicity, but the situation was under review.

IJC Listing Guideline (1991):

When phytoplankton or zooplankton community structure significantly diverges from unimpacted control sites of comparable physical and chemical characteristics. In addition, this use will be considered impaired when relevant, field-validated, phytoplankton or zooplankton bioassays (e.g. Ceriodaphnia; algal fractionation bioassays) with appropriate quality assurance/quality controls confirm toxicity in ambient waters.

IJC Delisting Guideline (1991):

When phytoplankton and zooplankton community structure does not significantly diverge from unimpacted control sites of comparable physical and chemical characteristics. Further, in the absence of community structure data, this use will be considered restored when phytoplankton and zooplankton bioassays confirm no significant toxicity in ambient waters.

Other AOC Comparisons:

The Bay of Quinte AOC has adopted a labour intensive (and expensive) method of long term (30+ years) biweekly monitoring of phytoplankton and zooplankton communities including taxonomy, biomass and production. The Detroit River AOC wants a composition and abundance reflective of oligotrophic/mesotrophic conditions. Michigan AOCs defer to their eutrophication/algae BUI criteria as a surrogate for a phytoplankton/zooplankton BUI.

Many Canadian AOCs are asking for clear direction from the federal and provincial governments on how best to proceed forward with this Beneficial Use. This direction will not be available before the end of the current HH RAP Stakeholder Forum process in June 2012.

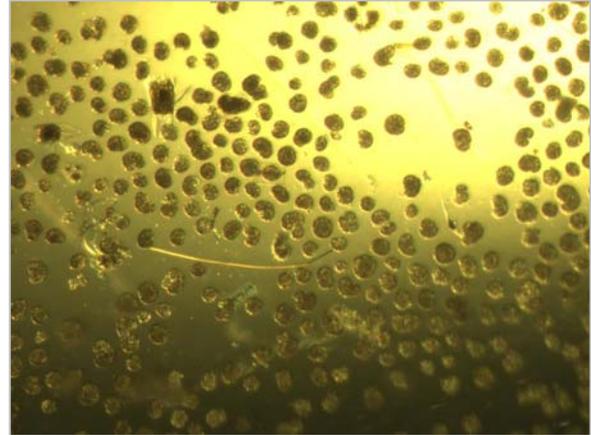
BACKGROUND INFORMATION

What Has Been Done?

- Various projects aiming to move the Harbour from a eutrophic state towards a mesotrophic state (WWTP upgrades, CSO containment, improved industrial discharges, watershed stewardship, etc.)

How Are Things Today?

- OMOE has sampled Hamilton Harbour as part of their Great Lakes Index-Reference Station Monitoring Program which cycles every three years, three times/year. Phytoplankton and zooplankton data are part of this data set; however, there has been no money to analyze the samples until now.
- DFO's Great Lakes Laboratory for Fisheries and Aquatic Sciences has conducted biweekly surveys of phytoplankton, zooplankton, microbial and benthic communities at 2 index stations from 2002 – 2009 with comprehensive spatial surveys in 2006.



HH phytoplankton bloom in 2006 @ 100x magnification (Munawar, DFO)

What Still Needs To Happen?

- In 2011, EC arranged for the counting and identification of the seasonal OMOE phytoplankton and zooplankton samples. DFO will interpret this data once the counting and identification are completed.
- DFO will resume biweekly sampling of microbial and planktonic communities in 2012 and follow up in 2014.
- From 2012-2015, DFO will be combining data from a number of Lake Ontario sites to develop a reference condition data set for a mesotrophic embayment. This data set is needed as there isn't one ideal reference site for HH to use for comparison. New sites will be identified and sampled to augment OMOE and DFO data sets.

When Will The Status Change?

- A status change from "requires further assessment" is expected around 2015 after an evaluation of all lines of evidence by the HH RAP Technical Team.

Where Can I Learn More?

Munawar, M. and M. Fitzpatrick. 2011. The application of Vollenweider's eutrophication models for assessing ecosystem health: Hamilton Harbour (Lake Ontario) example. *Aquatic Ecosystem Health & Management*. 14 (2): 204-208.

Doolittle, A.G., C.N. Bakelaar, and S.E. Doka. 2010. Spatial Framework for Storage and Analyses of Fish Habitat Data in Great Lakes' Areas of Concern: Hamilton Harbour Geodatabase Case Study.

Dermott, R., Johannsson, O., Munawar, M., Bonnell, R., Bowen, K., Burley, M., Fitzpatrick, M., Gerlofsma, J., and Niblock, H. 2007. Assessment of lower food web in Hamilton Harbour, Lake Ontario, 2002 -2004. *Can. Tech. Rep. Fish. Aquat. Sci.* 2729.

BARC. 2006. *Toward Safe Harbours: Progress Toward Delisting – Toxic Substances and Sediment Remediation*

HHRAP. 1992. *Remedial Action Plan for Hamilton Harbour. Environmental Conditions and Problem Definition. 2nd Edition of the Stage 1 Report.*

Most references can be provided by the HH RAP Office as a PDF upon request