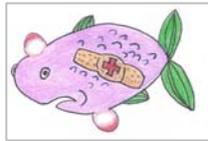


Hamilton Harbour Remedial Action Plan (HH RAP) Beneficial Uses

i	ii	iii	iv	v	vi	vii	viii	ix	x	xi	xii	xiii	xiv
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FISH TUMOURS OR OTHER DEFORMITIES



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 iv status be updated to “requires further assessment”.
2. Beneficial Use iv delisting objective wording be updated as follows:
Beneficial Use iv will be considered not impaired when incidence rates of fish tumours in brown bullheads, as an indicator species, do not statistically exceed rates at relevant reference site(s).

2002 HH RAP Delisting Objective:

When incidence rates of fish tumours or other deformities do not exceed rates at unimpacted control sites that are locally relevant and when survey data confirm the absence of neoplastic or preneoplastic liver tumours in bullheads or suckers.

Why Update the 2002 Status?

- Environment Canada reviewed fish tumour data from all Canadian AOCs (Completed 2010). Hamilton Harbour was the only AOC site of the six surveyed which had a statistically significant difference ($p \leq 0.05$) from its reference. An analysis of the age of the fish used from HH revealed they were older than reference site fish which may have been a factor in the higher number of tumours. This led to the recommendation that another round of sampling be undertaken for HH to determine the validity of the statistical difference.
- Environment Canada has budgeted for this additional HH survey to occur between 2012 and 2015.

Why Update the 2002 HH Wording?

Reasonable: Scientists no longer recommend “preneoplastic lesions be used as an actual impairment criterion” due to uncertainties they all progress to tumours (Baumann 2010, p. 5).

Achievable: Current wording specifies an “absence of...tumours”. This is not biologically achievable as these can occur naturally, hence the comparison to a reference site.

Measurable: A protocol for measuring fish tumours and statistically comparing results to reference sites has been established for use in Canadian AOCs.

BACKGROUND INFORMATION

What Was the Original Problem in Hamilton Harbour?

HH was the only Canadian AOC originally to be listed as “having a brown bullhead population with external and liver tumor epizootics during studies carried out prior to the mid 1990s” (Baumann 2010, p. 2).

IJC Listing Guideline (1991):

When the incidence rates of fish tumours or other deformities exceed rates at unimpacted control sites or when survey data confirm the presence of neoplastic or preneoplastic liver tumours in bullheads or suckers.

IJC Delisting Guideline (1991):

When the incidence rates of fish tumors or other deformities do not exceed rates at unimpacted control sites and when survey data confirm the absence of neoplastic or preneoplastic liver tumors in bullheads or suckers.

Other AOC Comparisons:

Detroit River AOC, Ohio AOCs, and Michigan AOCs specifically look to brown bullheads, but Jackfish Bay AOC does not specify a species. None of these AOCs refer to “neoplastic liver tumours”, but most refer to “fish tumour” and “deformities”. Fish sampled by Ohio and Michigan are to be three years or older. Detroit River establishes a minimum of two sampling events spaced three years apart to delist.

What Has Been Done?

Projects are indirectly related to reducing fish tumours or other deformities.

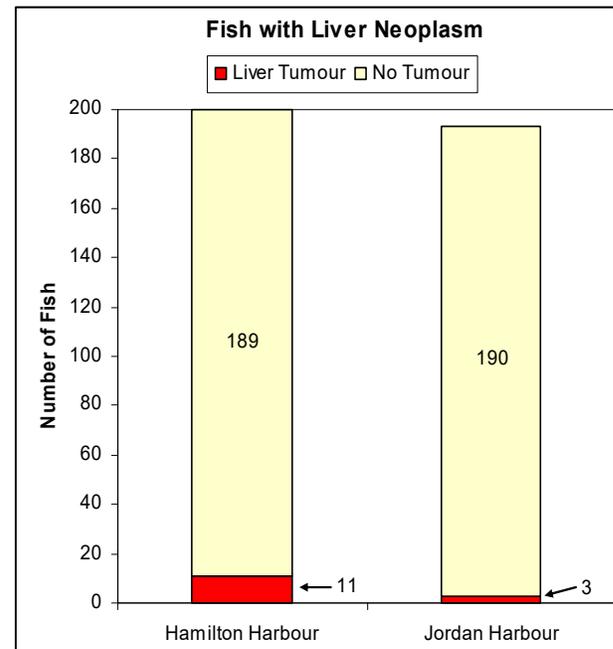
- MISA program reduced inputs of chemicals into HH by industry and municipal WWTPs (Ongoing)
- Natural burying of historical sediments by “cleaner” fill from the watershed and point source contributions (Ongoing)
- RBG Fishway – long term visual monitoring of fish traversing the Fishway provides anecdotal evidence on frequency of visible tumours (Ongoing)

How Are Things Today?

Environment Canada reviewed fish tumour data from all Canadian AOCs (Completed 2010). Hamilton Harbour was the only AOC site of the six surveyed which had a statistically significant difference from its reference.

Baumann Report Highlights:

- Hamilton Harbour samples were collected in 2001, 2005 and 2007.
- Jordan Harbour was used as the reference site.
- For all three years data combined, HH had a 5.5% liver tumour incidence, but Jordan Harbour only had 1.6%. This difference was statistically significant ($P = 0.013$).
- HH fish were the oldest mean age of any AOC sampled with 2007 samples averaging 3 years older than 2005 samples. Potentially “a more age specific comparison of the Hamilton Harbour [tumour] data might not demonstrate such a divergence from the reference data set.” (Baumann 2010, p. 13)



What Still Needs To Happen?

- “[A]n additional [HH] survey is recommended with sampling techniques or size cut-offs designed to simulate, as much as possible, the IC data base age structure” (Baumann 2010, p. 13). Environment Canada has budgeted for this additional HH survey to occur between 2012 and 2015.
- Randle Reef Sediment Remediation Project (in water work targeted for 2019 completion)
- ArcelorMittal Dofasco Boat Slip Sediment Remediation Project (targeted for 2015 completion)
- PCB source track-down for Windermere Arm (ongoing)

When Will The Status Change?

To be evaluated by the RAP Technical Team upon receipt of next HH survey results. If status reverts back to “impaired” based on that survey, anticipate a few years of recovery after the last sediment project is completed.

BACKGROUND INFORMATION

Where Can I Learn More?

Baumann, P.C., J. Sherry, B.J. Park, E.A. Blukacz-Richards, M.E. McMaster. 2012. Assessment of the Fish Tumor BUI for Canadian Areas of Concern in the Lower Great Lakes. *Journal of Great Lakes Research*. In Press.

Labencki, T. 2011. 2008 Field Season in the Hamilton Harbour Area of Concern. Hamilton Harbour PCB Assessment.

Baumann, P. C. March 2010. Data Analysis and Fish Tumor BUI Assessment for the Lower Great Lakes and Interconnecting Waterways.

BARC. 2004. Toward Safe Harbours: Progress Toward Delisting – Fish and Wildlife

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

REFERENCES