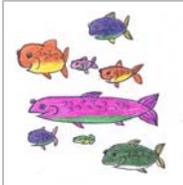


Hamilton Harbour Remedial Action Plan (HH RAP) Beneficial Uses

i	ii	iii	iv	v	vi	vii	viii	ix	x	xi	xii	xiii	xiv
STATUS													
DEGRADATION OF FISH POPULATIONS				2002 Status (fish)	Impaired	Requires Further Assessment	Not Impaired						
				2012 Status (fish)	Impaired	Requires Further Assessment	Not Impaired						

APPROVED BY 2012 RAP STAKEHOLDER FORUM:

- Beneficial Use iii status regarding fish populations remain "impaired".
- Beneficial Use iii delisting objective wording regarding fish populations be updated as follows:

Beneficial Use iii (fish populations) will be considered not impaired when the nearshore fish community has the following structure:

 - Shift from a fish community indicative of eutrophic environments (e.g. White Perch, Alewife, Bullheads, and Carp) to a self-sustaining community more representative of a mesotrophic environment with a balanced trophic composition that includes top predators (e.g. Northern Pike, Largemouth Bass and Walleye) and other native species (e.g. Suckers, Yellow Perch and Sunfishes).
 - Attain an Index of Biotic Integrity (IBI) of 55-60 for Hamilton Harbour and maintain the target score for two sequences of monitoring carried out a minimum of every three years. The IBI incorporates components of native species richness, numbers and biomass; piscivore biomass; non-native species; and reflects water quality and the quality of fish habitat.

2002 HH RAP Delisting Objective:

That the fish community has the following structure:

- Shift from a fish community indicative of eutrophic environments, such as White Perch, Alewife, Bullheads, and Carp to a self-sustaining community more representative of a mesotrophic environment, containing Pike, Bass, Yellow Perch, and Sunfish.
- Attain a littoral fish biomass of 200 - 250 kg/ha.
- Increase the species richness from 4 species to 6-7 species per transect.
- Increase the native species biomass from 37% to 80-90% of the total biomass.
- Reduce the spatial variability in fish biomass within the Harbour.
- Proposed nearshore fish community of Hamilton Harbour:

Category		Littoral Biomass (kg/ha)
Piscivores	(pike, bass)	40 - 60
Specialists	(Insectivores like pumpkinseeds and Yellow Perch)	70 - 100
Generalists	(Omnivores like Carp and Brown Bullhead)	30 - 90

The percent of fisheries biomass allocated to the three trophic groups was based on the effects of improved water quality in the Bay of Quinte and Severn Sound. The littoral fish biomass of 200-250 kg/ha was based on electrofishing data collected from Hamilton Harbour, Bay of Quinte and Severn Sound in 1990.

- Attain an Index of Biotic Integrity (IBI) of 55-60 for Hamilton Harbour.

Why Update the 2002 HH Wording?

Reasonable: This objective was updated in 2002 to include reference to an Index of Biotic Integrity (IBI). The objective for the composition of the HH fish community is specifically defined. The IBI integrates factors affecting the fish community and is a means to standardize the comparison of Hamilton Harbour with other areas in the Great Lakes. Bullets a – f in the 2002 version are all metrics included in the IBI calculation, so were redundant. Wording has been added to this delisting objective to include a period of monitoring to ensure sustainability of the fish community has been reached. HH objectives are consistent with both the OMNR HH Fisheries Management Plan and the Fish Community Objectives for Lake Ontario.

Achievable: This fish community structure and IBI are based on research from comparable Great Lakes sites and modified specifically for Hamilton Harbour. The HH RAP is not expected to be accountable for outside stresses on fish populations beyond our local control.

Measurable: Fisheries and Oceans Canada and the Ontario Ministry of Natural Resources conduct ongoing monitoring to measure these specific fishery targets.

What Was the Original Problem in Hamilton Harbour?

The fish community was dominated by invasive, pollution tolerant species; 60% of the Harbour wetlands had been filled to create Port and industrial land; and very few aquatic plants grew in the nearshore zone of the Harbour. Cootes Paradise and the mouth of the Grindstone Creek were dominated by carp.

IJC Listing Guideline (1991):

When fish and wildlife management programs have identified degraded fish or wildlife populations due to a cause within the watershed. In addition, this use will be considered impaired when relevant, field-validated, fish or wildlife bioassays with appropriate quality assurance/quality controls confirm significant toxicity from water column or sediment contaminants.

IJC Delisting Guideline (1991):

When environmental conditions support healthy, self-sustaining communities of desired fish and wildlife at predetermined levels of abundance that would be expected from the amount and quality of suitable physical, chemical and biological habitat present. An effort must be made to ensure that fish and wildlife objectives for Areas of Concern are consistent with Great Lakes ecosystem objectives and Great Lakes Fishery Commission fish community goals. Further, in the absence of community structure data, this use will be considered restored when fish and wildlife bioassays confirm no significant toxicity from water column or sediment contaminants.

Other AOC Comparisons:

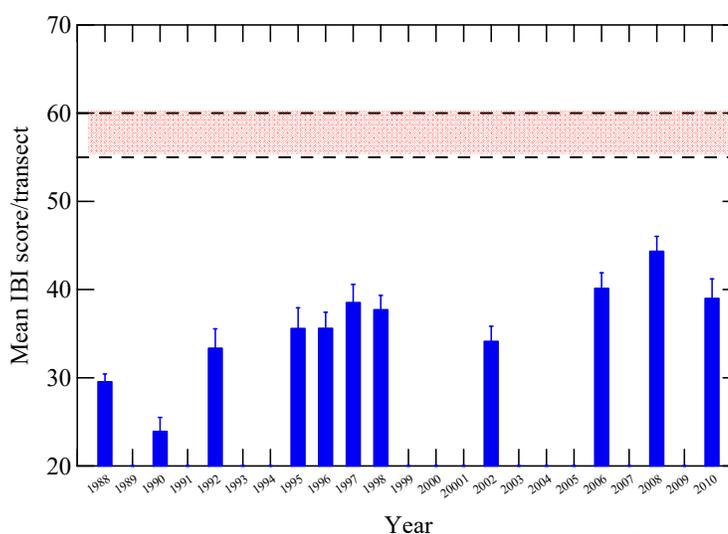
Other AOCs have tended towards more general targets for their fish communities, refer to their Fisheries Management Plan (St. Lawrence River AOC and Niagara River AOC), or compare to a suitable reference site (Jackfish Bay).

What Has Been Done?

Fish habitat has been added to six different sites around the harbour and improvements in water quality have seen the return of vegetation to the nearshore zone. Cootes Paradise restoration has been ongoing including the construction of a fishway/carp barrier. The mouth of the Grindstone Creek has included pike spawning ponds and wetland restoration.

How Are Things Today?

This figure shows the IBI (Index of Biotic Integrity) of the Harbour has improved from <30 in 1990 to ~40 in 2010. Over the years substantial data sets have been developed for the fish community and associated macrophyte and wetlands.



Source: Fisheries and Oceans Canada

What Still Needs To Happen?

- Water quality improvements required to meet Beneficial Use viii (Eutrophication or undesirable algae) will account for a major portion of the fishery changes directly in the Harbour. The restoration of the Cootes Paradise Marsh and the mouth of the Grindstone Creek as defined in Beneficial Use xiv (Loss of Fish and Wildlife Habitat) will aid to restructure the fish community.
- Ontario Ministry of Natural Resources plans to stock walleye in Hamilton Harbour (2012).
- Over the longer term, the Hamilton Harbour and Watershed Fisheries Management Plan targets cold water fish (lake herring) in the harbour.

When Will The Status Change?

The fish community will take years to respond to improvements to water quality and improvements to the habitat, particularly the restoration of the Cootes Paradise Marsh and Grindstone Creek. The desired outcome will likely come to fruition in the decade after 2020. It will however be possible to track the trend in the fish community via the IBI scores every few years.

Where Can I Learn More?

Stewart, T.J., A. Todd, S. LaPan. 2012. Fish Community Objectives for Lake Ontario. Public Consultation Draft. Ontario Ministry of Natural Resources and Great Lakes Fishery Commission.

http://www.mnr.gov.on.ca/en/Business/LetsFish/2ColumnSubPage/STDPROD_083935.html

Bowlby, J.N., K. McCormack, and M.G. Heaton. 2010. Hamilton Harbour and Watershed Fisheries Management Plan. Ontario Ministry of Natural Resources and Royal Botanical Gardens. <http://www.mnr.gov.on.ca/en/Business/LetsFish/2ColumnSubPage/251350.html>

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.

Brousseau, C.M. and R.G. Randall. 2008. Assessment of long-term trends in the littoral fish community of Hamilton Harbour using an Index of Biotic Integrity. Can. Tech. Rep. Fish. Aquatic. Sci. 2811.

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