III. GOALS AND OBJECTIVES

Considerable work went into designing the goals and objectives for the 1992 Stage 2 Report. Some of the rationales behind the selections can be found in the 1992 report (pg. 31 – 48). After making some changes to the original lists, the RAP Forum endorsed the following updated Goals and Objectives in 1999.

III.1 Vision

People living in the Harbour's watershed have a vision of Hamilton Harbour as a vibrant centrepiece in their community's life. They look towards a time when the environment will be balanced, friendly, accessible, clean and humming with diversity. They see the pleasure of recreation mixed with prosperity from use of the Harbour as an essential marine transportation link. They hope that what is a vision for them will be reality for generations to come.

III.2 Statement of Purpose of the Plan

A plan to bring about sustainable natural ecosystems in Hamilton Harbour and its entire watershed, and to improve the potential for more extensive recreational uses while maintaining the Harbour's and the watershed's essential economic function.

III.3 Primary Principles

1. Ecosystem approach.
2. Zero discharge of inputs of persistent toxic substances.
3. Sustainable communities

III.3.1 Ecosystem Approach

The ecosystem approach is intended to integrate social, economic and environmental matters. The Stakeholder approach used in this RAP brings together representatives from across a wide range of community interests. Although there may be potential water use conflicts among the stakeholders at the "round table" discussions, this is still envisioned as the best method to push forward remediation in order to realize the vision.

Three propositions underpin the ecosystem approach as set out in the 1992 Stage 2 Report:

1. **knowledge** that our species and its associated technology originated in the Biosphere and hence is part of Nature,
2. **ecological behaviour** that takes account of feedback at diverse levels, from personal to planetary, and
3. **ethical behaviour** based on an ethic of respect for other systems of Nature, comparable to an ethic of respect for other persons. (Vallentyne, 1982)

III.3.2 Zero Discharge of Inputs of Persistent Toxic Substances

The intent of this principle is to recognize zero discharge as the ultimate direction toward which actions ought to move, while recognizing there may be interim targets to apply along the way, and that resources will be applied in ways which bring the biggest benefit to the ecosystem, rather than "chasing the last molecule" of a substance.

III.3.3 Sustainable Communities

This principle was discussed as part of the ecosystem approach in the 1992 Stage 2 report. During the examination of the original goals and principles, the 1999 RAP Forum Stakeholders felt that it was important to highlight the concept of sustainable communities by elevating it into its own primary principle.

The City of Hamilton, the City of Burlington and the Regional Municipality of Halton are incorporating the concept of sustainable communities into the review of their respective Official Plans.

III.4 Secondary Principles

1. Human health protection with multiple Harbour uses.
2. Public support requires access and attention to foreshore uses of shoreline – land use planning.
3. Improved aesthetics and amenities are required.
4. Public education facilitates implementation.

III.5 Water Uses To Be Enhanced

1. Recreational boating: for the whole Harbour
2. Water sports: for specific areas.
3. Shipping and navigation: to continue in certain areas of the Harbour.
4. Industrial Use: to continue in certain areas, consistent with sustainability objectives.
5. Wastewater Receiving Body: subject to acceptable standards, assigned to certain areas and subject (where appropriate) to loading targets so as not to impede other uses.
6. Fisheries: permit edible, naturally reproducing warm water fishery, with no impact on coldwater species reproduction or edibility. Long-term goal of restored coldwater fishery in the Harbour.
7. Wildlife: healthy, self-sustaining resident and non-resident wildlife populations to be enhanced. Improved understanding and reconciliation of conflicts between human beings and wildlife in the urban environment to be gained.
8. Swimming and water contact sports: water quality to permit swimming in west end (short term) and certain other areas of the Harbour (long term), all with no impact on swimming in nearshore Lake Ontario.

9. Educational Resources: for all ages to be informed of the current (improved) conditions in the Harbour and watershed, enhancing awareness of this problem.
10. Access: improve quality and quantity for visual and physical access.
11. Aesthetics: improve shoreline and water aesthetics.

III.6 Plan Development and Implementation

Continuation of the Stakeholder Groups (Bay Area Restoration Council, BARC and Bay Area Implementation Team, BAIT) through each stage of development and implementation of the Plan, in order to:

- Consider the relation between official plans and the RAP
- Review current plans of the RAP
- Review goals of the RAP
- Promote remedial actions
- Audit and integrate public comment into the RAP

III.7 Great Lakes Water Quality Agreement

The water uses to be enhanced listed above can be compared to the 14 beneficial uses that are listed in Annex 2 of the Great Lakes Water Quality Agreement (GLWQA) of 1978, as amended by protocol, signed November 18, 1987 (Figure 5). The delisting objectives, as discussed later in this report in Chapter V: Attainability of Reaching Delisting Objectives, are directly linked to the 14 beneficial uses in the GLWQA (Figure 6).

The emphasis in the GLWQA beneficial uses has been placed on the proper functioning of populations of fish, aquatic birds and wildlife dependent on the Harbour. The proper functioning of the aquatic system to allow natural reproduction of a healthy, well-balanced biota that does not accumulate metals and organics is the key measure of the achievement of a clean body of water.

Figure 5: Remedial Action Plans as Characterized in the Great Lakes Water Quality Agreement of 1978, and amended by protocol of 1987 (Annex 2)

General Principles:

1. Systematic and comprehensive ecosystem approach.
2. "Plan shall provide a continuing historical record of … assessment … remedial action … methods … changes in environmental conditions and milestones."
3. Build on existing strategies
4. Reduce "point source impact zones to the maximum extent possible … pending the achievement of the virtual elimination of persistent toxic substances."
5. "Ensure that the public is consulted in all actions undertaken."

Plans to Include:

1. "A definition and detailed description of the environmental problem."
2. "A definition of the causes of use impairment."
3. "An evaluation of remedial measures in place."
4. "An evaluation of alternative additional measures."
5. "A selection of additional … measures … and a schedule."
6. "Identification of … (those) … responsible for implementation of remedial measures."
7. "A process for evaluating remedial measure implementation and effectiveness."
8. "A surveillance and monitoring process to track effectiveness of … measures and confirmation … of restoration of uses."

Impairment of a Beneficial Use:

This is intended to mean a change in the chemical, physical, or biological integrity of the Great Lakes System sufficient to cause any of the following:

1. Restrictions on fish and wildlife consumption
2. Tainting of fish and wildlife flavour
3. Degradation of fish and wildlife populations
4. Fish tumours or other deformities
5. Bird and animal deformities or reproduction problems
6. Degradation of benthos
7. Restrictions of dredging activities
8. Eutrophication or undesirable activities
9. Restrictions on drinking water consumption, or taste and odour problems
10. Beach closing.
11. Degradation of aesthetics
12. Added costs to agriculture or industry
13. Degradation of phytoplankton and zooplankton populations
14. Loss of fish and wildlife habitat

Source: Annex 2, Great Lakes Water Quality Agreement, as amended by protocol, signed November 18, 1987

Figure 6: Hamilton Harbour Delisting Objectives

NO.	BENEFICIAL USE IMPAIRMENTS AND HAMILTON HARBOUR DELISTING OBJECTIVES
(i)	***Restriction on fish and wildlife consumption.*** That there be no restrictions on consumption of fish and wildlife from the Harbour attributable to local sources.
(ii)	***Tainting of fish and wildlife flavour.*** When survey results confirm no tainting of fish or wildlife flavour.
(iii)	***Degraded fish and wildlife populations.*** 1. That the fish community has the following structure: a. 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. b. Attain a littoral fish biomass of 200 - 250 kg/ha. c. Increase the species richness from 4 species to 6-7 species per transect. d. Increase the native species biomass from 37% to 80-90% of the total biomass. e. Reduce the spatial variability in fish biomass within the Harbour.

NO.	BENEFICIAL USE IMPAIRMENTS AND HAMILTON HARBOUR DELISTING OBJECTIVES
(iii) cont'd.	f. 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 bullheads)* 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. g. Attain an Index of Biotic Integrity (IBI) of 55-60 for Hamilton Harbour 2. Colonial waterbirds: The overall objective is to have a self sustaining mixed community of colonial waterbirds generally with an increase of the rarer species and a reduction in the number of ring-billed gulls which currently nest in the Harbour. These figures are subject to revision once these general levels have been reached. Management of colonial waterbirds is experimental and achieving specific populations of particular species is highly speculative. Suggested Interim Targets — Number of Pairs Ring-billed gulls (Larus delawarensis) 5,000 Common terns (Sterna hirundo) > 600 Herring gulls (Larus argentatus) 350 Caspian terns (Sterna caspi) > 200 Double-crested cormorants (Phalacrocorax auritus) 200 Black-crowned night herons (Nycticorax nycticorax) 200 3. Other wildlife including waterfowl: No target will be suggested for other species of birds or animals, but a target for habitat has been suggested which will enhance wildlife populations generally. In addition, management of some species may be necessary as a result of habitat enhancement. That fish and wildlife bioassays confirm no significant toxicity from water column or sediment contaminants.

NO.	BENEFICIAL USE IMPAIRMENTS AND HAMILTON HARBOUR DELISTING OBJECTIVES
(iv)	***Fish tumours or other deformities.*** 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.
(v)	***Bird or animal deformities or reproductive problems.*** When the incidence rates of deformities or reproductive problems in sentinel wildlife species do not exceed background levels in control populations.
(vi)	***Degradation of benthos.*** Using the BEAST (BEnthic Assessment of SedimenT) Methodology: 1. Littoral Zone (depth < upper limit of maximum extent of anoxic conditions) • Benthic community structure (BCS) not different from that of appropriate reference sites in the Great Lakes (i.e., Hamilton Harbour sites determined as "equivalent to reference conditions" by BEAST methodology) and BCS not correlated to sediment contaminant levels among sites. • Absence of acute or chronic sediment toxicity attributable to contaminants in sediments. 2. Profundal Zone (depth > upper limit of maximum extent of anoxic conditions) • BCS not correlated to sediment contaminant levels among sites. • Absence of acute or chronic sediment toxicity attributable to contaminants in sediments.

NO.	BENEFICIAL USE IMPAIRMENTS AND HAMILTON HARBOUR DELISTING OBJECTIVES
(vii)	***Restrictions on dredging activities.*** When contaminants in sediments do not exceed biological and chemical standards, criteria, or guidelines such that there are no restrictions on disposal activities associated with navigational dredging.
(viii)	***Eutrophication or undesirable algae.*** That there are no persistent adverse water quality conditions for each of the components attributable to cultural eutrophication. The following net loading targets provide the specific objectives. Eutrophication goals and anticipated conditions in Hamilton Harbour, Cootes Paradise, and the Grindstone Creek area: TABLE 1: Net Loading Targets (Kg/d)

	Phosphorous		Ammonia		Suspended Solids	
	Initial	Final	Initial	Final	Initial	Final
Woodward WWTP	140	60	2270	530	3750	900
Skyway WWTP	30	12	470	115	500	200
King WWTP (Dundas)	5		22		28	
Main WWTP (Waterdown)	1		5		5	
CSOs	70	5	160	20	1400	200
Streams *	90	65				
Industry (combined)			400	270		
Stelco					4000	1500
Dofasco					3500	1500

* Stream loadings are extremely variable from year-to-year. The percentage of reduction is based on the estimated effect of best management practice.

NO.	BENEFICIAL USE IMPAIRMENTS AND HAMILTON HARBOUR DELISTING OBJECTIVES

(viii) cont'd.

TABLE 2: Environmental Conditions

	Hamilton Harbour		Cootes Paradise	Grindstone Creek Area	Beaches
	Initial Goals	Final Goals	Initial Goals	Initial Goals	Initial Goals
Phosphorus concentration (ug/L)	34	17	60 - 70	60 - 70	
Un-ionized Ammonia conc. (mg/L)	< 0.02	< 0.02	< 0.02	< 0.02	
Chlorophyll a conc. (ug/L)	15-20	5-10	20	20	
Secchi Disk Trans. (m)	2	3	1.5	1	1.2
Min. DO con. (ppm)	> 1	> 4	> 5	> 5	
Submergent/emergent aquatic plant area (ha)	105	170	240	50	
Suspended solids (ppm)			25	25	
Bacteria (E. coli organisms/100 ml water)					< 100

(viii) cont'd.

TABLE 3: Criteria for Determining Compliance with RAP Goals

GOAL	COMPLIANCE FORMULA
Compliance with environmental conditions with respect to Phosphorus, Secchi depth and chlorophyll a	13 out of 13 samples analysed weekly* at the centre station from June to August are at or better than the targeted level.
Compliance with environmental conditions with respect to unionized ammonia	Weekly samples from March to June at the centre station are not to exceed 0.02.
Compliance with environmental conditions with respect to dissolved oxygen	Weekly samples at 1 metre from bottom at centre station, from July to September are at or better than the targeted level.
Compliance with environmental conditions with respect to E. coli	Daily samples meet target on every day that is 48 hours after a rain event.

* Although weekly sampling is recommended at only one location, there will be periodic sampling of a large number of locations harbour-wide to confirm representativeness of the centre station.

NO.	BENEFICIAL USE IMPAIRMENTS AND HAMILTON HARBOUR DELISTING OBJECTIVES
(ix)	***Restrictions on drinking water consumption or taste and odour problems.*** That Hamilton Harbour water outflow to Lake Ontario not give rise to water quality restrictions on the water intakes for Hamilton and Halton.
(x)	***Beach closings. (Water contact sports.)*** 1. That Hamilton Harbour effluent to Lake Ontario not give rise to conditions which would cause restrictions on open Lake water contact sports. 2. That water quality conditions in the west-end and in the north-half of the Harbour, be such as to permit opening of beaches and which would cause no significant restriction on water contact sports.
(xi)	***Degradation of aesthetics.*** When the waters are free of any substance which produces a persistent objectionable deposit, unnatural colour or turbidity, or unnatural odour (e.g. oil slick, surface scum, algae).
(xii)	***Added cost to agriculture or industry.*** When there are no significant additional costs required to treat water prior to use for industrial purposes (i.e. intended for commercial or industrial applications and non-contact food processing). Cost associated with zebra mussels or other invasive organisms are excepted. An added cost related to withdrawal of water from the Harbour to agriculture is not appropriate as this is not a use directly applicable to Hamilton Harbour.

NO.	BENEFICIAL USE IMPAIRMENTS AND HAMILTON HARBOUR DELISTING OBJECTIVES
(xiii)	***Degradation of phytoplankton and zooplankton populations.*** 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.
(xiv)	***Loss of fish and wildlife habitat.*** 1. Provide 500 ha of emergent and submergent aquatic plants in Hamilton Harbour, Cootes Paradise, Grindstone Creek delta, and Grindstone Creek marshes in accordance with the Fish and Wildlife Habitat Restoration Project (360 ha FWHRP sites + 140 ha littoral zone). 2. Provide 15 km of littoral shore. 3. Provide 300 ha of wildlife habitat. 4. Provide 3 ha of colonial nesting bird habitat.