THE CITIZENS ENVIRONMENT ALLIANCE OF SOUTHWESTERN ONTARIO

REPORT TO THE DETROIT RIVER CANADIAN CLEANUP COMMITTEE ON THE RESTORATION OF THE DETROIT RIVER AREA OF CONCERN:

Changes to the draft document entitled Criteria for Determining Delisting Eligibility for Impaired Beneficial Uses in the Detroit River Area of Concern (Appendix A) based on Public Meetings hosted by the Citizens Environment Alliance in February and March 2001.

Note: The Citizens Environment Alliance hosted three public meetings on the restoration of the Detroit River Area of Concern in February and March 2001. These meetings, and this report, were funded by the Restoration Programs Division of Environment Canada.

June 2001

Introduction:

Three binational meetings were held in Windsor and Detroit (February 22, 2001 and February 24, 2001 in Windsor and March 13, 2001 in Detroit). Approximately 150 people came to express their views on the priority for remediation of the Detroit River Area of Concern.

The public meetings were another stage in the development of delisting criteria for the Detroit River Area of Concern. A draft delisting criteria document, Criteria for Determining Delisting Eligibility for Impaired Beneficial Uses in the Detroit River Area of Concern (Appendix A) was prepared by the Detroit River Canadian Cleanup Committee (DRCCC) and presented to the public for their views. The draft delisting criteria presented for public scrutiny were to be based on the development of a "list of comprehensive and scientifically valid targets/delisting objectives in consultation with the binational scientific community."

However, many of the delisting criteria are qualitative in nature, i.e. without numerical values, levels etc. being provided. Many of the use impairment criteria are insufficient to determine publicly acceptable delisting criteria because of the lack of substantive scientific definition and analysis. Overall, the deficiencies in baseline data and inadequacies in monitoring that have been apparent for many years render the establishment of delisting criteria, of a system that that is poorly understood, premature.

Highlights:

The following conclusions and recommendations are the result of the public meetings. Further follow-up meetings need to occur to assess progress on the recommendations of these public hearings.

General framework for improving criteria and establishing delisting progress:

- A specific set of parameters or conditions needs to be established that clearly defines when the beneficial use has been restored.
- Delisting criteria should be appropriate to the Detroit River ecosystem.
- The criteria should consider the most severely affected – the most sensitive component of the ecosystem (e.g. scientifically demonstrating recovery in the Trenton Channel).
- Sufficient procedures have to be established to verify continued ecosystem health (e.g. rigorous, comprehensive sampling and monitoring and removing or reducing bias from sampling and monitoring; suitable controls and reference sites have to be clearly defined).
- Delisting criteria based on standards or guidelines is transitory, need to also focus on health effects, i.e. risk based assessment.
- There are primary and secondary criteria. Primary criteria are the lynchpins that the other criteria hang on. For example, tainting of fish flavour is not a primary concern while fish consumption advisories are in place. Thus the fish tainting criteria may be met when more important concerns have been dealt with.
- The lack of monitoring must be resolved prior to dealing with issues such as degradation of populations. We must examine the most sensitive indicators, the populations that live in the river. Thus the numbers have to be determined through sufficient monitoring.
- Proper indicator species, i.e. the most sensitive, have to be monitored for fish tumors and bird or animal deformities. Bald eagles are not a proper indicator species because they are not as resident in the area as other birds. The use of insects should be considered since they are, in the main, a resident species. Zooplankton is a candidate study species since tumors have been noted in this species.
- Where uncertainty exists, for example eutrophication or undesirable algae, monitoring needs to be in place. If we state it as no impact then evidence needs to be provided.
- Restrictions on drinking water consumption are secondary and long-term criteria. Using filters to drink water, such as carbon filters is non-standard, thus this is an impaired use.

- Degradation of aesthetics is a secondary concern. For example, when oil or petrochemicals are in the water then it is not simply an aesthetic problem.
- Degradation of phytoplankton and zooplankton populations: Impaired community structure cannot be judged as being unimpaired; it is unknown. Toxic contaminants should be added to delisting criterion.
- Loss of fish and wildlife habitat is a primary criterion because habitat is being continually degraded and destroyed. The amount of critical mass of habitat has to be determined. In terms of land use management or development, the first step must be a moratorium: no further loss of habitat.
- Using standards to determine delisting should not open loopholes such as polluting up to a standard. If levels are shown to be below standard then they must stay at that level or lower.
- Upstream – Downstream monitoring is insufficient. There must be an understanding that substantive monitoring data, e.g. Upper Great Lakes Connecting Channels Study (UGLCCS), needs to be a continual process not ad-hoc or intermittent.

Primary Impairments of the Detroit River Area of Concern

USE IMPAIRMENT	DRCCC 1998 CONCLUSION	DRCCC draft (2000) CONCLUSION	Citizens' 2001 CONCLUSION
Restrictions on fish and wildlife consumption	Impaired	Impaired	Impaired
Degraded fish and wildlife populations	Impaired	Impaired	Impaired
Fish tumors or other deformities	Impaired	Impaired	Impaired
Bird or animal deformities or reproductive problems	Impaired	Impaired	Impaired
Degradation of benthos	Impaired	Impaired	Impaired
Degradation of phytoplankton and zooplankton populations	Not impaired	Community Structure not impaired. Evidence of toxicity.	Impaired
Loss of fish and wildlife habitat	Impaired	Impaired	Impaired
Exceedance of water quality standards/ objectives	Impaired	Status Undetermined	Impaired

Until these beneficial use impairments are restored in a statistically demonstrable and defensible manner, scarce resources dedicated to "de-listing" secondary impairments should not occur. The restoration of primary impairments is requisite for achieving progress in any of the secondary impairments.

Secondary Impairments of the Detroit River Area of Concern

USE IMPAIRMENT	DRCCC 1998 CONCLUSION	DRCCC draft (2000) CONCLUSION	Citizens' 2001 CONCLUSION
Tainting of fish and wildlife flavor	**Impaired**	**Impaired**	**Impaired**
Restrictions on dredging activities	**Impaired**	**Impaired**	**Impaired**
Eutrophication or undesirable algae	**Not impaired**	**Not impaired**	**Status Undetermined. Insufficient monitoring.**
Restrictions on drinking water consumption or taste or odor problems	**Impaired**	**Impaired**	**Impaired**
Beach closings	**Impaired**	**Impaired**	**Impaired**
Degradation of aesthetics	**Impaired**	**Impaired**	**Impaired**
Added costs to agriculture or industry	**Not impaired**	**Not impaired**	**Status Undetermined. Insufficient monitoring.**

These beneficial use impairments should not be targeted for "delisting" until the successful restoration of the primary beneficial use impairments is achieved. Dedicating resources to the delisting of *tainting of fish and wildlife flavor*, for example, while there are restrictions on fish and wildlife consumption is neither in the public interest nor does it make much sense.

Specific Public Comments on the Draft Delisting Criteria

NOTE: quotation marks refer specifically to words or phrases from the draft document Criteria for Determining Delisting Eligibility for Impaired Beneficial Uses in the Detroit River Area of Concern (Appendix A). Additions, corrections, changes and comments are included below, sometimes with the addition of bold font.

Preamble (second Paragraph):

"In order for each impaired beneficial use to be considered eligible for delisting, it is recommended that the responsible agency provide statistically" ***defensible*** "robust evidence that demonstrates a trend in the environmental response in the desired direction." ***i.e. how far has it moved in the desired direction and is that trend continuing?*** …

1) Restrictions on Fish and Wildlife Consumption

Consistent consumption advisories must precede other actions to restore this (BUI). Consistent standards for testing, sampling methods and the assessment of substances are necessary to determine actions. Standards are continually changing; decreasing to "acceptable levels". Focus should be placed on health effects, risk based analysis.

Delisting Criteria:
1) "Most stringent action levels", is too vague. Whose most stringent action levels?
2) There are ***currently*** no consumption advisories for wildlife.
3) Contaminant levels in fish and wildlife disprove the established null hypothesis based upon continued monitoring programs.

Null hypothesis: downward trends do not provide sufficient confidence for delisting. Establish a safe level of consumption agreed upon by scientists through consistency in sampling design and methods, chemicals that are tested and advisory triggers. If monitoring then shows that this agreed upon level is exceeded the conclusion is that the use is impaired. In other words, test and sample to show that an established null hypothesis is not true.

Current monitoring guidelines are considered too weak and thus an inefficient means of delivering desired actions.

2) Tainting of fish and wildlife flavour

This is a secondary BUI. Should only establish delisting criteria when other beneficial use impairments have been removed, particularly when restrictions on fish and wildlife consumption have been lifted.

3) Degradation of Fish and Wildlife Populations

Suggested Delisting Criteria also should include:

3) biodiversity: develop fish community goals. Analyze community structure in relation to current habitat. Indicator species have to be sensitive to changes in the River and spend their entire life in the river.

4) Analysis of genetics. Fish of the river must have healthy genes.

Suggested monitoring activity from draft: "none" is insufficient. Overall there is a lack of monitoring and lack of historical data on the number of species in the river. Additionally, an indicator species must be found to assess the impact of exotic/invasive species.

4) Fish Tumors or Other deformities

Suggested Delisting Criteria: suitable reference sites must be defined for this and any other criteria in which this phrase appears.

Suggested Monitoring Activities are insufficient. Monitoring must be spatially adequate for the entire AOC.

5) Bird or Animal Deformities or Reproduction Problems

Zooplankton tumors should be referenced for this criterion.

Suggested Delisting Criteria: 1) suitable reference sites, same as above. 2) Bald eagles are insufficient as a resident species and should not be included as such. A more resident species is required, perhaps an insect species.

6) Degradation of Benthos

Incorrect spelling of Edsall et al. and Hexagenia

Suggested Delisting Criteria: sediment quality guidelines must be biologically based guidelines. 1) reference sites question in this instance should be referred to Trefor Reynoldson.

7) Restrictions on Dredging Activities

This must include any and all dredging in the AOC.

Data/Study needs: Confined Disposal Facilities: how many are there? What is the quality of the sediment in the facility? Monitoring for leakage from facilities must occur on a continual basis.

8) Eutrophication or Undesirable Algae

"NO for Detroit River" There are no established target loads of phosphorous for the Detroit River; loadings are based on target for Lake Erie.

Suggested criteria: 1) establish target loadings; there are none for Lake Erie from Detroit River.

2) A target that requires monitoring, see null hypothesis below.

Monitoring needs: Monitoring needs to be in place to determine if downstream concentration is not higher than incoming concentration to the river.

A null hypothesis needs to be applied; show that there is no negative impact to Lake Erie. For example, the null hypothesis would state that the downstream concentration is greater than the upstream concentration. Monitoring needs to be in place to prove that the downstream concentration is equal to the upstream concentration.

9) Restrictions on Drinking Water Consumption, or taste and Odour Problems

Concerns: City of Detroit takes at least 15% of its water from Lake Huron. The City of Windsor has increased its chlorine content. Carbon treatment is a non-standard treatment and thus represents the fact that this criterion continues to be impaired.

Suggested Monitoring Activities: insufficient. A potential conflict of interest exists in the responsible agencies supplying the water and examining what is in the water in order to meet guidelines.

10) Beach Closings

Safe beaches are necessary, but not sufficient. Is it safe to swim in the river and have contact with the water? Contact with the water is occurring throughout the AOC not just at beaches.
Suggested Delisting Criteria: This criterion must include the consideration of whether it is safe to swim throughout the Detroit River and whether the bacteria levels throughout the river are safe. There would then be a requirement for better sampling.
Suggested Monitoring Activity: Identify beaches and standards for closing. (addition)

11) Degradation of Aesthetics

A secondary criterion due to the fact that if primary criteria are delisted it is likely that improvement will be possible in this criterion.
Suggested Delisting Criteria: eliminate "OR" that separates 1) and 2). Both need to occur before delisting.
Suggested Monitoring Activity: compilation of a visual record e.g. photographs, videos, etc., to document improvements

12) Degradation of Phytoplankton and Zooplankton Populations

Impaired community structure: should be stated as Unknown. Study needs include plankton community structure study compared to suitable reference sites, thus the state of impairment of the community structure is UNKNOWN.
Suggested Delisting Criteria: this should include toxicity: "Plankton are free of bioaccumulative and toxic contaminants …"
Monitoring: renew toxicity monitoring

13) Loss of Fish and Wildlife Habitat

This is a primary criterion because habitat is being continually lost. As an initial step, establish a moratorium on further loss or development that would cause the loss of further habitat. We then need to reestablish habitat.
Data/Study needs: Establish a baseline; what is the amount of habitat currently available and what is necessary to support biodiversity.
Suggested Delisting Criteria: Targets or goals must be set to achieve a level of habitat that is biologically sustainable for fish and wildlife in the AOC.
Suggested Monitoring Activity: "Determine desirable animals (indicator species) and habitat required to support them." This is not monitoring, it is research and should be placed into Data/Study needs.

14) Exceedance of Water Quality Standards/Objectives

This is a primary criterion because it encourages monitoring and is another way to demonstrate that the Area of Concern has been restored.
Data/Study needs: "which standards, objectives and guidelines are being monitored?" NONE
"which standards, objectives and guidelines are being exceeded? " A lack of monitoring means this question cannot be answered.
Suggested Delisting Criteria: 3. Minimal impact on Lake Erie – to be defined in conjunction with the Lake Erie LAMP (addition)
Suggested Monitoring Activity: "monitoring program based on the applicable guidelines of the responsible agencies." This is insufficient.

- Appendix A -

Criteria for Determining Delisting Eligibility for Impaired Beneficial Uses in the Detroit River Area of Concern

December 2000

Criteria for Determining Delisting Eligibility for Impaired Beneficial Uses in the Detroit River Area of Concern

In 1987 the governments of Canada and the United States signed a Protocol amending the Great Lakes Water Quality Agreement of 1978 with the addition of Annex 2, "Remedial Action Plans and Lakewide Management Plans." Under this annex, the two governments identified 43 environmentally degraded hot spots or Areas of Concern (AOC) throughout the Great Lakes where changes had occurred in the chemical, physical or biological integrity of the ecosystem sufficient to impair one or more of 14 enumerated beneficial uses. (Appendix One) For each AOC, the two federal governments undertook to cooperate with the state and provincial governments to prepare three-stage Remedial Action Plans (RAPs). Under the Agreement, the International Joint Commission[1] reviews and comments on RAPs as each stage is completed and submitted for approval.

A Stage One RAP includes the definition and detailed description of the environmental problem(s) in that AOC. All impaired beneficial uses must be identified, including the degree and geographic extent of the impairment. And causes of the impairment, including a description of all known sources of pollution and evaluation of other possible sources, must be outlined.

A Stage Two RAP evaluates exisiting existing remedial measures. Where those are inadequate, it identifies and selects additional remedial actions and develops an implementation schedule. For each remedial measure, a stage two RAP also identifies the actor, individuals or agency, responsible for implementing the action.

A Stage Three RAP is submitted for approval when monitoring indicates that the impaired beneficial uses have been restored. This means that the stage three document must identify a process for evaluating the implementation and effectiveness of remedial measures, typically a monitoring program. And it must describe how the program will monitor progress and confirm restoration of beneficial uses.

This document represents an important step in the RAP process — the identification and refinement of impaired beneficial uses and a definition of the criteria that will be used to determine when impaired beneficial use will be considered eligible for delisting. In July 2000 a group of scientists, resource managers and other individuals with an interest in the RAP process in the Detroit River Area of Concern met at the Great Lakes Institute for Environmental Research (GLIER) at the University of Windsor. (Appendix Six) The purpose of the meeting was to begin developing delisting criteria, which is the guide, or measure, for determining that a beneficial use has been restored.

The group reviewed the assessment of impaired beneficial uses enumerated in the Stage One RAP, the IJC's review of the Stage One, a 1996 RAP update and the *Detroit River Update Report* (1999). It identified data sets and studies that supported beneficial use impairment (BUI) assessments, where known. Where data sets and/or studies were not known, the type of data/study required for assessment purposes was identified. Finally, the group suggested preliminary delisting criteria with scientifically determined targets, i.e. numbers of species/area, or amount of habitat, or chemicals below a specific measure (micro grams per gram).

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[1] The International Joint Commission (IJC) is an independent, binational commission created under the Boundary Waters Treaty of 1909 and consists of six commissioners, three each appointed by the President of the United States and the Governor-in-Council (prime minister and cabinet) of Canada. The IJC has quasi-judicial, investigatory and arbitrational powers to implement and oversee the Boundary Waters Treaty. The Treaty enumerates rules for developing shared water resources between Canada and the United States. In 1972, Canada and the United States signed the Great Lakes Water Quality Agreement which assigned additional responsibility to the IJC to oversee and report on progress under the Agreement which the IJC now does by issuing biennial reports on progress and by reviewing and commenting on Remedial Action Plans and Lakewide Management Plans.

At the July 27, 2000 meeting those in attendance grouped the Detroit River beneficial use impairments into three categories: ecosystem objectives, standards and public. Three sub-committees were struck and asked to meet, review the elements of the beneficial uses developed on July 27 and assigned to the sub-group; refine the understanding of use impairment (ie identify further studies assessing impairment status, identify specific data needs to assess impairment status/recovery, and identify possible monitoring activities), consider further refinement of initially identified delisting criteria and report findings back to larger group in order to facilitate development of delisting document for public consultation. (Appendix Seven)

Ecosystem Objectives: 1) Restrictions on Fish and Wildlife Consumption; 3) Degradation of Fish and Wildlife Populations; 4) Fish Tumors or Other Deformities; 5) Bird or Animal Deformities or Reproduction Problems; 6) Degradation of Benthos; 13) Degradation of Phyto/Zooplankton Populations; 14) Loss of Fish and Wildlife Habitat.

Standards: 1) Restrictions on Fish and Wildlife Consumption; 7) Restrictions on Dredging Activities; 8) Eutrophication or Undesirable Algae; 9) Restrictions on Drinking Water Consumption, or Taste and Odour Problems (focus on first issue); 10) Beach Closings; 15) Exceedence of Water Quality Standards/Objectives.

Public: 2) Tainting of Fish and Wildlife Flavour; 9) Restrictions on Drinking Water Consumption, or Taste and Odour Problems (focus on the latter issue); 11) Degradation of Aesthetics; 12) Added Cost to Agriculture or Industry.

The main group met again on December 8, 2000. This meeting reviewed the work of the sub-committees and further refined the delisting criteria. The document that follows reflects the work submitted by the sub-committees and the comments and suggestions of those present at the December 8 meeting, as well as comments submitted by those who could not attend.

PREAMBLE
The Boundary Waters Treaty of 1909 obliges the governments of Canada and the United States to avoid polluting the water on one side of the boundary to the detriment of health and property on the other. In the spirit of that commitment, the two governments signed the Great Lakes Water Quality Agreement in 1972 and agreed to a revised Agreement in 1978. Given the purpose and intent of these treaties and agreements, it is generally accepted that the most stringent standards, objectives and guidelines will be applied to the boundary waters of the Great Lakes system. Thus, for the Detroit River Area of Concern delisting criteria, we also adopt the current most stringent standards, objectives and guidelines and apply those where applicable, recognizing that standards, objectives and guidelines are changed periodically to reflect a more refined understanding of the ecosystem.

In order for each impaired beneficial use to be considered eligible for delisting, it is recommended that the responsible agency provide statistically robust evidence that demonstrates a trend in the environmental response in the desired direction and that the trend in the environmental response be consistent with actions taken to remediate the condition.

1) Restrictions on Fish and Wildlife Consumption:
Fish: YES
Wildlife: YES, extent unknown

The Beneficial Use Impairment (BUI) for fish is based on current Michigan and Ontario consumption advisories for fish from the river that contain elevated levels of mercury and polychlorinate biphenyls (PCBs). Advisories also exist for dioxin in whitefish in western Lake Erie. Other contaminants may trigger future consumption advisories. The Michigan fish consumption advisory is based on carp and muskellunge data collected by the Michigan DNR.

No wildlife consumption advisories presently exist for the Detroit River. However, an EPA-funded study of PCBs in 13 ducks collected near Mud Island (Smith et al. 1985) revealed concentrations of 2.7-20 ppm that "may present a hazard to humans."
Bruce Manny (Manny 1999a) identified Fish and Wildlife Service studies of chlordane and other pesticides for Teal and young of year geese populations on Grassy Island. All exceed FDA guidelines. Manny also noted that wild celery tubers were uncontaminated even though growing in contaminated sediments (Manny 1999b).

For a better understanding of the degree of impairment, there is a research need to look at human health and the genetic/cancer impact on the most at risk populations. Researchers also need to determine what data exists on wildlife being eaten beyond ducks, ie turtles, muskrats, etc. For example, do wildlife consumption advisories exist in any other North American jurisdictions? If so, would levels of toxic chemicals found in edible tissues of game species in the watershed trigger wildlife consumption advisories?

c) Suggested Delisting Criteria:
This beneficial use impairment will be considered eligible for delisting when:

1) Levels of dioxin, PCBs, mercury and future relevant contaminants in fish tissue shall be less than the current most stringent action levels. (See Appendix Two); and
2) There are no human consumption advisories for wildlife; and

The responsible agency can demonstrate a continuing downward trend in the data
Contaminants levels in fish and wildlife remain below current most stringent trigger concentrations for a minimum of five years.

d) Suggested Monitoring Activity:
– monitoring program based on the applicable guidelines of the responsible agencies.
Annual analysis of food fish and wildlife consumed by humans for PCBs, mercury and dioxin. Analysis to continue annually after delisting to ensure fish and wildlife still safe for human consumption.

2) Tainting of Fish and Wildlife Flavour:

Fish: YES

Wildlife: No data exists to determine impairment, therefore we require a flavour study

a) Identified data sets/studies:

— Health Canada Angler Survey (many anglers fish on Windsor side b/c fish flavour better)

— Michigan DNR taste tests from the 1990s; based on studies outlined in American Society for Testing and Methods (ASTM)

b) Data/study needs:

— A statistically valid controlled study (olfactory/taste) and rotating (temporally) public opinion survey. Possibility that industry, service groups (such as Rotary) and Ontario Federation of Anglers and Hunters/Michigan United Conservation Clubs be approached to help with survey. Manny identified Traverse City quality of life index as a possible model.

— Use Health Canada angler survey to locate problems; this to be followed with a scientific fish flavour study possibly based upon Michigan DNR taste test methodology noted above.

c) Suggested Delisting Criteria:

The beneficial use impairment will be considered eligible for delisting when:

1) Representative angler and hunter survey results and ASTM taste studies confirm no tainting of fish flavour.

CAVEATS: a) survey/study to be determined, scientific fish taste/odour survey suggested;
b) definition of "no" to be determined.

d) Suggested Monitoring Activity:

1) Representative angler and hunter survey
2) ASTM flavour study

3) Degradation of Fish and Wildlife Populations:
Fish: YES
Wildlife: YES

a) Identified data sets/studies:

— Canadian Wildlife Service Herring Gull data
— Bruce Manny, *An Ecological Profile of the Detroit River* (1988)
— US Geological Survey Fish health survey in Trenton Channel (brown bullhead, large mouth bass and walleye)
— possibly Ontario MNR index fish netting
— Michigan DEQ fish survey for toxics — carp/walleye (1998, 1999)
– Manny referenced brown bullhead genetic study (early 1990s)
– Manny referenced historic data on diversity of species found in the river
– spatial extent outlined in Detroit River Update Report (1999)
– Ecosystem sub-committee noted declining trend in numbers of species using the river and the genetic quality within the remaining species.

b) Data/study needs:

– none suggested

c) Suggested Delisting Criteria:
The beneficial use impairment will be considered eligible for delisting when:

1) When environmental conditions support healthy, self-sustaining communities of most sensitive indicator species at 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; and
2) When fish and wildlife bioassays confirm no significant toxicity from water column or sediment contaminants.

Doug Haffner to add sentences/paragraph on guidelines for protection of fish and wildlife (for joint Cleanup Committee/Detroit RAP Steering Committee meeting)

d) Suggested monitoring activity

– none suggested.

e) Possible interim objectives/goals

1) measure of breeding success among most sensitive indicator species

4) Fish Tumors or Other Deformities:

YES

a) Identified data sets/studies:

— U.S. Geological Survey Fish Health Study (most recent report 1999) finds lesions/tumours on brown bullhead livers.

— Manny has photos of gross skeletal deformities of walleye and bullheads taken at the mouth of the Rouge River.

— Todd A. Leadley et.al. 1998. Chemical Accumulation and Toxicological Stress in Three Brown Bullhead (Ameuius Nebulosus) Populations in the Detroit River, Michigan, USA. Environmental Toxicology and Chemistry. 17(9): 1756-1766.

— Ronald W. Russell, et.al. 1999 Role of Chemical and Ecological Factors in Trophic Transfer of Organic Chemicals in Aquatic Food Webs. Environmental Toxicology and Chemistry 18(16): 1250-1257.

— G. Douglas Haffner. 1998. Concentrations and Distributions of Polychlorinated Biphenyls, Including Non-Ortho Congeners, in Mink Populations From Southern Ontario. Journal of Great Lakes Research 24(4): 880-888.

— Tracy L. Metcalfe, et.al. 2000. Distribution of Toxic Organic Contaminants in Water and Sediments in the Detroit River. Journal of Great Lakes Research 26(1): 55-64.

— B.A.R. Environmental. 1986. "Survey of Critical Fish Habitat Within International Joint Commission Designated Areas of Concern." Report to Department of Fisheries and Oceans Canada.

— Ecocern Inc. 1987. "Survey of Critical Fish Habitat Within International Joint Commission Designated Areas of Concern." Report to Department of Fisheries and Oceans Canada.

b) Data/study needs:

– none suggested

c) Suggested Delisting Criteria:

This beneficial use impairment will be considered eligible for delisting when:

1) The incidence of internal and external tumours on fish is no higher than in suitable reference sites elsewhere.

d) Suggested monitoring activities

– Periodic (period to be determined, not less than 5 year intervals) assessment of fish (forage and predator sentinel species) from suspect areas, such as the Rouge River mouth.

5) Bird or Animal Deformities or Reproduction Problems:

Deformities: YES
Reproduction: YES

a) Identified data sets/studies:

— Canadian Wildlife Service turtle tail and mud puppy studies
— Canadian Wildlife Service herring gull data
— Canadian Wildlife Service eagle blood data?
— Mary Gilbertson frog studies
—K.J. Fernie, "Contaminants and Wildlife Health in the Great Lakes Basin: Lake Erie," (report completed for Canadian Wildlife Service, Environment Canada, October 2000)

b) Data/study needs:

— frog studies?
— mink studies?

c) Suggested Delisting Criteria:

This beneficial use impairment will be considered eligible for delisting when:

1) There is no more incidence of bird or animal deformities than in suitable reference sites elsewhere in the Great Lakes basin; and
2) In the case of bald eagle, when there is no incidence of deformities or reproduction problems higher than with suitable inland reference populations. Suitable sites to be determined by experts.

d) Suggested monitoring activities:

-- Periodic (period to be determined) studies

6) Degradation of Benthos:

YES

a) Identified data sets/studies:

— Jan Ciborowski, University of Windsor, toxicity and deformity problems

— Sara Wood, GLIER, benthic survey *as data for use in an appropriate multivarient model*

— Beak Consultants. 1993. Environmental Assessment of Detroit River sediments and benthic macroinvertibrate communities – 1991, volume 1. (Beak, Brampton, Ontario)

— Edsell et. al. 1991 "Production of hexogenia l. nymphs...."

— Upper Great Lakes Connecting Channels Study (1985) benthic work

b) Data/study needs:

c) Suggested Delisting Criteria:

Taking into account sediment quality guidelines and the Sediment Quality Triad Approach (see Appendix Three), this beneficial use impairment will be considered eligible for delisting when:

1) there is no more incidence of deformity than at suitable reference sites, as determined by experts; and

2) community composition is no different from reference sites but is significantly better than degraded sites: and

3) sediment-associated contaminants are not bioaccumulative; and

4) sediment-associated contaminants are not toxic.

What do we mean by deformity, ie is there a trigger or specific benthic deformity for which we would be looking? Does bioaccumulative here mean any detectable level of a bioaccumulating chemical, or is there a trigger level, or series of trigger levels according to the chemical?

d) Suggested Monitoring Activity:

– Periodic (period to be determined) benthic studies of the Detroit River and suitable reference sites

7) Restrictions on Dredging Activities:

YES

a) Identified data sets/studies:
– none identified

b) Data/study needs
– none identified

c) Suggested Delisting Criteria:
This beneficial use impairment will be considered eligible for delisting when:

1) When contaminants in sediments do not exceed the most stringent standards, objectives or guidelines such that there are restrictions on (navigational) dredging or disposal activities. (See Appendix Three)

No consensus on whether this beneficial use refers exclusively to navigational dredging, or all dredging activities. The IJC delisting document does not specify navigational dredging only, but suggests that the impaired use is the ability to dredge the river everywhere and for any reason.

d) Suggested Monitoring Activities:

– monitoring program based upon the applicable guidelines of the responsible agencies.

8) Eutrophication or Undesirable Algae:

NO for Detroit River, however a problem for Lake Erie

— Group identified need to communicate with Lake Erie LaMP to ensure coordination.

Suggested Criteria:

1) No increase to IJC established target loadings for phosphorus to Detroit River. If increased volume of discharge, corresponding reduction in concentration must be demonstrated.

2) Downstream concentration of phosphorus not higher than incoming concentration.

9) Restrictions on Drinking Water Consumption, or Taste and Odour Problems:
Consumption: NO
Taste/Odour: YES

a) Identified data sets/studies:
– none identified

b) Data/Study Needs:

-- long-term (1990 on) records of "documented" complaints and factors to which taste and odour problems have been attributed. Purpose: determine complaint pattern over time and the factors to which complaints are attributed in order to establish criteria for delisting. Public sub-committee is attempting to locate data.

c) Suggested Delisting Criteria:
This beneficial use impairment will be considered eligible for delisting when:

1) For treated drinking water supplies: densities of disease-causing organisms or concentrations of hazardous or toxic chemicals or radioactive substances do not exceed the current and most stringent human health standards, objectives, or guidelines; and treatment needed to make raw water suitable for drinking, including the treatment for taste and odor, does not exceed the standard treatment. (settling, coagulation, disinfection)

d) Suggested Monitoring Activity:

– monitoring program based upon the applicable guidelines of the responsible agency.
— ASTM taste/odour tests may apply

10) Beach Closings:

Yes

The concept should be expanded to *"Recreational Use Restrictions."* Wayne County Health Department monitors beaches on the U.S. side, ie Belle Isle.

a) Identified data sets/studies:
– none identified

b) Data/study needs:
– none identified

c) Suggested Delisting Criteria:
This beneficial use impairment will be considered eligible for delisting when:

1) When waters, which are commonly used for total-body contact or partial body-contact recreation, do not exceed most stringent standards, objectives, or guidelines for such use. (See Appendix Four)

What does exceed mean in this case, one time per year, or more?

d) Suggested Monitoring Activity:

— monitoring program based on the applicable guidelines of the responsible agencies.
— recommend monitoring at sites in the Detroit River in addition to public beaches.

11) Degradation of Aesthetics:

YES

a) Identified data sets/studies:

– Ontario MOE complaints and spills reporting (Gary Johnson will obtain spills reporting information)

– Michigan DEQ and USEPA spills reporting (Jen Read will talk to Rose Ellison (USEPA) about US reporting)

– Health Canada study raw data (L. Tulen)

b) Data/Study Needs:

– Sub-committee suggested a focus group to define/select visual representations of "objectionable" scenes to be incorporated into a visual survey as a component of monitoring program for delisting.

c) Suggested Delisting Criteria:

This beneficial use impairment will be considered eligible for delisting when:

1) When the waters are devoid of any substance which produces a persistent "objectionable" deposit, unnatural colour or turbidity, or unnatural odour , for example oil slick or surface scum. Oil and petrochemicals should not be present in concentrations that can be detected as visible film, sheen or discolouration on the surface, detected by odour, or form deposits on shorelines and bottom sediment. To address turbidity, water should be free from substances attributable to municipal, industrial, agricultural or other discharges, such as raw sewage, dredge spoils and spills, resulting from human activity that will settle to form putrescent or otherwise objectionable sludge deposits. Persistence is defined in terms of spatial and temporal scales.

OR

2) Elimination of the discharges from CSOs and spills from point sources and non-point sources such that debris and persistent objectionable deposits are not found in the River or along the shoreline. There shall be no visible oil sheens on the river from any discharge.

d) Suggested Monitoring Activity:

1) Monitor e. coli/fecal colilform content to capture SSOs and CSOs to the river; monitor spill reports and complaints to U.S. EPA and Ontario MOE; representative survey of the public.

12) Added Cost to Agriculture or Industry:

Agriculture No
Industry No evidence

a) Identified data sets/studies
– none identified

13) Degradation of Phytoplankton and Zooplankton Populations:

Impaired community structure: NO

Toxicity: YES

a) Identified data sets/studies

– USEPA observed toxicity in 1980s; no evidence of a change.

– Larval yellow perch study [need reference]

– larval yellow perch study suggested impairment to plankton communities downstream of Rouge River outfall/Zug Island; perch collected below that site had empty guts

— Hatcher paper **(Bruce Manny has reference)**

— US EPA ceriodaphnia studies **(Russ Kreis has study)**

— phytoplankton studies by Russ Moll **(Russ Kreis has study)**

b) Data/Study Needs:

– Ceriodaphnia study

— plankton community structure study compared to suitable reference sites

— behaviour and other relevant tests of fresh, unpreserved samples

— To confirm community structure is not impaired ceriodaphnia study (monthly for ice-free period) should reveal survival of young at or above control numbers.

c) Suggested Delisting Criteria:

This beneficial use impairment will be considered eligible for delisting when:

1) Plankton are free of bioaccumulative contaminants at levels that alter community structure, with a community structure comparable to suitable reference sites

d) Suggested Monitoring Activities:

– Periodic (period to be determined) Ceriodaphnia bio-assay and community structure study.

14) Loss of Fish and Wildlife Habitat:
YES

a) Identified data sets/studies

— Approximately 1-3% of habitat existing prior to European settlement is left on the river.
— B. Manny, *Ecological Profile of the Detroit River* (1988)
— Great Lakes Institute for Environmental Research and Citizens Environment Alliance of Southwestern Ontario. 1998. Rehabilitation and Conservation of Detroit River Habitat: A Binational Conference.
— results of U.S. EPA sponsored Inventory of Candidate Sites for Remediation and Protection
— Biodiversity Conservation Strategy
— Detroit River Update Report

Potentially, an excellent opportunity to involve the public — preservation, restoration and cleanup.

b) Data/study needs:

– none suggested
— fish community objectives exist through the GLFC, Lake Erie/Lake St. Clair Committee and adopted by OMNR and MDNR; similar wildlife management plans required

c) Suggested Delisting Criteria:

This beneficial use impairment will be considered eligible for delisting when:

1) No further loss of productive fish and wildlife habitat, net gain of restored and protected habitat in accordance with fish and wildlife management plans for the conservation and restoration of Detroit River habitat, such as the Biodiversity Conservation Strategy, and local measures in place to protect conserved and restored sites in perpetuity (Appendix Five) ; and
2) The amount and quality of physical, chemical, and biological habitat required to meet fish and wildlife management goals have been achieved and protected.

d) Suggested Monitoring Activity:

— Determine desirable animals (indicator species) and habitat required to support them. Periodic (period to be determined) assessment of hectares/acres of protected habitat and protected linear feet of soft-engineered and protected shoreline.

e) Possible Interim Objectives/Goals:

— establishment of public access to areas where sport angling for edible fish is encouraged

15) Exceedence of Water Quality Standards/Objectives:

(Added by the Detroit River Canadian Cleanup Committee in 1998)

Status undetermined (not recorded)

a) Identified data sets/studies

– none identified

b) Data/study needs

— which standards, objectives and guidelines are being monitored?

— which standards, objectives and guidelines are being exceeded?

c) Suggested Delisting Criteria:

This beneficial use impairment will be considered eligible for delisting when:

1) River meets most stringent environmental quality guidelines and the responsible agencies have adopted an anti-degradation policy with no-backsliding.

2) In keeping with the Boundary Waters Treaty of 1909, the waters, sediments, and biota found in the Detroit River meet or exceed the most stringent jurisdictional standards, objectives, and guidelines. In addition, the anti-degradation policy will ensure that jurisdictions do not "pollute up to" these standards, guidelines and criteria.

d) Suggested Monitoring Activity:

– monitoring program based on the applicable guidelines of the responsible agencies.

Sub appendix one
Great Lakes Water Quality Agreement of 1978, As Amended by Protocol Signed November 18, 1987

Annex 2
1. (c) “Impairment of beneficial use(s)” means a change in the chemical, physical or biological integrity of the Great Lakes System sufficient to cause any of the following:

(i) restrictions on fish and wildlife consumption;
(ii) tainting of fish and wildlife flavour;
(iii degradation of fish wildlife populations;
(iv) fish tumors or other deformities;
(v) bird or animal deformities or reproduction problems;
(vi) degradation of benthos;
(vii) restrictions on dredging activities;
(viii) eutrophication or undesirable algae;
(ix) restrictions on drinking water consumption, or taste and odour problems
(x) beach closings;
(xi) degradation of aesthetics;
(xii) added costs to agriculture or industry;
(xiii) degradation of phytoplankton and zooplankton populations; and
(xiv) loss of fish and wildlife habitat.

Sub appendix two

1. 1996 RAP Update Report "Water Use Goals:" "Levels of contaminants such as PCBs and mercury in fish tissue shall be less than MDPH and OMNR/OMOE action levels."[2] For Ontario the levels are 0.45 ppm of mercury, and 0.5 ppm for PCB; in Michigan the levels are 0.5 ppm for mercury and 0.05 ppm for PCB[3].

[2] Michigan Department of Environmental Quality. 1996. *1996 Detroit River Remedial Action Plan Report*. MDEQ, Lansing , MI. p. 14

[3] This is the most restrictive trigger level. Depending on the target population and amount of consumption, the trigger levels range from 2.0 ppm to 0.05 ppm PCB.

Sub appendix three

I) Sediment Quality Guidelines

1996 RAP Update Report "Water Use Goals:"

"Concentration of pollutants in sediments shall be below levels that restrict dredging activities." *Discussion* - Restriction on dredging means "Sediments contaminant levels of all parameters shall be below the most restrictive value (basin wide/jurisdictional - likely to be protective of sediment dwelling organisms, cognizant of historical background conditions (pre-ambrosia, pre-colonial)." The Report goes on to say, "When Detroit River sediments are found to contain one or more contaminants which exhibit concentrations equal to or greater that the objectives, sediments from that site exceed Detroit River Sediments Quality Objectives." These values are as follows (all values are ppm dry weight unless otherwise noted) (Detroit RAP Report, 1996, 115)-

Organic Contaminants: PCBs (0.01); Organochlorine Pesticides - Aldrin (0.002), BHC (0.003), a-BHC (0.006), b-BHC (0.005), g-BHC (0.0002), Chlordane (0.005), DDT (0.007 total), op+pp-DDT (0.008), pp-DDD (0.008), pp-DDE (0.005), Dieldrin (0.0006), Endrin (0.0005), HCB (0.01), Heptachlor (0.0003), H-epoxide (0.005), Mirex (0.007); Polycyclic Aromatic Hydrocarbons - PAH (4 total), PAH individual - Anthracene (0.22), Benzo[a]anthracene (0.32), Benzo[k]fluoranthene (0.24), Benzo[a]pyrene (0.37), Benzo[g,h,i]perylene (0.17), Chrysene (0.34), Dibenzo[a,h]anthracene (0.06), Fluoranthene (0.75), Fluorene (0.19), Indeno[1,2,3-cd]pyrene (0.20), Phenanthrene (0.56), Pyrene (0.49);

Heavy Metals/Trace Elements: Chromium (26), Copper (16), lead (31), Mercury (0.2), Barium (20), Cyanide (<0.1), Zinc (<90), Cobalt (50), Silver (0.5)

Conventional Parameters: Total Kjeldahl Nitrogen (550), total Phosphorus (600)

Other Parameters: Ammonia (<75), COD (<40,000), Oil and Grease (<1000), Volatile Solids (5%)

II) Sediment Quality Triad Approach

The Triad approach to assessing sediment quality is effects-based and consists of three components: sediment chemistry to measure chemical contamination, sediment laboratory bioassays to measure toxicity, and in-field biological assessments to measure changes in the community structure of bottom-dwelling organisms.

No single component can be used to make predictions about the other two. However, the three components complement each other when determining environmental effects. Taken together, measurements of the three Triad components--chemistry, toxicity and biology--can provide a comprehensive assessment of the extent and severity of sediment contamination.

The Triad approach is labour intensive, requires biological and chemical expertise and is expensive. However, it also is fairly easy to understand and use, and can provide the information needed to make appropriate decisions about potentially expensive remedies.

Sub appendix four

1996 RAP Update Report "Water Use Goals:"

"All AOC areas shall be safe for total body contact activities. Bacteria levels shall meet OMOE/MDEQ criteria. There shall be no beach closings in the AOC or impacted areas in Lake Erie due to AOC contamination." The Ontario Standard is 100 E.coli counts/100ml, the Michigan Standard is 130 E.coli counts/100 and 200 fecal coliform/100ml (30 day average).

Sub appendix five

Essex Region Biodiversity Conservation Strategy Steering Committee

(forwarded by the Essex Region Conservation Authority as presented to the Detroit River Canadian Cleanup Committee Habitat Sub-Committee)

Recommendations indirectly address all of the impaired beneficial uses to the Detroit River Area of Concern and directly address impaired beneficial use 14. Loss of fish and wildlife habitat and 3. Degradation of fish and wildlife populations:

Develop a Habitat Inventory (Upland and Aquatic) for the Detroit River AOC

A habitat inventory is needed to obtain baseline information on existing wetland habitat, wildlife and fishery resources. A habitat inventory would provide the information need to pro-actively give developers and municipalities some guidance regarding habitat sensitivity and appropriate land zoning and permitted uses. Within the AOC, a wetlands inventory has been completed for the Canadian side of the Detroit River. (Detroit RAP Report, 1996, 82)

Develop a Habitat Management Plan for the Detroit River RAP

This would document strategies and the rationale for the protection, restoration and enhancement of fish and wildlife habitat in the AOC. It would pro-actively provide information to municipalities and developers that could be incorporated into planning documents. In addition, the plan could delineate areas suitable for public access development and environmental appreciation and education that would foster a better understanding of the relationship between humans and their environment. The Ontario Ministry of Natural Resources (OMNR) and the Essex Region Conservation Authority (ERCA) have completed a wetlands inventory and evaluation of wetlands within the Canadian portion of the AOC. (Detroit RAP Report, 82)

Make More Efficient Use of Staff by Coordinating Environmental Protection Activities with Other Agencies

The goal is to ensure that government agencies continue to find innovative ways of coordinating their environmental protection activities to restore and protect habitat. (Detroit RAP Report, 91)

Begin Remedial Actions on the List of Proposed Habitat Candidate Sites

The U.S. National Biological Survey (NBS) has estimated that over 90 percent of wetlands in the river (including both Canadian and U.S. sides) in 1873 were destroyed as the shoreline was modified and developed. In the face of these hug losses, restoration activities should begin immediately. (Detroit RAP Report, 103)

RECOMMENDATION

The following table outlines the recommended local targets and proposed restoration guidelines for the greater Detroit River Study Area. These values represent the application of Environment Canada guidelines, as outlined in *A Framework for Guiding Habitat Rehabilitation in Great Lakes Areas of Concern* (1998), to the local landscape. It is the recommendation of the Essex Region Biodiversity Conservation Strategy Steering Committee that these proposed restoration targets be used as a basis for establishing Delisting Criteria for the Detroit River AOC.

Table 1: Great Detroit River Habitat Guidelines vs. Proposed Restoration Conditions

Parameter	Guideline	Local Target	Proposed (Based on GIS Analysis)				
			Detroit River	Little River	River Canard	Turkey Creek	Total Study Area
% Natural Cover (all habitats)		12	12.81	10.83	13.66	19.64	13.77
Size (ha) of Largest Forest Patch	100	100	123.21	59.62	179.01	156.20	179.01
% Forest Cover (>0.5 ha) (upland + wetland)	30		3.96	2.66	4.82	10.73	4.8
% Forest Cover 100 m or Farther from Edge	> 10		0.53	0.24	0.74	1.88	0.76
% Forest Cover 200 m or Farther from Edge	> 5		0.15	0.05	0.2	0.49	0.2
% Riparian Habitat Naturally Vegetated along First-to-Third Order Streams (guideline: 30 m optimum; local target, not less than 3-10 m wide)	> 75	> 75	91.9	97.38	92.44	83.23	91.99
% Wetland in a Sub-watershed	> 6		5.59	0	0.55	0.37	1.51

Sub appendix six

Detroit River Beneficial Use Impairment Meeting
July 27, 2000

Great Lakes Institute for Environmental Research

ATTENDEES:

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Sub appendix seven

Sub-Committee Membership.

1) **Ecosystem Objectives:**

Beneficial Uses to Address:

1) Restrictions on Fish and Wildlife Consumption; 3) Degradation of Fish and Wildlife Populations; 4) Fish Tumors or Other Deformities; 5) Bird or Animal Deformities or Reproduction Problems; 6) Degradation of Benthos; 13) Degradation of Phyto/Zooplankton Populations; 14) Loss of Fish and Wildlife Habitat.

Members:

Bruce Manny, USGS (chair)
Ron Rossmann, USEPA
Doug Haffner, GLIER
Jim Francis, Michigan DNR
Chad Rhodes, City of Detroit (Detroit RAP)
Matthew Child, ERCA
Rose Ellison, USEPA

1) **Standards:**

Beneficial Uses to Address:

1) Restrictions on Fish and Wildlife Consumption; 7) Restrictions on Dredging Activities; 8) Eutrophication or Undesirable Algae; 9) Restrictions on Drinking Water Consumption, or Taste and Odour Problems (focus on first issue); 10) Beach Closings; 15) Excedence of Water Quality Standards/Objectives.

Members:

Scott Painter, Environment Canada (chair)
Gary Johnson, Ontario MOE
Russell Kreis, USEAP
Theresa Seidel, MDEQ
Elaine Brown, MSU Institute of Water Research (Detroit RAP)
Stan Taylor, ERCA

1) Public:

Beneficial Uses to Address:

2) Tainting of Fish and Wildlife Flavour; 9) Restrictions on Drinking Water Consumption, or Taste and Odour Problems (focus on the latter issue); 11) Degradation of Aesthetics; 12) Added Cost to Agriculture or Industry.

Members:

Jennifer Read, GLIER (chair)
Geoffrey Habron, Assistant Professor, Michigan State University
Tom Henderson, DRCCC PICS chair
Citizens Environment Alliance (TBA)
Danielle Breault, ERCA
Janice Harvey, Detroit RAP