

St. Clair River Area Of Concern Revised Delisting Criteria



Foreword

This document was prepared by a subcommittee of the Canadian RAP Implementation Committee (CRIC). The purpose of this initiative was to review and revise the delisting criteria, to ensure they are current, achievable and measurable.

The subcommittee of the CRIC initiated the review in the Spring of 2010. A draft report was approved by CRIC in the Fall of 2010 and by the Binational Public Advisory Council (BPAC) in early 2011. First Nations Consultation on the report was initiated in the spring of 2011 with Aamjiwnaang and Walpole Island First Nations communities. Comments were provided by the communities with respect to two criteria: Restrictions on drinking water consumption, or taste and odour problems and loss of fish and wildlife habitat, in late 2011. The CRIC Delisting Criteria Subcommittee reviewed the comments provided by the First Nations in March 2012 and the document was modified to address their input. The modifications to the criteria and the rationale for any change are reflected in this version of the report.

St. Clair River Area Of Concern Revised Delisting Criteria

Table of Contents

Foreword	2
Table of Contents	3
Introduction	4
Review Process	6
Structure of the Report	7
Restrictions on Fish and Wildlife Consumption	8
Degradation of benthos	13
Restrictions on dredging activities	18
Restrictions on drinking water consumption, or taste and odour problems	23
Beach closings	28
Degradation of aesthetics	33
Added costs to agriculture or industry	36
Loss of fish and wildlife habitat	39
Bibliography	49
Appendix	52



St. Clair River Area Of Concern Revised Delisting Criteria

Introduction

The Great Lakes Water Quality Agreement (GLWQA) was signed by Canada and the United States in 1972, revised in 1978 and amended by protocol in 1987. It identified 43 Great Lakes Areas of Concern (AOCs) – specific geographic areas where environmental quality was degraded and beneficial uses, as defined in the GLWQA, were impaired. The concept was that each area had one or more Beneficial Use Impairments (BUI) that was an extraordinary problem; it set the area apart from other areas within the Great Lakes Basin. The causes of beneficial use impairments had to originate within the AOC and thus be manageable within the local area of concern. Basin-wide issues of contamination were considered beyond the scope of the AOC program.

Annex 2 of the GLWQA dictates that Remedial Action Plans (RAPs) must be developed and implemented for each AOC in three stages: Stage 1 is the definition of the problem, which for the St. Clair River AOC was completed in 1991 (i.e., identification of impaired beneficial uses); Stage 2 is the development and implementation of remedial actions to address the identified problems, this was completed in 1995; and Stage 3 is the final assessment when all actions have been completed and the AOC can be removed from the list of AOCs, which is referred to as “delisting”. Removal of an AOC from the list of Great Lakes Areas of Concern is achieved by meeting the criteria for the restoration of beneficial uses as defined by the RAP and agreed upon by the agencies and local community.

The development and implementation of RAPs is guided by two important principles outlined in the 1987 amendment to the GLWQA. The first is that RAPs are to “embody a systematic and comprehensive ecosystem approach to restoring and protecting beneficial uses in Areas of Concern” (International Joint Commission 1987). The second is that RAPs are to “ensure that the public is consulted on all actions undertaken” (IJC 1987).

A list of 14 impaired beneficial uses is documented in Annex 2 of the Great Lakes Water Quality Agreement. Impairment of beneficial use(s) is defined in Annex 2 as “a change in the chemical, physical or biological integrity of the Great Lakes System sufficient to cause any impairment of the following”. The 14 beneficial uses are listed in Annex 2 and below. For the St. Clair River, eight beneficial uses were considered impaired (marked with ↓), four were considered to “require additional study on a site-specific basis” (marked with →) and two were considered not impaired (marked with ↑):

- (i) restrictions on fish and wildlife consumption; ↓
- (ii) tainting of fish and wildlife flavour; →
- (iii) degradation of fish wildlife populations; →
- (iv) fish tumours or other deformities; →

St. Clair River Area Of Concern Revised Delisting Criteria

- (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 ↓

Through a letter of commitment a *Four Agencies Framework* was established in 1998 and revised in 2009. The Four Agencies are: the United States Environmental Protection Agency, the Michigan Department of Natural Resource and Environment, Environment Canada and the Ontario Ministry of the Environment. They committed to coordinate continued development and review of measurable and achievable delisting criteria for shared Areas of Concern. This commitment was made to ensure that delisting criteria are based on current science, policy, technology and environmental conditions. A process was designed to ensure that the public and stakeholders were involved.

General listing and delisting criteria for the Great Lakes AOCs were developed in 1991 (International Joint Commission). These criteria provided guidance to managers and the public in developing AOC specific delisting criteria. Provincial and federal governments and public stakeholders adapted the criteria to be specific for use in determining restoration of individual BUIs. When RAPs were originally prepared for each AOC, specific quantitative criteria for listing or delisting these areas were developed with the local knowledge and experience available at the time.

In order to determine if an AOC can be delisted, it is critical that delisting criteria are clear, measurable and based on a complete ecosystem approach. Since the St. Clair River delisting criteria were developed in 1995, many environmental, legislative and scientific changes have occurred that significantly influence their relevance today.

Delisting criteria have recently been developed or updated in two other binational AOCs, the Detroit River and the St. Mary's River. The status of the BUIs for the Detroit River was first reported in the Stage 1 Report (MDNR and OMOE 1991). Delisting criteria were developed on the Canadian side of the Detroit River in 2005. They were further refined as part of the draft Stage 2 Remedial Action Plan Report (Green et. al. 2010).

St. Clair River Area Of Concern Revised Delisting Criteria

In Michigan, delisting criteria were revised for all AOCs in the State in 2008 (MDEQ). They provided state-wide guidance and established specific criteria which the State will use to determine when BUIs have been restored. The state recognized that criteria for two BUIs, loss of fish and wildlife habitat and added cost to agriculture and industry, were best defined locally. The criteria define what constitutes restoration of the BUIs, and any BUI that meets these criteria will be considered restored by the State. The criteria were reviewed and adopted by the St. Clair River BPAC.

In consideration of the binational nature of the St. Clair AOC and the above reviews in other AOCs, the St. Clair River Canadian Remedial Action Plan Committee (CRIC) considered it appropriate to initiate a review of the delisting criteria for the St. Clair River AOC, in the spring of 2010. A working group of the CRIC was established to review each delisting criterion for all impaired beneficial uses. The working group consisted of agency and public representatives including the following members:

Ted Briggs- OMOE,
Dean Edwardson – SLEA Industry,
Sharilyn Johnston - Aamjiwnaang First Nation,
Brian McDougall - SCRCA,
Claude Lafrance - RAP Coordinator,

Sandra Kok - EC,
Phil Vallance – BPAC,
Luca Cargnelli - EC,
Jennifer Richards - OMNR,
April White - EC.

EC – Environment Canada, OMOE – Ontario Ministry of the Environment, BPAC - Binational Public Advisory Council, SCRCA – St. Clair Region Conservation Authority, OMNR – Ontario Ministry of Natural Resources, SLEA – Sarnia Lambton Environmental Association.

Review Process

The working group began the review process by drafting a set of principles by which the criteria would be reviewed and modified. The review principles established guidance to the committee members in developing criteria that are: consistent with previous RAP documents, deal with anthropogenic issues, locally derived, practical, measurable, achievable and consistent with US binational criteria and federal and provincial legislation and policies. The principles document was presented to the CRIC and the Binational Public Advisory Council for comment and acceptance, prior to being used. The final principles document is attached to this report (Appendix 1).

Delisting criteria for the BUIs that are impaired were assigned to an individual or a small group of individuals of the working group, to research, review, amend as required and document the results of the exercise. The BUIs that are considered not impaired were not reviewed, while the BUIs judged to require further assessment were being addressed through further research outlined in the 2007-10 work plan.

St. Clair River Area Of Concern Revised Delisting Criteria

In revising the delisting criteria, the reviewers considered: the review principles referred to above, the Stage 1 and Stage 2 RAP Reports, the revised Michigan delisting criteria for the St. Clair River, criteria from other AOCs, in particular the Detroit River, current scientific findings, previous status reports, historical and recent surveys, and as required, consultation with internal experts and potentially affected stakeholders. Early drafts of the review documents were discussed with the working group as a whole and amended based on the consensus of the group. This final draft review document was developed for consultation with the BPAC, as required by the Four Agencies Managers Letter of Commitment. The BPAC-approved draft was used to consult with First Nations communities.

Structure of the Report

The BUI are ordered from i to xiv, consistent with the numbering protocol used in Annex 2 of the GLWQA. For each BUI that is considered impaired, revised delisting criteria are documented below. Thus, 6 criteria are not discussed in this document because no delisting criteria were established for them, as they were either not impaired or considered to require further assessment.

For each delisting criterion, this report documents: 1) the current status of the BUI as described in the Stage 1 and Stage 2 Reports; 2) the background for the BUI; 3) relevant delisting criteria; and 4) revised criteria. A rationale explains the reasons for the changes from the exiting criteria to the revised. Source documents are referenced.

BUI (i): Restrictions on Fish and Wildlife Consumption

Current Status of BUI Impaired

Fish consumption guidelines are exceeded for smallmouth bass, rock bass, yellow perch, carp, walleye, freshwater drum, bluegill, white and red horse sucker, and gizzard shad (OMOE 2010).

Contaminant levels in sport fish collected from the AOC in 2003 exceeded consumption guidelines for both the sensitive and general populations. Most of the consumption restrictions for the general populations in the Huron-Erie Corridor are caused by mercury (32%), PCB's (51%) and dioxins, including furans and dioxin like PCB's (17%). Mercury concentrations in walleye exceeded the 0.5 ug/g RAP biota yardstick. Based on these and past consumption advisories, the beneficial use status is impaired.

Background

Restriction on Fish and Wildlife Consumption was first designated as impaired for fish in the 1991 Stage 1 RAP Report (OMOE and MDEQ 1991). Within that report it stated that a number of fish species taken from different sections of the Ontario side of the St. Clair River Area of Concern have concentrations of mercury and/or PCB's in their flesh, which exceed Health and Welfare Canada limits, Great Lakes Water Quality Agreement Specific Objectives and Michigan Department of Public Health trigger levels for human consumption. Walleye greater than 55cm in length, downstream from the Bluewater Bridge, is the only species and age class for which the Ontario Ministries of the Environment and Natural Resources recommend no consumption. Mercury in these fish was found, at the time, to have greater than 1.5 ug/g exceeding both the MOE fish consumption guidelines and the Health and Welfare Canada guideline of 0.5 ug/g. Carp collected adjacent to Ethyl Corporation and gizzard shad adjacent to Stagg Island had PCB concentrations in excess of the 2.0 ug/g Health and Welfare Canada limit and Michigan Department of Public Health trigger level. For wildlife consumption it identified that there were no formal advisories currently in place but that the OMNR had issued a statement for people to use prudence with respect to the regular consumption of turtle meat from four areas sampled on the Ontario side (including Walpole Island) due to elevated PCB's. It further stated the status of this use could not be determined, because of the absence of applicable guidelines.

The 1995 Stage 2 Report (OMOE and MDEQ 1995) identified that fish consumption advisories in effect on the Ontario side included: for mercury; carp, walleye, white sucker, freshwater drum, and yellow perch, for PCB; carp and gizzard shad and for dioxin and furans, carp. For wildlife consumption it again stated there were no guidelines directly

St. Clair River Area Of Concern Revised Delisting Criteria

applicable to the St. Clair AOC but that there were some concerns with respect to the consumption of snapping turtles, mallards and redheads due to certain chemical concentrations.

From the 2009 Status of the St. Clair River (Sills and Heffner 2009) the following findings were presented. According to the 2009 – 2010 Ontario Guide to Eating Sport Fish, 20% of fish consumption advisories in the St. Clair River are due to mercury, and 80% are due to dioxin, furan and dioxin-like PCBs (OMOE 2009). Consumption advice is provided for the upper, middle and lower zones of the St. Clair River, which reflect the difference in fish tissue contaminant burdens. Contaminant levels in sport fish collected from the AOC in 2003 (and in previous years) exceeded the consumption guidelines for both the sensitive (women of child-bearing age and children) and general populations (CRIC 2007).

The Michigan Family Fish Consumption Guide (Michigan Department of Community Health 2008), gives strict guidelines for the sensitive and general populations. The fish included in these guidelines include: carp, freshwater drum, gizzard shad and walleye. These fish advisories are due to mercury and PCBs present in the fish. The Ontario Guide to Eating Sport Fish (OMOE 2009) presents fish consumption advisories for the upper, middle and lower St. Clair River as a result of concentrations of mercury, PCBs, dioxins and furans, chlorinated benzenes, pesticides and/or mirex. Species include: northern pike, walleye, smallmouth bass, largemouth bass, yellow perch, rock bass, white bass, carp, white sucker, redhorse sucker, brown bullhead, gizzard shad, freshwater drum, bluegill, and black crappie. Also, people are advised not to consume rainbow trout and Coho salmon (OMOE 2009). Figure 1 of the guide shows the levels of contaminants that are allowable for consumption in fish.

To this date, there are no numerical guidelines directly applicable to the St. Clair River regarding human consumption of wildlife. However, concentrations of PCBs in snapping turtles and OCS, HCB and PCBs in mallards and redhead ducks show a need for these guidelines. There has been a warning issued from the Ministry of Natural Resources for people to use caution when consuming those species from areas of the Delta (Mayne 2003).

Actions to Reduce Consumption Advisories From 1986 – 2000 there was a decreasing trend in environmental concentrations of certain chlorinated organic compounds in water, which was reported by Environment Canada's Head and Mouth Survey. This decreasing trend along with the removal of contaminated sediment by Dow Chemical Canada Inc. should contribute to improved health and quality of wild fish (Mayne 2003). Fish contamination occurs because of bioaccumulation in the food chain. The plankton and smaller fish that these larger fish eat are also contaminated from being in a close proximity to contaminated sediments, and also from contaminants in the water column. Mercury concentrations in suspended

St. Clair River Area Of Concern Revised Delisting Criteria

sediments were constant throughout the St. Clair River but higher in the South Channel. Between Bowens and Talfourd Creeks the mercury concentrations ranged from 0.170 ug/g to greater than 1.0 ug/g. Also, PCBs can be taken up by fish and wildlife. The concentrations of total PCBs in suspended and bottom sediments were up to 70.0 ng/g (Mayne 2003). To reduce the fish consumption advisories (based on the Ontario Ministry of the Environment guidelines), target PCB concentrations in sediments should be 2 ug/g Organic Carbon (OC) weight (to protect 10 most consumed species) or 0.58 ug/g OC weight (to protect top predators) (Drouillard et al. 2003). The precautionary principle requires that actions be taken to reduce dangerous risks. The most serious toxic chemicals should be phased out within the Great Lakes basin, and chemicals that are known to be persistent and bioaccumulate could have disastrous implications for wildlife as well as for human health, so they too should be phased out (Environmental Defense 2007).

Although fish consumption advisories are in place for the upper, middle and lower zones of the St. Clair River, there is evidence that the contaminated sediments contribute to the restrictions on fish consumption in this area. Since the fish consumption advisories are in place because the concentrations of contaminants exceed the RAP targets for fish (and for sediments which contribute to fish contamination), this BUI is considered impaired for fish. The BUI for Restrictions on Wildlife Consumption is considered to require further assessment based on a Great Lakes Basin basis. One of the reasons for this conclusion is that there are no Health Canada guidelines for the safe consumption of wildlife. Health Canada has also previously advised that the consumption of commonly hunted Ontario waterfowl poses no health hazards, presently.

Delisting Criteria

Revised Delisting Criteria

This BUI will be considered restored when fish consumption advisories in indicator fishes (e.g., walleye, brown bullhead, and smallmouth bass) in the AOC are the same or less restrictive than the associated Great Lake or appropriate reference site and when the general guidance for the consumption of indicator wildlife (e.g., snapping turtles, geese) are no different than the non-AOC sites in the Great Lakes.

Current (1995 Stage 2 Binational Report)

“This BUI will be considered restored when contaminant levels in fish and wildlife populations do not exceed current standards, objectives or guidelines and no public health advisories are in effect for human consumption of fish or wildlife.”

St. Clair River Area Of Concern Revised Delisting Criteria

1991 IJC General Delisting Guideline

“This BUI will be considered restored when contaminant levels in fish and wildlife populations do not exceed current standards, objectives or guidelines, and no public health advisories are in effect for human consumption of fish or wildlife. Contaminant levels in fish and wildlife must not be due to contaminant input from the watershed.”

Revised Michigan Delisting Criteria (2008)

“This BUI will be considered restored when:

1. The fish consumption advisories in the AOC are the same or less restrictive than the associated Great Lake or appropriate control site.
OR, if the advisory in the AOC is more stringent than the associate Great Lake or control site:

2. A comparison study of fish tissue contaminant levels demonstrates that there is no statistically significant difference in fish tissue concentrations of contaminants causing fish consumption advisories in the AOC compared to a control site.

OR, if a comparison study is not feasible because of the lack of a suitable control site:

3. Analysis of trend data (if available) for fish with consumption advisories shows similar trends to other appropriate Great Lakes trend sites...”

“No AOCs have advisories for wildlife consumption. However, if a wildlife restriction is issued at a later time within an AOC with the Fish and Wildlife Consumption BUI, the process for assessing restoration of the wildlife restriction will be similar to the process outlined above for fish consumption.”

Rationale

The delisting criteria were revised to focus on contaminants accumulated within the AOC and to be based on indicator species representing different components of the St. Clair River fish and wildlife community. For example, brown bullhead is a local benthivorous fish (bottom feeder) and is a good indicator of local sediment conditions. Smallmouth bass is a local, pelagic fish (lives in open water) that is highly regarded by recreational anglers. It is intolerant of pollution, and therefore, is a good indicator of a healthy environment. Walleye is a migratory species but is highly sought after by anglers and is a frequently consumed species caught in the St. Clair River. These criteria may be redesignated when fish consumption advisories still occur however none of these advisories can be due to locally derived sources (or attributable to local sources).

St. Clair River Area Of Concern Revised Delisting Criteria

It must be noted that there are no established safe consumption levels for wildlife (as there are for fish) and that is why the term general guidance has been used.

BUI (vi): Degradation of Benthos

Current Status of BUI Impaired

In the 1991 Stage 1 RAP Report (OMOE and MDEQ 1991), the dynamics of benthic populations component of the BUI was designated as “impaired” on the Ontario side, as data up to and including 1985 revealed that the benthic community structure was impacted from Sarnia’s industrial complex to Mooretown. Severely degraded benthic communities were in the vicinity of the Sarnia industrial waterfront and a few kilometers downstream, with the most severely degraded portion occurring along a 1 km reach of the river offshore and in the general area of Dow Chemical. In this region, conditions were unsuitable for a number of pollution-intolerant benthic species including indicator organisms, such as, mayfly nymphs and freshwater scud. The effect of contaminated sediments on benthic organisms was poorly understood in 1991 and therefore the body burden component was designated as “requires further assessment on Great Lakes Basin basis.”

In 1995, the Stage 2 Report (OMOE and MDEQ 1995) identified three areas (Zones 1, 2 and 3) as priority areas for further study due to benthic community alteration and contaminated sediment from mercury and several chlorinated organic compounds.

Background

Benthos is defined as “all organisms living in, on, or near the bottom substrate in aquatic habitats (examples are mayflies, clams, and burrowing worms)” (USEPA 1992). Benthic fauna have been shown to be good indicators of overall ecosystem health as they are generally sedentary organisms that inhabit or depend on the sedimentary environment for their life functions making them sensitive to both long and short-term changes in sediment, habitat and water quality (USEPA 1992). “Degradation of benthos” is one of the most widespread of the impairments for Areas of Concern (AOC’s) in Canada and the United States and is understood to be a deleterious alteration in the structure or function of the benthic invertebrate community as a result of contaminated sediment (Grapentine). Studies of benthic community populations (the collection, diversity and abundance of benthic organisms) and benthic body burdens (the bioaccumulation of organic and metal contaminant concentrations in benthic tissue) therefore provide data relating to sediment quality - where the contamination occurs and to what degree.

Surveys conducted between 1968 and 1977 found that the benthic community along the Michigan shore was well-balanced e.g. well represented by pollution intolerant, facultative and tolerant organisms, and was essentially unaltered spatially (OMOE and MDEQ 1991). However, along the Ontario shoreline, the opposite was true. In 1968, sediment impairment was documented based on impaired benthic communities along the Ontario shoreline from the City of Sarnia to below Chenal Ecarte (OMOE 1979) as a result of contaminated sediment due to

St. Clair River Area Of Concern Revised Delisting Criteria

industrial and municipal point sources on the Ontario side of the River (OMOE and MDEQ 1995).

By 1977, the impaired benthic community zone was reduced to approximately 20 km. When the St. Clair River was designated as an Area of Concern (AOC) in 1985, the sediment of the river was severely degraded as a result of nutrient loading and elevated levels of metals and organic compounds including mercury (Hg), polycyclic aromatic hydrocarbons (PAHs), Polychlorinated biphenyls (PCBs), octachlorostyrene (OCS), and hexachlorobenzene (HCB).

In 1990, a benthic invertebrate survey of the River identified four “environmental quality zones” based on benthic community structure and sediment chemistry (Pope, 1993). The river was classified into one of four zones: unimpaired, intermediate (slightly impaired), impaired and degraded. The degraded zone was restricted to three areas along the St. Clair River: (1) downstream of Sarnia (2) downstream of Suncor and (3) near Corunna. Bioassay results from sediment samples collected in the degraded zone ranged from “very highly toxic” to “moderately toxic”.

In 1996, chlorinated hydrocarbons were removed from a small area immediately downstream of the Cole Drain and between 2002 and 2004, 13,370 m³ of contaminated sediment within Zone 1 was remediated.

In 2004 and 2005, the Great Lakes Institute for Environmental Research (GLIER 2006) collected sediment and benthic macroinvertebrate samples for chemical analysis. Mayfly densities were highest in the St. Clair River and Delta compared to the Detroit River and densities were below the proposed threshold (20 larvae/m²) for degraded conditions. Oligochaetes were ubiquitous in the Huron Erie Corridor in 2004, with densities greatest in the Delta and exceeding the proposed abundance threshold indicative of degraded conditions.

Mayfly larvae density at the eight suitable sites suggests that Walpole Delta is clearly above the degradation threshold. Oligochaetes were present at all ten locations in numbers indicating moderate organic enrichment. The richness and identity of other benthic taxa suggested good environmental quality of benthic habitats at the Walpole Delta sample sites (GLIER 2006).

In 2007, the Canadian Remedial Action Plan Implementation Committee (CRIC 2007) identified the need to apply the Canada-Ontario Decision-Making Framework for Assessment of Great Lakes Contaminated Sediment (Environment Canada and MOE 2007) to the remaining degraded areas of the river in Zones 2 and 3.

The COA Sediment Framework uses an ecosystem approach to sediment assessment to evaluate potential effects on sediment-dwelling and aquatic organisms using four lines of evidence (LOEs) and knowledge of sediment stability to assess contaminated sediment and associated effects in AOCs. The Four lines of evidence (LOEs) are evaluated in tandem.

St. Clair River Area Of Concern Revised Delisting Criteria

Richman and Milani (2008) concluded that residual sediment contamination remains evident in Zone 2 and Zone 3 of the St. Clair River. With respect to methylmercury, they concluded that measured (2001-2004) and estimated (2006) invertebrate tissue concentrations of methylmercury are greater in Zone 2 and Zone 3 than in upstream reference stations, and a risk of methylmercury biomagnification exists for most of the area within Zone 2 and Zone 3. For higher trophic level consumers, extrapolation of these results suggests that the tissue residue guideline (Environment Canada 2002) would be exceeded at the majority of the sites in Zone 2 and Zone 3 for which extrapolation was performed.

In summary, for the remaining 8.3 km stretch (AOI) the research conducted to date suggests that:

- 1) sediment chemistry is in excess of guidelines and reference sites;
- 2) sediment toxicity is negligible to minor;
- 3) the benthic community structure is not considered to be altered relative to reference sites; and
- 4) there is a potential for biomagnification.

Based on the COA Sediment Framework Decision Matrix, when the biomagnification LOE indicates impairment and the benthos alteration and sediment toxicity LOE indicate adverse effects are unlikely, as is the case for the St. Clair River AOC, further assessment of the risk from biomagnification is required regardless of the outcome of the sediment chemistry LOE.

In response to these findings, the St. Clair Region Conservation Authority, MOE and EC have undertaken a project to determine what sediment management options should be implemented to address the risk for biomagnification. The options under consideration are: sediment removal, sediment capping and monitoring of natural recovery. The final decisions on the preferred options will be made by the responsible agencies following additional field work and public consultation. Once the management options are implemented, the area will be monitored to determine the effectiveness of the actions taken.

Delisting Criteria

Revised Delisting Criteria

This BUI will be considered restored when the benthic community structure, diversity and abundance are not significantly different to suitable, un-impacted reference sites within the AOC of comparable physical (sediment, grain size, water velocity) and chemical characteristics; and when benthic invertebrate tissue contaminant concentrations (body burdens) are comparable to suitable, un-impacted reference sites within the AOC or when all remedial options, recommended to address the areas of interest for contaminated

St. Clair River Area Of Concern Revised Delisting Criteria

sediment, have been completed and follow up monitoring confirms their effectiveness.

Current (1995 Stage 2 Binational Report)

“This BUI will be considered restored when invertebrate community structure can be documented as unimpaired or intermediate as defined by recent OMOE benthic investigations.”

1991 IJC General Delisting Guideline:

“This BUI will be considered restored when the benthic macroinvertebrate community structure does not significantly diverge from un-impacted control sites of comparable physical and chemical characteristics. Further, in the absence of community structure data, this use will be considered restored when toxicity of sediment-associated contaminants is not significantly higher than controls.”

Revised Michigan Delisting Criteria (2008)

“All remedial actions for known contaminated sediment sites with degraded benthos are completed (except for minor repairs required during operation and maintenance) and monitored according to the approved plan for the site. Remedial actions and monitoring are conducted under authority of state and federal programs, such as the Comprehensive Environmental Response, Compensation, and Liability Act (Superfund), Resource Conservation and Recovery Act, Great Lakes Legacy Act, or Part 201 of Michigan’s National Resource and Environmental Protection Act (NREPA) of 1994.”

Rationale

The delisting criteria have been revised to be consistent with IJC and US criteria and to reflect current policy, research, monitoring results, administrative responsibilities and environmental status of the St. Clair River. The following summarizes the rationale for the changes made to the criteria:

The classification of the river into one of four zones is no longer valid based on monitoring results collected over the past decades. The benthic community structure in those zones is now no longer impaired relative to the rest of the river .

Up and downstream reference sites have been included in the criteria as they have been used extensively for research conducted in the St. Clair River and other AOCs.

St. Clair River Area Of Concern Revised Delisting Criteria

The responsibility for benthic investigations is shared between Environment Canada and the Ministry of the Environment, thus the reference to the ministry of the environment was removed. The new federal/provincial policy to assess sediment contamination – “Canada-Ontario Decision-Making Framework for Assessment of Great lakes Contaminated Sediment” was used to guide decision making related to remediation actions.

In response to new findings related to the concentration of contaminants in the sediments, the risks of biomagnification of contaminants in the AOI have been identified by using the decision making framework. Various sediment management options are being evaluated for their technical feasibility in the St. Clair River. Sediment management may involve Monitored Natural Recovery, Isolation Capping and/or Dredging. Field work is currently underway to refine the understanding of the complexities of the site. These studies will support decisions on the preferred options to be implemented for the management of contaminated sediments.

Follow up monitoring will be done to confirm implementation of the preferred sediment management options and their effectiveness at reducing the risk of biomagnification.

BUI (vii): Restrictions on Dredging Activities

Current Status of BUI Impaired

The BUI was designated as impaired in the 1991 Stage 1 RAP Report (OMOE and MDEQ 1991) because concentrations of copper, cadmium, chromium, iron, lead, mercury, nickel, zinc, PCBs, total phosphorus and oil and grease along the Ontario shoreline exceed OMOE guidelines for the open water disposal of dredged sediments. Most exceedances occur along the Sarnia industrial waterfront, as far downstream as the Lambton Generating Station, and the mouths of Talfourd Creek, Baby Creek and the Murphy Drain. Confined disposal has been required in some instances due to the presence of HCB.

Concentrations of TKN, oil and grease, arsenic, copper, chromium, iron, lead and manganese from the Michigan shore are considered moderately or heavily polluted by US EPA guidelines for the disposal of Great Lakes harbour sediments and exceed OMOE disposal guidelines. There are currently no restrictions on dredging or disposal of dredged material from US waters of the St. Clair River due to the presence of contaminants.

The BUI status remained impaired in the 1995 Stage 2 RAP Report (OMOE and MDEQ 1995). No new data were presented.

The BUI status remained impaired in the 1997 RAP Stage 1 Update (OMOE and MDEQ 1998). Contaminant levels in sediment from Sarnia Harbour and the southeast bend cutoff channel in March 1996 exceeded RAP yardstick levels and PSQG lowest effect levels. Contaminant levels above sediment yardstick values continue to be recorded for certain metals total PCBs, total PAHs, TKN, total phosphorus, and oil and grease.

The BUI status remained impaired in the 2005 Update (Mayne 2005). Exceedances of sediment yardstick values were recorded in the Southeast Bend Cutoff Channel for manganese, mercury, HCB, total PCBs, TKN, and total phosphorus. However, exceedances were less than 5% of samples collected and values were only slightly above yardstick.

Background

Dredging in the St. Clair River began in the late 1850s. Most of this dredging was undertaken to support the rapid increase in commercial navigation on the Great Lakes. Additional material was removed in the early 1900s by commercial sand and gravel mining operations. These dredging projects were authorized by the United States Congress, following consultation between Canada and the United States and approval of both countries.

St. Clair River Area Of Concern Revised Delisting Criteria

The largest dredging activity ever undertaken in the river occurred between 1933 and 1936, when 8.4 million cubic metres of material were excavated to deepen the channel to 7.6 metres (25 feet). This volume accounts for one third of the total volume of dredging that has taken place in the St. Clair River over the last 150 years.

The last major dredging in the St. Clair River was undertaken between 1960 and 1962, when the navigation channel was deepened again to 8.2 metres (27 feet) throughout the entire river. The total volume of dredging during this period was about 1.5 million cubic metres of material. This volume represents only about 18% of the total volume dredged between 1933 and 1936, and accounts for about 27% of the total volume dredged since 1936. Most of the dredged material was deposited in various locations within the river where it would not impede navigation.

Since 1962, all dredging in the St. Clair River has been related to maintenance dredging. This work involves the removal of relatively small volumes of sediment and obstructions to restore the channel bottom to its authorized navigation channel depths.

Dredging for safe navigation typically takes place in the Southeast Bend Cut-Off Channel. This channel was cut across Bassett Island to create a straight channel into Lake St. Clair as part of the 27-foot Navigation Project. The Channel undergoes continuous natural in-filling with primarily sand and gravel material from upstream sources. Routine maintenance dredging is required every few years to restore depths for safe navigation (8.26 – 8.32 m).

Delisting Criteria

Revised Delisting Criteria

This BUI will be considered restored when there is no limitation on the disposal of dredging spoils from routine dredging in the St. Clair River.

Current (1995 Stage 2 Binational Report)

“This BUI will be considered restored when there is no limitation on disposal of dredging spoils.”

1991 IJC General Delisting Guideline

“This BUI will be considered restored when contaminants in sediments do not exceed standards, criteria, or guidelines such that there are restrictions on dredging or disposal activities.”

St. Clair River Area Of Concern Revised Delisting Criteria

Revised Michigan Delisting Criteria (2008)

“This BUI will be considered restored when:

1) There have been no restrictions on routine commercial or recreational navigational channel dredging by the U.S. Army Corps of Engineers (COE), based on the most recent dredging cycle, such that special handling or use of a confined disposal facility is required for dredge spoils due to chemical contamination.

OR, in cases where dredging restrictions exist:

2) A comparison of sediment contaminant data from the commercial or recreational navigation channel (at the time of proposed dredging) in the AOC indicates that contaminant levels are not statistically different from other comparable, non-AOC commercial or recreational navigation channels.”

Rationale

The revision to the delisting criteria adds details to more clearly define the objective of the delisting criteria, including aligning with the original intent of the BUI, and to make it more measureable and realistic in the context of current day practices, regarding the disposal of dredged material.

The original delisting criteria developed by the St. Clair River AOC RAP team states that this BUI will be restored when there is “no limitation on disposal of dredging spoils” (OMOE and MDEQ 1995). Although not explicitly stated, the original criterion refers to restrictions on the open water disposal of dredged materials from navigational dredging, and this was the basis for its impaired designation (Mayne 2007).

There are two general categories of routine dredging that occur in the Canadian waters of the St. Clair River. The revised delisting criteria address both.

The first category is routine navigational dredging of the international shipping channel that is conducted by Public Works and Government Services Canada (PWGSC) and the United States Army Corps of Engineers (USACE) on behalf of the Canada and U.S. federal governments. Navigational maintenance dredging in the St. Clair River is routinely done in the area of the Southeast Bend Cut-Off Channel. In the past decade, dredging of the channel was conducted in 2001, 2005, 2007-08, and 2009. The evaluation of this category of dredging will be based on available data from PWGSC.

St. Clair River Area Of Concern Revised Delisting Criteria

The second category is smaller-scale nearshore dredging, which can be for navigational (e.g., access to municipal or private dockage) or construction purposes. This category includes projects that are less than 2000 m³ of sediment. Generally, projects are submitted to the Ministry of Natural Resources (OMNR) for the issuance of a work permit. The OMNR seeks the advice of the Ontario Ministry of the Environment (OMOE) who reviews the project for water quality (turbidity) and sediment quality issues. OMOE may require the collection and analysis of sediment samples in the proposed work area. If OMOE is satisfied with water and sediment quality, then OMNR issues the work permit. The evaluation of this category of dredging will be based on available data from the OMOE.

The status of this BUI will be based on an evaluation of whether there is “no limitation” on the disposal of dredging spoils. Limitations on the open water disposal of dredged materials due to contaminants in the sediment result in increased disposal costs. This is consistent with the generic delisting criterion developed for this BUI by the International Joint Commission in 1989, which states that restrictions on dredging activities are implemented when contaminants exceed standards, criteria or guidelines, such that there are added costs associated with dredging or disposal activities (Krantzberg and Montgomery 2007).

The Provincial Sediment Quality Guidelines (PSQG), established for the protection of aquatic life (Persaud et al. 1993), will serve as the standard for the evaluation of this BUI. Both PWGSC and OMOE base their evaluations of dredged material on the PSQG Lowest Effects Level (LEL). If there are exceedances of the LEL, then open water disposal of the dredged sediment is not allowed. In this manner, the RAP can determine whether the costs of dredging in a navigational channel will rise due to the need for some form of confined disposal, thereby constituting impairment.

Although the near shore areas of the St. Clair River are not addressed by the revised delisting criterion for this BUI, near shore sediment issues are not being overlooked by the RAP. Several other BUIs deal with sediment quality in the near shore (e.g., Degradation of Benthos, Loss of Fish and Wildlife Habitat, Beach Closings).

The approach used for this BUI is also consistent with that being taken on US side of the St. Clair River AOC, where the Michigan statewide delisting criteria has been adopted: “This BUI will be considered restored when: There have been no restrictions on routine commercial or recreational navigational channel dredging by the U.S. Army Corps of Engineers based on the most recent dredging cycle, such that special handling or use of a confined disposal facility is required for dredge spoils due to chemical contamination” (MDEQ 2006). A recent analysis of September-October 2004 and June 2009 sediment sampling by the USACE indicates that all measured parameters fall below USEPA ecological screening levels. Therefore, the conclusion is

St. Clair River Area Of Concern Revised Delisting Criteria

that dredge spoils from the St. Clair River navigation channel meet Michigan's delisting criteria and this beneficial use can be deemed not impaired (MDNRE 2010).

BUI (ix): Restrictions on Drinking Water Consumption, or Taste and Odour Problems

Current Status of BUI: Impaired

Both the Stage 1 and Stage 2 RAP documents for the St. Clair River indicated that periodic closings of water treatment plants occurred due to consumption and taste and odour problems at treatment plants in Ontario as a result of chemical spills.

The issue underlying the Stage 1 declaration of impairment was that the impairment was not due to general water quality, but rather the concern over the frequency of spills to the St. Clair River by industry, primarily on the Canadian side of the River. The Stage 2 delisting criteria focused on spills that caused water treatment closure, but while this criterion has been met (no water treatment plant closures over a two (2) year period), at certain occasions over the past several years, there was concern that the criterion was not robust, since one event can resurface the question of renewed impairment. This was the case in the status of this BUI needing to be reassessed due to a spill in 2003 from Royal Polymers in Sarnia, and another spill in 2004 from Imperial Oil Ltd. in Sarnia.

Background

The St. Clair River Stage 1 Report identified that on both the Michigan and Ontario sides of the river, treated water was not impaired for human consumption. However, there were occasions when water treatment plants were shut down as a precautionary measure following upstream spills.

Closure of water treatment plant intakes ensured the quality of drinking water was not impaired. Numerous closures were reported for the Wallaceburg and Walpole Island Water Treatment Plants in Ontario and the City of Marysville, East China Township, Marine City, Algonac and Old Club Water Filtration Plants in Michigan.

At times the precaution was warranted, such as during the March 1989 ICI spill of Selexol and the October 1990 and May 1991 spills of ethylbenzene from Dow, both of which resulted in the closure of the Wallaceburg Treatment Plant.

Carbon filtration was added to the Wallaceburg and Walpole Island Water Treatment Plants for added treatment of organic contaminants associated with spills. Water filtration plants in Michigan were also advised to provide for the addition of activated carbon treatment.

St. Clair River Area Of Concern Revised Delisting Criteria

The Stage 1 Report identified that elevated total heterotrophic bacterial populations found in the river and river sediments may have adversely affected municipal drinking water supplies by contributing to taste and odour problems (OMOE 1990).

The October 1990 spill of ethylbenzene from Dow exceeded the Health and Welfare Canada tentative aesthetic objective for taste and odour by almost 20 times at the Wallaceburg intake. Concentrations within the Wallaceburg supply system slightly exceeded the objective during start-up, resulting in the continued closure of food processors. The Wallaceburg Water Treatment Plant closures during chemical spills had been associated with taste and odour problems (level II response). Records at this facility indicated three level II responses during each of 1989 and 1990.

The 2009 St. Clair River RAP Draft Update Report (GLIER 2009) looked at hazardous substances in drinking water which indicated that there have been no problems with disease-causing organisms or concentrations of toxic or radioactive substances in treated drinking water from the St. Clair River. The Water Quality Report (2003, first quarter) from the Township of St. Clair Lambton Area Water Supply System (LAWSS) reported that the test results from the water confirm that the water met all health-related Ontario Drinking Water Standards (Township of St. Clair Website, 2003). The parameters tested for include: microbiological parameters (bacteria from sewage plants, livestock operations, septic systems and wildlife; this is the most important aspect of drinking water quality because of association with dangerous water-borne diseases), inorganic parameters (metals that are naturally occurring or as a result of human activities) and organic parameters (naturally occurring or synthetic).

Overall there is no evidence of problems with disease-causing organisms or toxic substances in drinking water from the Lambton Area Water Supply System.

As for taste and odour in drinking water, some drinking water treatment facilities that obtain their water supply from the St. Clair River, were contacted (both on the Canadian and American sides of the St. Clair River) to determine the number of taste and odour complaints that had been received in the past few years. The Lambton Area Water Supply System (LAWSS) consists of a collection of six municipalities including Sarnia, the Township of St. Clair, the Town of Plymouth-Wyoming, the Village of Point Edward, the Township of Warwick and the Municipality of Lambton Shores. According to LAWSS, there were not many taste or odour complaints made, however it should be noted that powdered activated carbon (PAC) is added to the drinking water which helps to control taste and odour (Jasim, 2002).

The Walpole Island Water Treatment Plant has only had one complaint in the last five years concerning taste/odour of the St. Clair River water. Also, this plant does not use PAC, but used

St. Clair River Area Of Concern Revised Delisting Criteria

granular activated carbon to control taste and odour of the water. No ozone is currently used to treat the water, but the facility is set up to use ozone if the need arises.

Regulatory initiatives have also significantly strengthened protections in place relative to the time of the Stage 1 and Stage 2 reports. Bill 133 – Environmental Enforcement Statute Law Amendment Act – was passed by the Ontario Legislature on June 9, 2005. This amendment strengthened spill reporting requirements and introduced Environmental Penalties as an additional abatement tool. The Spill Prevention and Contingency Plans regulation (O. Reg 114/07) codified expectations for major industrial sources with respect to proactive incident prevention. Finally, under the Clean Water Act of 2006, Source Water Protection for drinking water has been significantly strengthened. All of these initiatives will serve to build on the much improved spill prevention performance evident in recent industry performance.

Delisting Criteria

Revised Delisting Criteria

This BUI will be considered restored when there are no treatment plant shutdowns due to exceedances of drinking water guidelines over a two year period. N.B. No change was proposed to the 1995 criteria.

Current (1995 Stage 2 Binational Report)

"This BUI will be considered restored when there are no treatment plant shutdowns due to exceedances of drinking water guidelines over a two year period."

1991 IJC General Delisting Guideline

"This BUI will be considered restored for treated drinking water supplies:

- 1) when densities of disease-causing organisms or concentrations of hazardous or toxic chemicals or radioactive substances do not exceed human health objectives, standards or guidelines;
- 2) when taste and odor problems are absent; and
- 3) when treatment needed to make raw water suitable for drinking does not exceed the standard treatment used in comparable portions of the Great Lakes which are not degraded (i.e., settling, coagulation, disinfection)."

Revised Michigan Delisting Criteria (2008)

"This BUI will be considered restored when monitoring data for 2 years indicates

St. Clair River Area Of Concern Revised Delisting Criteria

that public water supplies:

- 1) meet the current and most stringent human health standards, objectives, or guidelines (at the point of distribution into the water system) for levels of disease-causing organisms, hazardous or toxic chemicals, or radioactive substances; and
- 2) treatment needed to make raw water potable and palatable does not exceed standard methods in those supplies. In the event a public drinking water intake must be closed due to contamination of surface water, standard treatment methods are considered to have been exceeded.”

Rationale

The original draft *Revised Delisting Criteria Report (October 2010)* proposed to refocus the criteria on the frequency of spills, with the potential to impact water systems, relative to other AOCs located in interconnecting channels of the Great Lakes, where drinking water is not considered impaired. The proposed revised criteria stated:

This BUI will be considered restored when the frequency of spills to the St. Clair River with the potential to affect drinking water supplies is similar to the frequency of spills to other connecting channels for which drinking water is not impaired.

The St. Lawrence River, St. Mary’s River, Detroit River and Niagara River AOCs were to be compared to the St. Clair River AOC.

In developing the criteria, the committee attempted to avoid using a subjective time frame of 2 years, during which no water plant intake closures are caused by spills. Instead, a comparative approach to the criteria was proposed, i.e. the frequency and consequence of spills that would potentially impact a drinking water system in St. Clair River AOC should be no worse than other comparable areas in the Great Lakes Basin. The criteria were considered relevant to spills frequency issues, underlying the original decision to declare impairment. However, comments received through First Nations consultation and from others jurisdictions, highlighted the difficulty in making a reliable comparison between AOCs. The definition of a spill, the accuracy of spills tracking, differing land uses and the underlying reasons for the occurrence of spills, were thought to be too disparate to meaningfully compare AOCs related to water intake closures. The issues raised in the comments accentuated the challenge in assessing the information and comparing AOCs that were very dissimilar. In addition, some perceived the criteria to imply that the occurrence of spills was acceptable, as long as they were not more frequent in the St. Clair River than in other AOCs.

Consideration was given to an interval, during which a potable water supply should meet current standards. It was noted that two years is used by Michigan, in their statewide delisting criteria. Also, the 1995 St. Clair River AOC criteria have been met, as the intervals between spills over

St. Clair River Area Of Concern Revised Delisting Criteria

the last 15 years has been in excess of 2 years. The last spill to cause a closure of a plant intake was in 2004. It was also recognized that no matter what time interval is chosen for which no spills causing the shutdown of water intakes should occur (2 years, 5 years, or more), a spill would still be considered unacceptable.

Notification protocols are now in place in Ontario to provide sufficient warning to down river water users within a two hour time of travel, consistent with Source Water Protection policies and sufficient to protect a system from contamination. This protocol protects the water systems and water quality for consumers.

Considering the above arguments, the committee concluded that no new approach or wording to the criteria was possible to address all of the concerns. It decided not to change the current criteria (1995). It concurred that the most effective way to address the cause of the impairment was to reduce the number of spills that could result in the closure of a communal water intake. The committee recognized there would always be a risk, which should be reduced to the extent possible.

The committee recommended that the analysis of future bui status assessments should consider: 1) the frequency of spills over time resulting in intake closure, 2) spill prevention and contingency initiatives implemented at facilities adjacent to the river, 3) all related systemic improvements (legislative, regulatory, compliance) that have contributed to reductions in the risk of spills and 4) the effectiveness of spill warning systems. Having and enforcing the systemic measures that prevent spills and responding appropriately when spills occur were considered the most important factors in addressing the bui.

BUI (x): Beach Closings

Current Status of BUI Impaired

Permanent signs warning of possible intermittent pollution of water are posted at four parks on the Ontario side of the river (Willow, Seager, Branton Cundick and Brander). Postings are there as a warning to people who enter the water that there is a potential for health risks due to high bacteria levels, however these have been posted as a precaution and no monitoring by the local Health Unit occurs at these locations. The City of Sarnia posted a permanent “no swimming” sign in Centennial Park on the St. Clair River in 2006.

Presence of Beaches and Day-Use Parks within the St. Clair River AOC

There are two recognized beaches within the boundary of the St. Clair River AOC (Mitchell’s Bay and Canatara Park). While Centennial Park is not a recognized beach, the Public Health Unit continues to monitor *E. coli* counts due to the proximity of a children’s play area near the water’s edge.

There are numerous designated day-use parks located along the length of the St. Clair River which the public use (e.g. Seager, Branton Cundick and Brander) and may therefore be in direct contact with St. Clair River water, however no water quality monitoring for recreational use is undertaken by the local Health Unit at these location.

Background

Beach Closings were identified as an impaired beneficial use in the Stage 1 Report (OMOE and MDEQ 1991). The report identified that swimming advisories lasting up to two months in duration were placed on at least five bathing areas on the Ontario side of the St. Clair River during 1990 due to bacterial contamination in excess of the Provincial Water Quality Objective. The Ontario recreational beach water standard for *E.coli* is 100 cfu per 100ml (c.f.u. refers to colony forming units). The Ontario Ministry of Health and Long Term Care Beach Management Protocol stipulates that levels of *E.coli* exceeding 100cfu/100ml of water indicate adverse water quality. While the Ontario standard is 100cfu/100ml, the Canadian standard is 200cfu/100ml.

As updated in the Stage 2 Report (OMOE and MDEQ 1995), conditions within the river on the Canadian side remained the same with the addition of caution signs warning against high bacterial levels after rainfalls being posted on all Ontario beaches along the St. Clair River.

St. Clair River Area Of Concern Revised Delisting Criteria

Centennial Park

Centennial Park has been continuously posted throughout the summer months since 2004. Annual geometric mean *E. coli* counts increased significantly from 45.5 to 1028 cfu/ 100 ml between the years 1997 and 2007. Since 2006, the City of Sarnia posted no swimming signs at Centennial Park however monitoring will continue to track water quality.

Mitchell's Bay

Exceedances of the Ontario *E. coli* guideline (100 cfu/100 ml) occurred twice in 1999 and once during the week of June 15, 2005, when levels reached 138 cfu/100ml *E. coli*. Annual geometric mean *E. coli* counts at Mitchell's Bay have consistently fallen below the provincial guideline and ranged from 10 to 53 cfu /100 ml.

Canatara Park

Canatara Park, which is located at the upper end of the AOC, on Lake Huron ranged from 20 to 284 cfu /100 ml, indicating that beach postings, due to elevated *E. coli* counts is a Great Lakes problem and not restricted to the St. Clair River. Canatara Park *E. coli* exceedances tend to be associated with strong north winds, wave activity and the resuspension of sediment-bound *E. coli*. There is also some implication to sources from Perch Creek following heavy rainfall events.

Assessment of St. Clair River Shoreline and Tributary *E. coli* Levels

Water testing for *E. coli* levels is not conducted at shoreline and tributary stations along the St. Clair River on an annual basis. The most recent shoreline and tributary assessment by the County of Lambton Community Health Services Department was completed in 2004. At this time, water was tested for the presence of *E. coli* at various stations on the Canadian shoreline and tributaries of the St. Clair River from Sarnia to the delta.

E. coli counts at selected St. Clair River day-use parks were compared between 1998 and 2004. *E. coli* counts at Brander and Guthrie Parks in 2004 were generally consistent with results obtained in 1998. *E. coli* counts at Guthrie Park were below the guideline during all other weeks during the summer of 2004 except one week when counts reached 1380cfu/100 ml.

A wide range of individual results is apparent at Bowen Creek and Reagan Parks for both sample years, along with extremely high counts during certain weeks of the summer. Reagan Park had consistently high *E. coli* counts and the increase in 2004 is mainly due to one record that exceeded 4000 cfu / 100mL. Bowen Creek *E. coli* counts increased over 1998 levels due to

St. Clair River Area Of Concern Revised Delisting Criteria

elevated counts on three occasions, during which counts were a magnitude above provincial guidelines.

Additional sampling has occurred within Ontario in a shoreline sampling program (SCRCA and MOE 2009 unpublished data), initiated in the summer of 2009 at seven stations along the St. Clair River (Regan, Branton Cundick, Cathcart Park, Courtright, Mooretown, Guthrie and Bluewater Bridge). Samples were taken at each site weekly, between June and August (12 times in total). Of the 84 samples taken, only 4 were recorded exceeding the 100 cfu/100 ml guideline, one each in Regan, Branton Cundick, Courtright and Guthrie.

The USEPA supported a monitoring program that undertook *E.coli* monitoring at various transects along the St. Clair River which ran across the width of the river in 2008 and 2009.

Improvements at Centennial Park

In 2008, the City of Sarnia completed the first phase of work to eliminate combined sewer overflows, which have the potential during heavy rainfalls to direct untreated water to the St. Clair River. According to the County of Lambton Health Services Department data (County of Lambton 2009), this project has had a positive effect on the quality of the water in Sarnia Bay along the St. Clair River. In 2007, the average geometric mean of the Centennial Park beach area was well above any safe limit for swimming. Since 2007 there has been a total drop of 66 percent in the average geometric means calculated for Centennial Park. However, Centennial Park continues to experience high spikes in the level of *E.coli* detected. This is thought to be mainly due to the large populations of waterfowl along the shoreline and boat traffic related to the marina. Further study is required to address this assumption.

Delisting Criteria

Revised Delisting Criteria

This BUI will be considered restored when less than 20% of the geometric means of water samples collected over the swimming season, at identified beaches within the St. Clair River AOC, exceed the PWQO for *E. coli* or is similar to a suitable non-AOC reference site, when assessed over a period of at least three to five years.

Current (1995 Stage 2 Binational Report)

“This BUI will be considered restored when there are zero beach closings based on fecal coliform standards regulating beach guidelines over a two year period.”

St. Clair River Area Of Concern Revised Delisting Criteria

1991 IJC General Delisting Guideline

“This BUI will be considered restored when waters, commonly used for total-body contact or partial body-contact recreation, do not exceed standards, objectives, or guidelines for such use.”

Revised Michigan Delisting Criteria (2008)

1) No waterbodies within the AOC are included on the list of non-attaining waters due to contamination with pathogens in the most recent Clean Water Act *Water Quality and Pollution Control in Michigan: Section 303(d) and 305(b) Integrated Report* (Integrated Report), which is submitted to U.S. EPA every two years.

2) OR, in cases where the waterbodies within the AOC are on the list of non-attaining waters due to the presence of Combined Sewer Overflows (CSOs) or are impacted by upstream CSOs, this BUI will be considered restored when:

- Updated information reveals that the CSOs have been eliminated or are being treated.

3) OR, in cases where CSOs still exist and significant progress has been made towards their elimination or treatment, this BUI will be considered restored when:

- Monitoring in the AOC during the recreation period, using the sampling protocol outlined in Rule 62 of the Michigan WQS, meets the following criteria:
 - a) The sampling plan and Quality Assurance Project Plan are approved by the MDEQ;
 - b) *E. coli* concentrations are below a 30-day geometric mean of 130 counts per 100 milliliters (ml);
 - c) At least 90% of sample results are below the daily geometric mean limits of 300 counts *E. coli* per 100 ml;
 - d) No more than one (1) of the sample results exceed the partial-body contact water quality standard of 1,000 counts *E. coli* per 100 ml based on a daily geometric mean; and
 - e) DEQ-approved plans in a National Pollutant Discharge Elimination System (NPDES) permit are in place for addressing any remaining CSOs that are causing BUIs and the implementation plan is on schedule.

Sampling under approach 3 is done systematically throughout the recreation season, and does not specifically monitor wet weather discharges from CSOs. Meeting the above criteria does not negate regulatory requirements for separating CSOs in order to meet water quality standards.

St. Clair River Area Of Concern Revised Delisting Criteria

Rationale

To obtain Blue Flag status in Ontario, beaches must be within Provincial Water Quality Objectives (PWQO) for *E.coli* a minimum of 80% of the time during the swimming season. Therefore beaches within the AOC maintaining similar numbers would also be deemed to be healthy.

If this objective is not being met, then beaches within the AOC should be compared to an upstream reference beach, along the Lake Huron shores to determine if there are noticeable differences between them. If the water quality (percentage of samples above the provincial water quality objective for *E.coli*) found between AOC beaches and the non-AOC referenced beach (e.g. Mike Weir Park beach) are comparable, then consideration should be given to declaring this beneficial use impairment as not impaired.

The source of *E.coli* will also be considered during this analysis ie. anthropogenic and non-anthropogenic sources. If the reason that the AOC beaches are not achieving the PWQO is due to excessive geese or wildlife populations residing or nesting at the beach, and this is determined to be the main input resulting in elevated *E.coli* results, this would not be considered an AOC issue and the BUI could be redesignated.

BUI (xi): Degradation of Aesthetics

Current Status of BUI: Impaired

The Degradation of Aesthetics Beneficial Use Impairment was designated as impaired in the 1991 Stage 1 RAP Report (OMOE and MDEQ 1991). Its status remained impaired in the 1995 Stage 2 RAP Report (OMOE and MDEQ 1995) and in the RAP Update Progress Report for 1998-2003 (Mayne 2005).

Background

In the Stage 1 Report, degradation of aesthetics was cited to be caused by substances that degraded the visual quality of the water and/or contributed obnoxious odours. Specific substances noted by the Binational Public Advisory Council members were floating 'debris', scum and oil sheens. The extent of aesthetics degradation was not well described. However, it seemed to be associated with spill incidents, as the Stage 1 report includes data where spills reported to the Spills Action Centre result in degradation of aesthetics. In 1987, four instances of oil sheen/oil slicks were reported, two in 1988, and five in 1989. Sources were unknown for most of these incidences, with mention of one company in 1987. Parameters also used to gauge aesthetics were floating scum, slicks, periodic spills and objectionable odours. In a survey with 70 respondents, 21 respondents noticed oil, 13 noted foam, 10 noted sewage, 9 noted scum, 8 noted garbage, 5 noted cloudiness, 2 noted dead fish and 2 noted algae. Locations reported by citizens and newspaper articles were Sarnia Bay, Clay Creek (sedimentation), near the St. Clair River mouth, near combined sewer overflow outfalls and most tributaries to the river. Spill occurrences related mostly to ship traffic, docking facilities and industries. Occasional floating scums, slicks, periodic spills, and objectionable odours, were reported mainly adjacent to and downstream from Sarnia on the Ontario side.

The Stage 2 and the 2005 RAP Progress Report identified that floating scums, oil slicks, spills and odours were periodically reported. Point sources and Combined Sewer Overflows (CSOs) were cited as reasons, as CSO events were occurring in both Port Huron and Sarnia. However, reduction in spills has contributed to the improving condition of this BUI but reevaluation is necessary. Significant actions were completed: two CSOs were replaced and sewage treatment was improvements in Sarnia and Port Huron sewers were upgraded. The report suggests that this BUI could be on the verge of being redesignated, once a reevaluation was done.

Significant remedial actions have taken place since the Stage 1 and Stage 2 Reports were written. Port Huron has eliminated its CSOs and the City of Sarnia has done major infrastructure upgrades to divert the sanitary sewage component of the combined sewage to the treatment plant and to construct a large detention tank. Locations addressed were: Exmouth Street, Devine

St. Clair River Area Of Concern Revised Delisting Criteria

Street and Cromwell St. In addition, MISA regulations in the 1990's and more recently, the Spills Act have been in place, and spills have been reduced considerably.

Delisting Criteria

Revised Delisting Criteria

This BUI will be considered restored when the waters are devoid of anthropogenic substances at levels that produce a persistent objectionable deposit and/or odour.

Current (1995 Stage 2 Binational Report)

“This BUI will be considered restored when over a two year period there is/are no, objectionable deposits, unnatural colour or turbidity, or unnatural scum/floating materials.”

1991 IJC General Delisting Guideline

“This BUI will be considered restored when the waters are devoid of any substance which produces a persistent objectionable deposit, unnatural color or turbidity, or unnatural odor (e.g., oil slick, surface scum).”

Revised Michigan Delisting Criteria (2008)

This BUI will be considered restored when monitoring data for two successive monitoring cycles indicates that water bodies in the AOC do not exhibit persistent, high levels of the following “unnatural physical properties” (as defined by Rule 323.1050 of the Michigan WQS) in quantities which interfere with the State’s designated uses for surface waters:

Color

Turbidity

Settleable solids

Suspended solids

Deposits

Oil films

Floating solids

Foams

For the purposes of this criteria, these 8 properties impair aesthetic values if they are unnatural – meaning those that are manmade (e.g., garbage, sewage), or natural

St. Clair River Area Of Concern Revised Delisting Criteria

properties which are exacerbated by human-induced activities (e.g., excessive algae growth from high nutrient loading). Persistent, high levels are those defined as long enough in duration, or elevated to the point of being injurious, to any designated use listed under Rule 323.1100 of the Michigan WQS.

Natural physical features which occur in normal ecological cycles (e.g., logjams/woody debris, rooted aquatic plants) are not considered impairments, and in fact serve a valuable role in providing fish and wildlife habitat.

Natural physical features which occur in normal ecological cycles (e.g. logjams/woody debris, rooted aquatic plants) are not considered impairments, and in fact serve a valuable role in providing fish and wildlife habitat.”

Rationale

The revised criteria are consistent with 1991 IJC criteria and with Detroit River AOC delisting criteria. They provide consistency along the Huron-Erie corridor AOCs as all refer to waters devoid of any substance which produces a persistent objectionable deposit, colours, turbidity and/or odour).

Aesthetics parameters and objectionable deposits in the delisting criteria, are meant to reflect specific Stage 1 concerns (floating ‘debris’, scum and oil sheens, oil slicks, and odour). Reference conditions for this BUI were not used as they were judged to be subjective and unquantifiable.

“Anthropogenic” is used as it reflects “man-made” sources of contamination rather than natural occurrences which could also be seen as the cause aesthetic issues but are not the subject of the RAP.

The two year period is dropped as it is subjective and too prescriptive. The term “persistent” has been used as it reflects an “ongoing” issue rather than one-time incident.

BUI (xii): Added Costs to Agriculture or Industry

Current Status of BUI: Impaired

In the Stage 1 St. Clair RAP Report (1991) it identified this BUI as impaired based on facts that on the Ontario side, food processors in Wallaceburg temporarily shut down following the October 1990 ethylbenzene spill from Dow Chemical. The plants remained closed until the water supply system could be flushed due to concentrations of ethylbenzene in excess of the Health and Welfare Canada tentative aesthetic objective for taste and odour.

In addition, there were numerous non-quantified costs related to activities such as the confined disposal of contaminated sediments dredged for marine construction purposes, and for the extension of the drinking water pipeline from the Lambton Area Water Supply System (LAWSS) and associated capacity upgrading.

The Stage 2 Report reiterated the same problems identified in the Stage 1 Report.

Background

This BUI has been identified as impaired in the Stage 1 (1991), Stage 2 (1995) and RAP Update Report (EC 2005). The 2005 Update Report had identified that, because there had been no water treatment plant closures or associated interruptions in water supply to industrial users between 1994 and 1997, the status of this BUI be changed from “impaired” to “not impaired”. However, this recommendation was not formalized and the report identified that the BUI required re-assessment given reports that a number of facilities in the Sarnia industrial sector had allowed potentially harmful chemicals to spill into the St. Clair River since 2000.

In the 2009 Draft RAP Update Report (GLIER) some potential concerns were identified with zebra mussels clogging drinking water, industrial and power plant intakes. Cost estimates to control them were not reported specifically for the St. Clair River; however it is known that industrial plants around the Great lakes can spend up to hundreds of thousands of dollars per year for zebra mussel removal (National Atlas of the United States, 2005). However, zebra mussels are not unique to the St. Clair River AOC but rather are a basin wide issue.

Two of the companies that use raw water from the St. Clair River for cooling were contacted to determine whether they had experienced any added costs due to the quality of the water in the river. Suncor Energy uses the water for cooling, and there were no added or extra costs in using the raw water from the St. Clair River. Imperial Oil reported that it uses the water for cooling, and for firewater. There were no additional problems or costs associated with using the raw water from the St. Clair River.

St. Clair River Area Of Concern Revised Delisting Criteria

There are some golf courses located in the vicinity of the St. Clair River on both the Canadian and American sides. St. Clair River Country Club was contacted to determine whether they used raw water from the river for irrigation purposes, and if so, whether they experienced any added costs. The golf course reported using the water from the St. Clair River for irrigation and incurred no added cost.

Delisting Criteria

Revised Delisting Criteria

This BUI will be considered restored when there are no significant additional costs required to use raw St. Clair River water for agricultural and industrial purposes.

Current (1995 Stage 2 Binational Report)

“This BUI will be considered restored when no plant shutdowns attributable to water quality over a two year period. No added costs for the disposal of contaminated sediment.”

1991 IJC General Delisting Guideline

“This BUI will be considered restored when there are no additional costs required to treat the water prior to use for agricultural purposes (i.e. including, but not limited to, livestock watering, irrigation and crop-spraying) and industrial purposes (i.e. intended for commercial or industrial applications and noncontact food processing).”

Revised Michigan Delisting Criteria (2008)

This BUI will be considered restored when the locally-derived restoration target for this BUI, approved by the 4 Agency Management Committee, which oversees shared U.S. and Canadian AOCs, is met. The current target for this BUI, as adopted in the 1995 Stage 2 RAP, is:

- 1) No plant shutdowns attributable to water quality over a 2 year period.
- 2) No added costs for the disposal of contaminated sediments.”

Rationale

The criterion is refocused on no additional costs required to treat water relative to other parts of the Great Lakes for which raw water can be used for agricultural and industrial purposes and therefore not considered impaired. These include:

St. Clair River Area Of Concern Revised Delisting Criteria

- St. Lawrence River
- St. Mary's River
- Detroit River
- Niagara River

The revision is reasonable in that it is consistent with the principle that local impairment is not measured against “pristine” conditions, but measures relative to the background norms prevailing in the Great Lakes Basin at large.

It is measureable and compares the St. Clair River to similar, unimpaired connecting channels which can be related to a common data source. A polling for data about costs (other than for zebra mussel control) to industry and agriculture that utilize raw water from the St. Clair River must be undertaken.

It is sustainable and enables a conclusion that, once reached, is not immediately open for question and/or challenge.

Industry or agriculture drawing water from one of the tributaries to the St. Clair River should not be considered as part of this BUI assessment.

It is important to note that the food processing industries identified as part of the issue in the Stage 1 Report **no** longer operate in Wallaceburg.

The inclusion of costs related to contaminated sediment as part of this BUI is best dealt with under other BUI specifically related to sediment. Therefore reference to sediment removal costs was removed from this BUI.

Water pipelines servicing the lower reaches of the St. Clair River are now interconnected and if necessary Wallaceburg could receive water from the LAWSS system.

BUI (xiv): Loss of Fish and Wildlife Habitat

Current Status of BUI: Impaired

The 1991 Stage 1 Report designated the *Degradation of Fish and Wildlife Habitat* as impaired due to the significant loss of wetlands and extensive bulkheading and infilling of the St. Clair River shoreline. Wetland impairment as a result of dyke construction has impacted wetland functionality and the availability of fish habitat. Significant shoreline alterations including extensive bulk-heading and infilling has occurred along much of the river, eliminating and/or altering the littoral zone (shallow water areas) which has resulted in the loss of spawning, rearing and feeding sites for many fish species (MOE, 1995). The loss of terrestrial habitat has also been significant and by the early 1900's, most of the original woodlands had been converted to non-forest land use, primarily agriculture (Environment Canada, 2005).

Background:

The St. Clair River forms the upper-most portion of the corridor between Lakes Huron and Erie serving as a 'connecting channel' from Lake Huron to Lake St. Clair. The river flows approximately 64 km (40 mi) in a southerly direction from the outflow of Lake Huron to Lake St. Clair. Prior to entering Lake St. Clair, the river divides into several channels creating an extensive delta known as the St. Clair delta (also referred to as the St. Clair flats), a unique ecosystem composed of a variety of valuable fish and wildlife habitats.

In 1873, the U.S. portion of the Lake St. Clair was estimated to have 7,274 ha of wetlands however due to urban and industrial development along the river, by 1973, 5,252 ha or 72 percent of the original wetlands were lost (Herdendorf, 1986). In contrast, Ontario's coastal wetlands were being converted for agricultural purposes primarily and from 1873 to 1968, 4764 ha or 34%, of the original coastal wetlands, were lost. Between 1965 and 1984, wetlands from the Thames River mouth in Lake St. Clair north to the Chenal Ecarte dwindled from 3,574 ha (8,830 acres) to 2,510 ha (6200 acres) representing a loss of nine individual wetlands with a total area of 1064 ha (McCullough, 1985). Although the percentage of wetland area lost in Michigan is greater than in Ontario (72% vs. 34%), the actual area of wetland lost is greater in Ontario (Herdendorf, 1986). As is evident in the Figure 1, the majority of wetland loss occurred in the St. Clair River delta and along east shore of Lake St. Clair. The loss of woodlands was also extensive and by the early 1900s, most of the original woodlands had been converted to non-forest land use, primarily agriculture (Environment Canada, 2005).

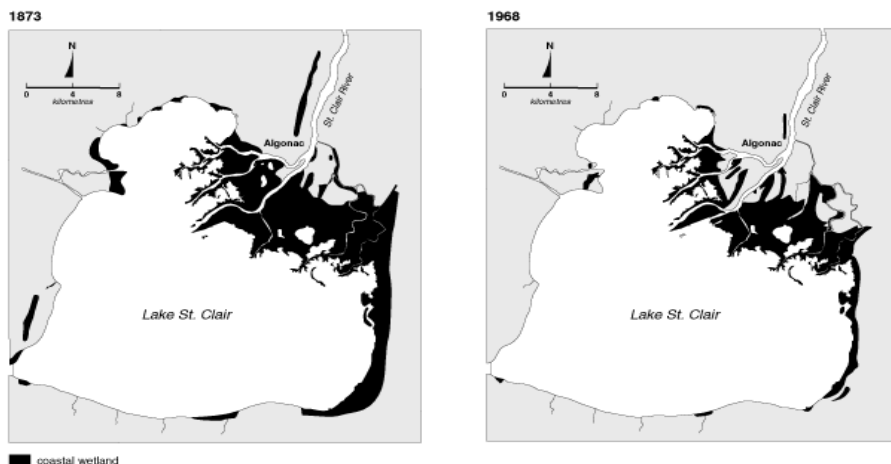
St. Clair River Area Of Concern Revised Delisting Criteria

Figure 1

St. Clair River Remedial Action Plan

Extent of Lake St. Clair coastal wetlands in 1873 and in 1968

(Herdendorf et al. 1986)



Dyke construction during the 1900's impaired wetland functions as they separated them from the main channel or lake which prevented the exchange of water, organic material and fish. As a result, these impoundments are dependent upon pumps and weirs to regulate water levels and tend to experience higher water temperature, influencing the diversity and abundance of aquatic flora and fauna. Currently, nearly one-half of the remaining wetlands are separated from Lake St. Clair by earthen dikes (Herdendorf, 1986). Widespread drainage works over the past 150 years have reduced wetland coverage overall to approximately 1 percent within the AOC as the *Drainage Act* permitted drainage of wetlands and supported construction of municipal drains beginning in the 1880s (Hayman, 2009). Drainage for agriculture accounted for 92 percent of wetlands lost within the Ontario portion of delta and Lake St. Clair (Herdendorf, 1986).

Extensive alteration to the original shoreline of the St. Clair River occurred during the last century to the detriment of fish and wildlife populations. In the late 1950s, an 8.3 metre channel was created in the St. Clair River and a significant proportion of the Canadian shoreline has been modified with revetments and other shoreline hardening structures. The extensive bulkheading and infilling along the river shoreline has resulted in the loss of spawning, rearing and feeding sites for many fishes. The shoreline alteration also disrupts normal sediment erosion and deposition processes in areas of the River and Delta. Wave action, water current direction and intensity are also modified by shoreline hardening devices (Mayne, 2006).

The loss of wetlands and wood cover identified in the Stage 1 Report provided the foundation for the recommended actions identified in the 1995 Stage 2 Report entitled *The St. Clair River Area of Concern: Water Use Goals Remedial Measures and Implementation Strategy*. The Stage 2 expanded the scope of the RAP to encompass the immediate drainage basin of the St. Clair River including several tributary creeks in Ontario (OMOE and MDEQ, 1995) in order to more

St. Clair River Area Of Concern Revised Delisting Criteria

comprehensively address the environmental problems defined in the Stage 1 RAP. As a result, “Area 1B” was established.

In 2006, recognizing that the 1995 criteria had been achieved to the extent possible, Ontario conducted a workshop to propose revisions to the 1995 delisting criteria. The 2006 proposed revisions to the criteria were reviewed and revised again in 2010. The delisting criteria are intended to reflect the Stage 1 concerns including the need for habitat protection and connectivity, wetland and shoreline restoration, improved habitat quality, and a long-term habitat management while still ensuring that the efforts and progress made under the 1995 criteria are captured accordingly.

Delisting Criteria

Revised Delisting Criteria

The Fish and Wildlife Habitat BUI in the Ontario portion of the SCR AOC will no longer be considered impaired when:

- 1. Administrative and legislative mechanisms are in place to protect recognized aquatic, wetland and terrestrial habitats from destruction or degradation.**
- 2. Wetland coverage within the sub-watersheds of Area 1A is 6-10%, or is restored to the extent possible, and 155 ha of wetland habitat is rehabilitated, created, or protected within the Chenal Ecarte, Walpole Island First Nation delta or along the eastern shore of Lake St. Clair.**
- 3. Habitat connectivity between the St. Clair River and Sydenham River and between Walpole Island First Nation, Bickford Oak Woods and the Aamjiwnaang First Nation has been improved using landscape ecology principles.**
- 4. 50% of the tributary lengths in Area 1A are buffered by a minimum width of 5m of natural vegetation to improve fish habitat.**
- 5. Near shore and shoreline fish habitat has been enhanced at 6–12 priority sites along the St. Clair River to demonstrate the benefits of integrating shoreline protection with fish habitat enhancement.**
- 6. Wetland habitat quality achieves an integrated ranking of “Good” or better has been achieved based on the IBI scores for water quality, submerged aquatic vegetation, aquatic invertebrates, fish and birds or, when the quality of the wetlands in the AOC are shown to be comparable to reference wetlands outside the AOC.**

St. Clair River Area Of Concern Revised Delisting Criteria

7. A long term *Fish and Wildlife Habitat Management Plan* for Ontario is completed to facilitate habitat restoration and protection beyond AOC delisting.

Current (1995 Stage 2 Binational Report)

“As a bi-national AOC, the 1995 delisting criteria identified objectives over a five year period for both Ontario and Michigan.

Protection:

1. Regulations - Ensure that sufficient enforceable mechanisms are in place to protect existing aquatic and wetland habitat from cultural destruction or degradation, including filling, dredging, adversely affecting the hydrology, cutting or removing vegetation required for habitat, and allowing pollutants such as sediment, excess nutrients or toxic substances to enter aquatic or wetland habitat.
2. Acquisition - Acquire into public ownership an additional 800 acres (324 ha) of wetland habitat in Michigan by the year 2000.
3. Protect existing habitat in Ontario.

Restoration and Enhancement:

1. Of the 5200 ha (12,844 acres) identified as "Candidate Sites" in Ontario, complete the following habitat rehabilitation projects by the year 2000:
 - Chenal Ecarté Wetland Creation (155 ha) (384 acres)
 - Stag Island (80 ha) (198 acres)
 - Darcy McKeough Floodway (445 ha) (1100 acres)
2. Reclaim and restore 200 acres (81 ha) of Michigan state-owned public bottom lands currently in private use by the year 2000.
3. Restore an additional 150 acres (61 ha) of wet prairie/meadow habitat in Michigan by the year 2000.
4. Enhance 2000 acres (809 ha) of wildlife habitat in Michigan by the year 2000.

St. Clair River Area Of Concern Revised Delisting Criteria

5. A long-term habitat management plan for both Michigan and Ontario, including an assessment of needs (GAP Analysis) relating to wildlife diversity and integrity, will be completed to ensure continued habitat restoration and protection beyond RAP delisting.”

Revised Michigan Delisting Criteria (2008)

Restoration of this BUI requires that a local aquatic habitat or population restoration plan be developed and implemented. The plan must be part of the RAP for the AOC, and contain at least the following components:

- 1) A short narrative on historical fish and wildlife habitat or population issues in the AOC, including how habitat or populations have been impaired by water quality.
- 2) Description of the impairment(s) and location for each aquatic habitat or population site, or for multiple sites where determined appropriate at the local level to address all habitat or population issues identified in the RAP and RAP updates.
- 3) A locally derived restoration target for each impacted habitat or population site. Sources of information for targets may include data from social science surveys, if appropriate. Habitat restoration targets may be based on restoration of fish and wildlife populations, if appropriate.
- 4) A list of all other ongoing habitat or population planning processes in the AOC, and a description of their relationship to the restoration projects proposed in the plan.
- 5) A scope of work for restoring each impacted aquatic habitat or population site. The scope of work should describe specific habitat or population restoration action(s) to be completed, including:
 - a) Timetable
 - b) Funding
 - c) Responsible entities
 - d) Indicators and monitoring
 - e) Evaluation process based on indicators
 - f) Public involvement
- 6) A component for reporting on habitat or population restoration implementation action(s) to the MDEQ.

Removal of this BUI will be based on achievement of full implementation of actions in the steps above, including monitoring conducted according to site plans and showing

St. Clair River Area Of Concern Revised Delisting Criteria

consistent improvement in quantity or quality of habitat or populations addressed in the criteria. Habitat values and populations need not be fully restored prior to delisting, as some may take many years to recover after actions are complete. Actions already implemented in AOCs may be reported and evaluated as long as the reports contain all the elements above.

Rationale

General

In 2006, recognizing that the 1995 criteria had been achieved to the extent possible; Ontario conducted a workshop to propose revisions to the 1995 delisting criteria. The 2006 proposed revisions to the criteria were reviewed and revised again in 2010. The delisting criteria are intended to reflect the Stage 1 concerns, including the need for habitat protection and connectivity, wetland and shoreline restoration, improved habitat quality, and a long-term habitat management plan, while still ensuring that the efforts and progress made under the 1995 criteria are captured accordingly.

With the exception of the Chenal Ecarte Wetland project which is ongoing, the Darcy McKeough Floodway and Stag Island projects have been completed to the extent possible, as a result of unforeseen constraints. The proposed spawning beds for the shallow sand point of the southern tip of the island were not done due to navigational concerns and because of the international agreement of no infilling of the river. Wetland excavations in the low, wet areas around Stag Island were not completed because of concerns associated with disturbance and re-suspension of contaminated sediment. The proposed off shore islands to help protect the west side from soil erosion and to help establish habitat, were also not completed due to lack of support by the Stag Island residents. The target of the Darcy McKeough was 445 ha however; this target was not entirely achieved because of concerns of possible interference with the Floodway operation.

The revisions conform to the S.M.A.R.T principle as they are specific, measurable, achievable, realistic and pending resources and land owner cooperation, achievable within a five to ten year timeframe. Quantifiable targets provide an endpoint and their use facilitates tracking and measuring progress over time. The delisting criteria are felt to be reflective on the Stage 1 concerns as they address the need for habitat protection, restoration and biological connectivity.

1. Rationale for protection

The revision combines the two protection concepts into one, simplifying the original 1995 criteria. There are various mechanisms that afford protection to locally recognized and/or unique

St. Clair River Area Of Concern Revised Delisting Criteria

aquatic fish and wildlife natural areas either through administrative measures, such as Official Plans and Planning Policies or legislation that has been enacted. Within the St. Clair AOC, natural heritage system features are protected via “Official Plans” prepared by Lambton County and the Municipality of Chatham-Kent. The St. Clair Region Conservation Authority provides input into Official Plans and administers the Ontario Regulation 97/04 “Development, Interference with Wetlands & Alteration to Shorelines & Watercourses” which is an additional mechanism to help manage land/water issues. In 2001, the Walpole Island First Nation Band Council and Environment Canada signed an agreement that commits the two parties to work together to produce a Recovery Strategy for the ecosystems and species at risk on Walpole Island (Mayne, 2006).

2. Rationale for wetland creation and restoration

The criterion of 6-10% is based on the recommendations of the Environment Canada Framework. Currently, the AOC has 10.7% wetland coverage overall. The criterion includes wetland creation, but also captures restoration, enhancement and acquisition. In addition, it acknowledges the significant investment of funds and the restorative, enhancement and acquisition projects that have been completed to date. Of the eleven sub-watersheds, those in Area 1A have greater potential to achieve 6-10% , as historically these areas contained more wet woods and marsh wetlands than the sub-watersheds located in the upper St. Clair River, which were more forest covered (Hayman, 2009).

To date, 116 ha of wetlands have been created or restored within the AOC and a feasibility study is currently underway to restore a wetland site within Walpole Island First Nation. RLSN is undertaking the planning of a coastal wetland project that will result in the restoration of a 15 ha wetland. With the assistance of OMNR GIS expertise and the knowledge of partners, potential candidate sites have been and will continue to be identified and pursued. A five year strategic plan at the sub-watershed level will be developed to prioritize, plan and focus resources and efforts for habitat restoration works within the AOC. The revisions also integrate remedial action planning with environmental objectives necessary to achieve habitat conditions consistent with Lake Erie and Lake Huron fish community goals and objectives.

3. Rationale for habitat connectivity and corridors

The loss of original woodlots across the AOC to facilitate farming removed and fragmented terrestrial habitat, reducing habitat connectivity and impeding wildlife movement. The creation of biological corridors between remaining terrestrial and aquatic habitats provides wildlife with access to a range of habitats needed for their life cycles. Although the original pothole wetland creation and aquatic habitat restoration targets for the Darcy McKeough Floodway were not achieved, because of concerns with interference of the Floodway operation, the Darcy

St. Clair River Area Of Concern Revised Delisting Criteria

McKeough Floodway provides a significant east-west wildlife corridor, connecting the Sydenham and St. Clair Rivers.

The Highway 40 project provides a 50 m wide and 38 km long north-south wildlife corridor, is a partnership between Rural Lambton Stewardship Network, the Ministry of Natural Resources (MNR) and the Ministry of Transportation (MTO) buffers the highway 40 right-of-way and naturalizes the adjacent MTO lands. The project includes planting rows of shrubs and trees adjacent to agricultural drains, planting riparian buffers adjacent to roadside and agricultural drains, and incorporating wetland creations and enhancements wherever possible. The project provides a corridor between Walpole Island, one of Canada's most biological diverse prairies, and home to 54 identified species at risk, and the Bickford Oak Woods Complex and the Aamjiwnaang First Nation forests.

4. Rationale for riparian cover in tributaries

Tributary stewardship addresses the GLWQA and COA goals for both non-point source pollution control and habitat restoration. Tributaries and each tributary/St. Clair River confluence provide the greatest aquatic habitat and species diversity (i.e., Clay Creek-St. Clair River confluence) (Barnucz and Mandrak, 2003). These tributary habitats should be maintained and where possible enhanced and or restored as they provide many benefits to the watercourse. The vegetation filters sediment and pollutants from surface runoff, shades and cools the water, provides shoreline habitat for fish, reduces bank erosion, and contributes organic matter such as woody debris and leaves for aquatic organisms (Hayman, 2009). In the 2008 Addendum to the St. Clair Area of Concern: Coastal Wetland Habitat Assessment Report, it recommended that *opportunities be pursued to expand the extent and distribution of riparian buffers (e.g. grasslands) along the St. Clair River AOC tributaries, other water input sources and wetlands to enhance wildlife habitat.*

The percentage of AOC tributaries buffered with riparian vegetation at least 5 m is just over twelve percent (Graham et al., 2006). Although Environment Canada's riparian habitat guidelines recommend seventy-five percent of the stream length be naturally vegetated with a 30m wide buffer ideally, land ownership and use within the AOC presents significant challenges and is not a realistic target for this AOC. A 5m minimum buffer, although much less than the recommended 30m, is realistic and offers flexibility where land use and ownership vary within the AOC. A 5m minimum buffer on both sides of the stream is the minimum to mitigate sedimentation, improving overall water quality for fish and other aquatic wildlife. Currently, 7.7 % of area 1A has a 30m buffer, while area 1B has 16.8%. The effectiveness of planning and implementing riparian stewardship initiatives within the AOC is strengthened by utilizing GIS to systematically plan and implement projects at the sub-watershed level. The quantitative target

St. Clair River Area Of Concern Revised Delisting Criteria

will be based on further GIS analysis of potential for riparian buffering to occur within Area 1A based on land ownership.

5. Rationale for improving shoreline fish habitat along the St. Clair River

Shoreline hardening was listed as one of the original causes of impairment of the “Loss of Fish and Wildlife Habitat” (RAP Stage 1, 1991) and currently, loss of habitat and productivity due to shoreline alterations is listed as a major issue which impedes attainment of the St. Clair System Fish Community Goal and Objectives (MacLennon et al., 2003). The delisting criterion is compatible with the St. Clair System Fish Community Goal and Objectives, specifically to “protect and restore fisheries habitat in the St. Clair System while maintaining the natural variation in the composition, structure and function of aquatic habitat.” Shoreline restoration, through the replacement of degraded shoreline retaining walls with stepped armour stone will demonstrate the benefits of integrating shoreline softening with fish habitat creation. Naturalizing the St. Clair River shoreline also enhances access to the river by wildlife and provides resting and hunting opportunities for birds and small mammals. This criterion could include near shore, in-river fish habitat structures.

6. Rational for wetland quality

The use of biological indicators has been widely accepted as a way of monitoring and predicting the quality of a wetland. Coastal wetland health is defined through the overall condition of biotic communities being monitored such as marsh birds, fish, amphibians, invertebrates and submerged aquatic vegetation. To measure the condition of the biotic community, a multi-metric approach is used and scored out of 100. Corresponding to the score is a “ranking” that ranges from poor to excellent. By using an Index of Biotic Integrity (IBI), wetland quality can be determined and understood and compared to wetlands outside the AOC. Using an IBI approach will demonstrate the capacity of the AOC’s wetlands to support and maintain a balanced, integrated, adaptive biological system having the full range of genes, species, assemblages, and processes (Mayne, 2006).

7. Rational for a *Binational Habitat Management Plan*

A Binational Habitat Management Plan has been drafted and provided current, benchmark conditions for which to set future goals and strategies for protection and restoration. The study concluded that large losses in natural habitat have occurred within the AOC and attempting to restore to historical conditions is unrealistic and conservation goals should ensure representation of historical habitat types and strive to preserve remaining biodiversity. To achieve this, a Natural Heritage Study (NHS) was completed by Geomatics International in 1998 and updated by OMNR in 2006. The NHS report mapped and measured upland forest, riparian and wetland areas and identified interim targets of 10% wetland cover, 20% forest cover, and 50% riparian

St. Clair River Area Of Concern Revised Delisting Criteria

cover in tributaries, but did not define core conservation lands or corridors. Refinements to the NHS Report are being discussed with OMNR Aylmer District.

St. Clair River Area Of Concern Revised Delisting Criteria

Bibliography

- Barnucz, J.M., Mandrak, N.E. 2003. Boat electroshocking of the St. Clair River, Ontario. Department of Fisheries and Oceans (unpublished report).
- County of Lambton Community Health Services Department. "Analysis of E. coli Counts from the St. Clair River." 2005.
- County of Lambton Community Health Services Department. "County of Lambton Beach Water Quality Report." 2009.
- CRIC, Canadian RAP Implementation Committee. "St. Clair River Area of Concern. Canadian RAP Implementation Committee Work Plan 2007-10. Addendum to Stage 2 Recommended Plan." 2007.
- Drouillard K.G., G. D. Haffner, and S. Reitsma. "Use of bioaccumulation models to perform hazard assessments of sport fish consumption advisories in the Detroit River AOC." Great Lakes Commission Meeting: Staying on target: A Regional Workshop for Establishing Restoration Targets for Great Lakes Areas of Concern. Romulus MI, June 6-7, 2003.
- Edsall, T.A., B.A. Manny and C. Nicholas Raphael. "The St. Clair River and Lake St. Clair, Michigan: An Ecological Profile." Biological Report 85(7.3). 1988a
- ENVIRON International Corporation. "Final Project Report for Applying the COA Framework to the St. Clair River Area of Concern." 2009.
- Environment Canada. "Canadian Tissue Residue Guidelines for the Protection of Wildlife Consumers of Aquatic Biota: Methylmercury." Report 1-4. 2002.
- . "The Lake St. Clair watershed draft technical report: an examination of current conditions." 2005.
- . "St. Clair River Area of Concern: Coastal Wetland Habitat Assessments." 2008.
- . "Addendum to St. Clair River Area of Concern: Coastal Wetland Habitat Assessments." 2008.
- . "How Much Habitat is Enough? *A Framework for Guiding Habitat Rehabilitation in Great Lakes Areas of Concern*. 2008.
- Environmental Defense. "Up to the Gills Pollution in the Great Lakes." 2007.
- GLIER. "Contaminated Sediments in the Walpole Delta: relationship to Fish Consumption Advisories, Draft Report prepared for the Great Lakes Sustainability Fund." 2006.

St. Clair River Area Of Concern Revised Delisting Criteria

- Graham, B., Posthumus, D., Kebbel D. "St. Clair River Area of Concern Natural Heritage Study Update – 2006: Methodology and Results." 2006.
- Grapentine, L. 2009. "Determining Degradation and Restoration of Benthic Conditions for Great Lakes Area of Concern ." Journal of Great Lakes Research (March 2009): 36-44.
- Green N.D., Cargnelli L., Briggs T., Drouin R., Child M., Esbjerg J., Valiante M., Henderson T., McGregor D., and D. Munro, eds., Detroit River Canadian Remedial Action Plan: Stage 2 Report. Detroit River Canadian Cleanup. Essex, Ontario: Publication No. 1,, 2010.
- Hayman, P. "St. Clair River Watershed Plan." 2009.
- Herdendorf, C.E., C.N. Raphael and E. Jaworski. "The Ecology of Lake St. Clair Wetlands: A Community Profile." Biological Report 85(7.7). 1986.
- International Joint Commission, IJC. "Commission Approves List/Delist Criteria for Great Lakes Areas of Concern." 1991.
- Kayak Consulting, 2006. "A Workshop on Aquatic and Terrestrial Habitat Projects in the St. Clair River Area of Concern (1995 – 2005): Have we met our delisting targets?" Summary Document. February, 2006. Unpublished.
- Krantzberg, G. and K. Montgomery. "Restrictions on Dredging as an Impaired Beneficial Use Under the Great Lakes Water Quality Agreement." Aquatic Ecosystems Health and Management (2007): 117 - 124.
- Mayne, Greg. "The St. Clair Area of Concern Remedial Action Plan Progress Report, Volume 1 - Synthesis Report." 2003.
- . "St. Clair River RAP Progress Report Volume 1 - Synthesis Report Environmental Conditions and Implementation Actions (1998-2003)." 2005.
- . "A Review and Assessment of beneficial Use Impairment "Restrictions on Dredging Activities" in the St. Clair River Area of Concern. Draft 1 ." 2007b.
- MacLennan, D., and Hyat, R. "Assessment of the fish community of the St. Clair River in 1994 associated with the Stage 1 RAP for the SCR AOC. Draft report. 1996
- MDEQ, Michigan Department of Environmental Quality. "Guidance for Delisting Michigan's Great Lakes Areas of Concern." 2008.
- Michigan Department of Community Health. "2008 Michigan Family Fish Consumption Guide." 2008.
- Michigan Department of Natural Resources (MDNR) and Ontario Ministry of the Environment (OMOE). " Stage 1 Remedial Action Plan for Detroit River Area of Concern." 1991.

St. Clair River Area Of Concern Revised Delisting Criteria

- Michigan Department of Natural Resources and Environmental Quality. "Recommendation to remove the Restrictions on Dredging BUI in US Waters of the St. Clair River AOC." April 28, 2010.
- Milani, D., L. C. Grapentine and T. B. Reynoldson. "Assessment of Mercury Contamination and Biological Impact in the St. Clair River. ." 2007.
- Moran, T., J. Houtby, J. Wenczler and B. Zajdlik. Sarnia-Lambton Environmental Association 2003/2004 St. Clair River Biological Program - Integrated Sediment Monitoring Program . Point Edward, Ontario: Prepared for the Sarnia-Lambton Environmental Association by Pollutech EnviroQuatics Limited, 2005.
- OMOE. "Guide to Eating Ontario Sport fish." 2005.
- . "St. Clair River Organics Study: Biological Surveys 1968 and 1977. Water Resources Assessment Unit, Southwestern Region." 1979.
- . "2009 Guide to Eating Sport Fish." 2009.
- OMOE and MDEQ. "The St. Clair River Area of Concern Environmental Conditions and Problem Definition, Stage 1 Remedial Action Plan." 1991.
- . "The St. Clair River area of Concern, water goals, remedial measures and implementation strategy. Remedial Action Plan Stage 2 - Recommended Plan St. Clair River RAP Team, St. CLair River BPAC.121p." 1995.
- Persaud, D., R. Jaagumagi, and A. Hayton. "Guidelines for the Protection and Management of Aquatic Sediment in Ontario." 1993.
- Pope, R.J. "Assessment of 1990 St. Clair River benthic-macroinvertebrate communities relative to sediment quality." 1993.
- Richman, L.A and D. Milani. "Sediment Contaminant Concentrations in the St. Clair River (2006) and Potential Implications for Sport Fich Tissue Concentrations." 2008.
- Richman, L.A. "Sediment Contamination for Contaminants of Concern, Zone 1, 2 and 3, St. Clair River. Technical Memorandum." 2008.
- Sills, D. and G. Heffner. "2009 Status of the St. Clair River (Draft)." 2009.
- SLEA - Sarnia Lambton Environmental Association. Monograph W2. Sarnia, 2005.
- USEPA. Sediment Classification Methods Compendium. Washington, D.C. EPA/630/R-92/001: United States Environmental Protection Agency, 1992.

St. Clair River Area Of Concern Revised Delisting Criteria

Appendix

St. Clair River Canadian RAP Implementation Committee Guiding Principles for Delisting the St. Clair AOC September 2010

The Canadian RAP Implementation Committee (CRIC) Delisting Criteria Work Group has developed the following principles to guide the CRIC's approach to delisting (including the review and redevelopment of new delisting criteria) the Canadian side of the St. Clair River AOC.

1. Criteria should be relevant to the original reasons for Beneficial Use Impairment (BUI) determination.
 - Delisting criteria should be linked to the concerns identified in the St. Clair River Stage 1 RAP Report.
2. Criteria should deal with anthropogenic causes that originate within the AOC
 - There are some region-wide issues that are beyond the AOC program. Therefore, focus of AOC RAP efforts should be directed to causes that originate within the St. Clair River AOC. (Need to distinguish between in-river sources, upstream/regional sources and out of basin sources.)
3. Delisting of a particular impairment in an Area of Concern can occur if it can be demonstrated that the impairment is not solely of local geographic extent, but is typical of lake wide conditions. Such delisting would be contingent on evidence that sources within the Area of Concern are controlled.
 - This recognizes that when a BUI is remediated to the point of being "similar to unimpaired portions of the Great Lakes Basin", there may still be some residual unmitigated impact of the issues, but not at levels that distinguish the St. Clair River from other areas of the Basin.
 - For some BUI's, it may not be the entire river that is impaired. Consideration will be given to both the severity and geographic extent of the localized impairment when comparing the overall state of the river to portions of the Basin deemed to be unimpaired.
4. Criteria should be practical, measurable and achievable
 - The intent of the RAP process was to identify AOC's and BUI's for actionable attention to remedy the worst issues in the Great Lakes Basins. Criteria should not be so stringent as to be impossible to achieve.
 - Targets set must have a measurable component to them.
5. Criteria should be consistent with those adopted for the U.S. side of the St. Clair River, and with the criteria adopted for the Detroit River, providing those criteria align with these principles.

St. Clair River Area Of Concern Revised Delisting Criteria

Delisting does not mean that the St. Clair River is in a pristine, natural state. It should mean that the River is no longer the seriously polluted body of water it once was.

After BUI delisting criteria have been met and a BUI has been re-designated as *not impaired*, the BUI should be assumed to remain unimpaired unless monitoring demonstrates that a significant impairment has again arisen. Monitoring and implementation will continue under the Lakewide Management Programs (LAMP) or within other core programs (e.g. OMOE Sport Fish Monitoring).

Reviewed and accepted:

Canadian RAP Implementation Committee – June 23, 2010

Bi-National Public Advisory Council – April 20, 2010