

Beneficial Use Impairment #14 Assessment Report

Loss of Fish and Wildlife Habitat

September 6, 2016

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Note: In 1986, the federal/provincial Bay of Quinte Remedial Action Plan (RAP) Coordinating Committee was established to oversee the development of a Bay of Quinte RAP. The Coordinating Committee was charged with developing the RAP through parallel processes of technical evaluation and public participation. A Public Advisory Committee (PAC) was established in 1988 to oversee the Bay of Quinte RAP public participation component. Both committees were dissolved in 1996 and in 1997 the Bay of Quinte RAP Restoration Council was formed to oversee implementation of the RAP.

Executive Summary

The Bay of Quinte Remedial Action Plan (RAP) Stage 1 Report (1991) identified the 'Loss of Fish and Wildlife Habitat' beneficial use as being 'impaired'. This status was supported by additional scientific evidence presented in the subsequent Stage 2 RAP Report (BQ RAP Coordinating Committee 1993).

Habitat conditions of the Bay of Quinte in the early 1990s had substantially deteriorated from the originally extensive natural shorelines and macrophyte coverage around and within the bay. In addition, invasive species such as the Eurasian water-milfoil had taken over parts of the bay, and algae blooms proliferated due to the abundance of phosphorus available.

In 1991, the International Joint Commission identified the following redesignation guideline for the impaired beneficial use 'Loss of Fish and Wildlife Habitat':

"When the amount and quality of physical, chemical, and biological habitat required to meet fish and wildlife management goals have been achieved and protected."

In order to assess whether this beneficial use has met the redesignation guideline, the following 5 indicators were selected to be used:

1. Extent and density of submergent aquatic vegetation (SAV) in the upper Bay of Quinte;
2. Overall quality of the vegetation as measured by Index of Biological Integrity (IBI)/Index scores relating to coastal wetland SAV;
3. Coastal wetland water quality;
4. Weighted suitable areas of fish habitat in the Bay of Quinte; and
5. Aquatic macroinvertebrate communities in the Bay of Quinte wetlands.

Since the 1990s, the status of aquatic habitat has changed for the better, thanks to extensive remediation efforts. The Bay of Quinte can now be considered as one of the most productive areas of Lake Ontario. Submergent aquatic vegetation covers approximately 29% of the total near shore area of the bay, compared to <5% coverage in other Lake Ontario coastal areas. Water quality is better in the bay compared to other Lake Ontario wetlands, and the bay also provides higher species richness and abundance of ecologically sensitive species than in comparative Lake Ontario sites.

Targets and specific criteria were established for each of the five indicators and refined over the period of study from 1993 through 2015. Research and monitoring of the conditions over that period has led to the conclusion that for each indicator the target has been met and that the beneficial use 'Loss of Fish and Wildlife Habitat' has been restored.

The status of 'not impaired' is recommended for this beneficial use and is supported by the contents and recommendations of five delisting reports prepared by members of the Fish and Wildlife Habitat Technical Work Team, a sub-committee which reports to the Restoration Council. These delisting reports are contained in Appendices F through J of this 'Loss of Fish and Wildlife Habitat Beneficial Use Impairment Assessment Report' (under a separate cover).

1.0 Introduction

The Bay of Quinte Area of Concern 'Loss of Fish and Wildlife Habitat' Beneficial Use (BU) was identified as being 'impaired' in the 1990 Bay of Quinte Remedial Action Plan (RAP) Stage 1 Report (prepared by the Bay of Quinte Remedial Action Plan Coordinating Committee). This status was supported by additional scientific evidence presented in the subsequent Stage 2 Report (BQ RAP Coordinating Committee 1993).

The original natural shorelines of the Bay of Quinte had been altered and the once-extensive macrophyte coverage around and within the bay had been significantly reduced. Invasive species such as the Eurasian water-milfoil had taken over parts of the bay, and in conjunction with the shading effect of the algae blooms which proliferated due to the abundance of phosphorus available, crowded out the native plants. But extensive remediation efforts since the 1990s have resulted in a resurgence of aquatic habitat, resulting in the Bay of Quinte being one of the most productive areas of Lake Ontario. Submergent aquatic vegetation covers approximately 29% of the total near shore area of the bay, compared to <5% coverage in other Lake Ontario coastal areas. Water quality is better in the bay compared to other Lake Ontario wetlands and the bay also provides higher species richness and abundance of ecologically sensitive species than in comparative Lake Ontario sites (Randall et al. 2014).

This report summarizes the work that has been done to establish a 'not impaired' status of the fish and wildlife habitat of the Bay of Quinte. This consists of work done by scientists who have been members of the Fish and Wildlife Technical Work Group to: establish the targets and criteria needed to measure the status of the beneficial use; and, to conduct and document the monitoring and research needed to assess whether those targets and criteria have been met. This report also documents the historical deterioration of the quality of fish and wildlife habitat and some of the actions taken to improve this quality over the past 40 years. This report is based on, and summarizes five delisting criteria status reports prepared for each of the five targets (Appendices F through J).

2.0 Targets and Criteria for Redesignating the Impaired Beneficial Use 'Loss of Fish and Wildlife Habitat'

In 1991, the International Joint Commission identified the following redesignation guideline for the impaired beneficial use 'Loss of Fish and Wildlife Habitat':

"When the amount and quality of physical, chemical, and biological habitat required to meet fish and wildlife management goals have been achieved and protected."

Beginning in 1993, specific targets and criteria were developed for the Bay of Quinte Area of Concern to effectively track changes in habitat over time. Over the years, these targets and criteria have been refined based on changing conditions and research results. The chronology of these changes is provided in Appendix E. Table 2.1 lists the final targets and criteria that were used to assess whether fish and wildlife habitat can be considered no longer impaired. For each of the five targets a separate, stand-alone status report has been developed. Together, these reports document the rationale for changing the status of this beneficial use from 'impaired' to 'not impaired'.

The main indicators used to assess the status of this beneficial use in the Bay of Quinte Area of Concern are:

1. Extent and density of submergent aquatic vegetation (SAV) in the upper Bay of Quinte;
2. Overall quality of the vegetation as measured by Index of Biological Integrity (IBI)/Index scores relating to coastal wetland SAV;
3. Coastal wetland water quality;
4. Weighted suitable areas of fish habitat in the Bay of Quinte; and
5. Aquatic macroinvertebrate communities in the Bay of Quinte wetlands.

Each of these indicators was assigned a target to achieve, and a set of criteria with which to measure achievement.

Table 2.1 - Delisting Targets and Criteria

DELISTING TARGETS	CRITERIA	STATUS
<p>1. Degradation of Submergent Aquatic Vegetation The extent (surface area in hectares) and community structure of submergent aquatic vegetation (SAV) in the Bay of Quinte is restored to levels more reflective of the mesotrophic system that existed before excessive nutrient loading created a eutrophic/hyper-eutrophic system.</p>	<p>A. Surface Area: 30% of the upper bay has SAV coverage of >50% density B. Statistically significant positive trends in: total species richness; and statistically significant improvement in the plant community index</p>	Achieved
<p>2. Coastal Wetland Submerged Aquatic Vegetation Submerged aquatic vegetation in Bay of Quinte coastal wetlands is not impaired.</p>	SAV community IBI not more than 2 standard deviations below 2006-2010 representative site mean outside the AOC	Achieved
<p>3. Coastal Wetland Water Quality Coastal wetland water quality is not impaired.</p>	Water quality index not more than 2 standard deviations below 2006-2010 representative site mean outside the AOC	Achieved
<p>4. Fish Habitat in the Bay of Quinte Conserve, enhance and maintain the high quality, diverse and extensive fish habitat in the Bay of Quinte, by assessing and mapping fish habitat suitability and the quantity of habitat needed to support the biodiversity and productivity of fishes in this ecosystem and, by identifying priority areas and actions for effective conservation and restoration.</p>	<p>1. Weighted suitable area of fish habitat should be: A. Above 80th percentile among 41 coastal Lake Ont. sites; and B. Not significantly lower than at Long Point Bay, L. Erie 2. Maintain a no-net-loss of the Weighted Suitable Area of fish habitat over time by ensuring that: A. The present weighted suitable area of fish habitat in the Bay of Quinte is greater than the conditions during previous time stanzas, and B. Highly suitable important, rare</p>	Achieved

	<p>or sensitive habitats are identified and conserved.</p> <p>3. Maintain the weighted suitability area of fish habitat required to support the long-term relative levels of important fish as projected from habitat supply models. Populations should:</p> <p>A. Be ranked above 80th percentile among 41 comparison sites</p> <p>B. Be stable or increasing over time</p>	
<p>5. Coastal Wetland Macroinvertebrate Populations</p> <p>Aquatic macroinvertebrate communities in Bay of Quinte coastal wetlands are not impaired.</p>	<p>Community IBI at representative Bay of Quinte coastal wetlands not more than 2 standard deviations below 2006-2010 representative site mean outside the AOC</p>	<p>Achieved</p>

3.0 Historical Impacts

Fish and aquatic wildlife habitat exists around the shoreline and within the Bay of Quinte as extensive areas of submergent and emergent vegetation alternating with bare rocky shores. Wetland communities distributed across the bay are important resting, production, staging, spawning and nursery habitat for fish and wildlife communities. Two hundred years of human settlement around the Bay of Quinte has resulted in a reduction of overall ecosystem health. The following provides a summary of the key historical impacts.

3.1 Eutrophication

Indirect and direct sources of phosphorous to the bay include rural agricultural and urban land uses which contribute nutrients and sediments in runoff. With the continued growth of these communities and land uses the input of nutrients and sediments associated with erosion, land runoff, storm sewer effluent, sewage systems and industrial discharges has increased (Bay of Quinte Remedial Action Plan Coordinating Committee 1993).

The resultant high levels of phosphorous in the bay caused increases in algal densities that limited light penetration and adversely affected quality fish habitat such as submerged macrophytes. By the mid-1960s, nutrient enrichment induced high algal densities that prevented sunlight from penetrating the water, thereby preventing submerged aquatic vegetation from getting the light required for growth, resulting in significantly reduced vegetation populations. This vegetation loss reduced the extent of available fish and wildlife habitat.

Phosphorous inputs to the bay were uncontrolled until the mid-1970s when the Canadian government mandated a reduction of phosphates in detergents and imposed phosphorous controls at sewage treatment plants. Although the direct phosphorous inputs to the bay have diminished since then, sediment at the bottom of the bay continues to be an important internal phosphorous source due to its highly enriched condition, refluxing high amounts of phosphorus back to the water column. This internal phosphorus loading has maintained the eutrophic state of the bay (Minns et al. 1986).

3.2 Land Use Changes

Two hundred years of settlement has altered the basin's landscape and has led to the instability and loss of diversity in the bay's aquatic community. Fish migration and spawning routes have been blocked by dams; natural tributary flows that maintained summer water exchanges and self-cleaning capacity of the bay was disrupted; natural water level fluctuations required to maintain the diversity of wetlands was regulated; fish spawning areas were silted over from erosion caused by de-forestation, human settlement and farming; wetlands and low-lying areas have been dredged, drained or filled; and shoreline alterations have destroyed some critical fish habitat (Bay of Quinte Remedial Action Plan Coordinating Committee 1993).

Near-shore and deep-water habitats of the Bay of Quinte have been physically altered, fragmented and/or destroyed from land use changes around the bay (Bay of Quinte Remedial Action Plan Coordinating Committee 1990). In spite of these losses, the Bay of Quinte contains the largest area of coastal wetlands in Lake Ontario.

3.3 Invasive Species

The Bay of Quinte ecosystem has been adversely influenced by biotic disturbances, such as invasions by non-native species which have altered the aquatic community structure and food-web relationships.

One such species is the Eurasian water-milfoil, a submergent aquatic plant, which out-competes native species by growing rapidly in early spring and forming a dense canopy at the surface in water depths up to 5 m. Other species beneath this canopy must then cope with limited light availability. Introduced into the bay during the 1950s, Eurasian water-milfoil very quickly took over and replaced much of the native aquatic plants (Bay of Quinte Remedial Action Plan Coordinating Committee 1990).

Zebra mussels, which first showed up in the bay in 1994, and subsequently Quagga mussels have influenced changes in native species behaviour in response to habitat changes caused by the invasion. The zebra mussel's life-cycle has been linked to observed changes in the nearshore habitats, including increasing the depth of light penetration which can result in increased abundances and distribution of submergent aquatic vegetation, and creating a shift in prey availability. The colonization of zebra mussels in the early 1990s and the subsequent increase in water transparency is suspected to be a major factor for increased mortality of young walleye.

Walleye habitat in the shallow upper bay has decreased since the invasion of these dreissenid mussels in 1994, resulting in increased competition for food and an increase in predation from visual predators tolerant of light (OMNR 2010a). On the other hand, the zebra mussel may have facilitated the establishment of other species through the provision of habitat or food resources. Largemouth bass and other centrarchids that associate with aquatic vegetation have increased, including pumpkinseed, bluegill, and black crappie (OMNR 2010a).

4.0 Beneficial Use Impairments

In 1991, the International Joint Commission identified the following redesignation guideline for the impaired beneficial use 'Loss of Fish and Wildlife Habitat':

“When the amount and quality of physical, chemical, and biological habitat required to meet fish and wildlife management goals have been achieved and protected.”

The RAP Stage 1 Report (BQ RAP Coordinating Committee 1990) noted that in the early 1950s the amount and distribution of shoreline aquatic vegetation had increased, partly in response to increasing enrichment (Crowder and Bristow 1986). However, by the late 1960s, plant growth was on the decline while standing stocks of algae were increasing (BQ RAP Coordinating Committee 1990). The decrease in the amount and quality of habitat was having a negative impact on fishing and hunting opportunities and on aesthetics of the bay. Large, smelly algal mats could be seen floating on the water and washing up on the shoreline.

4.1 Amount of Habitat

Between the 1950s and the 1960s, the submergent aquatic vegetation beds in the bay were said to have decreased to 50% of their estimated extent (Crowder and Bristow 1986; Leisti et al. 2006). In the 1970's macrophytes became restricted to a euphotic zone (water zone where light can penetrate to the bottom) of 2 m in the upper bay and 4 m in the lower bay. (Minns et al.1986).

The decrease in plant coverage was attributed to the shading effects of phytoplankton which limited vascular plant growth to water depths of 2 m or less, and in part, to prolonged stable water levels which reduced overall productivity within the submerged wetland areas (BQ RAP Coordinating Committee 1990).

The RAP Stage 2 Report identified that two-thirds of the Bay of Quinte's original wetlands have been lost due to development pressures. This left about 6,700 hectares, including 2,500 ha of swamp and 3,800 ha of emergent community types (BQ RAP Coordinating Committee 1993). The diversity, community structure and biomass of the submerged aquatic vegetation were low, due to the shading effects of algae and poor sediment quality.

4.2 Quality of Habitat

In the early 1970s, diversity and community structure were considered poor partly because of the expansion of Eurasian water-milfoil, which became the dominant species in the submerged community of the upper bay, outcompeting native species (Crowder and Bristow 1986).

Direct impacts to fish and wildlife habitat included obstructions to migration and the harmful alteration or destruction of coastal wetlands and nearshore areas. Within the bay, spawning, nursery and feeding areas had been reduced. Sediments became more readily re-suspended by wave and wind action, muddying the water and changing the substrate.

4.3 Fish Populations

The loss of coastal wetlands and nearshore habitats translated directly into a reduction of fish and wildlife populations. Waterfowl resting, production and staging habitat, and fish spawning and nursery habitat were negatively affected.

In terms of commercial harvest, these changes resulted in a depletion of fishing opportunities. Over time, this lake-wide industry had been greatly reduced in scale (OMNR 2010b).

5.0 Actions Undertaken to Address the Beneficial Use Impairments

Over the past 20 years (and in some cases, much longer), agencies, municipalities, organizations, and individuals, as well as the Mohawks of the Bay of Quinte, have been instrumental in carrying out projects and programs and developing policies all aimed at addressing the impairments to fish and wildlife habitat in the Bay of Quinte.

5.1 Habitat Remediation

Local remedial actions were undertaken to create and restore aquatic habitat in the Bay of Quinte, engaging the community through stewardship and education/outreach programs. These include reforestation, stream clean-up and rehabilitation, marsh restoration, shoreline naturalization, and preventing the spread of aquatic invasive species. Numerous other projects including livestock fencing projects, establishment of buffer zones, the installation of osprey platforms, habitat pond creation projects and native planting projects have also been implemented through the RAP program.

A brief list of significant habitat remediation initiatives that have been undertaken throughout the bay is provided in Appendix B.

5.2 Reduction in Nutrient Input

Phosphorus removal at the sewage treatment plants, conservation and best management farming practices, reduction of industrial phosphorus discharges and the recent closings of some industrial operations have all contributed to a significant reduction of phosphorus loads to the bay.

Phosphorus loads were first reduced in 1973 by federal regulations restricting the phosphate content of laundry detergent to 2.2% by weight, resulting in a drop of 55 kg-P/day to the inflow to the sewage treatment plants (BQ RAP Coordinating Committee 1993).

Beginning in the late 1970s, technologies aimed at improved nutrient removals were installed at the sewage treatment plants bordering the Bay of Quinte. In the early 1970s, phosphorous discharges from these sewage treatment plants totalled 214 kg-P/day. Since then, controlling the variability in wastewater flow, enhancing phosphorus removal capabilities and expanding treatment capacity has resulted in the daily average phosphorous load from these sewage treatment plants to drop down to 4.6 kg-P/day by 2012 (Kinstler and Morley 2014).

The implementation of a rural water quality program resulted in non-point source reductions of 16,500 kilograms/year of phosphorus into streams draining to the Bay of Quinte between 1994 and 2002 (Tejani and Muir 2004).

5.3 Bay of Quinte Natural Heritage Strategy

A BQ RAP Natural Heritage Strategy (2014), complete with mapping and official plan policy recommendations, has been developed for municipalities bordering the bay. The Natural Heritage Strategy study area encompasses six municipalities (City of Quinte West, City of Belleville, Town of

Greater Napanee, Tyendinaga Township, Loyalist Township, Municipality of Prince Edward County) and the Tyendinaga Mohawk Territory. Implementing a Natural Heritage Strategy that identifies significant natural heritage features and recommends a Natural Heritage System will assist municipalities in meeting the Provincial Policy Statement requirements in their official plans as they are updated. The implementation of a Natural Heritage Strategy which protects natural heritage resources along with the ecosystems and biodiversity they support will also benefit the people and communities living among them as well as the local Bay of Quinte economy.

5.4 Management Plans

In 2007, the Bay of Quinte AOC Restoration Council produced *A Fish Habitat Management Plan* and *A Management Plan to Address Wildlife Related Impairments for the Bay of Quinte*. These plans outlined the current state of fish and wildlife habitat and provided an overall management framework required to restore fish and wildlife habitat and populations. Components of this plan have been implemented on a yearly basis.

In 2010, the Ontario Ministry of Natural Resources and Forestry (OMNRF) produced the Bay of Quinte Fisheries Management Plan, which developed strategies to achieve a sustainable fisheries resource. Components of this plan include strategies for assessment of fisheries, promotion and enforcement of fishing regulations, and improved communication and community involvement. The accompanying maps that were created for the different fish guilds in the bay should be used in planning and management so that priority fish habitat areas are identified and preserved.

5.5 Land Use Management

Legislative tools such as Ontario's *Public Lands Act*, *Planning Act* and the federal *Fisheries Act* have helped to ensure a net gain in fish and wildlife habitat.

1. Provincial Policy Statement – Wetlands: Provincially Significant Wetlands (PSWs) are wetland areas identified by the provincial government as being the most valuable. They are determined by a science-based ranking system known as the Ontario Wetland Evaluation System. This OMNRF framework provides a standardized method of assessing wetland functions and societal values, which enables the province to rank wetlands relative to one another. This information is provided to planning authorities to support the land use planning process. Provincially Significant Wetlands are identified using objective criteria based on the best available science, as set out in the OMNRF's Ontario Wetland Evaluation System.

Once the OMNRF identifies a wetland as being provincially significant, municipalities are responsible for incorporating this information into their Official Plans. Section 2.1 of the Provincial Policy Statement (PPS) (2014) states that development and site alteration shall not be permitted within significant wetlands in Ecoregions 5E, 6E and 7E, (which cover southern Ontario including the Bay of Quinte), or within significant coastal wetlands.

The PPS indicates that development and site alteration shall not be permitted within the 120 m adjacent lands around a provincially significant wetland, or a significant coastal wetland, unless the ecological function of the adjacent lands have been evaluated and it has been demonstrated that there will be no negative impact on the natural features or on their ecological functions.

In the Bay of Quinte, 19 wetlands have been classified as provincially significant.

2. Provincial Policy Statement – Floodplain: Section 3.1 of the PPS provides direction with regard to development (including lot creation) and site alteration as it relates to flooding hazards. The PPS directs the majority of development and site alteration to areas outside of the regulatory floodplain and states that development and site alteration shall not be permitted in a floodway or areas that would be rendered inaccessible to people and vehicles during times of a flooding hazard.
3. Provincial Policy Statement – Natural Heritage: Section 2.1.1 of the Provincial Policy Statement (2014) states the following:

“The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.”
4. Municipal Plans Official Plans and Zoning By-laws: A 30 m setback from waterbodies and watercourses for development is standard for most municipalities.
5. Conservation Authority Regulations: Conservation Authority Regulations in the Bay of Quinte apply to the mapped floodplain (100 year flood) and a 15 m setback. Under the Regulations no person shall:
 - Undertake development, or permit another person to undertake development in or on areas within the jurisdiction of the Conservation Authority that are subject to hazards associated with flooding, erosion, dynamic beaches, unstable slopes; or
 - Straighten, change, divert or interfere in any way with the existing channel of a river, creek, stream or watercourse or change or interfere with a wetland without the prior written approval of the Conservation Authority.
6. Fisheries Act: The Fisheries Act, amended in 2012, states that "no person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery".

"Serious harm to fish" is defined as the death of fish or any permanent alteration to, or destruction of, fish habitat.

Any alteration to a watercourse or development adjacent to watercourse features may require authorization under the federal Fisheries Act.

6.0 Beneficial Use Assessment: Results and Recommendations

To assess the current condition of the impaired beneficial use 'Loss of Fish and Wildlife Habitat' and to determine whether this beneficial use has been restored, teams of experts (members of the Fish and Wildlife Technical Work Group) have conducted the necessary monitoring and research, and summarized their findings and recommendations in a series of status reports that address each of the five targets and associated criteria separately.

Appendices F through J of this report contain the full status reports for each of the five delisting targets and associated criteria. The following is an overview of the results of these reports.

6.1 Degradation of Submergent Aquatic Vegetation

Appendix F: Degradation of Submergent Aquatic Vegetation Delisting Criteria Status Report. March, 2016

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Improving the quantity and quality of submergent aquatic vegetation was considered critical to delisting the Bay of Quinte Area of Concern. The Stage 1 report for the Bay of Quinte stated:

“Key to the Bay of Quinte's recovery is a return of macrophytes. They will assist in reducing the feedback of phosphorus from the sediments, and provide habitat for the algal grazers and white perch predators (e.g. northern pike).”

- Bay of Quinte RAP Coordinating Committee, 1990.

The two criteria that were applied required an improvement to the overall quantity of vegetation (1A) as well as trends that showed improvements to plant diversity and health (1B).

Criterion 1A: Show that an increase in the area of submergent aquatic vegetation has occurred in the period following the appearance of zebra and quagga mussels (1995-2012) such that 30% of the area of the upper Bay of Quinte has vegetation coverage of more than 50% density. This is approximately a 20% increase in the vegetation area of the upper bay when 1978 to 1994 is used as a “base-year period”.

The 2014 Bay of Quinte Submerged Aquatic Vegetation model was used to predict the extent and density of vegetation. Results show that the percentage coverage with more than 50% density increased from 9.4% to 33.3%; thus criterion 1A has been met.

*Criteria 1B: Measure statistically-significant positive trends or changes in **both** of these plant community health measures (a & b):*

- a) *A positive slope in total species diversity for the upper bay based on standardized SAV surveys between 1972 and 2011.*

OR

A significant positive difference (one-tailed t-test, alpha = 0.05) in total plant species diversity between Post-P and Post-D time stanzas.

AND

- b) *A positive slope or statistically-significant improvement in a plant community health index.*

OR

Index values in the ‘good to excellent’ range for 3 recent annual SAV surveys.

Note: Post-P time period (stanza) refers to the years 1978 – 1994, after phosphorous loading from sewage treatment plants had been substantially reduced in 1977. The Post-D time period (stanza)

refers to the time period 1995-2012, after dreissenid (zebra mussels and quagga mussels) became established in the bay (1994). Significant shifts in the Bay of Quinte ecosystem were seen after the 1977 and 1994 events. The years 1972-1977 are termed the Pre-P time period (stanza).

Results for the assessment of 1B criteria, which deals with plant community diversity, were less certain. For criteria 1Ba, there is a positive slope in total species diversity for the upper bay, and a one-tailed t-test on species richness between the Post-P and Post-D time periods indicates that species diversity was significantly higher in the Post-D time period.

However, for the criteria under 1Bb, a positive slope in plant community health was not found; and the results from 'index values in the 'good to excellent' range for 3 recent annual SAV surveys is variable. When applying the Wetland Macrophytes Index (WMI) methodology, scores were below the "good to excellent" threshold. When applying the Index of Biotic Integrity (IBI) methodology, the results met the threshold, indicating that the coastal wetlands are not impaired.

The authors of this status report provide the following as rationale for their recommendation that the 1Bb criteria have been met:

- 1) *the Wetland Macrophytes Index was developed using many oligotrophic sites and a large geographic gradient and therefore cut-off values may not be appropriate for the mesotrophic Bay of Quinte;*
- 2) *the quadrat sampling conducted by Department of Fisheries (DFO) during surveys was relatively limited because it was intended for acoustics validation and simple species composition information;*
- 3) *the middle and lower bay sites were excluded from the assessment of the Wetland Macrophytes Index simply because the upper bay was the intended target for vegetation remediation and restoration;*
- 4) *the Wetland Macrophytes Index results are from DFO surveys conducted in areas outside of emergent wetlands where higher vegetation species richness could be anticipated;*
- 5) *comparison of submergent aquatic vegetation values using the same dataset showed that the majority of the Wetland Macrophytes Index results were below the "good to excellent" range, while the use of the Index of Biotic Integrity criteria suggested that submergent aquatic vegetation in Bay of Quinte coastal wetlands are not impaired by Lake Ontario standards; and*
- 6) *Bay of Quinte values from the Wetland Macrophytes Index were typically better than 50% of other wetlands across Lake Ontario.*

Given the research and monitoring that has been done, the conclusion is:

"... that 1Bb is not impaired despite not receiving a good to excellent rating according to the WMI and this decision is based on several lines of evidence that are detailed in this report."

Summary: The conclusions of this report indicate that improvements to the spatial extent and diversity of the submerged aquatic vegetation have resulted in criteria 1A and 1B being achieved, which is sufficient to recommend a 'not impaired' status.

6.2 Coastal Wetland Submerged Aquatic Vegetation

Appendix G: Coastal Wetland Submerged Aquatic Vegetation Delisting Criteria Status Report. October 22, 2015

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The 2007 management plan developed to address wildlife-related impairments indicated that an impaired coastal wetland submerged aquatic vegetation community was an important factor in the loss of wildlife habitat (e.g., for nesting and foraging birds). Therefore a target was established specifically for coastal wetland submerged aquatic vegetation.

The criterion that was applied to determine whether the coastal wetland submerged aquatic vegetation community was not impaired was:

'The submerged aquatic vegetation community Index of Biotic Integrity (IBI) at representative Bay of Quinte coastal wetlands shall not be more than two standard deviations below the 2006-2010 representative site mean that accounts for varying conditions in Lake Ontario outside of the AOC from 2006-2010.'

The focus is to maintain a healthy coastal wetland submerged aquatic vegetation community that is either equal to, or better, than that at other Lake Ontario coastal wetland sites, with room for natural variability which is normal in stable ecosystems.

The Bay of Quinte Remedial Action Plan Restoration Council (2007) selected 10 coastal wetlands as representative locations to test the assessment criterion. From these 10 wetlands, 14 sampling sites were monitored over the period 2006-2014.

The Index of Biotic Integrity scores were calculated using a Lake Ontario based methodology developed by Grabas et al. (2012). The index uses the following metrics:

- Number of turbidity-intolerant species;
- Coefficient of conservatism;
- Total cumulative coverage; and
- Total number of native species.

The calculations to determine whether this criteria has been met requires: 1) A baseline of coastal wetland health in the bay. This baseline value was calculated from Bay of Quinte wetland data from 2006-2010. 2) The Lake Ontario coastal wetland health mean from 2006-2010. This was calculated from other Lake Ontario sites sampled through other projects (minimum two years of data to be included). 3) 2014 Lake Ontario mean condition. 4) 2014 Bay of Quinte mean condition.

By using five years of data (2006-2010) instead of just one, any inter-annual differences that result from changes in sampling location would be accounted for. Further, to account for natural variability in the wetlands, fluctuations in the quality of bay is allowed. This is calculated and is called the 'threshold value'. The 2014 Bay of Quinte mean condition can be either above or at the threshold value, or at the most, two standard deviations below the threshold value, to be considered as 'not impaired'.

The results of the monitoring and calculations for 2014 were:

- 2014 Bay of Quinte IBI Threshold: 61.6
- 2014 Bay of Quinte IBI Mean Condition: 79.3

The IBI mean condition for Bay of Quinte coastal wetland sites is above the calculated threshold, meeting the established criterion. Table 6.1 demonstrates that the criterion has been met in each year from 2011-2014:

Table 6.1 - Mean SAV IBIs - Bay of Quinte

	2011	2012	2013	2014
'Other Lake Ontario sites'	28.4	31.4	17.9	21.0
Bay of Quinte IBI threshold	68.9	72.0	58.5	61.6
Bay of Quinte IBI mean condition	82.9	83.3	80.4	79.3
Criterion met (Y/N)	Y	Y	Y	Y

Source: Darwin, A., and G. Grabas, October 22, 2015. Coastal Wetland Submerged Aquatic Vegetation Criteria Delisting Report

Summary: The 2014 Bay of Quinte mean condition is above the Bay of Quinte threshold value. The conclusions of this report indicate that the Bay of Quinte coastal wetland submerged aquatic vegetation community should be considered to be 'not impaired'.

6.3 Coastal Wetland Water Quality

Appendix H: Coastal Wetland Water Quality Delisting Criteria Status Report. October 22, 2015

Authors:

- Angela Darwin, Landscape Assessment Officer, Canadian Wildlife Service, Environment and Climate Change Canada
- Greg Grabas, Habitat Ecologist, Canadian Wildlife Service, Environment and Climate Change Canada

Water quality has a significant effect on the quality of aquatic habitat in coastal wetlands. Water is directly a part of the habitat, as it is the medium in which fish and many other wildlife species live. Poor water quality can have a direct impact on the behaviour and physiology of fish and wildlife species. Water quality will also affect the quality of vegetation and macroinvertebrates available for food and habitat (cover, shelter, and egg-laying substrate).

To meet the target of having the coastal wetland water quality 'not impaired', the following criterion must be met:

'The water quality index at representative Bay of Quinte coastal wetlands shall not be more than two standard deviations below the 2006-2010 representative site mean that accounts for varying conditions in Lake Ontario outside of the AOC from 2006-2010.'

To be considered 'not impaired', the water quality index at representative Bay of Quinte coastal wetlands should be equal to, or better than, that at other Lake Ontario sites, with room for variability which is normal in stable ecosystems.

The Bay of Quinte Remedial Action Plan Restoration Council (2007) selected 10 coastal wetlands as representative locations to test the assessment criterion. From these 10 wetlands, 14 sampling sites were monitored over the period 2006-2014. Variables collected included pH, water temperature, conductivity and turbidity. Using a water quality index (WQI) developed for the Great Lakes by Chow-Fraser (2006), mean annual WQIs were calculated for Bay of Quinte coastal wetlands as well as other Lake Ontario sites.

The calculations to determine whether this criteria has been met requires: 1) A baseline of coastal water quality health in the bay. This baseline value was calculated from Bay of Quinte data from the years 2006-2010; 2) The Lake Ontario coastal wetland water quality mean, from 2006-2010. This was calculated from other Lake Ontario sites sample through other projects (minimum two years of data to be included); 3) 2014 Lake Ontario mean condition; and, 4) 2014 Bay of Quinte mean condition.

By using five years of data (2006-2010) instead of just one, any inter-annual differences that result from changes in sampling location would be dampened. Further, to account for natural variability in the wetlands, fluctuations in the quality of bay is allowed. This is calculated and is called the 'threshold value'. The 2014 Bay of Quinte mean condition can be either above or at the threshold value, or at the most, two standard deviations below the threshold value, to be considered as 'not impaired'.

The results of the monitoring and calculations for 2014 were (Table 6.2 on following page):

2014 Bay of Quinte Water Quality Index Threshold: -0.26

2014 Bay of Quinte Representative Mean Water Quality Index Score: 0.62

The Water Quality Index mean condition for Bay of Quinte coastal wetland sites is above the calculated threshold, meeting the established criterion. Table 6.2 demonstrates that the criterion has been met in each year from 2011-2014:

Table 6.2 - Water Quality Index 2011-2014

	2011	2012	2013	2014
'Other Lake Ontario sites'	-0.99	-1.31	-1.43	-1.23
Bay of Quinte WQI threshold	-0.03	-0.34	-0.46	-0.26
Bay of Quinte WQI mean condition	0.51	0.60	0.56	0.62
Criterion met (Y/N)	Y	Y	Y	Y

Source: Darwin, A, and G. Grabas, October 22, 2015. Coastal Wetland Water Quality Criteria Delisting Report.

Summary: The 2014 Bay of Quinte mean condition is above the Bay of Quinte threshold value. The conclusions of this report indicate that the Bay of Quinte coastal wetland water quality should be considered to be 'not impaired'.

6.4 Fish Habitat in the Bay of Quinte

Appendix I: Fish Habitat in the Bay of Quinte Delisting Criteria Status Report. October, 2012

Authors:

- Susan Doka, Ph.D., Research Scientist, Fisheries and Oceans Canada
- Erin Gertzen, Aquatic Science Biologist, Fisheries and Oceans Canada
- Jody MacEachern, GIS Analyst, Fisheries and Oceans Canada

Methodology described in the 2007 Bay of Quinte Fish Habitat Management Plan was used to establish three criteria to measure whether fish habitat was sufficiently recovered to allow the Bay of Quinte AOC fish habitat to be declared 'not impaired':

1: The Bay of Quinte's Weighted Suitable Area (WSA) of fish habitat across all guilds and life stages should be:

- a) ranked above the 80th percentile among 41 coastal comparison sites within Lake Ontario, and*
- b) not significantly lower than at Long Point Bay, Lake Erie.*

2: Maintain a no-net-loss of the Weighted Suitable Area of fish habitat over time by ensuring that:

- a) the present (post-zebra mussel invasion) weighted suitable area of fish habitat in the Bay of Quinte is greater than the conditions during previous time stanzas, and*
- b) highly suitable important, rare or sensitive habitats are identified and conserved.*

3: Maintain the Weighted Suitable Area of fish habitat required to support the long-term relative levels of important fish populations as projected from habitat supply models. Population results should:

- a) be ranked above the 80th percentile among 41 comparison sites within Lake Ontario, and*
- b) be stable or increasing over time within the Bay of Quinte given previous and projected changes in habitat availability.*

Fish habitat was measured using the Weighted Suitable Area (WSA) as developed by Minns et al. 2001. The WSA measures important habitat variables (water depth, substrate, vegetation and temperature) and fish-habitat associations to calculate the suitability of an area for the entire fish community or specific guild of fishes.

The results for all three criteria were positive for the Bay of Quinte sites. For criterion 1a, which measured the overall fish habitat (as Weighted Suitable Area), the Bay of Quinte sites met or exceeded the thresholds set in the criterion. The upper and middle sections of the Bay of Quinte and Presqu'île and West Lake subareas ranked within the top 80th percentile, and the subarea that overlapped the upper/middle sections ranked 1st (or 100 percentile) when compared against all 41 Lake Ontario subareas. The deeper and more open habitat of the lower section of the bay had a relatively low Weighted Suitable Area, which is to be expected. As the authors of the delisting report note, "This result is consistent with the expectation that the largely deeper and more open habitat would not support a large warmwater fish community but nonetheless would provide an important connection to open waters for cool and coldwater species". An example of the result of the WSA modelling (for spawning habitat supply) is presented below as Figure 6.1. (Figure 3 from the 2012 status report).

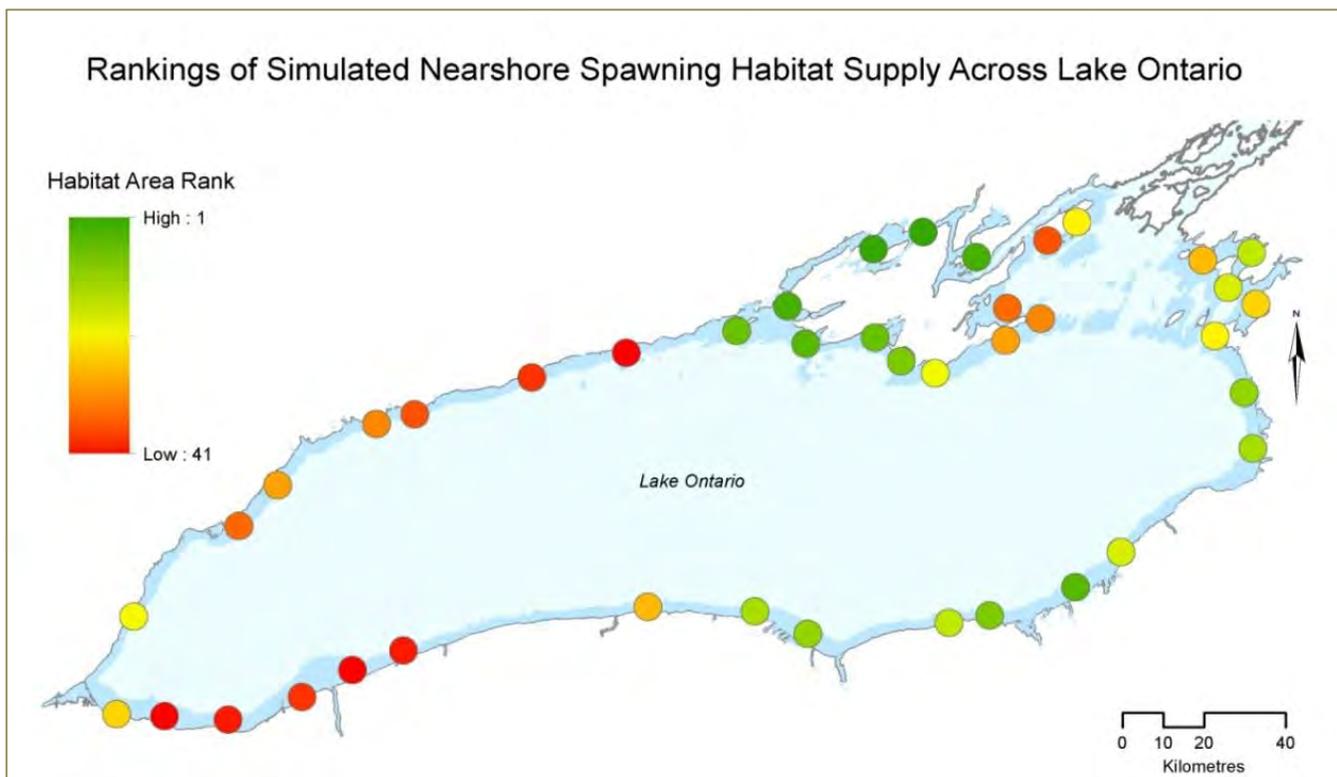


Figure 6.1 - Average rankings across a 50-year time series of fish community-weighted suitable area of spawning habitat across 41 coastal comparison sites in Lake Ontario. For this analysis, warm and coolwater fish guilds were given more weight than coldwater fish guilds¹.

Criterion 1b compared results of community-wide Weighted Suitable Areas for the Bay of Quinte against those of Long Point Bay, Lake Erie. The comparison to conditions at Long Point showed Bay of Quinte WSAs to be within 10% of the Long Point result over all life stages. Although Long Point provided greater spawning habitat, the authors of the delisting report felt that these differences were compensated for by relatively greater adult habitat supply in the Bay of Quinte. Table 6.3 lists the results of the analyses for the three subareas of Bay of Quinte and for Long Point Bay.

Table 6.3 - Standardized average annual cumulative weighted suitable area estimates (WSA, hectare-days) for Bay of Quinte study areas in relation to inner Long Point Bay, Lake Erie.

Bay of Quinte Study Site	Spawning	Nursery	Adult	Average
Upper Bay reach cluster (site)	552 (-)	5210	6157 (+)	3973
Overlap of upper/middle sites	601 (-)	5293	6180 (+)	4025
Middle Bay (some upper/lower overlap)	480 (-)	4850	4959	3430
Inner Long Point Bay, Lake Erie	939	5364	5014	3772

NOTE Differences are shown by life stage and the average across life stages using the Bay of Quinte fish community as the basis for both areas. Differences greater than $\pm 10\%$ from inner Long Point were considered statistically significant and are denoted by an either a negative (-) or positive (+) sign.

Source: Gertzen et al. September, 2012. *Fish Habitat in Coastal Wetlands Status Report* September, 2012

Criterion 2a requires a “no net loss” of fish habitat over time, measuring results from post-zebra mussel invasion against previous time stanzas. Criterion 2a measures the total weighted suitable area

of habitat. Figure 6.2 is reproduced from Figure 6 of the status report (2012) and shows results for the three time stanzas:

- Pre-P: Pre-phosphorous control (1972-1977)
- Post-P/Pre-D: Post-phosphorous control, and pre-*Dreissena* (zebra and quagga mussel) invasion (1978-1994)
- Post-D: Post- *Dreissena* invasion (1995-)

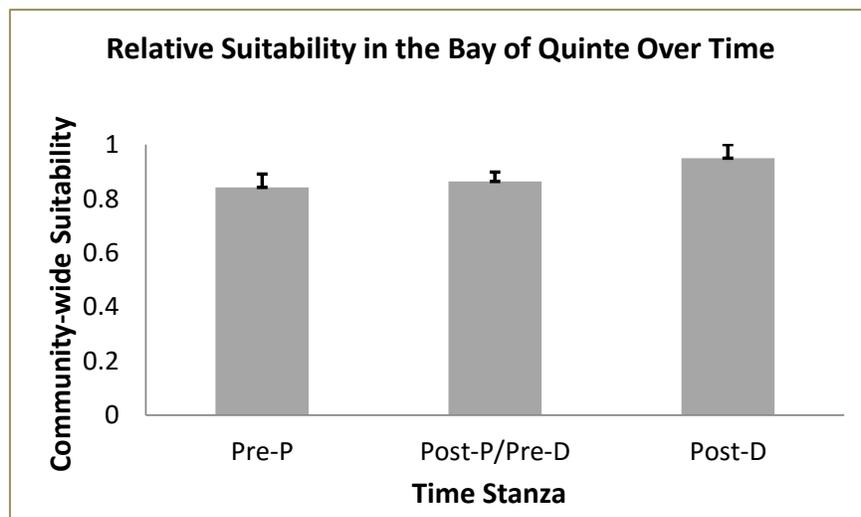


Figure 6.2 - Changes in relative fish community-suitability across important time stanzas in the Bay of Quinte. Bars show the suitability during an average water level year within the time stanza. The error bars show the range of suitabilities across high and low water level years. [Pre-P = pre-phosphorous control; Post-P and Pre-D = post phosphorous control and pre *Dreissena* invasion; Post-D is post *Dreissena* invasion.]

Results showed that quality of habitat has improved over time. For the overall fish community, over all life stages, habitat quality has improved by more than 10% since the 1970s. Suitability by guild of fishes show increased suitability for species with an affinity for high vegetation and adult piscivorous guilds.

Criterion 2b requires that: “highly suitable important, rare or sensitive habitats are identified and conserved”. The authors used a variety of existing sources to identify relative habitat suitability for different fish guilds and life stages. The results from measuring weighted suitable areas of habitat for criterion 1 and 2b were used to identify areas that were highly suitable for whole fish communities and for sensitive guilds and life stages. These areas were identified, and noted as priority areas for conservation, thereby meeting this criterion.

Criterion 3 requires the maintenance of habitat levels sufficient to support “important fish”. The species included were: northern pike; largemouth bass; smallmouth bass; and yellow perch. Simulated fish abundance, based on habitat availability, was modelled to test criterion 3a. Results for the upper and middle sections of the bay, as well as the Presqu’ile/West Lake reach clusters were compared against Lake Ontario comparison sites. All these Bay of Quinte areas ranked well, and were found to fall within the top 80th percentile of population abundances across Lake Ontario sites, based on habitat for northern pike, largemouth bass, smallmouth bass, and yellow perch. **The analysis showed that this criterion had been met.**

The last criterion, 3b, requires that the habitat for “important fish” in Bay of Quinte is stable or increasing over time. Over the period 1972-2010, different species demonstrated different trends, as portrayed on Figure 6.3 (reproduced from Figure 16 of the 2012 delisting report). Overall, the habitat supply-based population trends indicated that, given ongoing improvements in habitat quality in the Bay of Quinte, **key fisheries populations are responding in a positive direction.**

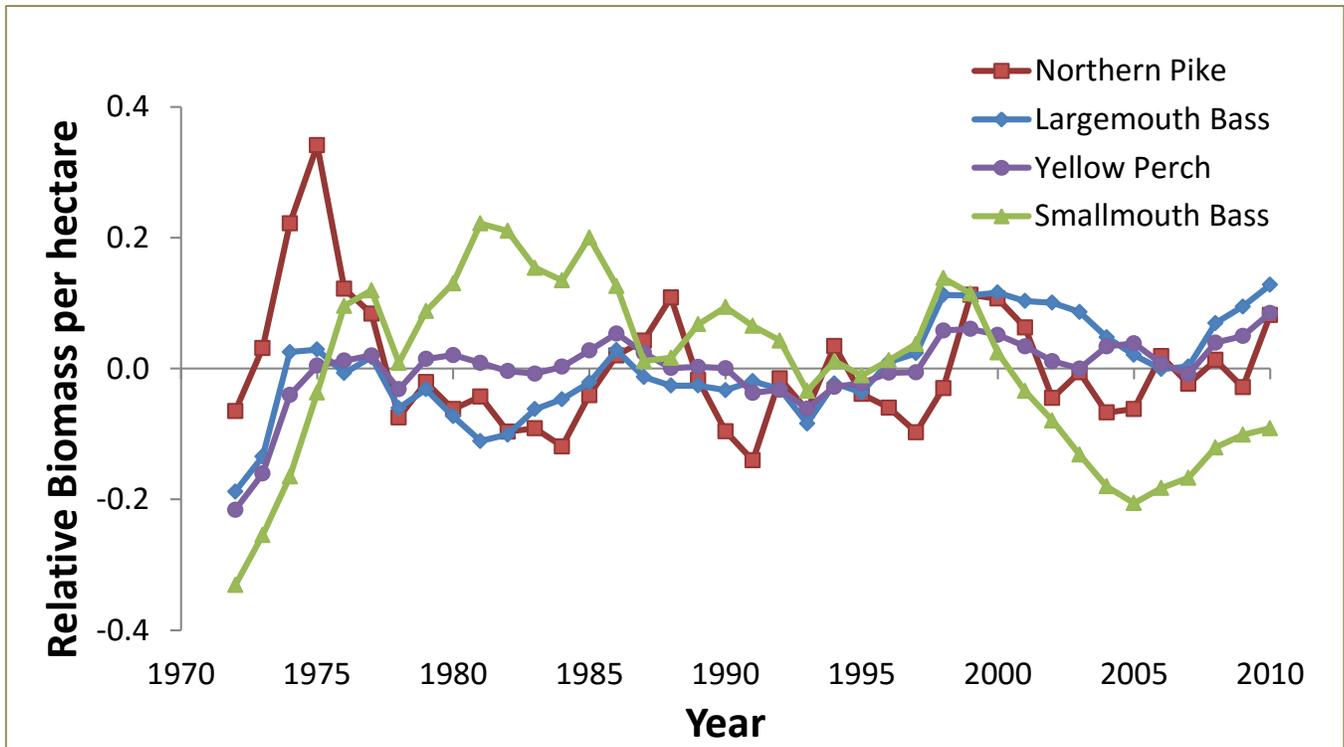


Figure 6.3 - Simulated changes in relative population biomass per hectare from 1972 to 2010, based on habitat-linked population models. The y-axis is plotted relative to average biomass per hectare across the time period.

Summary: The conclusion of the analyses is that the fish habitat in the Bay of Quinte AOC should be considered as ‘not impaired’.

6.5 Coastal Wetland Macroinvertebrate Populations

Appendix J: Coastal Wetland Macroinvertebrate Populations Delisting Criteria Status Report.
October 22, 2015

Authors:

- Angela Darwin, Landscape Assessment Officer, Canadian Wildlife Service, Environment and Climate Change Canada
- Greg Grabas, Habitat Ecologist, Canadian Wildlife Service, Environment and Climate Canada

The condition of the aquatic macroinvertebrate communities in the coastal wetlands of the Bay of Quinte is important for two key reasons: macroinvertebrates (e.g., mayflies, caddisflies) are the primary food source for many species of fish and other aquatic fauna; and macroinvertebrates play an important role in the cycling of nutrients through the water column.

For coastal wetland macroinvertebrate populations, the criterion that must be met for a 'not impaired' status is:

'The aquatic macroinvertebrate community Index of Biotic Integrity (IBI) at representative Bay of Quinte coastal wetlands shall not be more than two standard deviations below the 2006-2010 representative site mean that has been corrected for varying conditions in Lake Ontario outside of the AOC from 2006-2010.'

The focus of this criterion is to demonstrate that the aquatic macroinvertebrate community is either equal to, or better, than that at other Lake Ontario coastal wetland sites, with room for natural variability which is normal in stable ecosystems.

A suitable Index of Biotic Integrity had to be developed that would allow for consistent and comparable measurement of the macroinvertebrate communities. This was done by the Great Lakes Coastal Wetland Consortium (Uzarski et al. 2008), and refined for this application by Environment Canada and Central Lake Ontario Conservation Authority. The latter work was based on seven years of data collected across Lake Ontario (2003, 2006-2011). The index measured the following:

- Number of Ephemeroptera (mayflies) + Trichoptera (caddisflies) genera;
- Total number of families;
- Percent Trichoptera; and
- Percent Crustacea.

The calculations to determine whether this criteria has been met requires: 1) A baseline of coastal wetland invertebrate health in the bay. This baseline value was calculated from Bay of Quinte invertebrate data from the years 2006-2010; 2) The Lake Ontario coastal wetland invertebrate health mean, from 2006-2010. This was calculated from other Lake Ontario sites sample through other projects (minimum two years of data to be included); 3) 2014 Lake Ontario invertebrate mean condition; and, 4) 2014 Bay of Quinte invertebrate mean condition. By using five years of data (2006-2010) instead of just one, any inter-annual differences that result from changes in sampling location would be dampened. Further, to account for natural variability in the wetlands, fluctuations in the quality of bay is allowed. This is calculated and is called the 'threshold value'. The 2014 Bay of Quinte mean condition can be either above or at the threshold value, or at the most, two standard deviations below the threshold value, to be considered as 'not impaired'.

The results of the monitoring and calculations for 2014 were:

- 2014 Bay of Quinte IBI Threshold: 54.3
- 2014 Bay of Quinte IBI Mean Condition = 80.0

The IBI mean condition for Bay of Quinte macroinvertebrate population is above the calculated threshold, meeting the established criterion. Table 6.4 demonstrates that the criterion has been met in each year from 2011-2014:

Table 6.4 - Macroinvertebrate IBI

Mean IBI	2011	2012	2013	2014
'Other Lake Ontario sites'	50.9	50.5	33.6	46.9
Bay of Quinte IBI threshold	58.3	57.8	41.0	54.3
Bay of Quinte IBI mean condition	83.6	63.3	71.2	80.0
Criterion met (Y/N)	Y	Y	Y	Y

*Source: Darwin, A., and G. Grabas,
Coastal Wetland Macroinvertebrate Population Criteria Delisting Report*

Summary: The 2014 Bay of Quinte mean condition is above the Bay of Quinte threshold value. The conclusions of this report indicate that the Bay of Quinte macroinvertebrate community should be considered 'not impaired'.

7.0 Post-delisting Monitoring

Monitoring of fish and wildlife habitat will be continued post-delisting in order ensure that the health of the bay does not deteriorate. The Remedial Action Plan does not see a need to develop new, AOC-specific monitoring programs in order to accomplish this. Rather, existing programs which routinely sample the Bay of Quinte will be continued.

Table 7.1 - Post-delisting Monitoring Programs

Metric	Monitoring Program	Beneficial Use Criteria #	Responsible Agency and Contact
Index of Biotic Integrity	Coastal wetland monitoring – 15 locations each year: submerged aquatic vegetation, water quality, aquatic macroinvertebrate populations	2 3 5	Quinte Conservation Association
% Area SAV Species richness Plant community index	Acoustic Submerged Aquatic Vegetation – every 5 years	1	Quinte Conservation Association
Weighted suitable area of fish habitat	Every 5 years	4	Fisheries and Oceans Canada

Source: Fish and Wildlife Habitat Delisting Criteria Status Reports

8.0 Conclusions and Recommendation

This assessment of the status of the beneficial use by technical experts of the Fish and Wildlife Technical Work Group indicates that all redesignation targets and criteria related to the 'Loss of Fish and Wildlife Habitat' beneficial use have been met. The health of the Bay of Quinte AOC is consistently above that of reference locations around the Canadian Great Lakes. The Bay of Quinte now provides healthy, self-sustaining fish and wildlife habitat which is more diverse and stable than was found in the mid-1970s, when the bay was considered to be hyper-eutrophic. Submerged aquatic vegetation now covers extensive areas of the bay, and the quality of water and habitat is very high.

The recommendation based on this assessment report is that the 'Loss of Fish and Wildlife Habitat' beneficial use has been restored.

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APPENDICES (attached)

- A. Acronyms**
- B. Bay of Quinte Habitat Remediation Projects**
- C. Contributors, Technical Reviewers, Approvals**
- D. Communications**
- E. Evolution of Delisting Criteria and Measures**

APPENDICES (under separate cover)

- F. Degradation of Submergent Aquatic Vegetation Delisting Criteria Status Report**
- G. Coastal Wetland Submerged Aquatic Vegetation Delisting Criteria Status Report**
- H. Coastal Wetland Water Quality Delisting Criteria Status Report**
- I. Fish Habitat in the Bay of Quinte Delisting Criteria Status Report**
- J. Coastal Wetland Macroinvertebrate Populations Delisting Criteria Status Report**

APPENDIX A: Acronyms

AOC	Area of Concern
BQ	Bay of Quinte
BQ RAP	Bay of Quinte Remedial Action Plan
BU	Beneficial Use
BUI	Beneficial Use Impairment
DFO	Department of Fisheries and Oceans Canada
DRCWMP	Durham Region Coastal Wetland Management Plan
IBI	Index of Biotic Integrity
OMNR/OMNRF	Ontario Ministry of Natural Resources changed to Ontario Ministry of Natural Resources and Forestry in 2014
OWES	Ontario Wetland Evaluation System
PPS	Ontario Provincial Policy Statement
PSW	Provincially Significant Wetlands
RAP	Remedial Action Plan
SAV	Submerged Aquatic Vegetation
WMI	Wetland Macrophyte Indices
WSA	Weighted Suitable Area
WQI	Water Quality Index

APPENDIX B: Bay of Quinte Habitat Remediation Projects

Numerous remediation projects have been undertaken throughout the bay since it was designated as an Area of Concern. The following is a list of some key remediation projects undertaken to increase the amount of fish and wildlife habitat:

Palliser Creek: Between 1991 and 2000 on Palliser Creek, a tributary of the Moira River, the Palliser Creek Improvement Association along with partners completed many projects to improve the quality of Palliser Creek. Projects include: planting over 15,000 trees and shrubs; building rip rap erosion control projects; and restricting cattle access to the stream by installing 3 cattle watering stations and exclusion fencing at 7 sites.

Cold Creek: A tributary of the Trent River, Cold Creek was the focus of numerous environmental initiatives through the 1990s. The Cold Creek Improvement Association, in cooperation with other local associations, agencies and private sector sponsors, completed a variety of erosion control, fish habitat rehabilitation, channelization, stream bank stabilizations and pollution abatement projects.

Pine Point: The Pine Point wetland in Ameliasburgh Township was the target for a large-scale enhancement in the mid-1990s. The aging stagnant cattail marsh and shrub swamp was turned into a series of small ponds and connecting channels. The total net gain of wetland and productive habitat was more than 5 hectares.

Sawguin Creek Marsh: Water levels in Lake Ontario are regulated and where naturally fluctuating water levels are controlled, wetland habitat quality is compromised. The lack of periodic flooding and lowered water levels results in the establishment of extensive stands of cattails at the expense of other plant community types mostly the meadow marsh community.

This type of single species environment does not provide diverse and productive wetland habitat. In 1992 and 1998, as a restoration effort, a project in Sawguin Creek Marsh was implemented that aimed to improve the quality of wetland habitat and address the loss of fish and wildlife habitat by providing increased open water. At Sawguin Creek Marsh, larger areas of open water were created by excavating channels through the large cattail stands covering much of the marsh area. The project in 1992, involved the creation of 380 metres of channels dredged through the dense cattail mat. In 1994 the channels were re-assessed and it was determined that further dredging to create wider, deeper channels and ponds was needed. Subsequently, in 1998, 5.5 kilometres of sinuous channels were dredged and 4 interconnecting ponds created.

Over the past several years the monitoring in Sawguin Creek Marsh has shown extremely positive results. The channels are maintaining themselves and supporting numerous fish and wildlife species, including species at risk.

Deseronto Centennial Park: In 2012-2013, 77 metres of gabion stone baskets were removed from the park shoreline. The area was converted to a naturally sloping shoreline with 100's of native plant species. This increased the shoreline buffer zone and improved fish and wildlife habitat. Other project components included a walking path designed to link to the Water Front Trail, signage and various shoreline naturalization. This project was a demonstration project to show landowners the different alternatives that exist besides hardening the shoreline.

Trenton Greenbelt Demo Site: Along the waterfront of Trenton, Ontario the park system had limited safe access for the public to utilize the water. In 2011-2012 a project was implemented to

demonstrate the proper usage of shoreline by creating stable access points and naturalizing 170 metres of shoreline by increasing the buffer zone and planting native plant species.

Bayside Shoreline Naturalization: Throughout 2010 and 2011, three property owners naturalized 100 metres of their shoreline by increasing the buffer zone and planting native plant species. This project also involved the removal of a vertical concrete wall constructed along the 100 metres of shoreline. The shoreline was graded to a natural slope and covered with a mixture of rock and plant species.

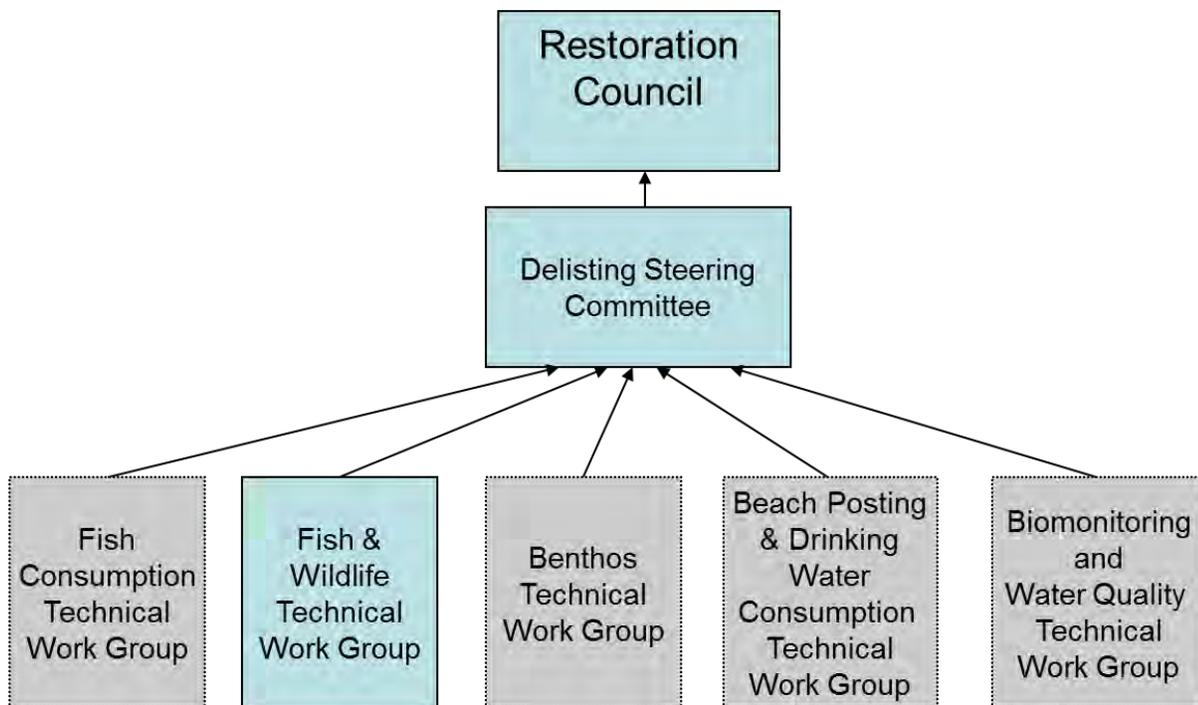
Big Island Marsh Improvement Project: The Big Island Coastal Wetland (BICW) is located in Prince Edward County (PEC) on the Bay of Quinte. It is bound on the north by Big Island and the south by the former Municipality of Sophiasburgh, now PEC. Historically, BICW had a large sinuous channel carving through the middle, connecting to smaller channels and numerous pockets of open water, which allowed the waters of the Bay of Quinte to move freely around Big Island. The introduction of water level regulations, and the construction of a causeway which connected the mainland of PEC to Big Island, have resulted in the loss of the natural open water variability and diversity in this wetland (visual observations of historical and current air photography). Many of the small connecting channels have diminished, and isolated the open pockets of water from continual use by fish (visual observations). Currently, the dominant vegetation in the BICW is Cattail (*Typha* sp.), which forms a solid mat covering the majority of the wetland, limiting water movement. The historical expansion in cattail cover and lack of water movement through the wetland has assisted in clogging of the main channel and smaller channels over time (visual observations). The historical and current condition of BICW has made it an interesting site for restoration and further investigation.

Restoration efforts occurred in two separate phases. Phase one was a partnership between the Bay of Quinte Restoration Council, Quinte Conservation Association, Lower Trent Region Conservation Authority, Ducks Unlimited and the Hastings and Prince Edward Stewardship Council. In late 2011 and early 2012, access to a large area of open water was created in the Big Island Marsh by channeling through a cattail stand. In total, 745 metres of channel habitat at 10 metres in width was created and provided access to approximately 2.5 acres of additional open water, critical for fish and wildlife.

Phase two of the BICW restoration efforts started in 2012 and finished in 2014. Quinte Conservation Association managed the fish habitat creation project funded by Ontario Power Generation (OPG). This phase of the project created an additional 11.71 hectares of open water pond habitat and 4.61 hectares of channel habitat (4610 metres).

APPENDIX C: Contributors, Technical Reviewers, Approvals

The Bay of Quinte 'Loss of Fish and Wildlife Habitat' BUI Assessment Report is a synthesis of environmental assessments undertaken by scientists to determine whether the Bay of Quinte is meeting the delisting criteria. Each of these scientists belong to the Bay of Quinte Fish and Wildlife Technical Work Group, who review all of the fish and wildlife criteria and assessment reports and then provide their expert recommendations to the Delisting Steering Committee. The Delisting Steering Committee provides an additional layer of accountability, ensuring that the appropriate documentation and data substantiate recommendations to the Bay of Quinte Restoration Council that delisting targets and criteria have been met for Impaired Beneficial Uses. The Restoration Council is the body which oversees implementation of the Bay of Quinte Remedial Action Plan, and which ultimately requests delisting.



Authors of Criteria Status Reports

DELISTING CRITERIA	Author(s)
<p>FWH-1A: Show that an increase in the area of Submerged Aquatic Vegetation (SAV) has occurred in the post-dreissenid time stanza such that 30% of the upper Bay of Quinte has SAV coverage of more than 50% density. This is approximately a 20% increase in the SAV area of the upper bay when 1978 to 1994 is used as a “base-year period.”</p> <p>FWH-1B: Measure statistically significant positive trends or changes in both of these plant community measures:</p> <p style="padding-left: 20px;">a) A positive slope in total species richness for the upper bay based on standardized SAV surveys between 1972 and 2010 OR a significant difference in total plant species richness between post –P and post-D time stanzas.</p> <p style="padding-left: 20px;">b) A positive slope or statistically-significant improvement in a plant community index</p> <p>OR index values in the ‘good to excellent’ range for 3 recent consecutive SAV surveys.</p>	<p>Susan Doka, Ph.D. Research Scientist Fisheries and Oceans Canada</p> <p>Erin Gertzen Aquatic Science Biologist, Fisheries and Oceans Canada</p> <p>Kathy Leisti Freshwater Research Biologist Fisheries and Oceans Canada</p> <p>Jody MacEachern GIS Analyst Fisheries and Oceans Canada</p> <p>Jon Midwood, Ph.D. Aquatic Science Biologist, Fisheries and Oceans Canada</p> <p>Rex Tang Aquatic Science Biologist, Fisheries and Oceans Canada</p>
<p>FWH-2: The submerged aquatic vegetation community IBI at representative Bay of Quinte coastal wetlands shall not be more than two standard deviations below the 2006-2010 representative site mean that accounts for varying conditions in Lake Ontario outside of the AOC from 2006-2010.</p>	<p>Angela Darwin Landscape Assessment Officer Canadian Wildlife Service Environment and Climate Change Canada</p> <p>Greg Grabas Habitat Ecologist Canadian Wildlife Service Environment and Climate Change Canada</p>
<p>FWH-3: The water quality index at representative Bay of Quinte coastal wetlands shall not be more than two standard deviations below the 2006-2010 representative site mean that accounts for varying conditions in Lake Ontario outside of the AOC from 2006-2010.</p>	<p>Angela Darwin Landscape Assessment Officer Canadian Wildlife Service Environment and Climate Change Canada</p> <p>Greg Grabas Habitat Ecologist Canadian Wildlife Service Environment and Climate Change Canada</p>
<p>FWH-4A: The Bay of Quinte’s weighted suitable area of fish</p>	<p>Susan Doka, Ph.D. Research Scientist</p>

Authors of Criteria Status Reports

DELISTING CRITERIA	Author(s)
<p>habitat across all guilds and life stages should be:</p> <p>a) ranked above the 80th percentile among 41 coastal comparison sites within Lake Ontario , and</p> <p>b) not significantly lower than at Long Point Bay, Lake Erie.</p> <p>FWH-4B: Maintain a no-net-loss of the weighted suitable area of fish habitat over time by ensuring that:</p> <p>a) the present (2005-2010) weighted suitable area of fish habitat in the Bay of Quinte is greater than the conditions during previous time stanzas, and</p> <p>b) highly suitable important, rare or sensitive habitats are identified conserved.</p> <p>FWH-4C: Maintain the weighted suitability area of fish habitat required to support the long-term relative levels of important fish as projected from habitat supply models. Population results should:</p> <p>a) be ranked above the 80th percentile among 41 comparison sites within Lake Ontario, and</p> <p>b) be stable or increasing over time within the Bay of Quinte given previous and projected changes in habitat availability.</p>	<p>Fisheries and Oceans Canada</p> <p>Erin Gertzen Aquatic Science Biologist Fisheries and Oceans Canada</p> <p>Jody MacEachern GIS Analyst Fisheries and Oceans Canada</p>
<p>FWH-8: The aquatic macroinvertebrate community IBI at representative Bay of Quinte coastal wetlands shall not be more than two standard deviations below the 2006-2010 representative site mean that accounts for varying conditions in Lake Ontario outside of the AOC from 2006-2010.</p>	<p>Angela Darwin Landscape Assessment Officer Canadian Wildlife Service Environment and Climate Change Canada</p> <p>Greg Grabas Habitat Ecologist Canadian Wildlife Service Environment and Climate Change Canada</p>

Reviewers

Each individual delisting criteria status report and the 'Loss of Fish and Wildlife Habitat' BUI Assessment Report has been reviewed and approved by members of the Fish and Wildlife Technical Work Group and the Delisting Steering Committee. Because many of the memberships overlap, below is an amalgamated list of all who have been involved in the discussion, review and approval process.

Bay of Quinte RAP Office

- Sarah Midlane-Jones, Communications Specialist
- Shan Mugalingam, PhD, P.Eng., BQ RAP Technical Coordinator

Environment and Climate Change Canada

- Angela Darwin, Landscape Assessment Officer, Canadian Wildlife Service
- Kristin Geater, Remedial Action Plan Program Officer, Great Lakes Areas of Concern
- Rimi Kalinauskas, Senior Remedial Action Plan Program Officer, Great Lakes Areas of Concern

Fisheries and Oceans Canada

- Christine (Brousseau) Boston, Aquatic Science Biologist, Fish Habitat Section
- Susan Doka, Ph.D., Research Scientist, Fish Habitat Section
- Erin Gertzen, Aquatic Science Biologist, Fish Habitat Section
- Marten Koops, Ph.D., Research Scientist,
- Kathy Leisti, Freshwater Research Biologist, Fish Habitat Section
- Jody MacEachern, GIS Analyst, Fish Habitat Section
- Robert G. Randall, Ph.D., Research Scientist, Central & Arctic Region

Lower Trent Region Conservation Authority

- Anne Anderson, Special Projects Coordinator

Ontario Ministry of the Environment and Climate Change

- Andrew Morley, Great Lakes Advisor

Ontario Ministry of Natural Resources and Forestry

- Alastair Mathers, Assessment Supervisor, Lake Ontario Management Unit

Quinte Conservation Association

- Brad McNevin, Regulations Officer and Fisheries Biologist

St. Lawrence River Institute of Environmental Sciences

- Jeff Ridal, Ph.D., Executive Director

Voting Members and Alternates on the Restoration Council

Agency	Member	Alternate
Lower Trent Region Conservation Authority	Glenda Rodgers, Co-chair RAP Restoration Council CAO and Secretary Treasurer, Lower Trent Region Conservation	Anne Anderson Special Projects Coordinator
Quinte Conservation Association	Terry Murphy, Co-chair RAP Restoration Council General Manager, Quinte Conservation Association	Brad McNevin Regulations Officer/Fisheries Biologist
Environment Canada	Kristin Geater Remedial Action Plan Program Officer, Great Lakes Areas of Concern Section	Rimi Kalinauskas Senior Remedial Action Plan Program Officer, Great Lakes Areas of Concern Section

Voting Members and Alternates on the Restoration Council

Agency	Member	Alternate
Ontario Ministry of the Environment and Climate Change	Andrew Morley, Great Lakes Advisor	Christine Brown Area Supervisor Belleville Area Office
Ontario Ministry of Natural Resources and Forestry	Alastair Mathers Lake Ontario COA Basin Coordinator Lake Ontario Management Unit Glenora Fisheries Station	Jim Hoyle Assessment Biologist Lake Ontario Management Unit Glenora Fisheries Station
Ontario Ministry of Agriculture, Food and Rural Affairs	Peter Doris Environmental Specialist	Ben Hawkins Engineer, BMP Technical Integration & Transfer
Fisheries and Oceans Canada	Gavin Christie Division Manager Great Lakes Laboratory for Fisheries and Aquatic Sciences	Christine Boston Aquatic Science Biologist
Mohawks of the Bay of Quinte	Nicole Storms Environmental Services Officer	
CFB Trenton	Drew Craig Environmental Officer 8 Wing CFB Trenton	

Formal Approvals

November 20, 2012: Restoration Council approved proceeding with a change in status for this impaired beneficial use. It was recommended that all criteria status reports for this BUI be sent to the Fish and Wildlife Technical Work Group then to the Delisting Steering Committee for final approval, then the reports be reviewed by an outside consultant to provide a recommendation of BUI status to the Restoration Council.

April 16, 2013: At a combined Fish and Wildlife Technical Work Group and Delisting Steering Committee meeting, all criteria reports were approved. It was recommended to proceed with the development of the Fish and Wildlife Habitat redesignation report. It was decided that instead of an outside consultant, the final assessment report and recommendation for a change in BUI status to the Restoration Council would be developed internally.

Final approval of BUI assessment report by Fish and Wildlife Technical Work Group: DATE

Final approval of BUI assessment report by Delisting Steering Committee: DATE

Final approval of BUI assessment report by Restoration Council: DATE

APPENDIX D: Communications

To be inserted (Sarah/Kristin)

APPENDIX E: Evolution of Delisting Criteria and Measures

In 2001, the BQ RAP developed delisting criteria that were intended to guide the development of its 2001-2005 Work Plan. Delisting criteria for 'Loss of Fish and Wildlife Habitat' were general statements about protecting and restoring habitat to the greatest extent possible and demonstrating that populations were consistent with a stable, diverse and healthy aquatic ecosystem. Primarily, the delisting criteria relied upon action-based items such as completion of Natural Heritage Studies, rather than measurable, quantifiable delisting criteria.

The process to develop measurable, quantifiable delisting criteria can be complicated and time consuming. However, measurable and achievable delisting criteria are essential to guide the work of BQ RAP and to determine whether a BUI can be considered delisted. A set of delisting criteria for this impaired beneficial use were developed, based on consultation with the Project Quinte partners.

Fish habitat delisting criteria was written to reflect ecosystem attributes and functions that, collectively, would demonstrate whether fish and wildlife habitat should be 'impaired' or 'not impaired'.

REPORT	BUI - TARGET/CRITERIA/ACTION – Changes over time
<p>1993</p> <p>Stage-2: Time to Act. BQ RAP Coordinating Committee. September, 1993</p>	<p>TARGET:</p> <p>Re-establish and maintain aquatic, shoreline and wildlife conditions within the Bay of Quinte ecosystem capable of supporting healthy, diverse, stable and self-sustaining aquatic and terrestrial communities by:</p> <ol style="list-style-type: none"> 1. Encouraging restoration of damaged habitats; and 2. Applying a principle of “No Net Loss of the Productive Capacity of Habitat” to all development. <p>CRITERIA/ACTION:</p> <p><i>Not determined</i></p>
<p>2001</p> <p>Five-Year Work Plan 2001-2005 for BQ RAP Fred Stride Environmental. February 2001</p>	<p>TARGET:</p> <ol style="list-style-type: none"> 1. To the greatest extent possible, protect the quantity, function and diversity of significant natural features as identified in Natural Heritage Strategies (NHS) completed for partnership municipalities and First Nations fronting on the Bay of Quinte 2. To the greatest extent possible, protect and restore fish habitat in the Bay of Quinte 3. Encourage municipalities and broad public and sectoral support/advocacy for the Natural Heritage Strategies and Fish Habitat Management Strategy findings and recommendations 4. Establish a self-sustaining, volunteer, community-based wildlife monitoring program for the Bay of Quinte area <p>CRITERIA/ACTION:</p> <ol style="list-style-type: none"> 1. The Natural Heritage Strategies will be completed 2. The use of Natural Heritage Strategies will be monitored with respect to municipal planning 3. The Ontario Ministry of Natural Resources Fish Community Objectives will be adopted, and actions taken to monitor achievement of the objectives 4. A Bay of Quinte Fisheries Habitat Management Strategy will be completed 5. An education and awareness program will be developed and implemented to gain support for the Natural Heritage Strategies and the Fish Habitat Management Strategy 6. A stewardship program will be developed and delivered for the protection, creation and rehabilitation of fish habitats identified in the Natural Heritage Strategies and the Fish Habitat Management Strategy 7. A communications plan will be developed and implemented 8. A strategy will be developed and implemented for recruiting and coordinating volunteers for existing “wildlife watchers” programs (e.g. Marsh Monitoring Program) and annually reporting the findings

REPORT	BUI - TARGET/CRITERIA/ACTION – Changes over time
<p>2007</p> <p>Fish Habitat Management Plan for the Bay of Quinte. Paul Johanson & Brad McNevin. March 2007</p>	<p>TARGET:</p> <p>FWH-1 - The extent (surface area) of submerged aquatic vegetation in the Bay of Quinte has been restored to levels more reflective of the mesotrophic system that existed in the Bay of Quinte before nutrient loading created a eutrophic/hyper-eutrophic system.</p> <p>FWH-2 - Submerged aquatic vegetation in the Bay of Quinte coastal wetlands is not impaired.</p> <p>FWH-3 - Coastal wetland water quality is not impaired.</p> <p>FWH-5 - Implement the institutional arrangements and site specific rehabilitation recommendations outlined in the Bay of Quinte Remedial Action Plan's Fish Habitat Management Plan.</p> <p>CRITERIA/ACTION:</p> <p>FWH-1 - Using the 1986-1994 as a "base year period", increase area of submerged aquatic macrophytes so that 30% of the upper Bay of Quinte has macrophyte coverage of more than 50% density. This is approx. 20% increase in the submerged aquatic macrophytes in the upper Bay of Quinte.</p> <p>FWH-2 - The average submerged aquatic vegetation Index of Biotic Integrity (IBI) at representative Bay of Quinte coastal wetlands will be 60 or above (very good or better) using the Durham Region Coastal Wetland Monitoring methodology, and is stable or improving based on multi-year assessments. However, no more than three of the coastal wetlands can score less than 60.</p> <p>FWH-3 - The average water quality index scores at representative Bay of Quinte coastal wetlands will be 3.5 or above (good or better) using the methodology of Chow-Fraser (Chow-Fraser, P. 2006) and is stable or improving based on multi-year assessments. However, no more than three of the coastal wetlands can score less than 3.33.</p>
<p>2007</p> <p>A Management Plan to Address Wildlife Related Impairments for the Bay of Quinte. Paul Johanson & Brad McNevin. March 2007</p>	<p>TARGET:</p> <p>FWH-4 - Shorelines around the Bay of Quinte have an acceptable level of natural vegetation which protects water quality and contributes to fish and wildlife habitat.</p> <p>FWH-6 - Implement the institutional arrangements and site specific rehabilitation recommendations outlined in the Bay of Quinte Remedial Action Plan's Management Plan to Address Wildlife Related Impairments for the Bay of Quinte.</p> <p>FWH-7 - Complete Natural Heritage Reports for all local governments bordering the Bay of Quinte.</p> <p>CRITERIA/ACTION:</p> <p>FWH-4A - An undisturbed terrestrial vegetated buffer of 30 m along shore-lands and 120 m adjacent to Provincially Significant Wetlands (PSW).</p> <p>FWH-4B - 80% of the shorelines along the Bay of Quinte must have an undisturbed natural terrestrial vegetated buffer of 5m or greater from the high water mark. From 5 m to 30 m (or 120 m for PSW lands) the extent of the buffer should be 60% naturally vegetated. This criterion may be revised pending field verification that will examine</p>

REPORT	BUI - TARGET/CRITERIA/ACTION – Changes over time
	<p>extent of buffering within the 30 m and 120 m areas of the Bay of Quinte.</p> <p>FWH-6 - Implement the institutional arrangements and site specific rehabilitation recommendations outlined in the Bay of Quinte Remedial Action Plan’s Management Plan to Address Wildlife Related Impairments for the Bay of Quinte.</p> <p>FWH-7 - Complete Natural Heritage Reports for all local governments bordering the Bay of Quinte.</p>
<p>2011</p> <p>Revised Criteria as recommended by the Bay of Quinte Delisting Steering Committee and Approved by the Restoration Council</p>	<p>TARGET:</p> <p>FWH-2 -Submerged aquatic vegetation in Bay of Quinte coastal wetlands is not impaired.</p> <p>FWH-3 - Coastal wetland water quality is not impaired</p> <p>FWH-8 - Aquatic macroinvertebrate communities in Bay of Quinte coastal wetlands are not impaired.</p> <p>FWH-9 - Conserve, enhance and maintain the high quality, diverse and extensive fish habitat in the Bay of Quinte, by assessing and mapping fish habitat suitability and the quantity of habitat needed to support the biodiversity and productivity of fishes in this ecosystem and, by identifying priority areas and actions for effective conservation and restoration.</p> <p>CRITERIA/ACTION:</p> <p>FWH-2 - The submerged aquatic vegetation community IBI at representative Bay of Quinte coastal wetlands shall be no less than two standard deviations from the recent representative site mean that has been corrected for varying conditions in Lake Ontario outside of the AOC.</p> <p>FWH-3 - The water quality index at representative Bay of Quinte coastal wetlands shall be no less than two standard deviations from the recent representative site mean that has been corrected for varying conditions in Lake Ontario outside of the AOC.</p> <p>FWH-8 - The aquatic macroinvertebrate community IBI at representative Bay of Quinte coastal wetlands shall be no less than two standard deviations from the recent representative site mean that has been corrected for varying conditions in Lake Ontario outside of the AOC.</p> <p>FWH-9A - The Bay of Quinte’s weighted suitable area of fish habitat across all guilds and life stages should be</p> <p>a. ranked above the 80th percentile among 39 coastal comparison sites within Lake Ontario, and</p>

REPORT	BUI - TARGET/CRITERIA/ACTION – Changes over time
<p>2011 (cont'd)</p>	<p>b. not significantly lower than Long Point Bay, Lake Erie, a coastal area similar in importance to the Bay of Quinte, providing high quality fish habitat in the lower Great Lakes but with understood physical differences that should be caveats in the assessment.</p> <p>FWH-9B - Maintain a no-net-loss of the weighted suitable area of fish habitat over time by ensuring that:</p> <ul style="list-style-type: none"> a. the present (2005-2010) weighted suitable area of fish habitat in the Bay of Quinte is greater than the conditions during previous time stanzas (pre and post phosphorus habitat conditions and pre & post zebra mussel conditions), and b. more specifically, highly suitable (suitability >0.66) important, rare or sensitive habitats are identified so they are not lost to development and/or other pressures on the system, either under present conditions, or under anticipated future conditions. A greater or equal area of highly suitable habitats over time should be projected into the future to ensure system resilience. <p>FWH-9C - Maintain the weighted suitability area of fish habitat required to support the long-term relative levels of important fish populations (northern pike, yellow perch, smallmouth bass, largemouth bass and walleye) as projected from habitat supply models. Population results (relative biomass in kg or relative abundance) should:</p> <ul style="list-style-type: none"> a. be ranked above the 80th percentile among 39 comparison sites within Lake Ontario, and b. be stable or increasing over time within the Bay of Quinte <p>(correlated with measure 1; slope of annual average abundance over time for each population is ≥0) given previous and projected changes in habitat availability.</p>
<p>2012</p> <p>Revised Criteria as recommended by the Bay of Quinte Delisting Steering Committee and Approved by the Restoration Council</p>	<p>TARGET:</p> <p>FWH-1 - The extent (surface area in hectares) and community structure of submergent aquatic vegetation (SAV) in the Bay of Quinte is restored to levels more reflective of the mesotrophic system that existed before excessive nutrient loading created a eutrophic/hyper-eutrophic system.</p> <p>FWH-2 - Submerged aquatic vegetation in Bay of Quinte coastal wetlands is not impaired.</p> <p>FWH-3 - Coastal wetland water quality is not impaired.</p> <p>FWH-8 - Aquatic macroinvertebrate communities in Bay of Quinte coastal wetlands are not impaired.</p> <p>CRITERIA/ACTION:</p> <p>FWH-1 - Using data collected from the north and south reference transects at Trenton, Belleville and Big Bay stations in the Bay of Quinte:</p> <ol style="list-style-type: none"> 1) Show that an increase in the area of SAV has occurred in the post-Dreissena time stanza (1994-current year) such that 30% of the upper Bay of Quinte has SAV coverage of more than 50% density. This is approximately a 20% increase in the SAV area of the upper bay when 1978 to 1994 is used as a “base year period” (standard post-P but pre-<i>Dreissena</i> time stanza).

REPORT	BUI - TARGET/CRITERIA/ACTION – Changes over time
2012 (cont'd)	<p>2) Measure statistically significant positive trends or changes in <i>both</i> of these plant community measures:</p> <ul style="list-style-type: none"> c) A positive slope ($F > 0.05$) in total species richness for the upper bay based on standardized SAV surveys between 1972 and 2010 OR a significant difference (one-tailed t-test, $\alpha = 0.05$) in total plant species richness between post -P and post-D time stanzas. d) A positive slope or statistically significant improvement in a plant community index OR index values in the 'good to excellent' range for 3 recent consecutive SAV surveys. <p>FWH-2 - The submerged aquatic vegetation community IBI at representative Bay of Quinte coastal wetlands shall not be more than two standard deviations below the 2006-2010 representative site mean that accounts for varying conditions in Lake Ontario outside of the AOC from 2006-2010.</p> <p>FWH-3- The water quality index at representative Bay of Quinte coastal wetlands shall not be more than two standard deviations below the 2006-2010 representative site mean that accounts for varying conditions in Lake Ontario outside of the AOC from 2006-2010.</p> <p>FWH-4A - A minimum of 50% of the area within 30 metres of the high water mark of the Bay of Quinte is natural habitat.</p> <p>FWH-4B - A minimum of 50% of the area within 120 metres of the boundary of the Provincially Significant Wetlands along the Bay of Quinte shoreline is natural habitat.</p> <p>FWH-8- The aquatic macroinvertebrate community IBI at representative Bay of Quinte coastal wetlands shall not be more than two standard deviations below the 2006-2010 representative site mean that has been corrected for varying conditions in Lake Ontario outside of the AOC from 2006- 2010.</p>
<p>Notes:</p> <p><u>1. Bay of Quinte Shoreline Vegetation: FWH-4A and FWH-4B</u> The Restoration Council approved that the Shoreline Vegetation measures be considered as long-term conservation targets rather than as delisting criteria, and that the long-term target aim for no net loss of shoreline vegetation based on our current extent of coverage (i.e. approx. 50%); within a $\pm 5\%$ margin (i.e. a minimum threshold of 45% should be maintained for both of the shoreline vegetation targets). The Restoration Council approved this due to following reasons:</p> <ol style="list-style-type: none"> 1. The recommended thresholds do not have a rigorous scientific underpinning behind them. 2. Bulk of the shoreline lands are within private ownership. Conservation Authorities use education & outreach and voluntary stewardship programs such as shoreline naturalization and habitat enhancement to interact with the land owners in a positive manner. 3. Significant portion of the shoreline zone falls under the jurisdiction of Conservation Authorities (hazard lands) and Ministry of Natural Resources (provincially significant wetlands). Thus, a number of programs/policies/regulations are in place to minimize damages to shoreline vegetation due to development activities. List of applicable management actions/ programs/ policies that are already in place will need to be pulled together for the development of long-term management strategy that focuses on the long-term conservation target. <p><u>2. Change in Identifier</u> The identifier FWH-9 was changed to FWH-4 when FWH-4 (Shoreline Vegetation) was removed from the list of criteria.</p>	