

Status Recommendation for the *Degradation of Fish and Wildlife Populations* (BUI #3) in the St. Clair River Area of Concern (Ontario) October 2023



Purpose: In 1987, the St. Clair River was identified as an Area of Concern (AOC) under the Great Lakes Water Quality Agreement (GLWQA) between Canada and the United States due to severe degradation of the aquatic environment. Decades of industrial and municipal point sources contributed to poor water quality that impaired one or more of the fourteen beneficial use impairments (BUI) in the GLWQA. One of these BUIs, *Degradation of Fish and Wildlife Populations* (BUI #3) had insufficient data to make a status determination of “*impaired*” or “*not impaired*”. The purpose of this fact sheet is to summarize the extensive work that has been completed by the Canadian Remedial Action Plan Implementation Committee (CRIC) to assess this BUI and enable a status recommendation of “*not impaired*” for the St. Clair River AOC.

Listing of the St. Clair River AOC: Historically, the St. Clair River (SCR) was impacted by industrial and municipal point source pollution originating primarily from Sarnia, Ontario and Port Huron, Michigan. Contaminants, such as PCBs and mercury, were introduced into the waterway where they settled onto the sediment of the river. Fish and wildlife feeding in these areas were then exposed to these contaminants. Other problems that contributed to the AOC designation of the river included sewage overflow events that led to beach closures and degraded aesthetics. Agriculture and coastal development contributed to the loss of valuable fish and wildlife habitat as the natural shoreline was hardened and wetlands were filled and altered.

History of BUI #3: The 1991 *Stage 1 Report* described environmental conditions for fish and wildlife populations in the SCR AOC. Waterfowl surveys conducted between 1968 -1982 revealed a decline in four waterfowl species. Industrial contaminants were found to be accumulating in fish and wildlife tissue. While fish populations were described as “diverse and well-balanced”, the decline in waterfowl, limited information about wildlife diversity and abundance, and uncertainty about how industrial contaminants might be affecting local fish and wildlife populations, meant that further studies were required to fully assess this BUI. As a result, BUI #3 was deemed “*requires further assessment (RFA)*”.



BUI #3 Assessment Approach: The approach follows the initial guidance provided by the IJC in 1987. The guidance conveys the importance of *diversity*, *abundance* and for local fish and wildlife populations to be *self-sustaining* which means they should be able to grow effectively and reproduce successfully. In addition, contaminants should not be negatively affecting survival of populations in the AOC. Subsequent RAP reports provided recommended actions to guide and assess this BUI in the SCR. When these conditions are met, then BUI #3 can be designated as “*not impaired*”.

There are two components to the assessment of this BUI in the SCR (Ontario):

1. Abundance and diversity of wildlife:

- Compare trends in abundance and diversity of wildlife populations within the AOC to those outside of the AOC and Great Lakes reference sites using monitoring data from wildlife agencies.

- Incorporate Indigenous ecological knowledge provided by Walpole Island First Nation.

2. The accumulation of contaminants (or “body burdens”) that may impair the ability of fish and wildlife populations to be self-sustaining:

- Compare spatial trends in contaminant body burdens in fish and wildlife in the AOC to those at suitable reference sites outside of the AOC.
- Assess temporal trends to determine if body burdens in fish and wildlife have declined following remediation activities in the AOC.
- Compare body burdens to scientific thresholds associated with adverse impacts on fish and wildlife survival.

Numerous studies and evaluations of data sets were conducted in the SCR AOC from 2006–2018 to assess the status of fish and wildlife populations in relation to these objectives. The assessment was comprehensive, evaluating aquatic wildlife of different taxa and fish and wildlife contaminant burdens spatial and temporally. These findings provide the foundation for the CRIC status recommendation.

BUI 3 Assessment Results:

1. Wildlife Diversity & Abundance

a) Waterfowl

- In the most recent waterfowl surveys conducted in 2009–2011, waterfowl abundance was 1.6 million use days in the spring in two surveyed areas (“sectors”) of the AOC and nearly 5.5 million use days in the fall. This amount of use is similar to that at Long Point, a federal wildlife reserve.
- In Sector C16 (that covers the largest part of AOC), waterfowl use in the spring was stable from 1968/69–2009/11 and was relatively lower in the last three fall surveys (**Fig. 1**). Many factors that are not specific to the AOC, such as changing food abundance and water levels, can also influence these trends.
- For those four waterfowl species of initial concern, there was decrease in use by green-winged teal, American wigeon, blue-winged teal and wood duck in surveys conducted between 1968/69 compared to 2009–2011. Overall, this group of small dabblers represented a low percentage overall of total waterfowl use (0.07% and 5.1% in the spring and fall, respectively) and was similar to use by these species in two other sectors in southern Lake St. Clair (LSC) in the 2009/11 survey.
- Long term trends in waterfowl use in the AOC were either similar or better compared to areas outside of the AOC in the spring and the fall from 1968/69 to 2002/03.
- High waterfowl abundance and diversity in the area are consistent with traditional knowledge shared by WIFN knowledge holders.

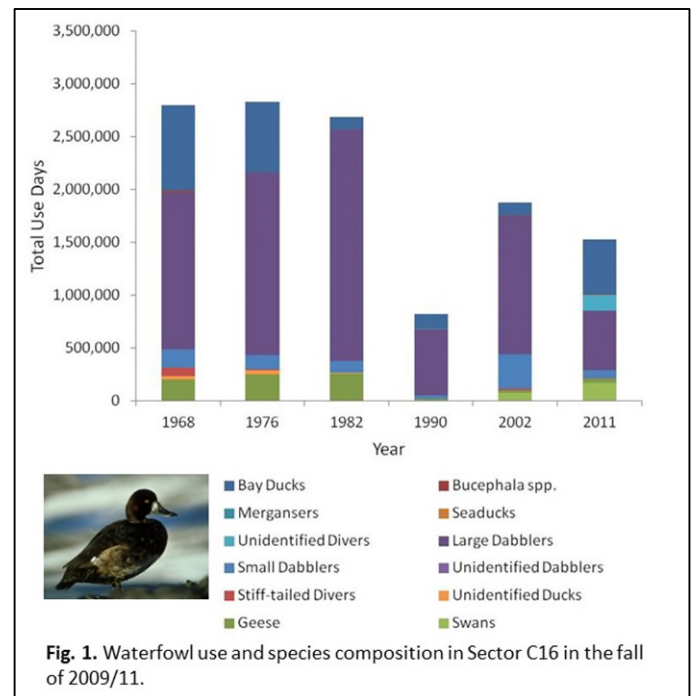
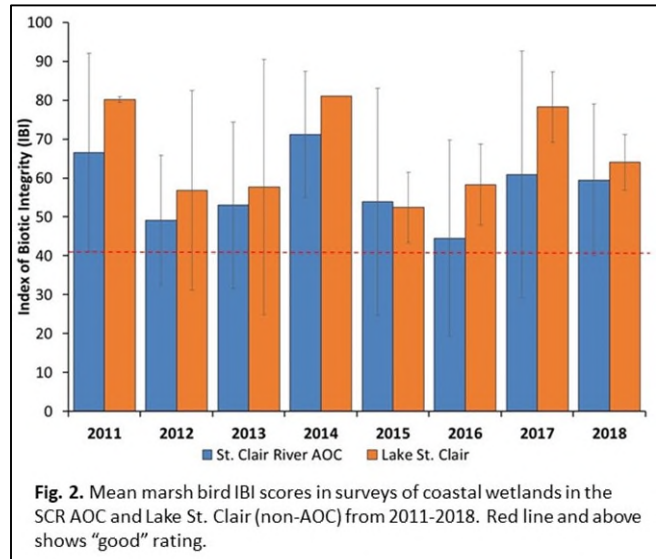


Fig. 1. Waterfowl use and species composition in Sector C16 in the fall of 2009/11.

b) Marsh birds

- Marsh bird community condition was assessed using the Marsh Monitoring Program protocol at six AOC wetlands and compared to wetlands on LSC using a multi-metric index that incorporates different attributes of marsh bird diversity and abundance.
- Marsh bird community condition was similar between the AOC and non-AOC sites in eight survey years from 2011–2018 and were rated as “good” in all study years (Fig. 2).
- Marsh-obligate nesters are birds that require marsh habitat to nest. Abundance of this group was greater within the AOC vs in areas outside the AOC resulting in a “good” rating. Abundance of several important marsh-dwelling species were also generally rated fair-good
- Trends in abundance of marsh-obligate nesters, while declining, were less severe for marsh birds in the AOC vs outside of the AOC from 1995–2011.



c) Amphibians (Frogs and Toads)

- Amphibian surveys were conducted using the Marsh Monitoring Program protocol at five wetlands in the AOC from 2006–2010 and compared to three wetlands surveyed on LSC.
- Species richness (diversity) was similar for three amphibian metrics assessed between the AOC and greater (non-AOC) region resulting in a “fair” rating.
- Firsthand accounts by community members from Walpole First Nations indicate that while the amphibian community has changed over time, it is generally diverse and abundant.

d) Mammals

- Harvest records for mink and muskrat were collected from trappers from mid-1990s–2010.
- Trends for muskrat and mink populations were high in the AOC and similar between the AOC and greater region resulting in a “fair” rating.
- Firsthand accounts by community members from Walpole First Nation indicate that muskrat are abundant.

2. Fish & Wildlife Contaminant Body Burdens

a) Fish

- In 2014, three fish species, shorthead redhorse sucker (SHRH), yellow perch (YP), and emerald shiner (ES), were collected at AOC sites and an upstream reference site (REF) on Lake Huron and analyzed for contaminants. Assorted body measurements were also taken to assess fish health and reproductive potential.
- Mercury and sum PCB concentrations were statistically similar in male and female SHRH from the AOC compared to the REF site (Fig. 3); some spatial differences were evident for other

organochlorine compounds. Some spatial differences were also found for ES between AOC and reference sites.

- For most comparisons, there was a decrease in concentrations for sum PCBs and mercury in SHRH and YP between 2002/03 and 2014 and for many these, decreases in body burdens were significant representing a large and steady change in body burdens.
- Concentrations of mercury and PCBs in all fish from the AOC were below those associated with adverse impacts on fish health.
- While some site differences for estimates of health and reproductive capacity (based on body measurements) were found, it is unlikely that these would result in adverse effects on growth or reproduction for fish in the AOC.

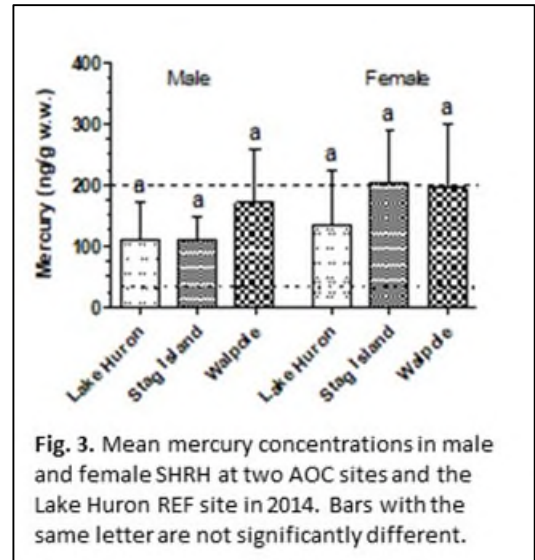


Fig. 3. Mean mercury concentrations in male and female SHRH at two AOC sites and the Lake Huron REF site in 2014. Bars with the same letter are not significantly different.

b) Wildlife

i) Northern Leopard Frogs

- Frogs were collected from seven sites within the AOC and upstream reference sites on Lake Huron and analyzed for contaminants in 2006 and 2007.
- In general, concentrations of sum PCBs and other legacy organochlorines were similar in frogs from AOC sites compared to those from the REF site. However, frogs from Johnston Channel had relatively higher concentrations of total DDT and dieldrin. These two compounds are highly persistent and have been banned in Canada for more than three decades.
- Mercury concentrations were largely similar in frogs from AOC sites compared to those from the REF site. One exception was for frogs from Bassett Channel and Goose Lake that had statistically higher mercury concentrations compared to the REF site.
- Concentrations of PCBs and mercury in frogs from the AOC were below those associated with toxic effects in frogs.

ii) Snapping Turtles

- Snapping turtle eggs were collected from locations in the Walpole Delta within the AOC in 2011 and three REF Great Lakes reference sites.
- Total sum concentrations of sum PCBs and other legacy organochlorines in eggs from the AOC were among the lowest of Great Lakes sites; in contrast, mercury concentrations in eggs were among the highest among Great Lakes sites.
- Sum PCBs and mercury in AOC eggs were below thresholds associated with adverse impacts on reproduction in birds or turtles.
- PCBs and mercury in eggs have remained fairly stable in eggs collected between 1995 and 2011; this coincides with the period when the largest decreases had already occurred and levels had stabilized in biota on the Great Lakes.

iii) Waterfowl

- Canvasbacks were collected from LSC in the fall and SCR in the winter of 2008 and 2009 and mallards were collected from Walpole Delta in 2010. Livers were analyzed for contaminants.

- Dramatic decreases in liver concentrations of legacy organochlorines were found in mallards between the mid 1980s and 2010.
- Canvasback rapidly accumulated mercury, PCBs, and other organochlorines over the winter from November to February of 2008/09 (Fig. 4). Several factors contribute to this trend: movement of birds, changes in diet, and/or the rapid loss of fat reserves over the winter that will increase contaminant levels in the liver. This pattern is typical for overwintering or migrating birds.
- Sum PCB and mercury concentrations in both waterfowl species were below levels associated with reduced survival in birds.

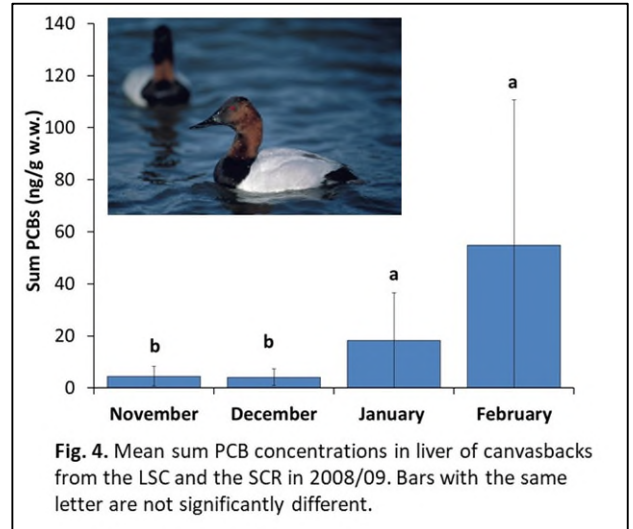


Fig. 4. Mean sum PCB concentrations in liver of canvasbacks from the LSC and the SCR in 2008/09. Bars with the same letter are not significantly different.

iv) Mink

- Mink were collected from trappers at Walpole Delta in the AOC in 2002 and from three REF sites. Livers were analyzed for contaminants.
- Similar to turtle eggs, total sum concentrations of sum PCBs and other legacy organochlorines in liver of mink from the AOC were among the lowest of Great Lakes sites; in contrast, mercury concentrations in liver were among the highest among Great Lakes sites.
- Liver concentrations of sum PCBs and mercury were well below those associated with reduced mink survival.

Assessment Conclusions:

- Wildlife survey data and traditional knowledge indicate while changes in diversity and abundance in aquatic wildlife populations have occurred in the AOC, monitoring studies indicate that wildlife populations in the AOC are currently similar to or better than those in areas outside of the AOC.
- While body burdens in fish and wildlife in the AOC were higher for some legacy contaminants relative to those at other Great Lakes sites, they were below threshold levels associated with increased health risks to fish and reduced survival for wildlife (where thresholds are known). Contaminant body burdens in fish and wildlife have also declined or remained stable over the last few decades. There is no evidence suggesting current body burdens are impairing the ability of fish and wildlife populations to be self-sustaining in the AOC.

In Relation to the Two Components for the Assessment of BUI #3:

- ✓ Conditions for wildlife diversity and abundance have been met.
- ✓ Current contaminant body burdens are not impairing the ability of fish and wildlife populations to be self-sustaining in the AOC.

Therefore, it is recommended that the status of *Degradation of Fish and Wildlife Populations* (BUI #3) be designated as *Not Impaired* (from RFA) for the St. Clair River Area of Concern (Ontario).