

Thunder Bay Area of Concern Beneficial Use Impairment Assessment Report

Degradation of Aesthetics



Photo Credit: Dr. Robert Stewart

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Executive Summary

Degraded water quality within the Thunder Bay harbour affected recreational use of the waterway, resulting in the Degradation of Aesthetics to be considered as a beneficial use impairment (BUI) in 1991. Floating sludge mats surrounded by foam, oil slicks, creosote deposits, piles of rotting wood waste and abandoned industrial sites were some of the primary triggers for this impaired designation.

To assist in the early years of the Areas of Concern (AOC) program, the International Joint Commission suggested listing and delisting guidelines to help focus efforts to address beneficial use impairments (BUIs). The delisting criterion for this impairment originally developed by the International Joint Commission was subsequently applied to the Thunder Bay AOC:

"When the waters are devoid of any substance which produces a persistent objectionable deposit, unnatural colour or turbidity, or unnatural odour (e.g. oil slick, surface scum)."

To determine whether the delisting criterion has been met, two aesthetics-based surveys were undertaken. The reports on the two studies are appended under separate cover:

Results of the 2012 Thunder Bay Aesthetics Survey - Prepared by: Jim Bailey, Remedial Action Plan Coordinator. November 2013. The results showed that there was no evidence of persistent objectionable deposits, unnatural colour or turbidity, or unnatural odour.

2015-16 Ice Free Survey for the Thunder Bay Area of Concern - Prepared by: Dr. Robert Stewart, Lakehead University. March 2017. The results of this rigorous survey shows that the overall aesthetic conditions in the Thunder Bay AOC are 'good' to 'excellent'. There was no evidence of persistent objectionable deposits, unnatural colour or turbidity, or unnatural odour.

Based on the results of these two studies, it is determined that the Degradation of Aesthetics BUI delisting criterion has been met; thus this BUI should be considered to be 'not impaired' and can be removed from the list of environmental issues facing the Thunder Bay AOC.

Introduction

For the Thunder Bay AOC, Degradation of Aesthetics was identified as an impairment in the report Stage 1: Environmental Conditions and Problem Definition (Thunder Bay Remedial Action Plan Writing Team 1991). This status was further supported in the subsequent 2004 report Stage 2: Remedial Strategies for Ecosystem Restoration.

This 2018 assessment report summarizes the work that has been accomplished within the AOC since 1991 to improve aesthetic conditions, and outlines the results of two surveys undertaken to assess the status of the beneficial use impairment (BUI). The first survey, in 2012, was undertaken by members of the Thunder Bay AOC Public Advisory Committee with support from Lakehead University. The second survey was conducted by Lakehead University and spanned 2015 and 2016. This scientific-based survey was commissioned in order to verify the results from the 2012 survey and to provide further objectivity through a more standardized and consistent method of observation. The purpose of this 2018 assessment report is to consider the current aesthetic conditions within the Thunder Bay AOC and provide conclusions and recommendations regarding re-designation.

Background

When the waters in and around the City of Thunder Bay were designated as an AOC in 1987, water quality, recreational use and the aesthetics of the AOC were impacted by discharges of pollutants from local pulp and paper industries and wastewater treatment plants, urban runoff, and the use of the harbour for logging booms and shipping waste. Persistent noxious odours, visible scum, organic material and oil deposits were observed.

The delisting criterion for the Degradation of Aesthetics BUI in the Thunder Bay AOC is as follows:

"When the waters are devoid of any substance which produces a persistent objectionable deposit, unnatural colour or turbidity, or unnatural odour (e.g. oil slick, surface scum)."

The use of the words 'persistent' and 'unnatural' was deliberate, so natural debris or scum and one-off events that caused temporary problems would not be included.

Actions Undertaken to Address the Beneficial use Impairment

A significant number of environmental initiatives have been undertaken by the Thunder Bay community to address the aesthetics impairment since it was identified in 1991 Stage 1 RAP:

1991 – Wastewater treatment technology at Bowater Pulp and Paper (now Resolute Forest Products Inc.) was upgraded to improve the quality of wastewater discharged to the Kaministiquia River, a major tributary that flows into Thunder Bay.

1992 – The Kaministiquia River Heritage Park was created to protect and enhance the shoreline of the Kaministiquia River and improve public access to the waterfront. The project included a scenic overlook, promenade and additional 500 metres of parkland.

1993 – Habitat at the mouth of McVicar Creek was rehabilitated and a crescent-shaped island (Sanctuary Island) was built to provide nursery habitat for fish and to encourage the re-establishment of an historic wetland.

1994 – Two shallow embayments were created near the mouth of the McKellar River to increase the littoral zone and provide an additional three hectares of wetland habitat.

Trees and shrubs were planted to provide food and cover for wildlife and walking trails connect the embayments to a local conservation area.

1995 – Secondary effluent treatment was added at the Abitibi– Consolidated Inc. mill to improve the quality of wastewater discharged to the Kaministiquia River.

1997 – Smurfit Stone Container Canada Inc. upgraded its treatment technology to improve the quality of wastewater discharged to Lake Superior.

1998 – A Watershed Management Plan for the Slate River was developed in 1998. In 2008, a watershed assessment determined the effectiveness of implementing the plan, concluding the prior adoption of agricultural best management practices had improved water quality and the quality and quantity of forest cover. Based on this, it was concluded that full implementation of the Slate River Watershed Management Plan was no longer required, as many of the original concerns were being adequately addressed through current programs.

1999 – The City of Thunder Bay adopted a Pollution Prevention Control Plan to reduce urban pollutant loadings related to combined sewer overflows and protect water resources.

2002 – The Northern Wood Preservers Alternative Remediation Concept (NOWPARC) project was completed. The focus was to clean up the creosote deposits/contaminated sediment and improve fish and wildlife habitat.

2005 – The City of Thunder Bay’s Atlantic Avenue Water Pollution Control Plant was upgraded to secondary treatment to improve wastewater quality effluent.

2006 - Prince Arthur's Landing Waterfront District development was initiated, which now contains a vibrant waterfront park and marina, focusing on bringing people down to the waterfront year-round for recreation, culture and the arts.

2010 – Stormwater assessments in McVicar Creek, the Neebing River, Current River and the Lyon’s Channel were completed to identify areas where debris and contaminants were present in rivers flowing into the Thunder Bay Harbour.

2010 to 2017 – Several Low Impact Development projects along local waterways were implemented to reduce the negative impact of urban stormwater, which is helping to improve water quality.

2012 – A Stormwater Master Plan was initiated by the City of Thunder Bay to improve aesthetics and water quality along the waterfront and in tributaries.

2013 – The Northshore Steelhead Association restored fish habitat and enhanced green space at the mouth of the Current River.

On going - Community clean-ups of the Thunder Bay waterfront. Starting in 1993, coordinated community clean-up events have held on an annual basis, hosted by various organizations such as EcoSuperior, and the Ocean Conservancy which hosts an annual clean up of Lake Superior National Marine Conservation Area.

The actions above all contributed toward improving water quality across the AOC, and to restore the aesthetics of Thunder Bay.

Assessment

Two studies were undertaken to assess whether the BUI was still applicable to the Thunder Bay AOC: a 2012 harbour boat tour/survey and a 2015-16 survey during ice-free conditions. They both focused on five locations identified in the Stage 1 RAP report as having particularly poor aesthetic conditions, where contaminants were historically released:

- 1 - Kaministiquia River at the Resolute outfall
- 2 - Kaministiquia River near the Thunder Bay Rowing Club
- 3 - Thunder Bay Harbour South within the breakwall
- 4 - Thunder Bay Harbour offshore of the former Northern Wood facility
- 5 - Thunder Bay Harbour North offshore of the former Cascades Mill



Figure 1: Location of the five aesthetic survey sites.

2012 Harbour Cruise

The first aesthetics survey was conducted in 2012 during a public boat tour of the Thunder Bay harbour and rivers. The results are contained in the appended report: Results of the 2012 Thunder Bay Aesthetics Survey. During the tour, participants filled out aesthetics monitoring data sheets as part of the formal harbour aesthetics assessment and provided qualitative information about their observations and impressions throughout the day. The results indicated agreement among tour participants that aesthetic impairment at all sites visited was either non-existent or minimal, and that aesthetics in the AOC were not impaired. There was no evidence of persistent unnatural odour or debris in the waters. A presentation of the survey results was subsequently made to the Thunder Bay Area of Concern Public Advisory Committee (PAC) on May 8, 2013, whereupon the PAC agreed that the aesthetics of Thunder Bay was not impaired (Thunder Bay Area of Concern Advisory Committee 2013).

2015-2016 Ice-Free Survey

Although the 2012 survey identified that the aesthetics were not impaired, it was felt that a more quantitative and scientific-based assessment was required. The 2015 and 2016 survey was thus undertaken. It focused on the levels of water clarity, colour, odour, and visual debris in the bay, and determined whether these four parameters represented excellent, good, fair or poor environmental conditions.

The results of this survey, including the raw data, are contained in the appended report: 2015-16 Ice Free Survey for the Thunder Bay Area of Concern.

The methodology used for this survey was adapted from the Aesthetic Index, which has been successfully used in other AOCs to assess the Degradation of Aesthetics BUI.

Values of 10 are given for each parameter and descriptor if the sample is considered excellent, whereas a value of 0 would be Poor, or the lowest quality desirable. Tables 1 and 2 summarize the results from 2015 and 2016.

Location	Clarity	Colour	Odour	Debris	Clarity (.2)	Colour (.2)	Odour (.3)	Debris (.3)	TBAI (/10)	Overall Condition	
Area 1 - Resolute Outfall	10	8	10	6	2	1.6	3	1.8	8.4	Good	
Area 2 - Rowing Club	10	8	10	6	2	1.6	3	1.8	8.4	Good	
Area 3 - South Harbour	10	8.5	10	6	2	1.7	3	1.8	8.5	Good	
Area 4 - Northern Wood Preservers	10	10	10	6	2	2	3	1.8	8.8	Good	
Area 5 - North Harbour	10	10	10	6	2	2	3	1.8	8.8	Good	
									TBAI	8.6	Good

Table 1: Results of the 2015 Fall Survey

Location	Clarity	Colour	Odour	Debris	Clarity (.2)	Colour (.2)	Odour (.3)	Debris (.3)	TBAI (/10)	Overall Condition	
Area 1 - Resolute Outfall	10	9.6	10	6	2	1.9	3	1.8	8.7	Good	
Area 2 - Rowing Club	10	9.6	10	6	2	1.9	3	1.8	8.7	Good	
Area 3 - South Harbour	10	9.6	10	8	2	1.9	3	2.4	9.4	Excellent	
Area 4 - Northern Wood Preservers	10	10	10	8.6	2	2	3	2.6	9.6	Excellent	
Area 5 - North Harbour	10	10	10	8.6	2	2	3	2.6	9.6	Excellent	
									TBAI	9.2	Excellent

Table 2: Results of the 2016 Survey

The outcome of the 2015-2016 survey was that the overall aesthetic conditions in the AOC in 2015 were 'good', and in 2016 were 'excellent'. This verified that strengthened regulations and better wastewater treatment has lead to improved aesthetic conditions in Thunder Bay.

The report also includes a water quality audit of the Thunder Bay Water Pollution Control Plant, Resolute Forest Products (formerly Bowater up to 2010) and Abitibi Fort William, spanning three decades. The biological oxygen demand, residue and particulates data clearly show declines in all parameters, a result of modern water treatment technology and provincial and federal regulations since the beginning of the RAP program in the late 1980s. This has contributed to improved water clarity.

Recommendation

Criterion	Status
When the waters are devoid of any substance which produces a persistent objectionable deposit, unnatural colour or turbidity, or unnatural odour (e.g. oil slick, surface scum).	Achieved

The results of the two aesthetic surveys strongly show that there is no evidence of degraded water quality, nor impairment to river and harbour front aesthetics that adversely affect recreational use of associated lands and resources. There are no substances which produce a persistent objectionable deposit, unnatural colour or turbidity, or unnatural odour that affect the aesthetics value of the AOC. As such, the Degradation of Aesthetics BUI delisting criterion has been met; thus this BUI should be considered to be 'not impaired' and can be removed from the list of environmental issues in the Thunder Bay AOC.

References

Bailey, Jim. 2013. Results of the 2012 Thunder Bay Aesthetics Survey. November 2013.

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