Water Quality along Lake Huron

What are the issues?

Algal fouling – Irregular, less frequent, less widespread, but some significant local events

Influences – Tributaries contribute; many complex factors at work

Beach postings – Irregular; recurrent; variable

Stewardship – Watershed plans developed and increased uptake in best management practices (BMPs) realized

Where improvements can be seen – Best management practices and projects effective at the site and watershed scale

Lake Huron Water Quality

Grade distribution of overall surface water quality conditions throughout the Ausable Bayfield watersheds

From Watershed Report Card (2013)

Surface water quality monitoring stations in Ausable Bayfield watersheds

From Watershed Report Card (2013)
What is this community doing to protect the Lake?

Conservation Education
Monitoring
Stewardship Grants, Technical Expertise

Build Awareness
Communities in Action
Support Communities
Take Action

Citizen Science
Encourage Cover Crops
Community Watershed Plans Creating rain gardens

Watere Quality along Lake Huron
Water Quality along Lake Huron

Is what we are doing working?

What We Know

- Runoff contributes to water quality issues
- There is a hierarchy of environmental actions
- There is a hierarchy of environmental responses
How do we measure and map change along the shoreline?

**Dynamic Beach**

Hazards along the shoreline are mapped as Lakeshore Area 1 and Lakeshore Area 2. Lakeshore Area 1 is adjacent to the lake where the hazard is considered to be greater than in Lakeshore Area 2.

In the existing Shoreline Management Plan (2000), 1:2,000 mapping from the federal government, created from 1988 air photos, was used to identify and map Lakeshore Areas 1 and 2.

The shoreline from, approximately, the Maple Grove Subdivision, in the Municipality of South Huron, south to the ABCA jurisdictional boundary at Seth Lane south of Port Franks is known as the **DUNES or Dynamic Beach Area**.

The dynamic beach area of the ABCA watersheds.

Refer to the current Shoreline Management Plan (2000) for a full definition of lakeshore areas.
How do we measure and map change along the shoreline?

**Cohesive Bluffs**

Hazards along the shoreline are mapped as Lakeshore Area 1 and Lakeshore Area 2.

Lakeshore Area 1 is adjacent to the lake where the hazard is considered to be greater than in Lakeshore Area 2.

The shoreline from, approximately, the Maple Grove Subdivision in Municipality of South Huron, where the height of the bluffs are approximately 5 metres, north to the Ausable Bayfield Conservation Authority (ABCA) jurisdictional boundary at Towerline Road in the Municipality of Central Huron, where the height of the bluffs are approximately 20 metres, is known as the **Cohesive Bluffs**.

In the **Cohesive Bluffs** the composition of the till creates an erosion hazard at the toe and the top of the bluffs. We are interested in the location and movement of the toe and top of the bluff, as well as the location of the stable top of bank. A slope that is 3:1 vertical distance to horizontal distance is considered **stable**.

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Modern mapping and data collection techniques allow for monitoring and measuring of the changing lake. The Ausable Bayfield Conservation Authority (ABCA) has a wealth of data and information on Lake Huron.

Examples of current mapping tools and products are at left and below.

- An example of a modern map for the shoreline.
- A three-dimensional (3-D) view of a cohesive bluff in the Ausable Bayfield Conservation Authority watershed area showing the buildings in grey.
- Ausable Bayfield Conservation Authority watershed area cohesive bluffs.
- 2012 ground survey utilizing Global Positioning System (GPS) to tie into location into a Geographic Information Systems (GIS) system.
How do we measure and map change along the shoreline?

**Average Annual Recession Rate**

*Average Annual Recession Rates (AARR)* In the **COHESIVE BLUFFS**, the average annual recession rate is calculated by comparing the historic location of the toe of the slope and/or top of the bluff with more recent locations. The toe of slope and top of the bank were mapped and compared in a geographic information system (GIS). Ground surveys, contour maps, and air photos can be used.

1935 Shoreline

1935 Toe of Bluff

1988 Shoreline

1988 Toe of Bluff


The toe of the slope location or shoreline from 1935 was compared with the toe of the slope from 1988. The 1988 mapping from the federal government was also used for comparison with the 1935 geo-referenced survey.

100 Year Erosion Limit

To determine the 100 year erosion limit, you take the **AVERAGE ANNUAL RECESSION RATE** and multiply it by 100 years. The 100 year erosion limit helps to determine hazard planning setbacks.

**Recalculated Rates**

Rates were re-examined using 1973 scanned images from the National Air Photo Library that were geo-referenced to align with 2007 aerial photography and features. The toe of the slope and top of the bank locations were compared from 1973 to 2007. Recalculated rates were checked with historic information.
The Effects of a Changing Lake

Shoreline Oblique Photography

Cohesive Bluff Area

2009 Average April
Lake Level - 176.20 metres

2017 Average April
Lake Level - 176.66 metres

Dynamic Beach Area

2009 Average April
Lake Level - 176.20 metres

2017 Average April
Lake Level - 176.66 metres
How are the Lakeshore Hazards determined in the current Shoreline Management Plan (2000)?

**Lakeshore Area 1**

**Flood Hazard**
- That area of the shoreline which is landward from the water’s edge, including the 100-year flood level plus a horizontal 15-metre wave uprush setback.

**Erosion Hazard**
- That area of the shoreline which is lakeward of the stable slope line, and includes the slope and toe of the lakebank.

**Dynamic Beach Hazard**
- That area of the shoreline which is measured landward from the water’s edge including the Flood Hazard plus a distance of 15 metres measured horizontally.

**Lakeshore Area 2**

**Flood Hazard**
- Not Applicable.

**Erosion Hazard**
- That area of the shoreline located landward the greater of the following:
  - from the Lakeshore Area 1 Erosion Hazard and extending to the 100-year erosion setback line
  - a setback of 30 metres extending landward from the top of the unaltered lake bluff

**Dynamic Beach Hazard**
- That area landward from the Lakeshore Area 1 Dynamic Beach Hazard to where water erosion ceases to influence dune morphology and wind erosion creates embryo and foredunes with sparse vegetative cover established.
- This distance is a minimum of 15 metres landward from Lakeshore Area 1, however generally extends over the entire dune area stretching to the shore parallel road.

For complete definitions please consult the Shoreline Management Plan (2000) and Provincial Policy.
The 2014 Provincial Policy Statement states the Erosion Hazard:

- Means the loss of land, due to human or natural processes, that poses a threat to life and property.
- The erosion hazard limit is determined using considerations that include the 100-year erosion rate (the average annual rate of recession extended over a one hundred year time span), an allowance for slope stability, and an erosion/erosion access allowance.

Provincial Technical Guides indicate that:

- The erosion hazard consists of the combined influence of the stable slope allowance, 100 times the average annual recession rate and/or an erosion allowance.
  
  1) the stable slope allowance is a horizontal distance measured landward from the toe of the cliff/bluff/bank (i.e., standard 3 times the height of the cliff/bluff/bank or based on a study using accepted geotechnical principles);
  
  2) the 100 times the average annual recession rate, applied where 35 years of recession rate information is available, is a horizontal distance measured landward from the landward extent of the stable slope allowance; (emphasis added)

  and

  3) the erosion allowance of either:

  a) a horizontal distance of 30 metres, in the absence of a known recession rate and in the absence of studies using accepted scientific and engineering principles, measured landward from the landward extent of the stable slope allowance or from the top of the cliff/bluff/bank, where slopes are considered to be “stable”.

  or

  b) a horizontal distance determined through studies using accepted scientific and engineering principles (e.g., connecting channels, bedrock shorelines, naturally well sheltered areas, or along the Lake St. Clair shorelines) measured landward from the landward extent of the stable slope allowance or from the top of the cliff/bluff/bank, where slopes are considered to be “stable.”

Based on the above three contributing factors, the erosion hazard is the greater of:

\[ A + C \quad \text{OR} \quad B + C \]

A) the sum of the stable slope allowance plus 100 times the average annual recession rate measured landward from the toe of the cliff/bluff/bank

B) the sum of the stable slope allowance plus a 30-metre erosion allowance measured landward from the toe of the cliff/bluff/bank

C) a 30-metre horizontal allowance as measured from the top of the cliff/bluff/bank

Refer to the Provincial Policy Statement (2014) and supporting technical guidelines for full descriptions.
HAZARD IDENTIFICATION

How does current provincial direction affect how the Lakeshore Hazards are defined?

Lakeshore Area 1

Flood Hazard – Unchanged
That area of the shoreline which is landward from the water’s edge, including the 100-year flood level plus a horizontal 15-metre wave uprush setback.

Erosion Hazard – Unchanged
That area of the shoreline which is lakeward of where the stable slope line meets original ground, and includes the slope and toe of the lakebank.

Dynamic Beach Hazard – Unchanged
That area of the shoreline which is landward from the water’s edge including the Flood Hazard plus a distance of 15 metres measured horizontally.

Lakeshore Area 2

Flood Hazard – Unchanged
Not Applicable.

Erosion Hazard
That area of the shoreline located landward the greater of the following:
– from the Lakeshore Area 1 Erosion Hazard and extending to the 100 year erosion setback line – Unchanged
or
– a setback of 30 metres extending landward from where the stable slope line meets original ground.

Dynamic Beach Hazard
That area of the shoreline which is landward from the Lakeshore Area 1 Dynamic Beach Hazard plus a horizontal distance of 30 metres.
How does Ausable Bayfield Conservation Authority currently review shoreline development in regulated areas?

The policies of the Ausable Bayfield Conservation Authority (ABCA) have not been changed. Currently the ABCA uses the Development Guidelines (below) contained in the Shoreline Management Plan (2000).
What are current Lake Huron water levels?

The water levels of Lake Huron are not at the record highs of 1986 (177.50 metres) but they have rebounded from the lower-than-average lake levels of the 1999-2014 period, including the record low of 175.57 metres in January of 2013.

**Recent Lake Levels**

![Recent Lake Levels Chart](chart.png)

**Historic Lake Levels**

![Historic Lake Levels Chart](chart2.png)

Monthly Mean Water Levels for Lakes Huron-Michigan. Data obtained from The Canadian Hydrographic Service, Department of Fisheries and Oceans. All levels are referenced to the International Great Lakes Datum of 1985 (IGLD 85).