Lake Ontario

Douglas A. Wilcox
SUNY-Brockport
Lake Ontario

**Average Depth**
- 283 feet
- 86 meters

**Maximum Depth**
- 802 feet
- 244 meters

**Volume**
- 393 cu. mi.
- 1,640 cu. km.

**Water Area**
- 7,340 sq. mi.
- 18,960 sq. km.

**Land Drainage Area**
- 24,720 sq. mi.
- 64,030 sq. km.

**Shoreline Length**
- 712 mi.
- 1,146 km.

**Population**
- US (2000); Can (2001)
- 9,751,655

**Retention Time**
- 6 years

Source: State of the Great Lakes 2005; NOAA, GLERL
Status of Lake Ontario Progress

- Lake Ontario indicators measure the health of the ecosystem
- Critical pollutant indicators show progress
- Overall, contaminant levels in young fish, herring gull eggs, and Lake trout continue to decline
- LaMP objectives for bird populations, bald eagle, mink and otter achieved
Status of Lake Ontario Progress

- Extensive coastal wetlands—indicators being developed
- Water level alterations—adaptive management
Lake Ontario Challenges

- LaMP objectives for lower food web and Lake trout populations not met
- Nearshore nutrients, algal blooms, invasive exotic species, human impacts on habitat
- Lake Ontario Binational Cooperative research and Monitoring Year 2008 focused on lower food web problems
SOLEC Indicators
Coastal Wetlands

- Invertebrate communities
- Fish communities
- Amphibian communities
- Bird communities
- Plant communities
- Landscape extent and composition
SOLEC Indicators Coastal Wetlands

- Human impact measures
- Adjacent land cover
- Wetland area by type
- Restored area by type
- Sediment inflow
- Sediment available for coastal nourishment
- Phosphorus and nitrogen levels
SOLEC Indicators
Wetland Related

- Non-native species
- Ground-water dependent plants/animals
- Base flow of ground-water discharge
- Extent of hardened shoreline
- *Artificial coastal structures*
SOLEC Indicators
Coastal Wetlands

• Effects of water level fluctuations
a - High water level of lake
b - Average water level of lake
c - Low water level of lake
--- Ground water levels
Lakes Michigan - Huron

![Graph showing lake levels over time with arrows indicating significant events]
Lake Michigan
Late Holocene Lake Level

Historical record (1819 - 1999)

~160-year fluctuation
~30-year fluctuation

Nipissing II phase
Algoma phase

Measured
Inferred

177
178
574
576
578
580
582
584
586
588
590
592
594

0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000
Calendar year before 1950

1950 1500 1000 500 0 BC 500 1000 1500 2000 2500 3000 AD
Year

IGLD 1985 Elevation (m)

IGLD 1985 Elevation (ft)

Historical average (1819 - 1999)

v. 2003
Lake Superior

Lake Superior

Lake Level (Meters, IGLD 1985)

Lake Level (Feet, IGLD 1985)
From the Bog

This is your house on the floodplain.

This is the floodplain on your house.
Any questions??
LAKES MICHIGAN–HURON WATER LEVELS – OCTOBER 2008

LEGEND

RECORDED
LAKE LEVELS

PROJECTED

AVERAGE **
MAXIMUM **
MINIMUM **

1936  1934  1926  1934

** Average, Maximum and Minimum for period 1918-2007

CHART DATUM: 577.5 FEET (176.0 METERS)

LAKES MICHIGAN–HURON
Lake Ontario
Lake Level Modeling

Lake Level (meters, IGLD 1985)

Lake Level Modeling
## Lake Level Modeling

<table>
<thead>
<tr>
<th>Transect</th>
<th>Elevation</th>
<th>Rationale</th>
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<tbody>
<tr>
<td>A</td>
<td>75.60m</td>
<td>Last flooded 30 years ago</td>
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<tr>
<td>B</td>
<td>75.45m</td>
<td>Last flooded 10 years ago</td>
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<td>C</td>
<td>75.35m</td>
<td>Last flooded 5 years ago</td>
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<tr>
<td>D</td>
<td>75.00m</td>
<td>Flooded &amp; dewatered last 5 years</td>
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<tr>
<td>E</td>
<td>74.85m</td>
<td>Last dewatered in growing season 4 years ago</td>
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<tr>
<td>F</td>
<td>74.70m</td>
<td>Last dewatered in growing season 38 years ago</td>
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<tr>
<td>G</td>
<td>74.25m</td>
<td>Last dewatered in growing season 68 years ago</td>
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Generic Shapes Used to Display Averaged Surface Data for Each Geomorphic Type
Lake Level Modeling
Model-Derived Predictions

Mean percent meadow marsh in years following low total basin supplies under simulated pre-regulation conditions and five lake-level regulation plans

<table>
<thead>
<tr>
<th>Plan</th>
<th>Pre</th>
<th>B+</th>
<th>2007</th>
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<td>32.2</td>
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<td>23.4</td>
<td>23.3</td>
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# Model-Derived Predictions

## Predicted Area of Meadow Marsh (hectares)

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<td><strong>8186</strong></td>
<td><strong>6869</strong></td>
<td><strong>6761</strong></td>
<td><strong>6247</strong></td>
<td><strong>4637</strong></td>
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Potential Lake Ontario Metrics

- **Lake Level**
  - Frequency that growing season peak level is less than 74.6 m
  - Duration of low lake level periods (no. successive years below 75.0 m)

- **Habitat Diversity**
  - Percent of wetland mapped as meadow marsh
  - Percent of wetland mapped as cattail (or all invasives)
  - Elevation delineating meadow marsh and cattail
  - Rate of expansion/contraction of cattail community
  - Mean percent cover of cattail in meadow marsh quadrats
  - Percent wetland obligate species
  - FQI
  - Number of native taxa

- **Associated Faunal Metrics**
Lake-Level Variability and Water Availability in the Great Lakes

by

D.A. Wilcox, T.A. Thompson, R.K. Booth, J.R. Nicholas