

Water Levels, Climate Change and Impacts to Tourism Operations



Al Douglas
Hide Away Lodge

RTO 7
Wednesday September 25, 2013
Collingwood, Ontario



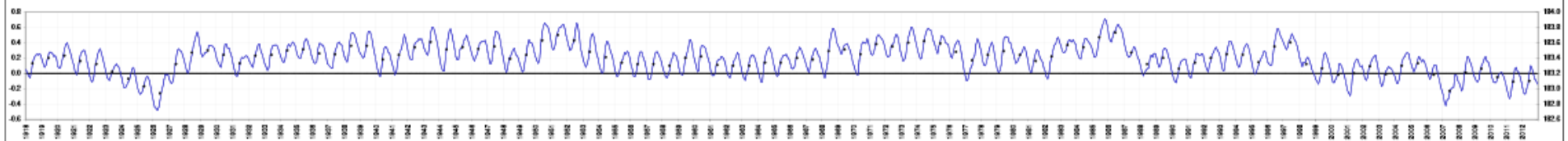
Perspectives and Content

Records of Great Lakes Water Levels

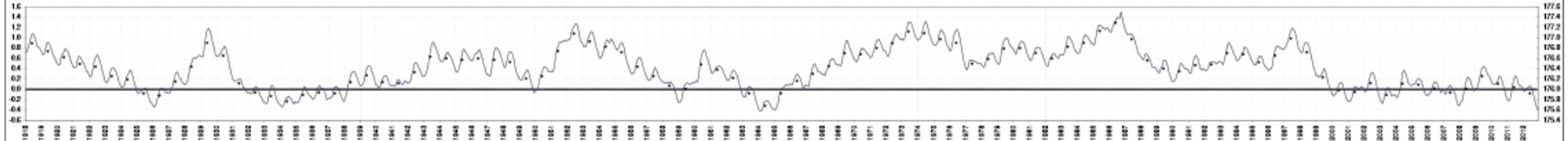


Monthly and Yearly Mean Water Levels / Moyennes Mensuelles et annuelles du niveau d'eau

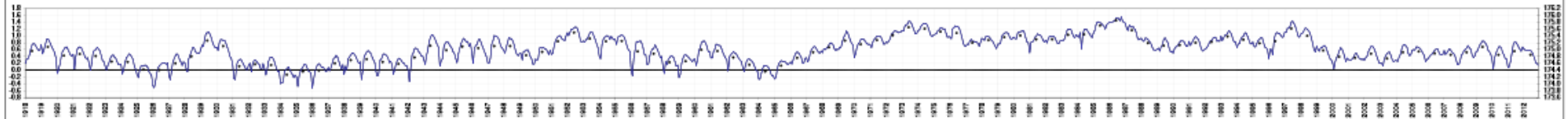
Lake Superior / Lac Supérieur



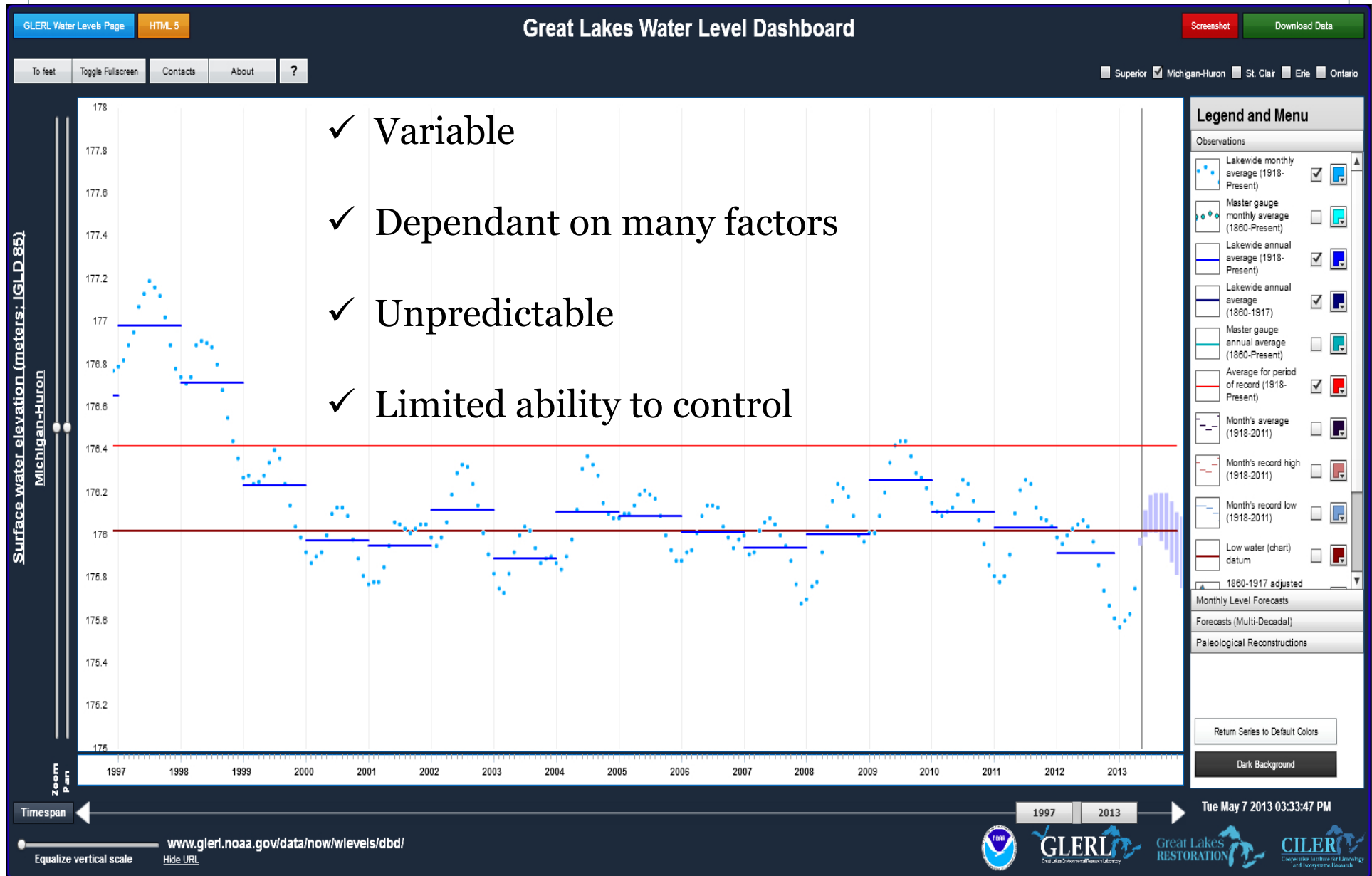
Lakes Huron-Michigan / Lacs Huron-Michigan



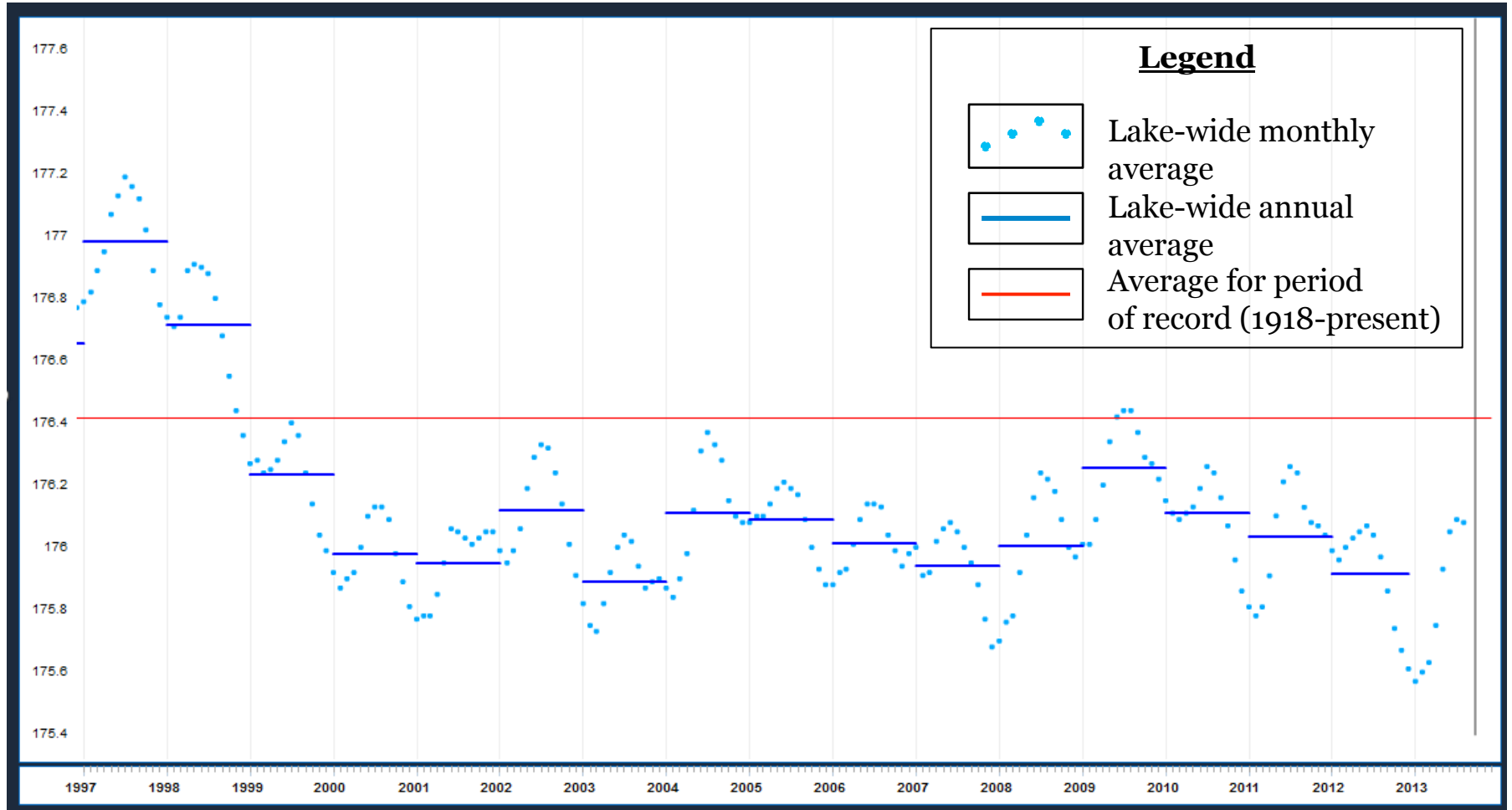
Lake St. Clair / Lac Sainte-Claire



Michigan/Huron Water Levels



Huron-Michigan Water Levels





Impacts and Observations





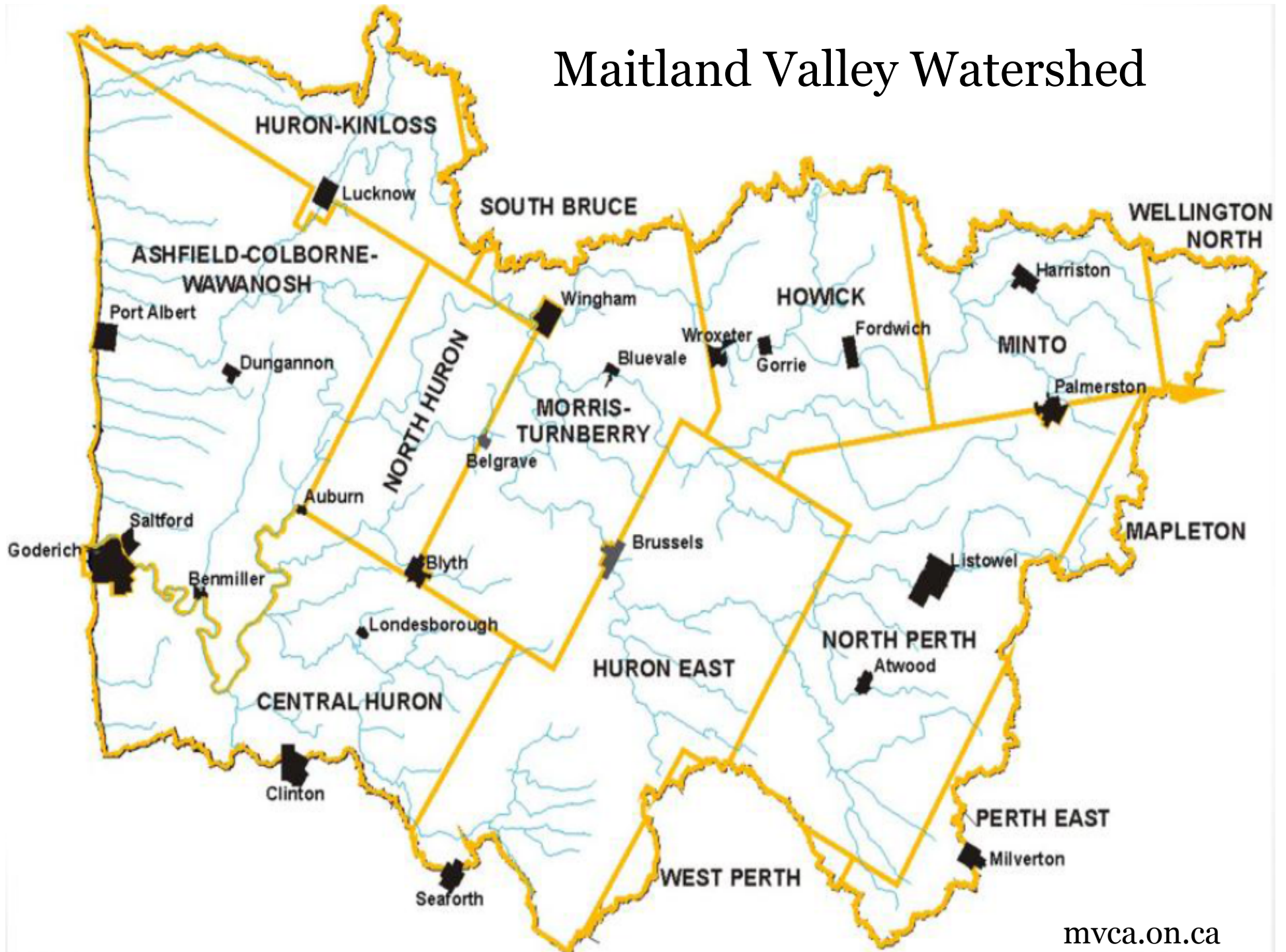






greatlakesecho.org

Maitland Valley Watershed

















MNR, 2013



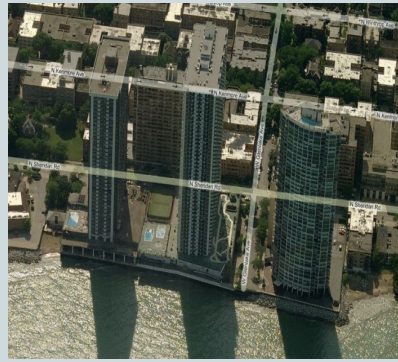
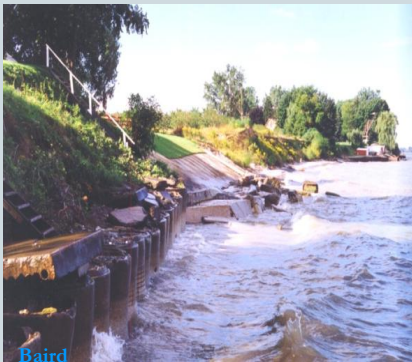
MNR, 2013



MNR, 2013

Costly Choices

- Shoreline development in the hazard zone
- Poorly designed marinas and boat launches
- Poorly designed shore protection
- Infrastructure decisions
- Encroachment

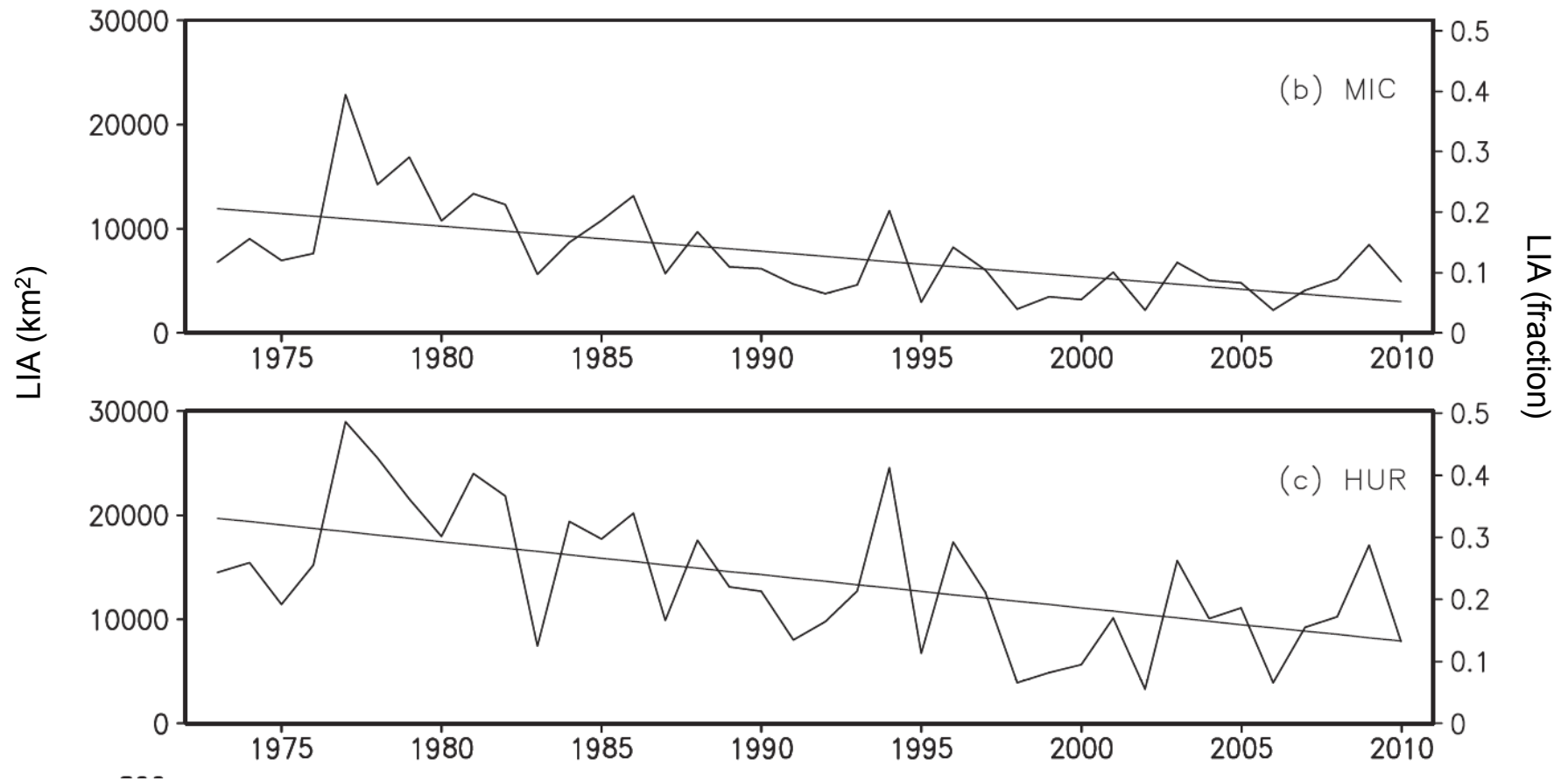


Additional Challenges

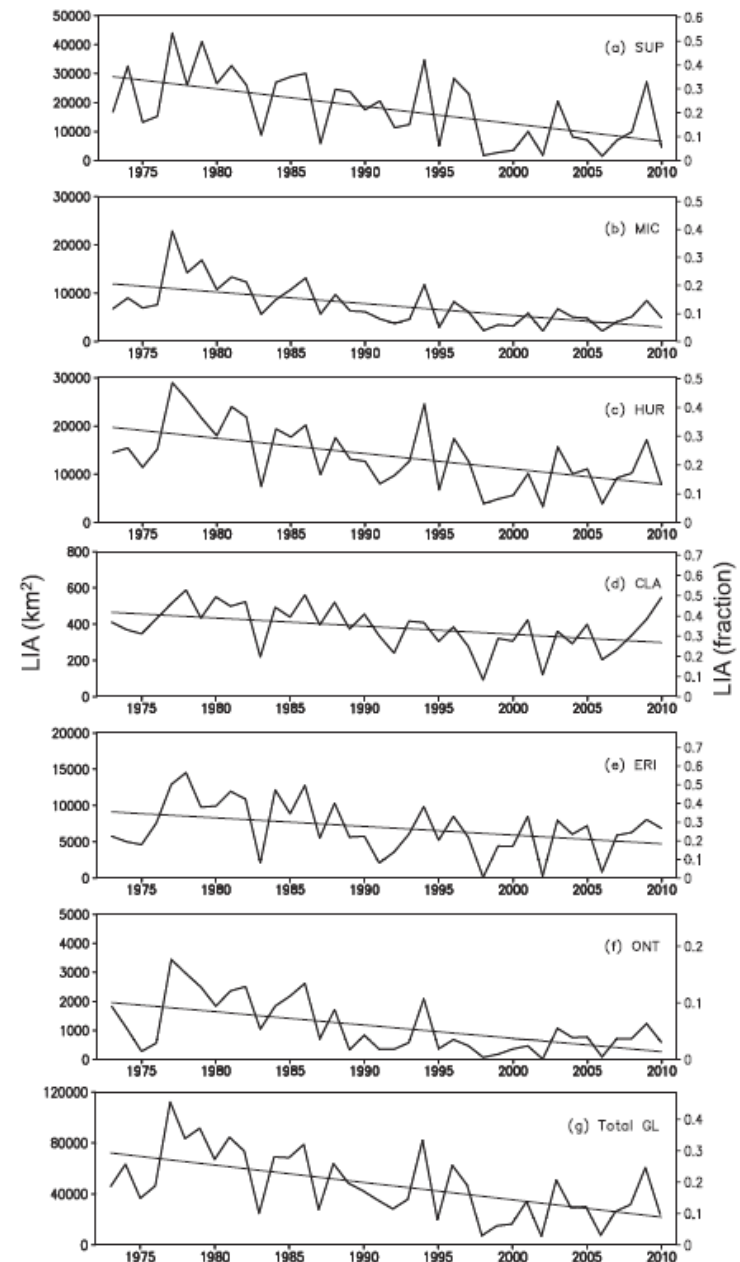
- Big storms
- Glacial isostatic adjustment
- Neighbors making bad decisions
- Natural changes in conveyance
- Erosion and deposition
- Changes in demographics



Lakes Michigan and Huron Ice Cover




Annual-mean lake ice area for each of the six lakes and total Great Lakes ice anomaly during the period 1973–2010.





Additional risks

- Increased flood risk
- Increased runoff and erosion rates
- Increased stream flow
- Reduced shipping capacity
- Reduced hydropower generation capacity
- Reduced wetland areas
- Constraints to water supply
- Loss of shoreline



**In addition to
water
quantity...**

- Potential for invasive species
- Increase in algal blooms
- Increased lake stratification, hypoxia
- Altered fisheries
- Increased shoreline erosion
- Declines in nearshore water quality



Science noted!

- Temperature increases , notably in winter*
- Decrease in number of frost days
- Increase in number of hot days*
- Lake temperatures warm earlier in the spring, reach higher maximum in summer*
- Duration, thickness, and extent of annual ice over lakes decreasing*
- Increases in annual precipitation (but timing!)
- Most models project a decrease in lake levels



Benefits and Opportunities

- Longer shipping season
- New species of fish
- Extended camping season
- Longer, warmer shoulder seasons
- More lake/beach recreation opportunities
- Rainfall capture and use



**What to
do...**

ADAPT!



Adaptation Takes Many Forms

- Social changes
- Personal changes
- Business adaptation
- Ecosystem resiliency



stjamesmarine.com





ROWDY
~~TROUT~~
RANCH

BASS



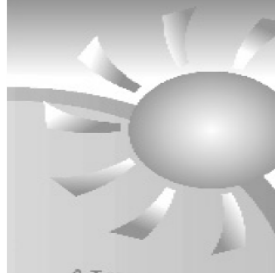


archiexpo.com

Adaptation Strategies



- Dredging along shorelines
- Dock relocation or extension
- Adjusting shipping and cruise routes
- Installing permeable surfaces to decrease runoff
- Expanding storm sewers and culverts
- Installing storm and/or wave walls
- Extending or lowering water intake supply pipes
- Adjusting water treatment chemicals
- Changing advertising for tourism
- Updating infrastructure to include rain/sun shelters



Climate Change Vulnerability Assessment and Adaptation Options for Ontario's Clay Belt – A Case Study

← **Assessment**



9C | Later fall stream-flow peak.

Aquatic habitat

10A	Wetlands may be lost or decrease in quality due to drying.
10B	Coldwater fish species may be extirpated from some streams.
10C	Smallmouth bass distribution may increase in lakes throughout the Clay Belt.
10D	Walleye productivity may increase in some lakes and decrease in others.

Socio-economics

11A	Increased walleye productivity will increase revenues at remote tourism establishments.
11B	Smallmouth bass introductions will reduce revenues at remote tourism establishments.
11C	The length of the snowmobiling season may decrease.
11D	The length of the ice fishing season may decrease.

Impacts →

Upper Lakes Study

IJC Recommendations to Governments



The Commission:

1. Endorses Lake Superior Regulation Plan 2012
2. Declines further study of Multi-Lake Regulation options
3. Recommends further investigation to restore Lake Michigan-Huron water levels
4. Endorses implementation of a comprehensive Adaptive Management approach supported by Science and Monitoring

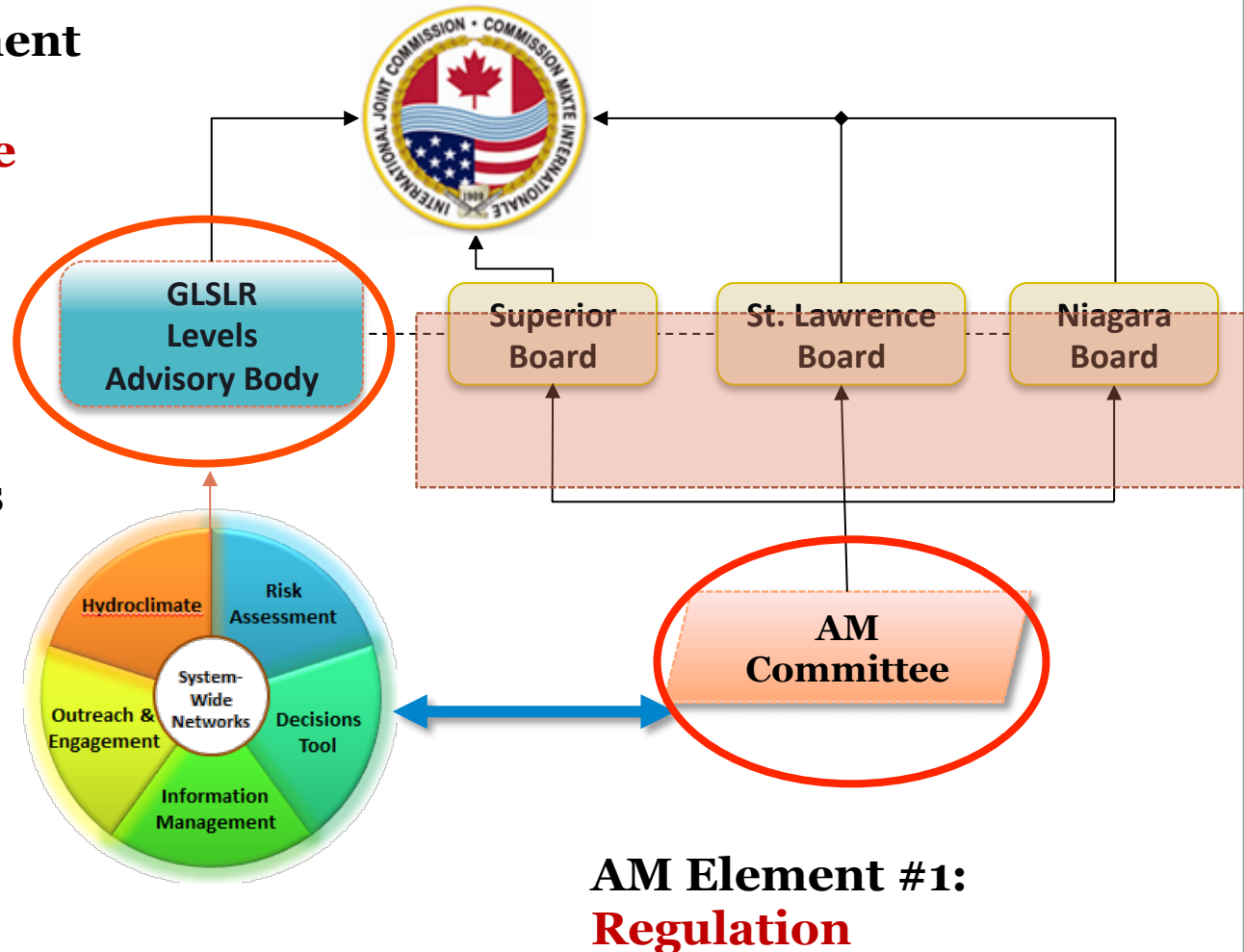
More information at: www.ijc.org

How Will The Plan Be Carried Out?

AM Element #2: Response

Networks:

- Address five themes
- 1. Hydroclimate**
- 2. Risk Assessment**
- 3. Decision Tool**
- 4. Information Management**
- 5. Outreach and Engagement**



Thank you



For more information, please visit the OCCIAR
website: www.climateontario.ca

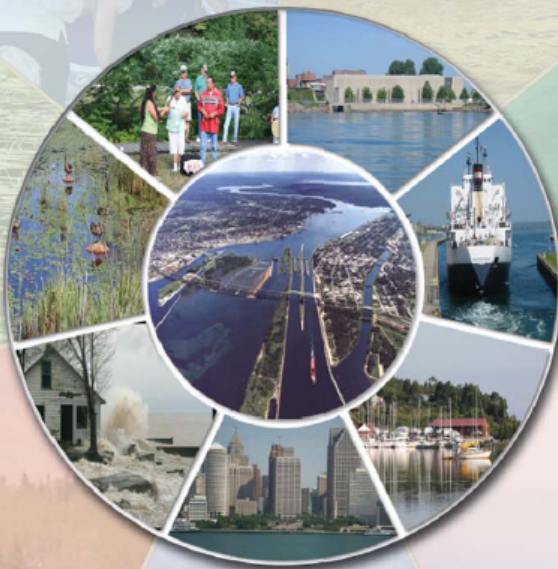
Or contact:
adouglas@mirarco.org



OCC_{AR}



LAKE SUPERIOR REGULATION: ADDRESSING UNCERTAINTY IN UPPER GREAT LAKES WATER LEVELS



FINAL REPORT TO THE INTERNATIONAL JOINT COMMISSION
MARCH 2012