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Science in Support of Adaptive Management – Historical Great Lake Levels

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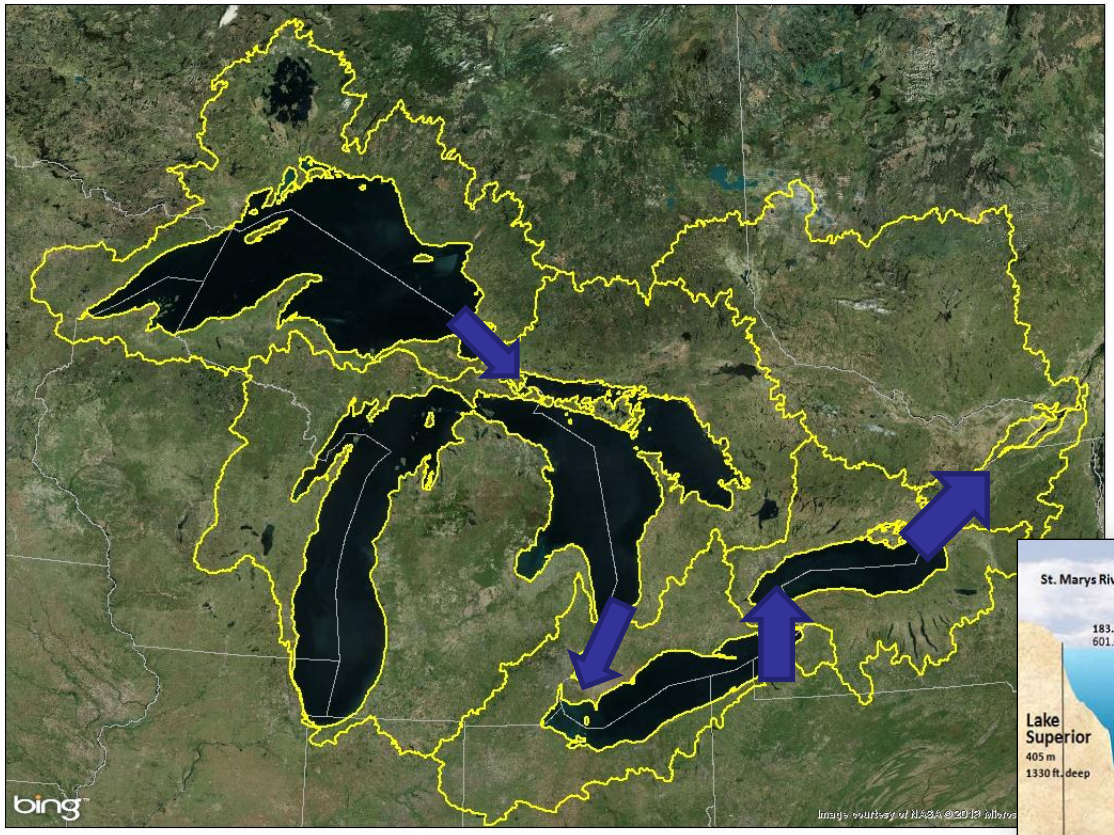
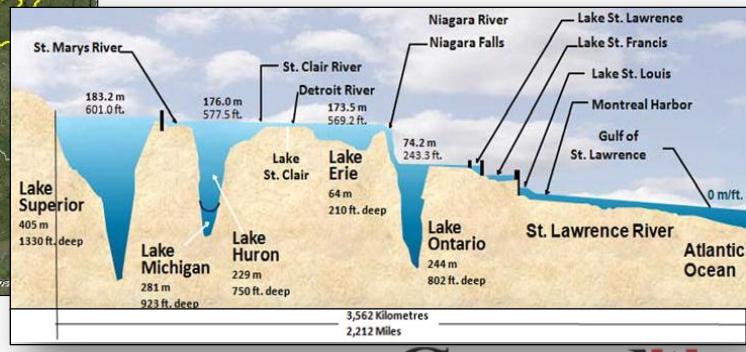
OAIA Annual Conference
Toronto, Ontario
October 24, 2013

The Great Lakes – St. Lawrence River System

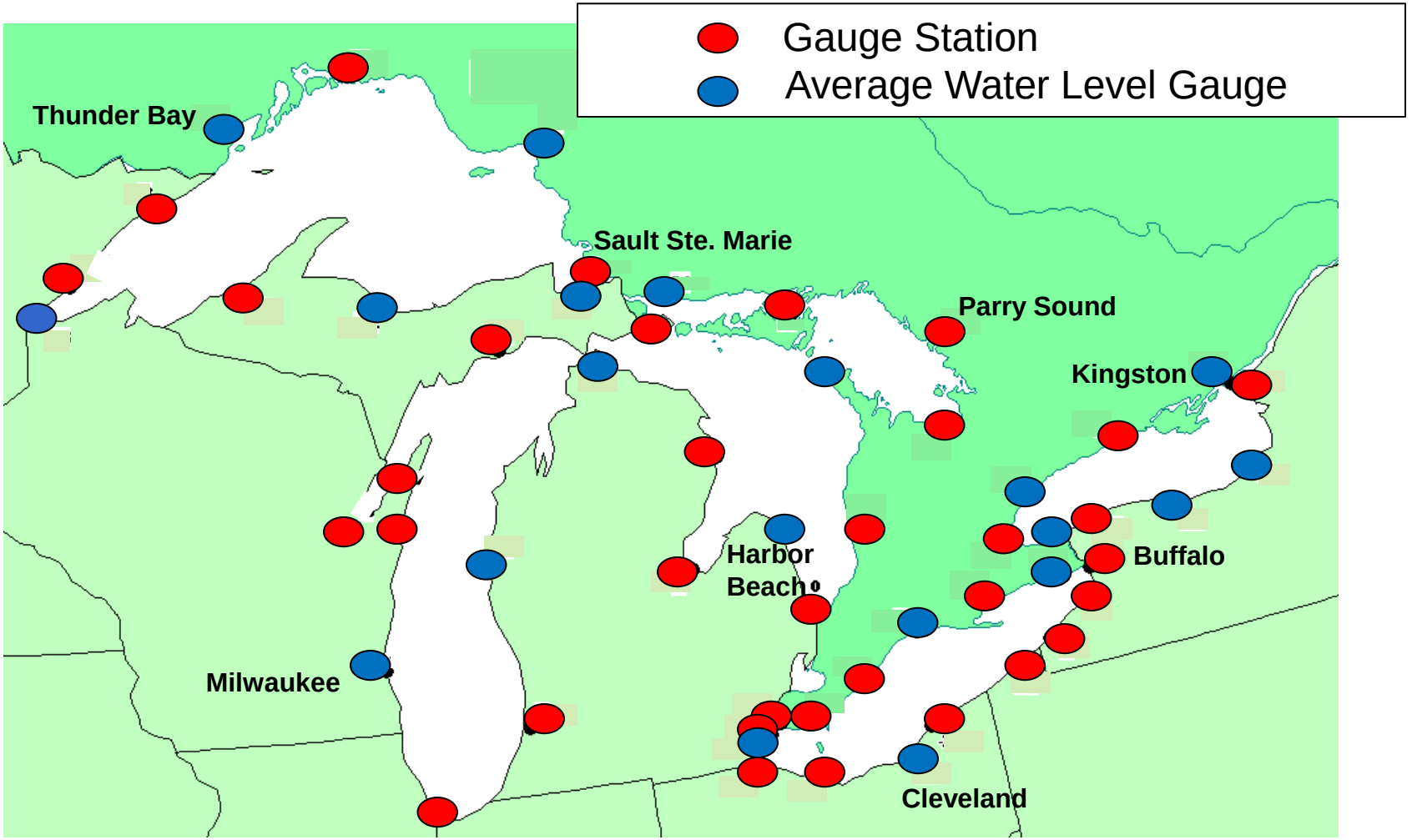
- The Great Lakes Basin covers approximately 774,000 km^2
- The lakes cover ~32% of the basin and contain ~23,000 km^3 of water



	Surface Area
Superior	82,100 km^2
Michigan-Huron	117,000 km^2
Erie	25,700 km^2
Ontario	19,000 km^2
	Volume
Superior	12,100 km^3
Michigan-Huron	8,460 km^3
Erie	484 km^3
Ontario	1,640 km^3

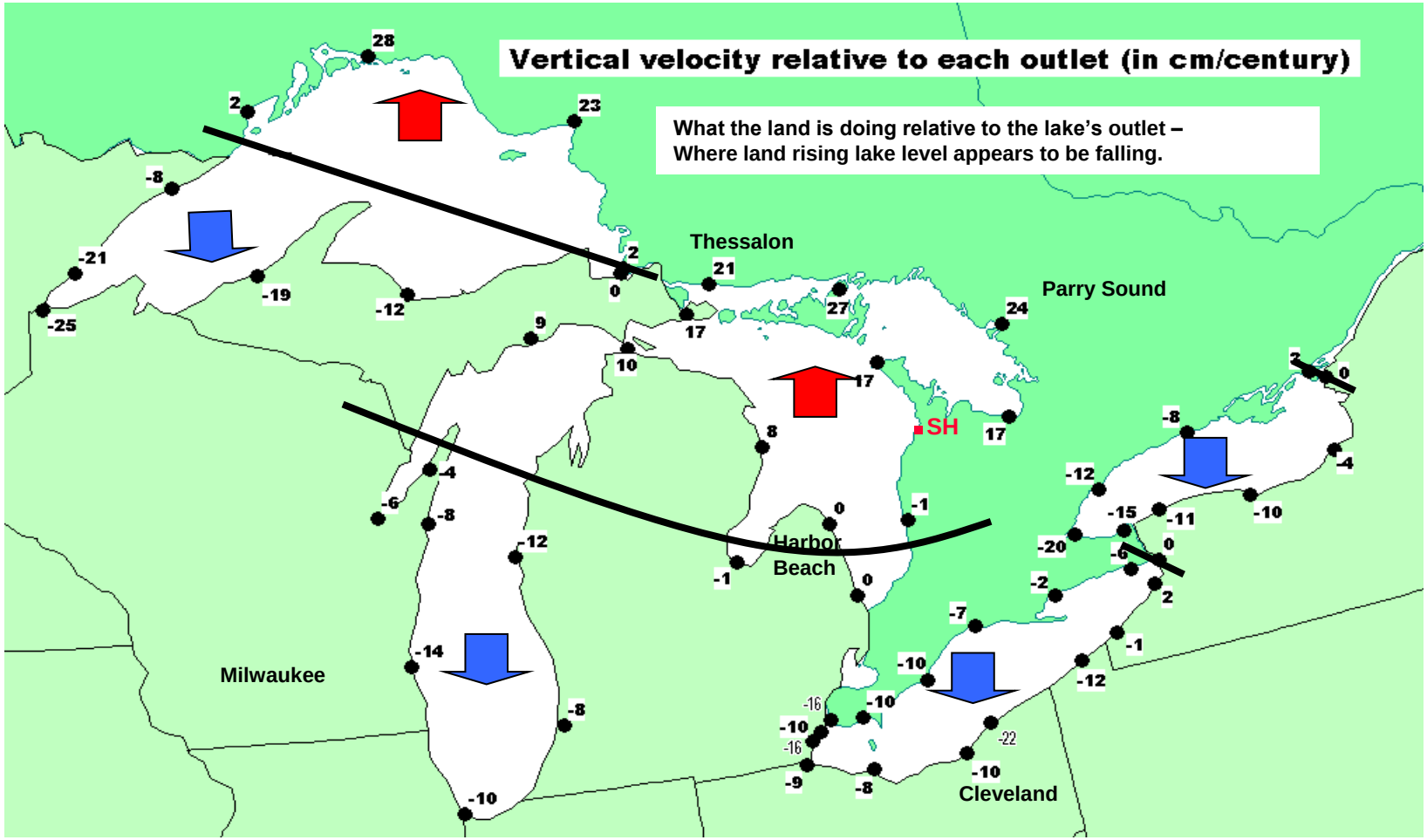


Water Level Gauges Around Great Lakes



Relative Crustal Movement & Lake Level

NRCan/NOAA



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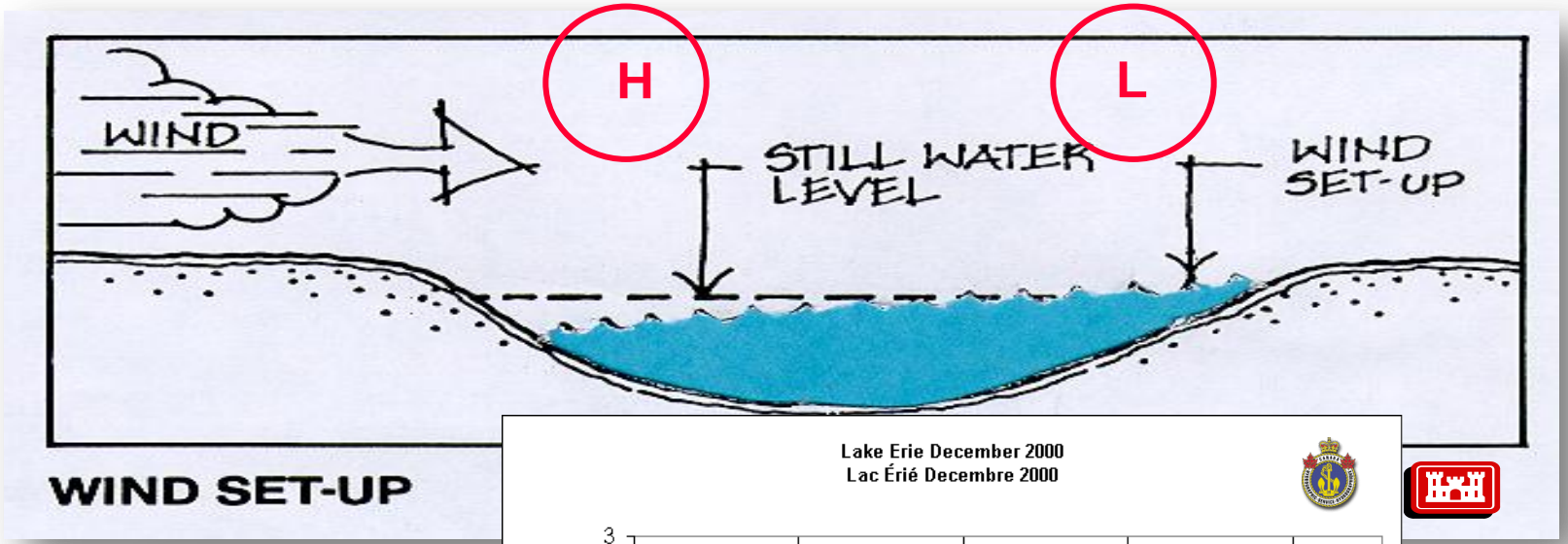
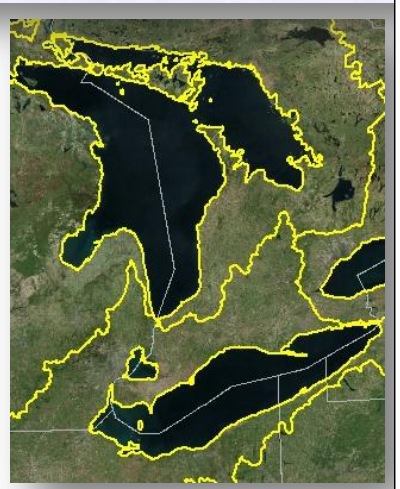
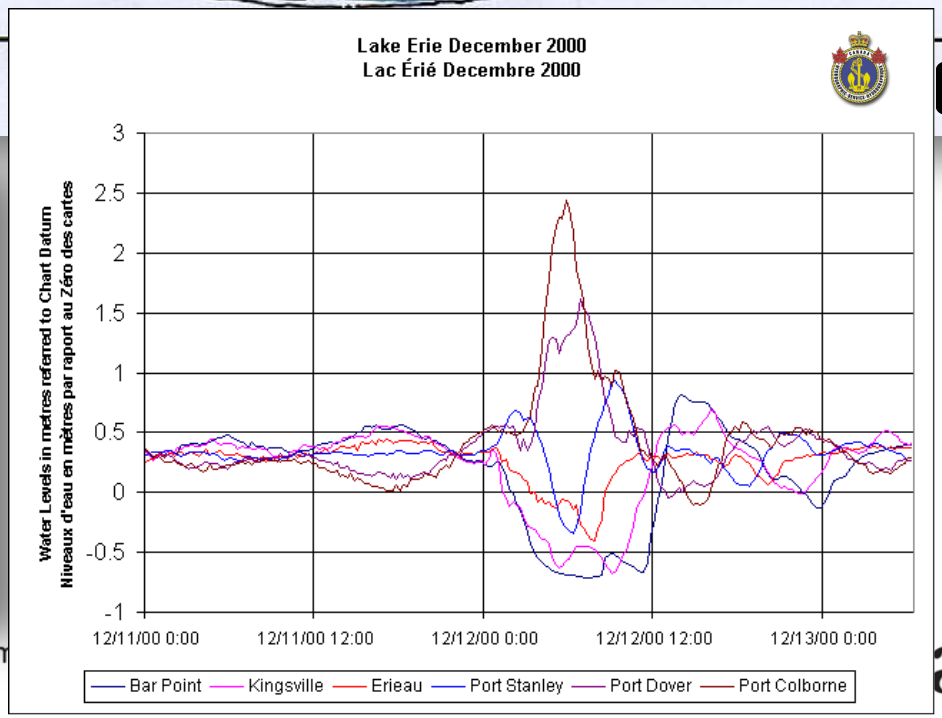
Short-Period Fluctuations



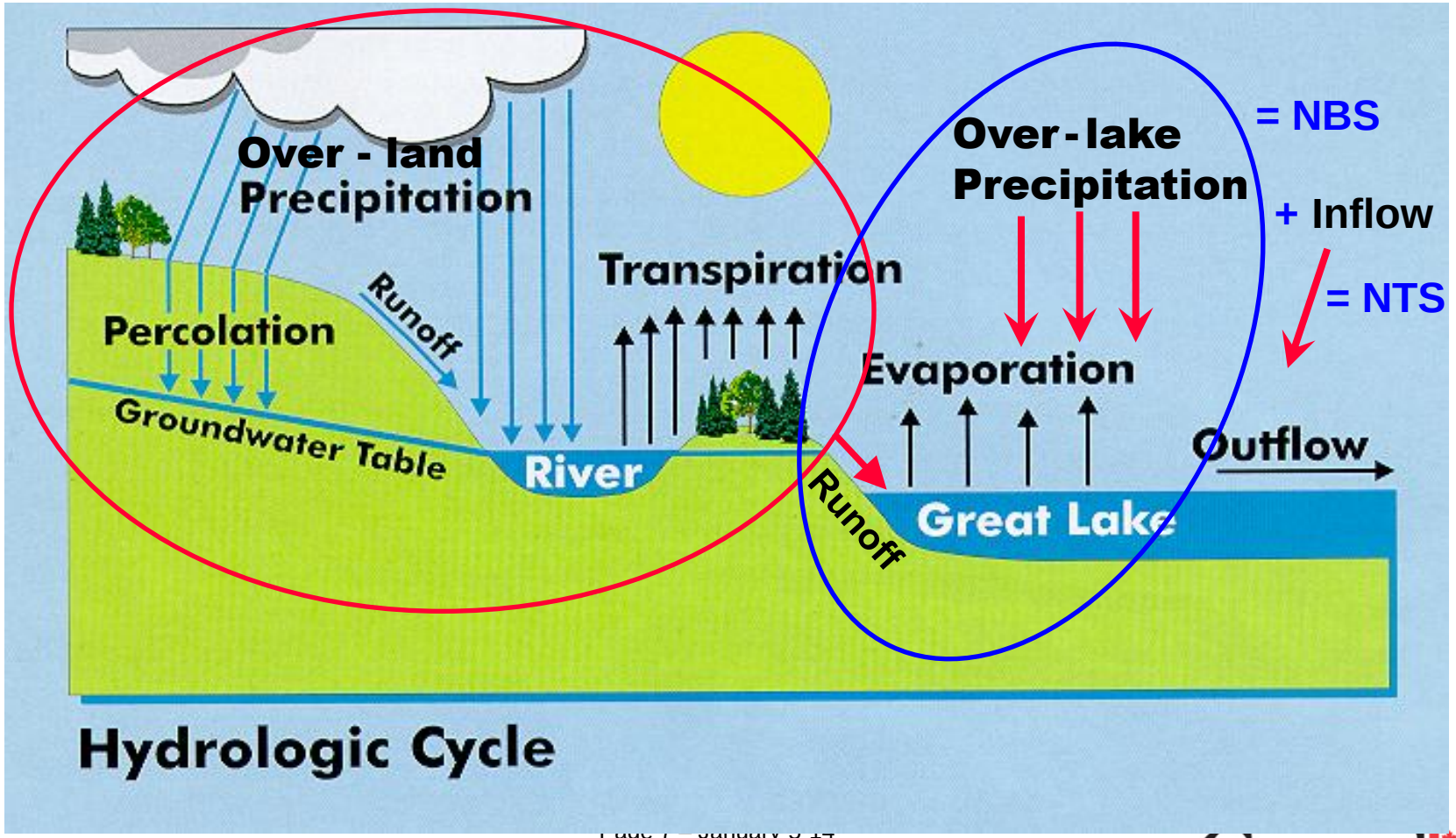


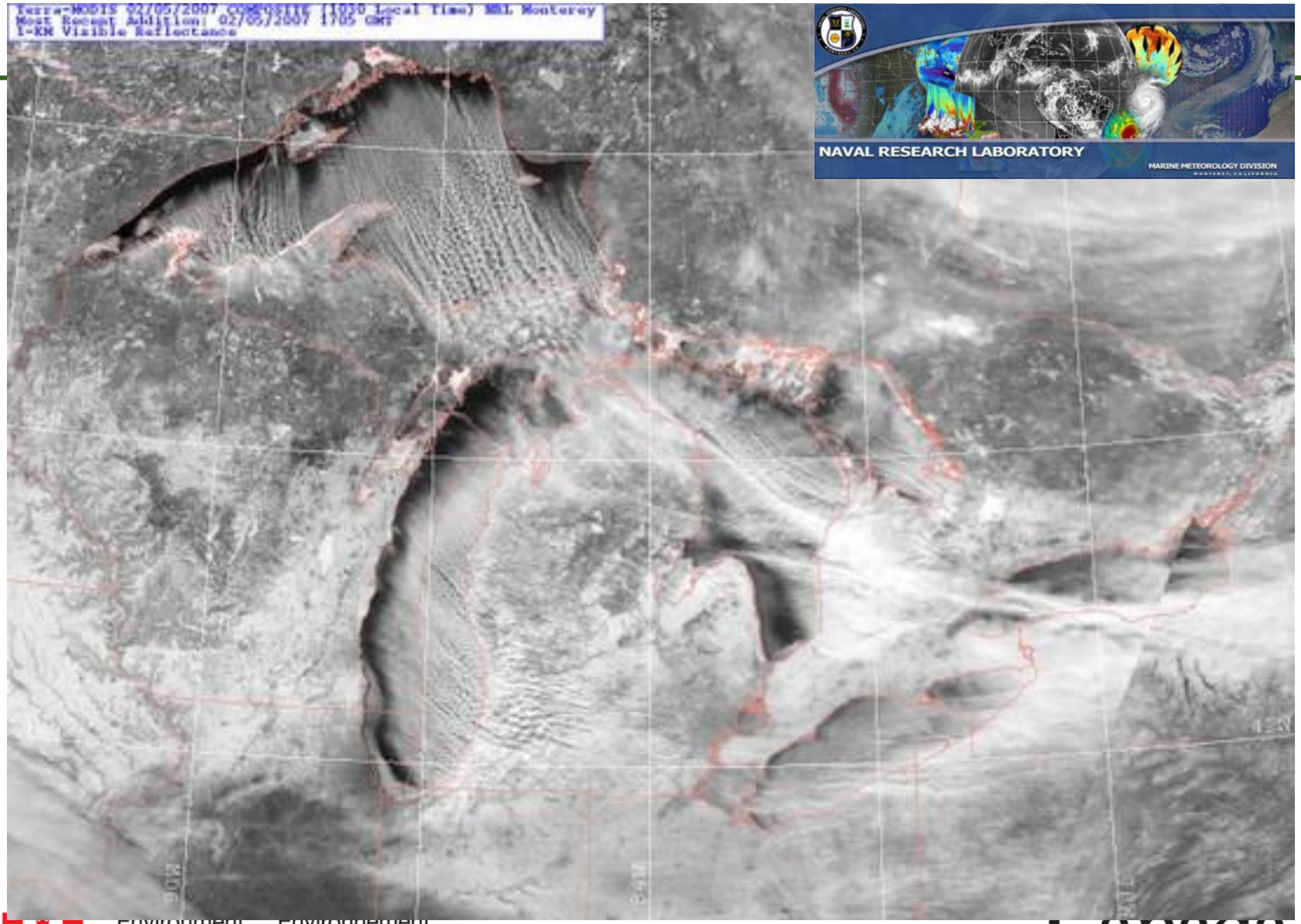


High water due to a positive storm surge

Low water due to a negative storm surge

Hydrologic Cycle





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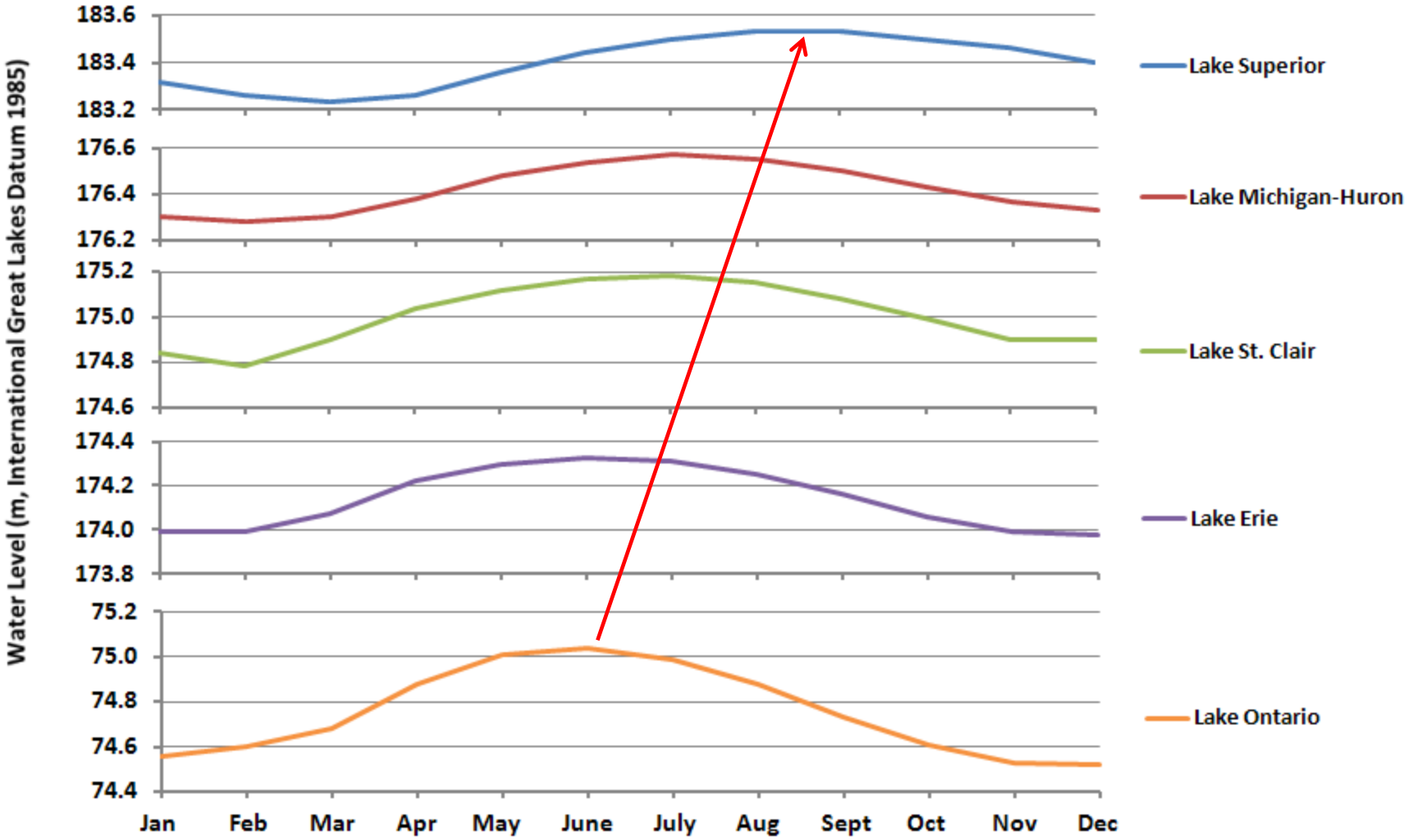
Satellite imagery provided courtesy of the Naval Research Laboratory / NPOESS NexSat project

Human Factors - Regulation

Regulation of Lake Superior Outflows at Sault Ste. Marie on St. Marys River

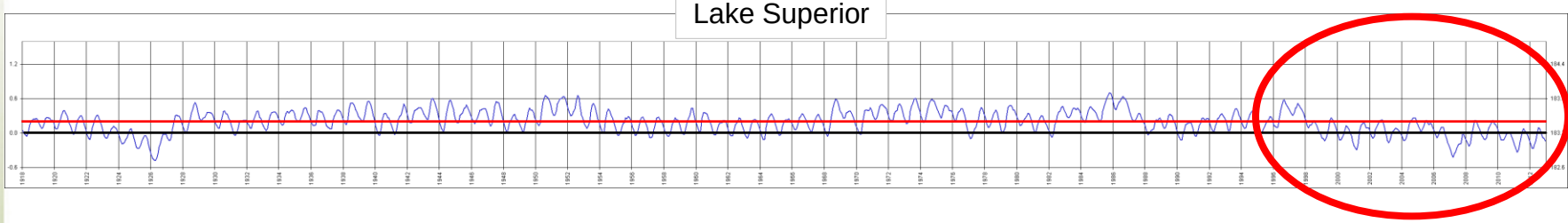
Regulation of Lake Ontario outflows at the Moses-Saunders Dam on the St. Lawrence River at Cornwall/Massena

Seasonal Fluctuations

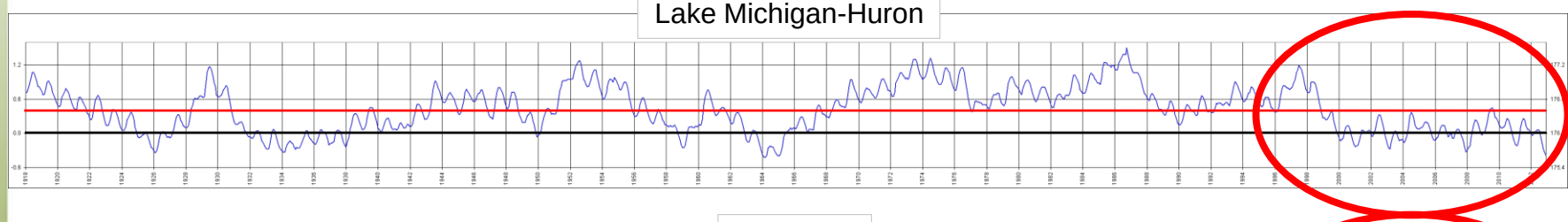


Long-Term Fluctuations

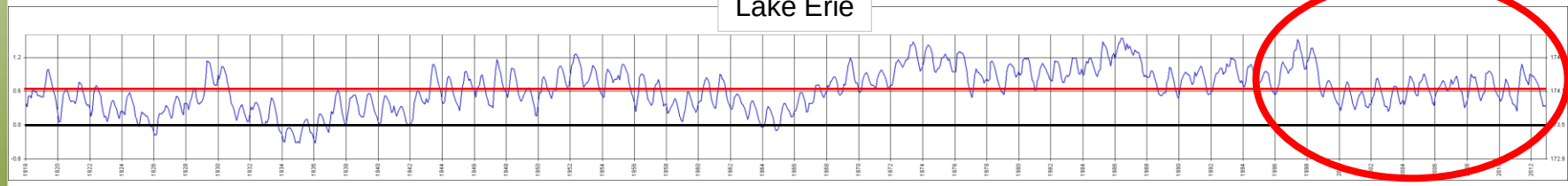
Lake Superior



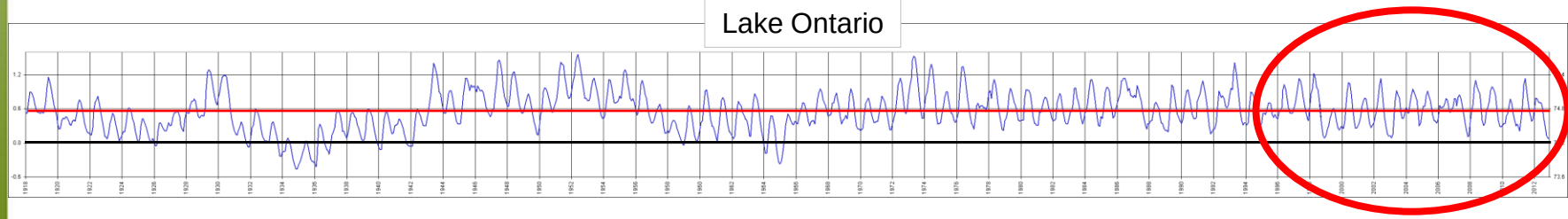
Lake Michigan-Huron



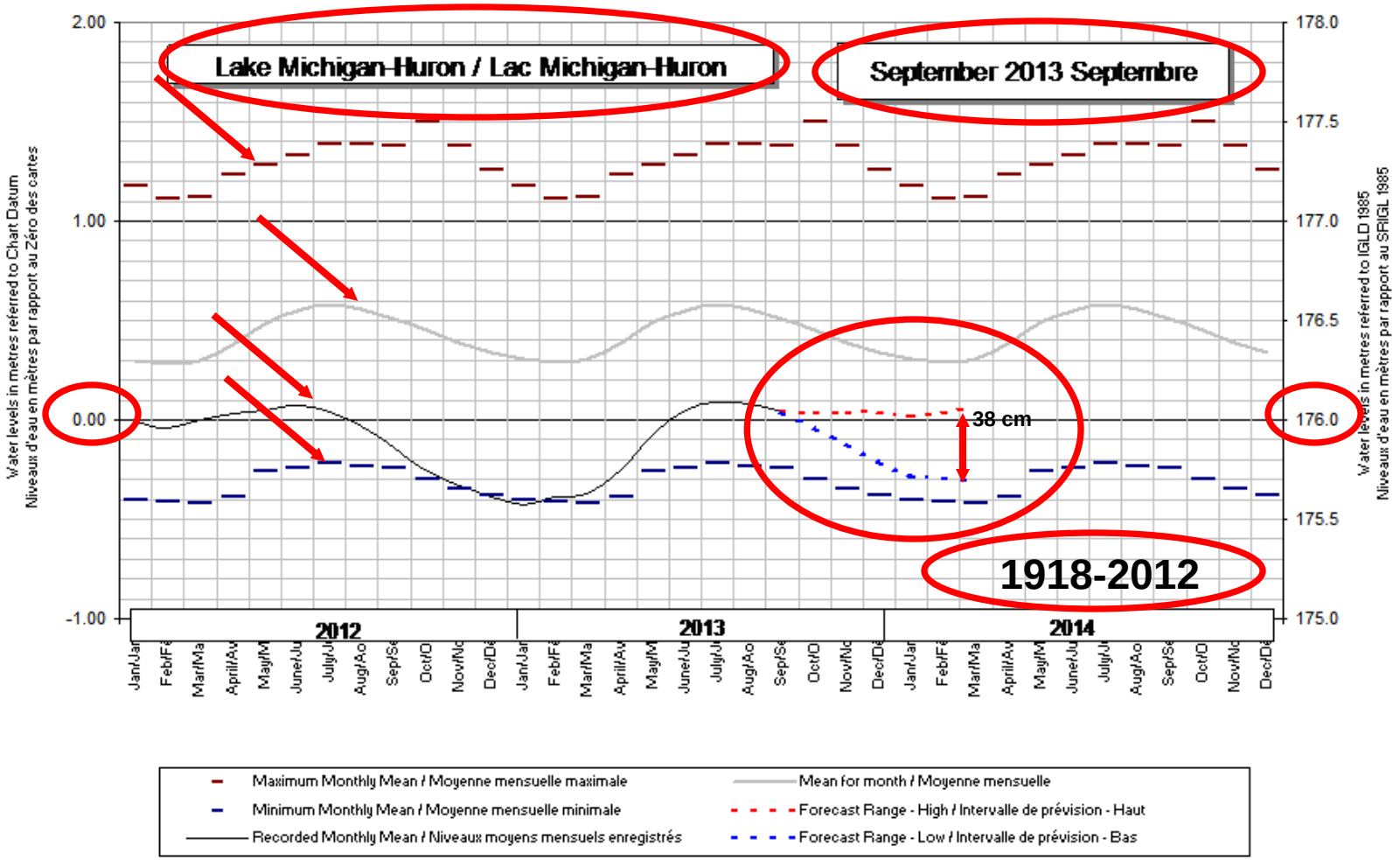
Lake Erie



Lake Ontario



Past, Present & Near Future



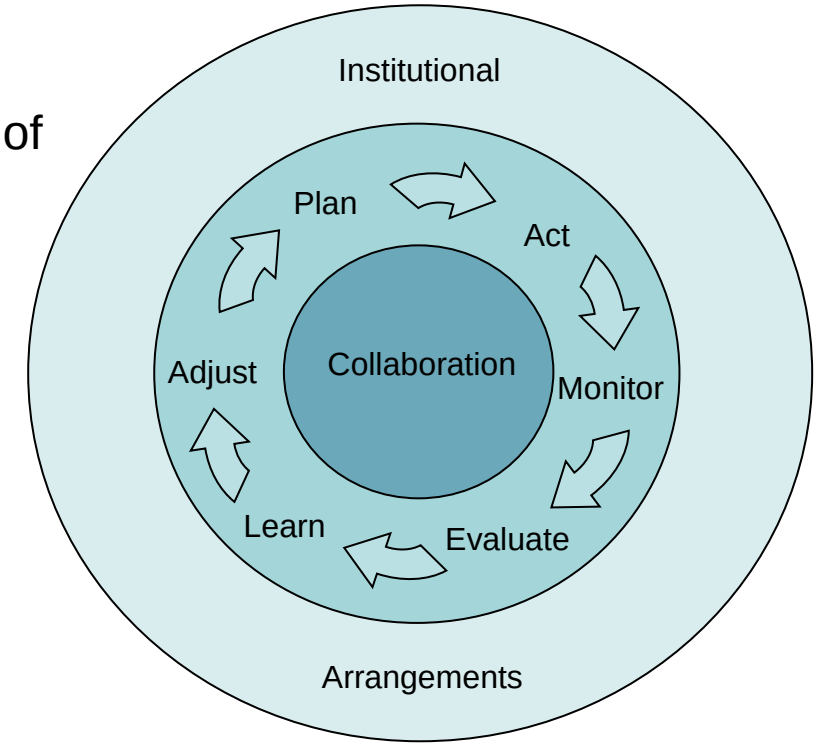
Water Levels are Always Changing

What is Adaptive Management?

A structured, iterative process for continually improving management results by learning from the outcomes of previous policies and practices

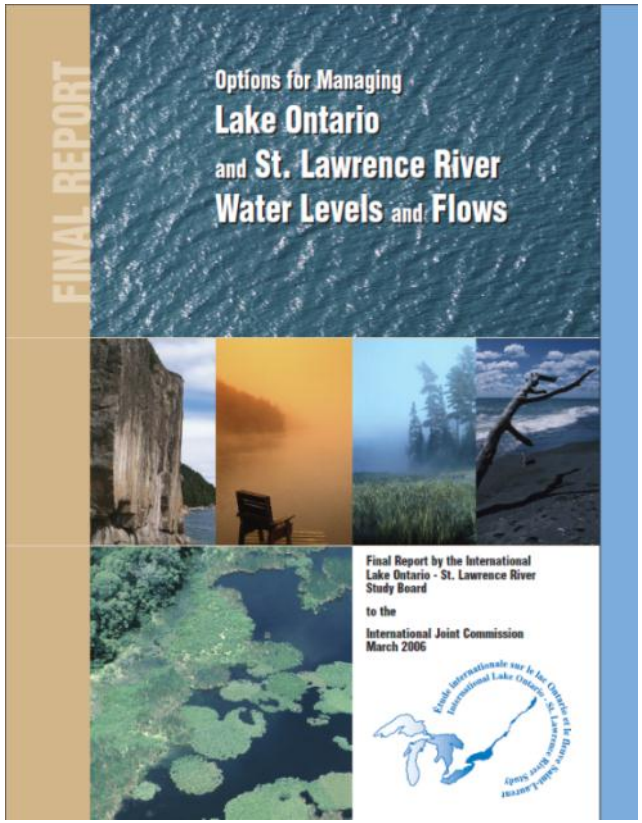
Plan, Act, Monitor conditions, **Evaluate, Learn** (Review) and **Adjust** the plan if needed

Working together to solve problems

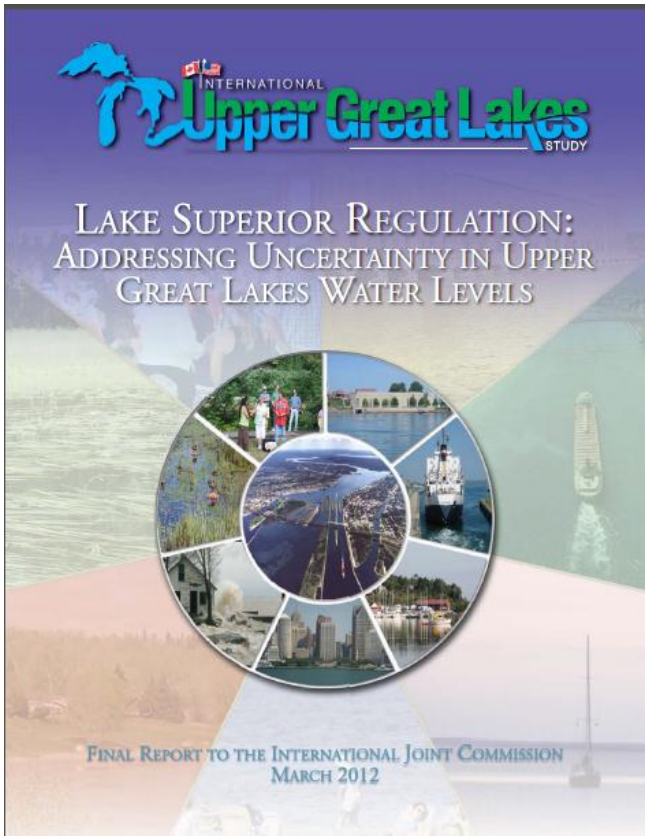


Source: International Joint Commission

Lake Ontario – St. Lawrence River & Upper Great Lakes Study



http://www.ijc.org/en/activitiesX/losl/losl_study.php



http://ijc.org/iuglsreport/

- Examples of water management planning and adaptive management approaches

Summary

- Be sure you account for dynamic nature of the lake.
- Existing network of Great Lakes water level gauges and historical measurements provides a valuable risk assessment and planning tool for the future.
- Both natural and human factors contribute to the range of water level conditions.
- Water levels are always changing and future water levels are uncertain.
- Need to plan and manage our activities accounting for a range of possible future water level conditions.
- Adaptive management provides a tool to address the complex issues of changing lake levels.