# INTERNATIONAL UPPER GREAT LAKES STUDY

## Public Interest Advisory Group

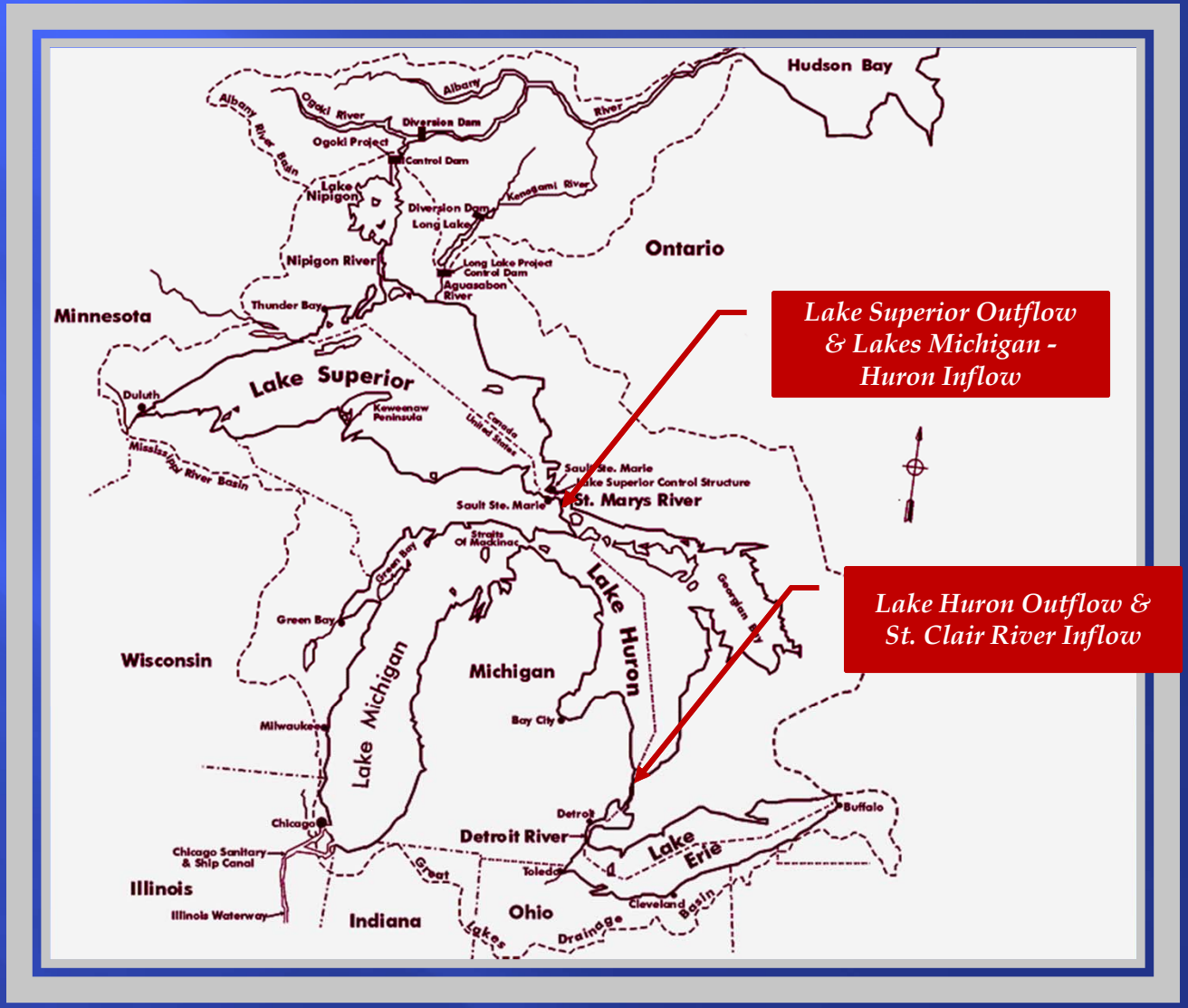
# Presentation Outline

- International Upper Great Lakes Study Objectives
- Public outreach plans
- Current water level conditions
- Questions

# Study Objectives

- To investigate St. Clair River flow characteristics and determine how the natural regime of the river has been changed by human activities.
- Assess relative importance of St. Clair River conveyance, hydroclimatic and other factors in the decline in levels since 1997.
- To investigate whether the current Lake Superior outflow management procedures could be improved considering evolving upper Great Lakes interests and climate change.
- To make recommendation to the IJC on changes and actions that may be necessary.

# Study Area


Hudson Bay
Albany River
Albany River Basin
Ogoki River
Ogoki Project
Diversion Dam
Control Dam
Lake Nipigon
Kenogami River
Diversion Dam
Long Lake
Ontario
Nipigon River
Long Lake Project Control Dam
Aguasabon River
Thunder Bay
Minnesota
Lake Superior
Duluth
Keweenaw Peninsula
Canada
United States
Mississippi River Basin
Sault Ste. Marie
Lake Superior Control Structure
Sault Ste. Marie
St. Marys River
Straits Of Mackinac
Green Bay
Green Bay
Lake Huron
Georgian Bay
Wisconsin
Michigan
Lake Michigan
Milwaukee
Bay City
Chicago
Detroit
Buffalo
Detroit River
Lake Erie
Chicago Sanitary & Ship Canal
Toledo
Great Lakes Drainage Basin
Illinois
Illinois Waterway
Indiana
Ohio
Cleveland
Lake Superior Outflow & Lakes Michigan - Huron Inflow
Lake Huron Outflow & St. Clair River Inflow

# Some Basic Facts

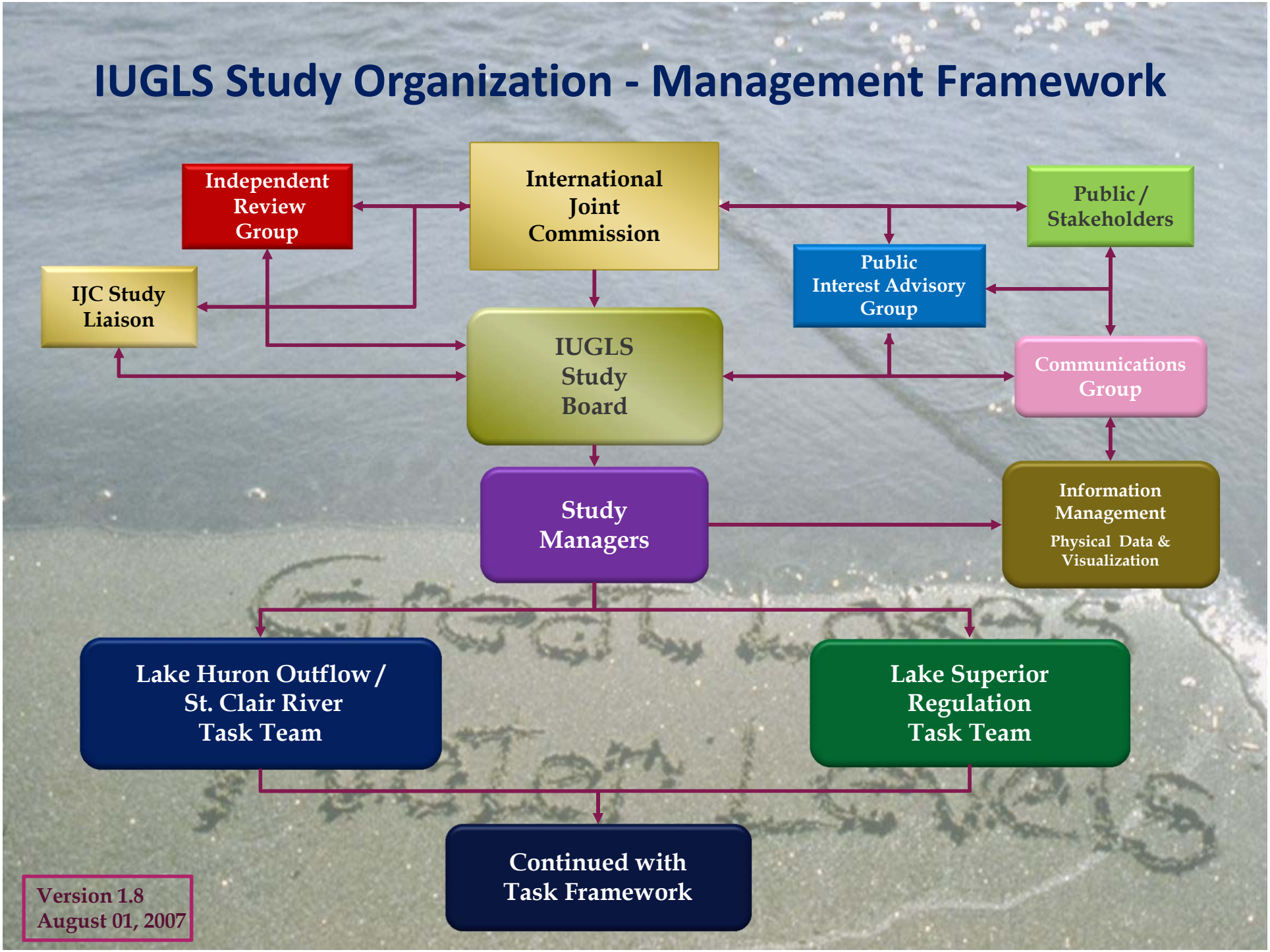
- Diversion of water from Lake Michigan at Chicago → 90 $m^3/s$ (3,200 $ft^3/s$)
- Long Lac & Ogoki diversions into Lake Superior → 154 m3/s (5,400 ft3/s)
- Long term average flow through St. Clair River is 5,310 m3/s (188,000 ft3/s)
- 2 bgd 'loss due to drain hole' → 86 m3/s or 1.6% of daily St. Clair River flow
- Average daily evaporation from Lakes Michigan-Huron ~ 2,466 m3/s (87,000 ft3/s)
- IJC reports (2000) that in 1998, about 10 mill. litres (~ 10 mill. gallons) of water were exported from the Great Lakes basin, while 141 mill. litres (~ 37 mill. gallons) were imported.

# International Lake Superior Board of Control

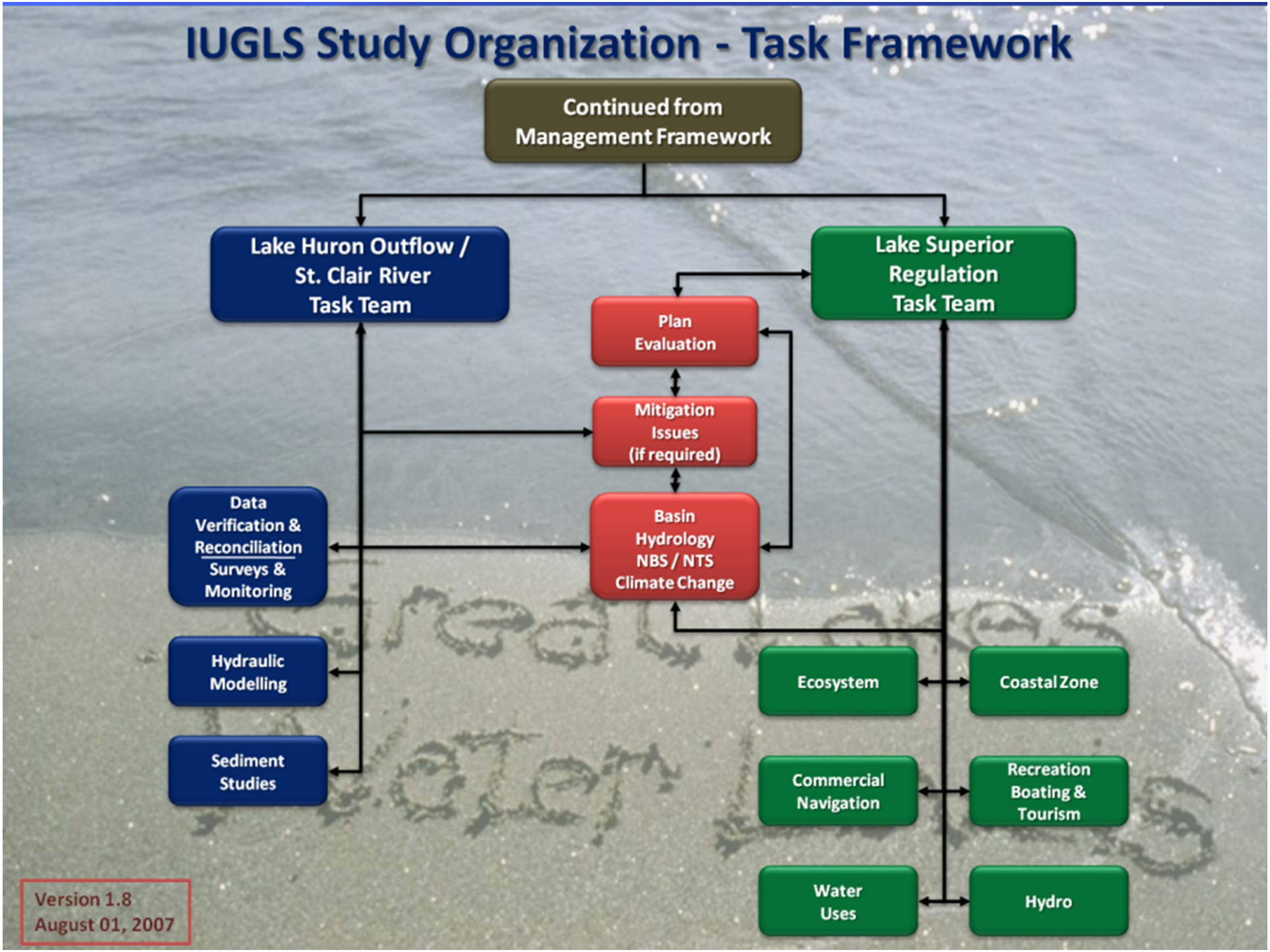
A management Board responsible for the day to day operations of the control structures at Sault Ste. Marie, Ontario / Michigan.


St. Marys River at Sault Ste. Marie
(Looking East or Downstream)

# IUGLS Study Organization - Management Framework



# IUGLS Study Organization - Task Framework



# KEY Reports/Milestones

- *"Further Regulation of the Great Lakes"* (RGL) 1976 IJC Report to the Governments of Canada and the U.S. (began with record lows and ended with record highs)
- *"Levels Reference Study: Great Lakes- St. Lawrence River Basin"* (LLR) – 1993 Levels Reference Study Board Report submitted to the IJC (focused on reducing extreme high levels)

# Overall Conclusions from the RGL and LLR

- GL must be managed as system, maximizing net benefits to all, without unduly harming any single interest
- IJC has authority to revise "Orders" for operating existing control structures, but must refer all other new structural and non-structural measures that could alleviate damages to respective countries, states, provinces for implementation
- Most proposed water control structures that could deal with extreme lake level fluctuations have Benefit –Cost Ratio << 1
- GL are a large, self-regulating system – human intervention cannot significantly modify extremes

# Science Questions

1. Is the St. Clair River bed eroding?
2. Has the conveyance of the St. Clair changed? If so, what are the factors/processes that have led to change?
3. Is the change in the difference in levels between Lake M-H and Erie attributable to a change in conveyance and/or hydroclimatic factors?
   - Dredging that took place prior to 1962
   - Dredging in 1960s and ongoing erosion
4. If hydroclimatic factors are important, is this due to natural climate variations or to climate change or a combination thereof?

# IUGLS Approach (1)

1. Sediment/geomorphological perspective
   - Determine whether the bed is stable or eroding by:
     - examining cross-sectional changes,
     - examining the bed and suspended sediment composition, and
     - establishing a sediment budget.
2. Hydraulic perspective
   - Determine whether the flow characteristics have been changed by:
     - analyzing past and current stage-discharge relationships,
     - evaluating hydraulic factors (e.g., weed growth, ice cover, etc.) to determine their impact, and
     - calibrating and running various hydraulic models.

# IUGLS Approach (2)

3. Hydroclimatological perspective
   - Determine whether the change in the head difference between Lake Michigan-Huron and Lake Erie is a result of changes in Net Basin Supply by:
     - analyzing the hydroclimatological data to determine patterns and trends,
     - evaluating consumptive use and diversion impacts, and
     - applying hydrological and Regional Climate Models to determine a water balance

# Work Underway to Address Questions

**Scientific and Technical**:

- Collection of suite of bathymetric data
- GIS analysis of all the cross-sectional data
- Application and calibration of 1-D model
- Net basin supply component sensitivity analyses
- Review and QA/QC of data sets, datum , etc.
- Reconnaissance for installation of 3 hydrometric gauges
- Bed material sampling and videoing of St. Clair bed

# Expedited Reporting Schedule

*April, 2008*

Interim Progress Report focusing on findings and interpretation of the St. Clair River sediment regime and whether the bed is stable or eroding. Initial results from hydraulic models and Net Basin Supply analysis.

*October, 2008*

Interim Progress Report providing further analyses in these three areas and tentative conclusions and potential remedial actions identified.

*February, 2009*

Draft Final Report on St Clair River completed and distributed for comments to all the key groups.

*June, 2009*

Final Report for the St. Clair River portion of IUGLS submitted to the IJC.

# Public & the Study Process

# Public Interest Advisory Group (PIAG)

- Gives public the opportunity to provide input to the study regarding values associated with different Great Lakes water levels.
- Provides vehicle for study to disseminate information to the public.
- Advises study on outreach and communications.
- Advises study on broad direction of work.
- Study benefits from experience and expertise of PIAG members.

# PIAG Reflects Broad Range of Interests

- Ecosystem/environment
- Recreational boating and tourism
- Hydropower
- Commercial navigation
- Municipal, industrial and domestic water uses
- Coastal and shoreline interests

# PIAG Membership

## Canada

**James Bruce** (PIAG Co-Chair)
**James Anderson,** Ducks Unlimited
**Doug Cuddy,** Lake Superior Conservancy and Watershed Council
**Dick Hibma,** Conservation Ontario
**Kenneth Higgs,** Property Owner
**William Hryb,** Lakehead Shipping Company Ltd.
**John Jackson,** Great Lakes United
**Don Marles,** Lake Superior Advisory Committee
**Mary Muter,** Georgian Bay Association

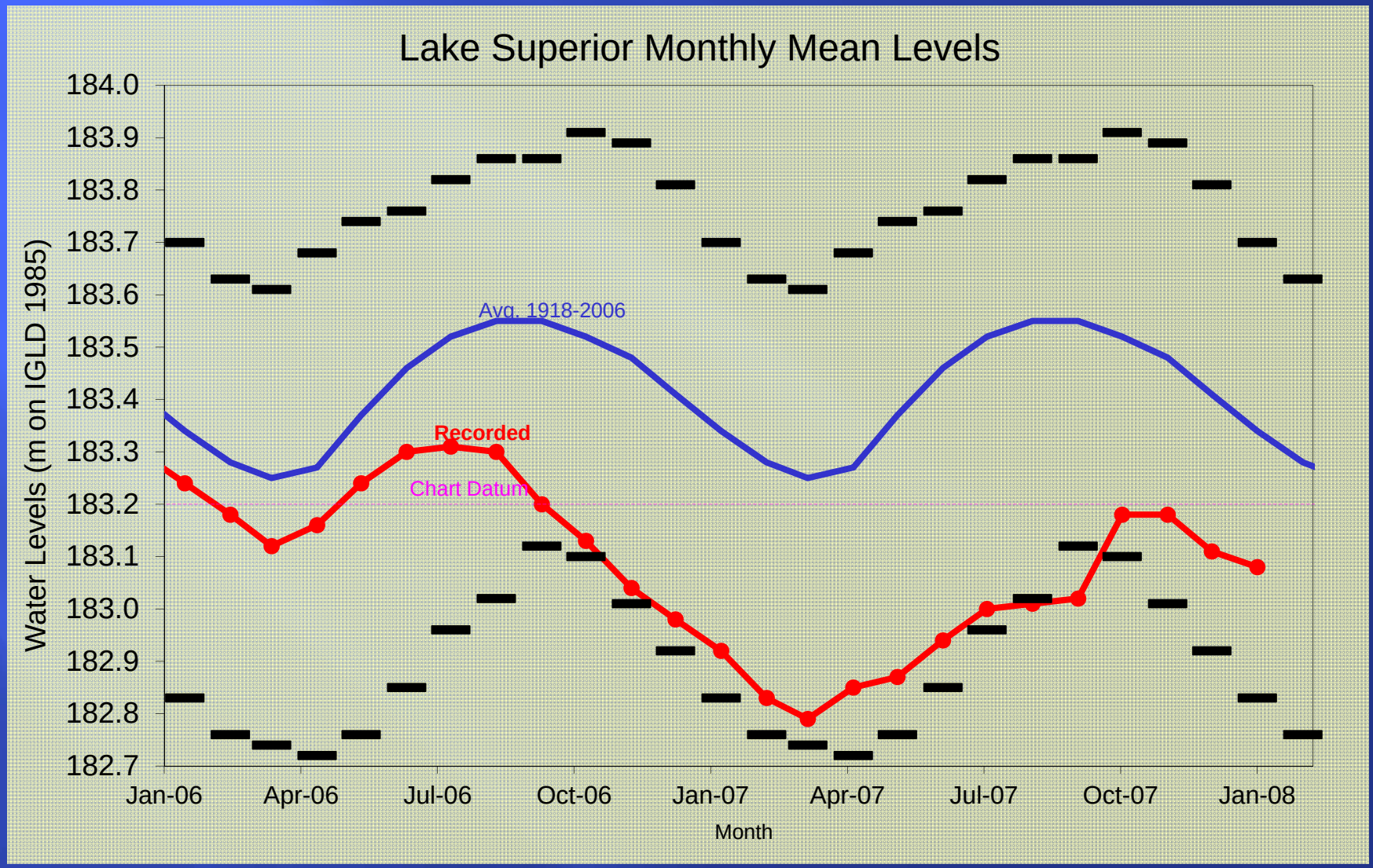
## United States

**Kay Felt,** Co-Chair
**David Powers** – Save our Shoreline
**Roger Smithe** – International Great Lakes Coalition
**Dan Tadgerson** – Sault Ste. Marie Tribe, Chippewa Indians
**Alan Steinman** – Annis WRI
**Samuel Speck** –Ohio DNR
**Jim Weakley** – Lake Carriers' Assn.
**Jeff Vito** – Cities Initiative
**Dan Thomas** –GL Sport Fishing Council
**David Irish** – boat shop owner

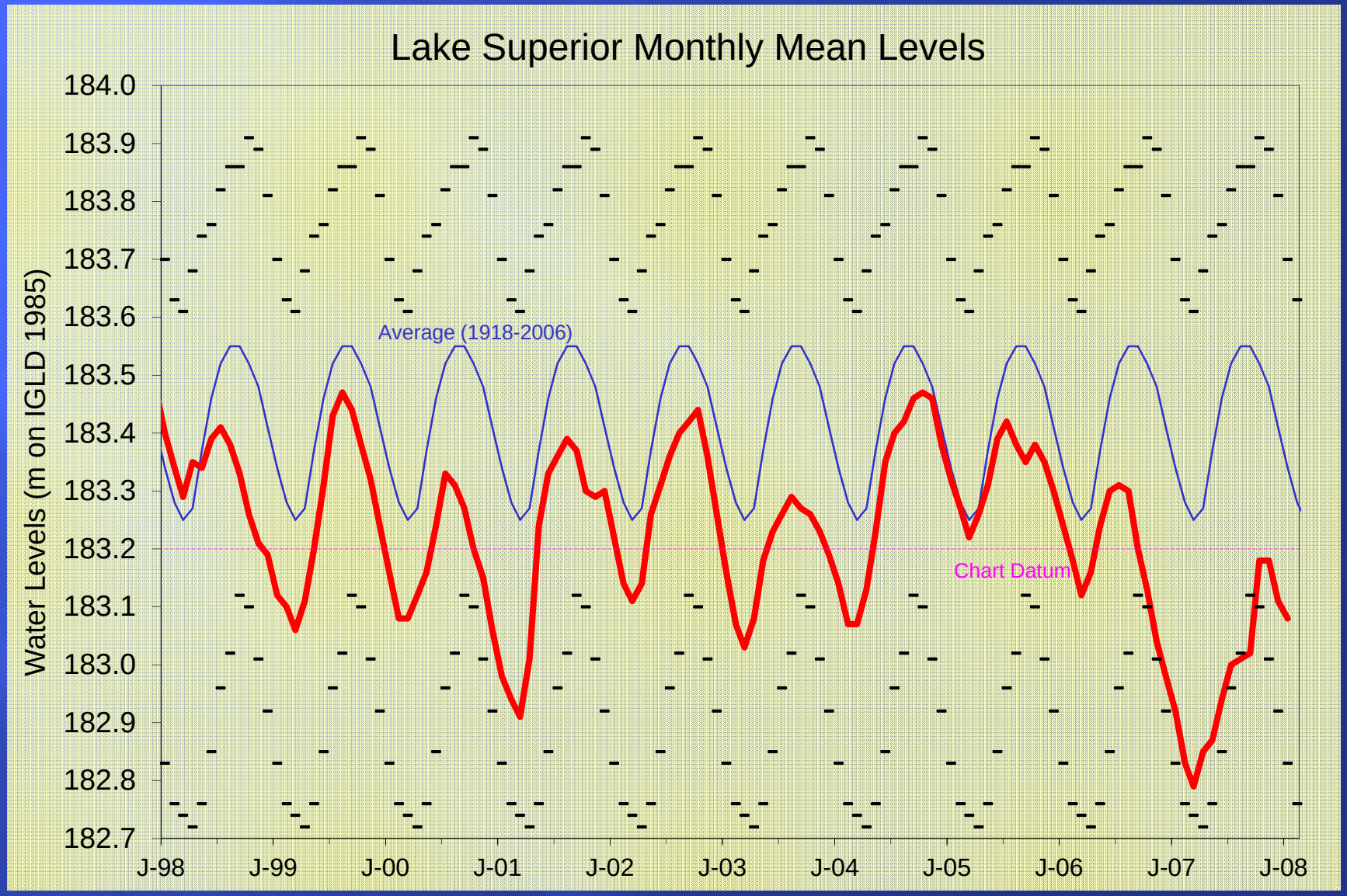
# Outreach Strategy Highlights

- Public Meetings
- Internet/web dialogues
- Targeted interest-based workshops
- Regular progress reports
- PIAG liaison to Technical Working Groups
- Congressional/Parliamentary Briefings
- Meetings with federal/state/provincial officials
- Newsletter
- Interactive web page

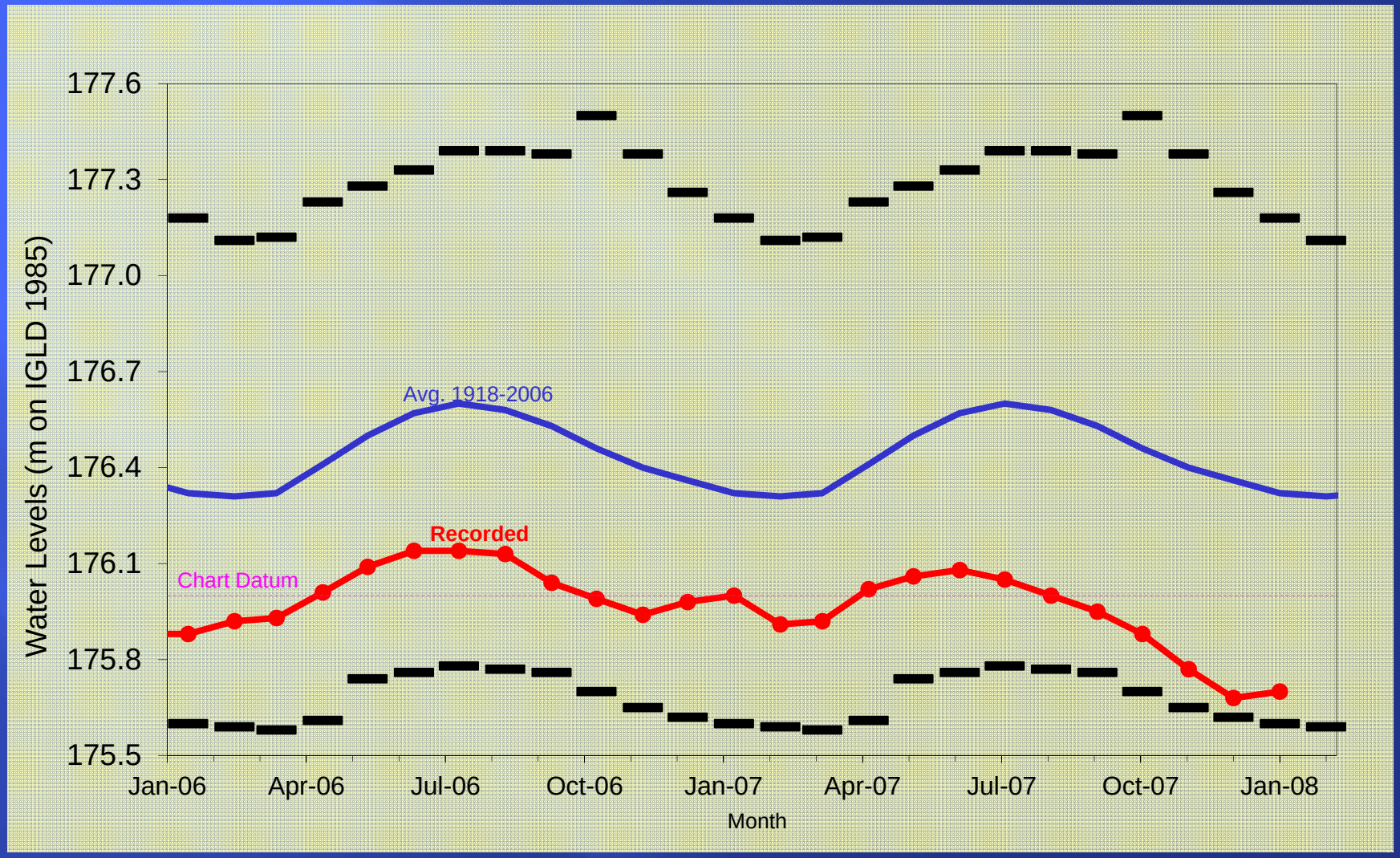
# Lake Superior – Current Conditions



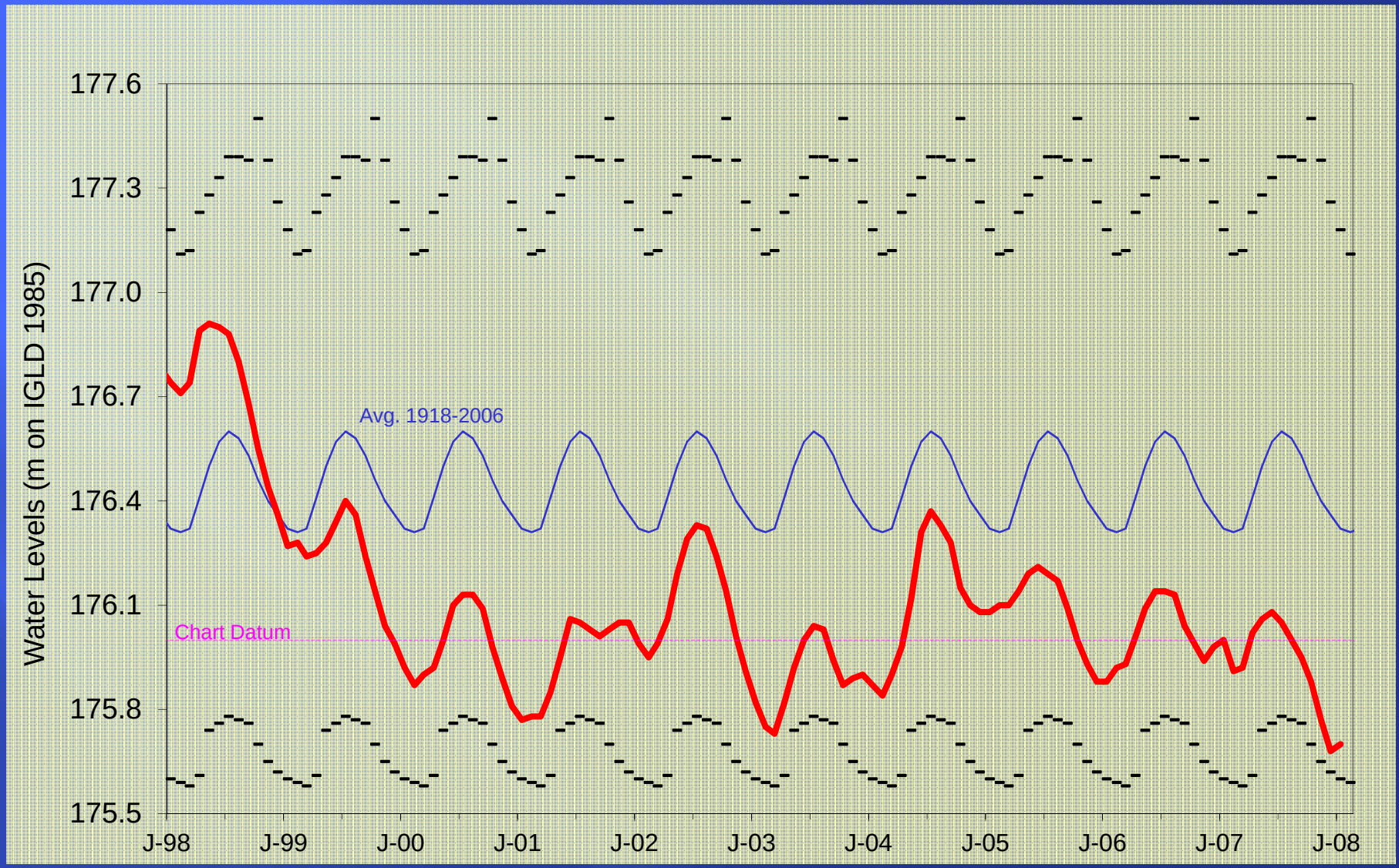
# Lake Superior 1998 – 2008



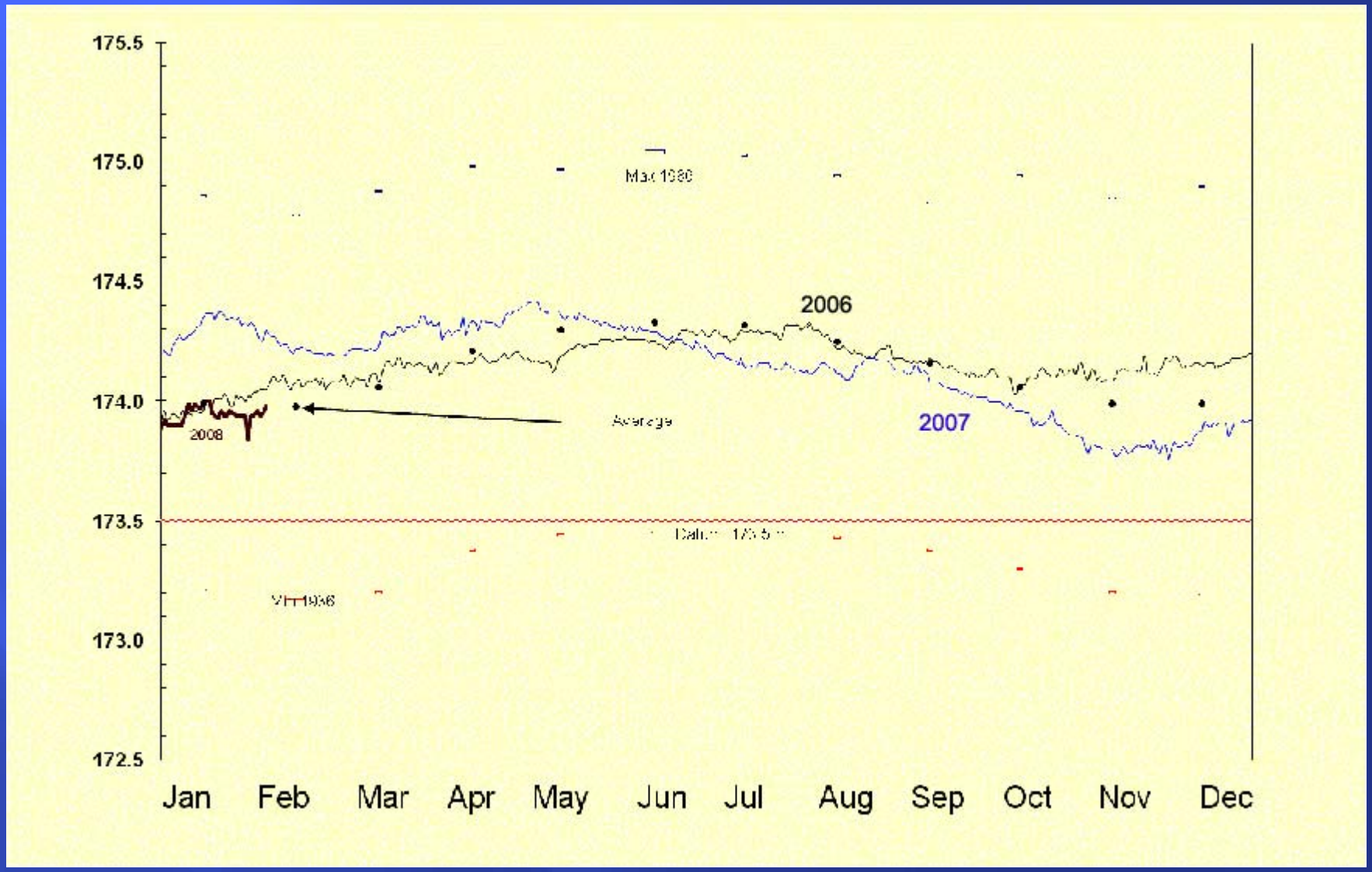
# Lakes Michigan-Huron Current Conditions



# Lakes Michigan-Huron 1998 - 2008

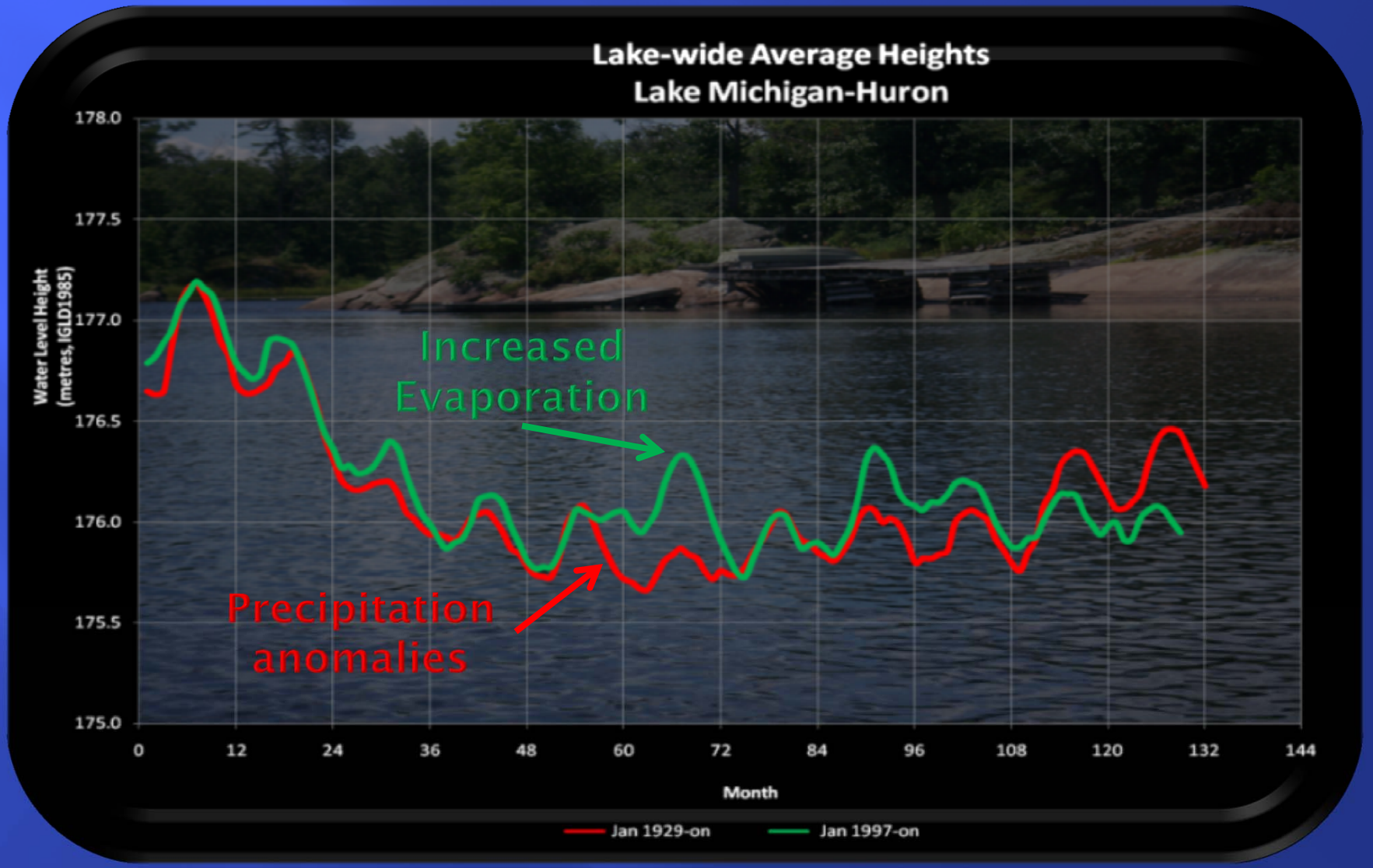


# Lake Erie / 2006 – 2008

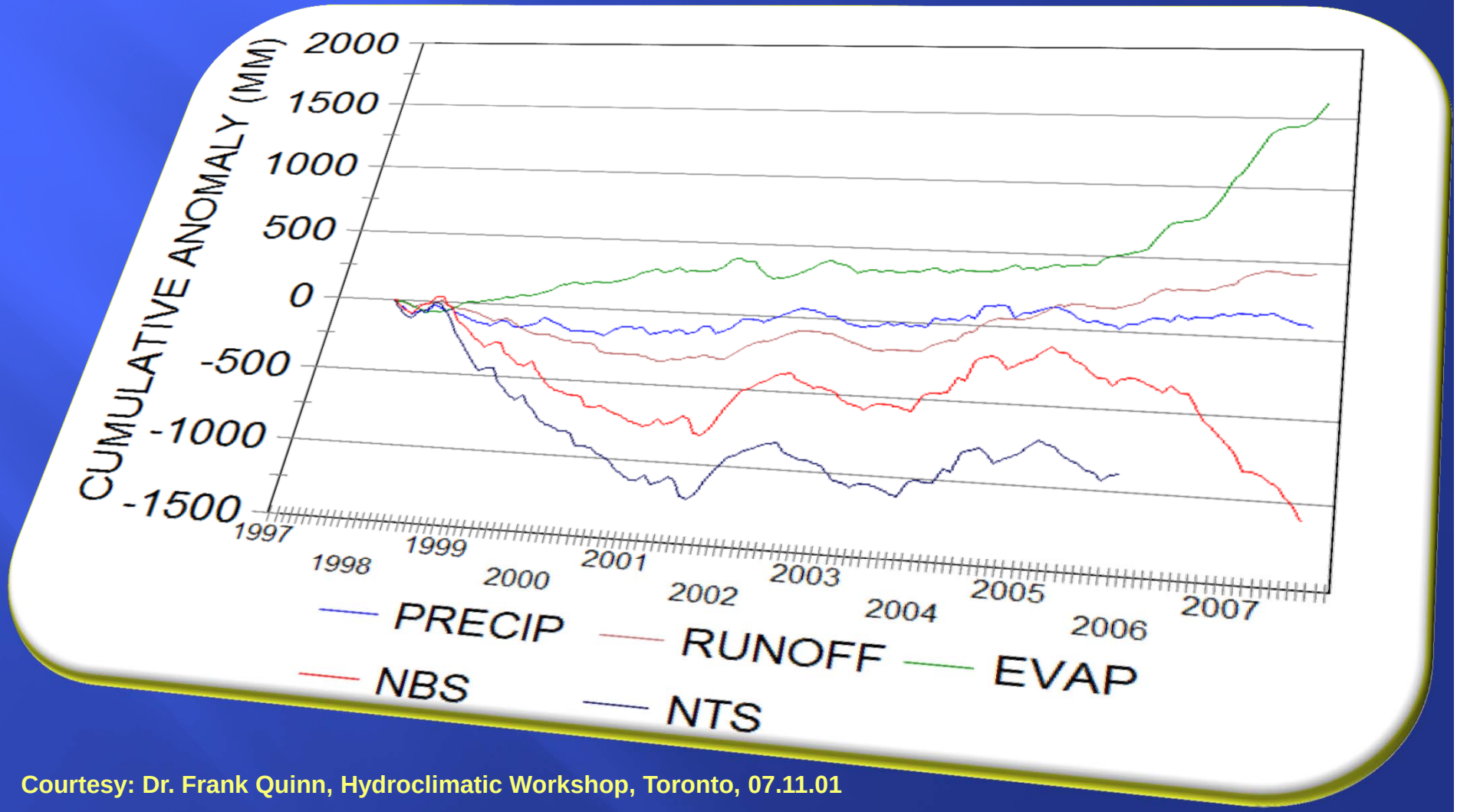


# Current Levels Compared to 1930s

## "*Dust Bowl Era*"

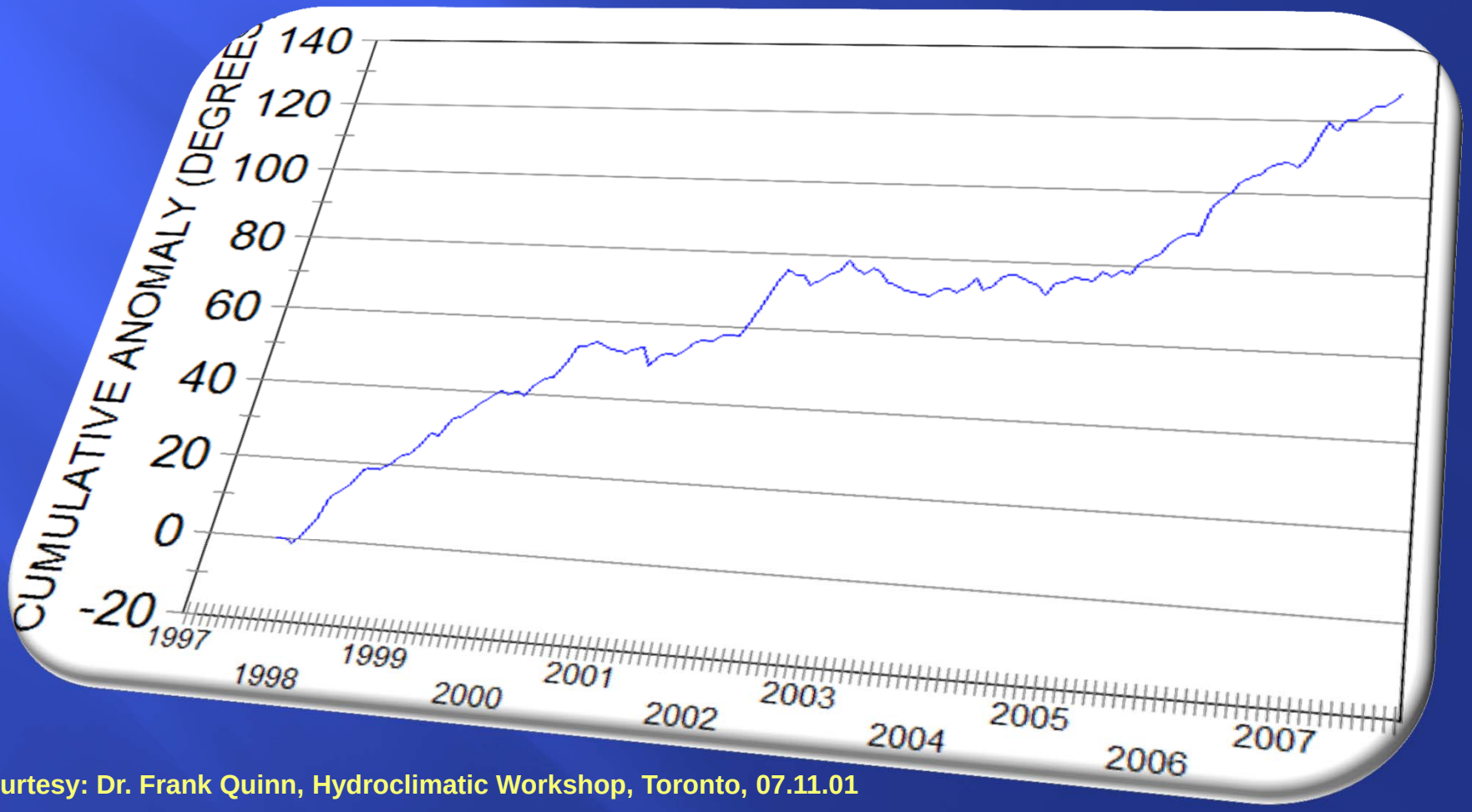


# Lake Michigan-Huron Hydrological Components Anomaly




Courtesy: Dr. Frank Quinn, Hydroclimatic Workshop, Toronto, 07.11.01

# Temperature Anomalies Lake Michigan-Huron




Courtesy: Dr. Frank Quinn, Hydroclimatic Workshop, Toronto, 07.11.01

# Conclusions

- Study is well under way – previous work is being reviewed, new research pursued, with a focus on getting the facts first.
- The public will be heavily engaged and their input will help drive study activities and outcomes.
- The scientific issues related to climate and physical processes are complex and demand serious, peer-reviewed science.
- Immediate mitigation is premature and not within the current mandate.
- Study results will reflect independent, bi-national work that is credible and on the level.

# Questions?

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