Planning the regulation of Lake Superior

27th Annual Captains Committee Meeting
Cleveland, OH
Thursday January 28, 2010

Objectives

- Our goal is to bring you in to the design review of the rules for regulating the release of water from Lake Superior
  - We want your advice – what's broken, what's not
  - We want you to understand the possibilities and the limits of what we're doing
- We'll start by quickly summarizing the large study effort that has been going on since 2007 and then focus on the smaller but key part of it that is just starting.
- We planned on this hour being more discussion and less presentation. We have some questions for you and invite your questions of us.

IUGLS – the big study

- The **I**nternational **U**pper **G**reat **L**akes **S**tudy started in 2007, will end in March 2012.
- Run by an independent bi-national study board appointed by the International Joint Commission (IJC)
- IJC created by the Boundary Waters Treaty of 1909
- Similar study of Lake Ontario regulation completed in 2006. Negotiations to revise the regulation rules based on those study recommendations are still going on now.

IUGLS – the big study

- Two big questions/reports for the big study:
  1. **Why are Lakes Michigan and Huron levels closer to Lake Erie levels than they used to be (the "St. Clair" study)**
  2. **Can we improve the regulation of Lake Superior?**
- The Study Board focused on the St. Clair study first and just released its final report
  - **Relative Michigan-Huron levels have dropped as a result of**
    - **increased channel conveyance in the St. Clair River,**
    - **climate variability and**
    - **isostatic rebound.**
  - **The Board recommended that remedial measures not be undertaken in the St. Clair River at this time**
  - **But that the need for mitigative measures in the St. Clair River be examined as part of the climate change assessment in the Lake Superior regulation part of the study.**

IUGLS – 2nd part of the big study

- We are considering impacts to navigation, hydropower, coastal development, recreational boating, municipal and industrial water supply and wastewater and the environment
- A technical working group has been set up for each sector. The U.S. Commercial Navigation TWG lead is **Dave Wright** of the Corps, the Canadian lead is **Ralph Moulton**, recently retired from Environment Canada.
- A Public Interest Advisory Group (PIAG) is charged with bringing views of stakeholders into the study.
- There are two PIAG members who are also on the Commercial Navigation TWG, **Bill Hryb**, former General Manager of the Lakehead Shipping Company in Thunder Bay and **Glen Nekvasil**, VP for Corporate Communications at the Lake Carriers' Association

Three Regulation Decisions

Higher releases during times of greatest demand for electricity

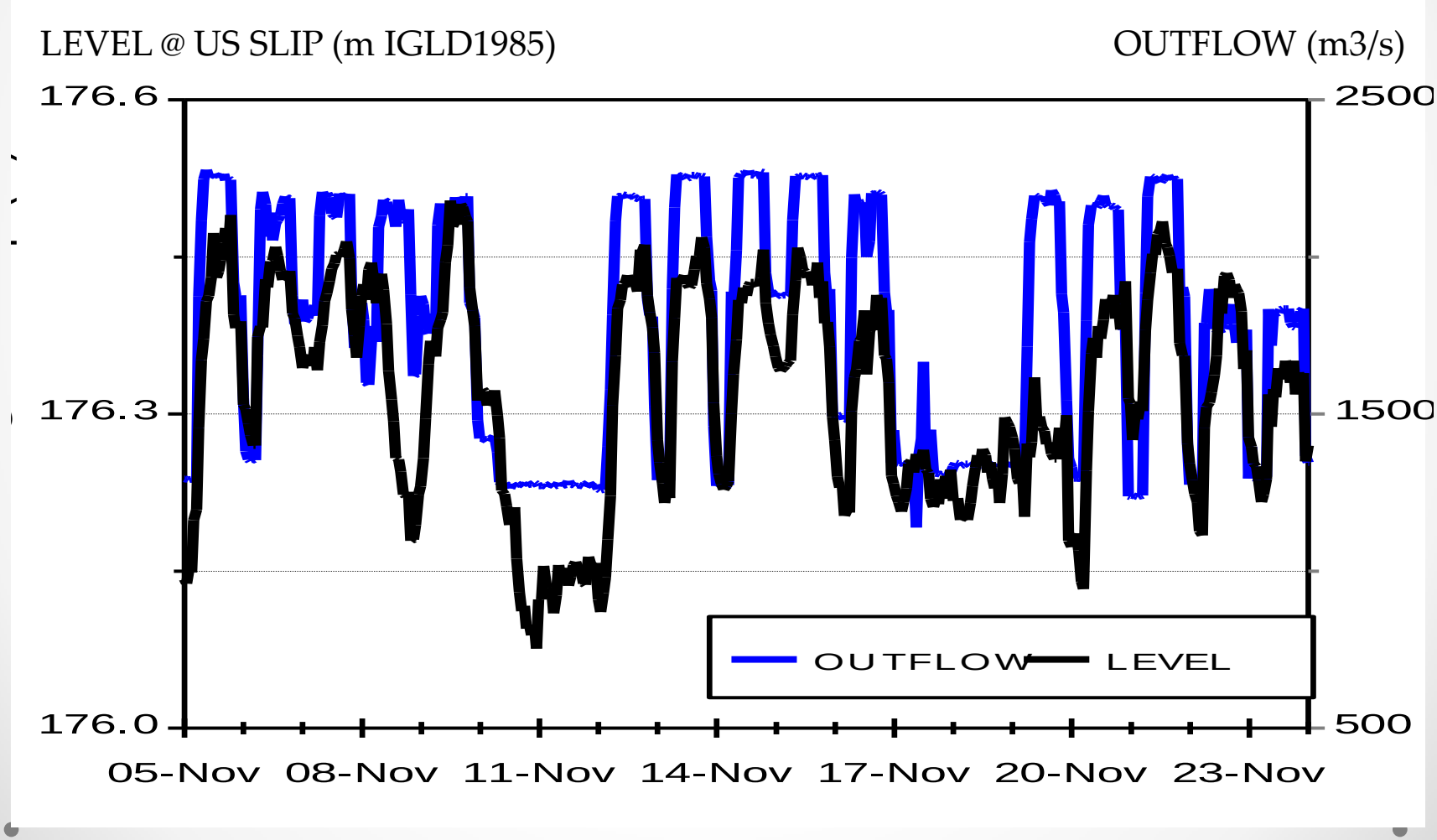
1. Design a new rule set for regulating the total volume of water from Lake Superior through the St Marys River
2. Design a new rule set for regulating peaking releases from Superior within the month.
3. Develop a plan to manage upper Great Lakes levels regulation adaptively over the next several decades in response to changing climate, economics, environmental conditions and isostatic rebound.

We are most interested in 1 and 2 today, but happy to discuss 3.

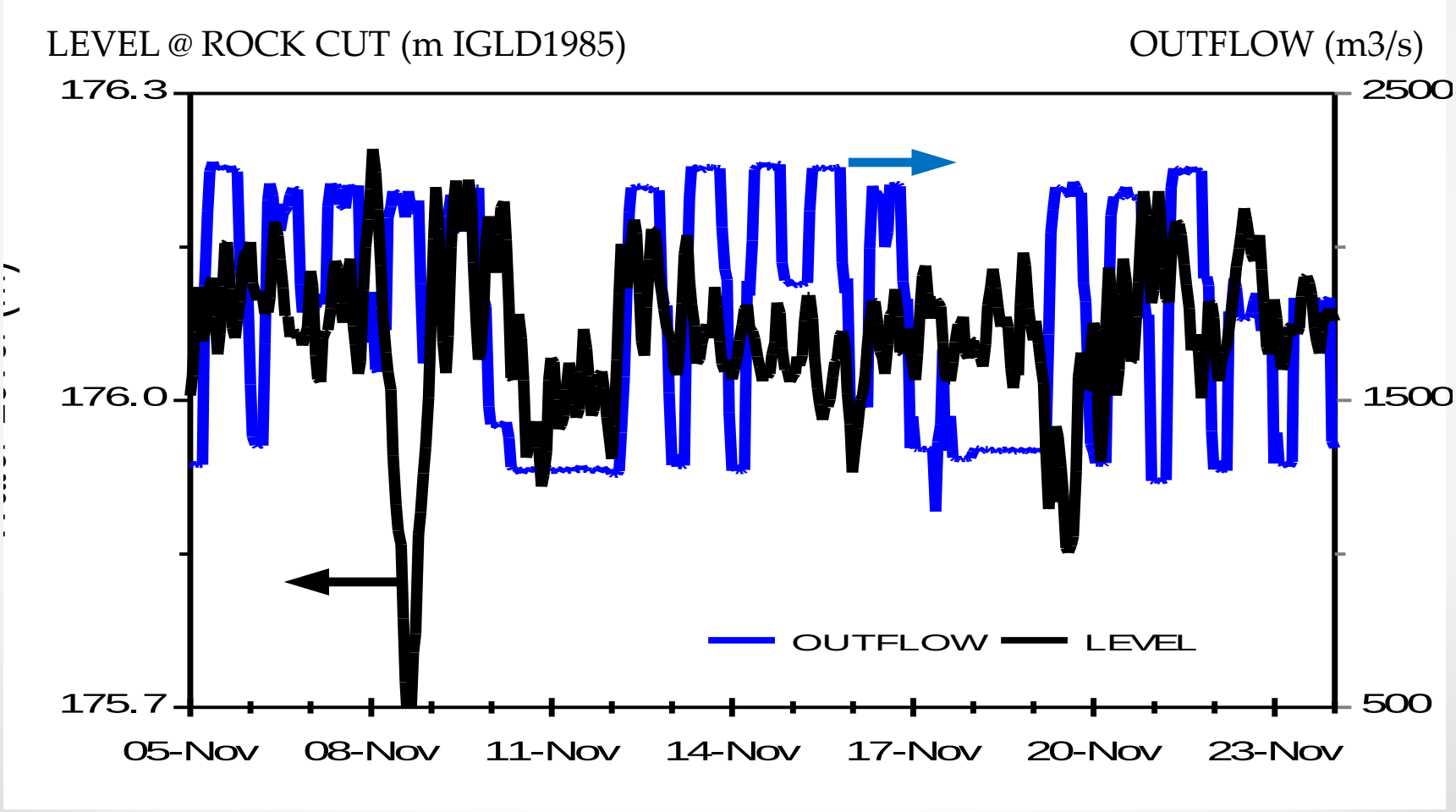
Big Pictures on Superior Regulation

- Water levels affect a lot but regulation of Lake Superior has only a limited effect on levels
  - Affects St. Marys River flows a lot
  - Can change Lake Superior elevations quite a bit
  - Has some effect on Michigan-Huron levels but not much
  - Has almost no effect on Lake Erie levels
  - Has no discernible effect on Lake Ontario and St Lawrence
- The current regulation plan is designed to balance Lakes Superior and Michigan-Huron while honoring past interpretations of water use priorities

Peaking and Ponding Example
Nov 2001- US Slip



Peaking and Ponding Example
Nov 2001 - Rock Cut



Big Pictures on Superior Regulation – "Criteria" in current rules

- Criterion (a): Keep Lake Superior within 182.76 meters (IGLD 1985) and 183.86 meters based on supplies of the past, with no greater probability of exceeding 183.86 m than would have occurred under the 1955 Modified Rule of 1949 (Rule of 49).
- Criterion (b): maximum level at US Slip gage must not exceed 177.94 m if the flow is greater than the pre-project flow;
- Criterion (c): maximum outflow is pre-project flow if Lake Superior below 183.40 m

Big Pictures on Superior Regulation – "Requirements" in current rules

a) The maximum May through November release shall be limited to the capacity of the 16 gate compensating works plus 2320 m3/s flow through the hydropower plants.
b) The maximum release December through April shall not exceed 2410 m3/s (hydro plants + ½ gate open
c) The minimum release shall be no less than 1560 m3/s , unless criterion c governs
d) Consistent with other requirements, reduce the frequency of high Michigan-Huron levels
e) Consistent with other requirements, reduce the frequency of low Michigan-Huron levels.
f) Consistent with other requirements, reduce the frequency of high Lake Erie levels
g) Consistent with other requirements, reduce the frequency of low Lake Erie levels.

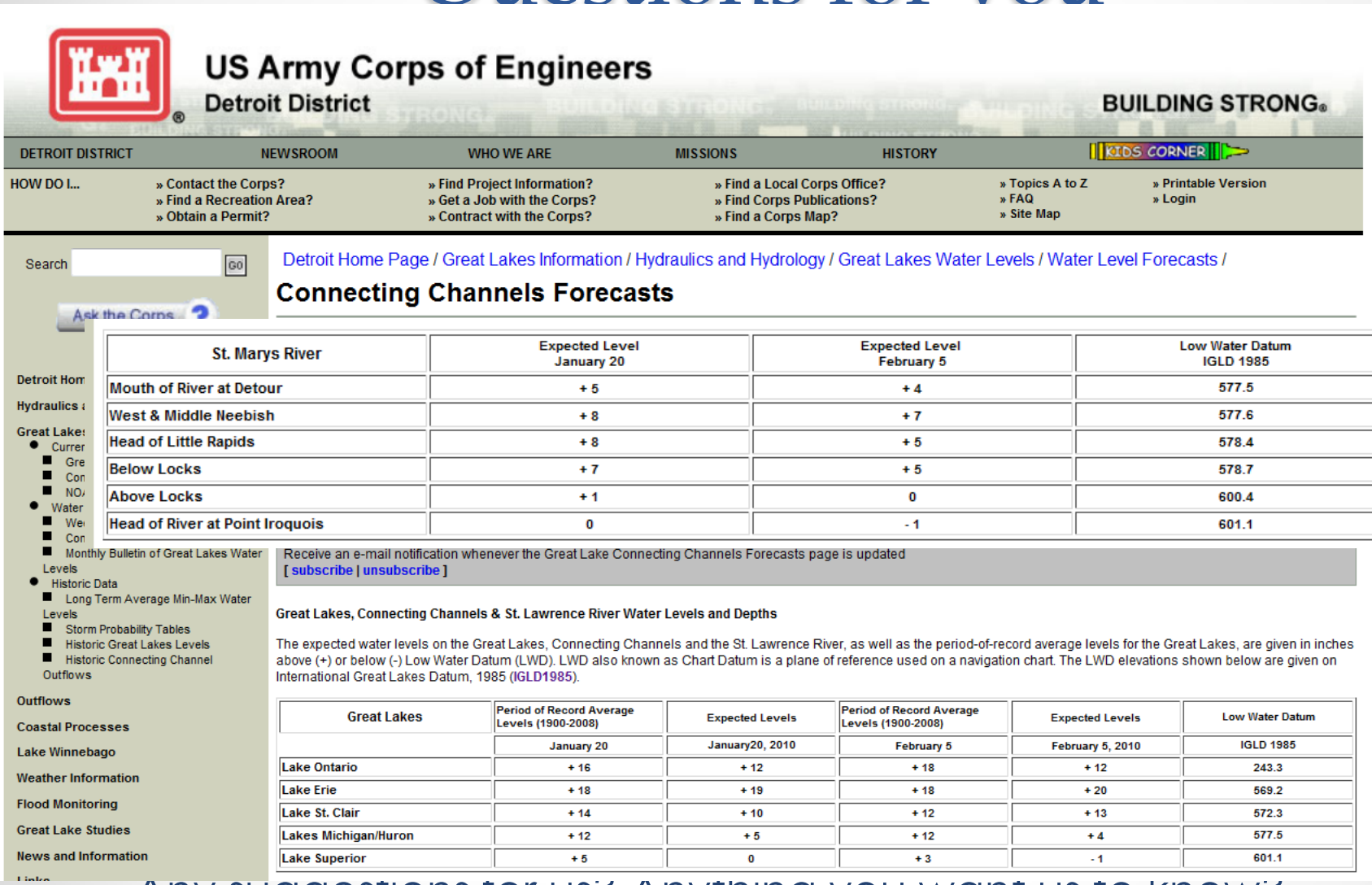
Evaluating Alternative Regulation Plans

- Using recorded and future possible water supplies into the lakes, every plan produces its own time series of water levels and connecting channel flows.
- One "shared vision" computer simulation will calculate impacts in each of the six sectors for any alternative plan based on the plan levels and flows
- The impacts include economic impacts for commercial navigation and hydropower, and quantified but non-dollar impacts for the other four sectors.
- **Navigation on Lake Superior and through the St. Marys River may be a critical element in plan comparisons,** so we came here to make sure we understood how you work, what you want, and how you make decisions about loading and scheduling.

First our doubts, then questions for you

- Our initial assessment is based on a model that's still being developed and may have serious errors.
- We are using average monthly levels and don't know how much that simplification distorts the answer
- We haven't yet analyzed to see if there are particular points in trips with a Superior leg that are causing the problem – certain docks, or specific points in the St. Marys

Questions for you



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Connecting Channels Forecasts

St. Marys River	Expected Level January 20	Expected Level February 5	Low Water Datum IGLD 1985
Mouth of River at Detour	+ 5	+ 4	577.5
West & Middle Neebish	+ 8	+ 7	577.6
Head of Little Rapids	+ 8	+ 5	578.4
Below Locks	+ 7	+ 5	578.7
Above Locks	+ 1	0	600.4
Head of River at Point Iroquois	0	- 1	601.1

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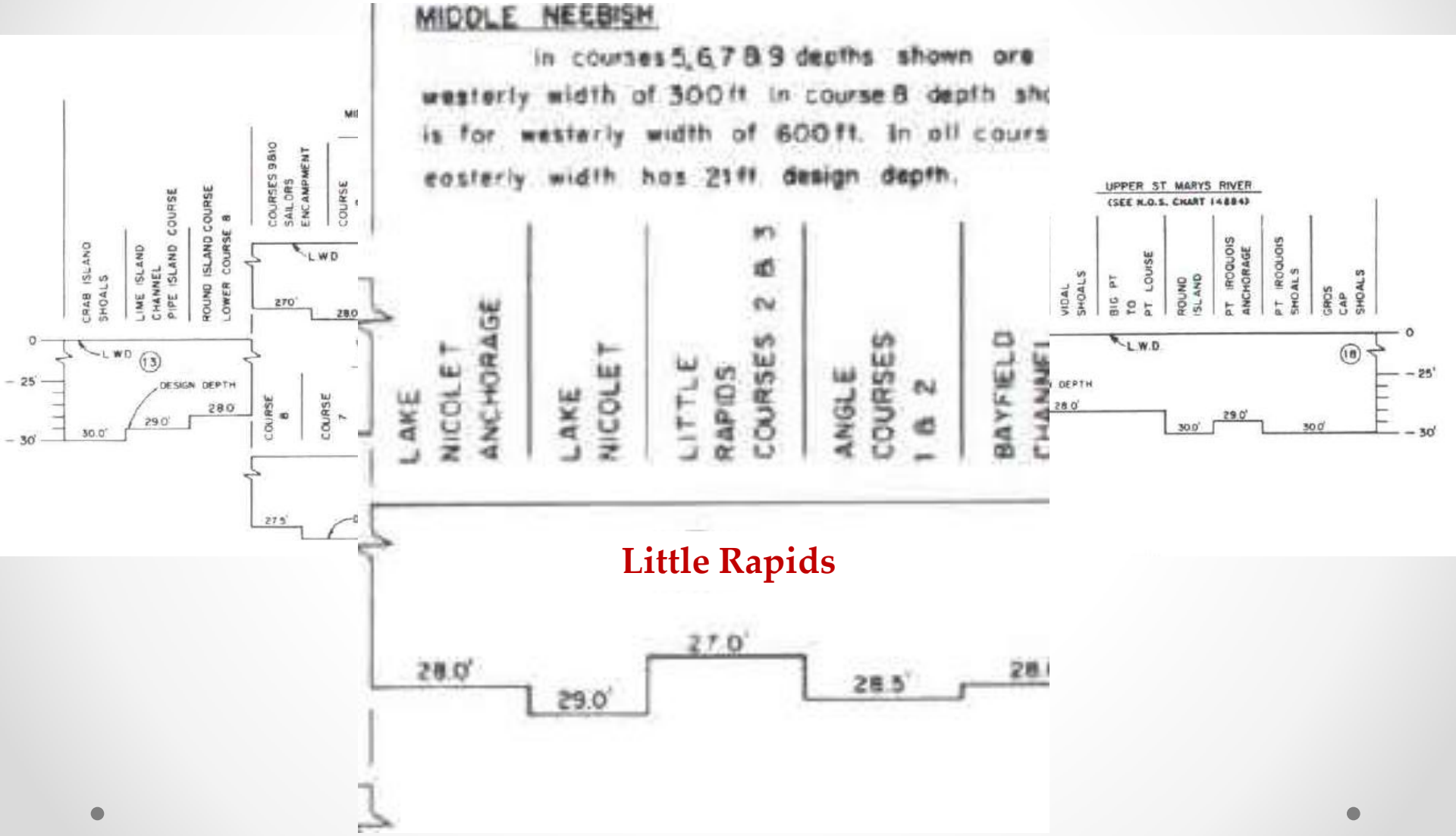
Great Lakes, Connecting Channels & St. Lawrence River Water Levels and Depths

The expected water levels on the Great Lakes, Connecting Channels and the St. Lawrence River, as well as the period-of-record average levels for the Great Lakes, are given in inches above (+) or below (-) Low Water Datum (LWD). LWD also known as Chart Datum is a plane of reference used on a navigation chart. The LWD elevations shown below are given on International Great Lakes Datum, 1985 (IGLD1985).

Great Lakes	Period of Record Average Levels (1900-2008)	Expected Levels	Period of Record Average Levels (1900-2008)	Expected Levels	Low Water Datum
	January 20	January20, 2010	February 5	February 5, 2010	IGLD 1985
Lake Ontario	+ 16	+ 12	+ 18	+ 12	243.3
Lake Erie	+ 18	+ 19	+ 18	+ 20	569.2
Lake St. Clair	+ 14	+ 10	+ 12	+ 13	572.3
Lakes Michigan/Huron	+ 12	+ 5	+ 12	+ 4	577.5
Lake Superior	+ 5	0	+ 3	- 1	601.1

- Any suggestions for us? Anything you want us to know?

St. Marys River Channel Profile



Little Rapids

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St. Marys River Real-Time Water Level Gauging Stations
Click on individual gauges
to access water level data
?
Lake
Superior
Sault Ste Marie
Above Lock, Ontario
Sault Ste Marie
Below Lock, Ontario
Little Rapids, MI
Frenchette, MI
S.W. Pier, MI
U.S. Slip, MI
Cell Dock, MI
Lookout #4, MI
Rock Cut, MI
Slab
Dock, MI
North
Channel
St. Marys River
De Tour
Village, MI
Lake Huron
NOAA Gauges
DFO Gauges
USACE Gauges