Coastal Outreach and Partnerships in the Upper Great Lakes

26 October 2017

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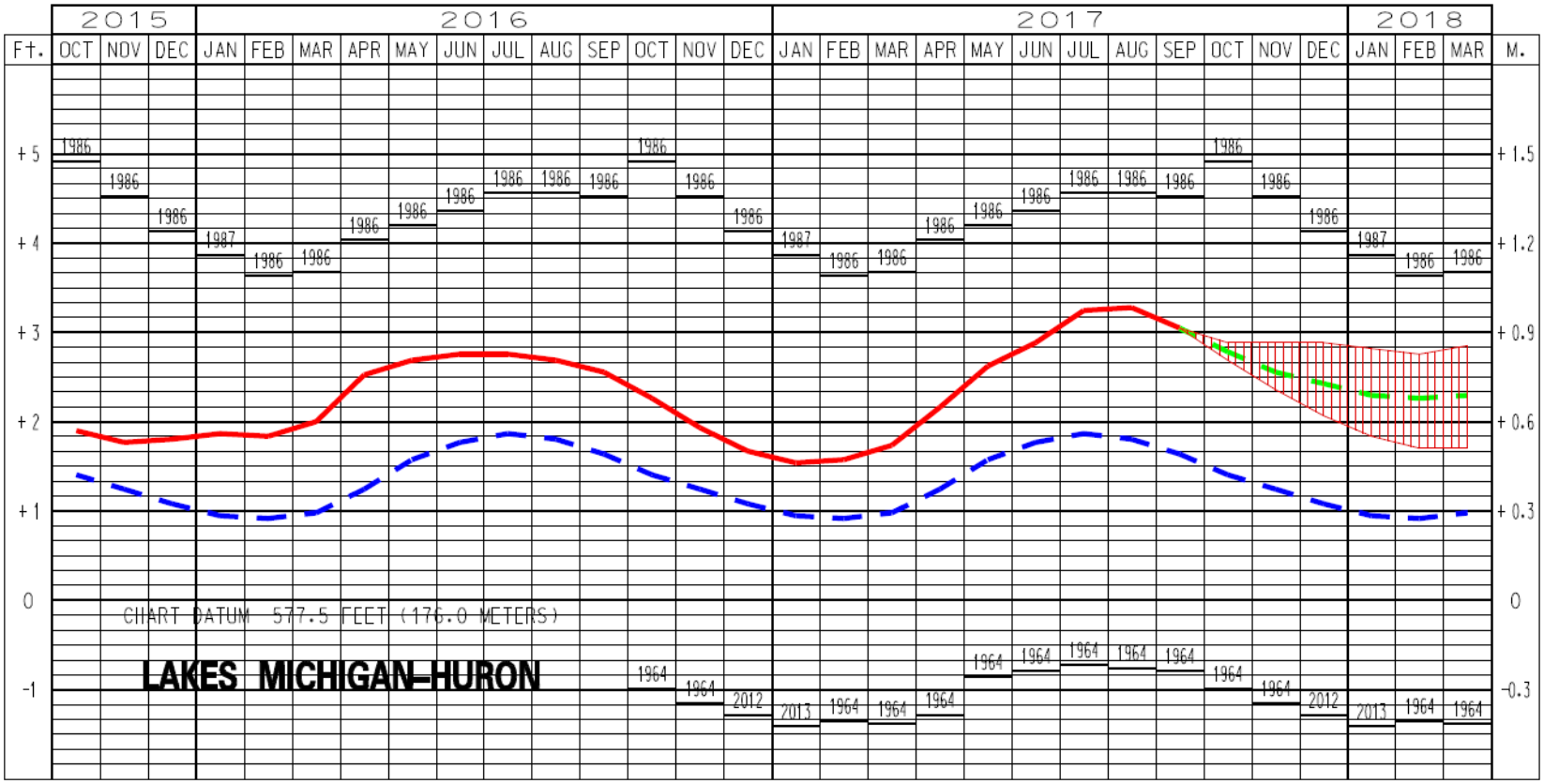
Coastal Outreach and Partnerships in the Upper Great Lakes

- Lake levels and erosion
- Sand supply and shore protection
- Beach Walks with a Scientist
- Coastal Roundtable

LAKES MICHIGAN–HURON WATER LEVELS – OCTOBER 2017



LEGEND

LAKE LEVELS

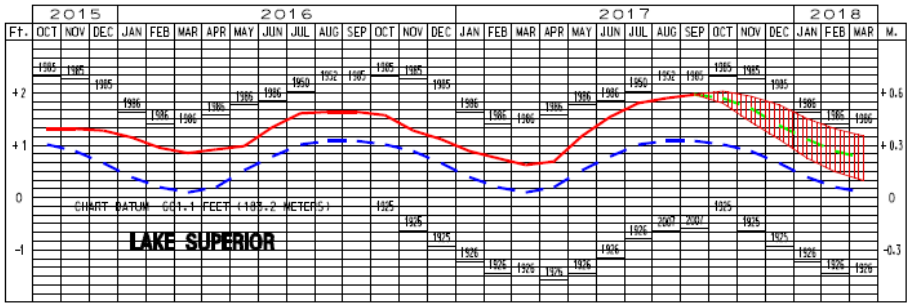
RECORDED

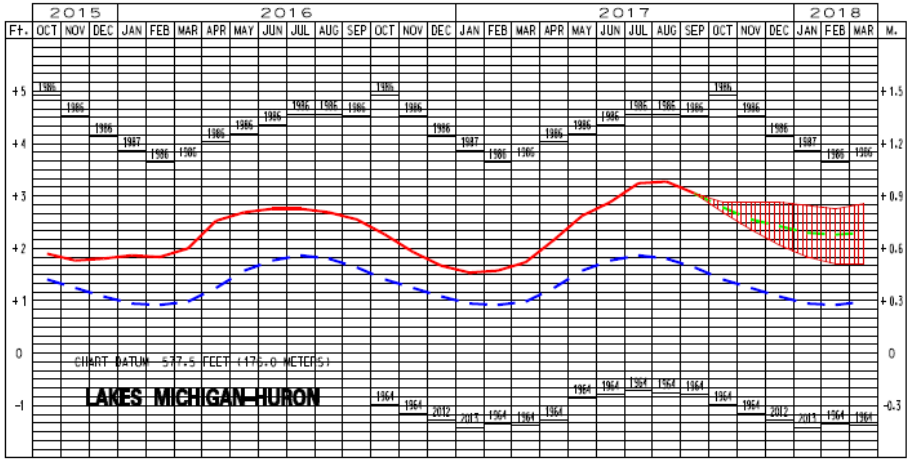
PROJECTED

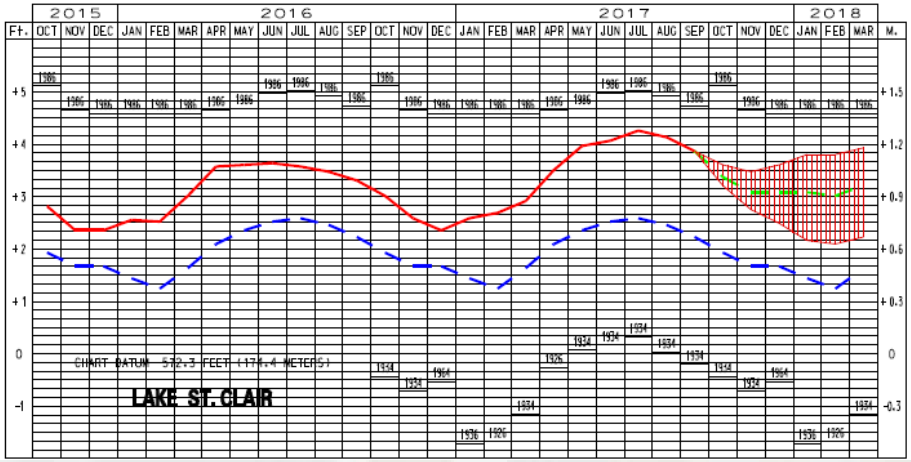
AVERAGE **				
MAXIMUM **	1985	1985	1973	1973
MINIMUM **	1936	1934	1926	1934

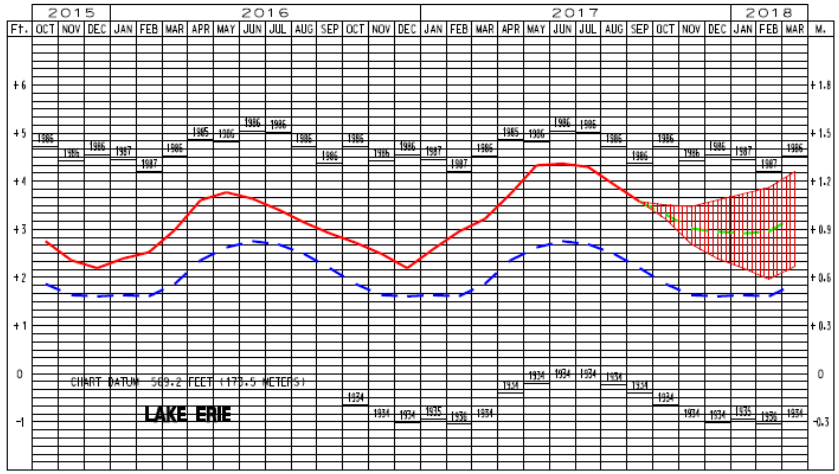
** Average, Maximum and Minimum for period 1918–2016

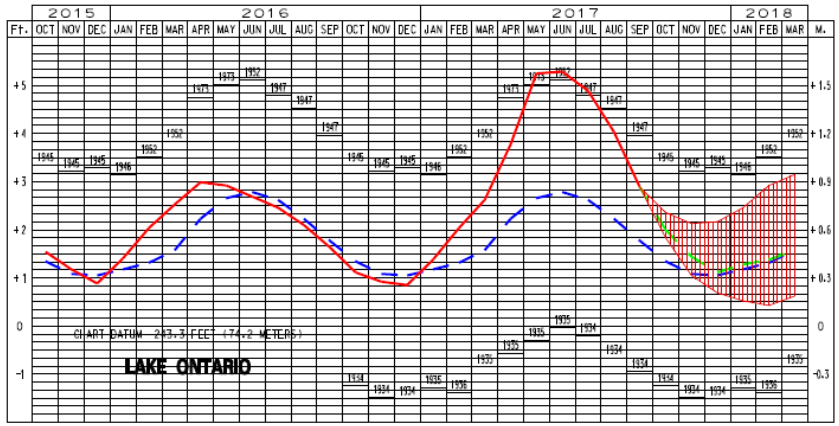
The Rest of the Lakes





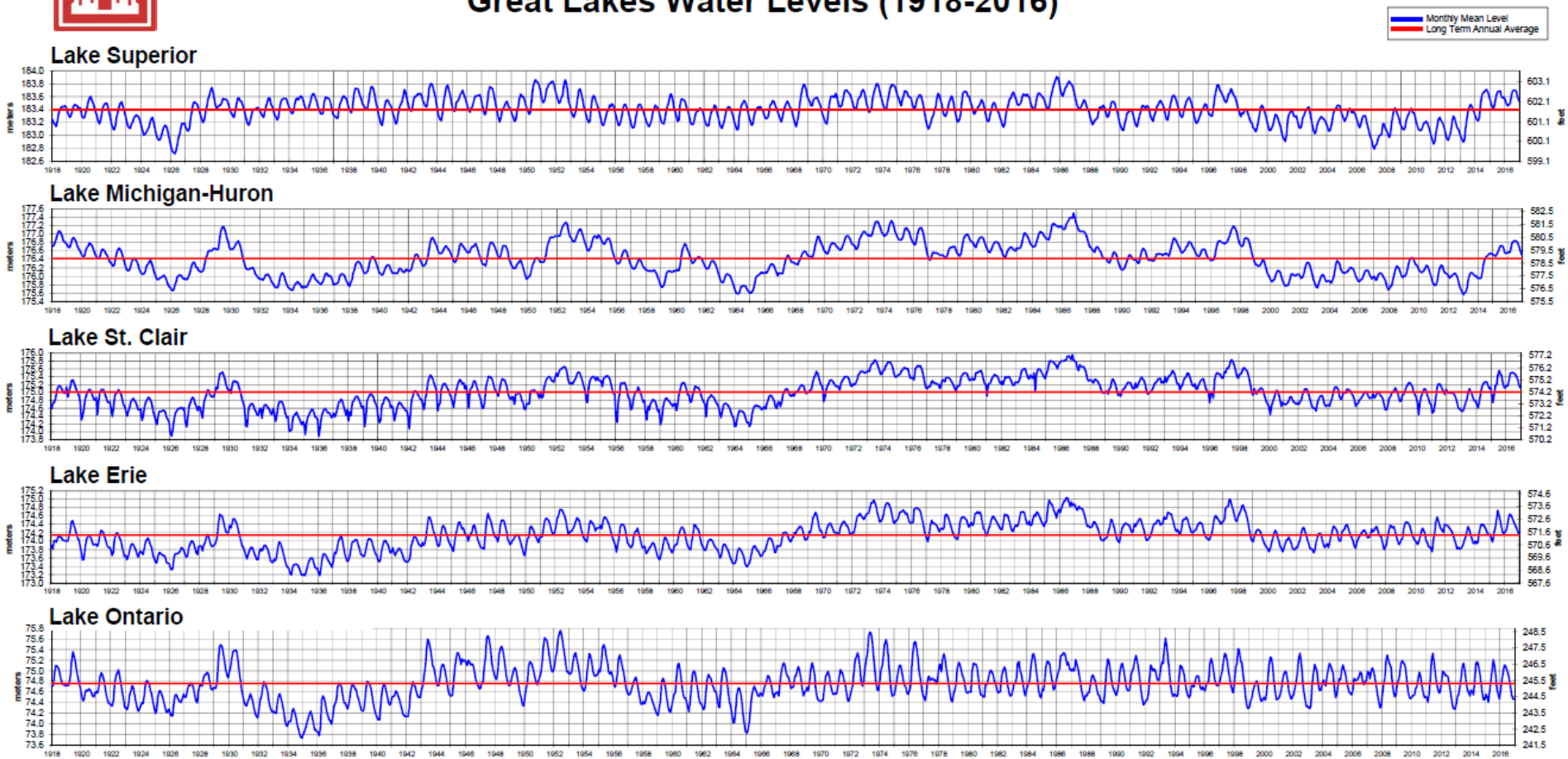






BUILDING STRONG®

Great Lakes Water Levels (1918-2016)



The monthly average levels are based on a network of water level gages located around the lakes.

Elevations are referenced to the International Great Lakes Datum (1985).

Mid- to Late-Holocene Lake Levels

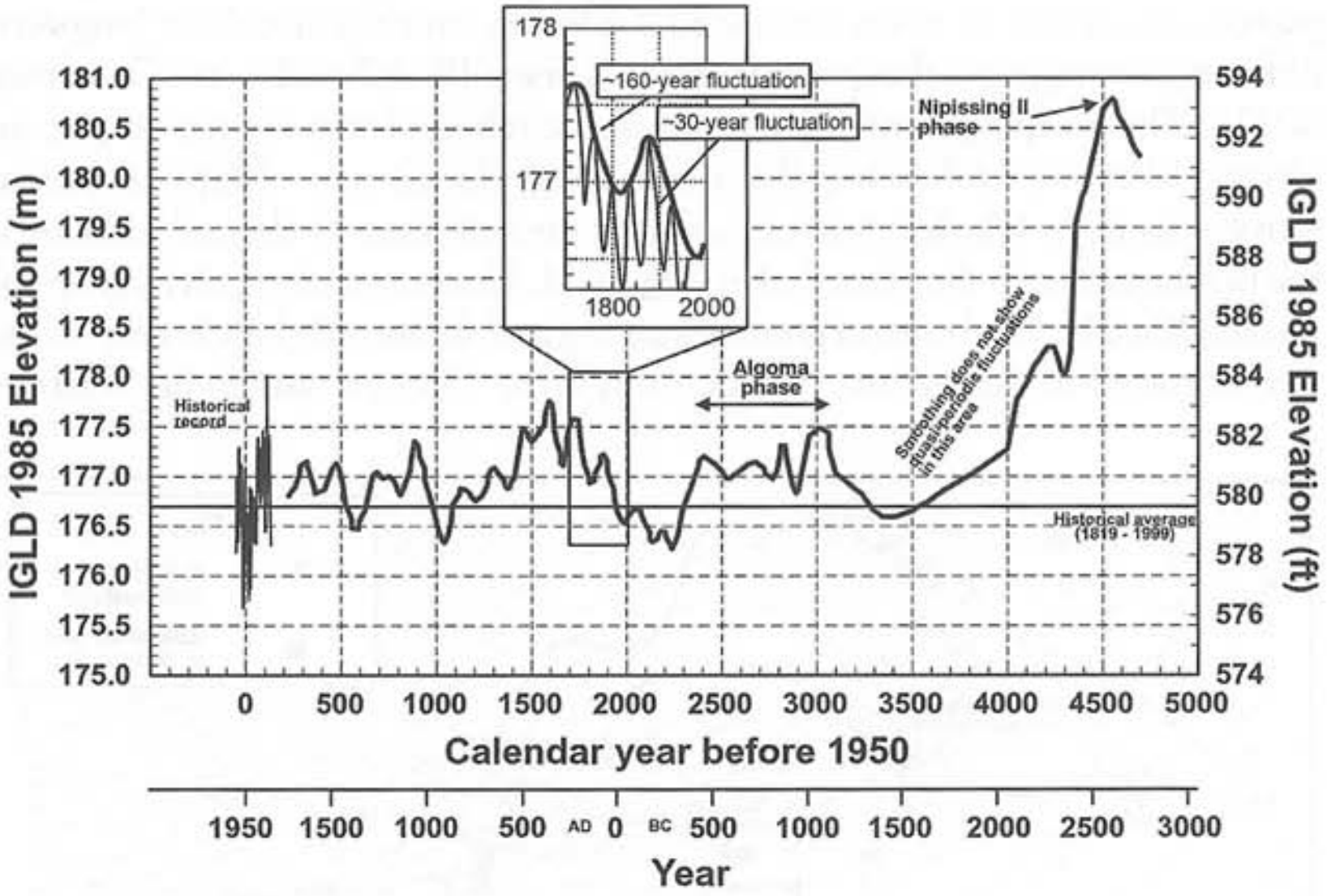


FIGURE 2. Hydrograph of late Holocene lake level in the Lake Michigan/Huron basin. Modified from Baedke and Thompson (2000).

US Army Corps of Engineers

Detroit District

Lake Levels and Erosion

1997

2004

US Army Corps of Engineers

Detroit District

Waves Cause Erosion

(Not Lake Levels!)

Erosion in the Last Two Years

2015

Erosion in the Last Two Years

Erosion in the Last Two Years

Erosion in the Last Two Years

An Elevator to Nowhere

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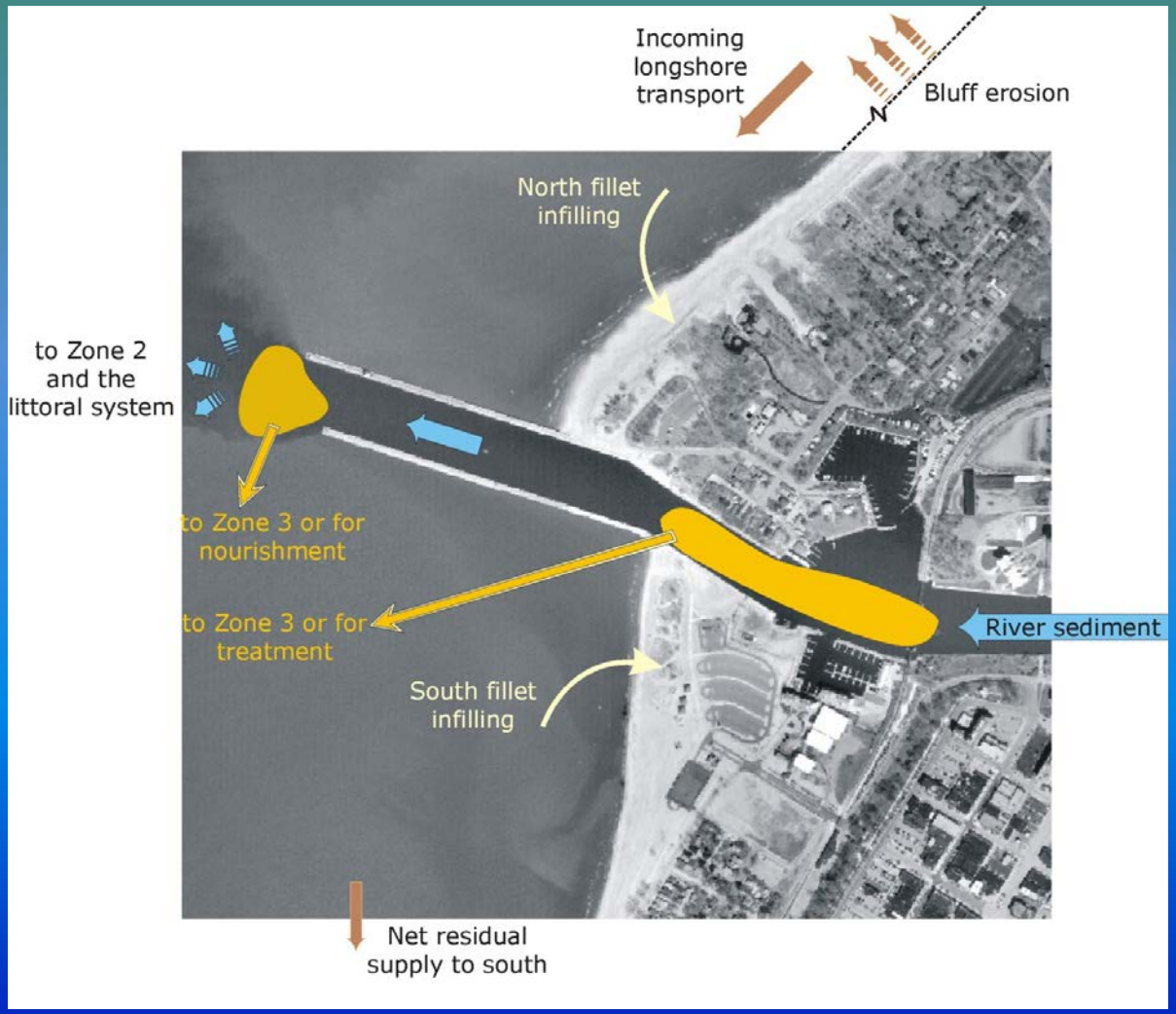
Source of Most of Lake Michigan Littoral Sand is Eroding Coastal Bluffs



Questionable Development Requires Immediate Shore Protection

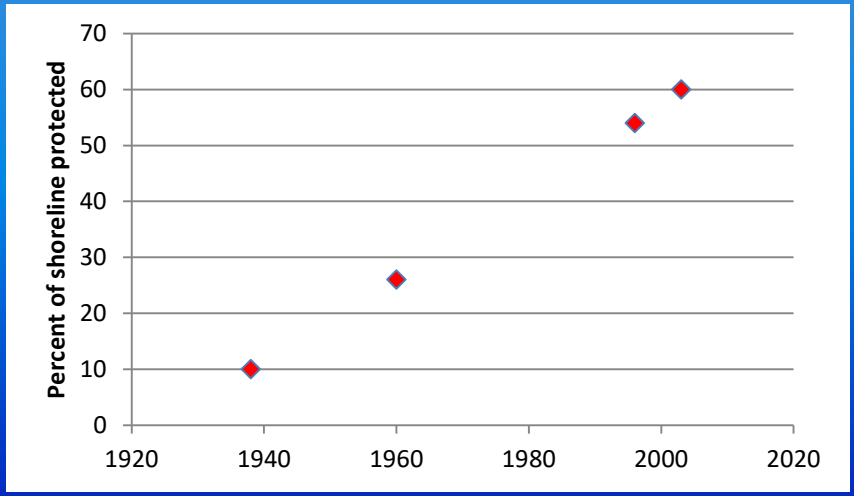
A Pandemic of Shore Protection

Evidence of Reduced Sand Supply

Shore Protection South of St. Joseph

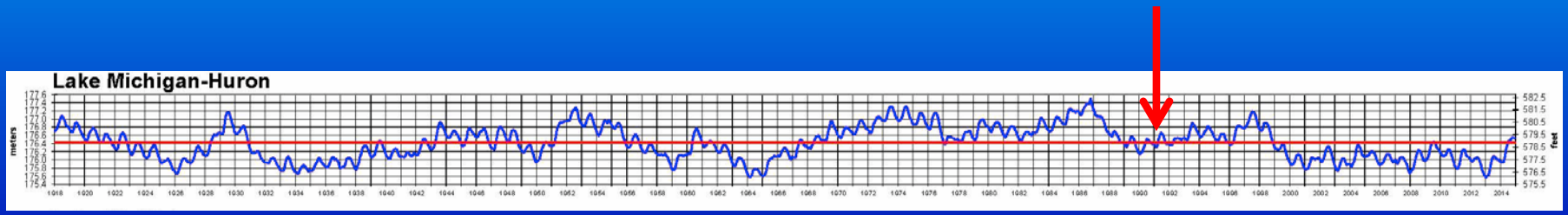
Table 4.3 Shore Protection Development

Date of Air Photo	Reach 1 (5,450 m)		Reach 2 (4,225 m)		Reach 3 (2,700 m)		Reach 4 (1,660 m)		Total (13,500 m)	
		%		%		%		%		%
1938	1,308	24	0	0	0	0	0	0	1,308	10
1960	2,889	53	592	14	0	0	0	0	3,481	26
1996	3,815	70	1,521	36	1,408	64	564	34	7,308	54
2002/03	4,524	83	1,563	37	1,408	64	621	37	8,116	60

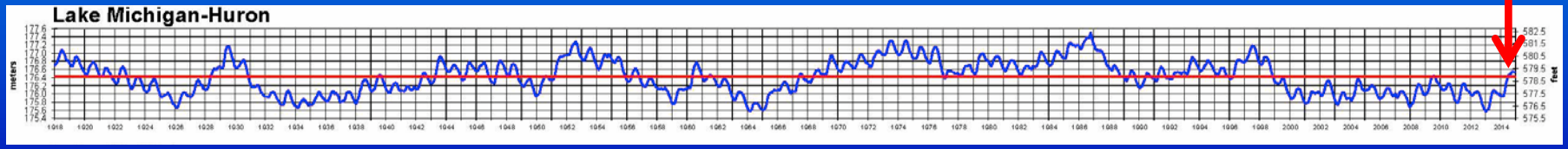


Apr 1991
Water Level : **Average**

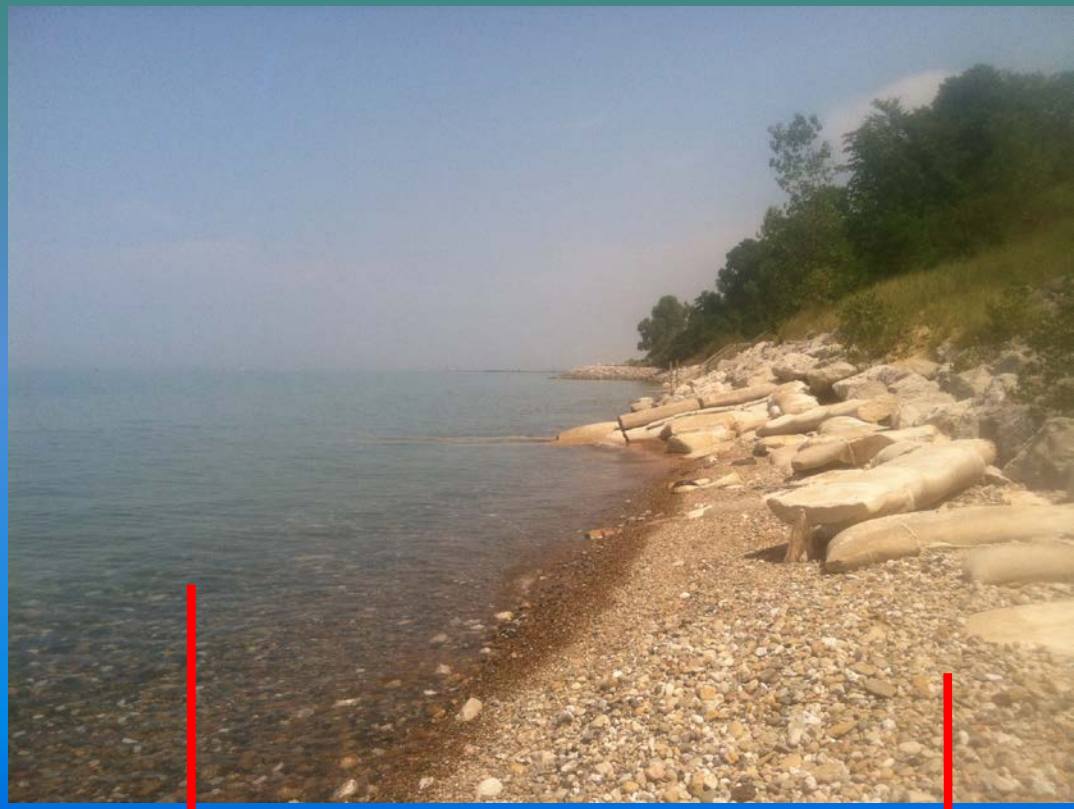
Pump Station →

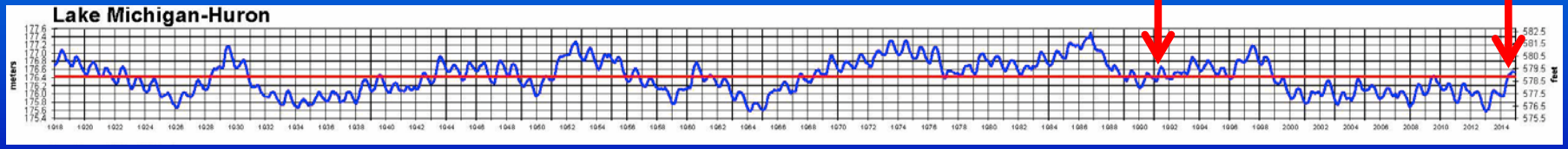


Aug 2014
Water Level : **Average**



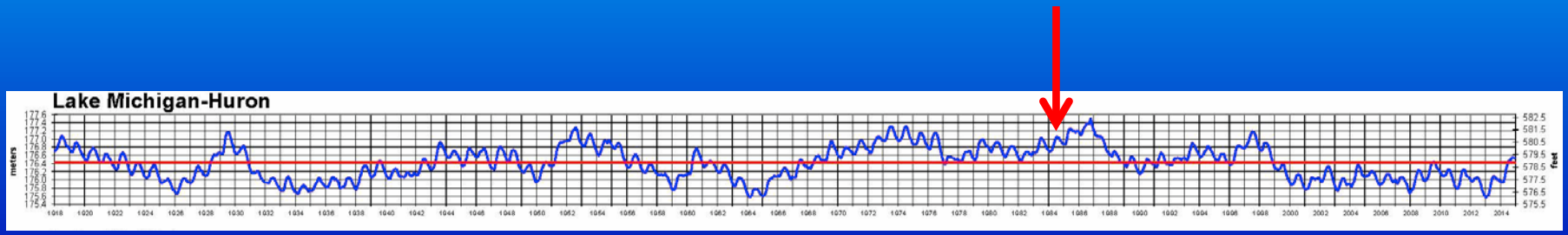
Apr 1991 vs. Aug 2014
Water Level : **Average**





July 1984

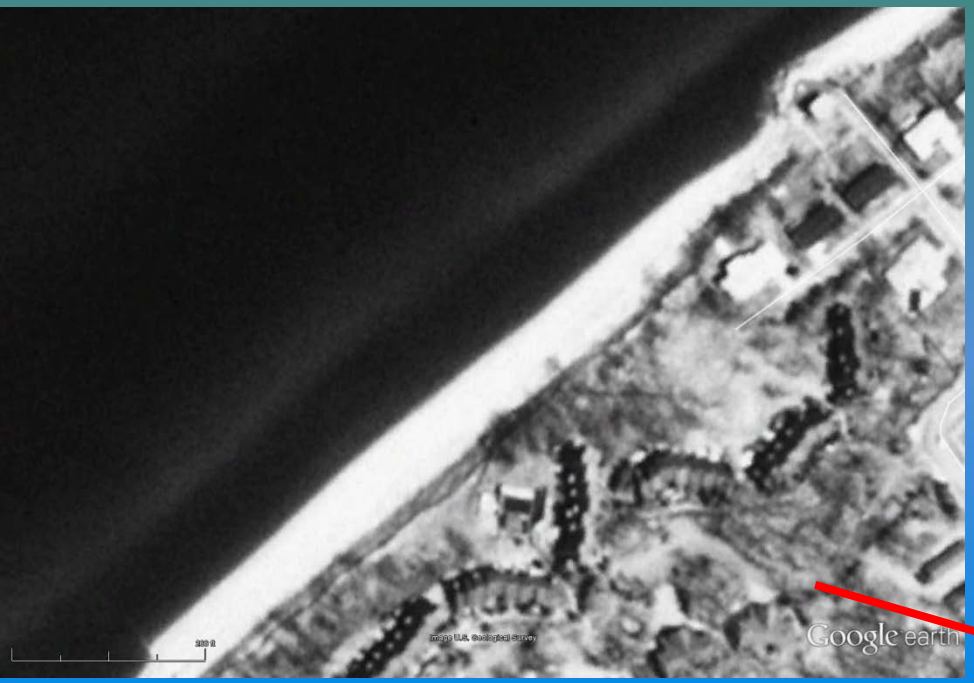
Water Level : **Above Average**



Evidence of Reduced Sand Supply

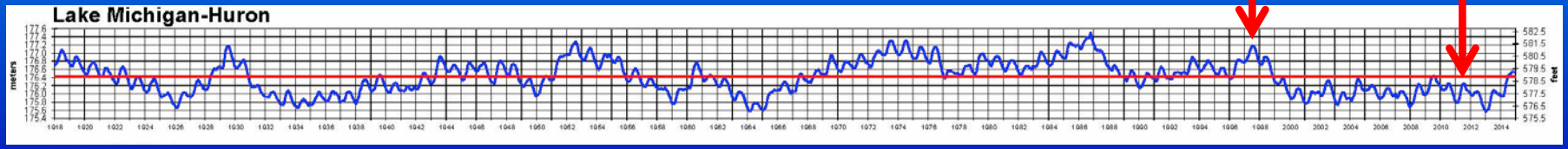
Same Scale

1997 – High Water



2011 – Low Water

Oldest and newest photo on Google Earth – This analysis could be expanded using our photo data base (1983, 1989-2002 (14 continuous years) and Regulatory's data base)



Coastal Outreach and Partnerships in the Upper Great Lakes

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- Sand supply and shore protection
- Beach Walks with a Scientist
- Coastal Roundtable

Outreach Was Needed to Tell This Story

Beach Walk
With a Scientist

Take a stroll down the beautiful beaches at Van Buren State park with a coastal scientist as he discusses coastal processes and erosion.

Some of the topics to be discussed:

- The effect of lake levels on coastal erosion (and the lake level forecast for the next 6 months)
- What other things affect coastal erosion
  - Waves
  - Harbors
  - Shore protection structures
  - Ice
- The role of dunes in protecting coastal bluffs
- Coastal geology and erosion

When: Thursday, May 26, 2016

7:00—8:30 pm (rain or shine)

Where: Van Buren State Park

23960 Ruggles Rd

(Meet at northwest corner of middle parking lot)

About the Speaker:

Outreach Was Needed to Tell This Story

US Army Corps of Engineers ®
Detroit District

Great Lakes Coastal Processes

Meet at the beautiful beaches of Hoffmaster State Park with U.S. Army Corps of Engineers coastal scientists and engineers as we discuss coastal processes, erosion and Corps programs.

Some of the activities and topics to be discussed:

- The effect of lake levels on coastal erosion (and the lake level forecast for the next 6 months)
- What other things affect coastal erosion
  - Waves
  - Harbors
  - Shore protection structures
  - Ice
- The role of dunes in protecting coastal bluffs
- Coastal geology and erosion
- Summary of Corps Regulatory Program and permitting requirements
- Brief overview of Corps Planning Programs and Authorities (specifically Section 14 and 206)
- An interactive beach walk to illustrate these coastal processes

When: Tuesday, September 12, 2017
7:00–9:00 pm (rain or shine)

Where: Hoffmaster State Park
6585 Lake Harbor Rd, Muskegon, MI 49441
(Meet by the concessions in the parking lot)

About the Speaker(s):

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Coastal Roundtable

- Meet Quarterly
- Composed of local, state and federal agencies with an interest in coastal sustainability
  - MDEQ Coastal Zone Management
  - MDEQ Water Resources Division
  - MDEQ Office of Great Lakes
  - MSU Geography Dept
  - MSU Geology Dept
  - WMU Geology Dept
  - Calvin College, Geology Dept
  - USGS, Michigan WSC
  - USGS, Great Lakes Science Center
  - Michigan Sea Grant
  - U of Waterloo, Geology Dept
  - U of Michigan, Urban and Regional Planning
  - Michigan Geological Survey
  - USACE Detroit District
  - Michigan Tech University
  - ASBPA Great Lakes Chapter
- Needed an issue to all rally around – resurrect the Lake Michigan sand supply
- Share field and training experiences
- Build trusting relationships
- Education
- Agency update of activities

Questions

Jim Selegean, Ph.D., P.E., P.H.
Hydraulic Engineer
USACE – Detroit

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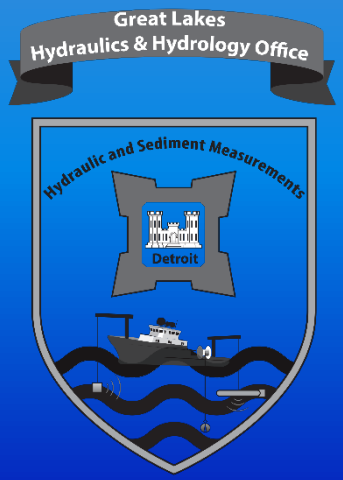
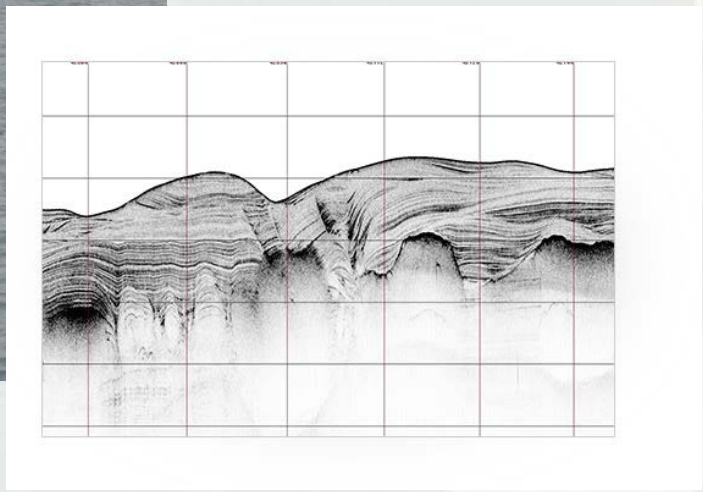
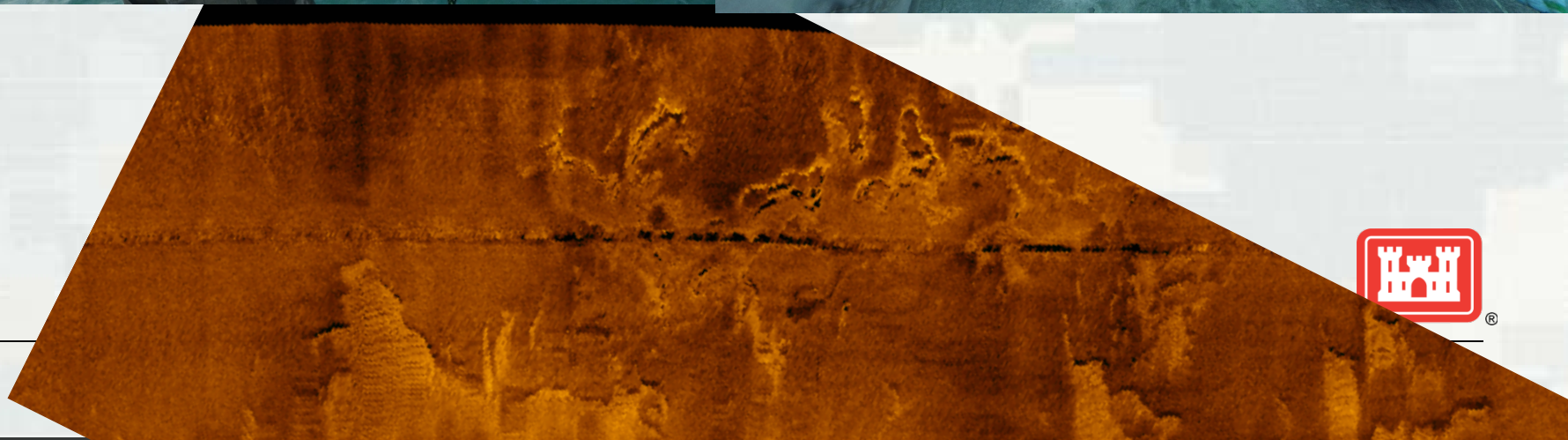


Monitoring Sand Supply
Sub-bottom Profiling



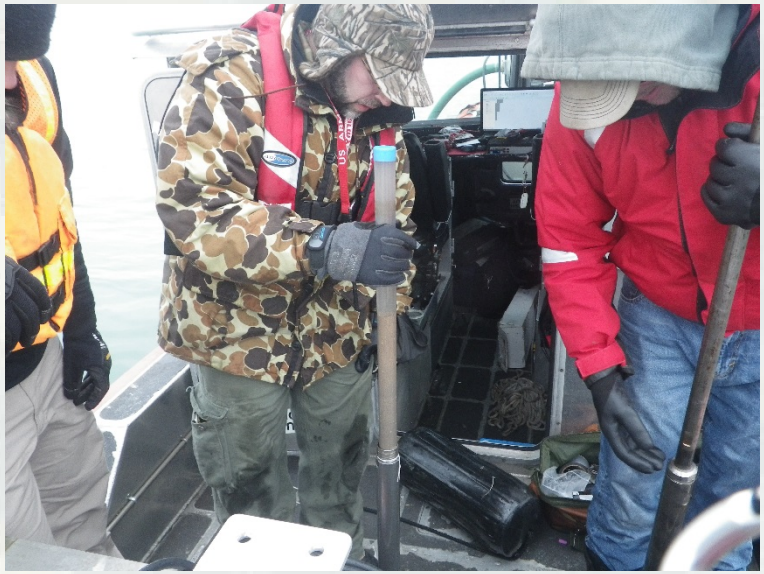
Monitoring Sand Supply

Side Scan Sonar



Monitoring Sand Supply

Cores



Grab Samples

Jet Probing

Underwater Video