

Coastal Outreach and Partnerships in the Upper Great Lakes

26 October 2017

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¹Detroit District, ²ERDC

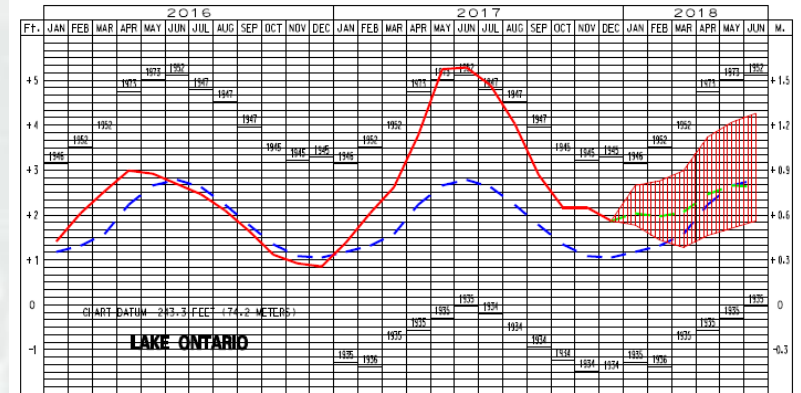
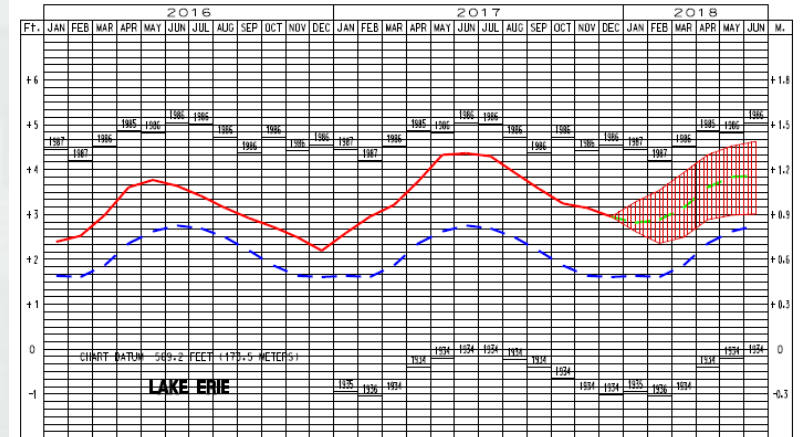
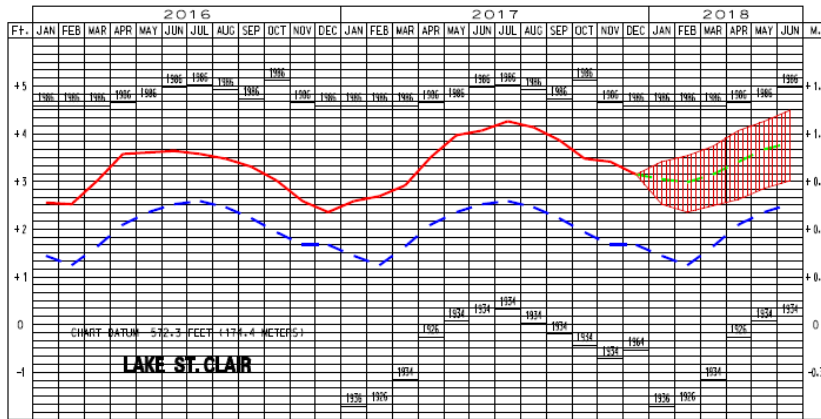
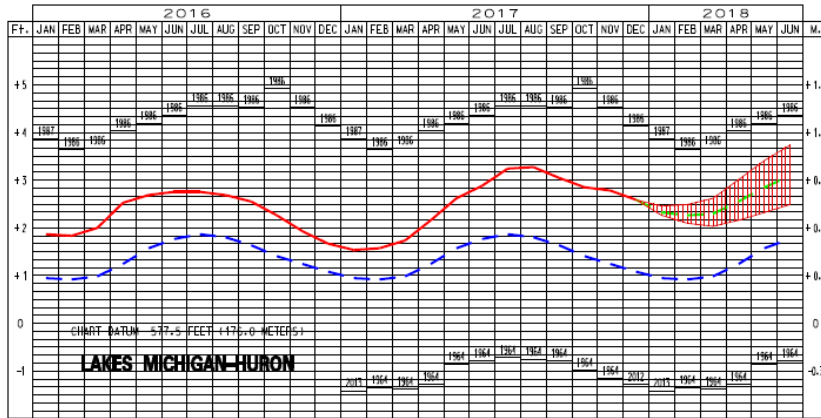
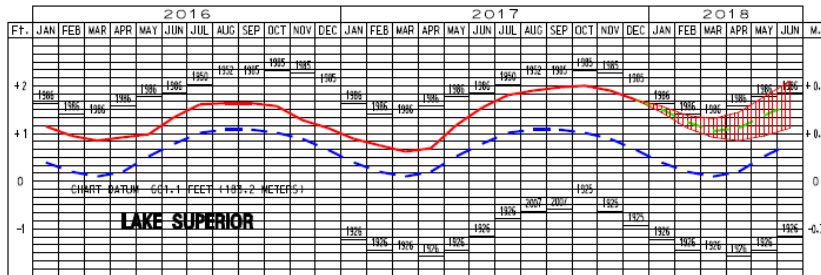


Coastal Outreach and Partnerships in the Upper Great Lakes

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



The Rest of the Lakes



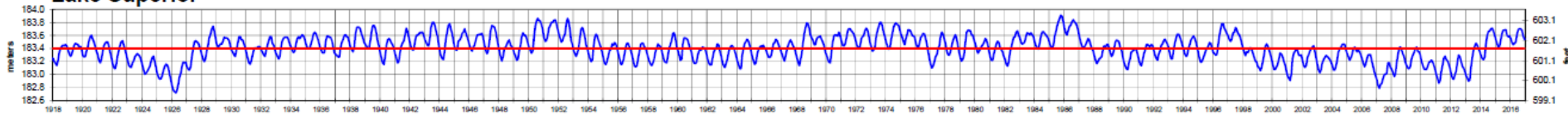
BUILDING STRONG®



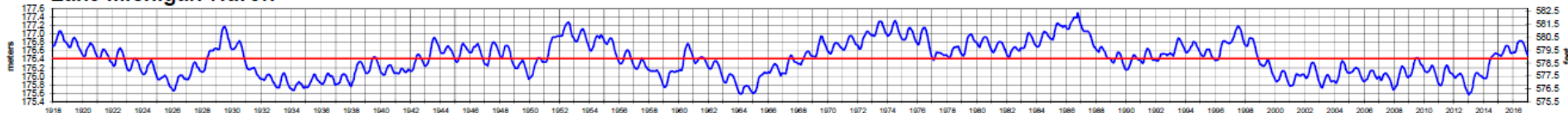
Great Lakes Water Levels (1918-2016)

Monthly Mean Level
Long Term Annual Average

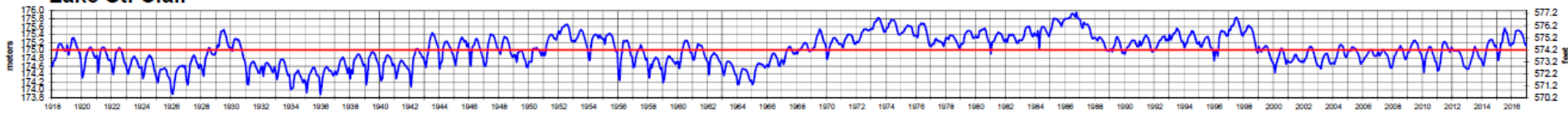
Lake Superior



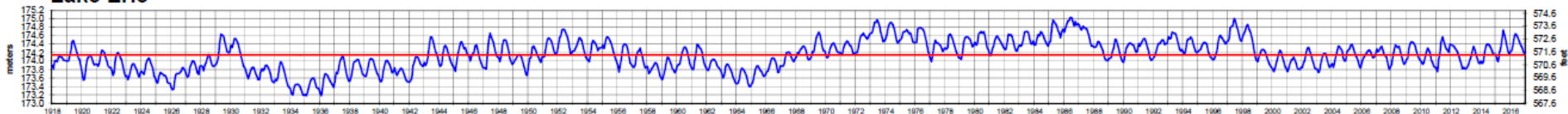
Lake Michigan-Huron



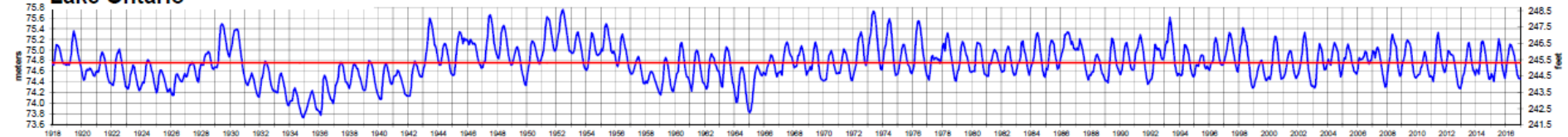
Lake St. Clair



Lake Erie



Lake Ontario



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

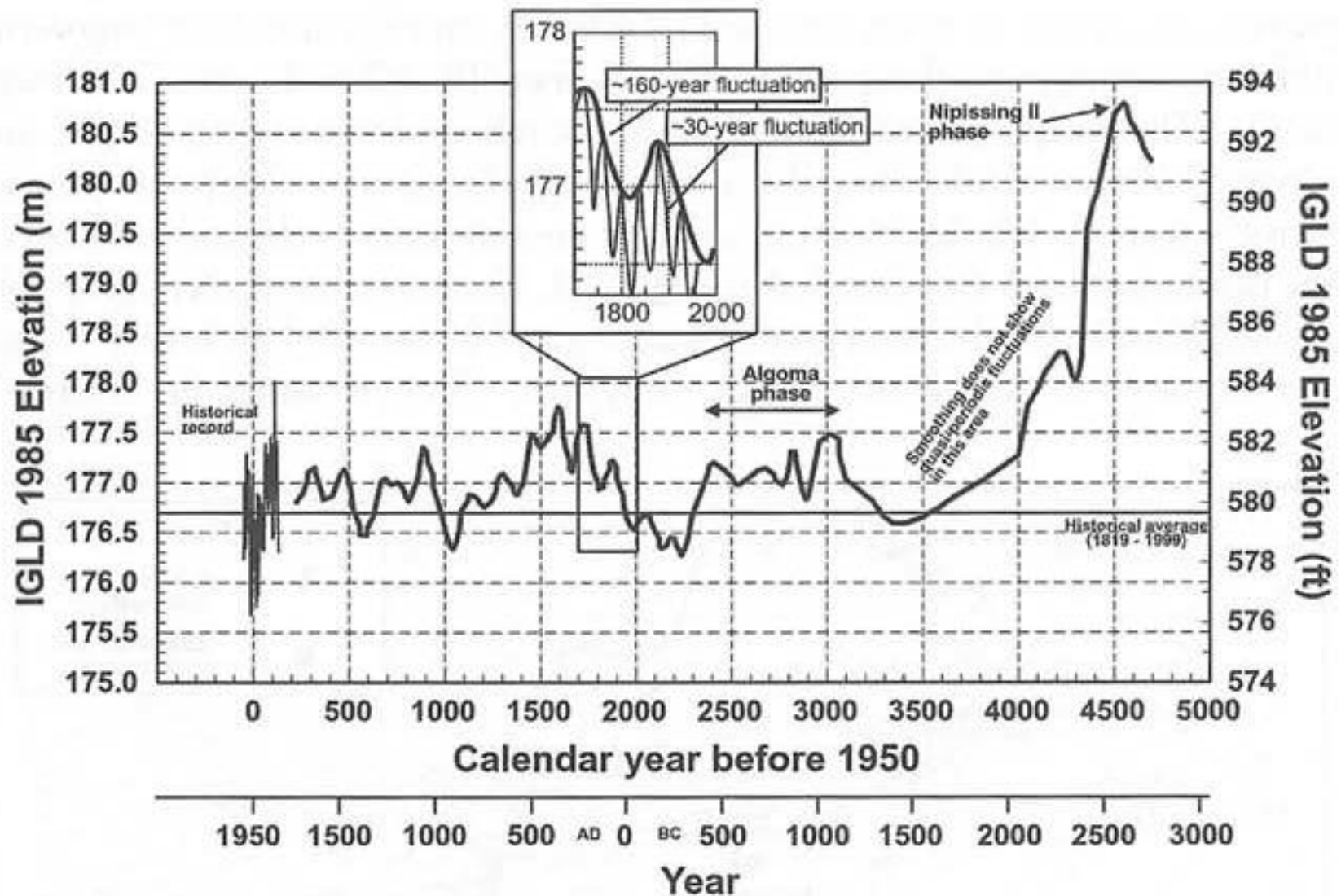


FIGURE 2. Hydrograph of late Holocene lake level in the Lake Michigan/Huron basin. Modified from Baedke and Thompson (2000).



US Army Corps
of Engineers

Detroit District

Lake Levels and Erosion

2004

1997





US Army Corps
of Engineers

Detroit District

Waves Cause Erosion

(Not Lake Levels!)



Erosion in the Last Two Years



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Erosion in the Last Two Years



Erosion in the Last Two Years



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Erosion in the Last Two Years



An Elevator to Nowhere



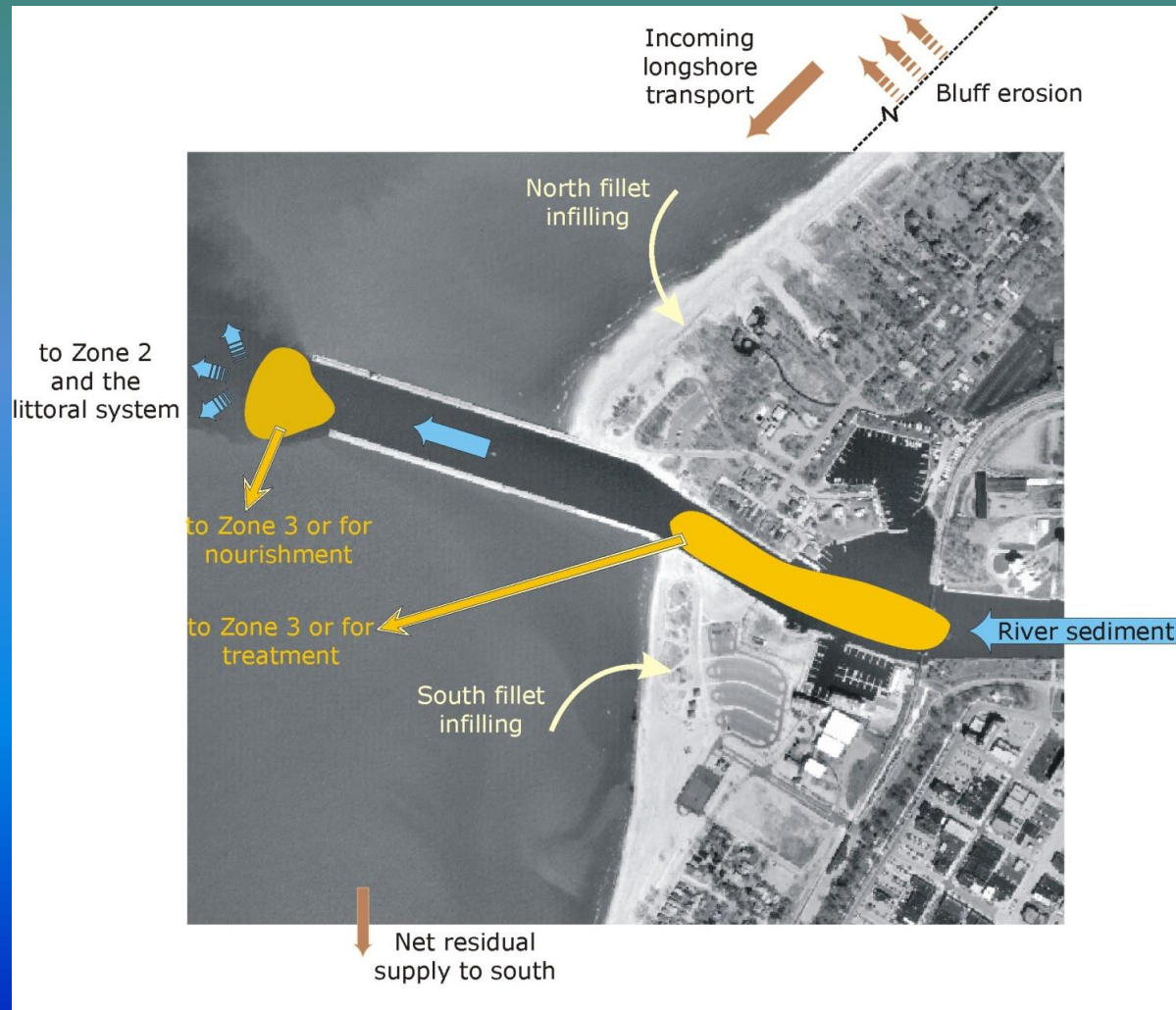
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Source of Most of Lake Michigan Littoral Sand is Eroding Coastal Bluffs



Questionable Development Requires Immediate Shore Protection



A Pandemic of Shore Protection

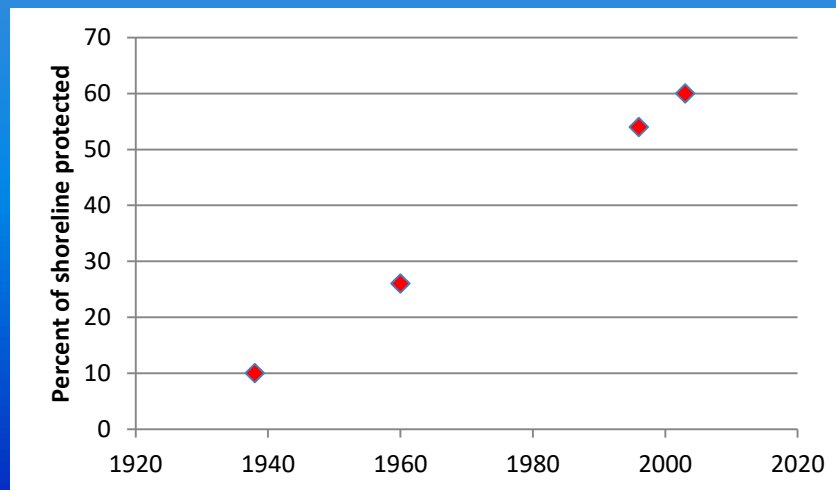


Evidence of Reduced Sand Supply

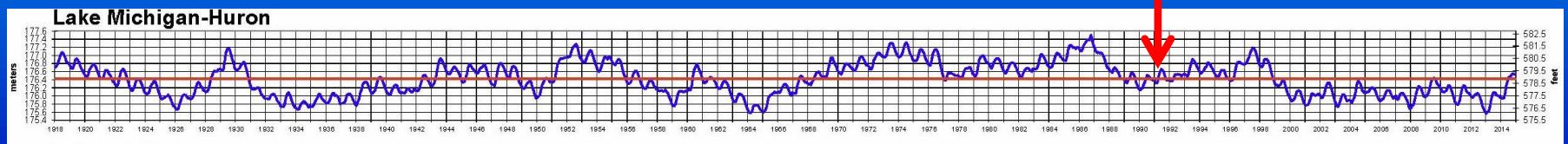
Shore Protection South of St. Joseph

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

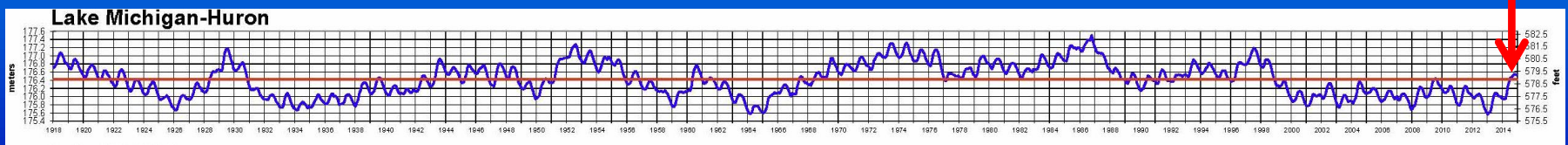


Apr 1991
Water Level : Average

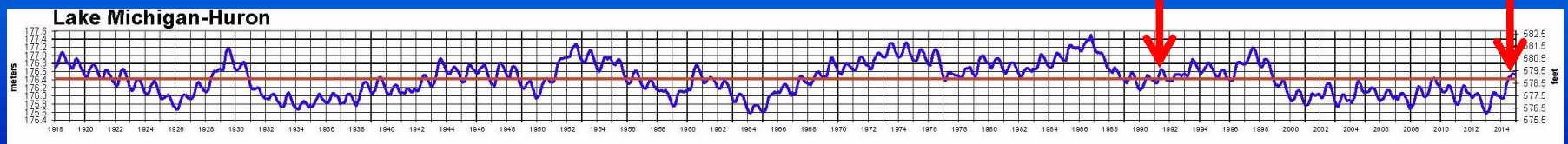
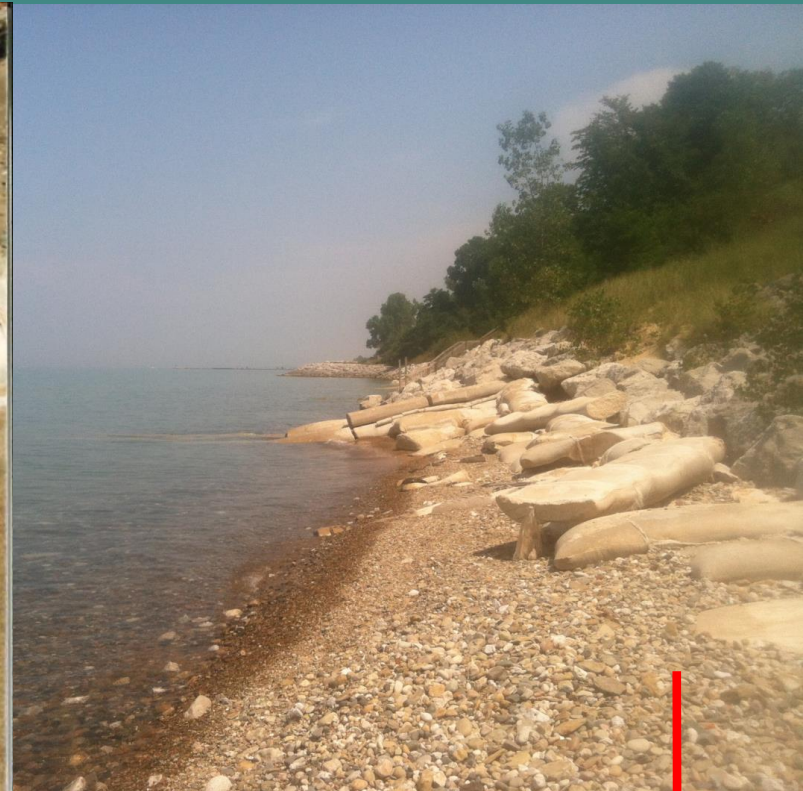


Aug 2014

Water Level : Average

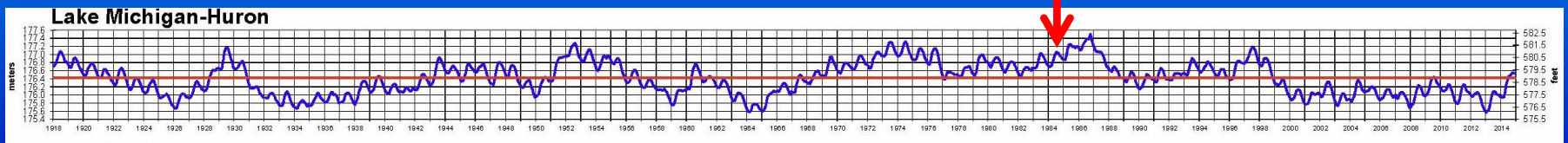


Apr 1991 vs. Aug 2014 Water Level : Average



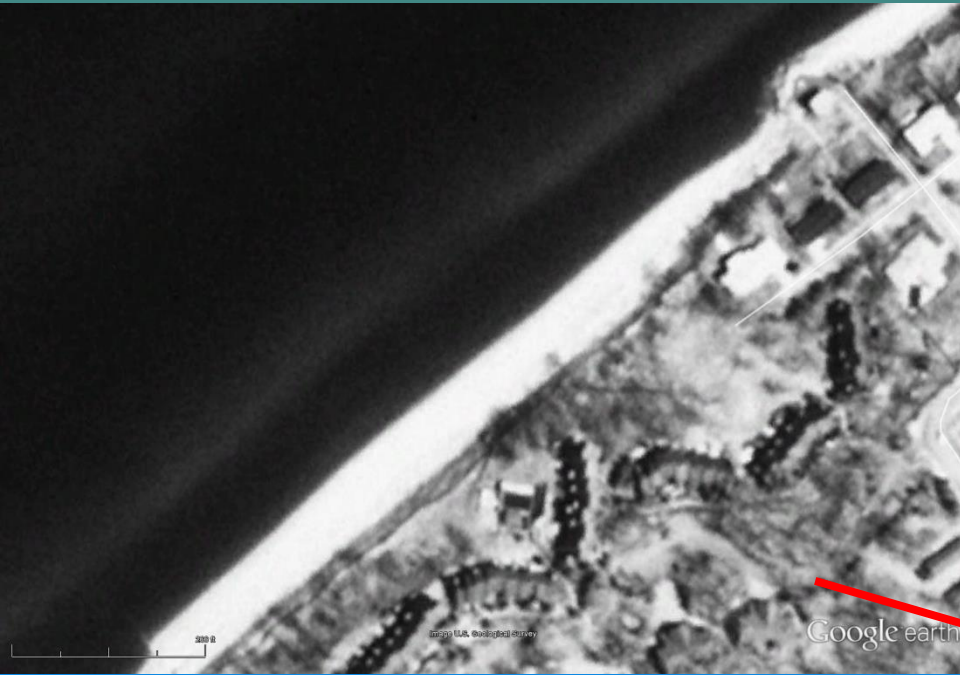
July 1984

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)



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- 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:

Dr. Jim Salomon, D.E., Ph.D., is a hydrologist and geologist with the Great Lakes Water Science & Technology Center.

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):

Coastal Outreach and Partnerships in the Upper Great Lakes

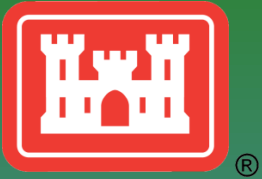
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Coastal Roundtable

- 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



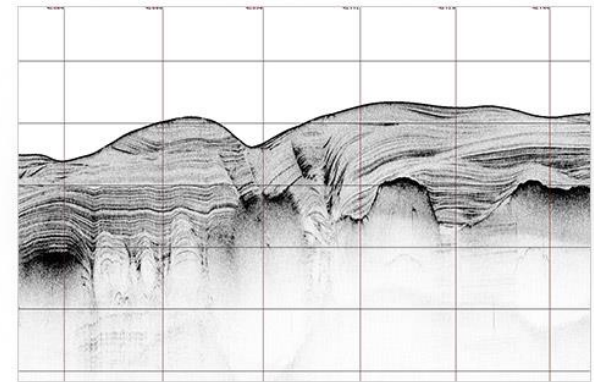
Jim Selegian, Ph.D., P.E., P.H.
Hydraulic Engineer
USACE – Detroit

James.p.selegian@usace.army.mil



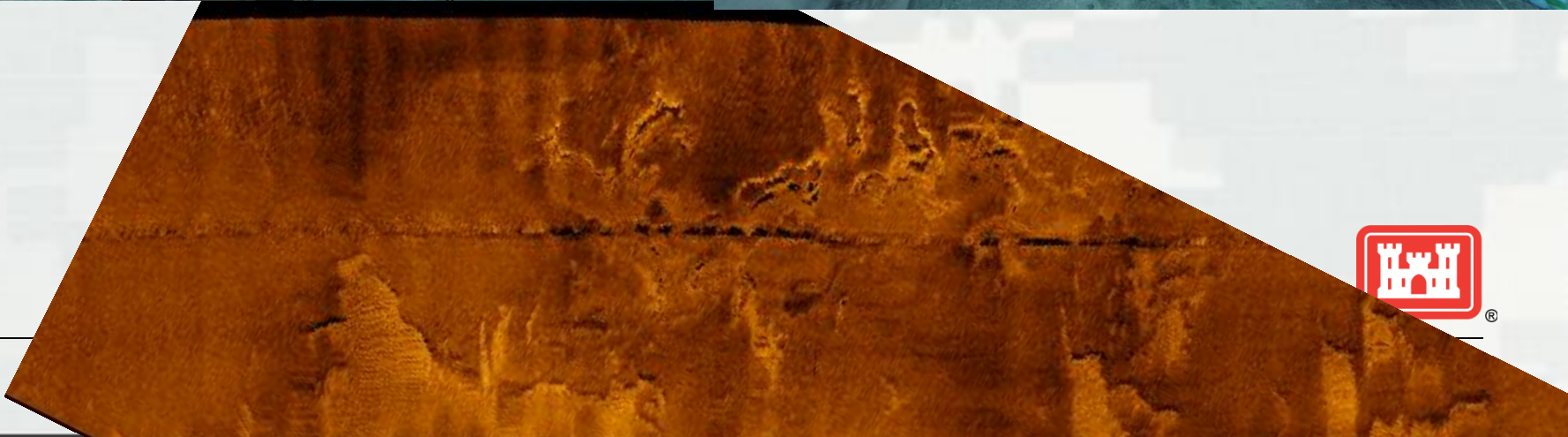
Monitoring Sand Supply

Sub-bottom Profiling



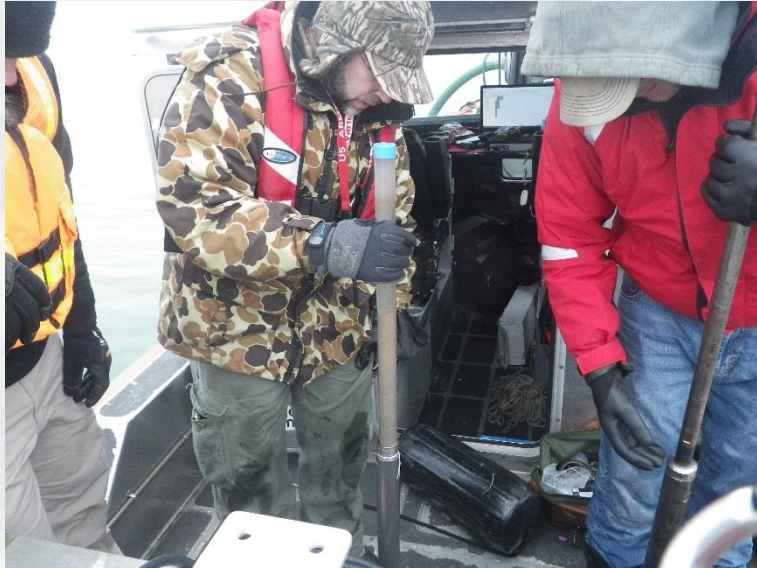
Monitoring Sand Supply

Side Scan Sonar



Monitoring Sand Supply

Cores



Grab Samples



Jet Probing



Underwater Video

