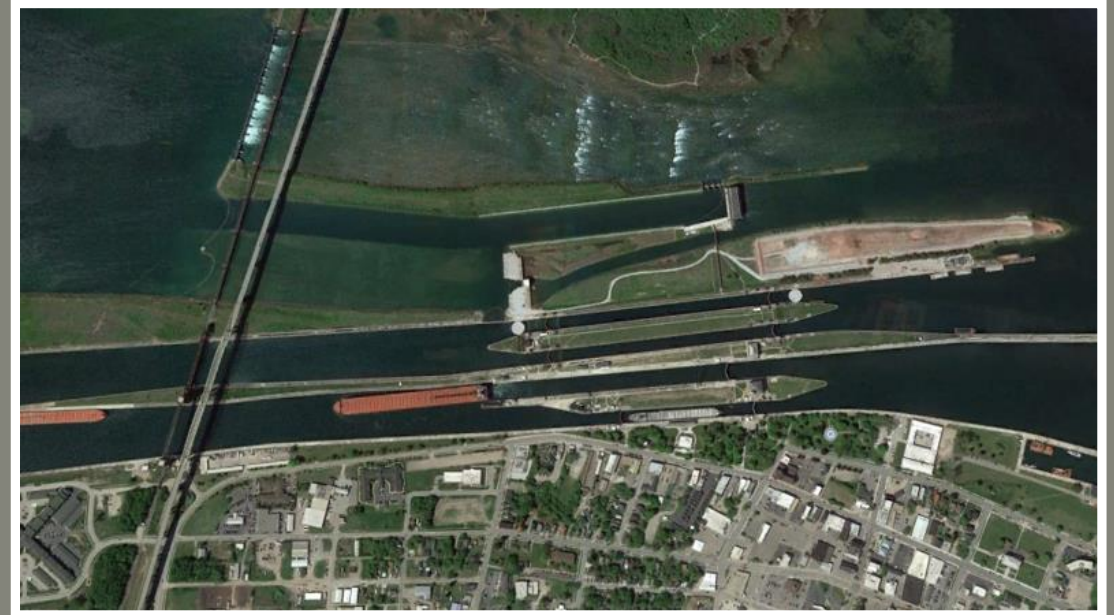


# Great Lakes Navigation Update

Marie T. Strum, P.E.  
Great Lakes Navigation Lead  
USACE, Detroit District

June 10, 2019



*"The views, opinions and findings contained in this report are those of the authors(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation."*

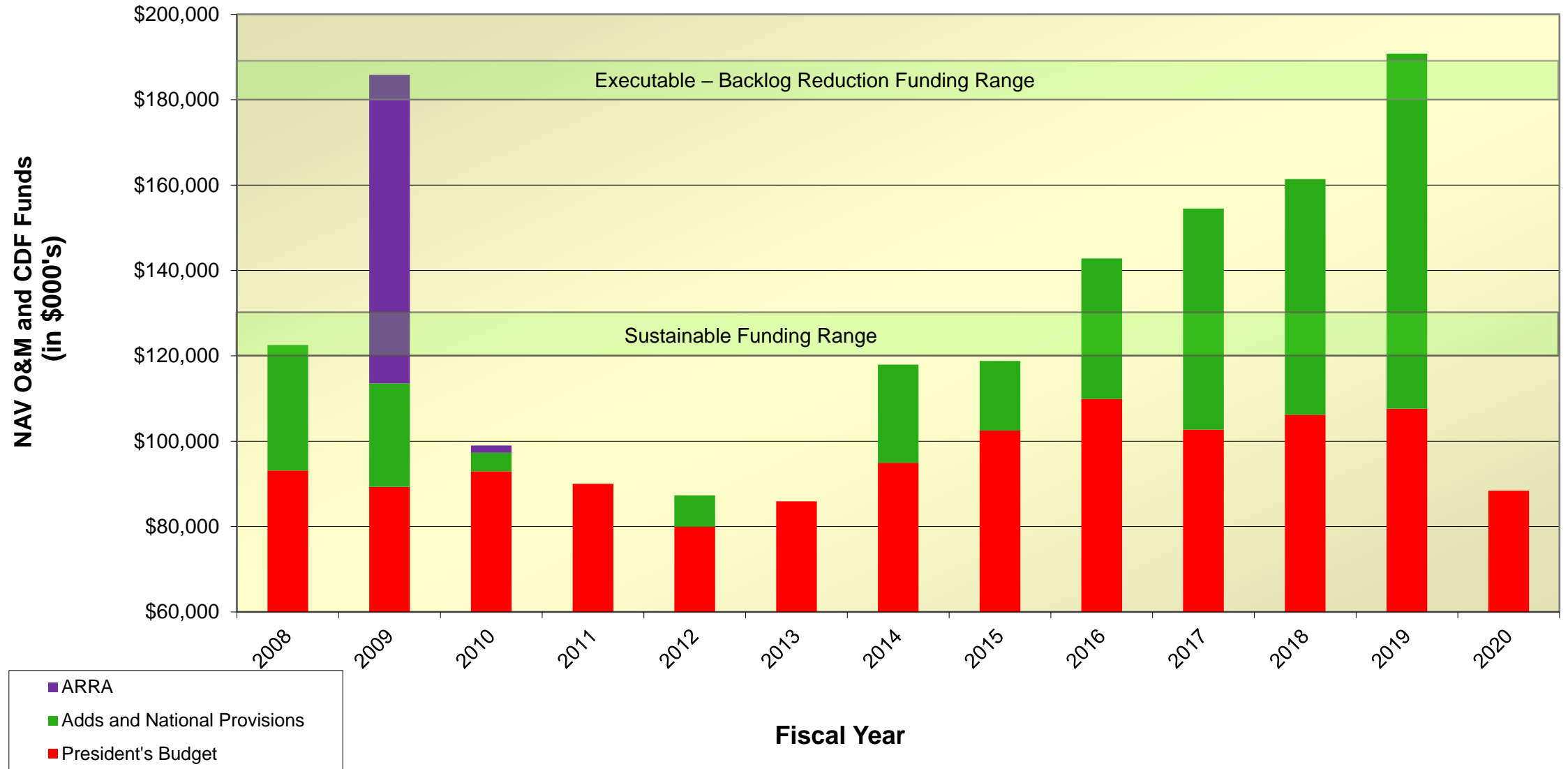
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*and Taking Care of People!*



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# GL NAVIGATION FUNDING HISTORY



# FY18 GL Navigation President's Budget

## + Work Plan Funding

Great Lakes Navigation Operations & Maintenance

\$106.2M + \$52.4M = \$158.6M

### Key Items

\$37.9M + \$17.8M in Dredging (40 projects: 16 + 24) 4.5M CY

\$11.3M in Dredged Material Management

\$15.8M in Soo Asset Renewal

\$19.0M in navigation structure repair (by contract)



# FY 19 GREAT LAKES NAVIGATION

## PRESIDENT'S BUDGET + WORKPLAN

---

Great Lakes Navigation Operations & Maintenance

**\$107.5M + \$83.2M = \$190.7M**

### Key Items

\$46.3M in Dredging (25 projects; 3.3M cy) (\$38.0M + \$8.35M)

\$14.85M in Dredged Material Management (\$11.0M + \$3.85M)

\$51.3M in Navigation Structure Repair (\$2.2M + \$49.1M)

\$17.4M in Soo Locks Maintenance (\$2.4M + \$15M)

\$4.8 in Black Rock Lock Maintenance (\$4.25 + \$0.55M)

\$4.6M in Chicago Lock Maintenance (\$4.6M)



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# FY19 PBUD + WORK PLAN DREDGING (\$46.4M)

---

Ashtabula Harbor  
Burns Harbor  
Calumet Harbor  
Cleveland Harbor +  
Conneaut Harbor  
Detroit River +  
Duluth-Superior  
Fairport Harbor  
Grand Haven Harbor  
Green Bay Harbor  
Holland Harbor  
Indiana Harbor  
Ludington Harbor

Milwaukee Harbor  
Rochester Harbor  
Sandusky Harbor  
St. Clair River +  
St. Joseph River  
Toledo Harbor  
Waukegan Harbor  
Manitowoc Harbor  
Sturgeon Bay Harbor  
Kewaunee Harbor  
Buffalo Harbor  
Oswego Harbor



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# FY19 PBUD + WORK PLAN

## STRUCTURE REPAIR (\$51.3M)

---

### Engineering & Design

Grand Haven Harbor  
Frankfort Harbor  
Keweenaw Waterway  
Manistee Harbor  
Manistique Harbor  
Kenosha Harbor  
Kewaunee Harbor  
Cleveland Harbor

### Minor Repairs (Gov't Plant)

Hammond Bay Harbor  
Lexington Harbor

### Contract Structure Repair

Buffalo Harbor  
Chicago Harbor  
Chicago Lock North Pier  
Duluth-Superior Harbor  
Lorain Harbor  
Muskegon Harbor  
Oswego Harbor  
Rochester Harbor  
Sheboygan Harbor



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# PURPOSE OF GREAT LAKES NAVIGATION STRUCTURES

## Authorized purposes:

- Safeguard navigation from wave and ice damage
- Protect navigation channel from sediment shoaling
- Protect navigation channel from wave action (preserve the design wave climate to allow pilots to navigate the channel)

## Additional benefits:

- Protect other structures within harbor such as CDFs
- Protect critical city infrastructure (buildings, roads, power plants, water/wastewater plants)
- Provide essential flood and storm protection



St. Joseph Harbor



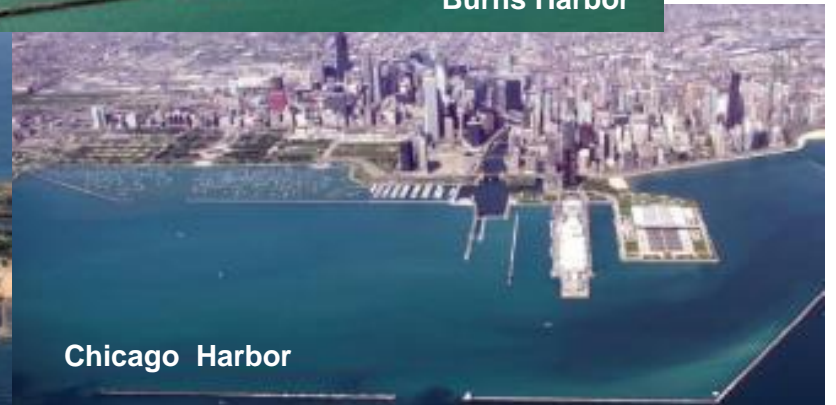
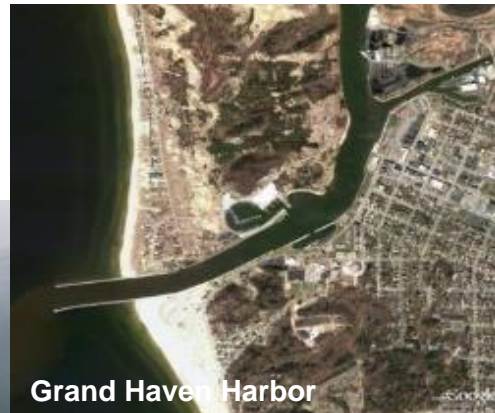
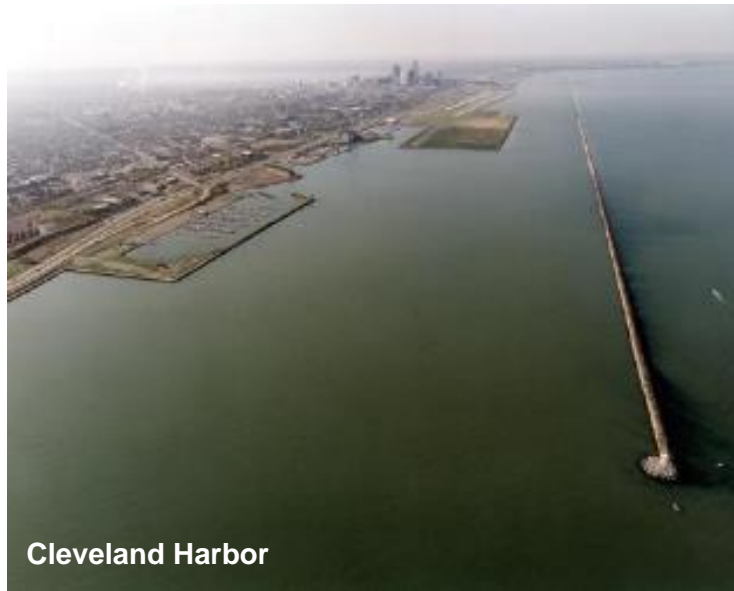
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# GREAT LAKES NAVIGATION STRUCTURES

---

- 104+ miles of navigation structures on the Great Lakes
- Structures include piers, jetties, revetments, and breakwaters
- Most were built between 1860 and 1940
- Jetties and piers were constructed perpendicular to shore to keep the channel open for navigation
- Off shore breakwaters were constructed to allow safe navigation entry to harbors and channels; they are critical to keeping dredging needs down.





# FY 19 GREAT LAKES NAVIGATION

## PRESIDENT'S BUDGET + WORKPLAN

---

Great Lakes Construction General

**\$32.388M New Soo Lock**

**\$1.1M Calumet DMDF Design**



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# FY 20 GREAT LAKES NAVIGATION PRESIDENT'S BUDGET

---

Great Lakes Navigation Operations & Maintenance  
**\$88.4M**

## Key Items

\$27.8M in Dredging (12 projects; 2.3M cy)

\$6.0M in Dredged Material Management

\$2.6M in Soo Locks Maintenance

Navigation Construction General

\$75.33M New Lock Approach Walls



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# Harbor Maintenance Trust Fund

- Prior to 1986, GL dredging was conducted at full federal expense
- WRDA 1986 required users of federal navigation to pay an ad valorem tax (tax on value of cargo) into a harbor maintenance trust fund to pay for maintenance of channels and harbors.
- Tax applied at 0.04% of cargo value in 1986
- Increased in 1990 to 0.125%
- In 1998, Supreme Court struck down tax on exports; now tax is paid only on domestic cargo and imports.
- Collected funds pay for all coastal O&M and Construction of CDFs
  - Dredging
  - Breakwater maintenance
  - Lock operations and maintenance
  - Operations, maintenance, and construction of CDFs



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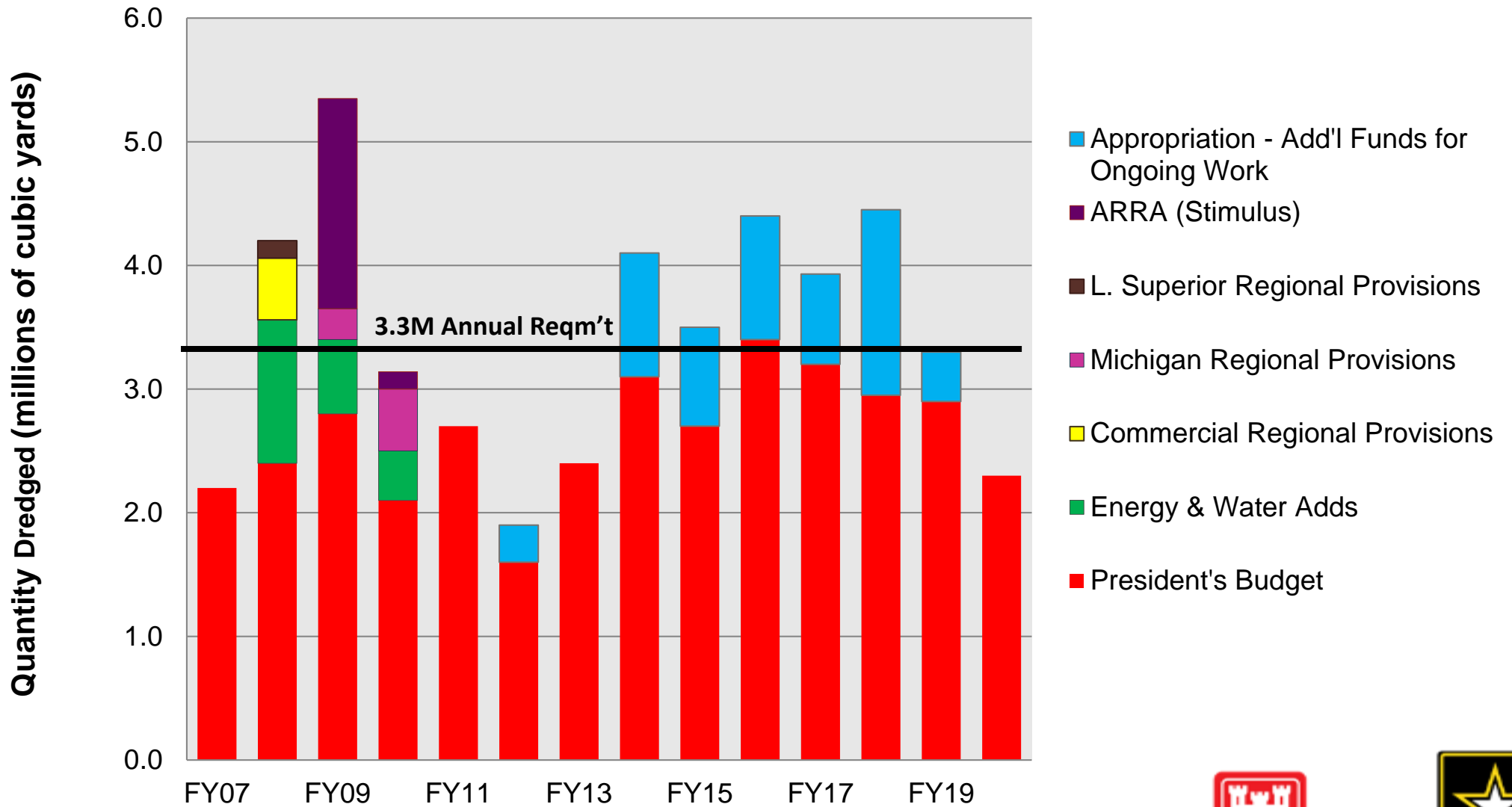
# DREDGING/DMM



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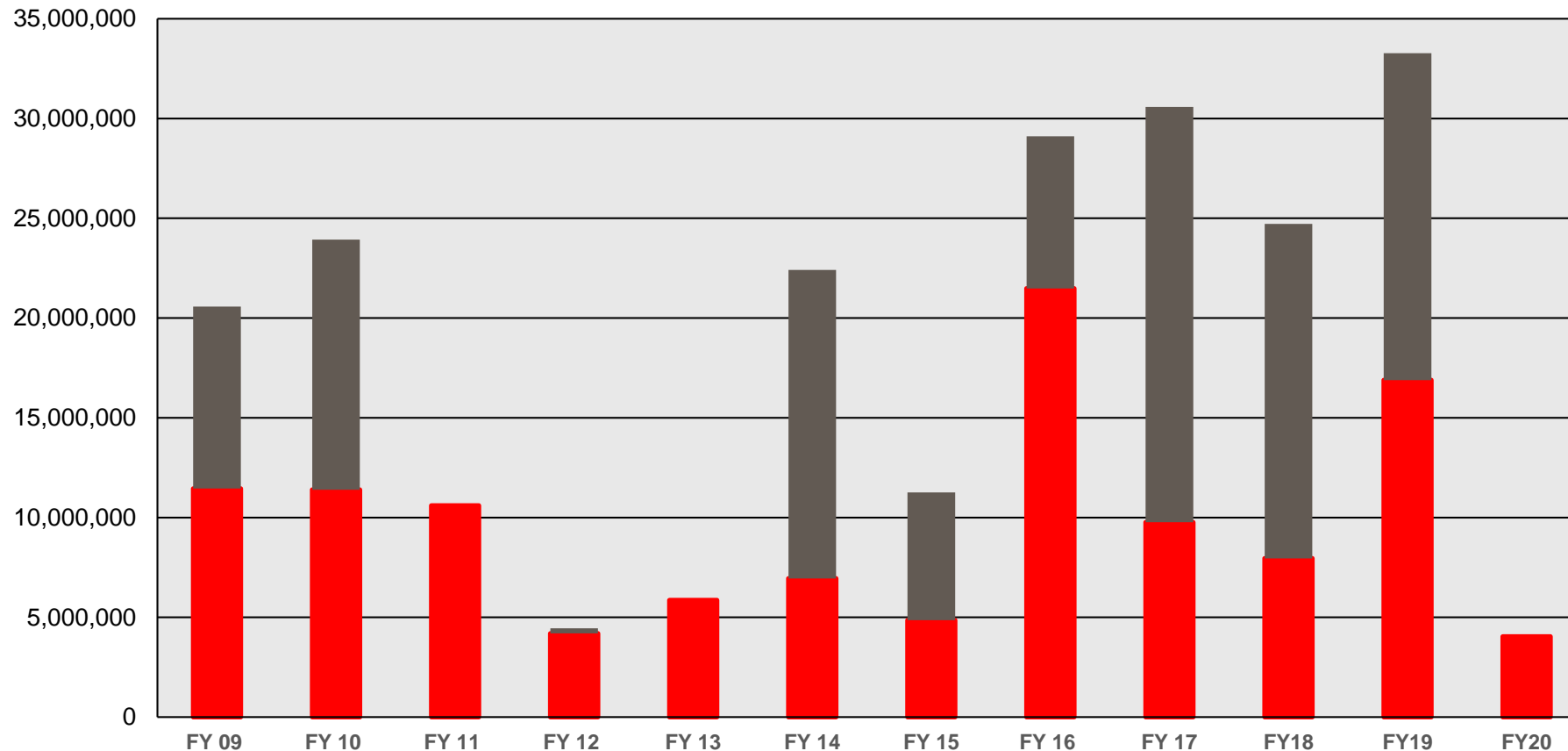


# DREDGING FUNDING TRENDS 2007 – 2020



# HISTORICAL FUNDING

## GREAT LAKES LOW USE PROJECTS (<1M TONS)



■ President's Budget   ■ Workplan/Appropriation

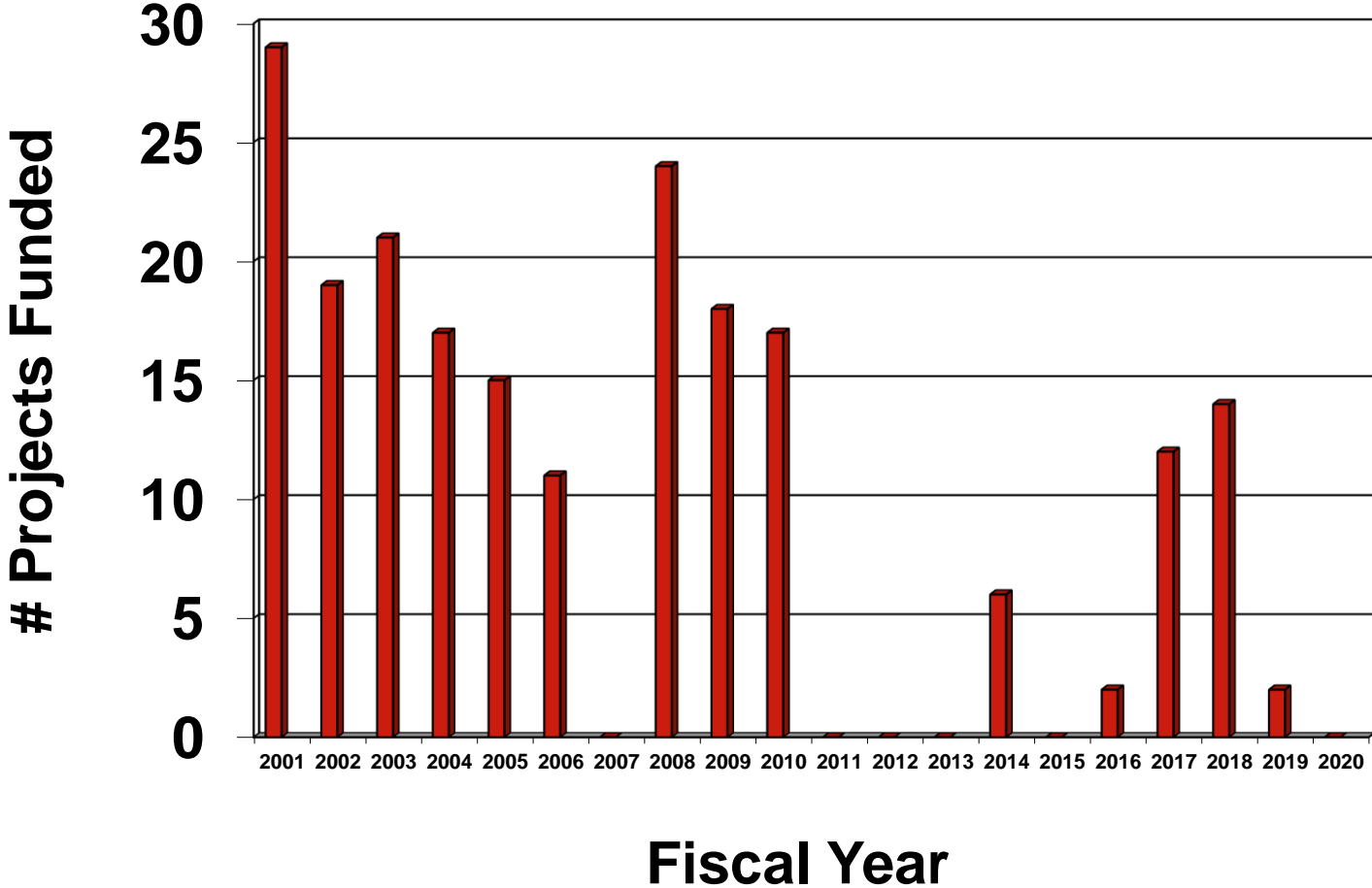


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# HISTORICAL SHALLOW DRAFT/ RECREATIONAL HARBOR FUNDING

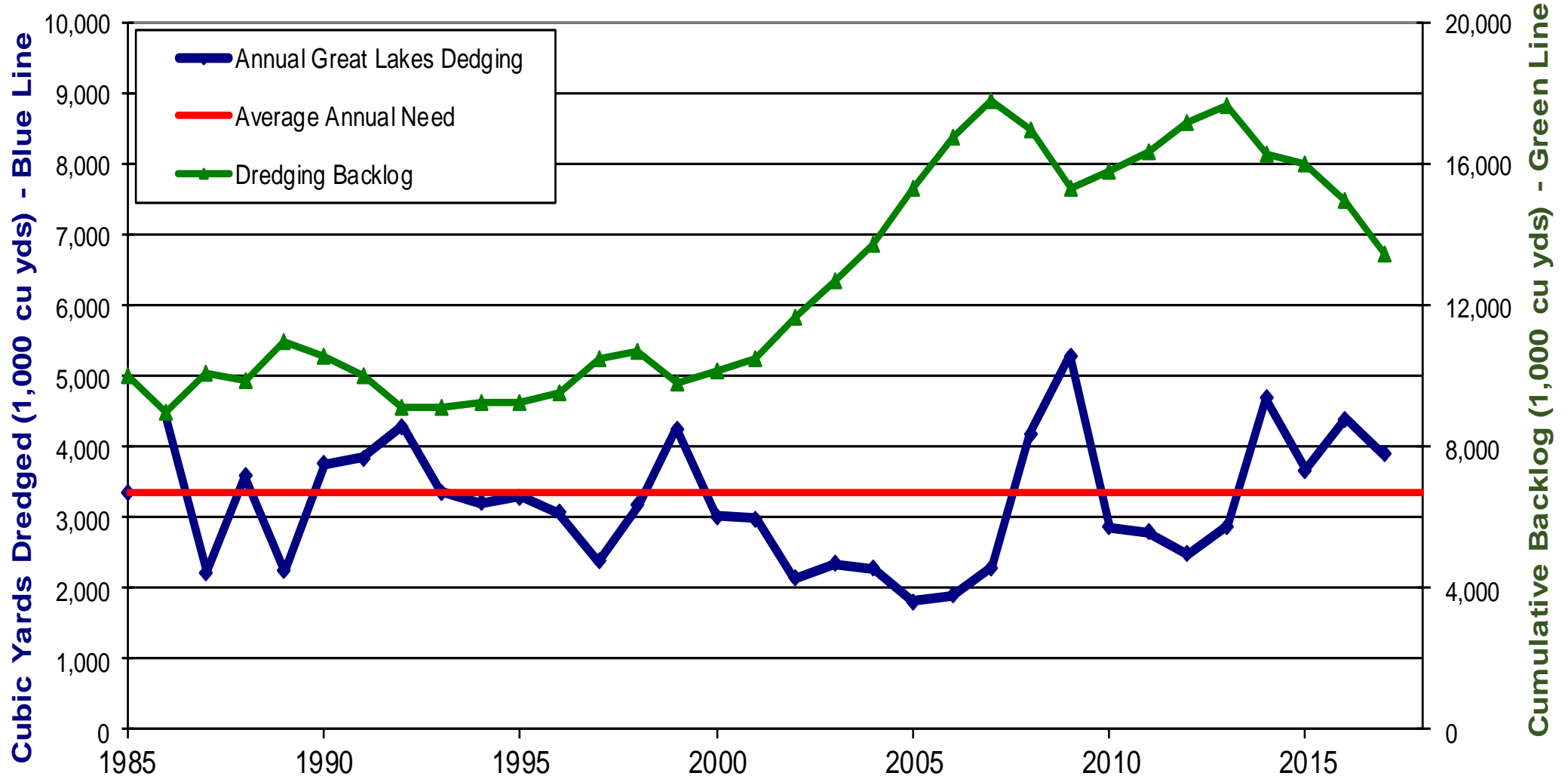
Includes Dredging & Structure Repairs



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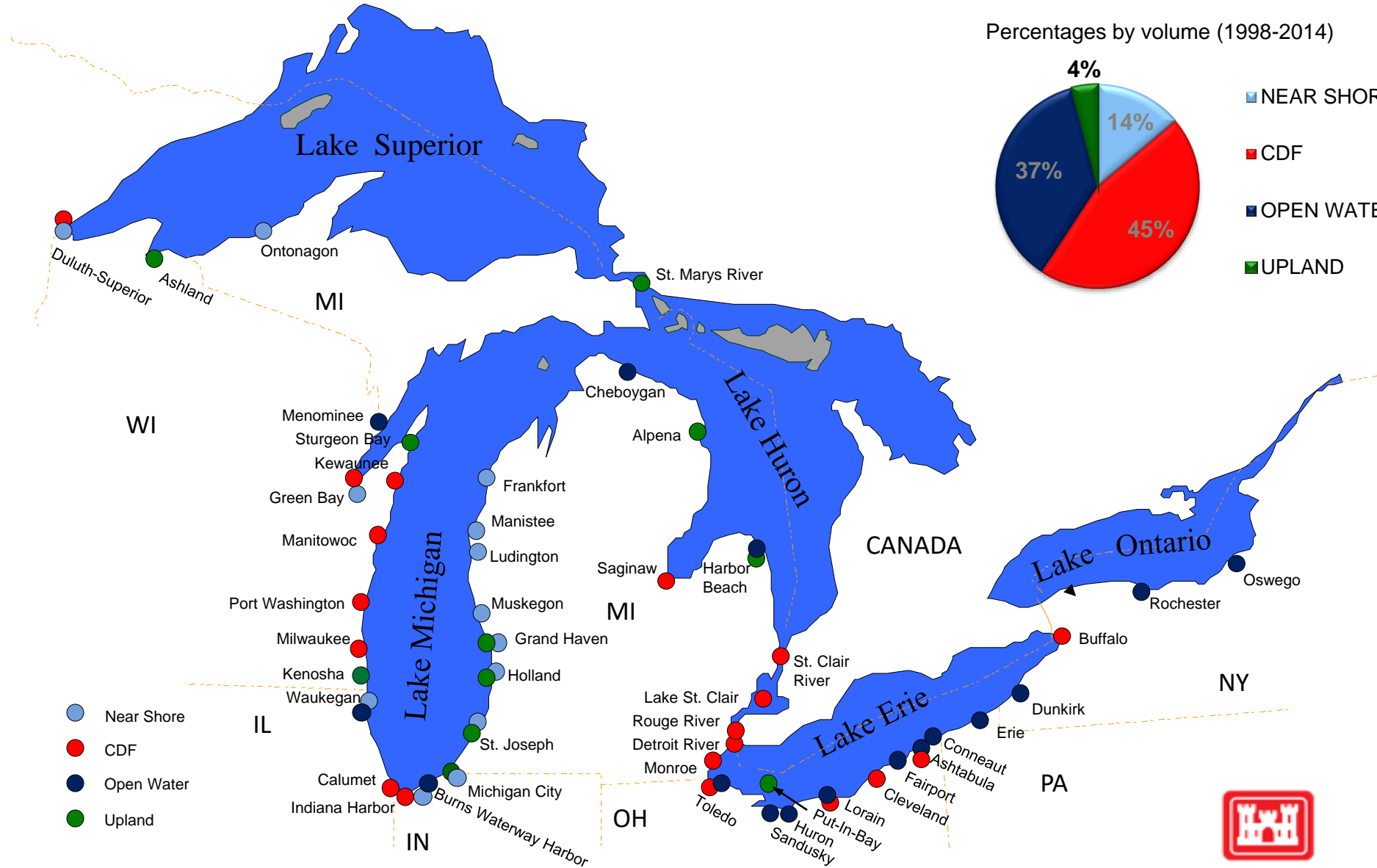
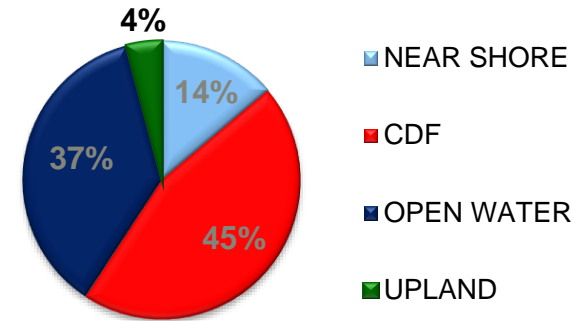
# Great Lakes Dredging Backlog 1985-2017





# Current Dredged Material Placement Methods

Percentages by volume (1998-2014)



- Near Shore
- CDF
- Open Water
- Upland



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# Key Project Dredging Updates

- Green Bay – Cat Island refinements to control turbidity
  - Installed HESCO barriers at/below water line to retain fine material – successful
  - Working with CIAC on operational procedures to adjust to new species/requirements
- Indiana Harbor – dredging TSCA material this year; backlog nearly complete
  - Phase II of CDF under design; will raise dikes 11 feet
  - Without dike raising, CDF near capacity in 2021
- Calumet Harbor CDF Update
  - EIS is out for review until early July
  - Tentatively selected plan – expand existing facility for river material only and beneficially use harbor material; reduces confined material by 50%
  - Project Sponsor – City of Chicago Dept of Transportation
- Duluth-Superior Harbor
  - Need to resolve near and long-term dredged material placement locations



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# CONCERNS ABOUT TURBIDITY FROM CELLS

Hesco barrier placed at end of cell to help retain solids, reduce turbidity outside cells

Very effective and reducing turbidity leaving cells



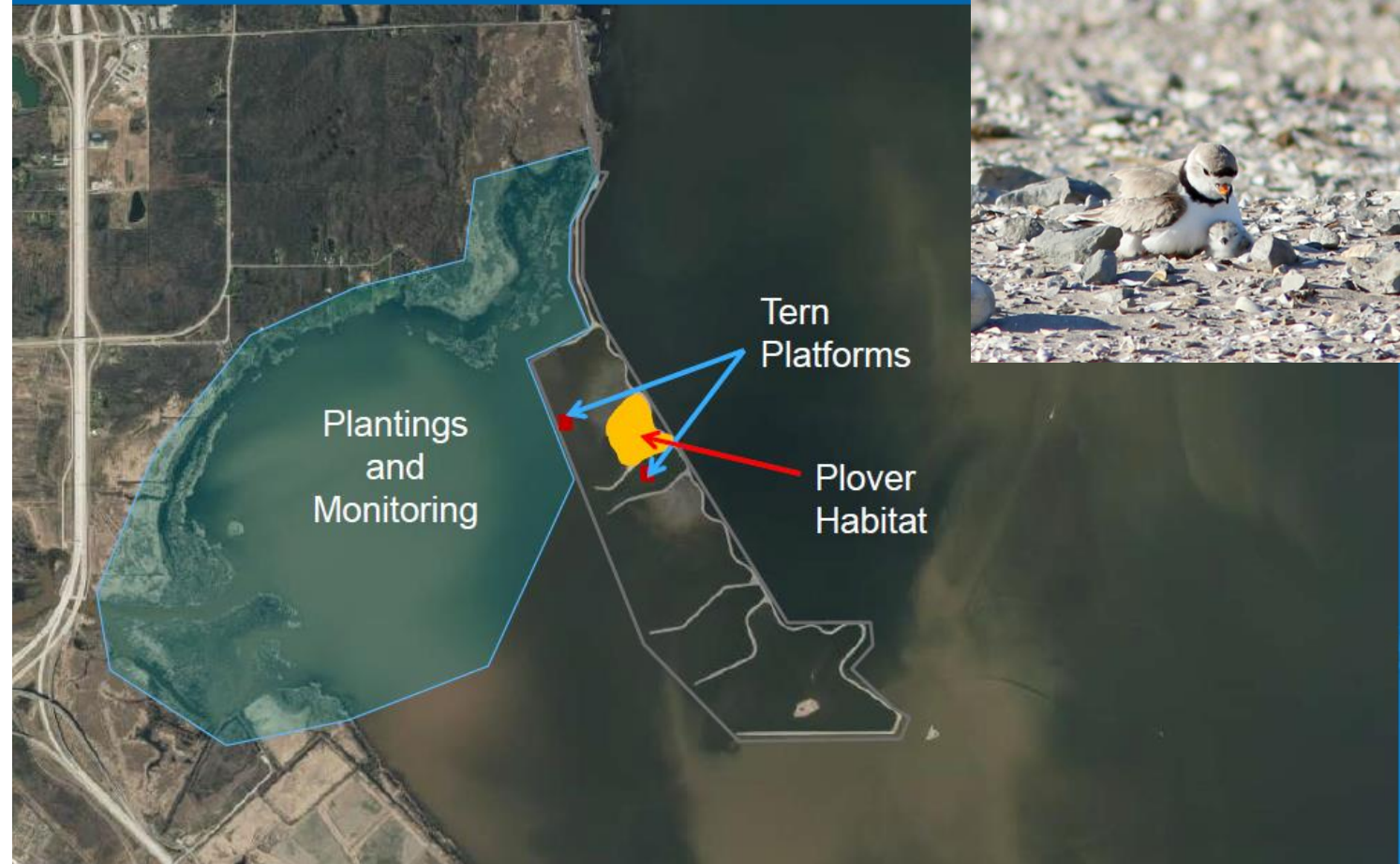
# AGENCIES WORKING HABITAT PROJECTS IN AND AROUND DMDF

The DMDF has reestablished outstanding habitat

Piping plover endangered species – established

Agencies and environmental groups working on numerous habitat projects

## Cat Island Habitat Projects



Brown County Aerial Photography, 2017

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# MINNESOTA POINT PLACEMENT OPTION – 2019 TARGET



## Benefits:

- Erosion control
- Protect trees/vegetation
- Threatened/Endangered Species
- Coastal Resiliency
- Property protection



## Challenges:

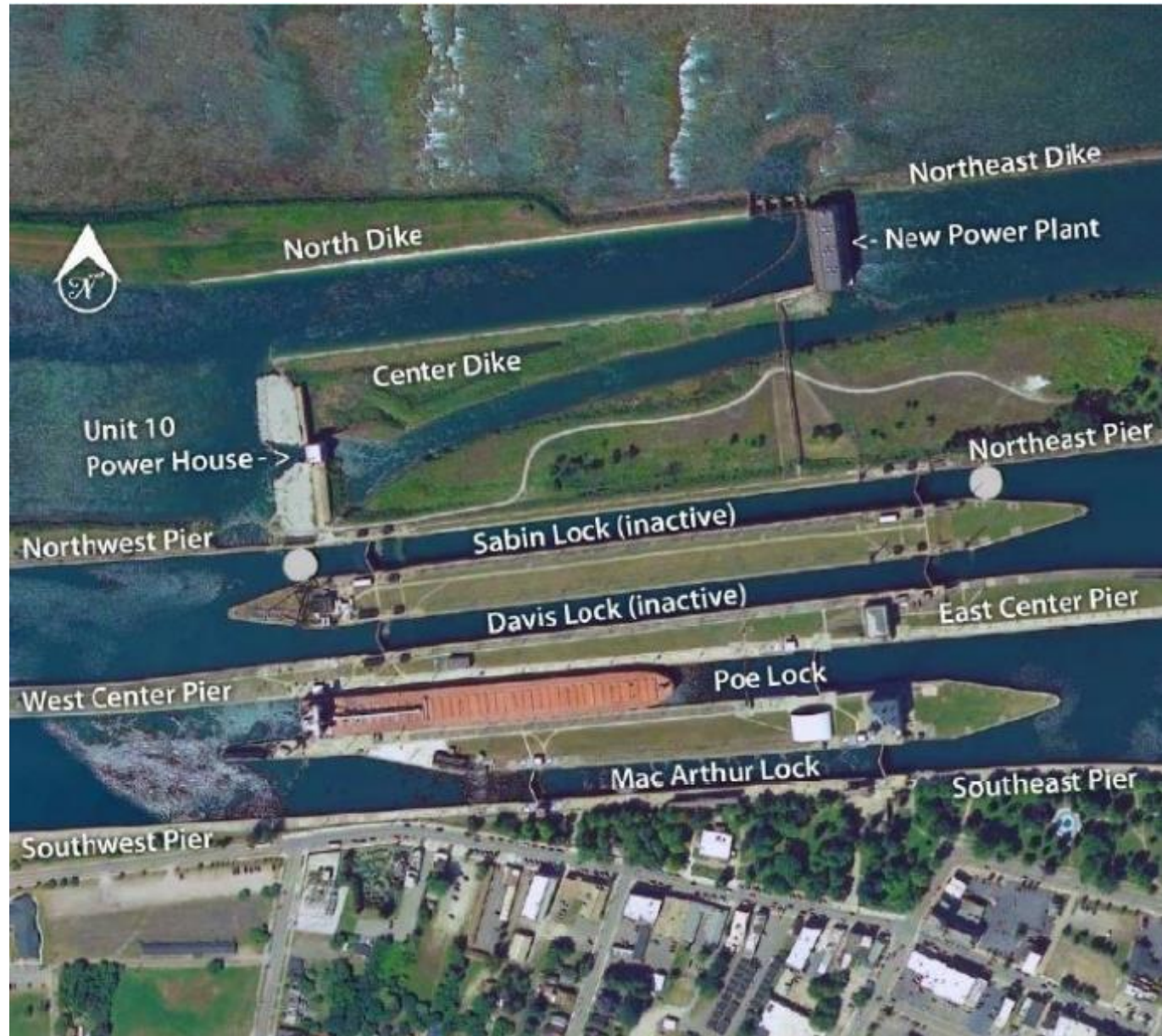
- Dredging/placement windows
- Sediment characteristics
- Dioxin concern



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# SOO LOCKS FACILITY

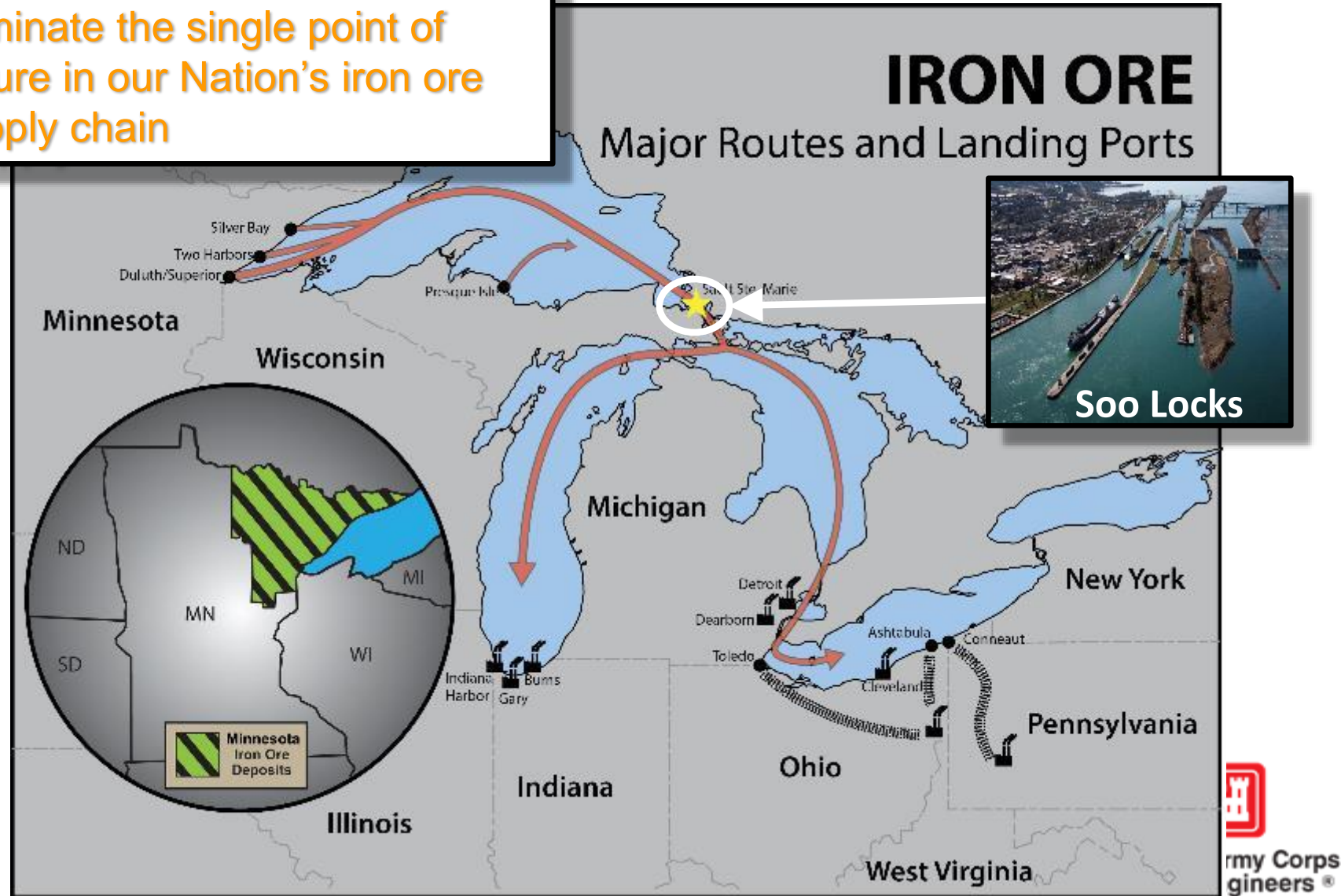


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# SOO LOCKS LOCATION & IMPORTANCE

The New Soo Lock would eliminate the single point of failure in our Nation's iron ore supply chain



# PROPOSED SECOND POE-SIZED LOCK



**Existing**



**Proposed**

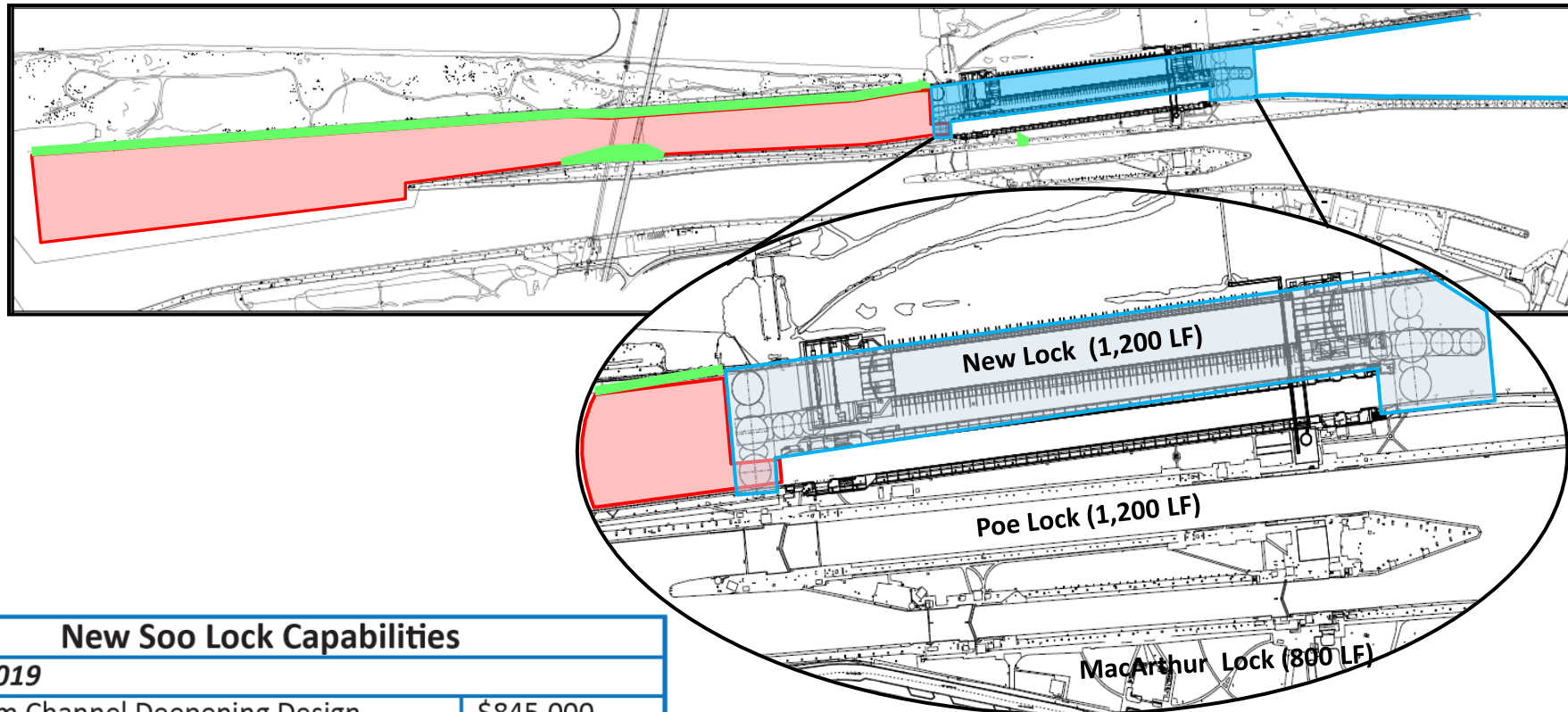


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# NEW LOCK CONSTRUCTION PHASES



- Remaining Work:
- (1) Upstream Channel Deepening
  - (2) Upstream Approach Walls
  - (3) New Lock Chamber

New Soo Lock Capabilities	
<b>Fiscal Year 2019</b>	
• Upstream Channel Deepening Design	\$845,000
• Upstream Approach Walls Design	\$1,826,000
• Lock Chamber Design	\$8,124,000
• Upstream Channel Deepening Construction	\$63,086,000
<b>Total Fiscal Year 2019 Capabilities</b>	<b>\$73,881,000</b>
<b>Fiscal Year 2020</b>	
• Upstream Approach Walls Construction	\$78,200,000
• Lock Chamber Design	\$11,200,000
<b>Total Fiscal Year 2020 Capabilities</b>	<b>\$89,400,000</b>



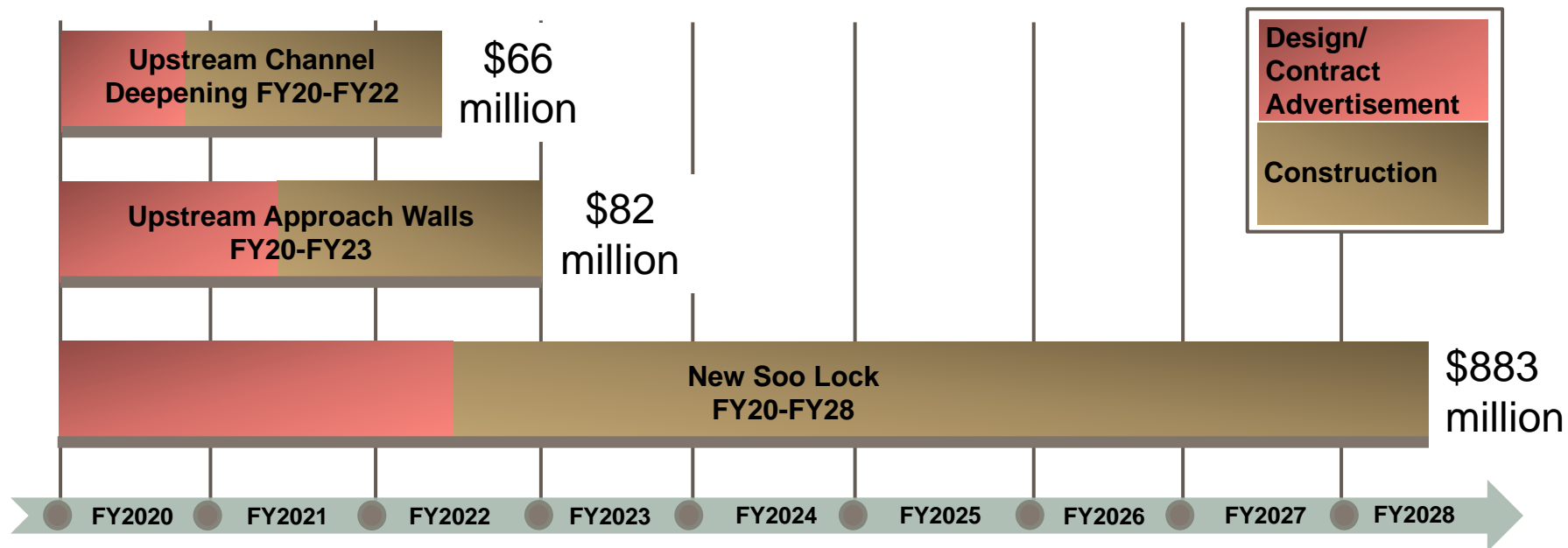
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# NEW SOO LOCK PATH FORWARD

## Design and Construction Schedule

(Assuming funding beginning with Fiscal Year (FY) 2020 President's Budget)



- Construction completion estimated within 7-10 years  
(Assuming efficient funding stream and use of Continuing Contracts Clause)
- Total project cost estimated at \$1 billion



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# GREAT LAKES WATER LEVELS

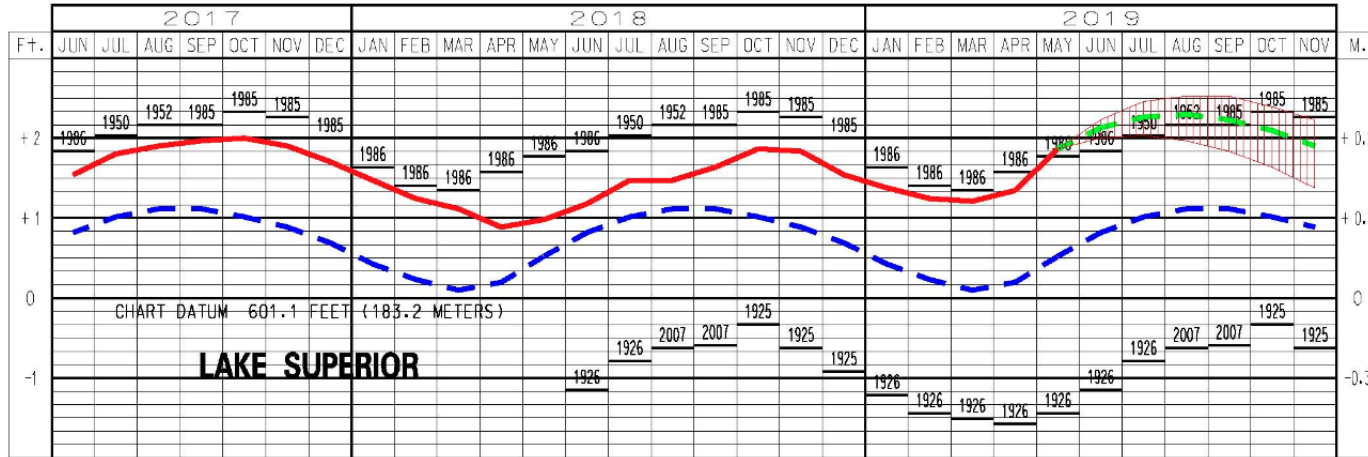
- New record high water levels for the month of May were set on Lake Superior, Lake St Clair and Lake Erie. Lake Michigan-Huron was at its highest May level since 1986.
- The June edition of our 6-month forecast suggests the likelihood of additional record high water levels on all the Great Lakes and Lake St. Clair this summer.
- Shoreline erosion risks and impacts due to coastal flooding will continue especially during storm events and periods of strong onshore winds.
- Hydrologic conditions are the primary driver of water level fluctuations. Water levels of the Great Lakes cannot be fully controlled through regulation of outflows, nor can regulation eliminate the risk of these extreme water levels occurring during periods of wet water supply conditions.



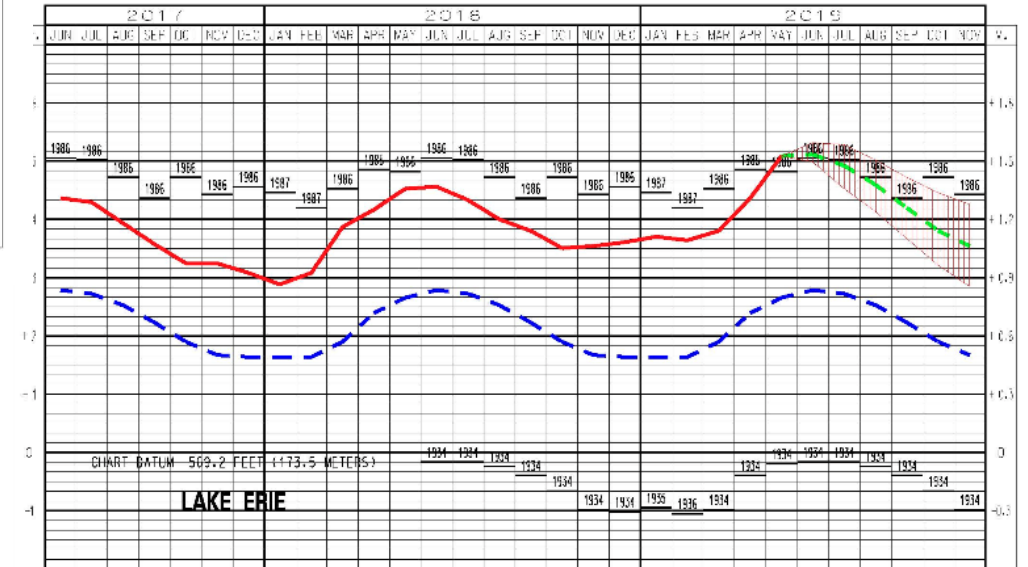
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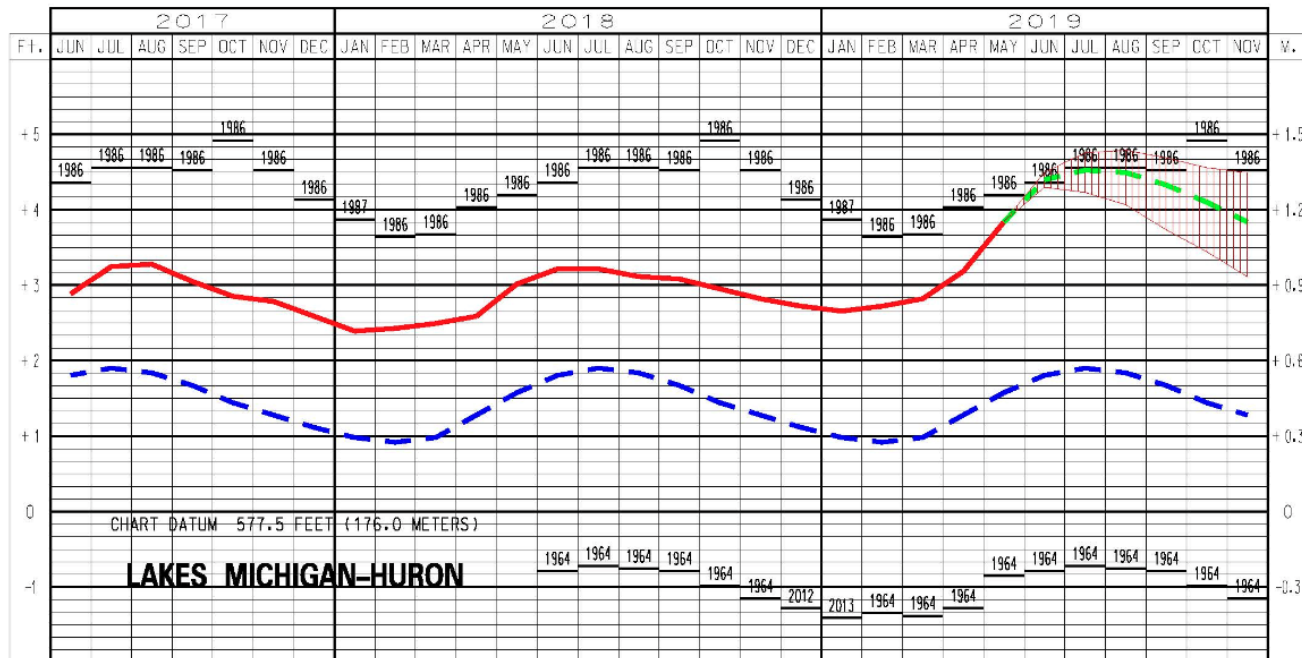
## LAKE SUPERIOR WATER LEVELS - JUNE 2019



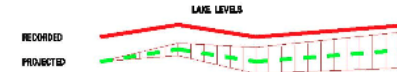
## LAKE ERIE WATER LEVELS - JUNE 2019



## LAKES MICHIGAN-HURON WATER LEVELS - JUNE 2019



### LEGEND



RECORDED	PROJECTED
1986	2019
1985	2018
1984	2017
1983	2016
1982	2015
1981	2014
1980	2013
1979	2012
1978	2011
1977	2010
1976	2009
1975	2008
1974	2007
1973	2006
1972	2005
1971	2004
1970	2003
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1945	1978
1944	1977
1943	1976
1942	1975
1941	1974
1940	1973
1939	1972
1938	1971
1937	1970
1936	1969
1935	1968
1934	1967

\*\* Average, Maximum and Minimum for period 1910-2018



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# IGLD 85 DATUM UPDATE

- All Great Lake water levels are referenced to a common vertical datum, IGLD 85 network of gages across the system.
- International Great Lakes Datum (IGLD) of 1955 (IGLD55) was the first common vertical datum on the Great Lakes
- Due to continual glacial crustal rebound, the datum must be updated every 30 years (est 7-8 inches over 65 years since IGLD55)
- Now preparing for the next update – FY2020 to be implemented in 2025 will be based on observations from 2017-2023
- In addition to IGLD change, Low Water Datum will be re-evaluated.
  - LWD – a level so low that the level will seldom fall below it.
  - LWD calculation has not been reevaluated since 1933, It has only been adjusted for datum change since then.

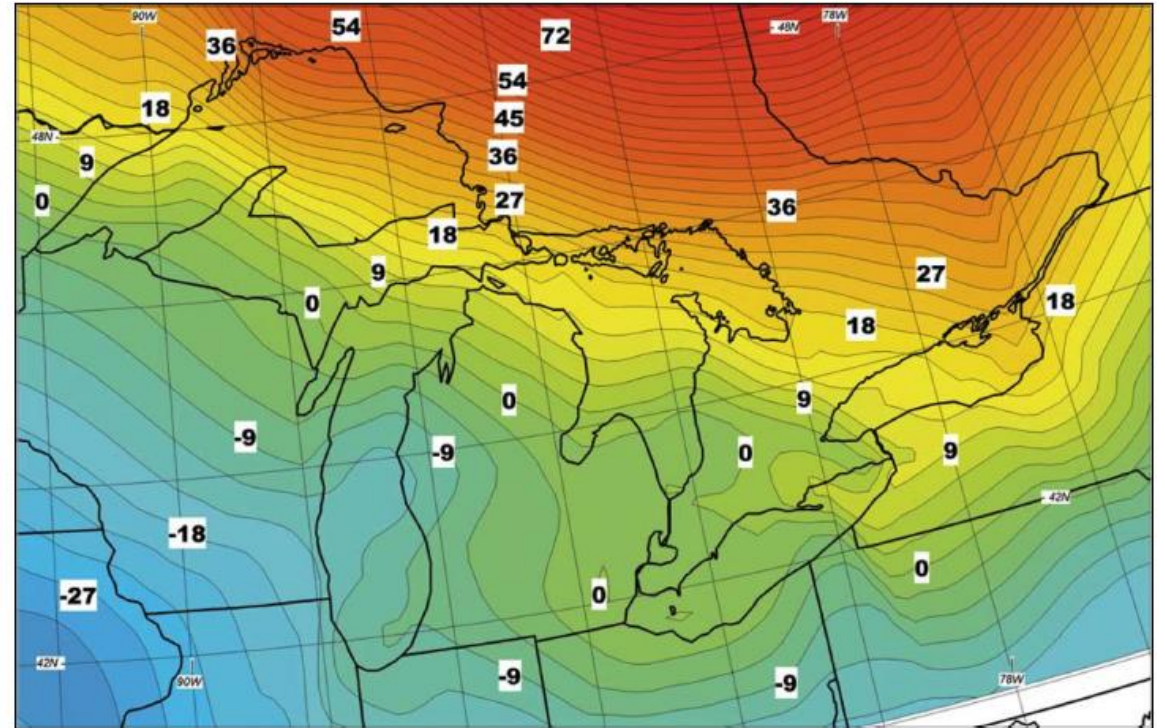


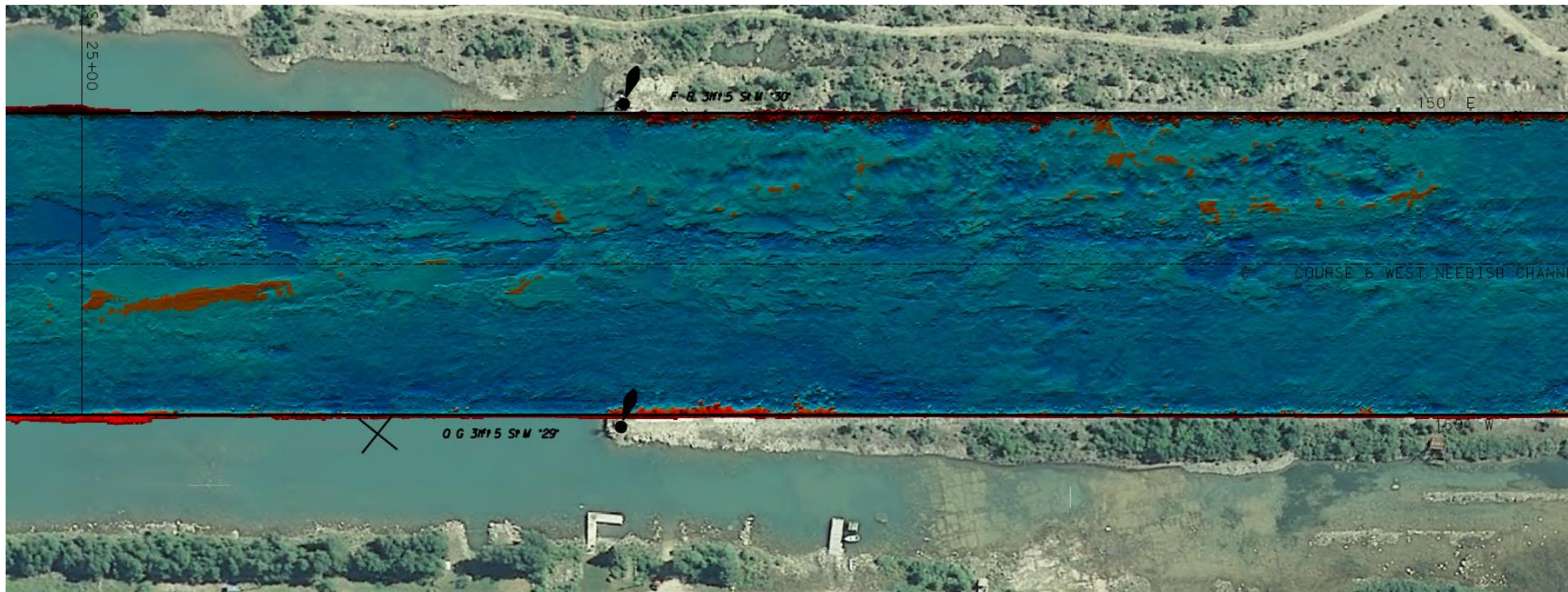
Figure 7. Contour map of vertical velocities in cm/century derived from water level gauges over the Great Lakes with ICE-3G model of velocities in the background (Mainville and Craymer, 2005). Contour interval: 3 cm/century (0.3 mm/year).

## ST. MARYS RIVER IGLD 55 TO 85, 2018

Due to a lack of gaging in the St. Marys River, the conversion from IGLD 55 to 85 was not completed until 2018.

The difference resulted in a 0.3 -0.4 ft change in datum, resulting in an instantaneous change to the survey plots.

The result was only 50 cu yds of material, but represented a critical center of channel shoal.



# QUESTIONS?

