



*June 18<sup>th</sup>, 2014*

# USING MULTIPLE DREDGE METHODS FOR HABITAT RESTORATION

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*Marine Professionals Since 1919*

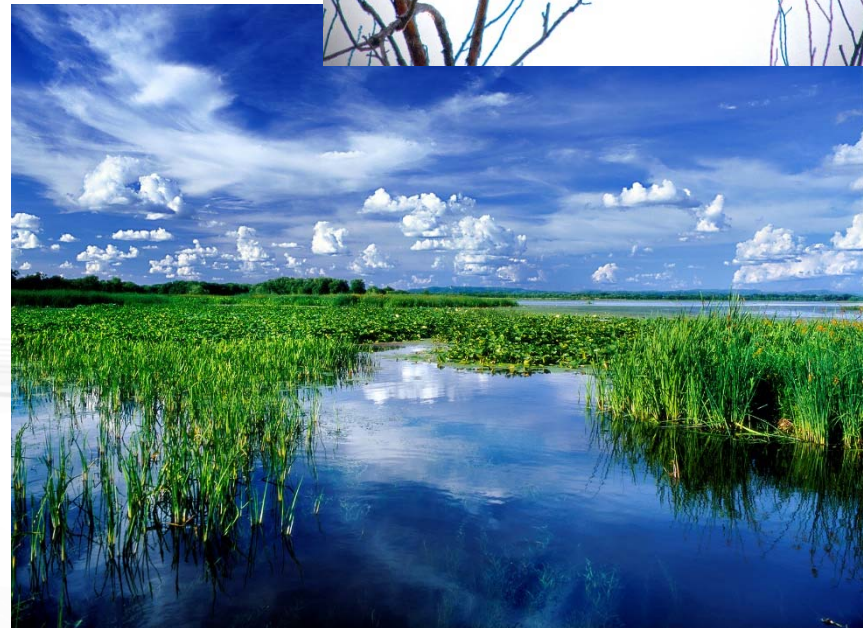


# The Upper (Mississippi River)

## America's Best Kept Secret

- Home to outdoor enthusiasts
  - 326 Bird Species (60% of North America)
  - 150 Freshwater fish and mussel species (25% of North America)
  - 145 Amphibian and Reptile Species
  - 50 Mammal species

\*Upper Mississippi River Conservation Committee



# Navigation

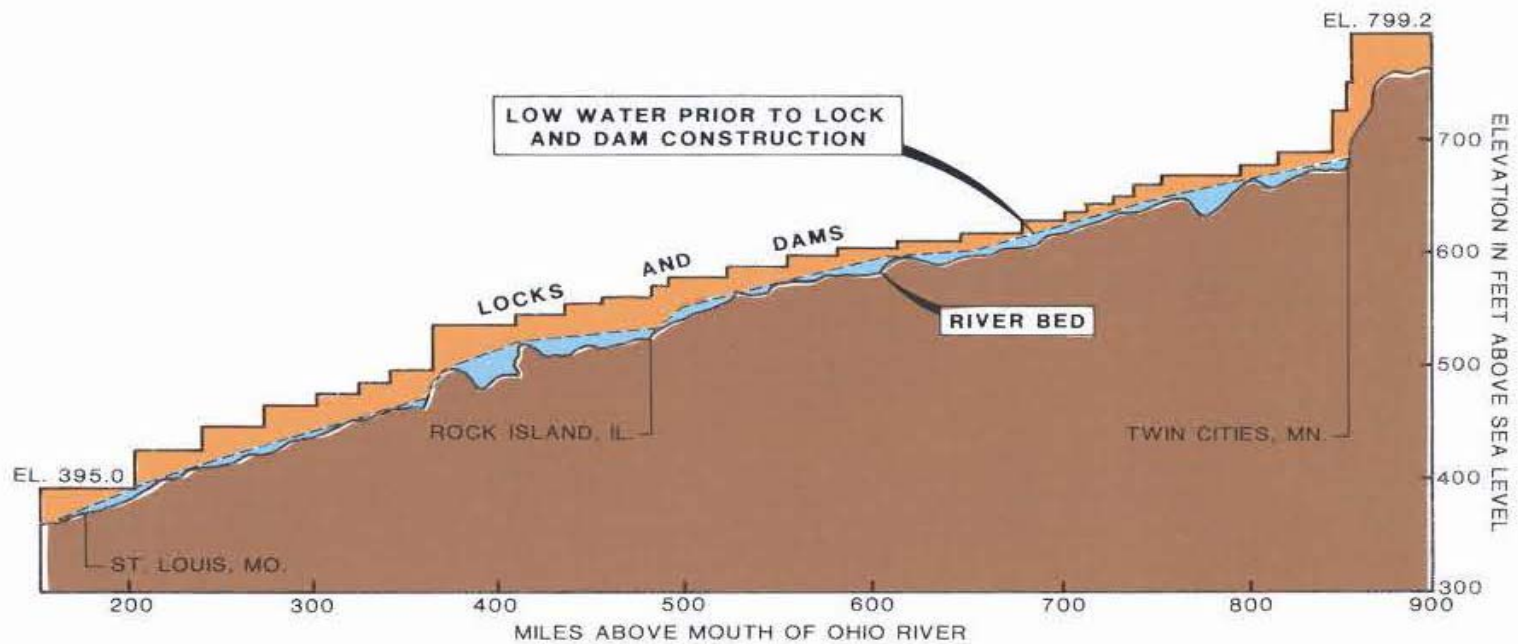


- The Rivers and Harbors Act of 1930
  - Established a 9-foot (2.74 m) navigational channel
  - 29 Locks and Dams
  - 400-foot (122 m) drop between Minneapolis and St. Louis (600 miles)
- Grain is king
- One 15-barge tow
  - = 200 Train cars
  - = 870 Large semi trucks





# Changes for Navigation



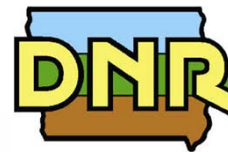
\*Diagram courtesy of the U.S. Army Corps of Engineers





# USACE EMP Program

- UMRR-EMP
  - Upper Mississippi River Restoration – Environmental Management Program
  - Authorized by WRDA 1986
  - 54 projects to date, restoring over 100,000 acres
  - Team Approach
    - Oversight by the USACE
    - Involvement from USFWS, USGS, USEPA, State DNRs, Local Governments









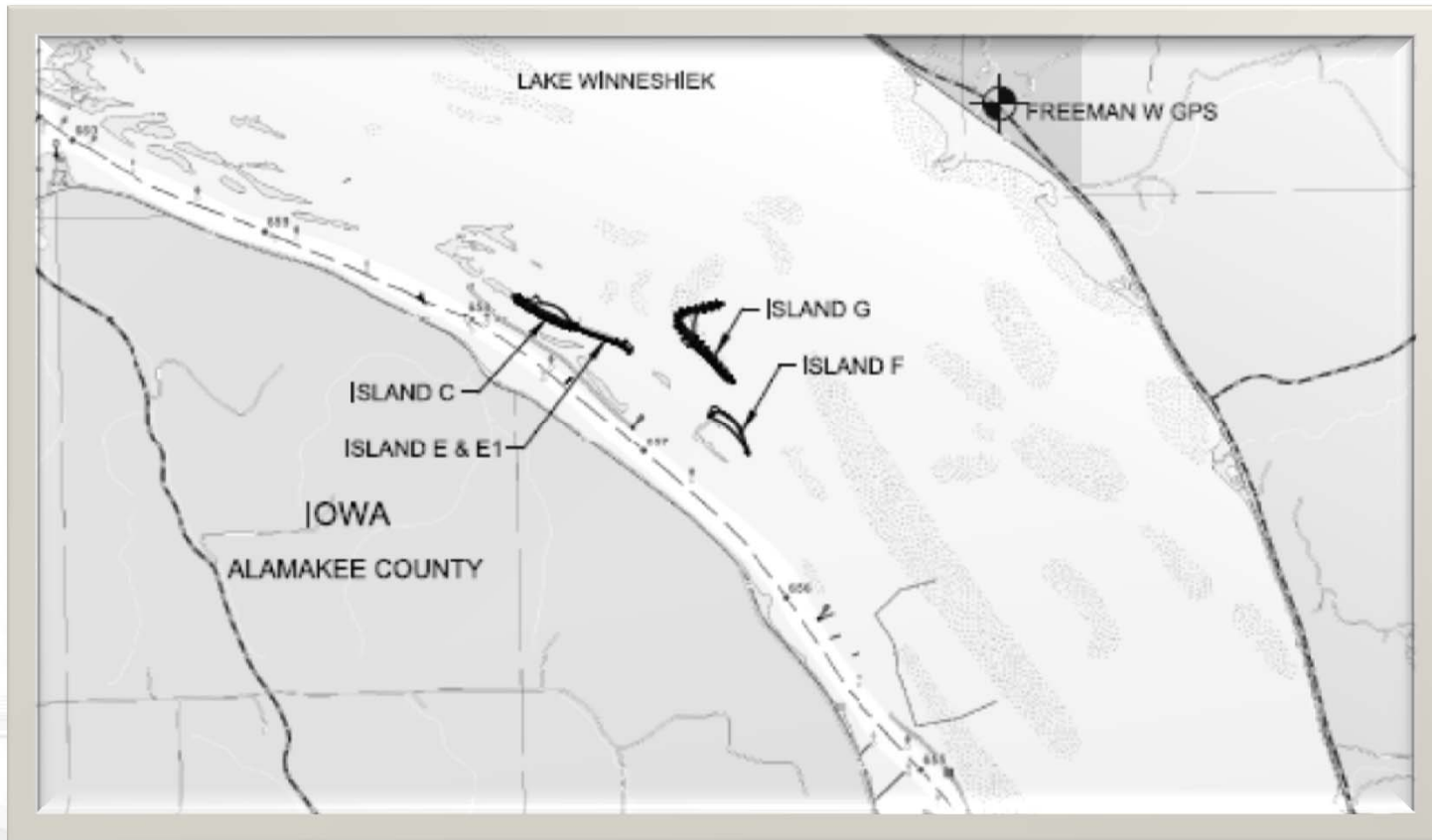


# Capoli Slough Islands

- Upper Mississippi River Pool 9 EMP, Phase II
  - 5 Islands
  - 1 Emergent wetland
  - 27 acres (10.9 ha) of new land created
  - 12 acres (4.86 ha) of access channels dredged
  - 229,000 Cubic yards (175,081 m<sup>3</sup>) of sand and topsoil used
  - 15,000 tons of rock placed
  - 6 miles (9.65 km) from nearest access point



# Capoli Slough Islands





# Building the Islands

- Multiple dredge methods
  - Hydraulic
  - Mechanical
  - Amphibious
- Multiple methods of transport
  - Hydraulic
  - Material barge
- Scour and erosion control
- Native seeding and planting





# Creating the Base



- 12” Swinging ladder cutter head dredge
  - Dredged 183,000 CY (140,000 m<sup>3</sup>) of sand
  - Pumped through 4,050 feet (1,234 m) of pipeline
  - Borrowed material from main channel
  - Compaction using dozers, excavators, and amphibious equipment



# Base Layer Challenges

- Challenging placement
  - Displaced unsuitable foundation material before sand placement
  - 2013 flood season
    - Lasted well into July
    - Required base of islands to be built underwater
  - Shallow water access only before channels were dug





# Other Options





# Installing Topsoil

- 56,000 CY (42,814.8 m<sup>3</sup>) mechanically dredged
- Excavator with 4 CY (3m<sup>3</sup>) bucket
  - Material moved using barges
  - Black dirt dredged from designated areas forming access channels
- Spread to thickness that ranged from 9 inches (228.6 mm) to 7 feet (2.13 m)





# Other Options







# Topsoil Challenges



- Borrow sites were located in environmentally sensitive areas
- During extended flood season, topsoil could not be placed
- Equipment intensive
  - Multiple material barges
  - Off road dump trucks
  - End loaders



# Amphibious Dredging

- Emergent wetland
  - 3.3 acre (1.3 ha)
  - Temporally sealed off for planting
- Initial material placement
- Shallow marsh areas





# Scour and Erosion Control

- To keep the islands in place
  - 14,800 tons of rock were placed
  - Dikes
  - Vanes
  - Groins
  - Embankment protection





# Scour and Erosion Challenges



- Rock was brought in from an access point located 6 miles upstream
- Placement was completed throughout the duration of the project



# Survey



- Tight tolerances
- Material placement challenges
- RTK-GPS system used





# Finishing





# Summary

- UMRR-EMP
  - The largest habitat restoration program of any major waterway in the U.S.
  - Has made measureable improvements to the Mississippi River ecosystem, one small step at a time
- Using multiple dredge methods
  - Overcome logistical challenges
  - Increases flexibility and competitiveness



# Thank You

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