St. Louis District Corps of Engineers /
American Council of Engineering Companies of Missouri /
American Council of Engineering Companies of Illinois Liaison Committee
- MINUTES -
Thursday, October 10, 2019
Location: Applied River Engineering Center (AREC)
100 Arsenal Street, St. Louis, MO 63118

ATTENDEES:

St. Louis District COE:	**ACEC Missouri:**	**ACEC Illinois:**
James Wallace	Mark Bross	Lori Daiber
Susan Wilson	Karen Frederick	Shelley Dintelman
Mandy Yeomans	Pam Hobbs	
	Rick Lodewyck	
	Len Madalon	
	Vonmarie Martinez-Chaluisant	
	John McEnery	
	Paul Reitz	

DISCUSSION ITEMS:

1. **Tour of AREC Service Base**
   The committee was given a tour of the Applied River Engineering Center (AREC) Service Base. They also had a brief meeting and during that time, the Corps gave a presentation on the River Engineering in the St. Louis District. The presentation is attached to these minutes but you can also find them on ACEC/MO's website (https://www.acecmo.org/wp-content/uploads/StLCOE-ACECLiaisonPresentation10-10-19.pdf).

2. **Next Meeting Date and Location**
   The next meeting is scheduled for February 6, 2020 beginning at 10:30 a.m. A location will be determined soon. Agenda and directions will be forwarded prior to the meeting.

River Engineering in the St. Louis District

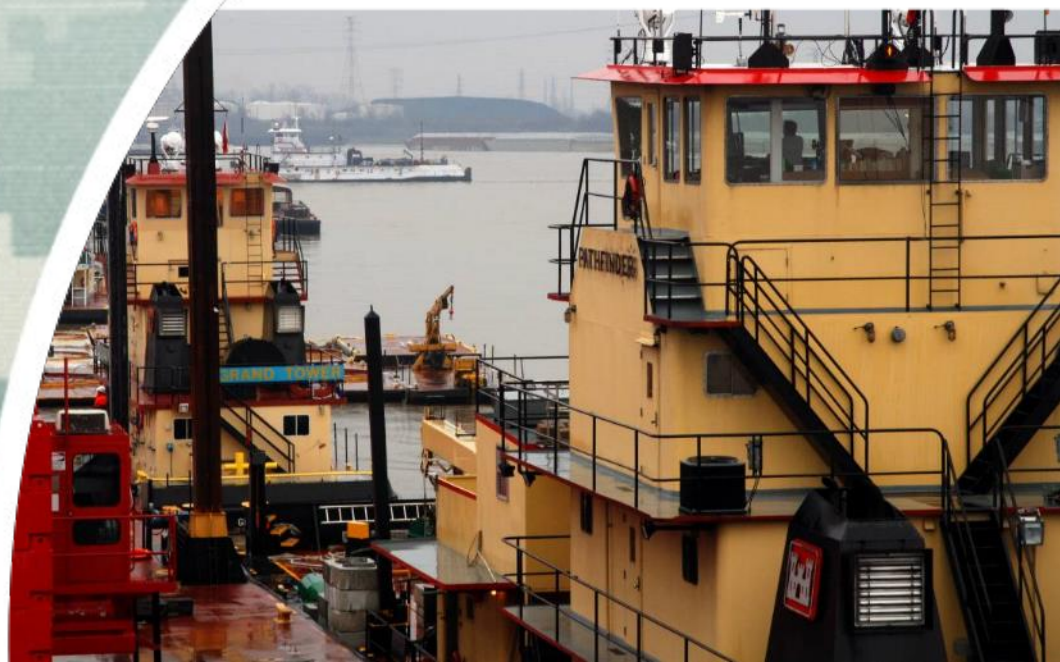
Presented to the Changjiang (Yangtze) River Administration of Navigation Affairs

Mike Rodgers

James Wallace

Brad Krischel

St. Louis, Missouri



August 12, 2019

US Army Corps of Engineers
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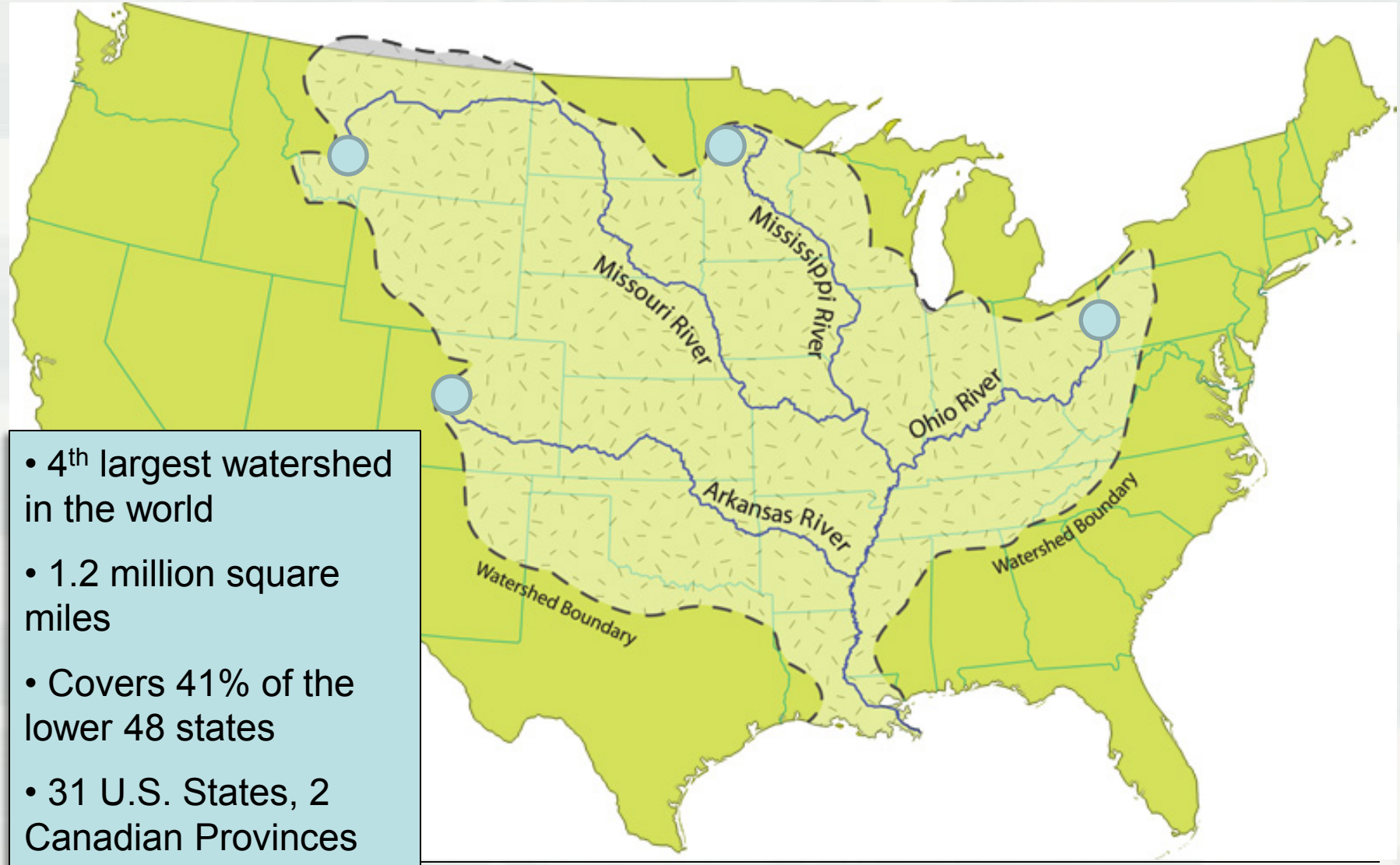
Mississippi River Watershed

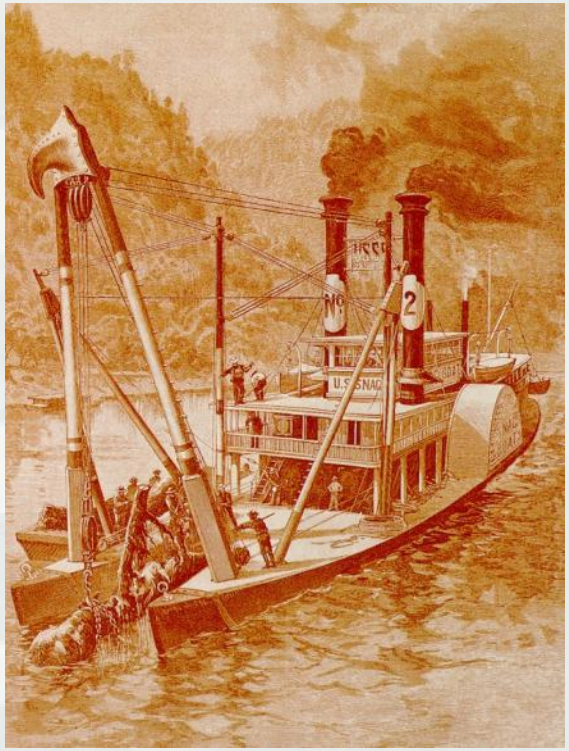


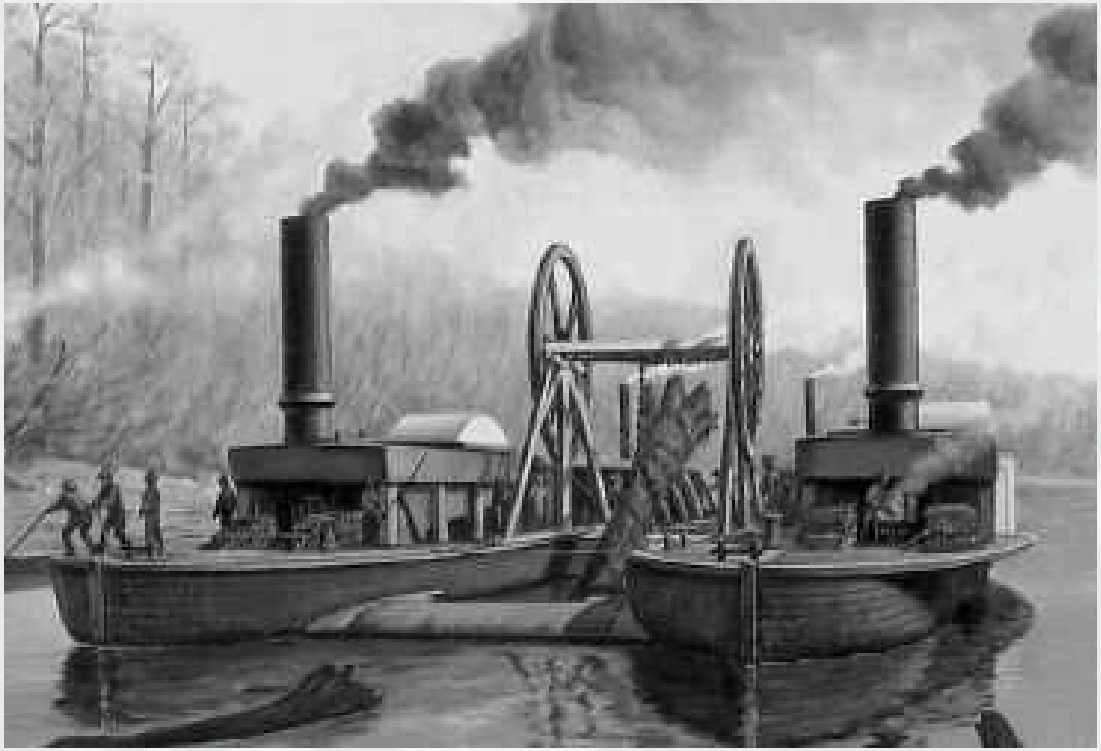
- 4th largest watershed in the world
- 1.2 million square miles
- Covers 41% of the lower 48 states
- 31 U.S. States, 2 Canadian Provinces

Mississippi River History

- Lifespan of steamboat in 1800's was 18 months.
- Between 1810 and 1850 over 4,000 people died in steamboat accidents
- Snags, Fire, explosions and collisions were the major causes

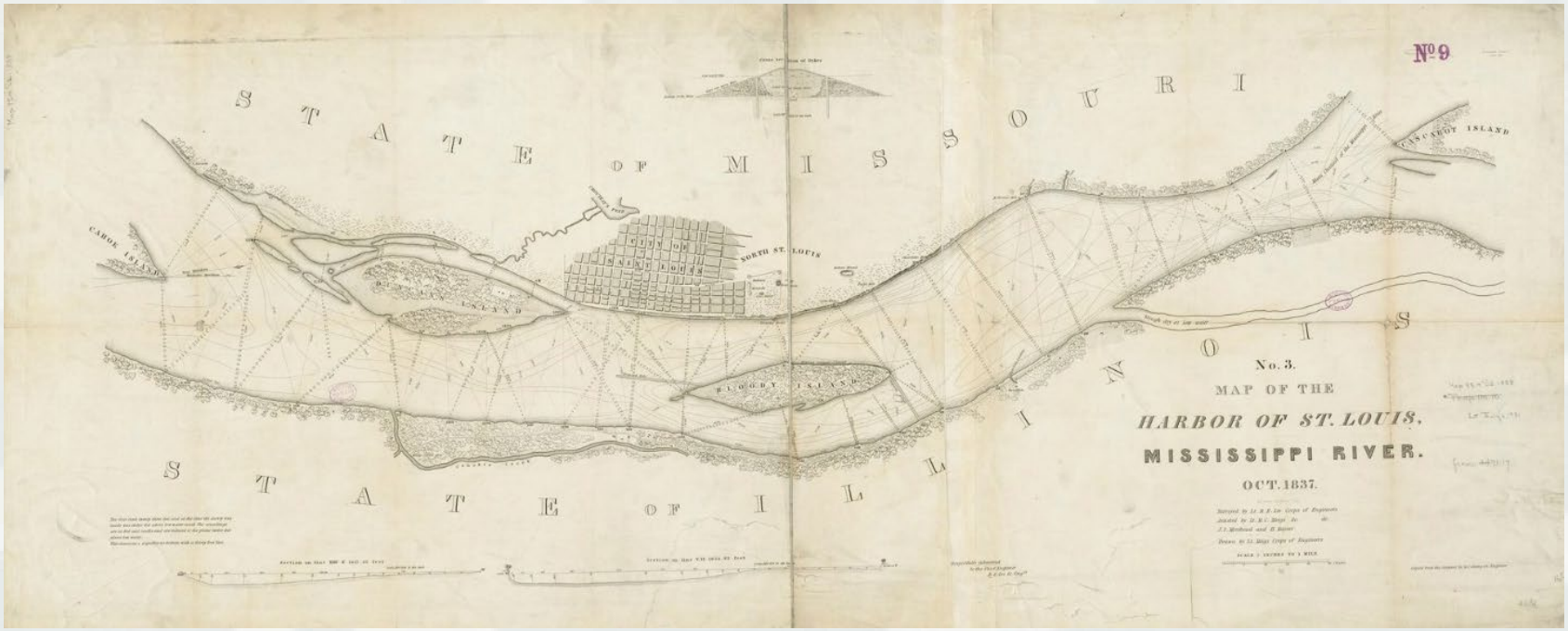
Early Navigation Mission

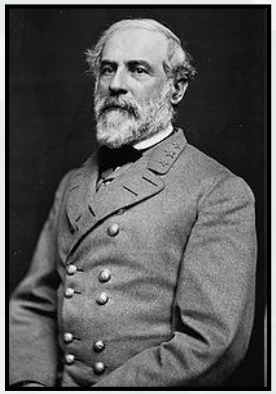




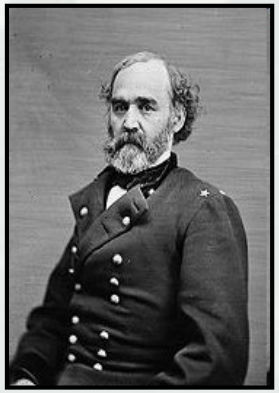
1824: Congress ordered the Corps of Engineers to clear snags on the Ohio and Mississippi Rivers.

Early River Engineering Structures





Lt. Robert E. Lee



Lt. Montgomery C. Meigs

1837: Lt. Robert E. Lee and 2nd Lt. Montgomery C. Meigs arrive in St. Louis to perform work on the harbor

Navigation and Flood Control

1872: The goal of the improvements on the Mississippi was to regularize a channel through the St. Louis harbor, sufficiently narrow and deep to accommodate the large amount of river traffic.

1879: Mississippi River Commission (MRC) created to execute a comprehensive flood control and navigation plan on the Lower Mississippi.

Navigation Channel

1939: A Nine foot navigation channel was completed on the Mississippi.

The St Louis District was responsible for the design and construction of three locks and dams. No. 24 at Clarksville, and No. 25 at Winfield in Missouri. And No. 26 in Alton Illinois

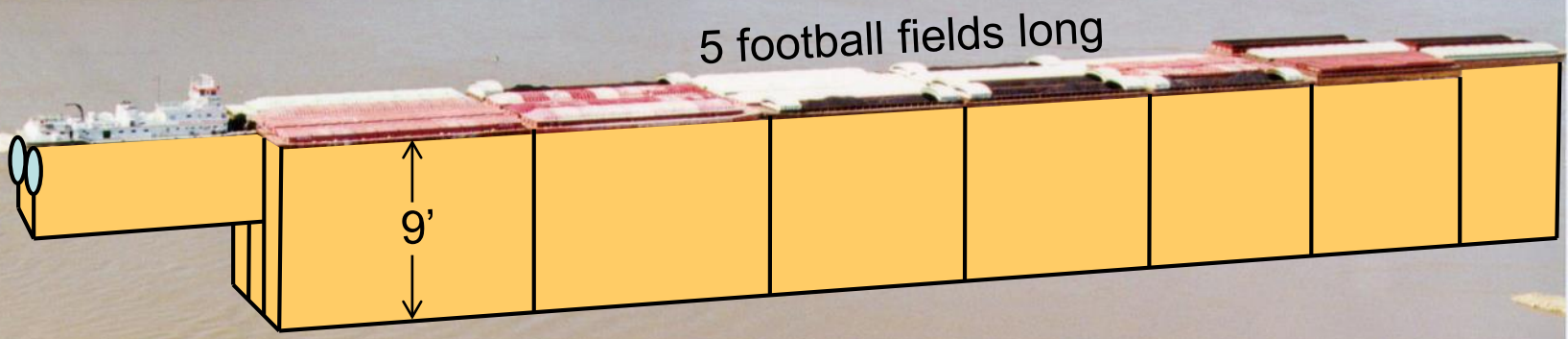
Lock and Dam #26 Under Construction

Navigation Mission

- St. Louis District maintains 9-foot deep, 300-foot wide navigation channel on 300 miles of the Mississippi, 80 miles on lower Illinois and 36 miles on lower Kaskaskia.
- 12,000 miles of commercially active waterway system maintained by the Corps.
- St. Louis 3rd busiest port on inland waterway system, handling 110 million tons annually.

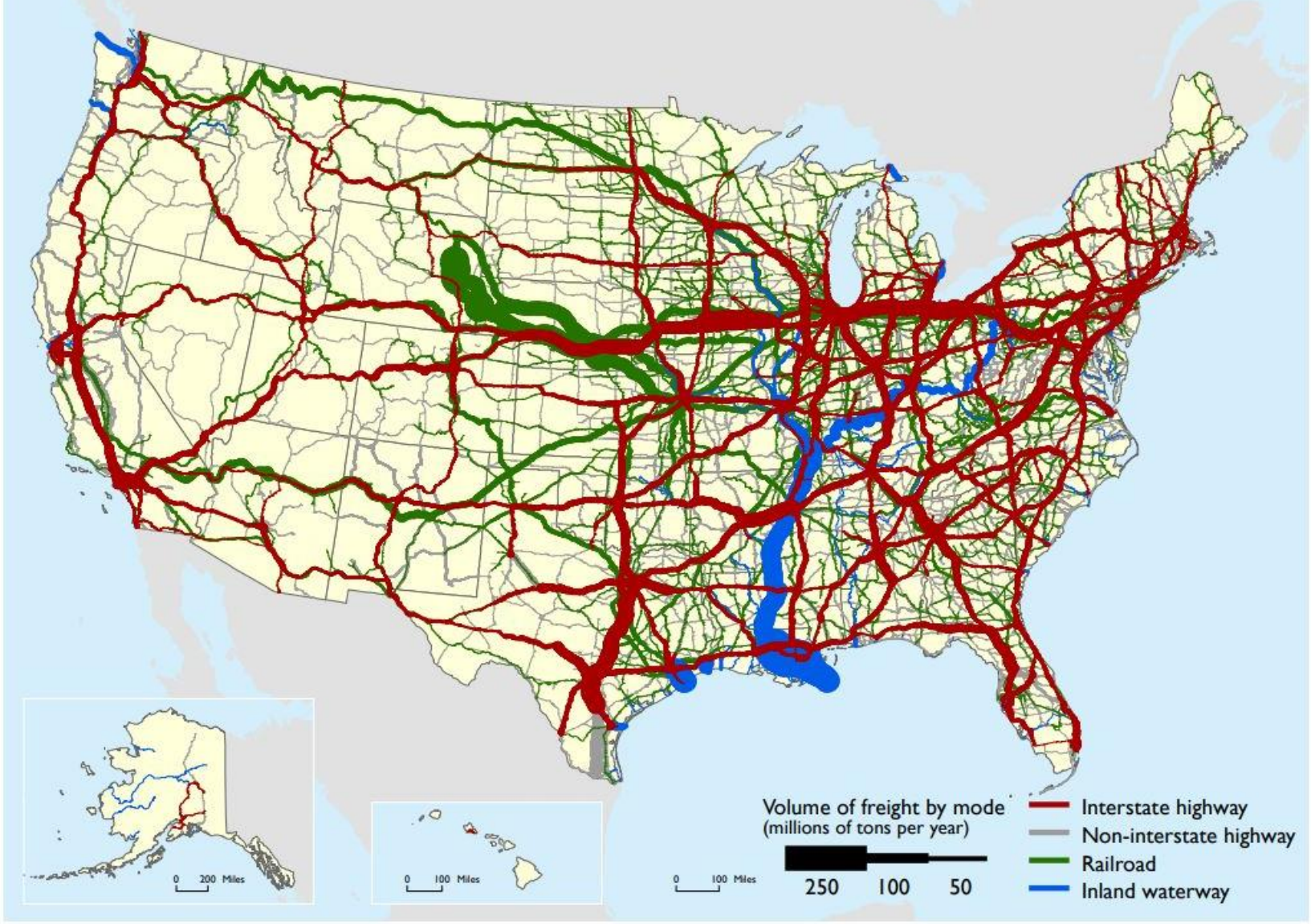
Navigation Channel Design

Develop a Reliable, Safe, and Environmentally Sustainable Navigation Channel on the Middle Mississippi River



During Low Water, 9 feet deep, 300 feet wide, with additional width in bends as required

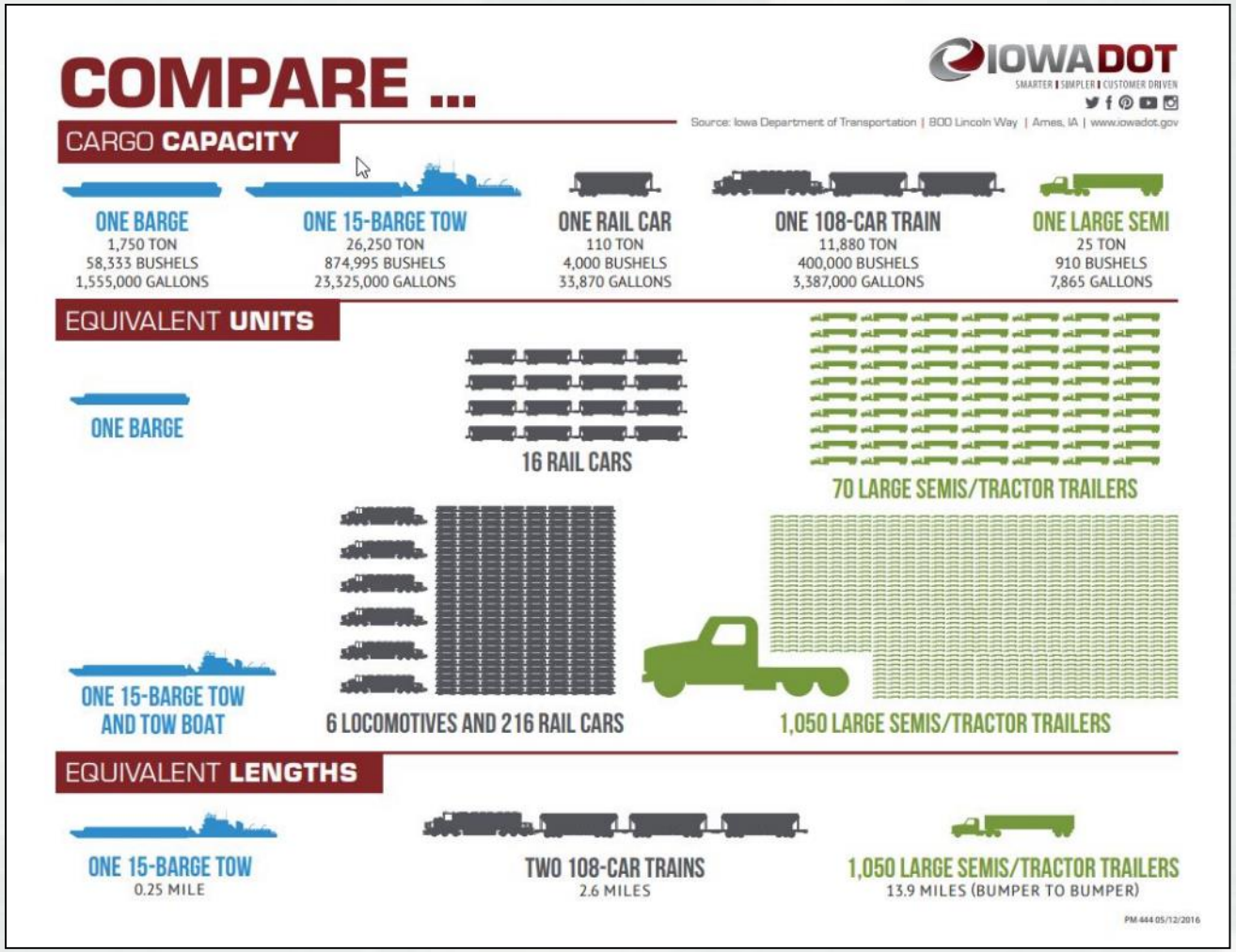
The Inland Waterway System



NOTE: The Freight Analysis Framework (FAF) is based in large part on results from the Commodity Flow Survey (CFS), last administered in 2012.

SOURCES: Highway: U.S. Department of Transportation, Bureau of Transportation Statistics and Federal Highway Administration, Freight Analysis Framework, Version 4.3.1, 2016; **Rail**: Based on Surface Transportation Board, Annual Carload Waybill Sample and rail freight flow assignment done by Oakridge National Laboratory, 2016; **Inland Waterways**: U.S. Army Corps of Engineers, Institute of Water Resources, Annual Vessel Operating Activity and Lock Performance Monitoring System data, 2016.

Waterways: The Most Efficient Mode of Freight Transportation



1 tow = 1,050 semis

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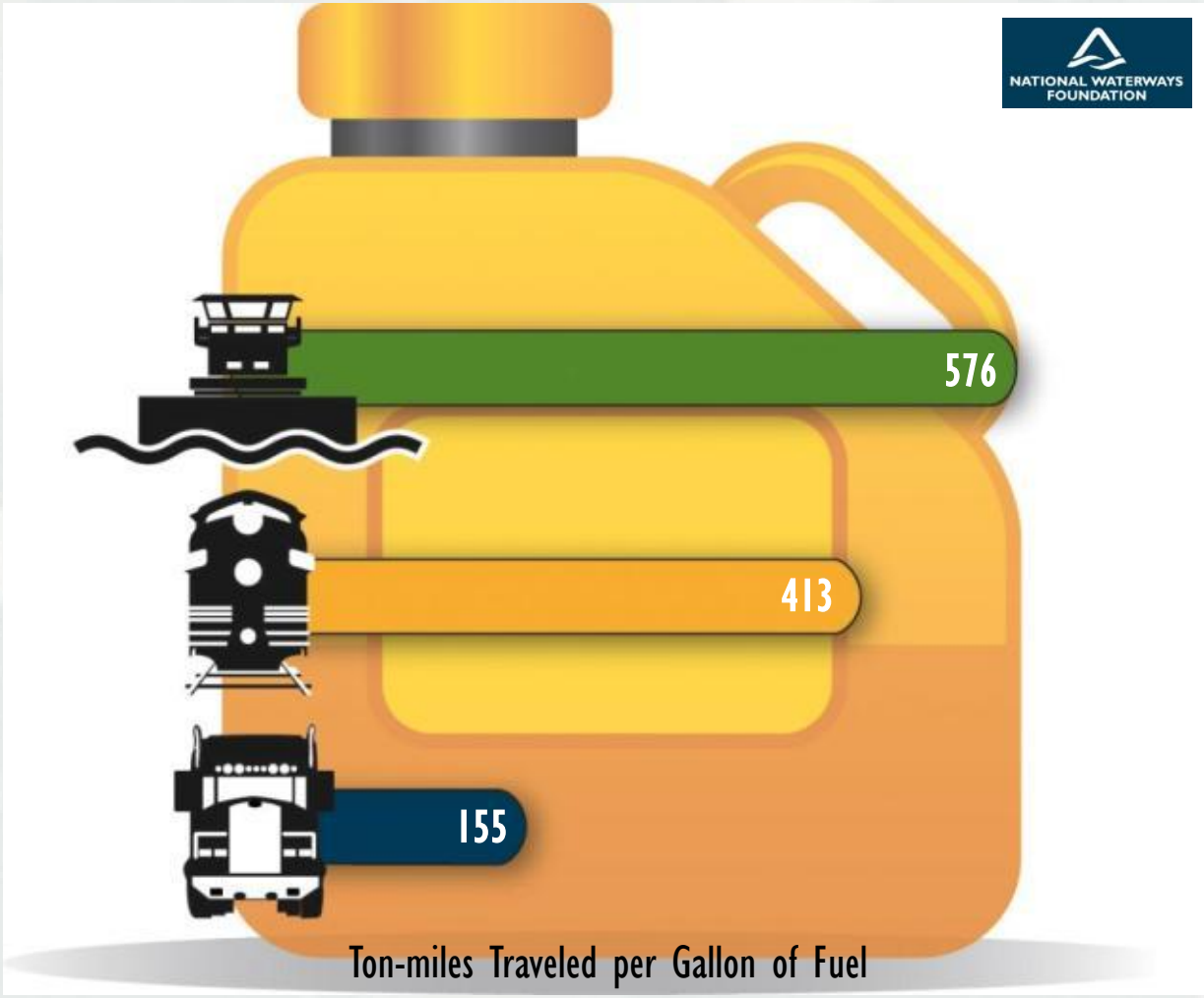
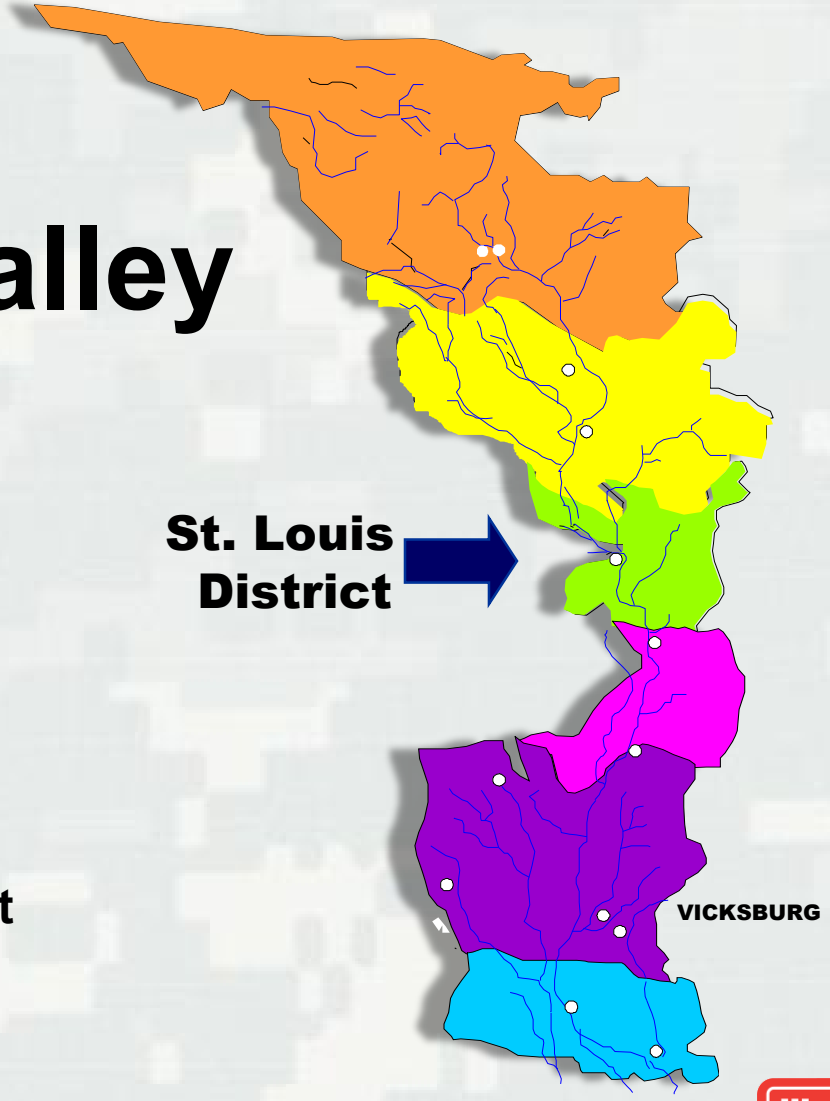
Waterways: The Most Efficient Mode of Freight Transportation

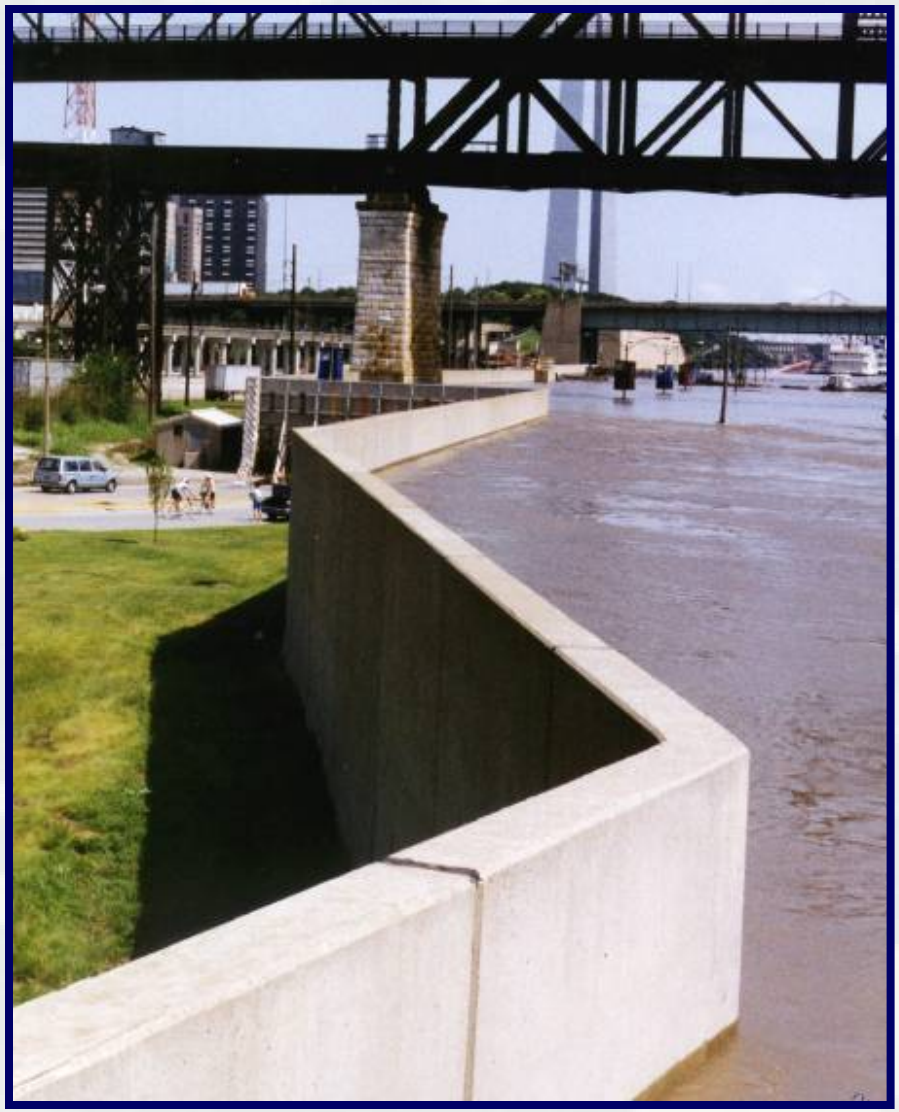


Mississippi Valley Division

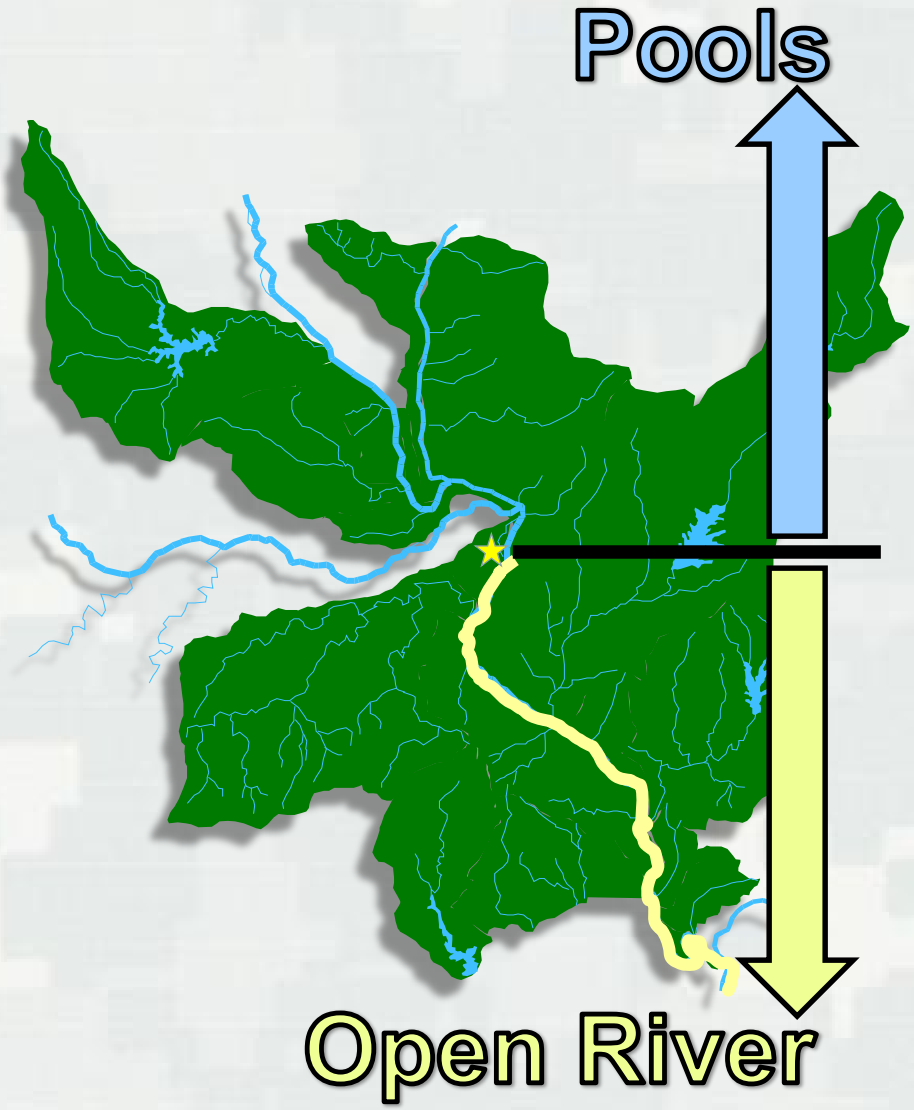
- St. Paul District
- Rock Island District
- St. Louis District
- Memphis District
- Vicksburg District
- New Orleans District

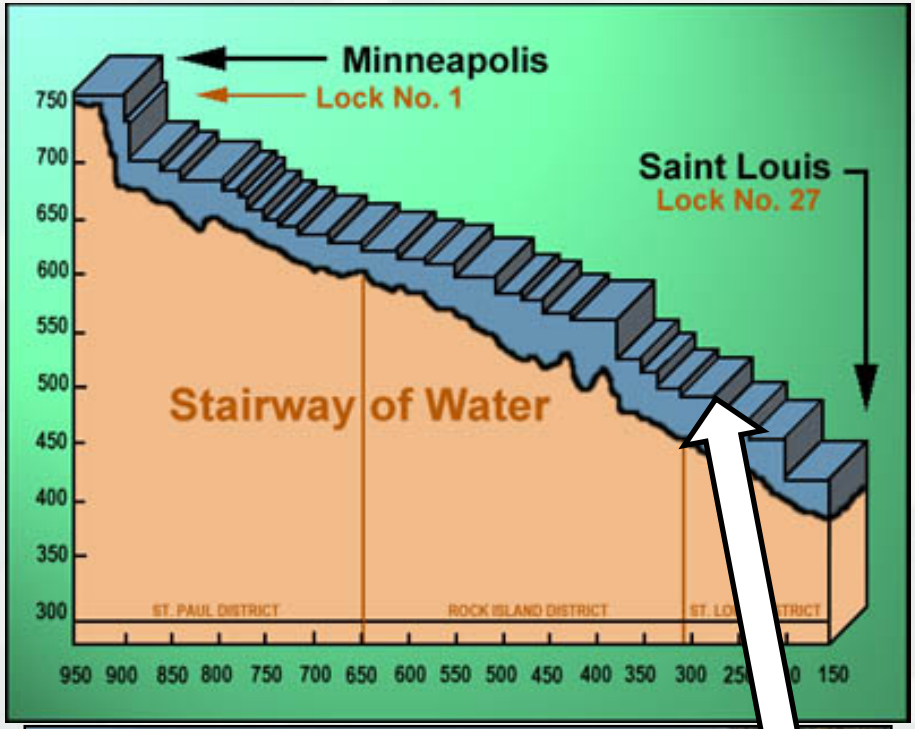


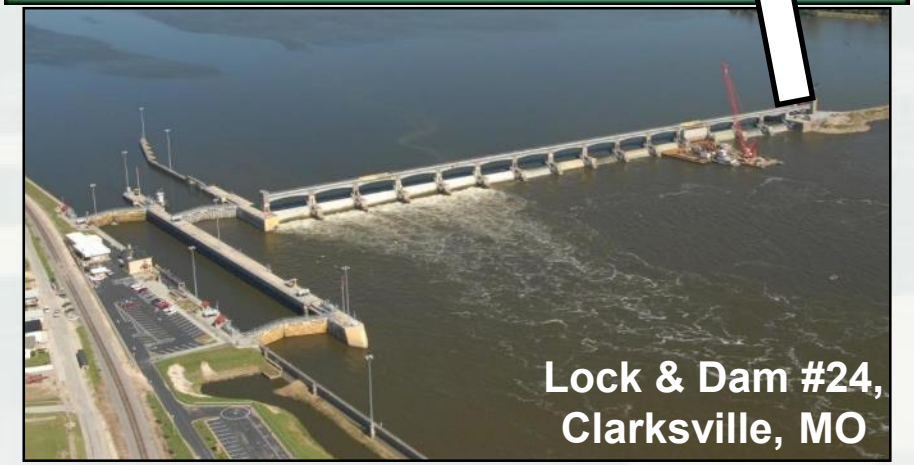
St. Louis District



St. Louis District: The Transition Point

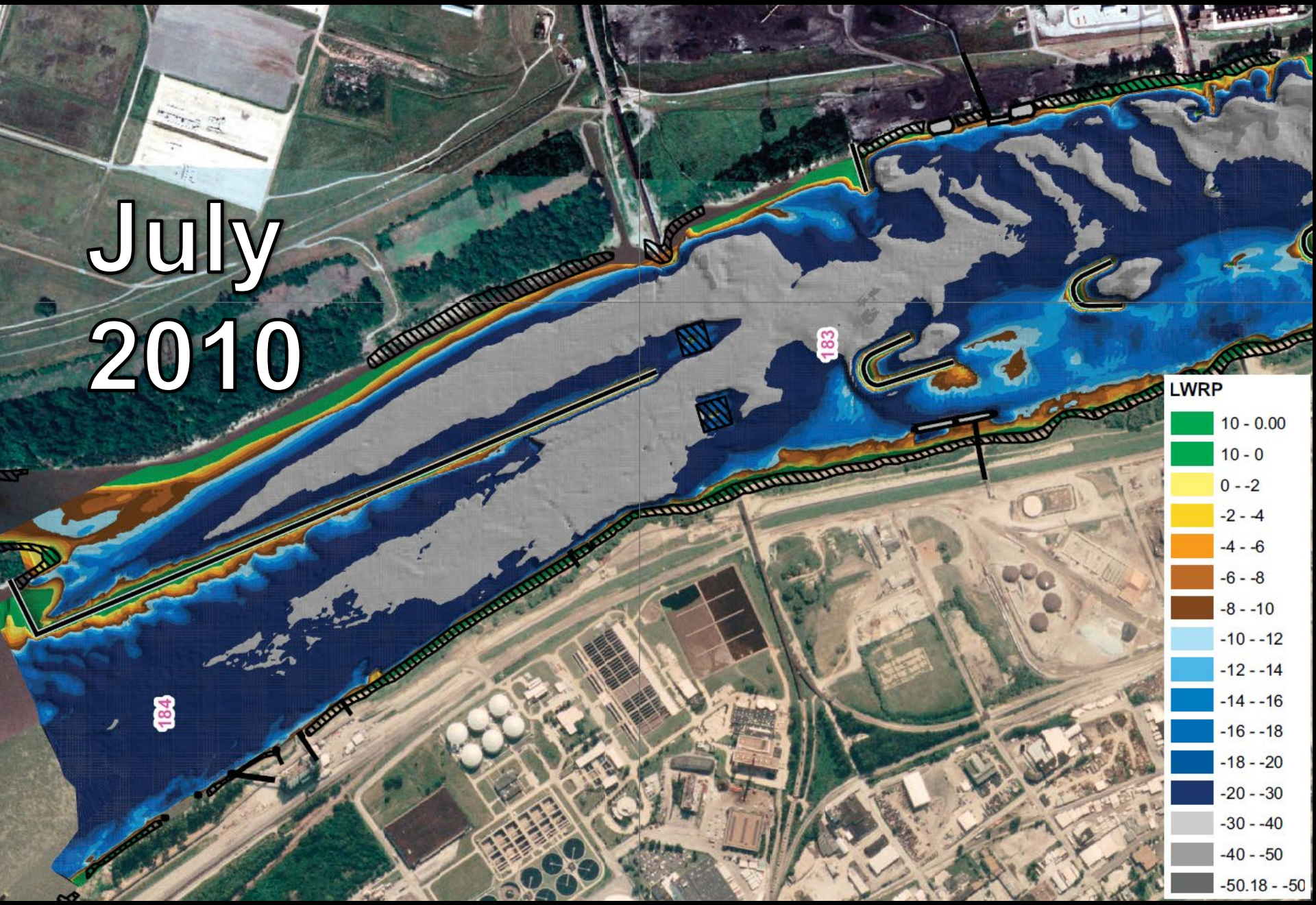


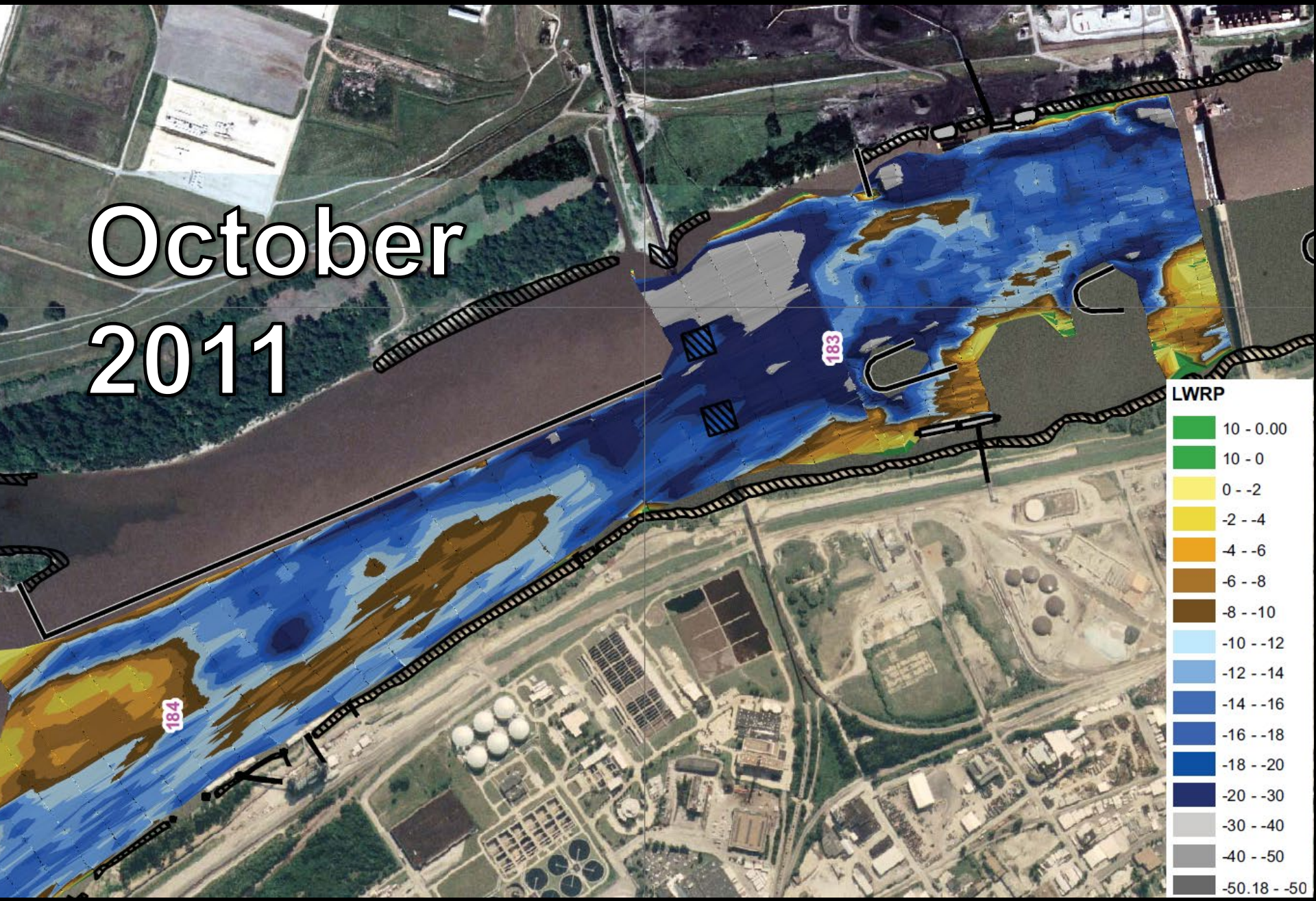




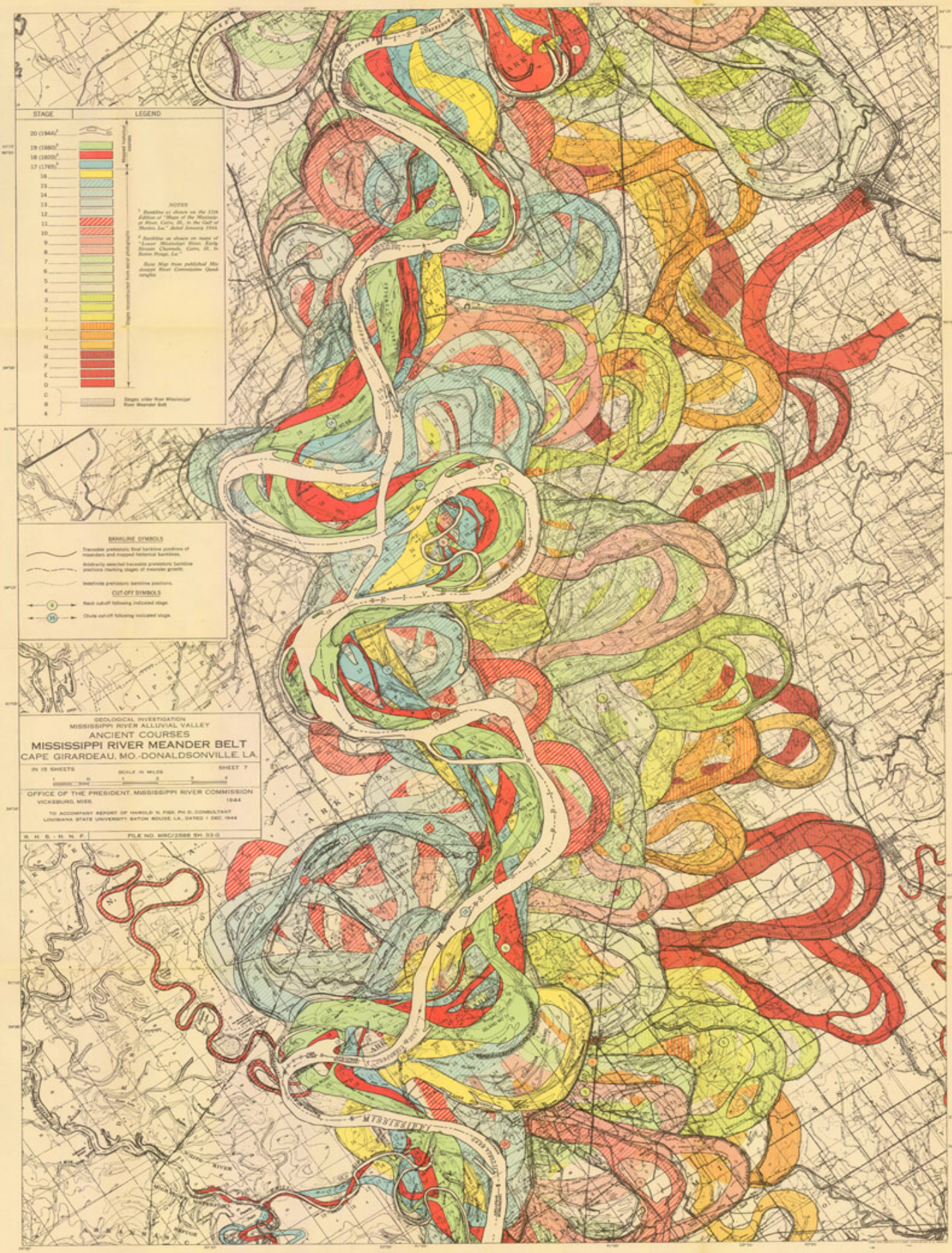
Tools Used for Maintaining Authorized Navigation Channel Dimensions on Open River

Sediment Management

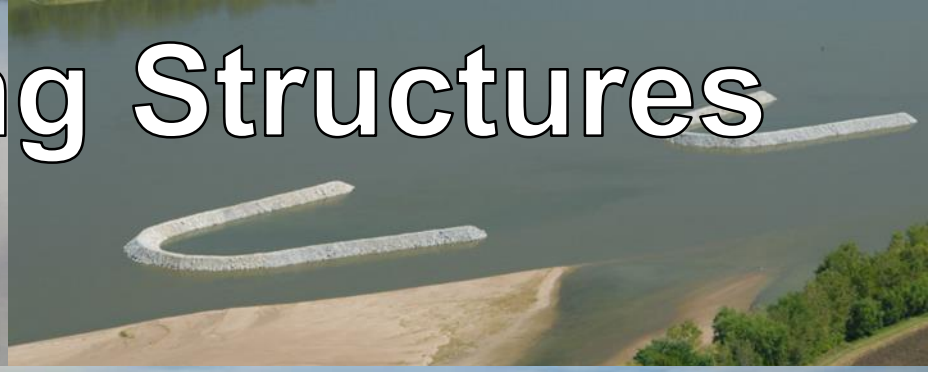

July
2010
183
184
LWRP
10 - 0.00
10 - 0
0 - -2
-2 - -4
-4 - -6
-6 - -8
-8 - -10
-10 - -12
-12 - -14
-14 - -16
-16 - -18
-18 - -20
-20 - -30
-30 - -40
-40 - -50
-50.18 - -50


October
2011
183
184
LWRP
10 - 0.00
10 - 0
0 - -2
-2 - -4
-4 - -6
-6 - -8
-8 - -10
-10 - -12
-12 - -14
-14 - -16
-16 - -18
-18 - -20
-20 - -30
-30 - -40
-40 - -50
-50.18 - -50

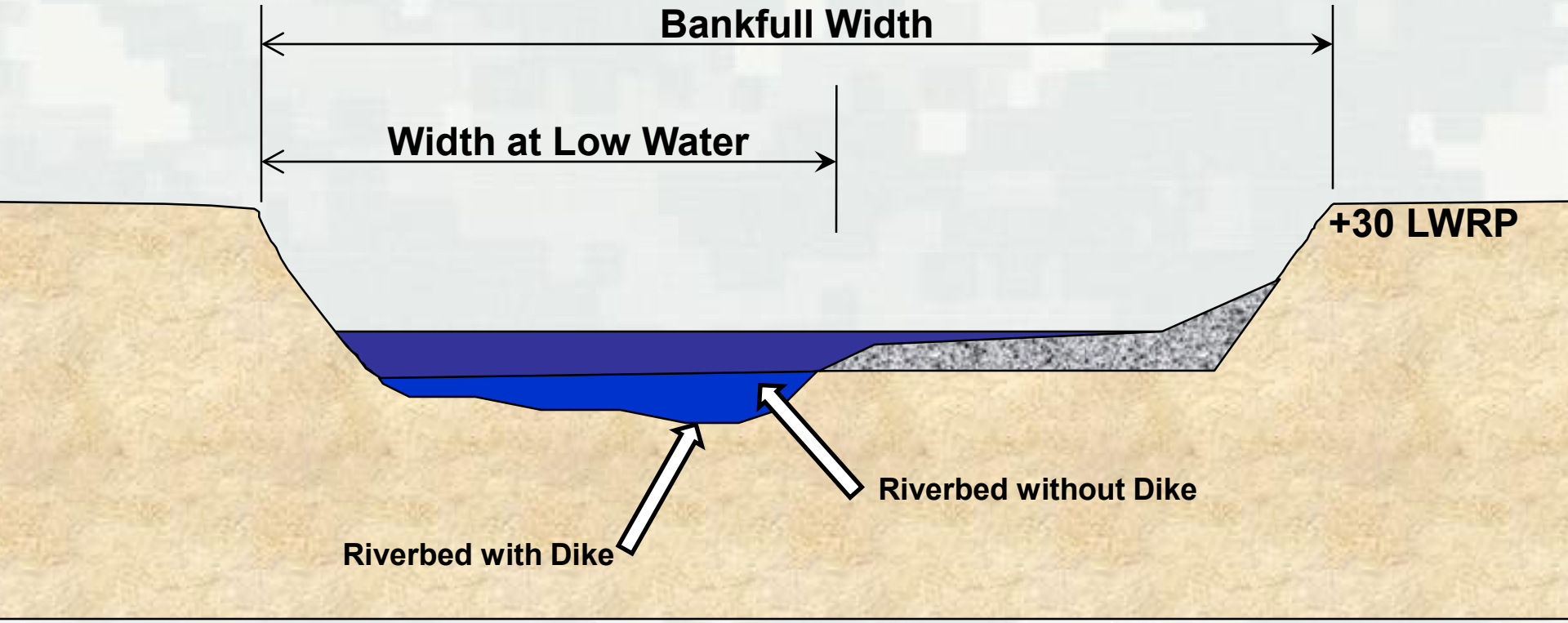
Channel Maintenance Dredging


STAGE
LEGEND
20 (1944)[1]
19 (1880)[2]
18 (1820)[2]
17 (1765)[2]
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
J
I
H
G
F
E
D
C
B
A
Mapped historical streams
From reconstruction from aerial photographs
Stages older than Mississippi River Meander Belt
NOTES
[1] Banklline as shown on the 12th Edition of "Maps of the Mississippi River, Cairo, Ill., to the Gulf of Mexico, La." dated January 1944.
[2] Banklline as shown on maps of "Lower Mississippi River, Early Stream Channels, Cairo, Ill. to Baton Rouge, La."
Base Map from published Mississippi River Commission Quad sheets
BANKLINE SYMBOLS
Traceable prehistoric final banklline positions of meanders and mapped historical banklines.
Arbitrarily selected traceable prehistoric banklline positions marking stages of meander growth.
Indefinite prehistoric banklline positions.
CUT-OFF SYMBOLS
Neck cut-off following indicated stage.
Chute cut-off following indicated stage.
GEOLOGICAL INVESTIGATION
MISSISSIPPI RIVER ALLUVIAL VALLEY
ANCIENT COURSES
MISSISSIPPI RIVER MEANDER BELT
CAPE GIRARDEAU, MO.-DONALDSONVILLE, LA.
IN 15 SHEETS
SCALE IN MILES
SHEET 7
OFFICE OF THE PRESIDENT, MISSISSIPPI RIVER COMMISSION
VICKSBURG, MISS.
1944
TO ACCOMPANY REPORT OF HAROLD N. FISK, PH. D., CONSULTANT
LOUISIANA STATE UNIVERSITY, BATON ROUGE, LA., DATED 1 DEC. 1944
R. H. S. - H. N. F.
FILE NO. MRC/2588 SH. 33-G
MISSISSIPPI
ARK.
MISS.
YAZOO BASIN
YAZOO RIVER

River Training Structures



River Contraction



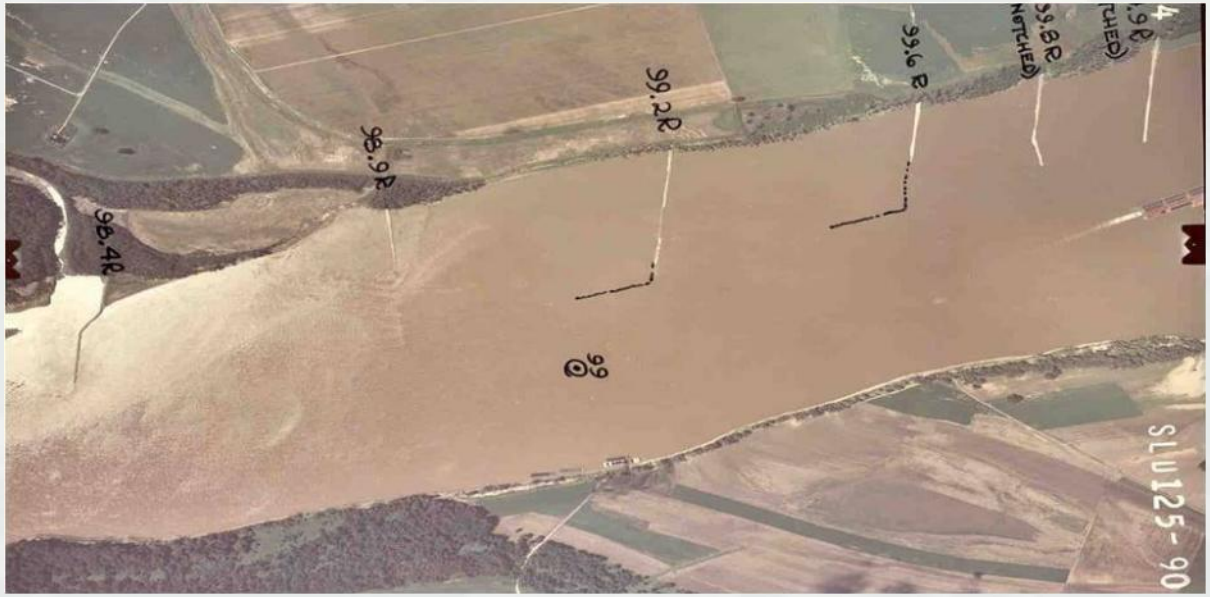
BRIEF HISTORY ON MVS DIKE PROGRAM

- River training structures (timber pile dikes), revetments (wooden mattresses)
- 1960's transitioned from timber structures and revetments to rock.
- 1990's bendway weirs and blunt nose chevrons were introduced to the Mississippi River.
- Early 2000's the benefits of the Regulating Works Project developments are evident with the reduction of dredging, increased reliability of the navigation channel during the low water period, and reduced accidents & groundings

Dikes (Wingdams)

Notched Dikes

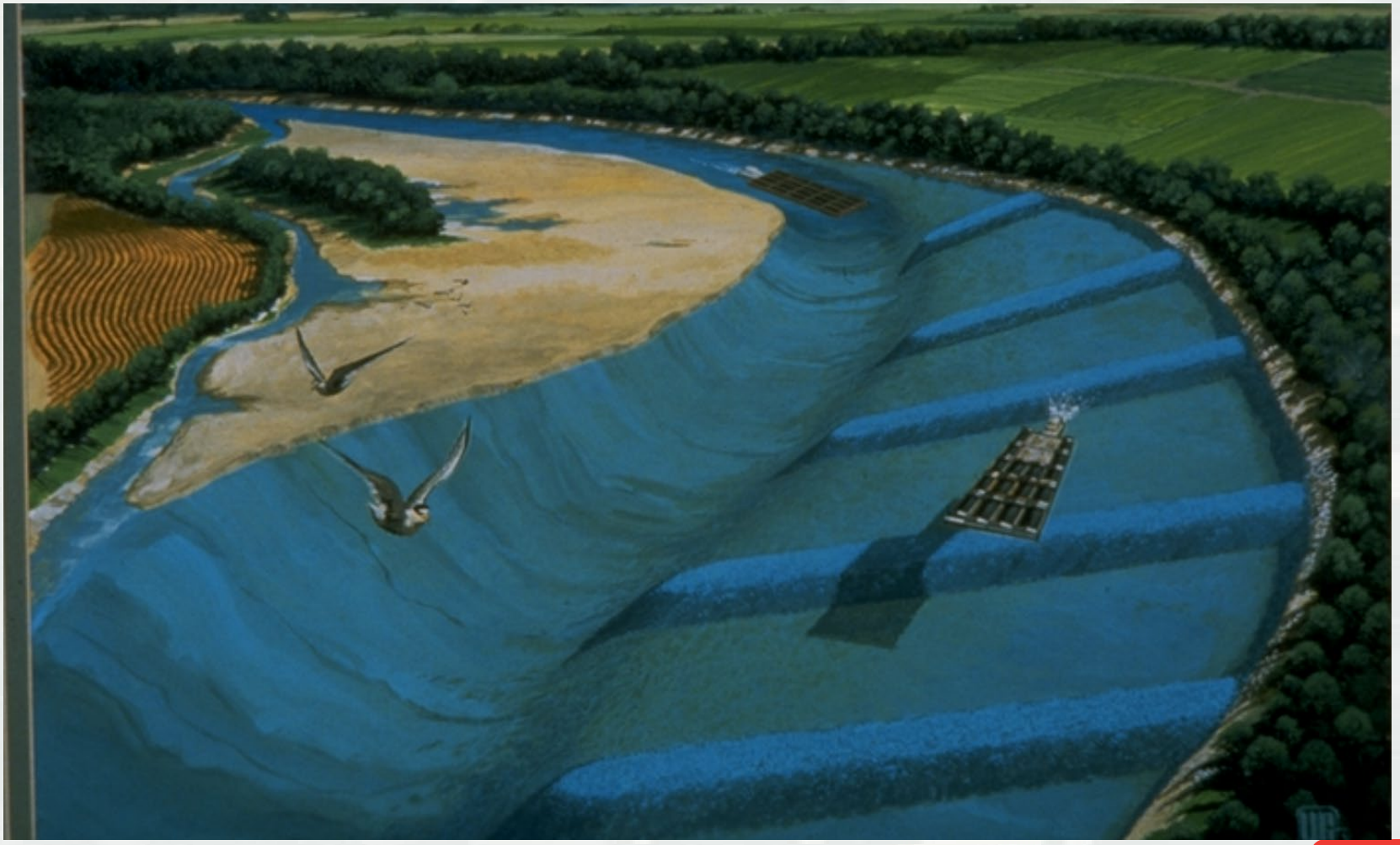
Notched Dikes



1974

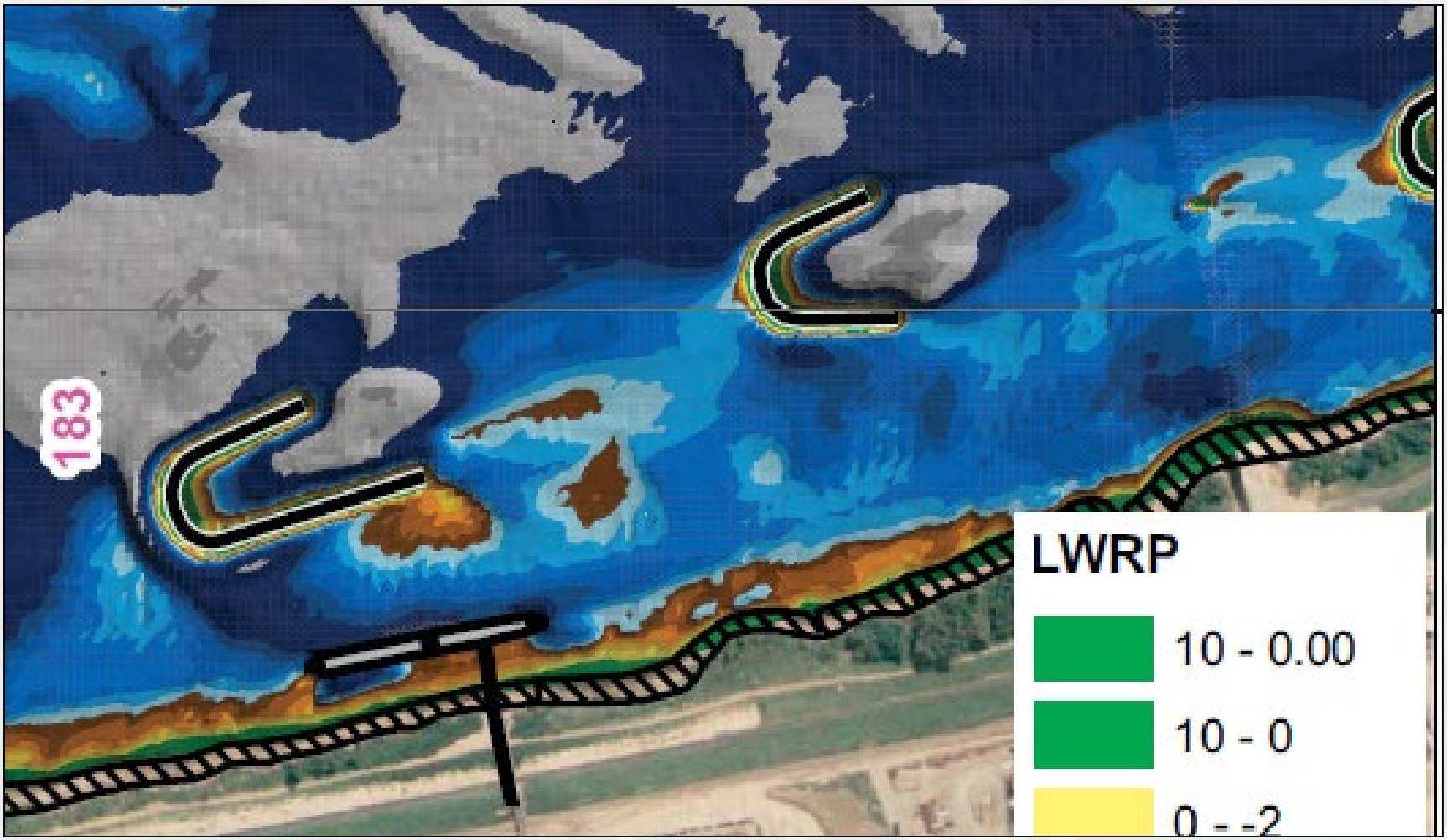
1998

Bendway Weirs



Chevrons

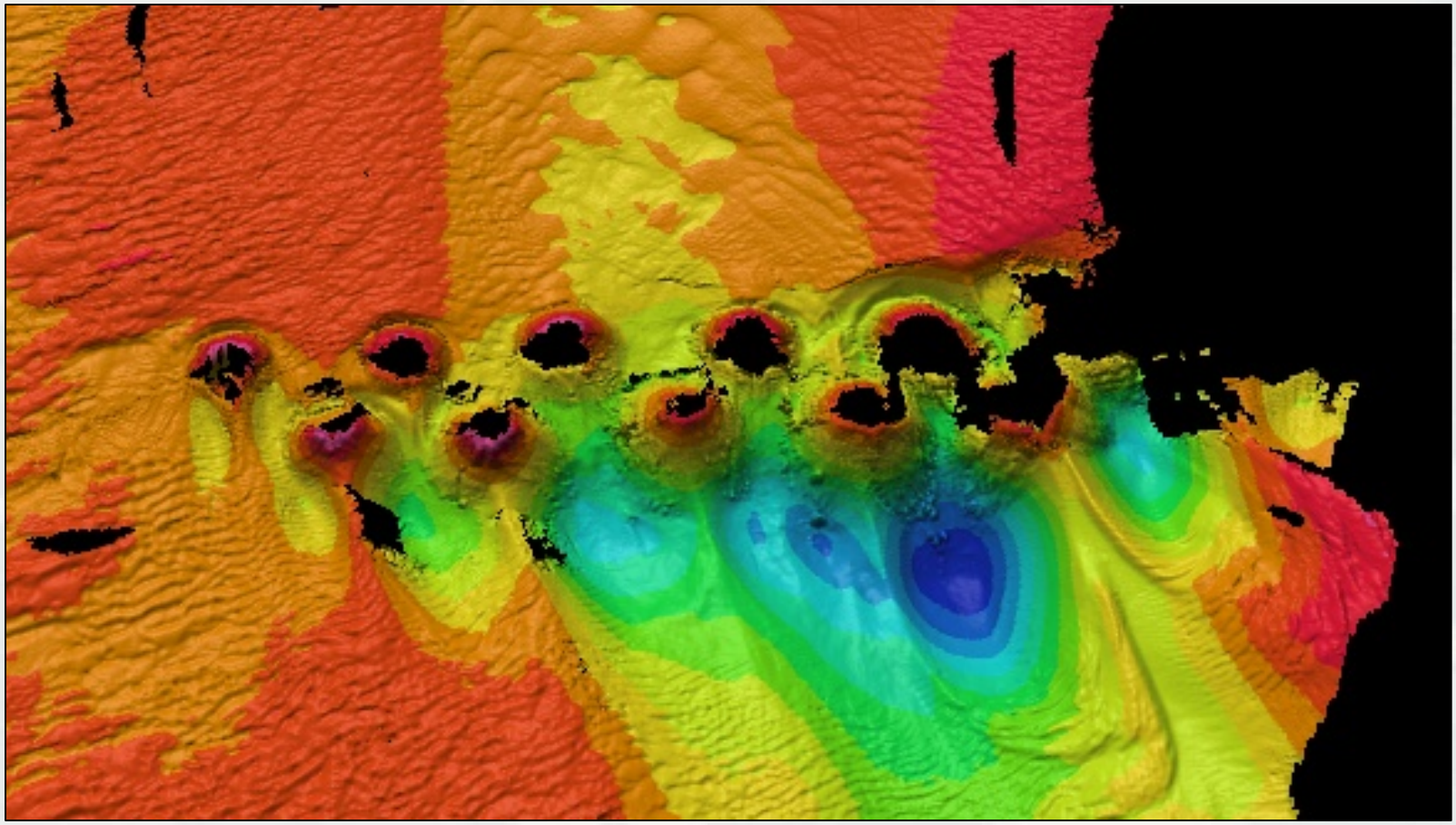
Chevrons



Bullnose

Multiple Roundpoint Structures

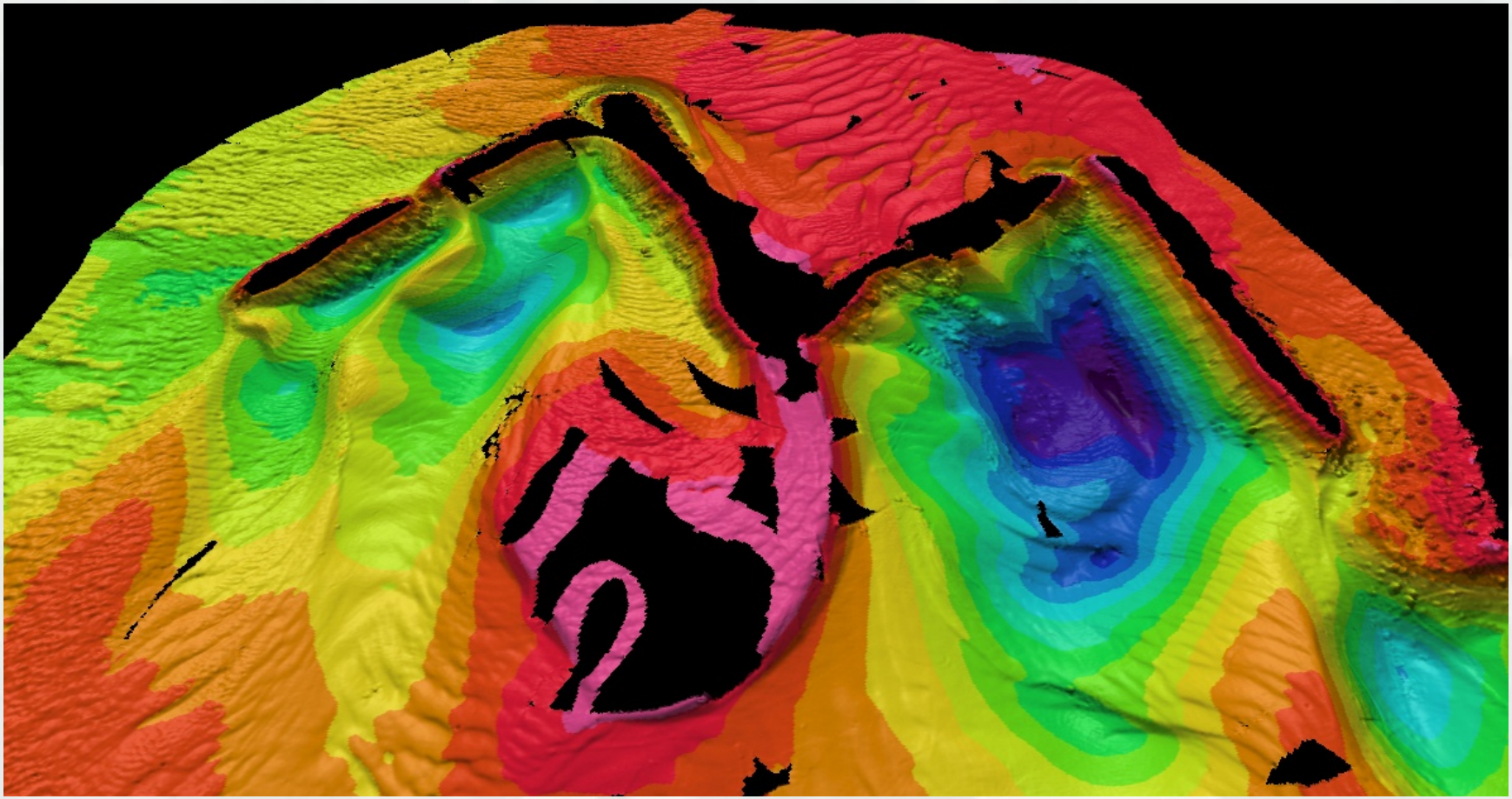
Multiple Roundpoint Structures



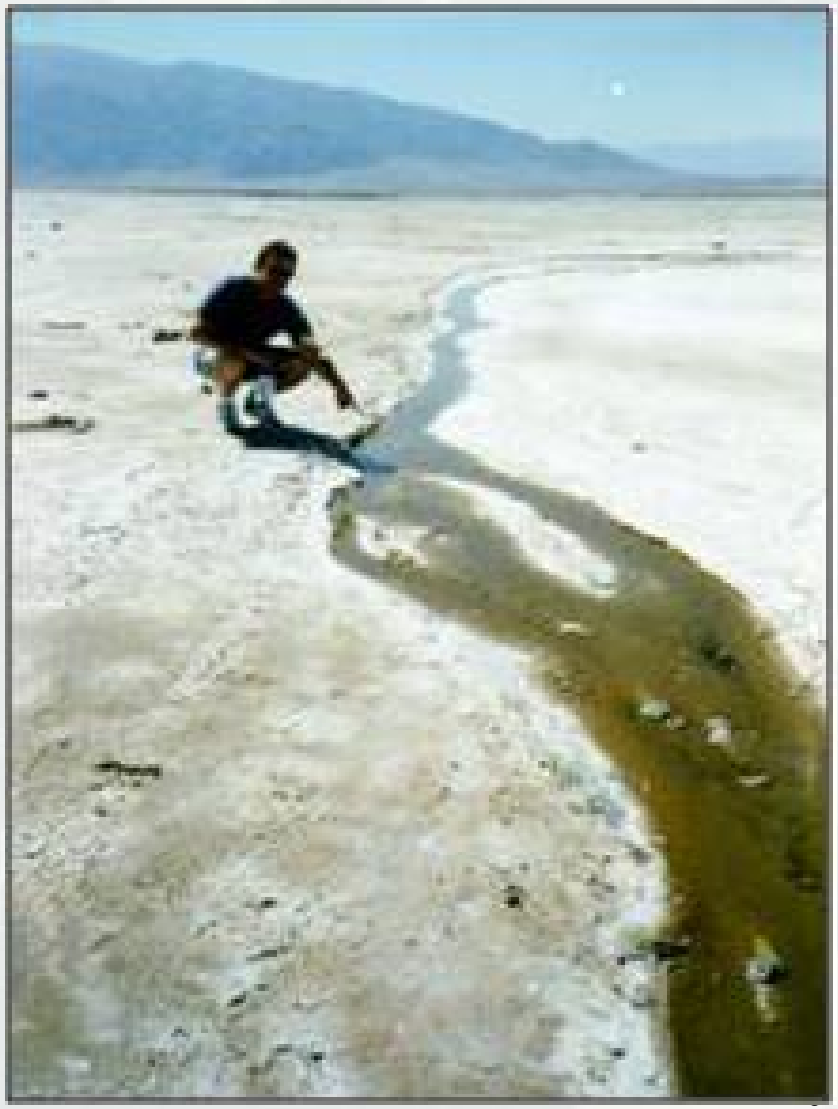
Z-Dikes

W-Dikes

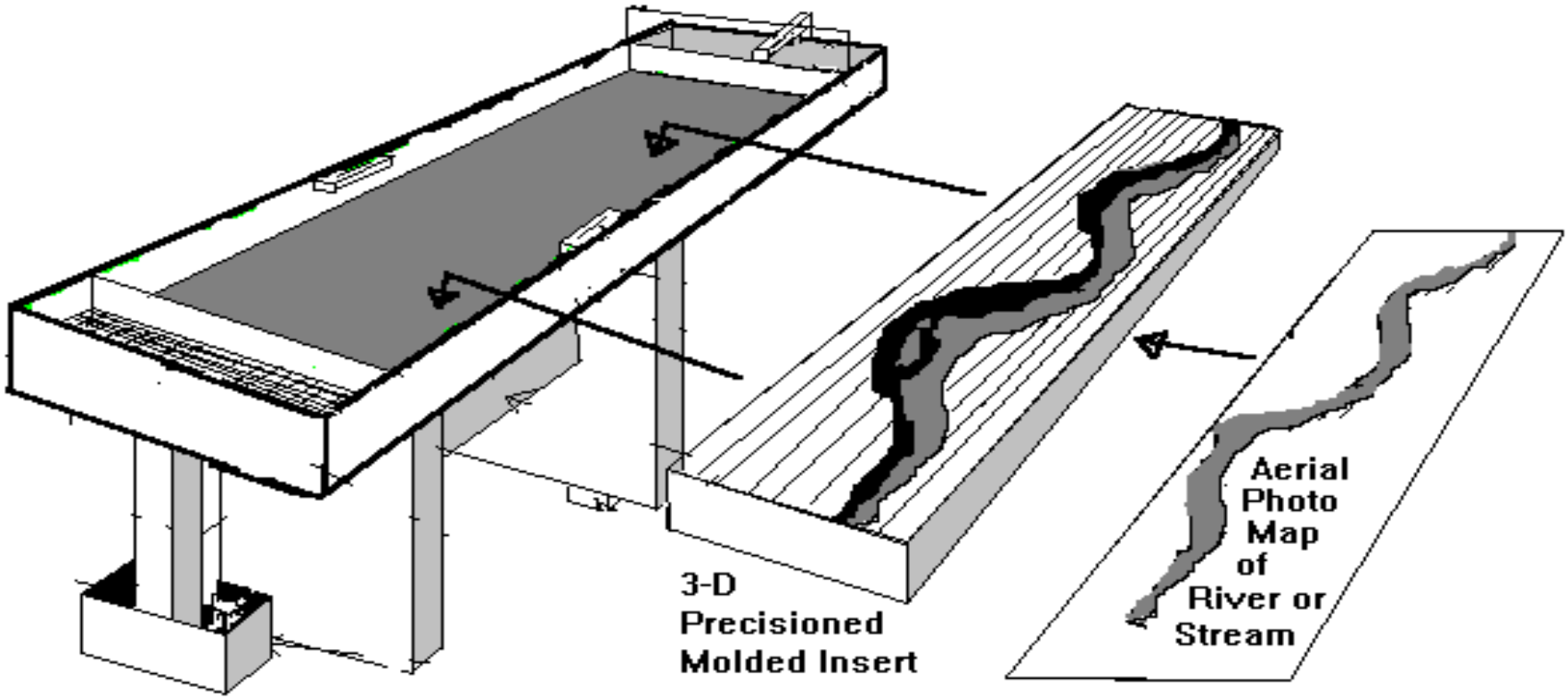
W-Dikes



HSR Modeling Basic Principle



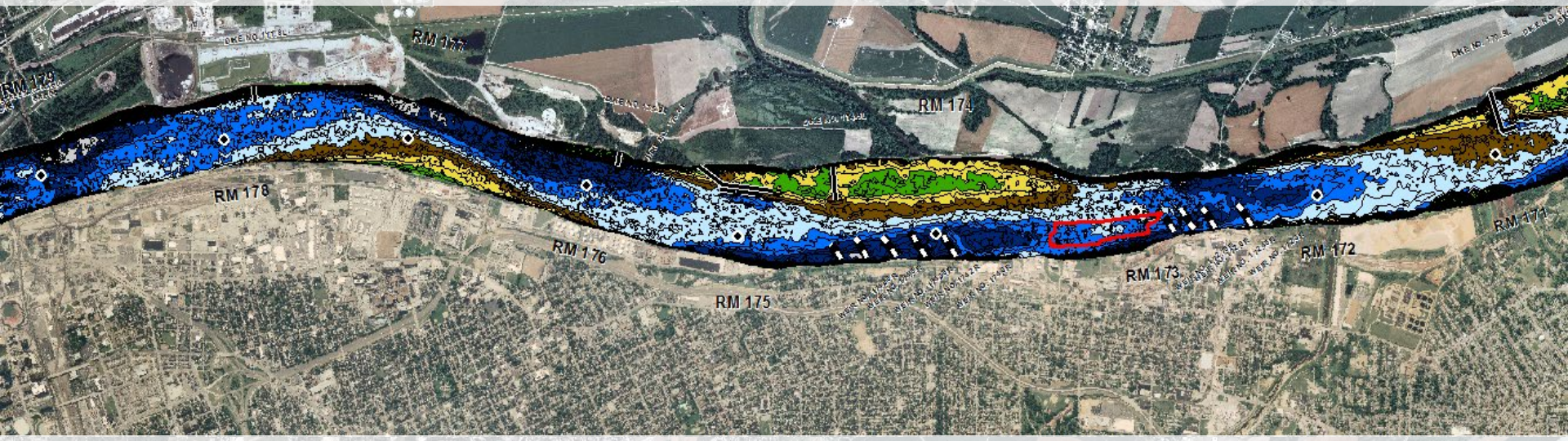
HSR Model


3-D
Precisioned
Molded Insert
Aerial
Photo
Map
of
River or
Stream

Carondelet HSR Model

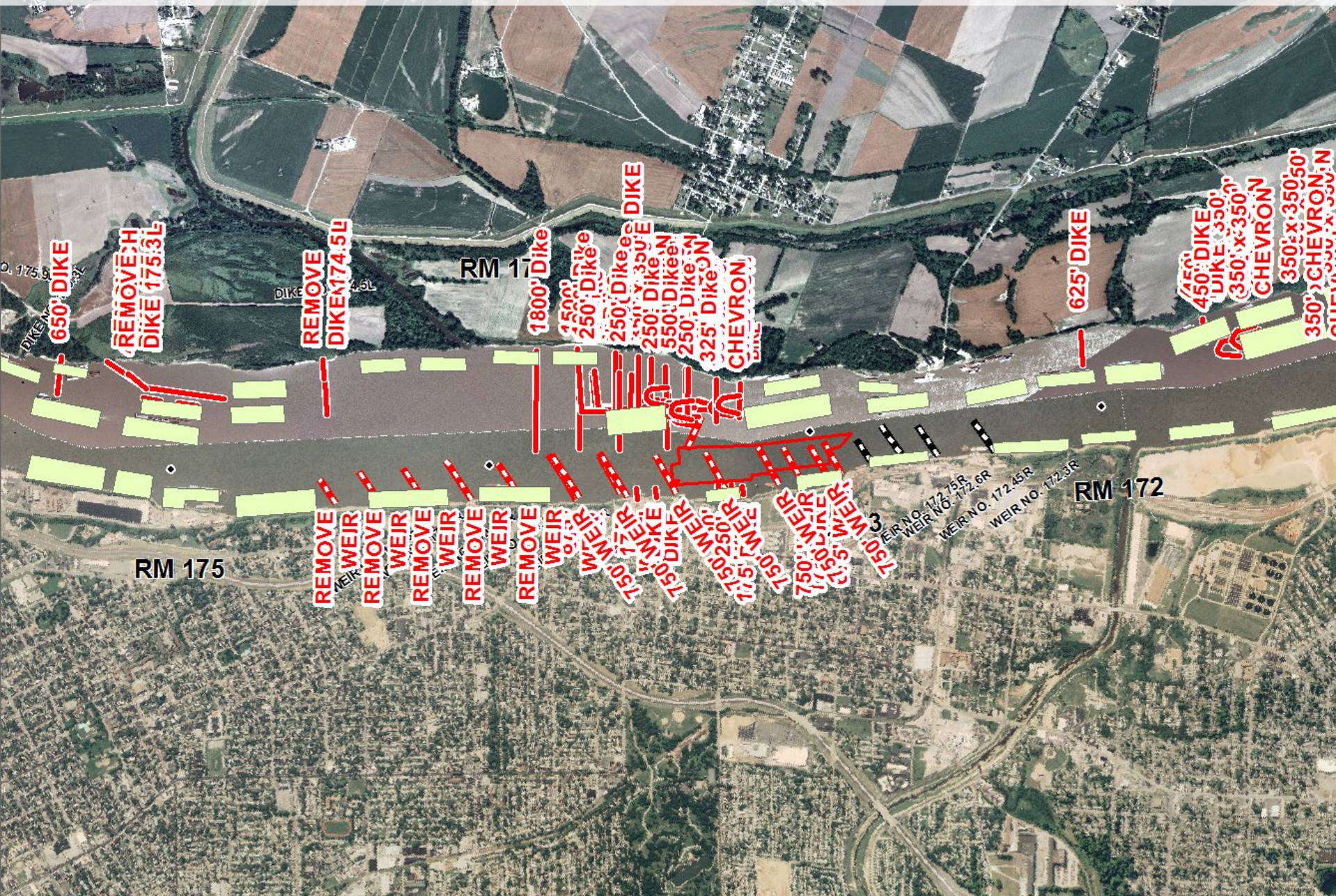
- River Miles 181.0 – 165.0
- Regulating Works Program

Model Replication

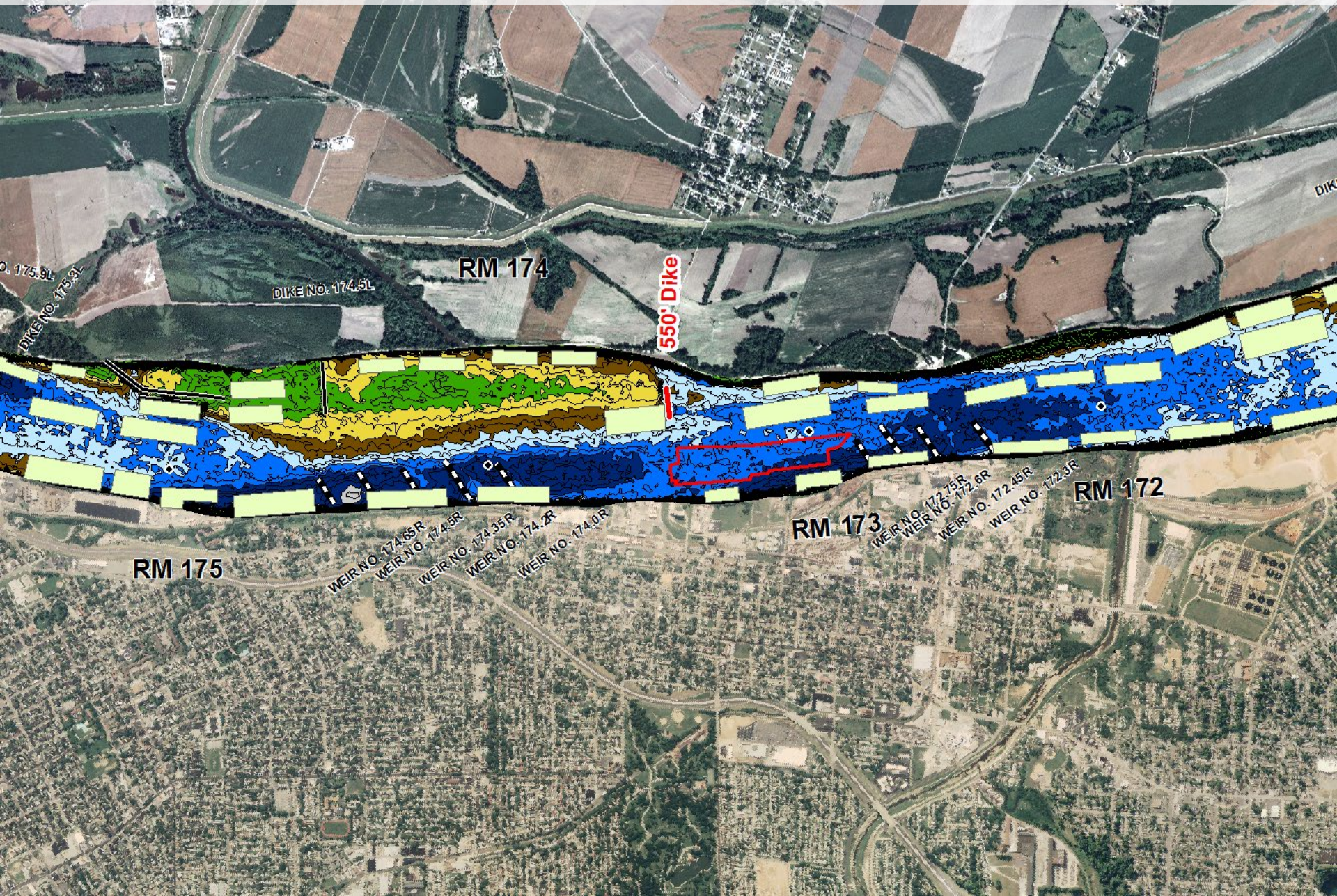


2010 Prototype

Alternative Testing



Recommended Alternative



Proven Design Capabilities of HSR Models

- Design and optimization of river training structures
- Thalweg realignment
- Reduction of costly, chronic dredging
- Modification of bathymetry and far-field flow patterns to improve navigation
- Environmental- i.e. Side Channels
- Demonstration & Education

Questions?