

2011 Missouri River Flood and The Ecological Impacts

North Central Region – NRCS Conference

John Remus

June 4, 2012



The System

Main Stem Dam/Reservoirs

- Multi-purpose
- Operated as a system

Bank Stabilization and Navigation Project

- 734 miles long
- Self scouring

Levees

- 250 Miles in Omaha District



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Missouri River Mainstem Reservoir System



Our Mission

Regulate Missouri River Mainstem Reservoirs to Support Congressionally Authorized Purposes

Flood Control



Hydropower



Water Supply



Water Quality Control



Recreation



Navigation



**Fish and Wildlife
Including Threatened and
Endangered Species**

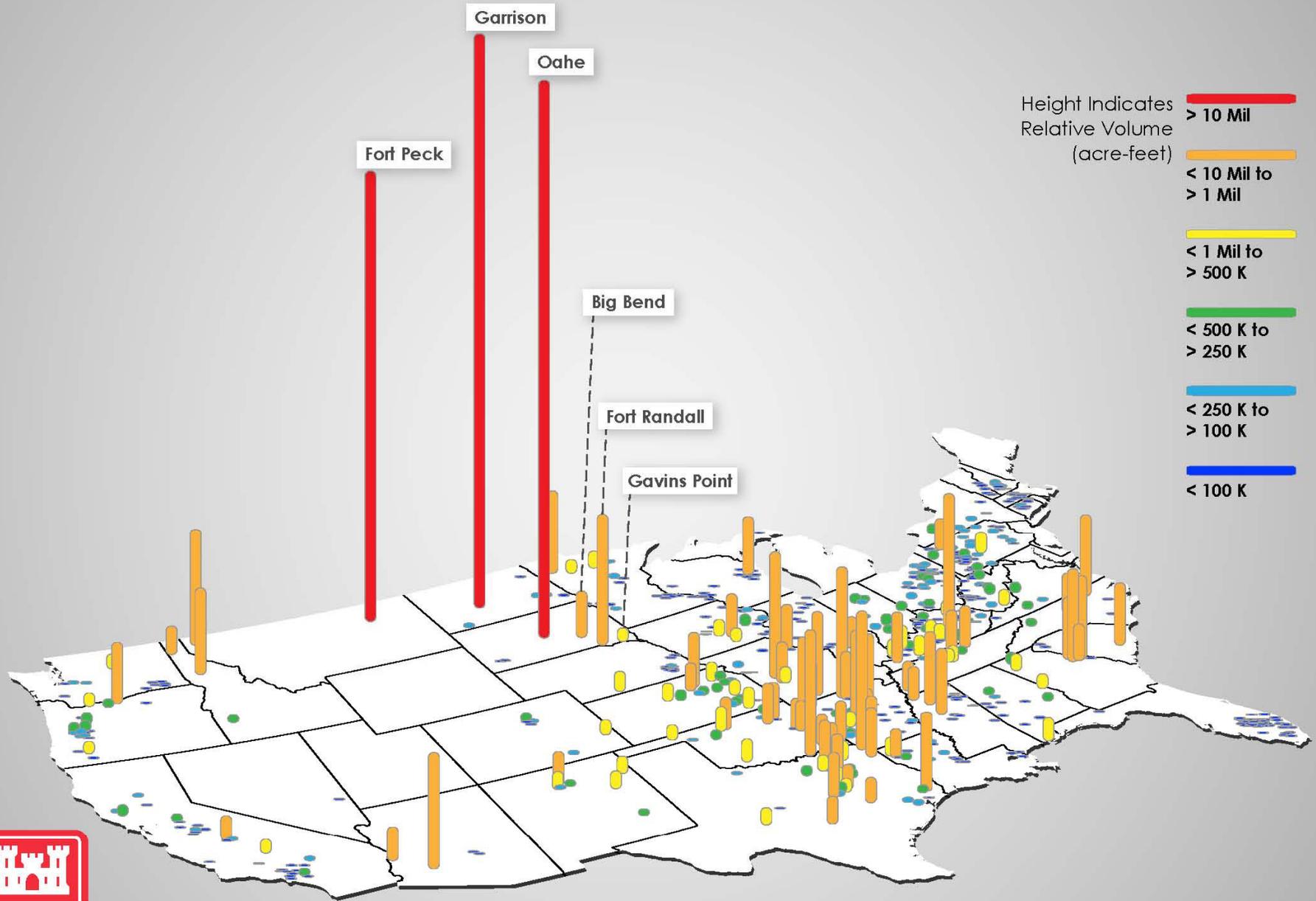


Irrigation



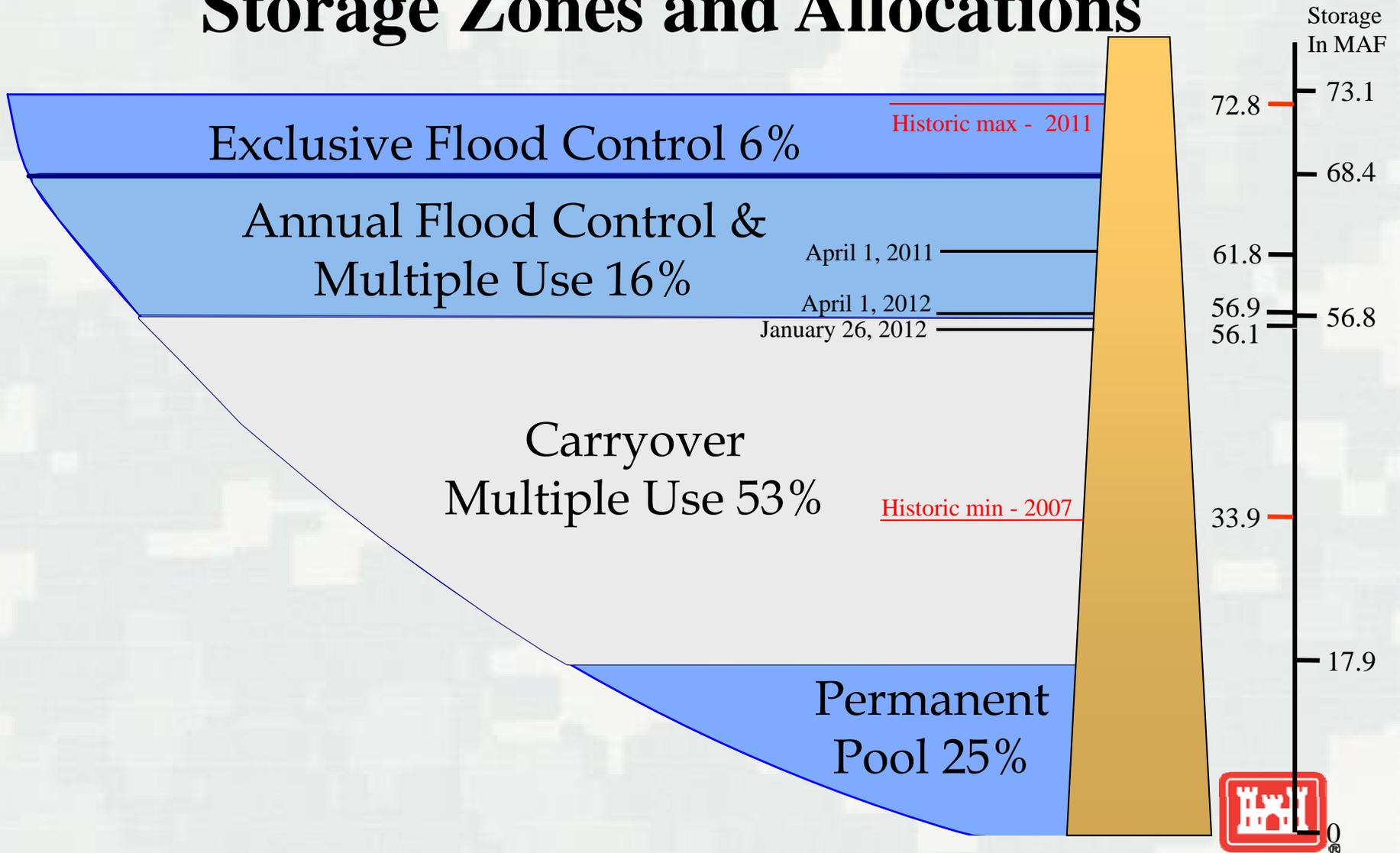
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Storage Capacity of Corps Reservoirs

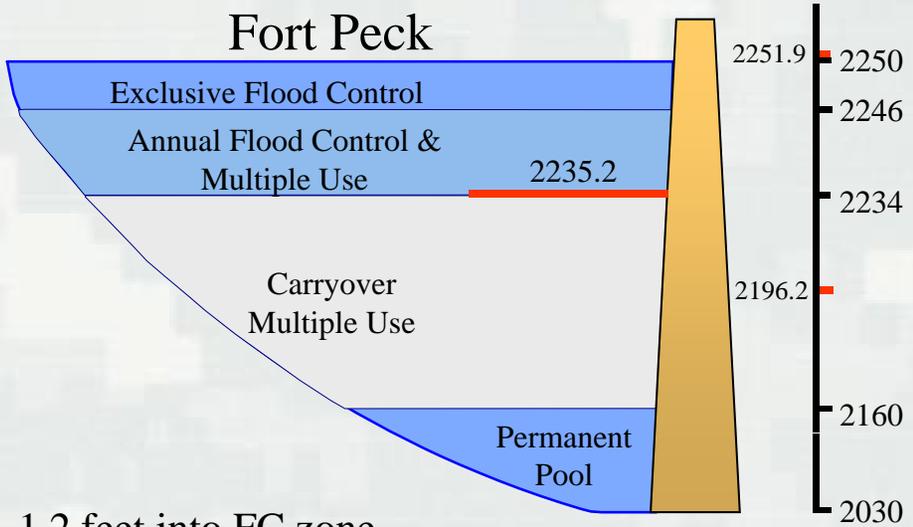


US Army Corps of Engineers
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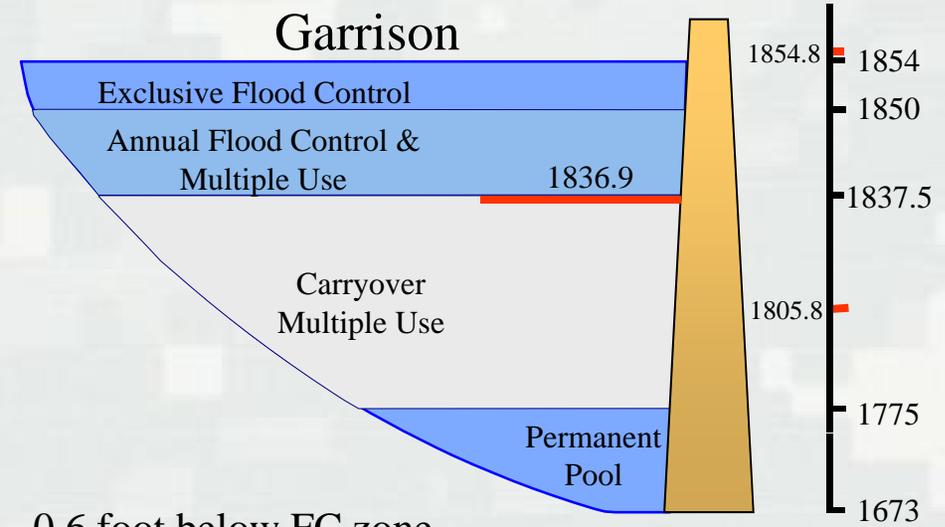
Missouri River Mainstem System Storage Zones and Allocations



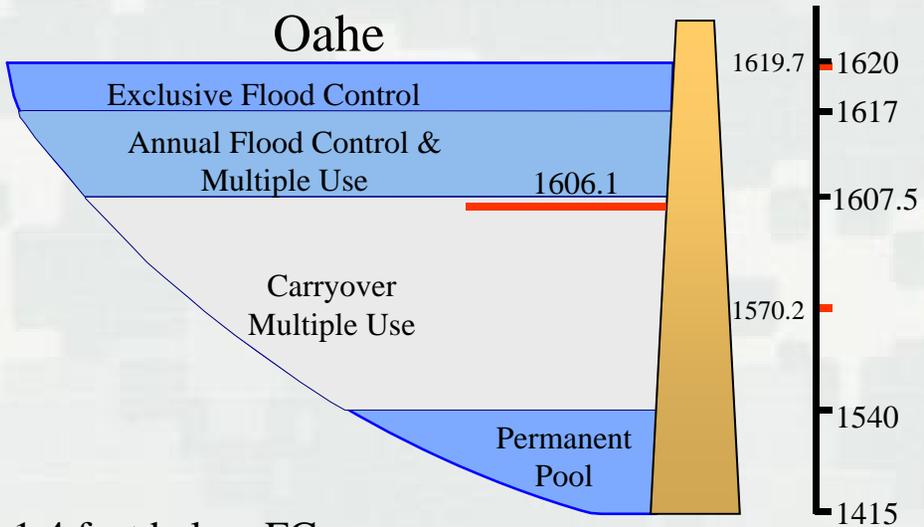
Current Reservoir Levels – April 15, 2012



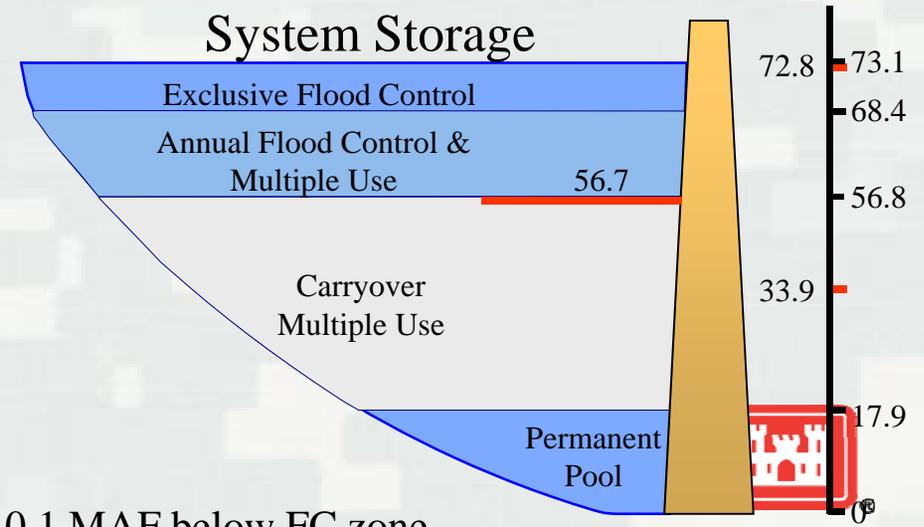
1.2 feet into FC zone.



0.6 foot below FC zone.

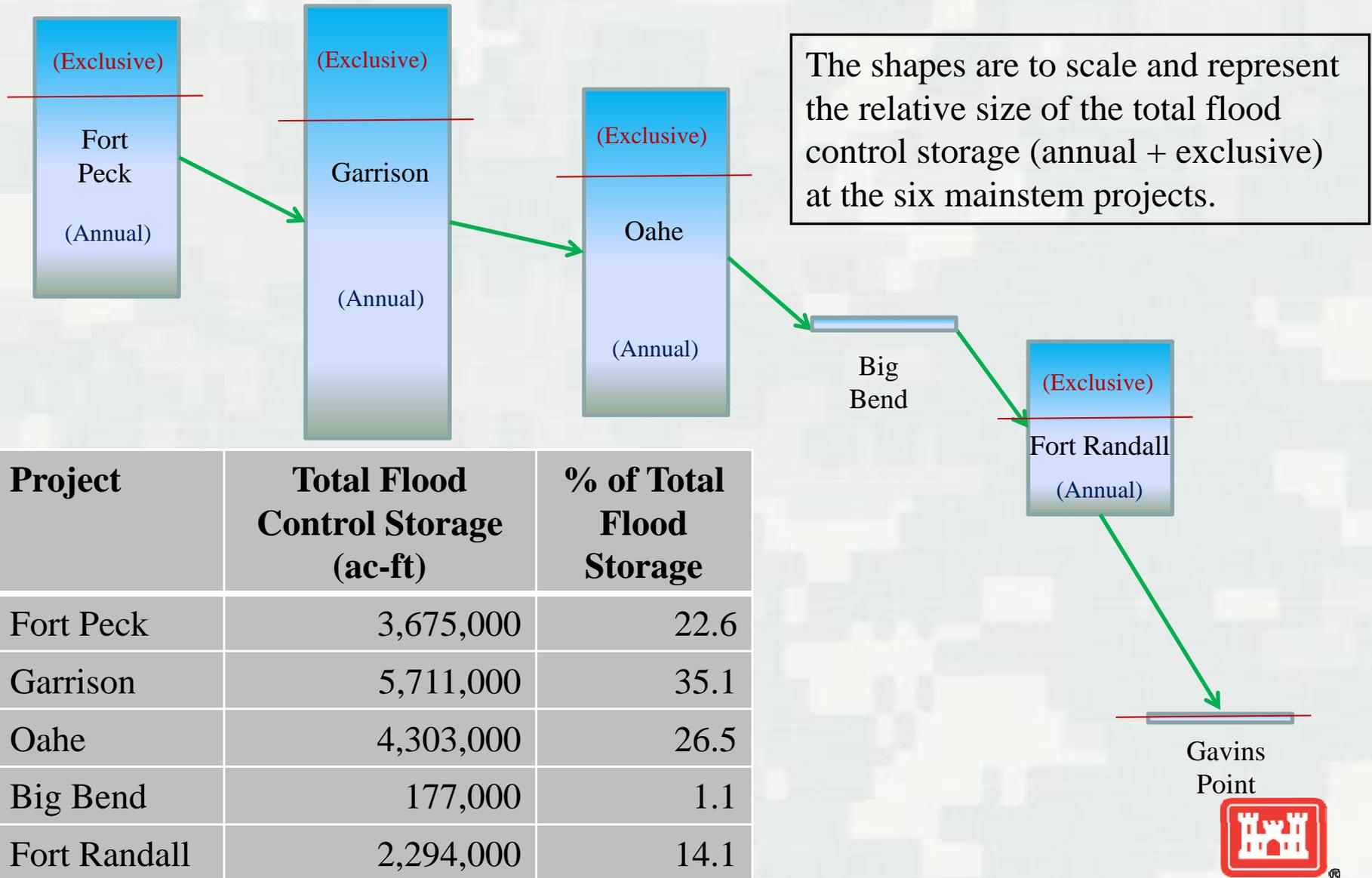


1.4 feet below FC zone.



0.1 MAF below FC zone.

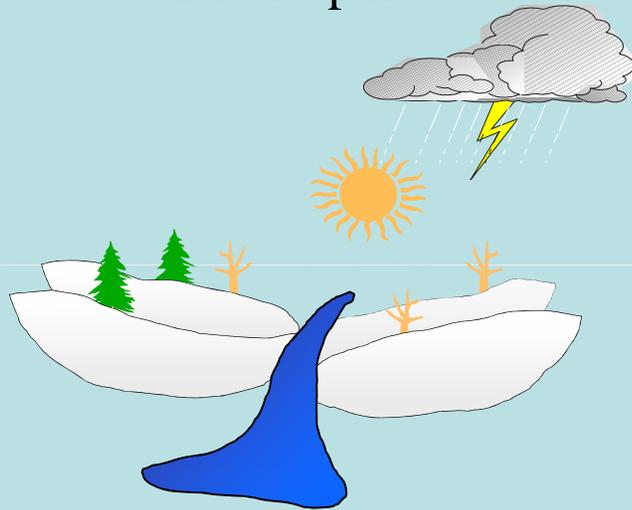
Flood Control Storage



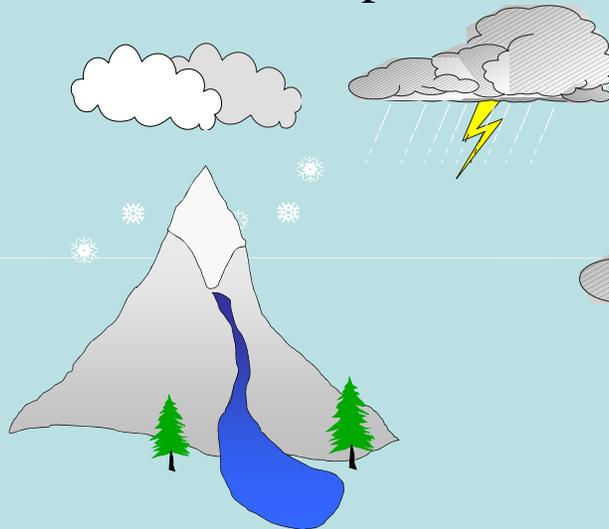
Project	Total Flood Control Storage (ac-ft)	% of Total Flood Storage
Fort Peck	3,675,000	22.6
Garrison	5,711,000	35.1
Oahe	4,303,000	26.5
Big Bend	177,000	1.1
Fort Randall	2,294,000	14.1
Gavins Point	108,000	0.7

Runoff Components (Above Sioux City)

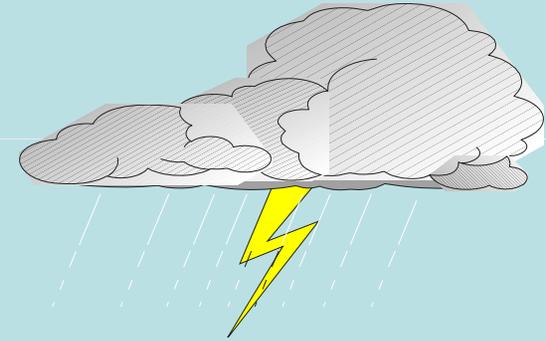
Plains Snowpack



Mountain Snowpack



Rainfall



March and
April

May, June
and July

Throughout
the Year

2012 Forecast* = 23.4 MAF



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*April 1 Forecast

Bank Stabilization and Navigation Project

734 miles long - Self scouring channel



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Rock Bluff Bend - Sep
1934



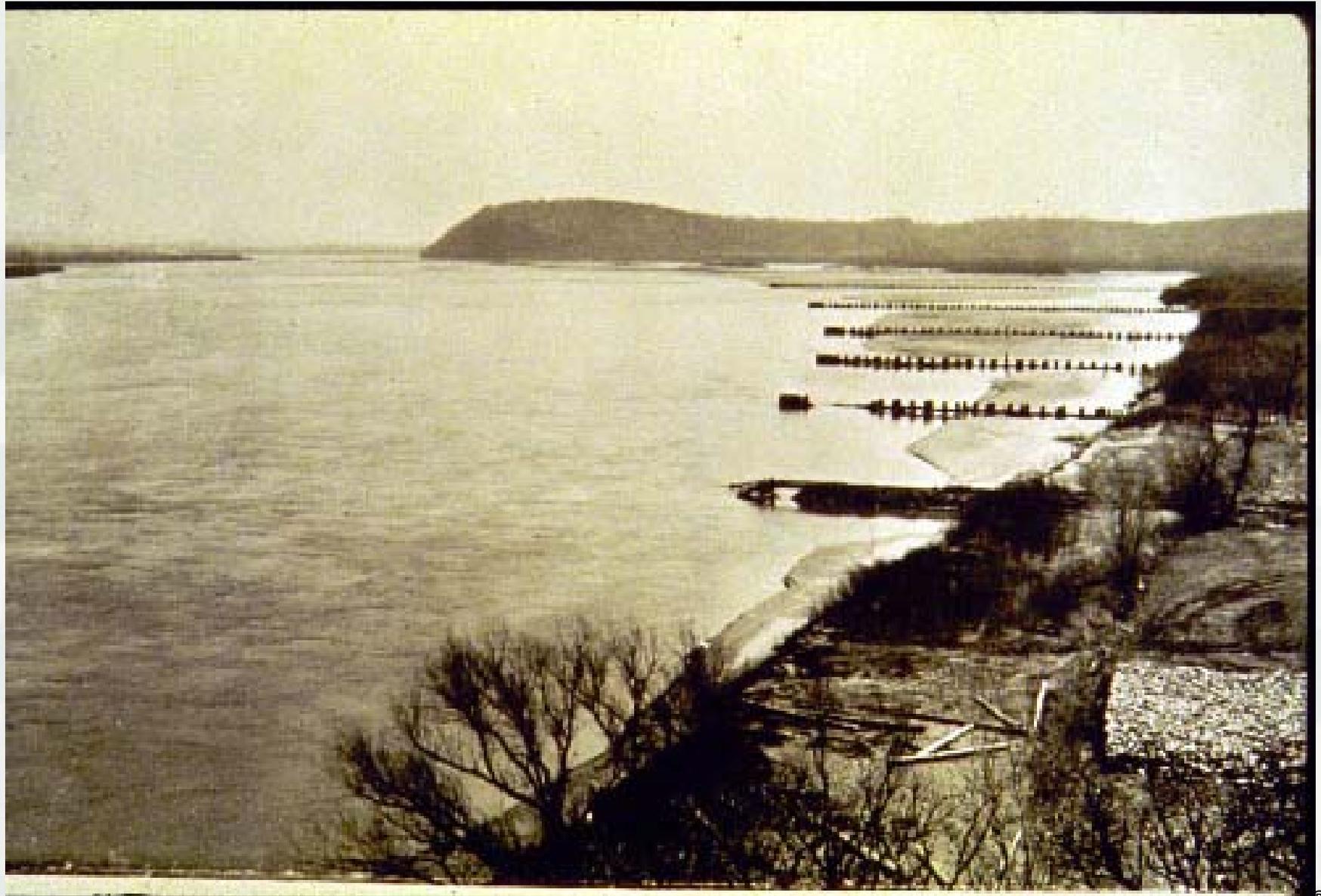
Rock Bluff Bend - Oct 1934



Rock Bluff Bend - Mar 1935



Rock Bluff Bend - Mar 1936



Rock Bluff Bend - Oct 1939



Rock Bluff Bend - 1942



Rock Bluff Bend - May 1956



Rock Bluff Bend - Mar 1983



Levee System Authorization



**1952 Council Bluffs
Levee Construction**

Flood Control Act of 1944

Design discharges:

- 250,000 cfs at Omaha
- 295,000 cfs at Nebraska City

Freeboard: 2-feet

Minimum conveyance width: 3,000 feet

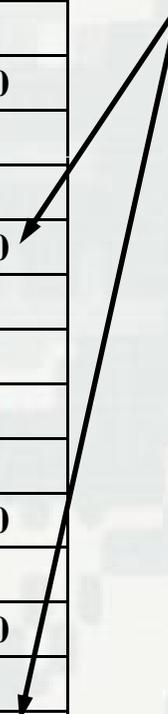


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Levee System Constrictions

Federal Levee System	Levee to Levee (feet)	Levee to Bluff (feet)	Width at Bridge (feet)
R-520		34,390	
L-536		3,280	
L-550	3,170	2,730	1,770
R-548	3,170		
R-562	3,780		
L-575	3,780	3,140	1,090
R-573	4,960		
L-594	4,090	2,780	
Lake Waconda	4,091		
L-601		3,010	
L-611-614	2,910	2,390	1,260
R-613	2,950		
R-616	2,910		2,500
L-624		10,510	
L-627	2,760		1,180
Omaha	3,000	2,890	1,180

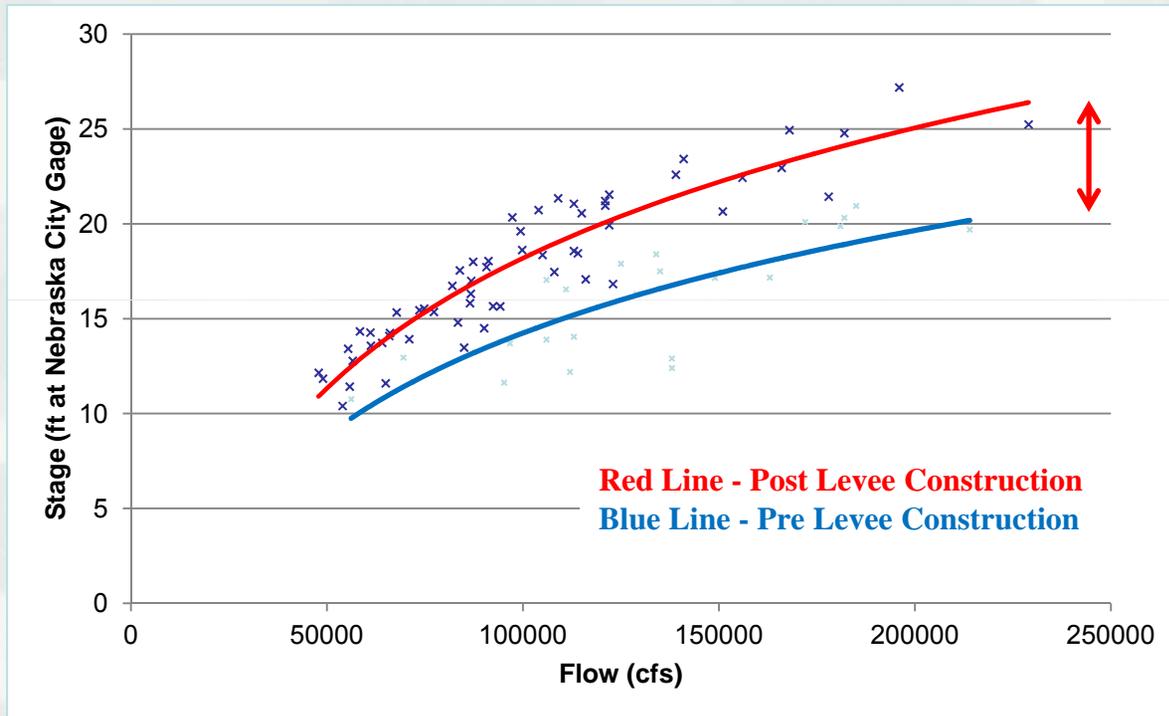
Significant Pinch Points



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Missouri River Levee System History

(comparison of flood stages pre- and post-levees)



>5ft of Hydraulic Impact

Dynamic Basin vs Static Solution

Increasing Risk vs Decreasing Level of Protection



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Ecological Impacts



Sandbar Habitat

- **Erosion/Deposition**
- **Streambed Degradation**

In Channel Habitat (Swallow Water)

Backwaters/Wetlands

- **Sediment Deposition**
- **Lowered Water Surface Elevations**



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Sand Bar Habitat

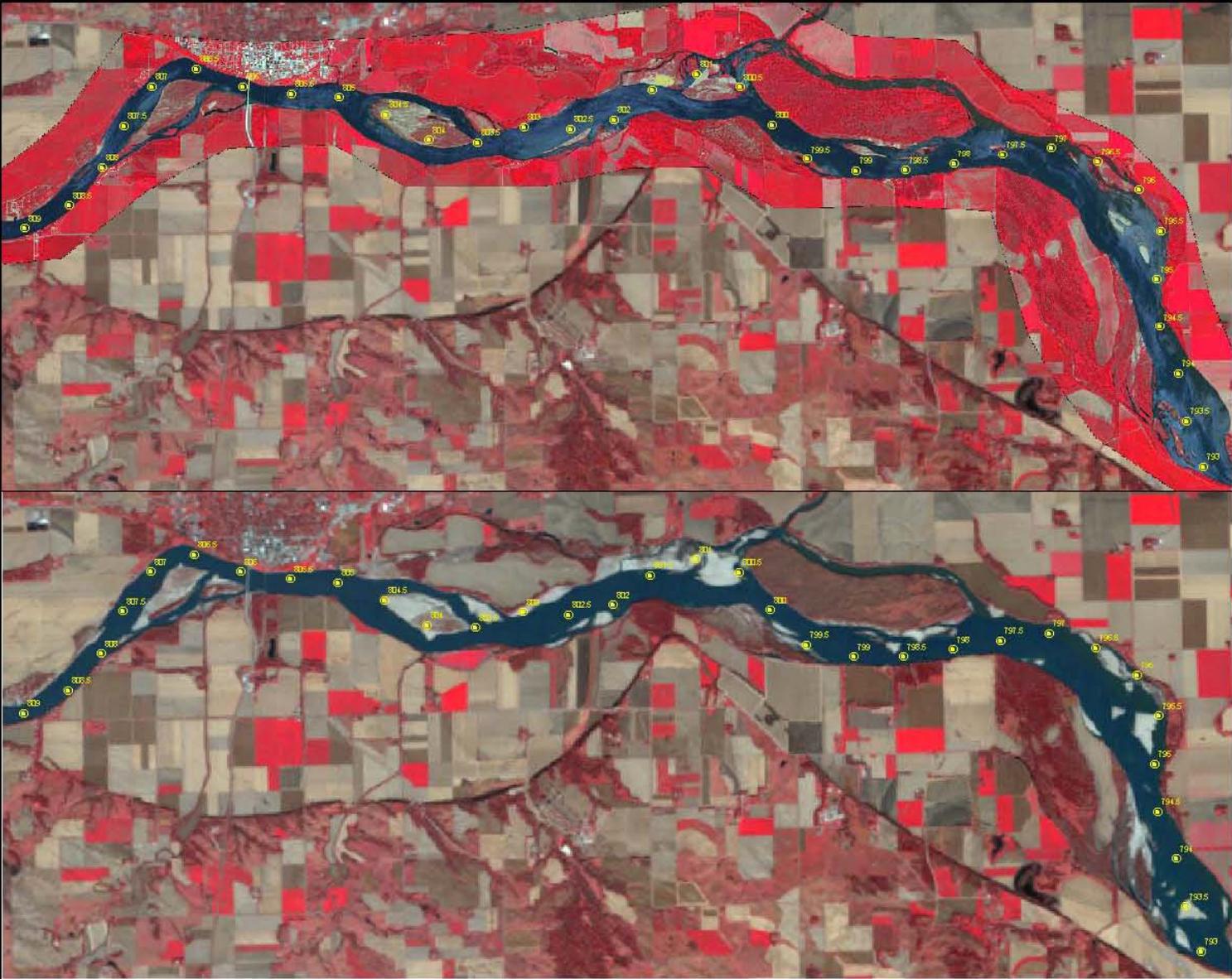
- Deposition and Bed Scour
 - ▶ High Sustained Flows – High Elevation Deposits

 - ▶ Bed Scour Lowers the Water Surface Elevation
 - 2-7 Gavins Point to Ponca State Park

 - ▶ Net Increase – Post Flood



Sand Bar Habitat



Before After
Comparison
Flood 2011

Page 1
RM 808-793

2009

2011

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Threatened and Endangered
MFC00-17

Prepared by
USACE

Preparation Date
11/01/11

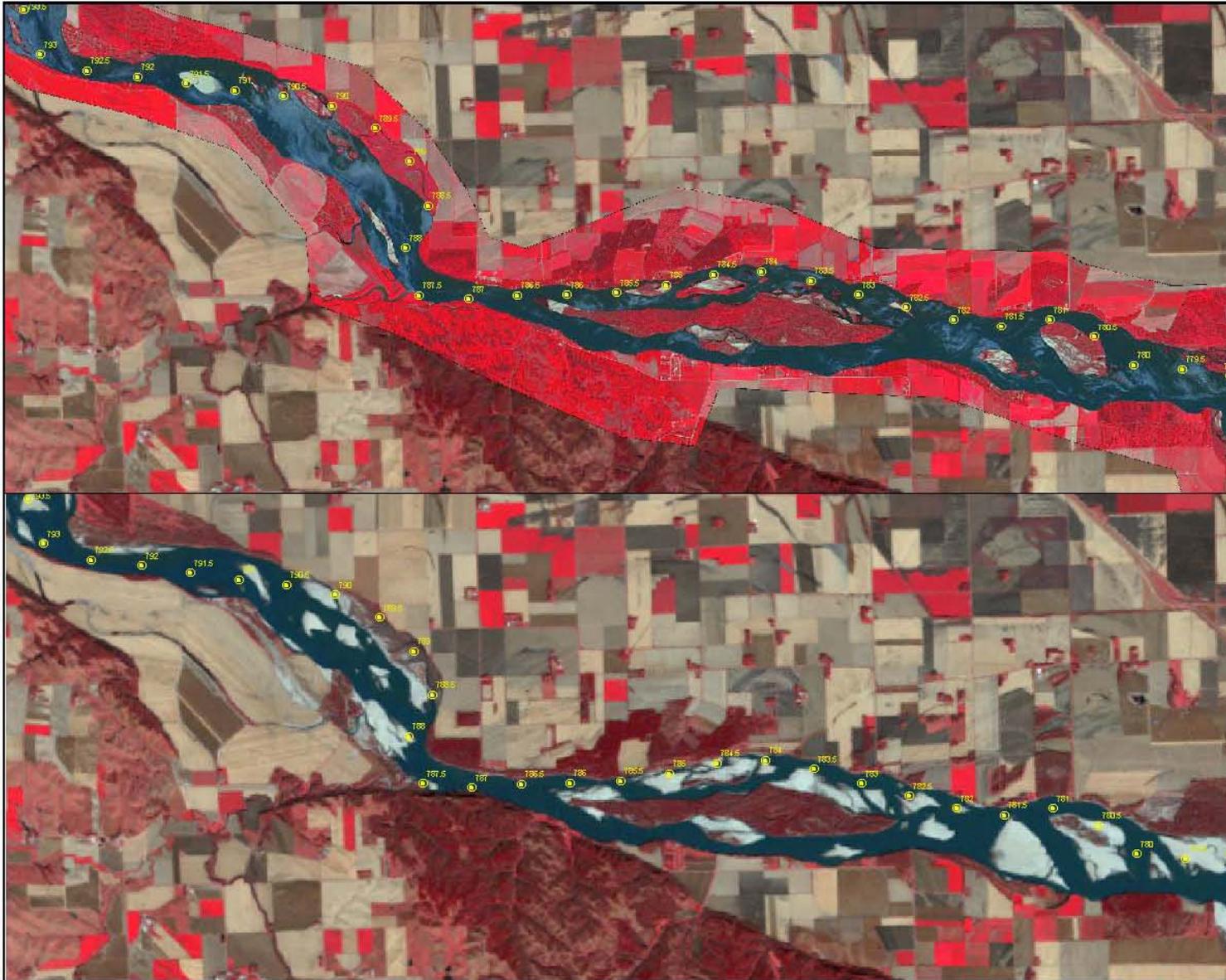
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Author
US Army Corps of Engineers
Cincinnati District

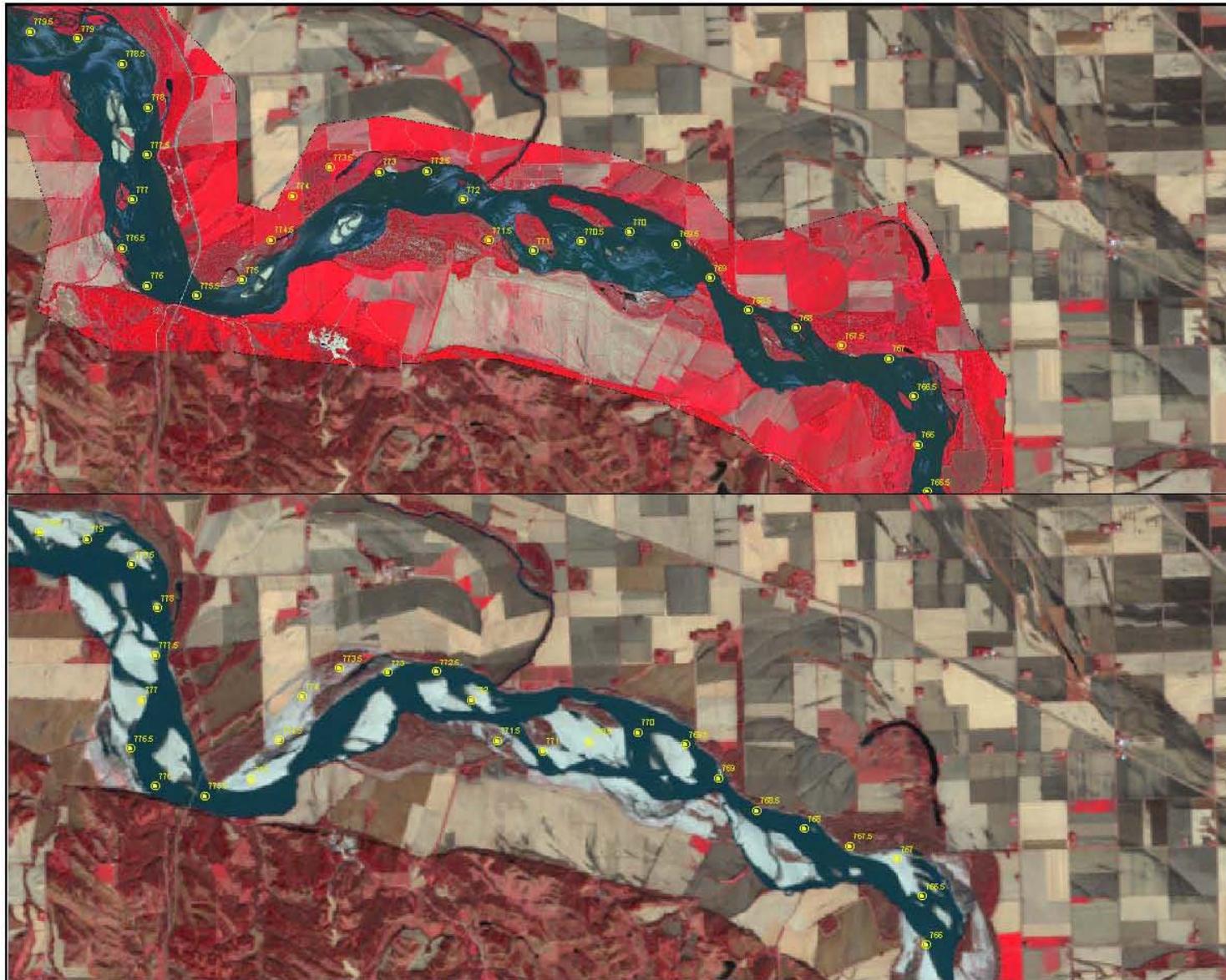
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Sand Bar Habitat



Sand Bar Habitat



Before After
Comparison
Flood 2011

Page 3
RM 779-766

2009

2011

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Threatened and Endangered

Prepared By: J. S. [unclear]

Project No: [unclear]

Date: [unclear]

Contract No: [unclear]

Location: [unclear]

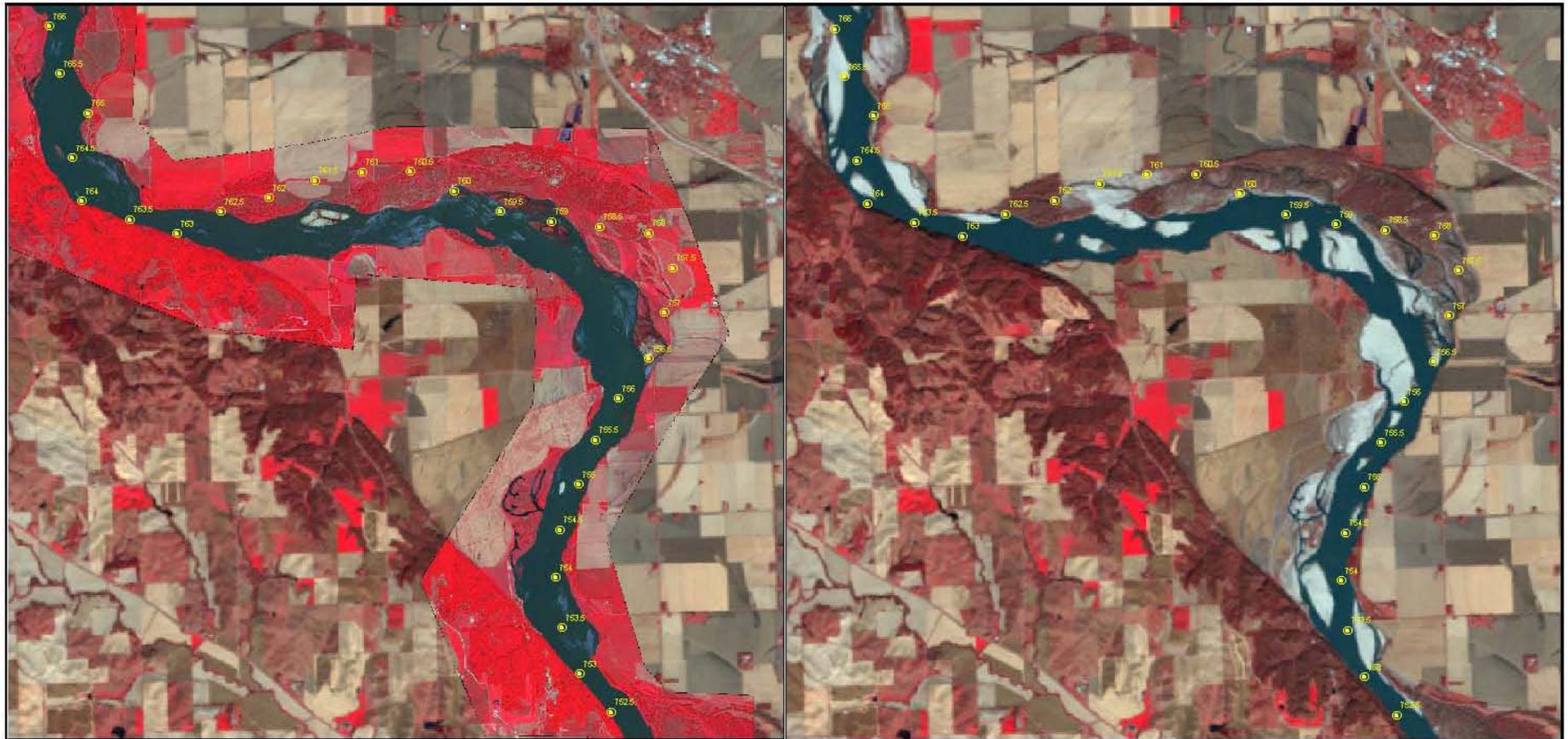
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0 0.6 1.2 Miles

US Army Corps of Engineers
Omaha District

Sand Bar Habitat



2009

2011

Before After
Comparison
Flood 2011

Page 4
RM 766-753

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Threatened and Endangered
Wetlands

Project No:	766-753
Project Name:	RM 766-753
Project Date:	11/01/11
Project No.:	766-753
Project Name:	US Army Corps of Engineers Omaha District
Project Date:	11/01/11



Sand Bar Habitat



Sand Bar Habitat



Sand Bar Habitat



Sand Bar Habitat

- Sustainability
 - ▶ Erosion/Vegetation
 - ▶ Lose roughly half per year



In Channel Habitat

- Erosion/Deposition
 - ▶ Extensive Damage to River Control and Habitat Features (Infrastructure)
 - ▶ Surveys are on going
 - ▶ Chutes Widened/Deepened, Deposition
 - ▶ Lost/Gained?
 - ▶ Still Adjusting!!!





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Backwater Wetland Habitat

- Deposition
 - ▶ Lost Acreage/Volume
 - ▶ Channel Degradation 1-3 feet
 - ▶ Lost Access
 - ▶ Still Adjusting











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Summary

- Ecosystem Damage?
 - ▶ Yes - Damage to infrastructure
 - ▶ There are some gains (sandbar)
- Are the Gains Sustainable?
 - ▶ Good Question
- Do the Damages Need to be Rehabilitated?
 - ▶ Another Good Question



Questions / Comments



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