

U. S. Army Corps of Engineers - Omaha District Regional Water Challenges

COLONEL JOHN W. HENDERSON, P.E.
District Commander

Presentation for:
National Science Foundation
Food-Water-Energy Workshop

South Dakota School of Mines and
Technology.

October 19, 2015

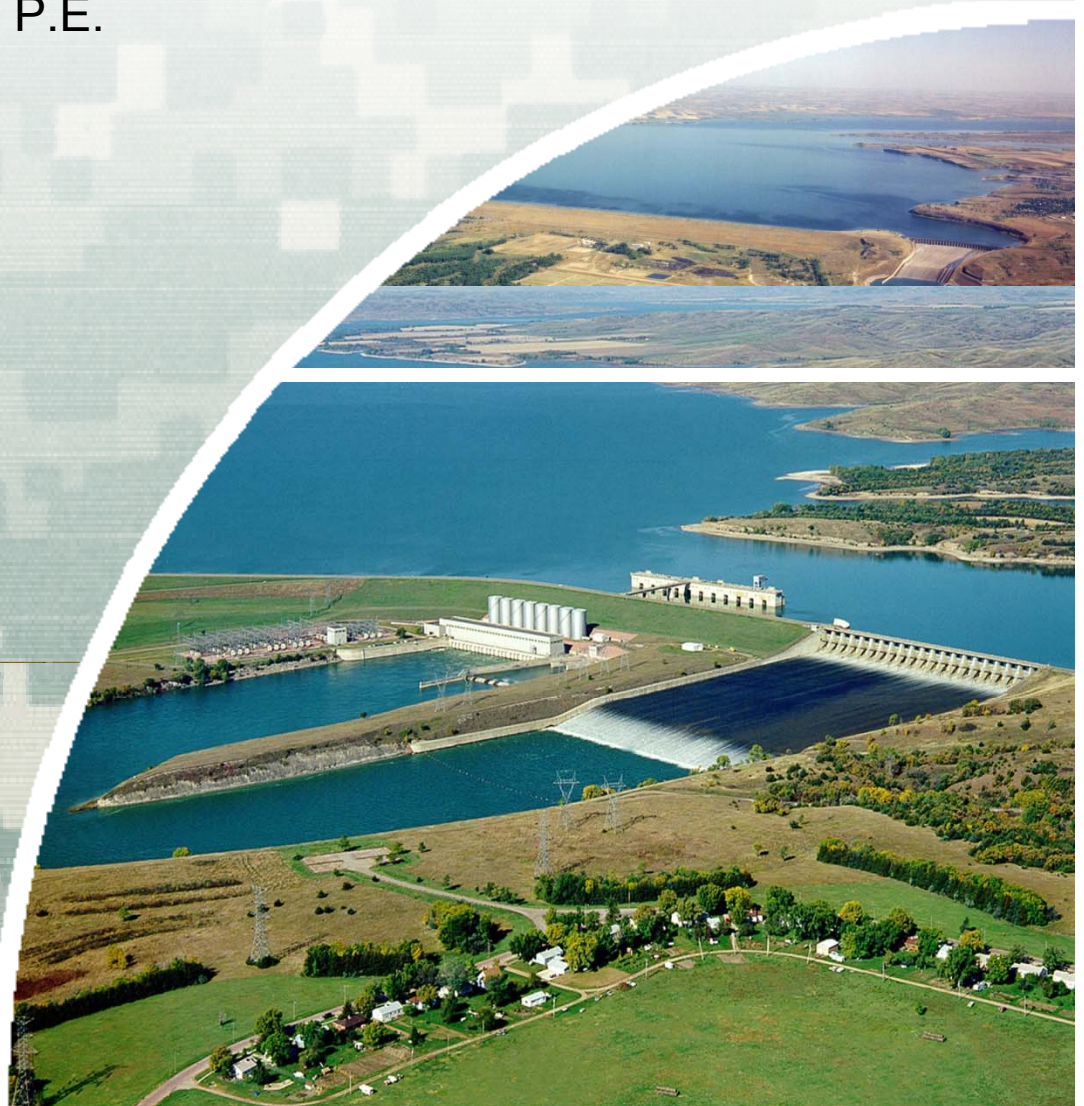


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US Army Corps of Engineers
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Mission and Vision



Mission:

Mission Statement: Provide vital public engineering services in peace and war to strengthen our Nation's security, energize the economy, and reduce risks from disasters.

Vision:

A GREAT engineering force of highly disciplined people working with our partners through disciplined thought and action to deliver innovative and sustainable solutions to the Nation's engineering challenges.



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Omaha District Missions Areas

- **CIVIL WORKS**
 - ▶ Flood Risk Reduction, Navigation, Hydropower
 - ▶ Water Supply, Water Quality, Recreation, Irrigation
 - ▶ Fish & Wildlife, Regulatory, Ecosystem Restoration
 - ▶ Flood Control and Coastal Emergencies (FCCE)
- **MILITARY CONSTRUCTION**
 - ▶ Design & Construction Management
 - ▶ 10 Active Air Force Installations
 - ▶ 1 Air Force Reserve Installation
 - ▶ 1 Army Installation & 1 Reserve
 - ▶ 3 Army Ammunition Plants
 - ▶ 2 Major Reserve Commands
- **ENVIRONMENTAL REMEDIATION**
 - ▶ Environmental Remediation
 - ▶ Environmental Compliance
 - ▶ Military Munitions Response Program
 - ▶ More than 550 Projects Nationwide
- **INTERNATIONAL AND INTERAGENCY SUPPORT**
 - ▶ DLA Fuels Program & SRM CONUS/OCONUS
 - ▶ MILCON SRM, EPA
 - ▶ Rapid Response & Fuels POL TCX
 - ▶ Protective Design & Transportation Systems MCX



Includes projects outside NWO boundaries

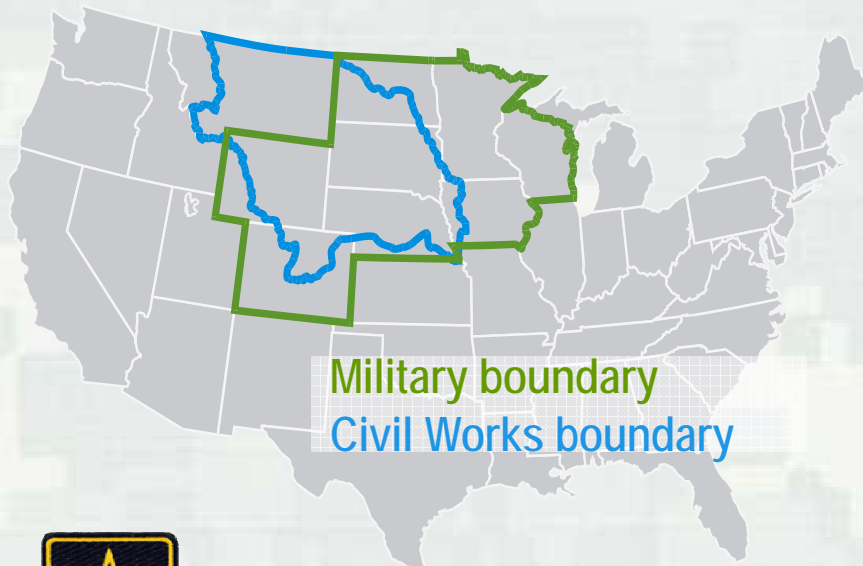
Omaha District Scope of Mission

7 USACE Centers of Expertise

- Protective Design MCX
- Transportation MCX
- Rapid Response CX
- Interior Design CX
- Fuels Systems CX
- Military Munitions Restoration Program Design Center
- Dam Safety Production Center

Omaha Specific Characteristics

- Regulatory Program in 6 states
- Real Estate Services in 10 states
- 700,000 square miles
- Nearly 60 locations
- 27 Dams (6 hydropower main-stem dams)
- 247 miles River Navigation
- 284 Recreation Areas
- 99 miles Missouri National Recreation River
- 6,627 miles of Shoreline
- 5,000+ Regulatory Permit Applications annually
- 53 Federally-recognized Tribal Nations
- Protected Cultural Sites
- 1,800+ projects annually
- 658 miles of levees
- 37 Public Water Systems (700+ intakes)



Military boundary
Civil Works boundary



*2005 data

Centers of Standardization

- Religious Facilities COS
- Access Control Points COS

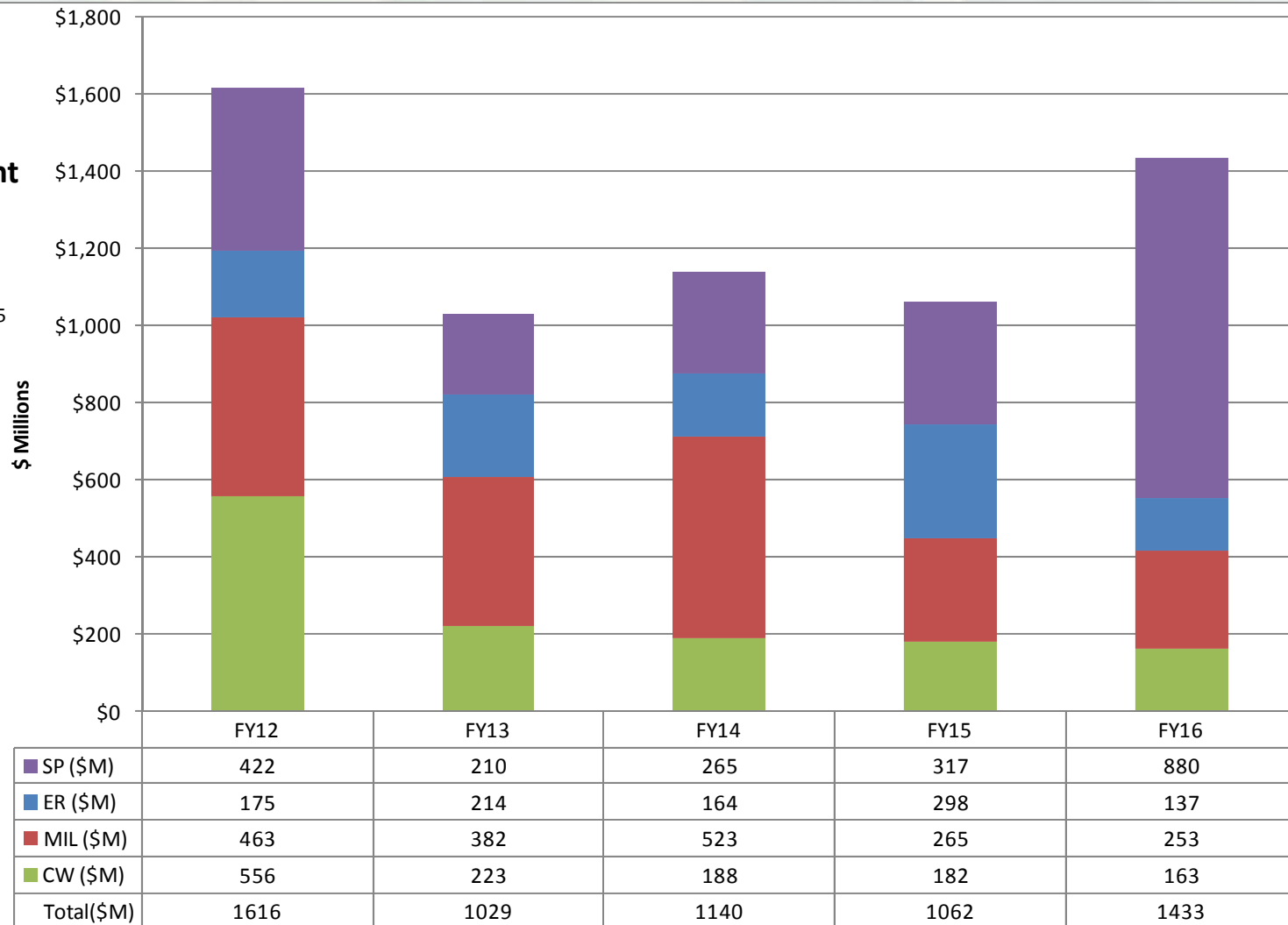


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District Workload

Total District Program Assessment (NWO)

As of: August 2015



Value to the Nation

- **Food Nexus** - Damages Prevented: Since 1938, the system has prevented \$53.6B; \$7B in 2011 (mostly crop land)
- **Food Nexus** - Agriculture: Dam construction accreted 500,000 acres of farmland that produces 100 million bushels of corn annually
- **Energy Nexus** - The Corps is the largest hydropower producer in the US, producing 24% of the Nation's hydropower
- **Energy Nexus** - Clean, Green, renewable energy in Missouri Basin
 - ▶ Annual Average Hydropower Production of 9.4 Billion kWh of electricity
 - ▶ Annual CO₂ emission reductions of 9.4 Million tons in contrast with coal produced electricity.
 - ▶ Annually, our hydropower dams serve ~2 Million households
- The dams generate over \$250M in revenue each year; U.S. Treasury receives portion of funds



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Value to the Nation

- Since the early 1900's, the Nation has invested over **\$35 Billion** in the Missouri River Basin through the construction of:
 - Bank Stabilization and Navigation Project
 - Main-stem Reservoir System
 - In addition to other flood control projects
- These projects annually provide **\$1.8 Billion** in benefits to the nation through ...
 - hydropower (~\$674 million)
 - water supply (~\$611 million)
 - flood control (~\$410 million)
 - upper basin recreation (~\$67 million)
 - lower basin recreation (~\$20 million)
 - and navigation (~\$9 million).



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Why the Army?

Rivers/Inland Waterways are a critical national resource

Security/management of critical national infrastructure

Serves as basis for national economy, quality of life, and national security.

Missouri Basin History

1803 – Louisiana Purchase

1804 – 1806 – Lewis and Clark

1807 – 1912 – Westward Expansion

1832 – First channel improvements

1912 – Bank Stabilization/Navigation

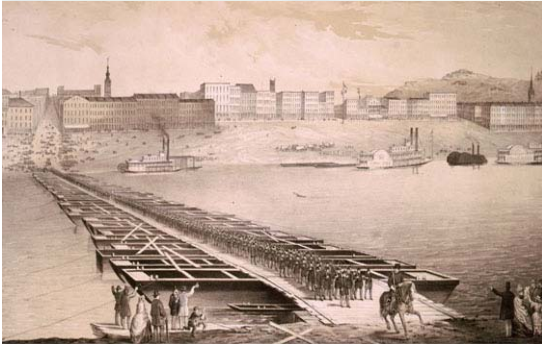
1936 – WPA Construction of Ft. Peck

1944 – Flood Control Act – Pick

Sloan Plan

2006 – Most updated Master Mgt

Manual



Missouri River Basin

Congressionally Authorized Project Purposes

Flood Control
Navigation
Hydropower
Irrigation
Recreation
Water Supply
Water Quality
Fish and Wildlife



Bank Stabilization and Navigation Project
Sioux City, IA – St. Louis, MO



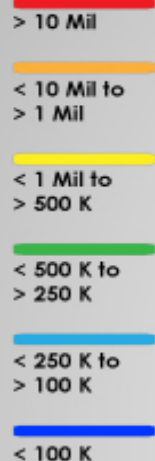
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Mainstem Reservoir Storage Capacity

Storage Capacity of Corps Reservoirs vs. Lake Powell & Lake Mead

Key

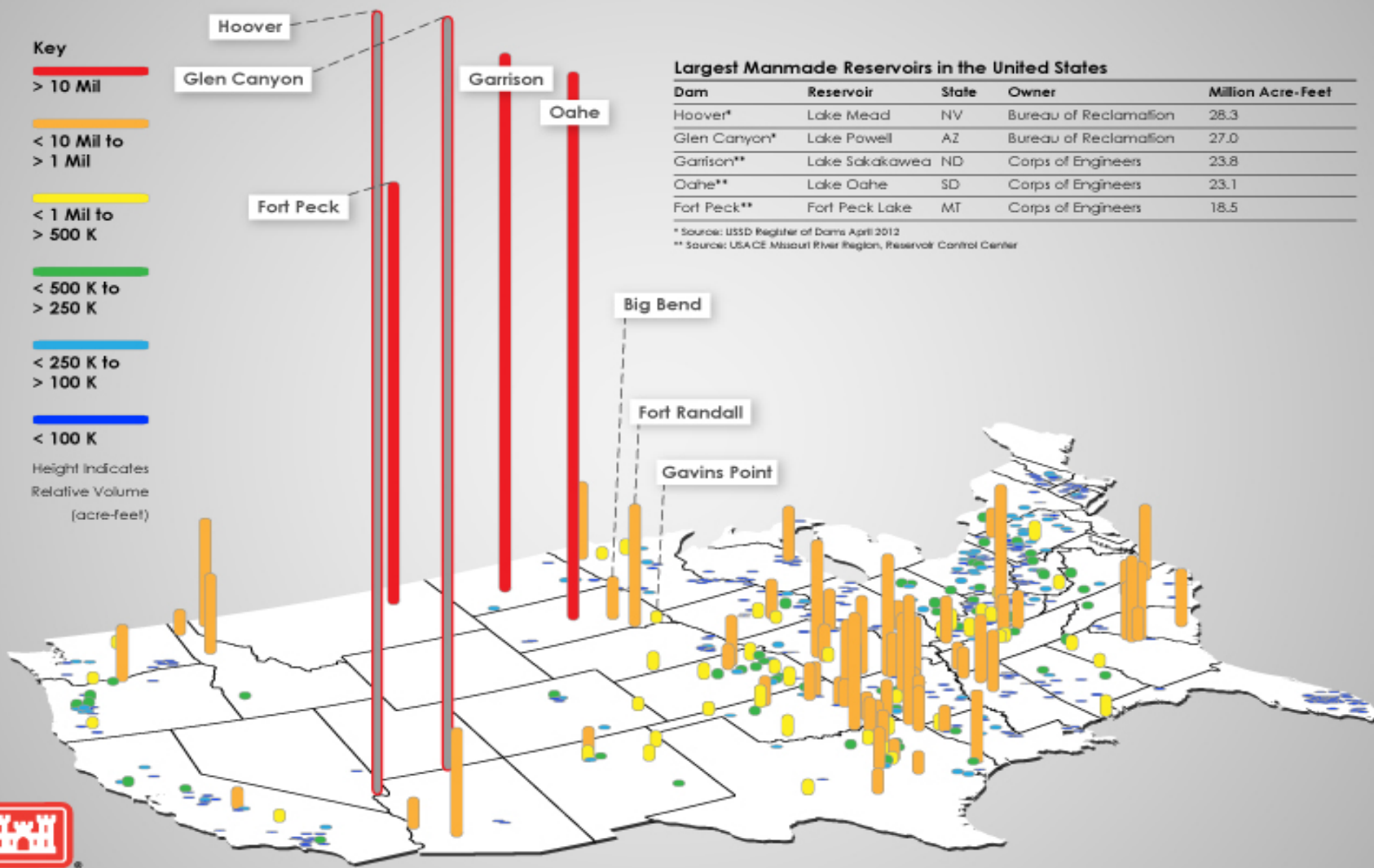


Largest Manmade Reservoirs in the United States

Dam	Reservoir	State	Owner	Million Acre-Feet
Hoover*	Lake Mead	NV	Bureau of Reclamation	28.3
Glen Canyon*	Lake Powell	AZ	Bureau of Reclamation	27.0
Garrison**	Lake Sakakawea	ND	Corps of Engineers	23.8
Oahe**	Lake Oahe	SD	Corps of Engineers	23.1
Fort Peck**	Fort Peck Lake	MT	Corps of Engineers	18.5

* Source: USSD Register of Dams April 2012

** Source: USACE Missouri River Region, Reservoir Control Center

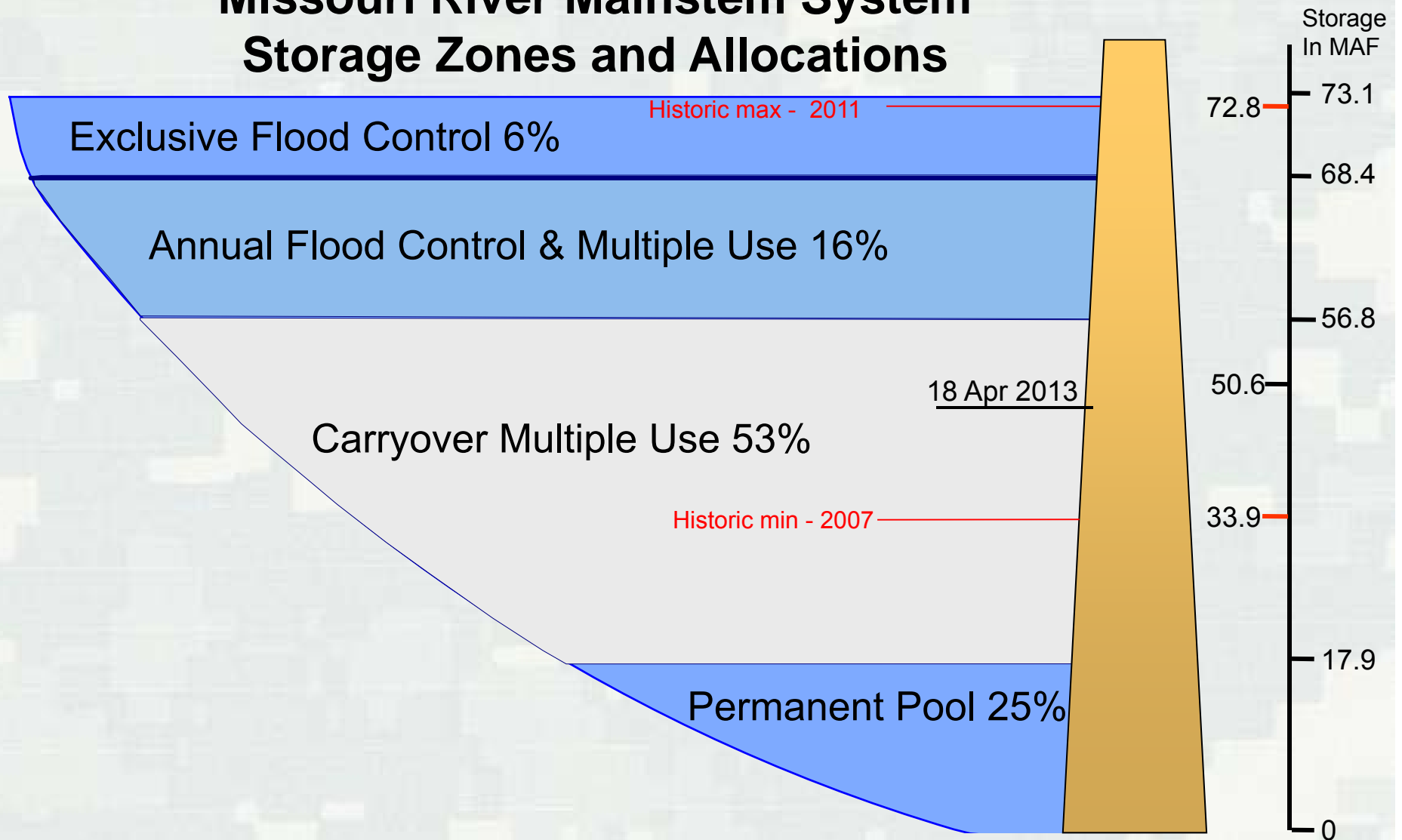


US Army Corps of Engineers
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Prepared and Produced by the U.S. Army Corps of Engineers Omaha District 2012

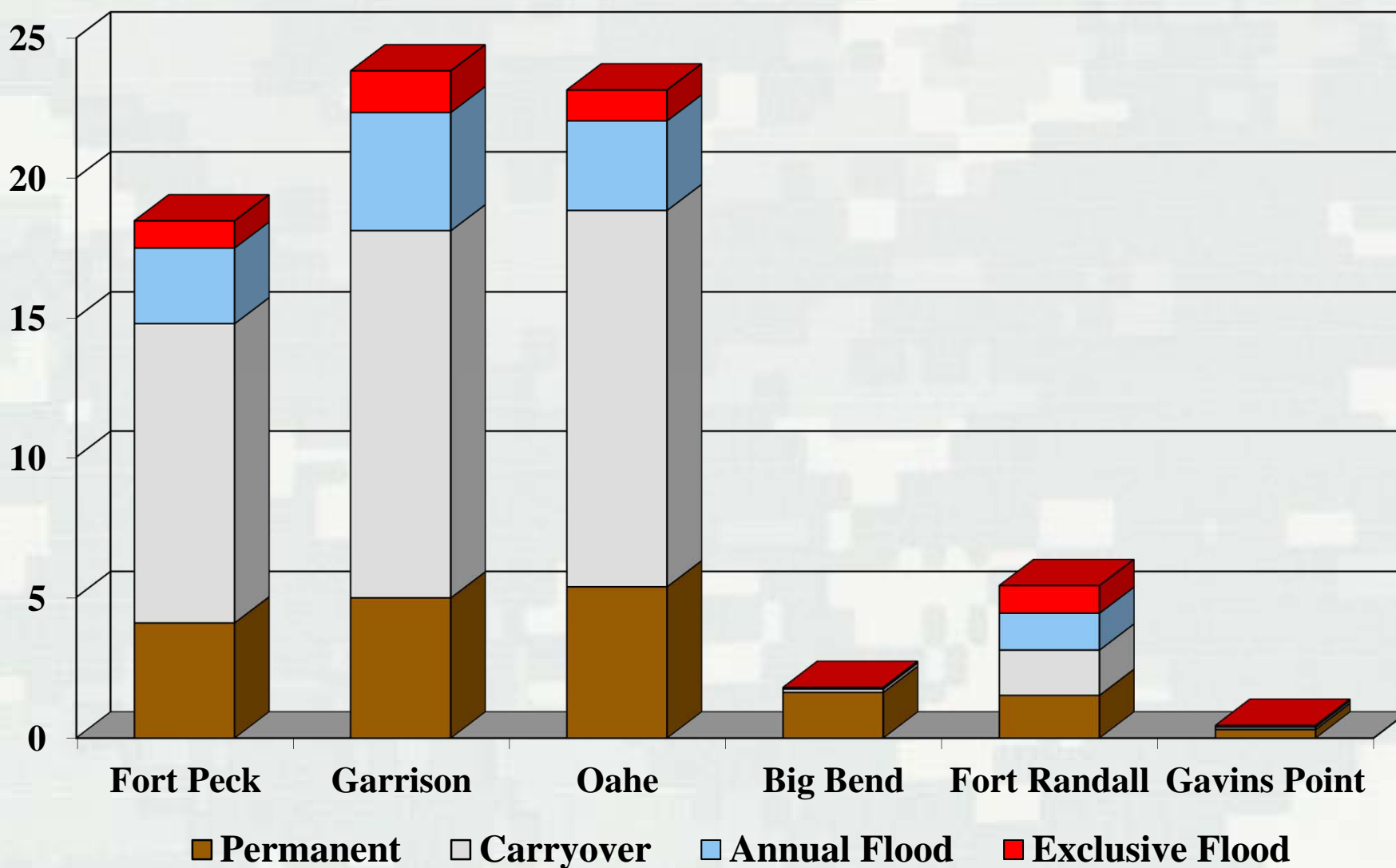
Water Storage Allocation

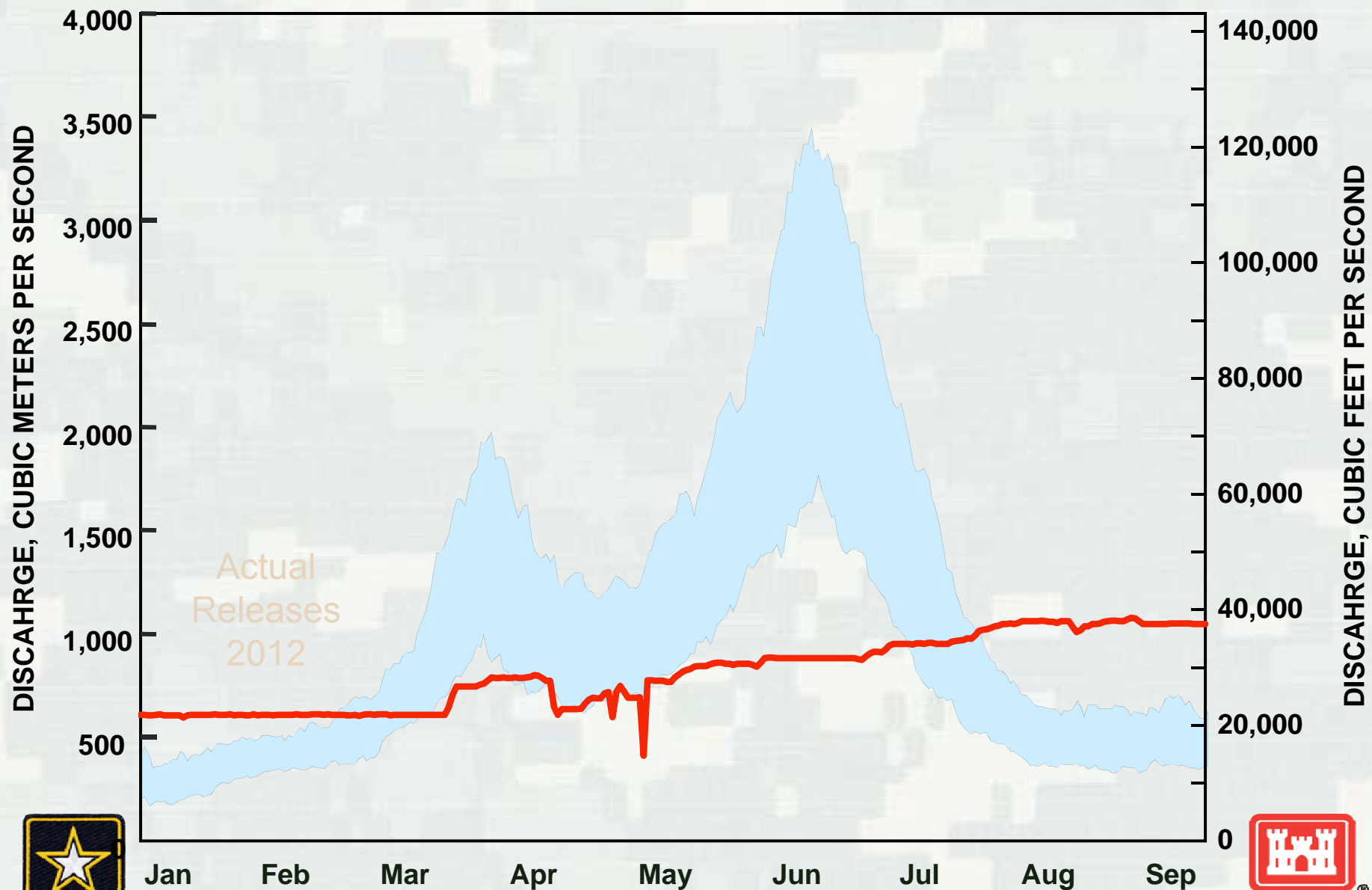
Missouri River Mainstem System Storage Zones and Allocations



Mainstem Reservoir Storage Capacity

Million Acre-Feet





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Flood Control

1881 Flood - Omaha





1952 Flood - Omaha

Navigation



October 8, 1934

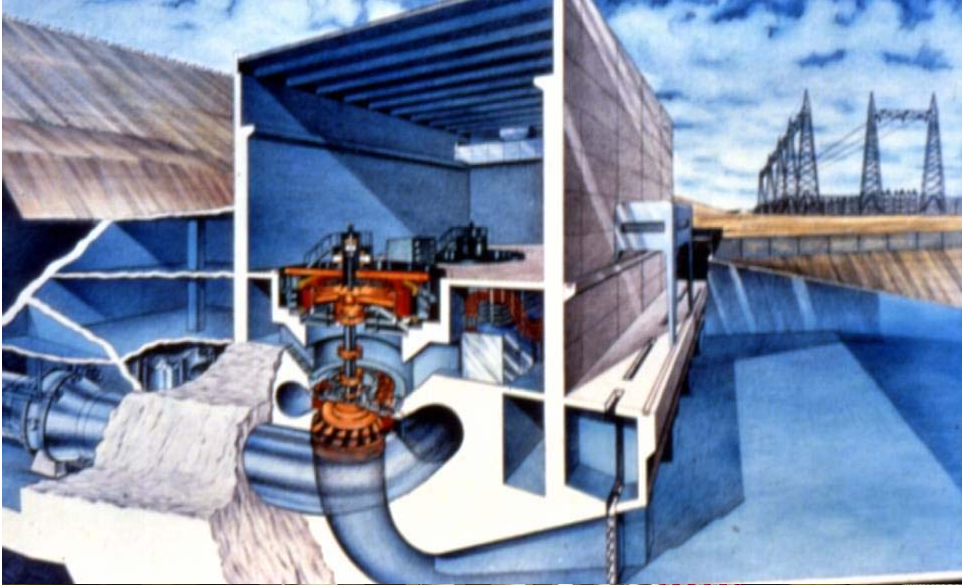


September 18, 1942



September 17, 1956

Hydropower

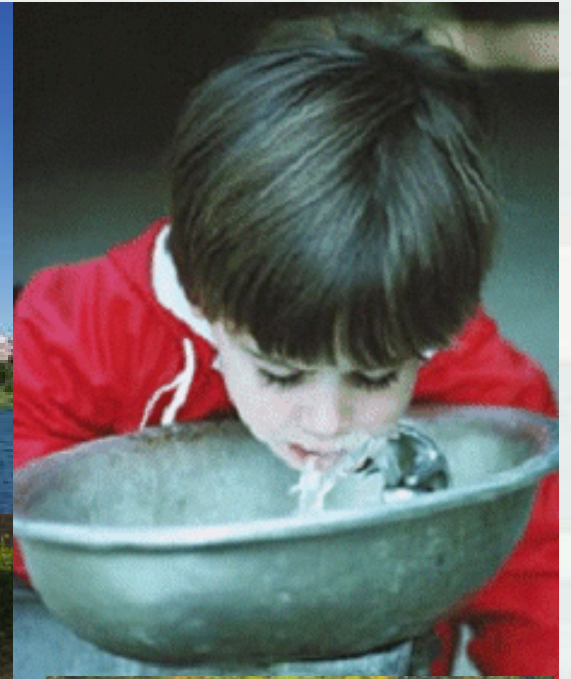


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Irrigation



Water Supply / Water Quality



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Recreation

Fish and Wildlife



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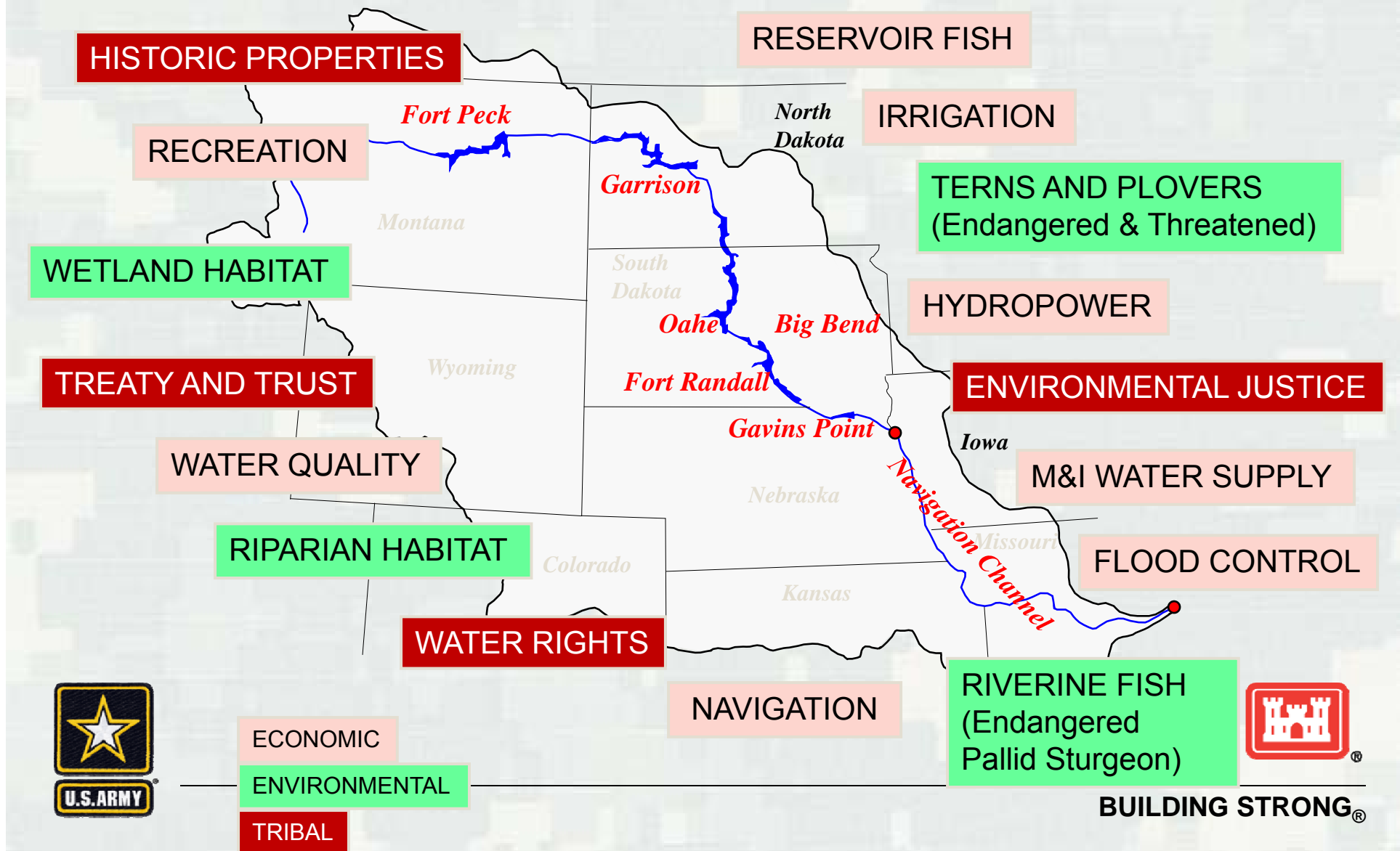
Regional Water Challenges

- Multiple conflicting interests in a highly litigious environment
- Tribal concerns – Cultural significance, water supply/rights
- Endangered Species Act (1973)
- Fish & Wildlife Coordination Act (WRDA 1986, 1999).
- Water Nexus - Clean Water Act (1972, 1977, 1987)
- Water Nexus - National Environmental Policy Act (1970)
- Energy Nexus (hydraulic fracking, nuclear/coal plants, impacts to US Waters, aging hydropower infrastructure)
- Food Nexus – Flood risk to cropland vs. ESA compliance
- Missouri River Master Management Manual.



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Regional Water Challenges – Interests



Regional Water Challenges – National Research Council Report



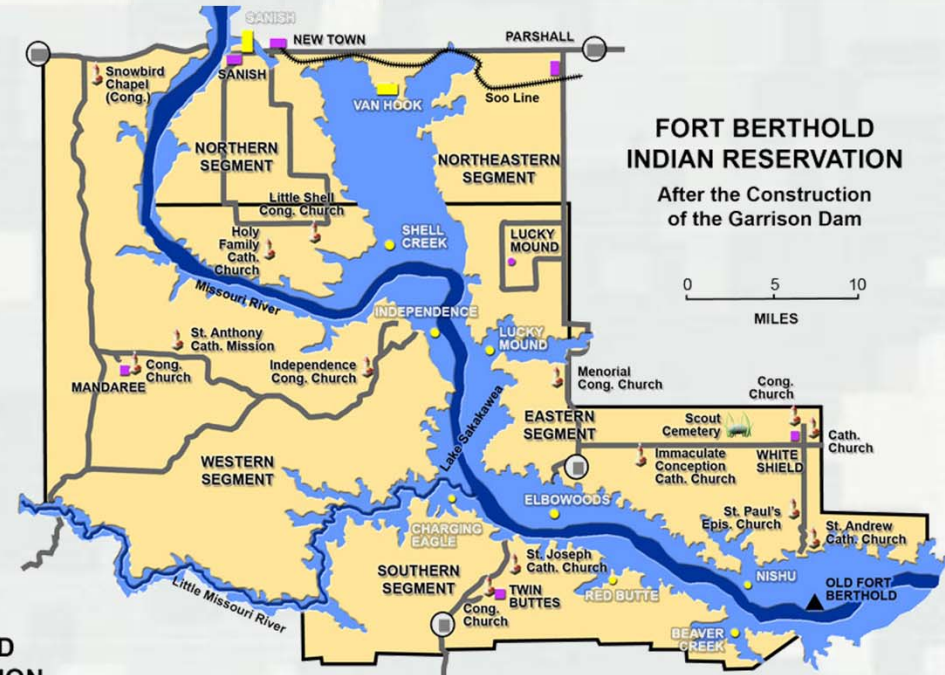
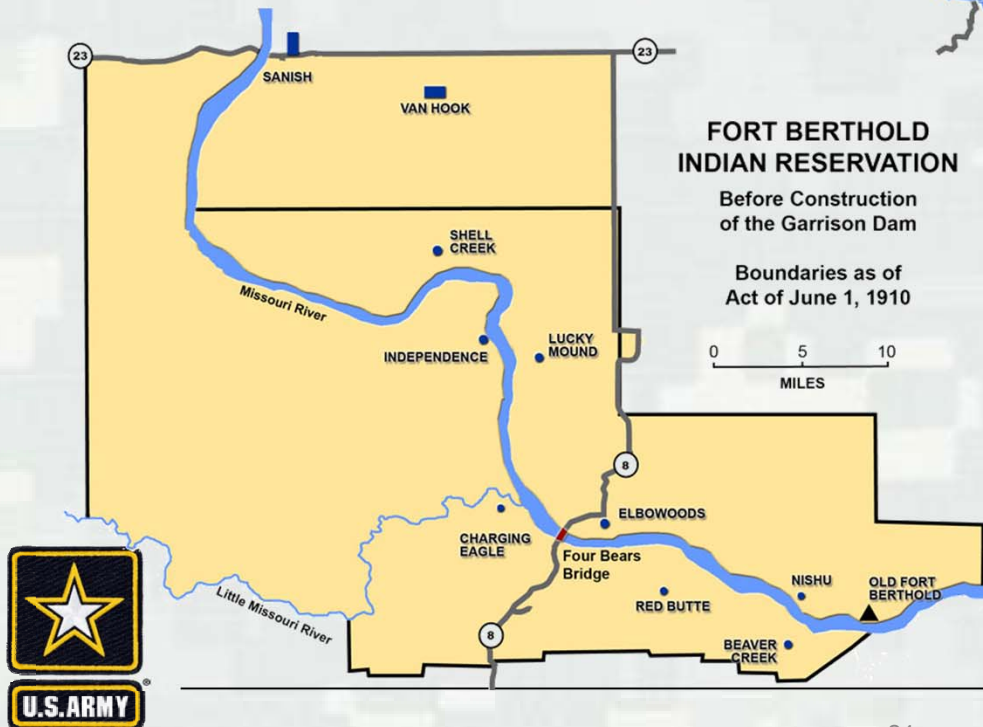
- Construction and operation of 6 mainstem reservoirs, BSNP and other flood control projects have resulted in ...
 - 750 miles channelized
 - 500-755 miles now under reservoirs
 - 522,000 acres of habitat lost
 - 51 of 67 native fish species listed as rare or decreasing
 - Sediment transport altered
 - Amplitude and frequency of peak flows have been sharply reduced
 - Reproduction of cottonwoods has ceased



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Regional Water Challenges – Tribal Interests

- Dependent Sovereign Nations
- Environmental Justice
- Shoreline Erosion
- Historic & Culturally Significant Places
- Water Supply / Water Rights



After Dam Construction

Before Dam Construction



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Regional Water Challenges – Endangered Species Act

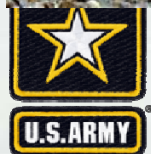
- Became Law in 1973
- All Federal Agencies Must Comply
- Administered by FWS or NMFS
- Biological Opinion



Piping Plover



Pallid Sturgeon



Interior Least Tern



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Bank Stabilization and Navigation Project Fish and Wildlife Mitigation



- Fish & Wildlife Coordination Act
- Authorized WRDA 1986 and amended WRDA 1999
- Restores habitat for fish and wildlife lost due to bank stabilization and navigation project
- Not species specific
- Nebraska, Iowa, Kansas and Missouri



Missouri River Recovery Program Elements

- Habitat Construction
 - ▶ Shallow Water Habitat
 - ▶ Emergent Sandbar Habitat
- Propagation / Hatchery Support
- Research, Monitoring, and Evaluation
- Flow Modifications
- Public Involvement



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Emergent Sandbar Habitat



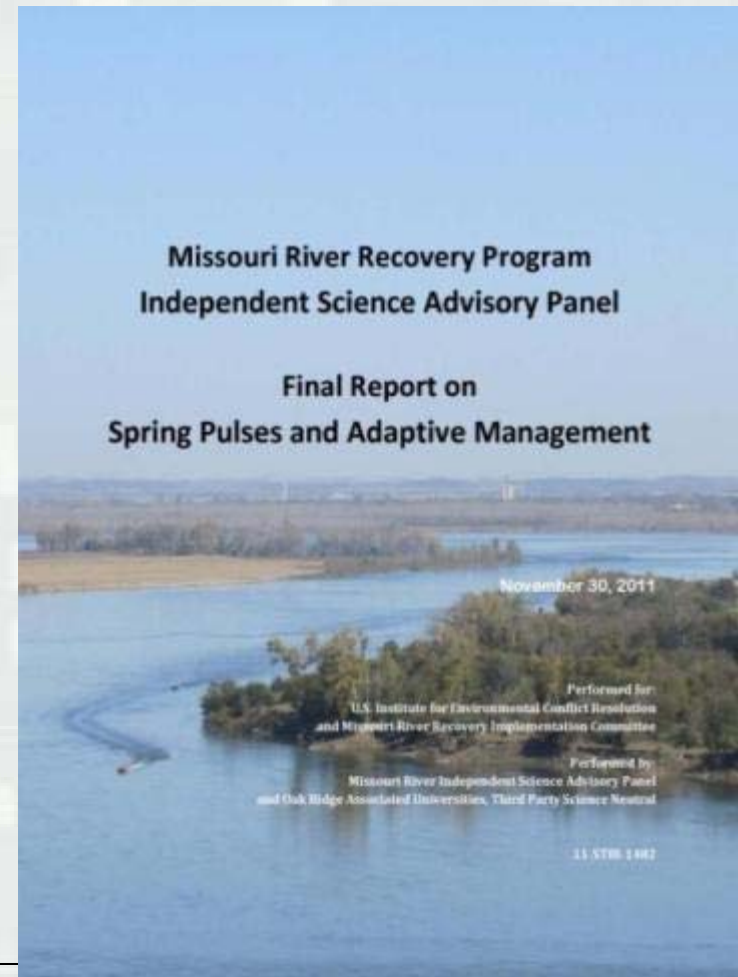
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Flow Modifications

- **Spring Pulse Releases from Gavins Point Dam**



“A new management agenda using hydrological manipulations and habitat construction activities, implemented in an adaptive management framework, needs to replace the current action plan to contribute to the survival and recovery of the listed species” – ISAP



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Shallow Water Habitat



**California Bend Chute –
Chute Construction North
of Blair, Nebraska**



**Overton Bottoms –
Bank and Dike Notches
near Rocheport,
Missouri**



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Shallow Water Habitat - Chute

Derooin Bend, across the river from Indian Cave State Park

-has an upstream and downstream connection to the Missouri River



Shallow Water Habitat - Backwater

Tyson Bend – few miles upstream of DeSoto National Wildlife Refuge
-has a downstream connection to the Missouri River



Shallow Water Habitat – Top Width Widening

Deer Island Top Width Widening Shallow Water Habitat Diagram

Photo information:

Taken October 27, 2014

Decatur, NE gauge data: 48,000 cfs, 25 feet

RM 671

Facing upstream

LEGEND

N
→

Old bank line

Approximate
potential sandbar
development zone

SWH rock
structures

BSNP rock
structures

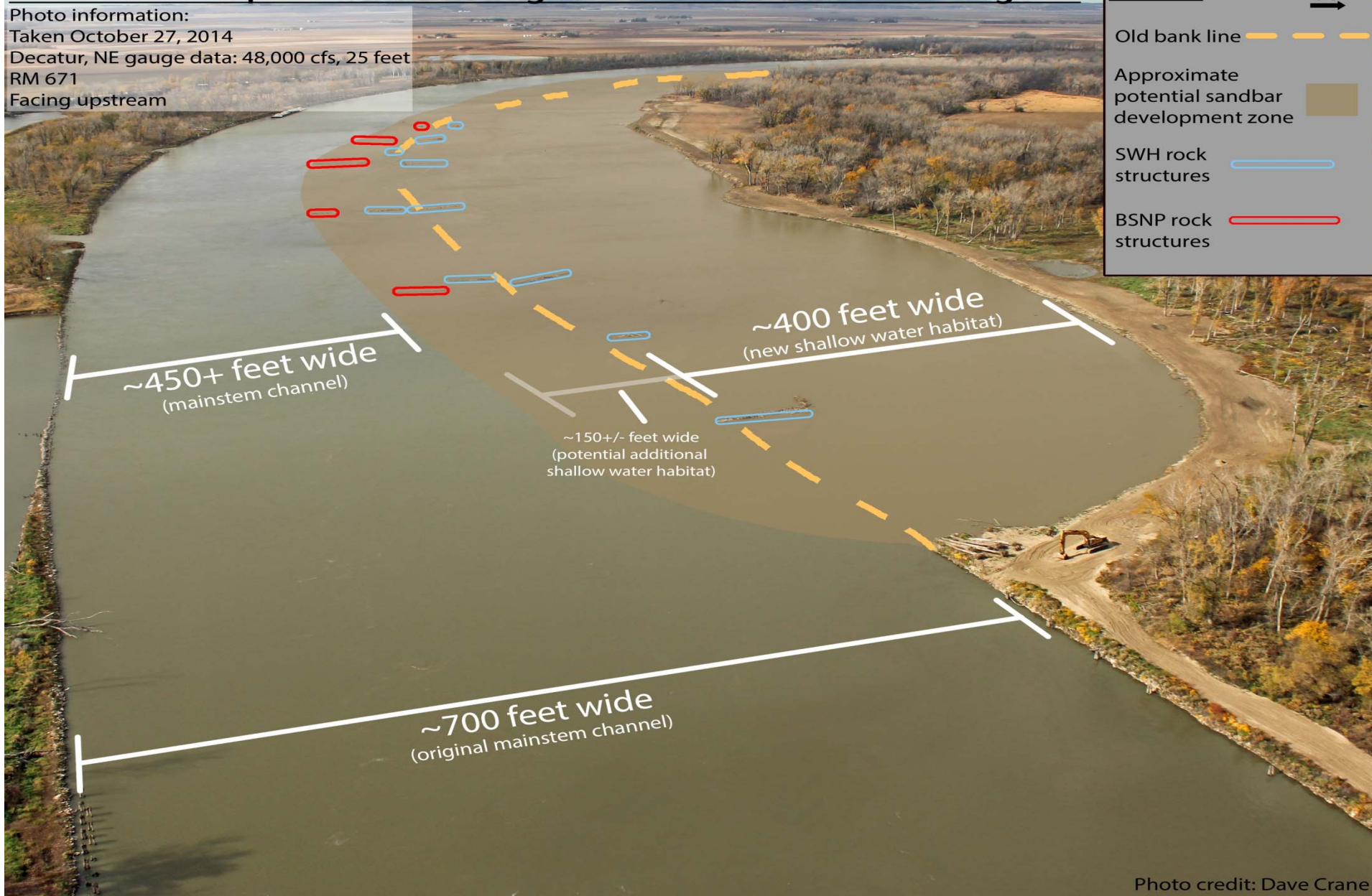


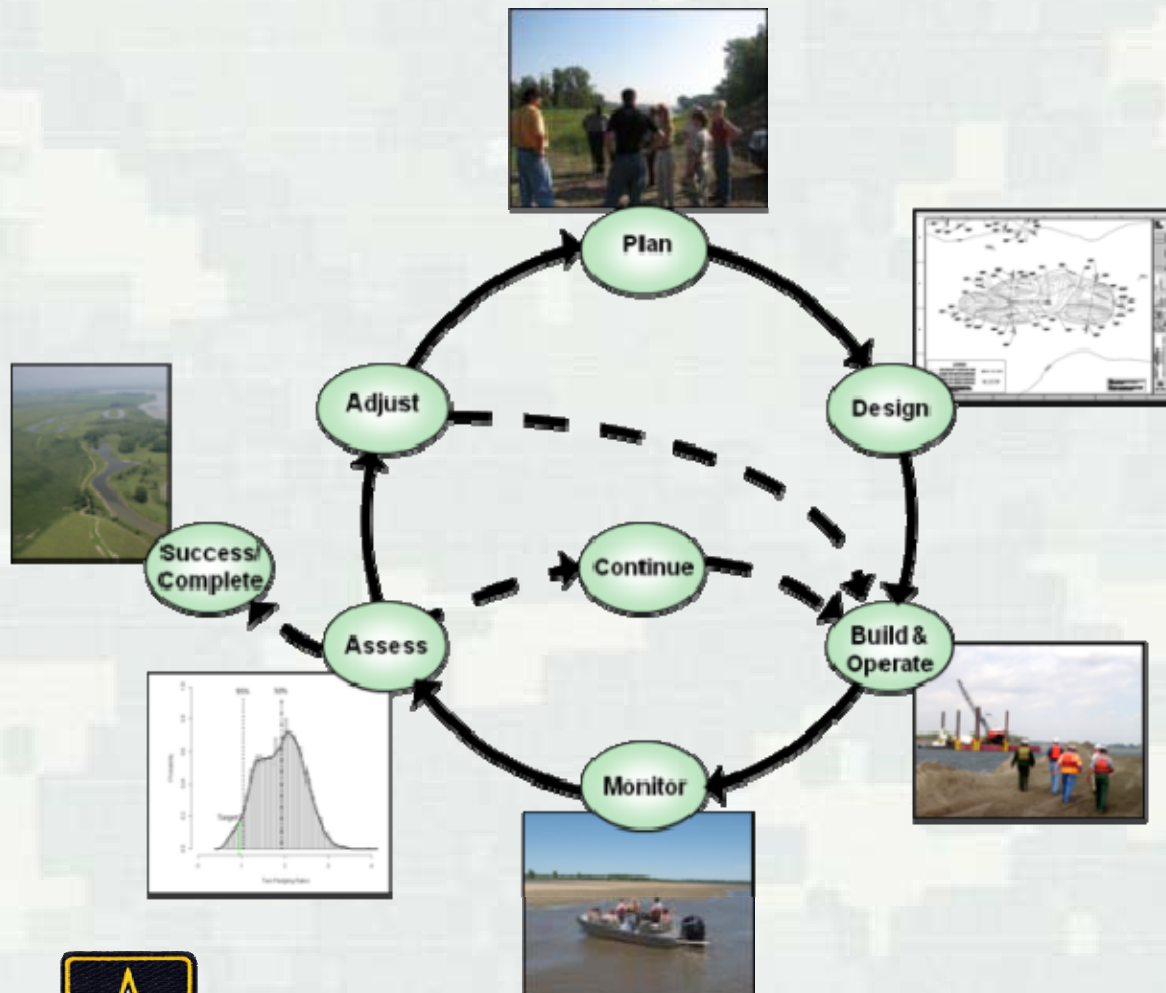
Photo credit: Dave Crane

Propagation & Hatchery Support



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Research, Monitoring & Evaluation



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Regional Water Challenges - Energy

- Water use/storage agreements
- Aging hydropower infrastructure
- Federal permitting for energy
- Impacts to environment
- Impacts to water resources
- Rapid growth, infrastructure development
- Oil/gas transmission pipelines
- Strategic value of energy independence – a national interest (economic, security).



Regional Water Challenges - Energy



Regional Water Challenges - Floods

- Changes in flow-regime to support ESA requirements may require changes to Master Manual
- Low water habitat, emergent sand bar habitat changes conveyance properties – still required to maintain navigation channel and flood risk reduction.



Regional Water Challenges - Climate

- Must adapt in every area
- Translating science into policy
- Apply policy to new infrastructure
- Adapt to existing infrastructure.
- Embrace Uncertainty
- Systems Approach
- Changes in approach from using past measurement to describe the future.



Climate Change

Newsletter

5 December 2013

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WELCOME

The U.S. Army Corps of Engineers (USACE) water resources missions and operations are very sensitive to changes in climate and weather. For this reason, we have been actively addressing climate change impacts for a number of years. With the release of the new Executive Order on Preparing the United States for the Impacts of Climate Change, I'd like to begin sharing information about USACE climate change adaptation activities through this periodic newsletter. Welcome to the first edition!

Mr. James C. Dalton, RE., SES
Chief of Engineering and Construction
Chair, USACE Climate Change Adaptation Steering Committee

DEADLINES

➤ By Aug. 31, 2014 – Complete an inventory and assessment of proposed and completed changes to land- and water-related policies, programs, and regulations [with Department of Defense (DoD), Department of the Interior (DOI), U.S. Department of Agriculture (USDA), U.S. Environmental Protection Agency (EPA), National Oceanic and Atmospheric Administration (NOAA), Federal Emergency Management Agency (FEMA)]

MESSAGE

During the past few months, I've had many opportunities to engage with groups and talk about the role of the Corps of Engineers in providing vital water resources infrastructure to the Nation. Without fail, I am always asked a question about how we are dealing with climate change. I am very proud that USACE is on the leading edge of important research and projects that will help ensure our infrastructure and operations are prepared for future conditions. Climate Change and Climate Adaptation issues are shared responsibilities... it's going to take a team of teams throughout the government and private sector. In fact, just a few weeks ago two of our USACE professionals, Dr. Kate White and Mr. Mark Huber, were recognized with the President's GreenGov Climate Champion Award as part of an interagency team that developed a Sandy Sea Level Rise Tool. Together with our partners, we are not only Building Strong, but we are building for the 21st century. Thank you for what you do in support of these initiatives!

Thomas P. Bostick
Lieutenant General, US Army
Commanding General and Chief of Engineers

SPOTLIGHT FEATURE

Executive Order 13653 on Preparing the United States for the Impacts of Climate Change was released 1 Nov 2013. Overall the message was consistent with expectations set from previous drafts and other guidance provided from the Executive Office. Highlights include USACE being named among 30 agencies in new Council on Climate Preparedness and Resilience targeted to replace the existing Interagency Climate Change Adaptation Task Force. The executive order was sub-divided in eight key sections.

www.corpsclimate.us

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Public Involvement

Missouri River Recovery Implementation Committee (MRRIC)



Missouri River Recovery Implementation Committee
August 2014
Casper, Wyoming



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Questions - Omaha District Online

- Internet: www.nwo.usace.army.mil/
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- Google+: www.gopl.us/OmahaUSACE
- Twitter: www.twitter.com/OmahaUSACE
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