

Missouri River Basin Water Management Fall 2016 Public Meetings

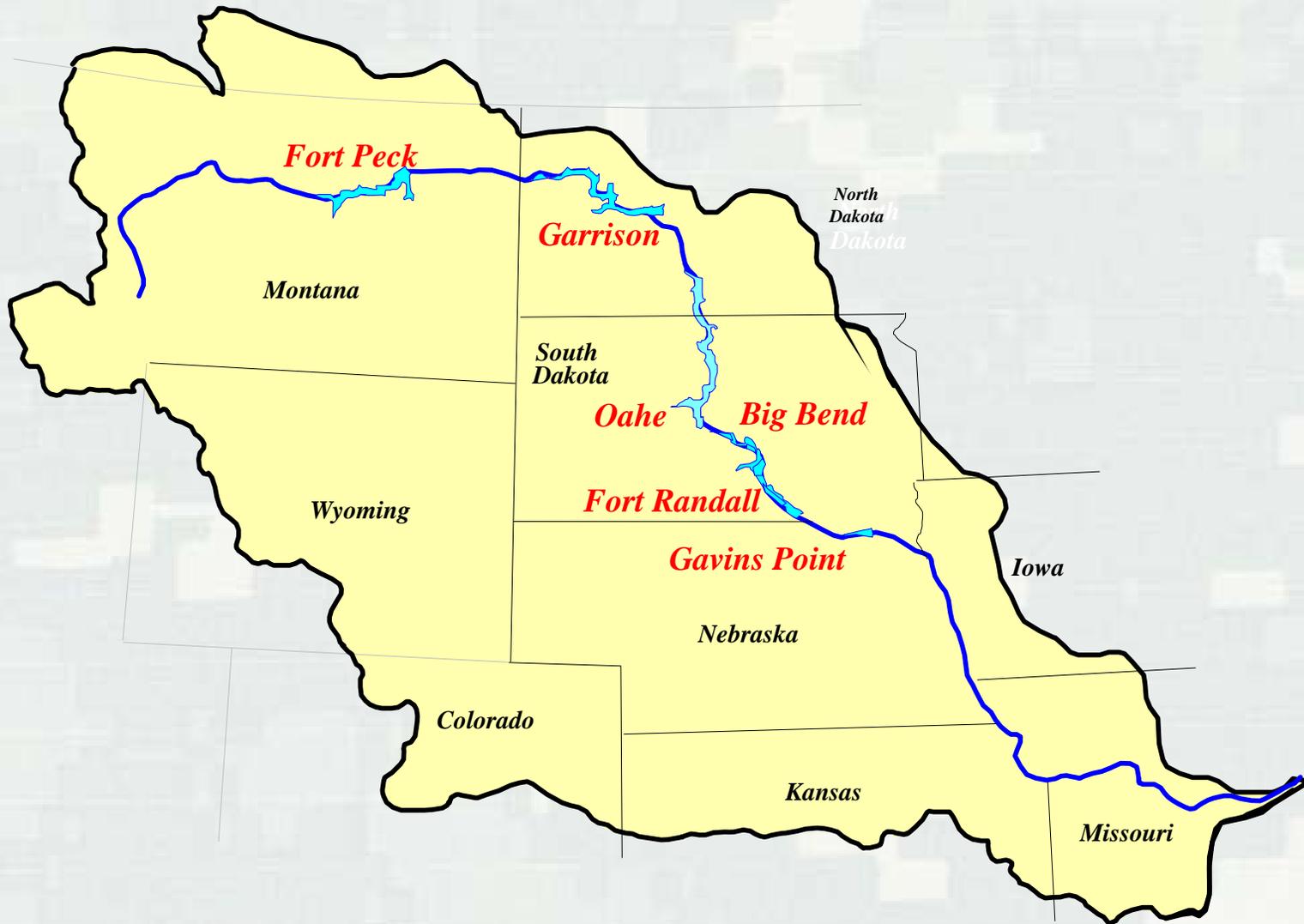
October 5 th	11:00 a.m.	Smithville, MO
October 5 th	5:00 p.m.	Council Bluffs, IA
October 6 th	11:00 a.m.	Pierre, SD
October 6 th	6:00 p.m.	Bismarck, ND
October 7 th	10:00 a.m.	Fort Peck, MT



®

US Army Corps of Engineers
BUILDING STRONG®

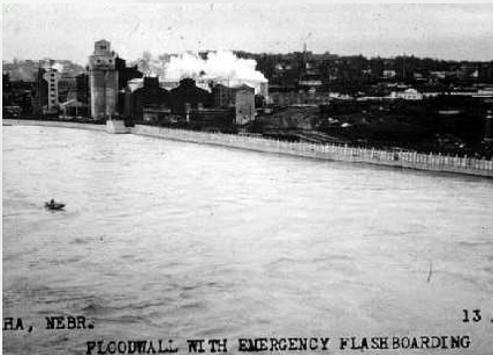
Missouri River Mainstem Reservoir System



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**



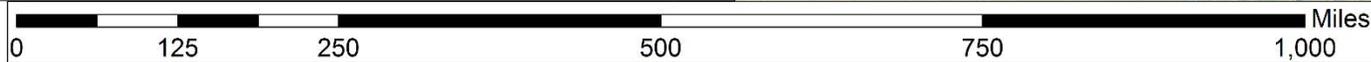
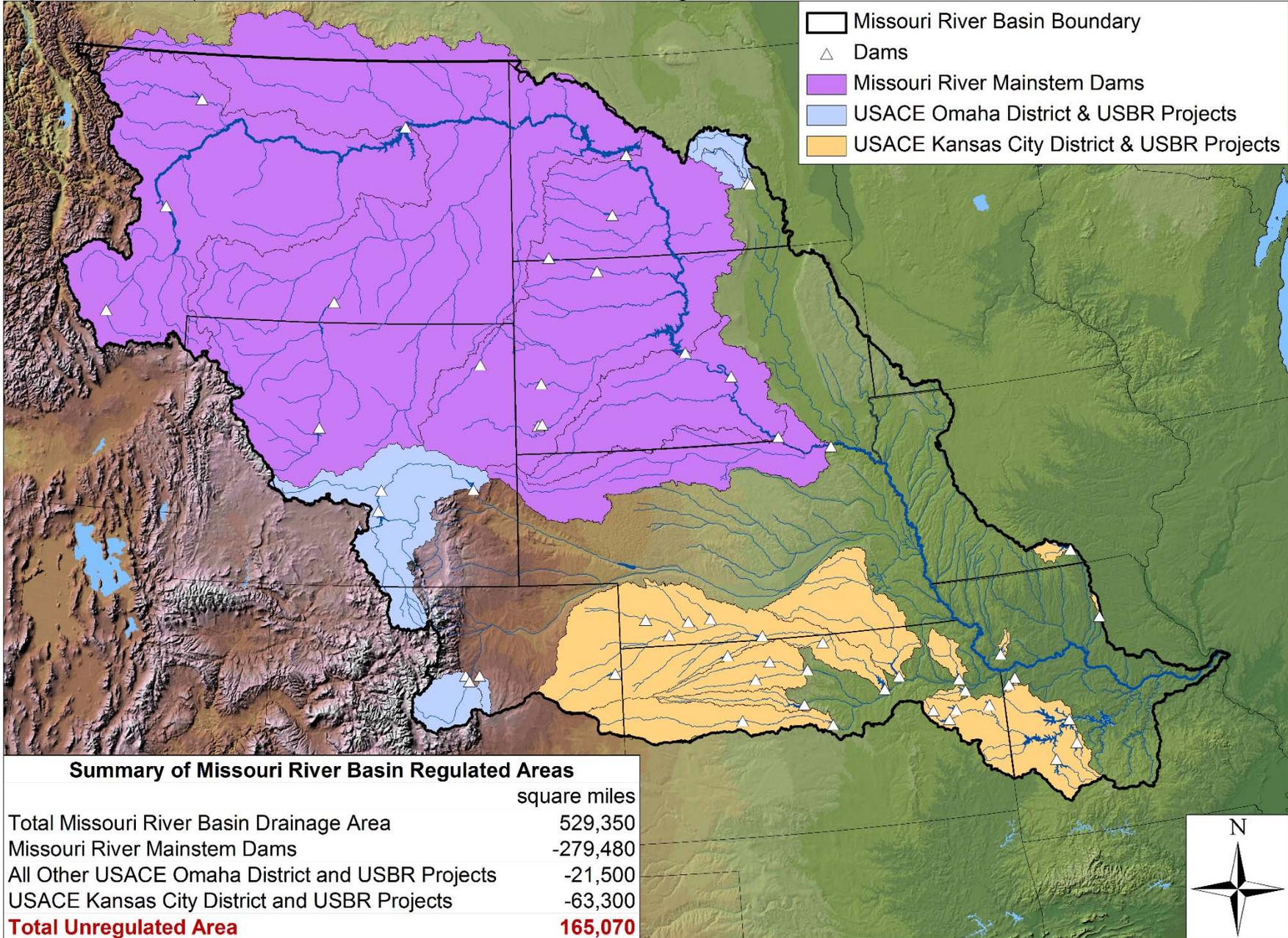
Irrigation



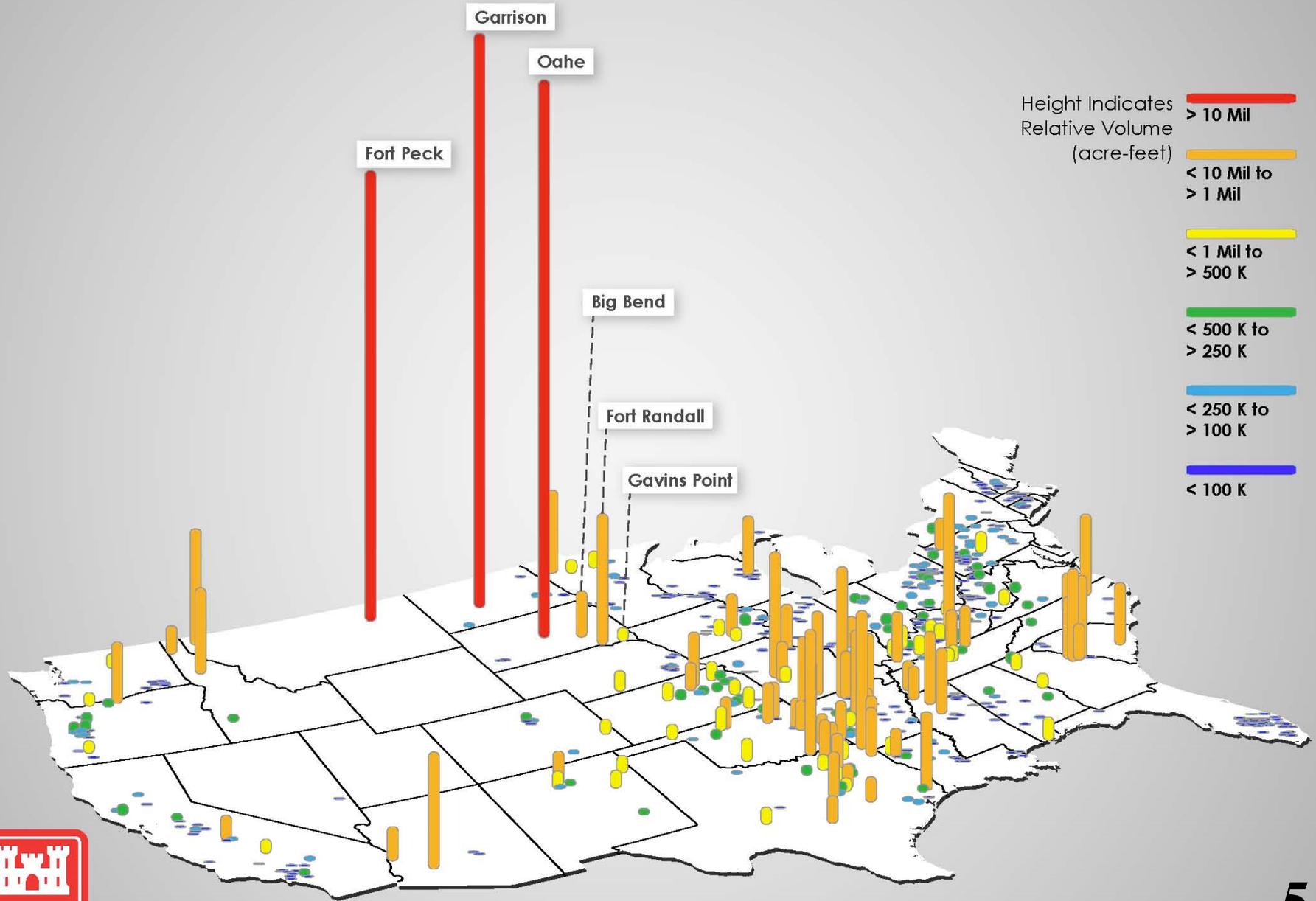
Missouri River Basin Regulated Watersheds

Background: North America Relief Map

USACE NWO March 2016

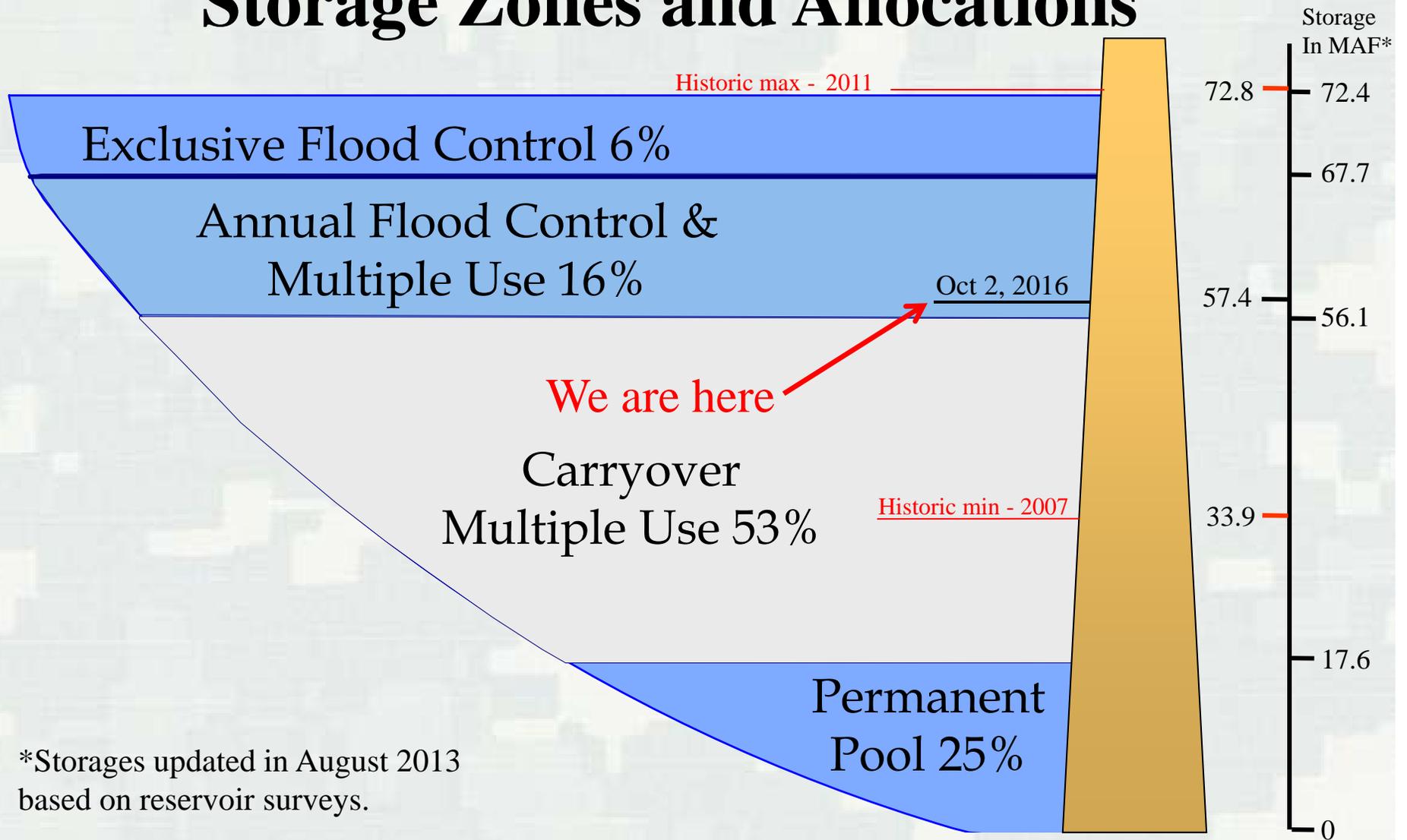


Storage Capacity of Corps Reservoirs



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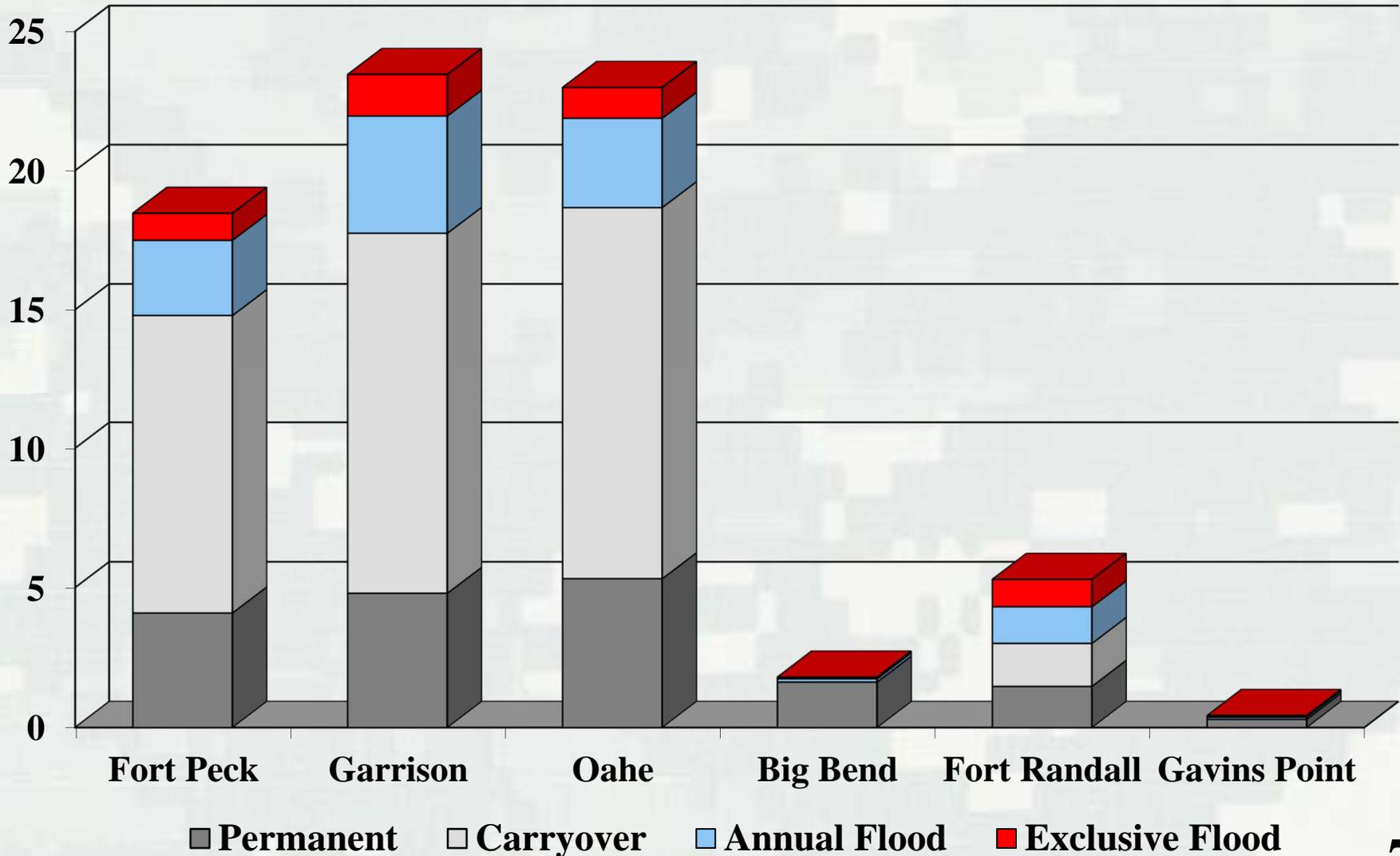
Missouri River Mainstem System Storage Zones and Allocations



*Storages updated in August 2013 based on reservoir surveys.

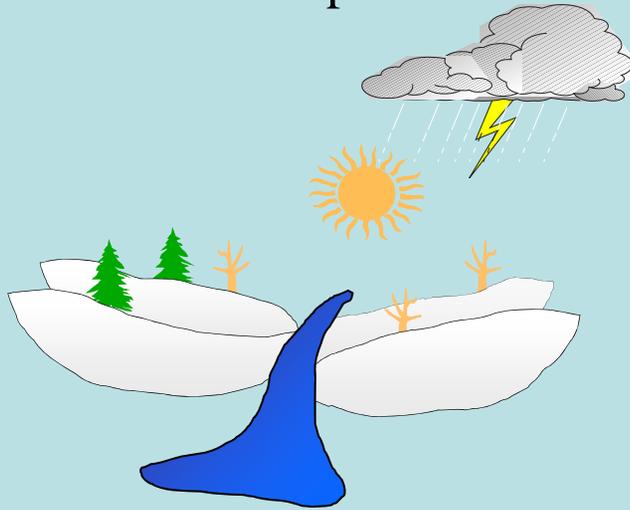
Mainstem Reservoir Storage Capacity

Million Acre-Feet

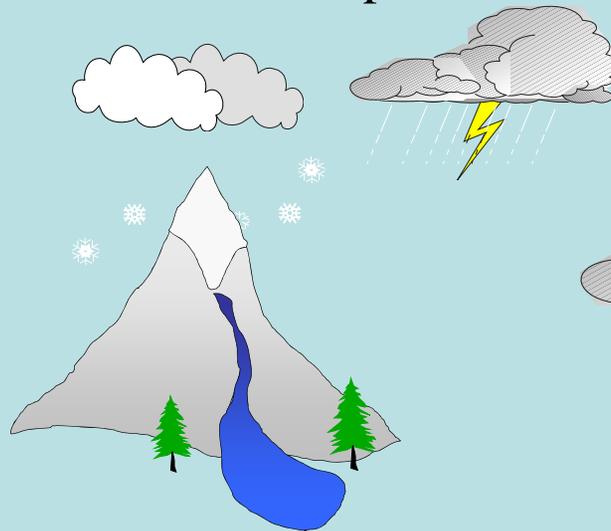


Runoff Components

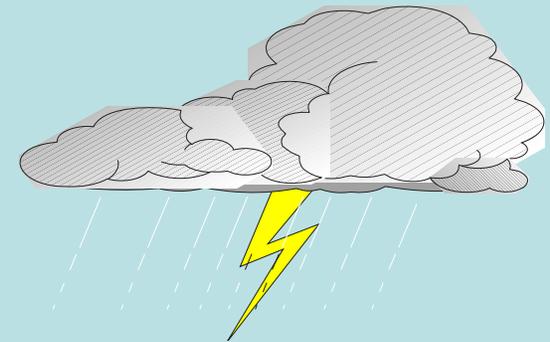
Plains Snowpack



Mountain Snowpack



Rainfall



March and
April

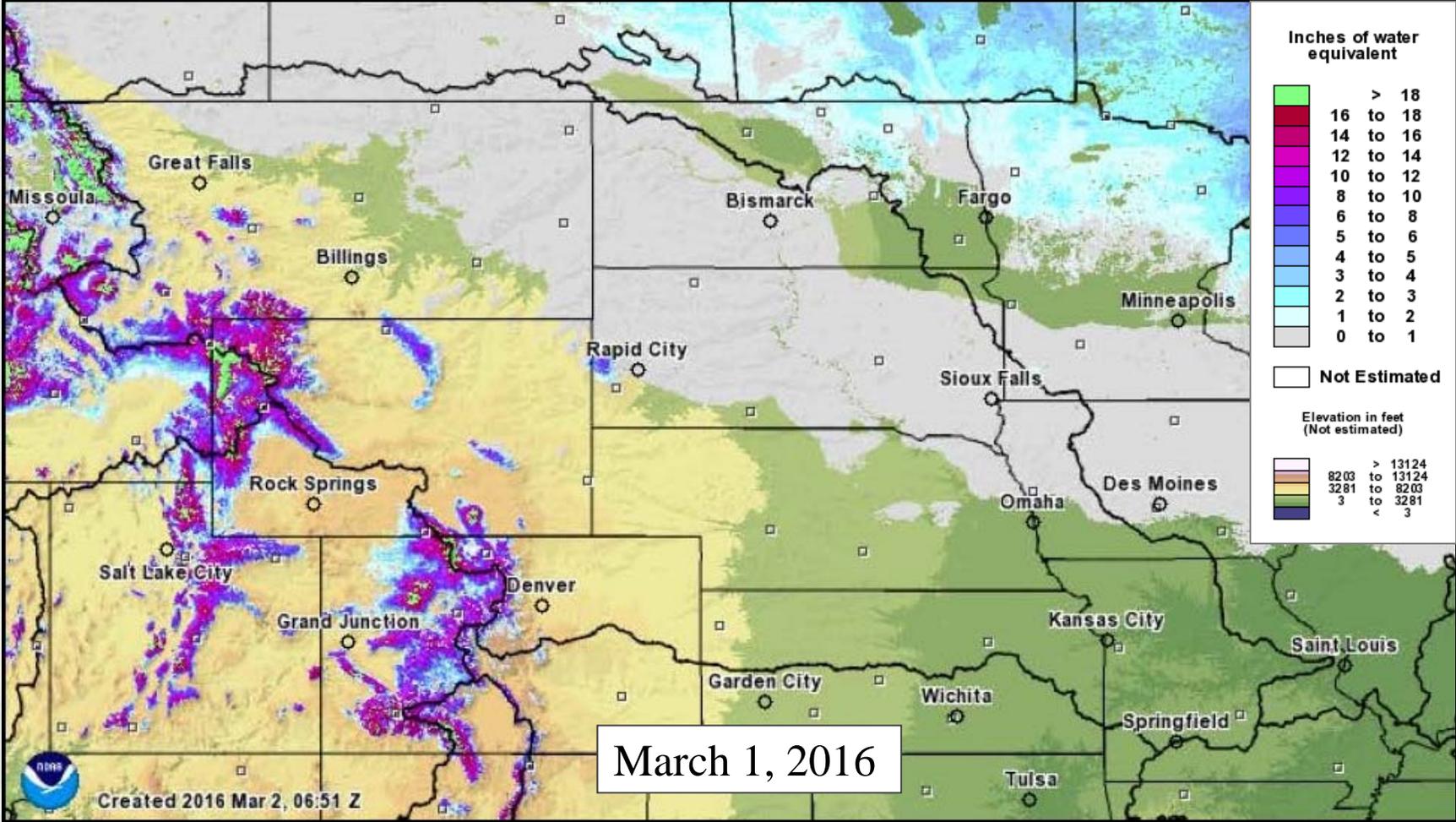
May, June
and July

March through
October

2016 Forecast = 22.7 MAF, 90% of average*

*October 1 forecast; average runoff is 25.3 MAF

Plains Snowpack

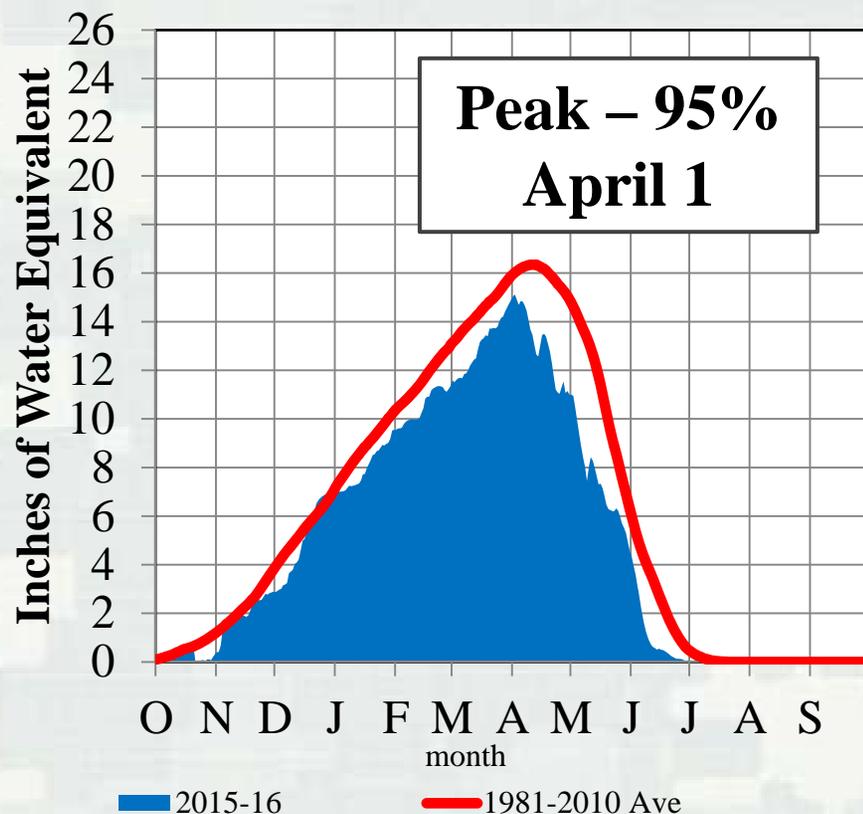


March 1, 2016

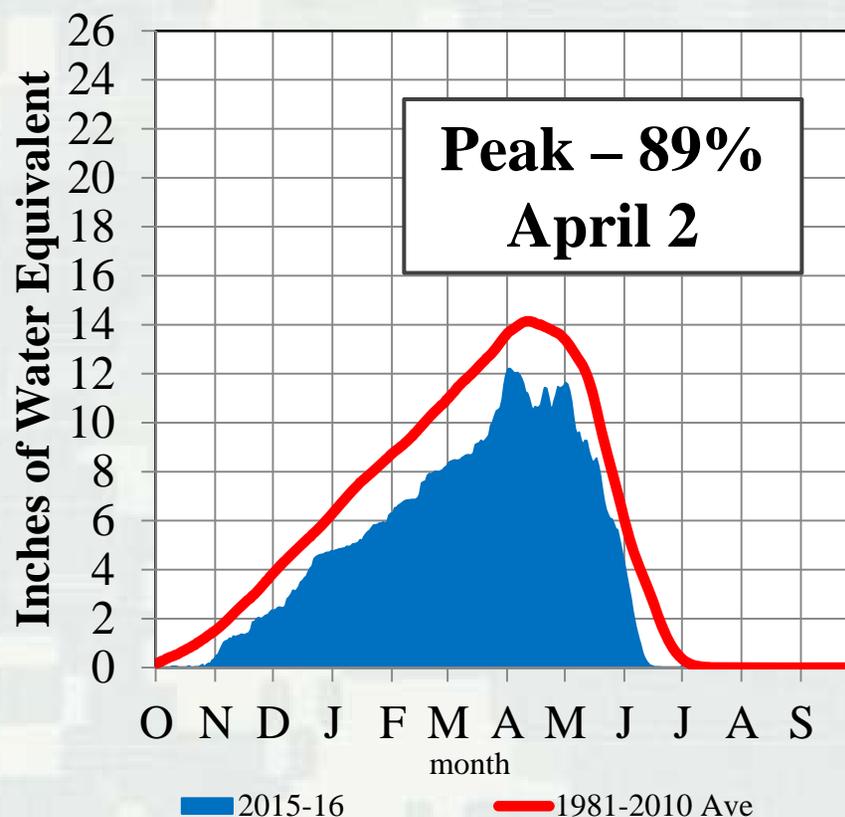
Source: NOAA National Operational Hydrologic Remote Sensing Center (NOHRSC)

Missouri River Basin 2015-16 Mountain Snowpack

Total above Fort Peck



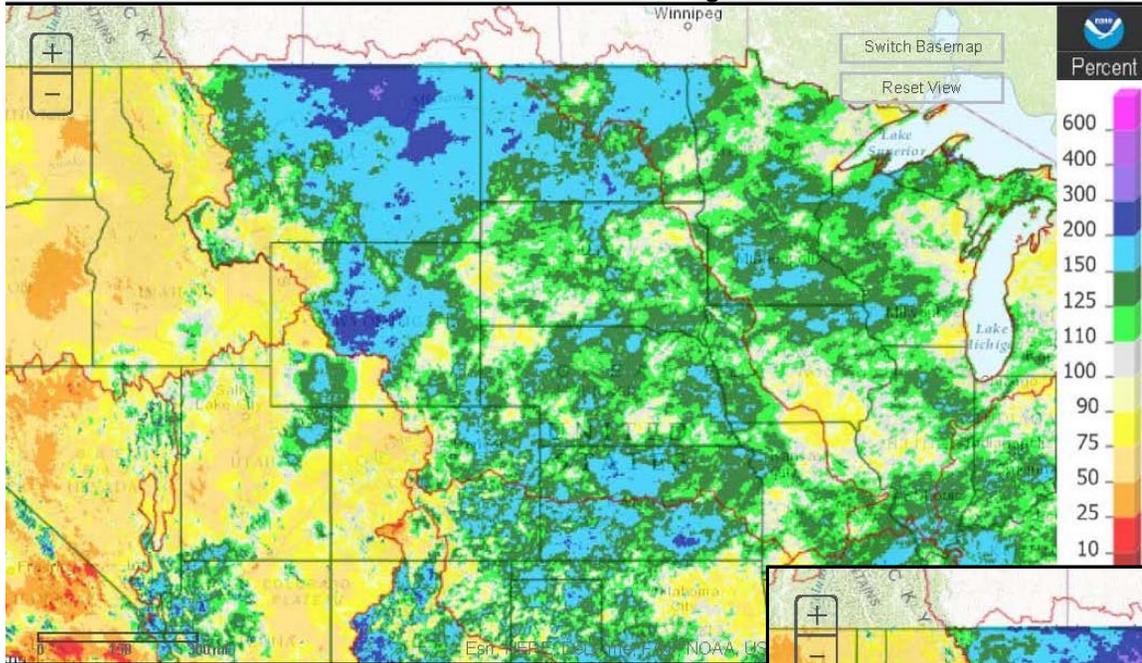
Total Fort Peck to Garrison



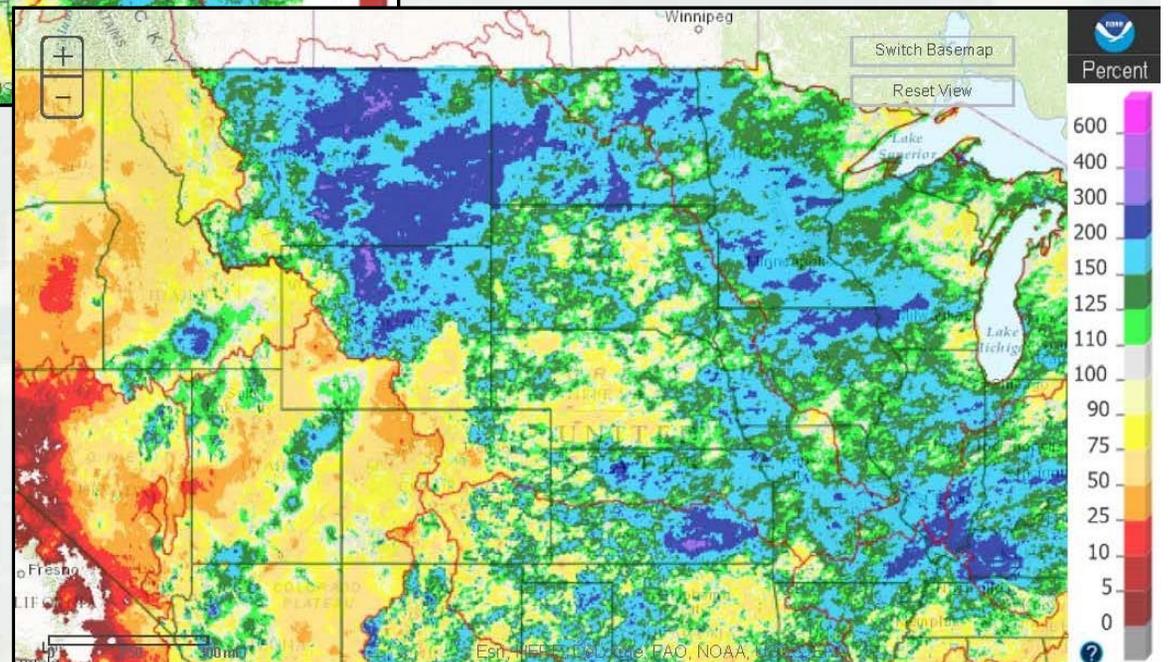
Source: USDA Natural Resources Conservation Service (NRCS)
National Water and Climate Center

Precipitation - Percent of Normal

Previous 180 Days



Previous 90 Days



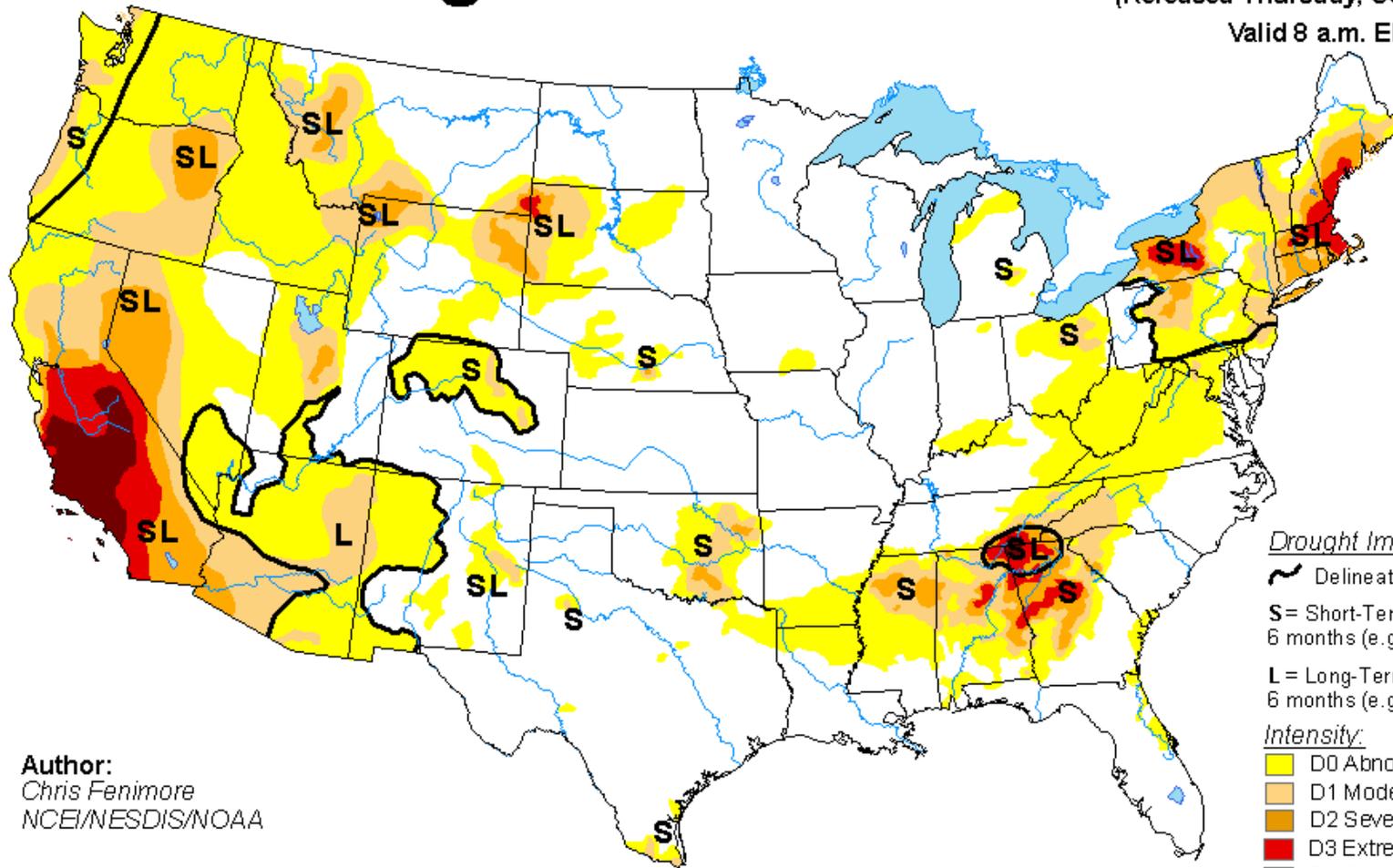
Source: National Weather Service, Missouri Basin River Forecast Center (MBRFC)

U.S. Drought Monitor

September 27, 2016

(Released Thursday, Sep. 29, 2016)

Valid 8 a.m. EDT



Drought Impact Types:

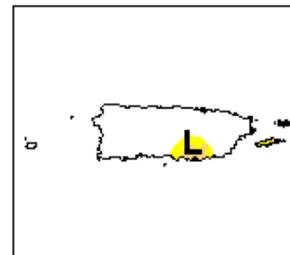
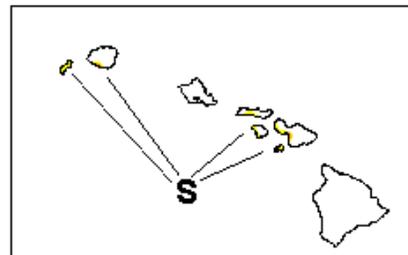
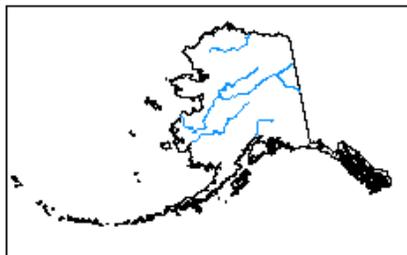
- Delineates dominant impacts
- S** = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L** = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Chris Fenimore
NCEI/NESDIS/NOAA



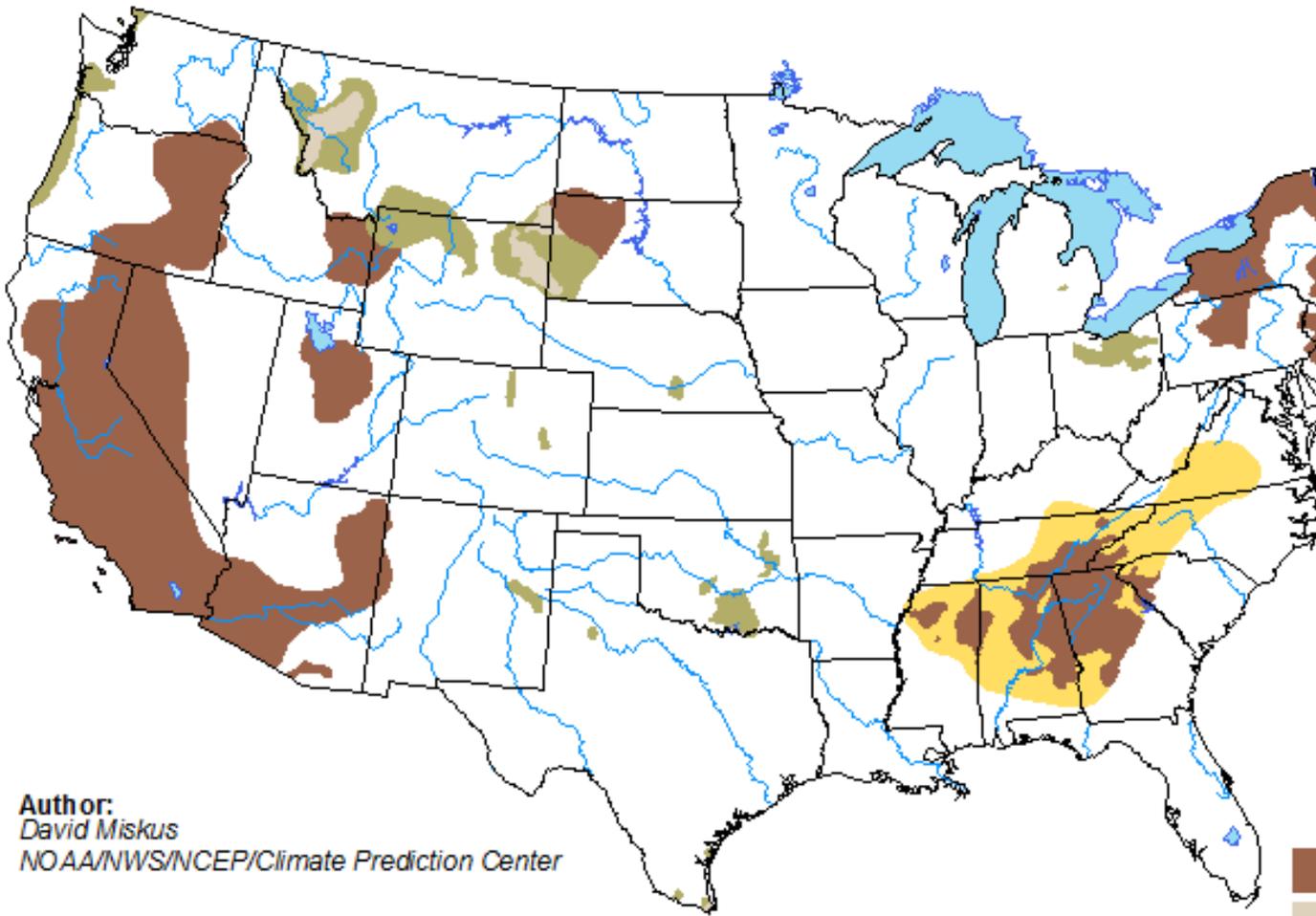
12



<http://droughtmonitor.unl.edu/>

U.S. Seasonal Drought Outlook Valid for September 15 - December 31, 2016

Drought Tendency During the Valid Period Released September 15, 2016

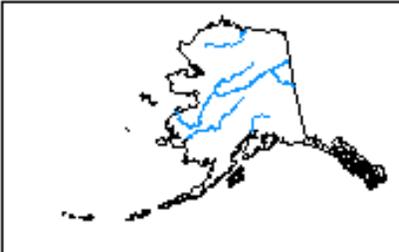


Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).

NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

- Drought persists
- Drought remains but improves
- Drought removal likely
- Drought development likely

Author:
David Miskus
NOAA/NWS/NCEP/Climate Prediction Center

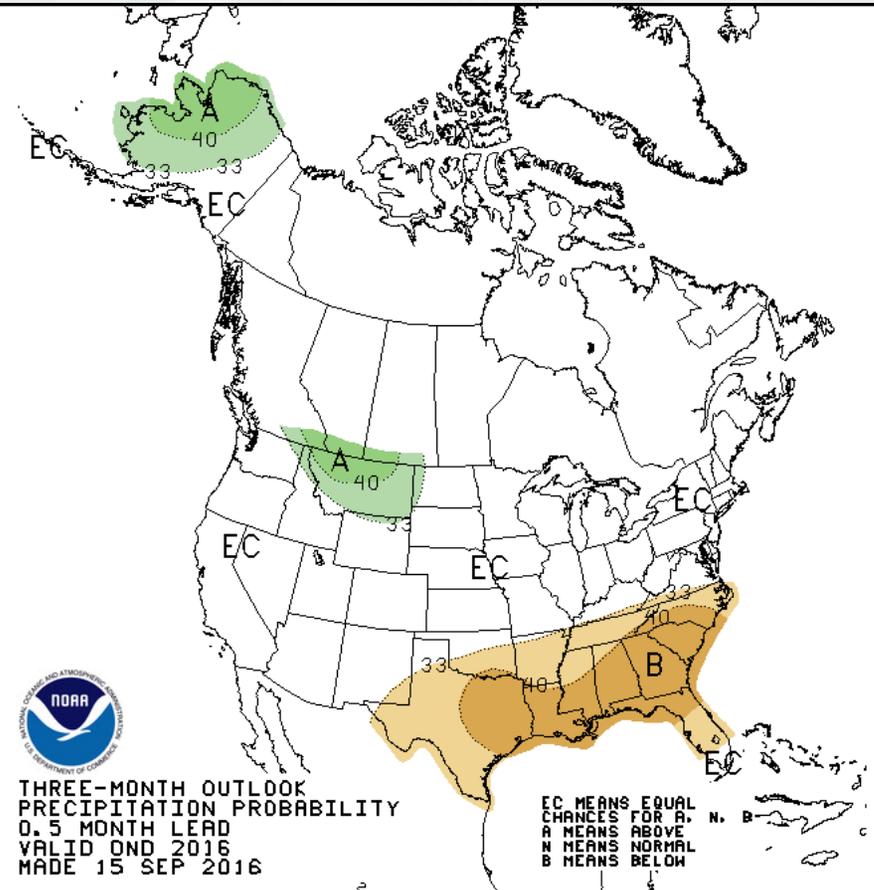
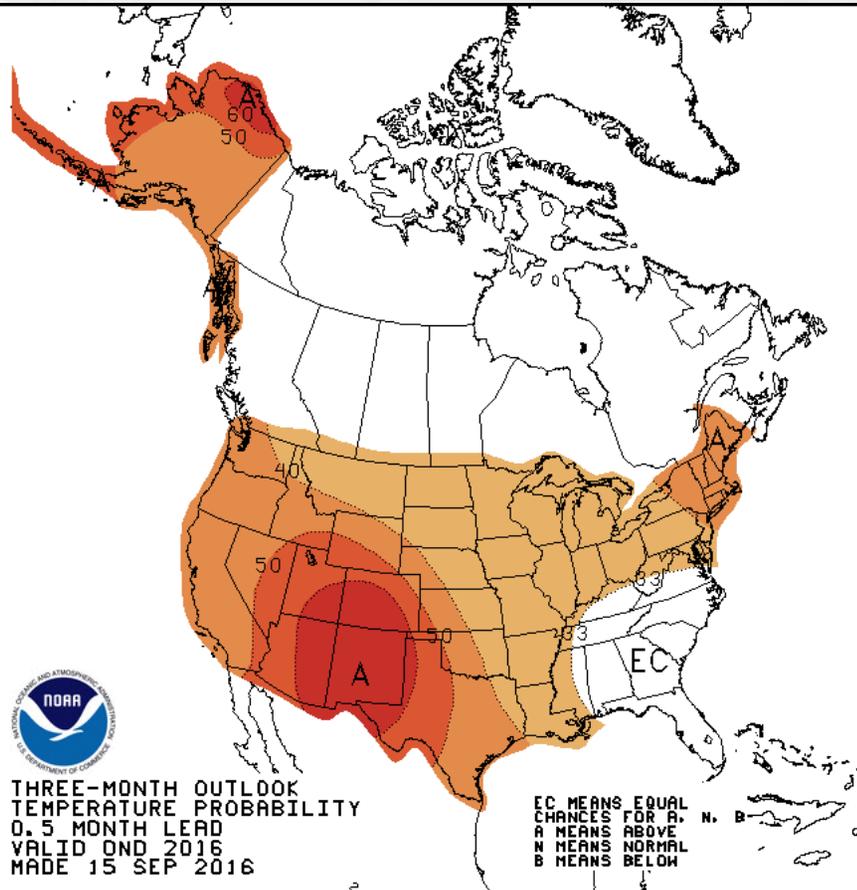


Long-Term Outlooks

Temperature and Precipitation

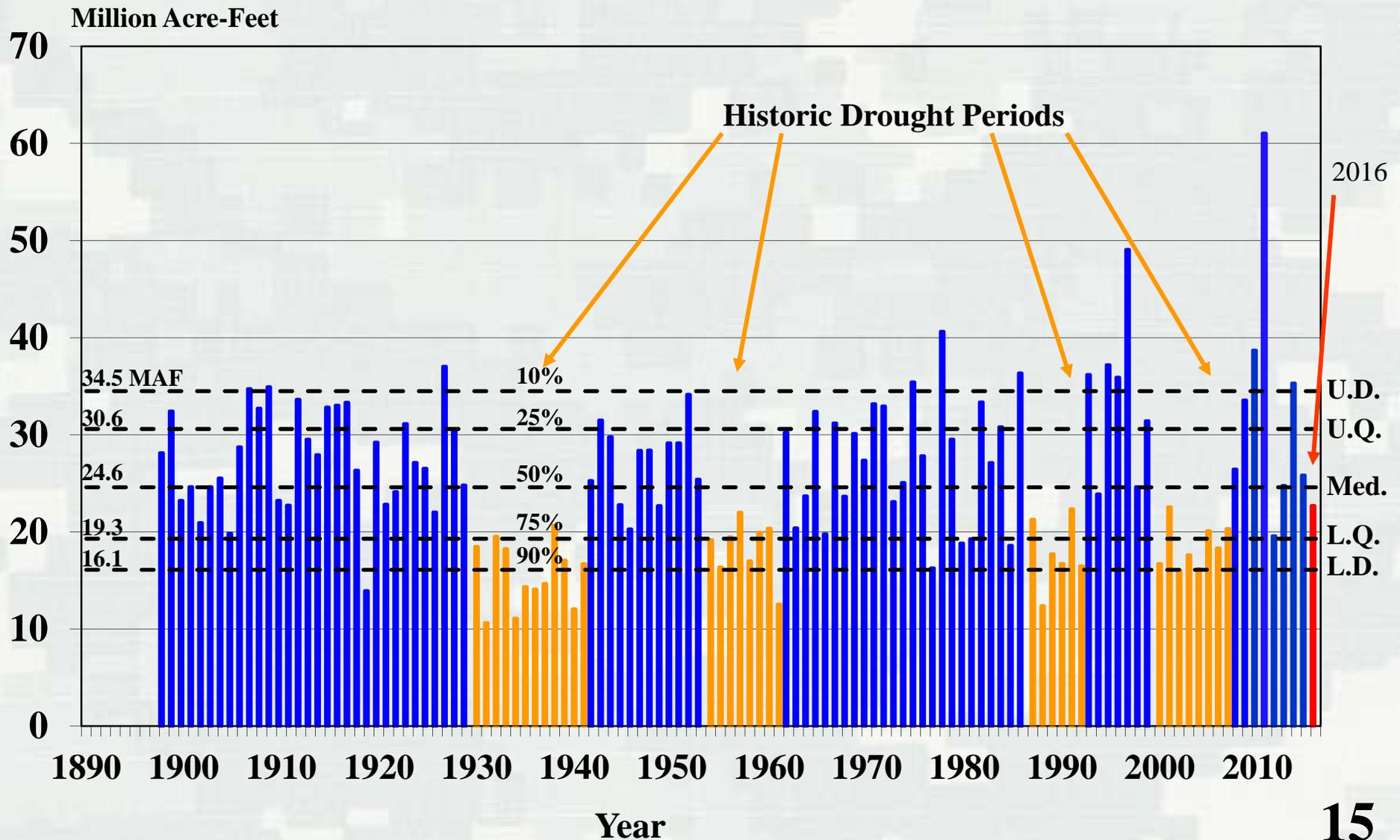
Oct-Nov-Dec

Oct-Nov-Dec

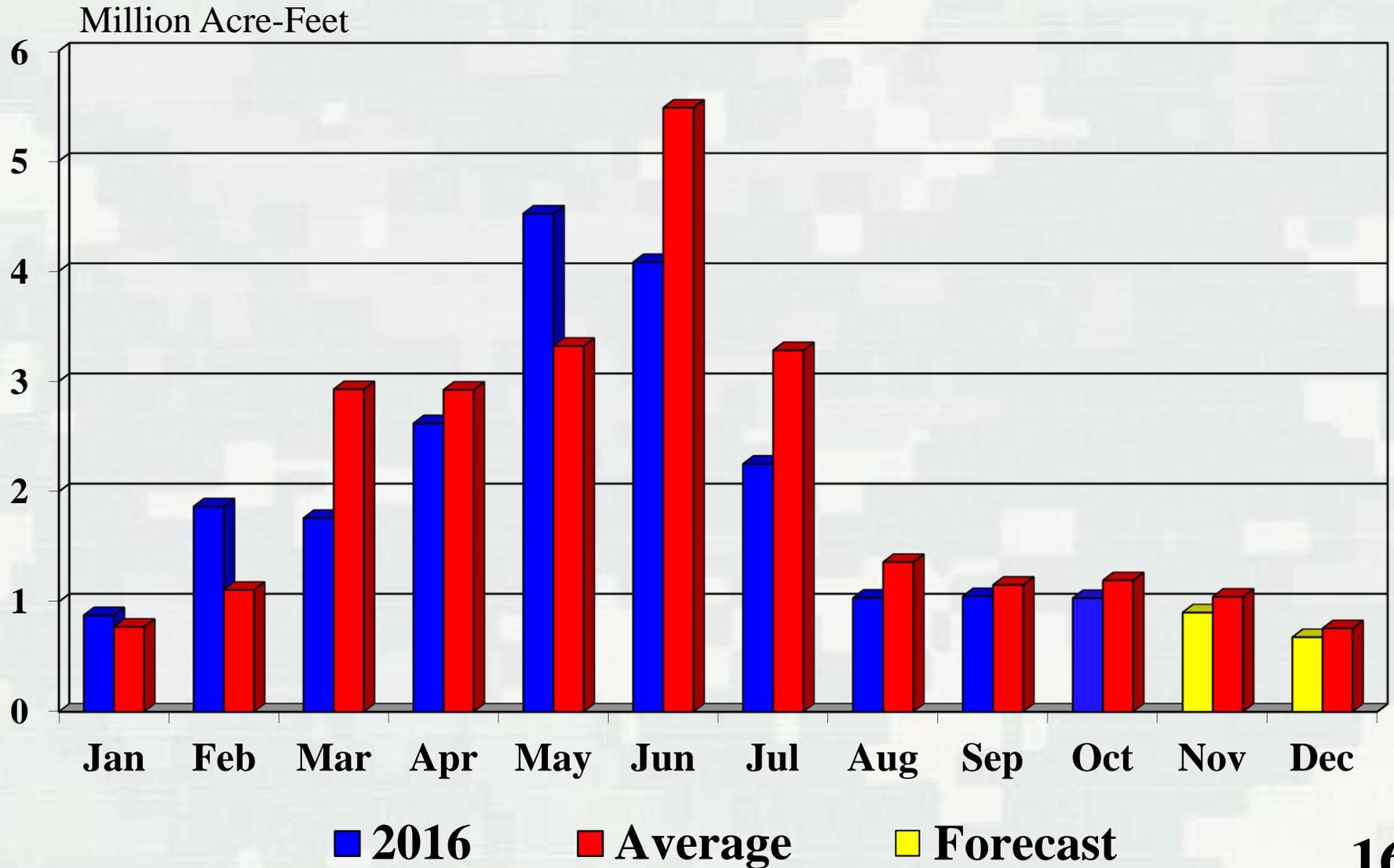


Source: National Weather Service, Climate Prediction Center (CPC)

Missouri River Mainstem System Annual Runoff above Sioux City, IA



Missouri River Runoff above Sioux City, IA 2016 Actual and Forecast



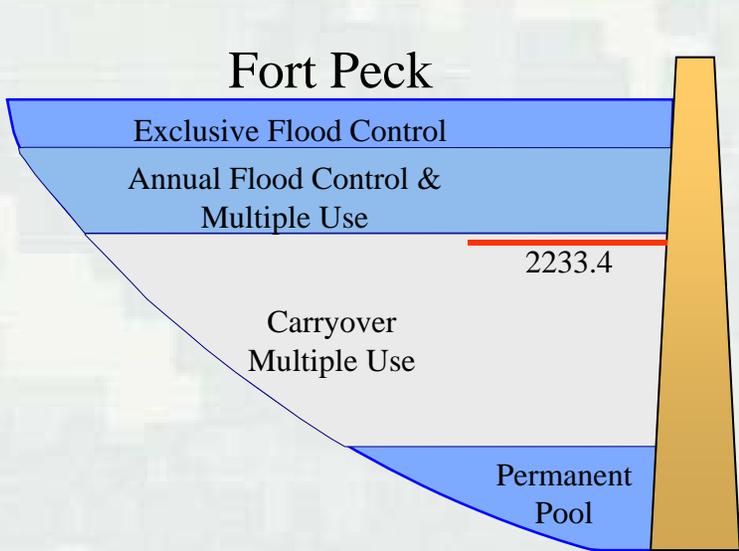
Fall / Winter Releases

- Gavins Point Dam winter releases will be reduced to winter rate beginning approximately November 21st (normal navigation season)
- Will closely monitor channel/ice conditions between reservoirs and downstream of Gavins Point Dam
- Gavins Point Dam winter releases of at least 17 kcfs (1000 cfs) to complete evacuation of stored flood waters
- Expected releases in kcfs:

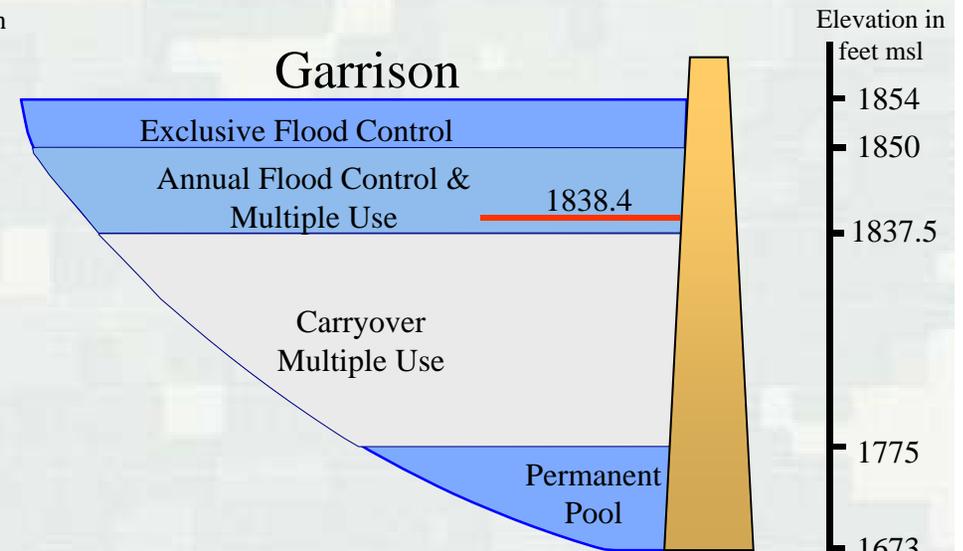
	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>
Fort Peck	4.5	5.5	6.5	6.5
Garrison	13.0	13.5	14.0	14.0
Gavins Point	24.0	17.0	17.0	17.0

**Results of 2016 Regulation and
Planned Operation for
Authorized Purposes in 2017**

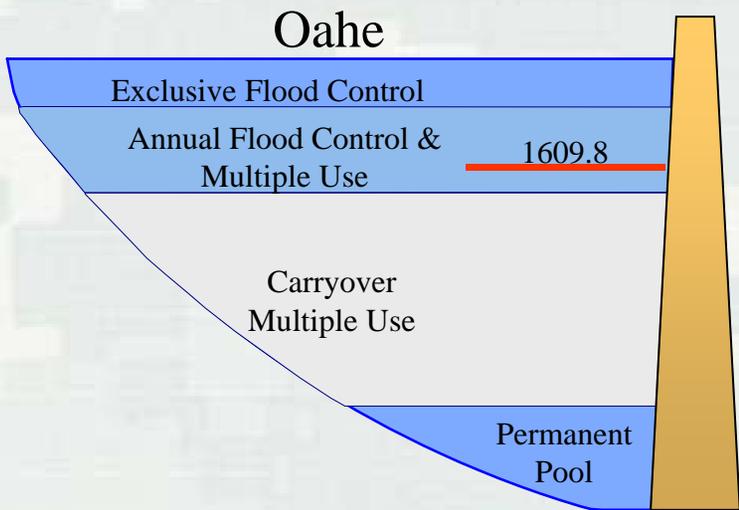
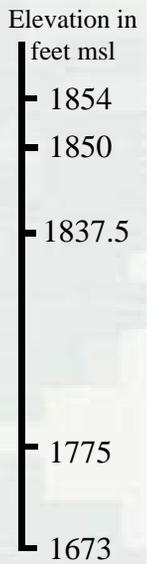
Current Reservoir Levels – October 2, 2016



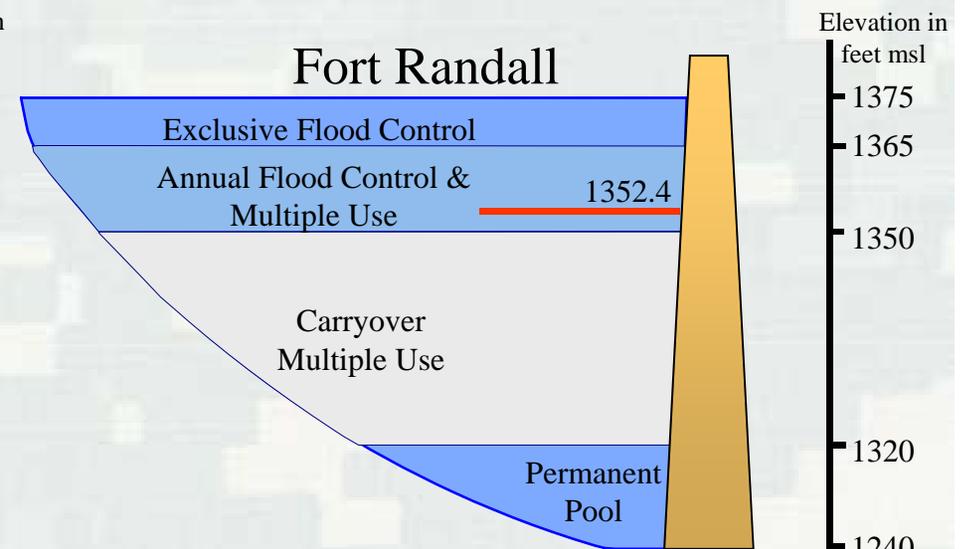
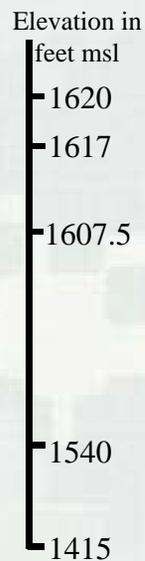
0.6 feet below base of Flood Control zone



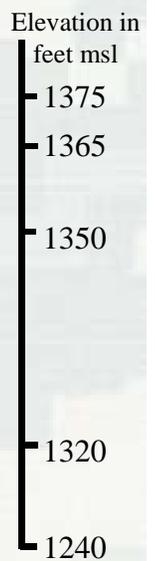
0.9 feet above base of Flood Control zone



2.3 feet above base of Flood Control zone

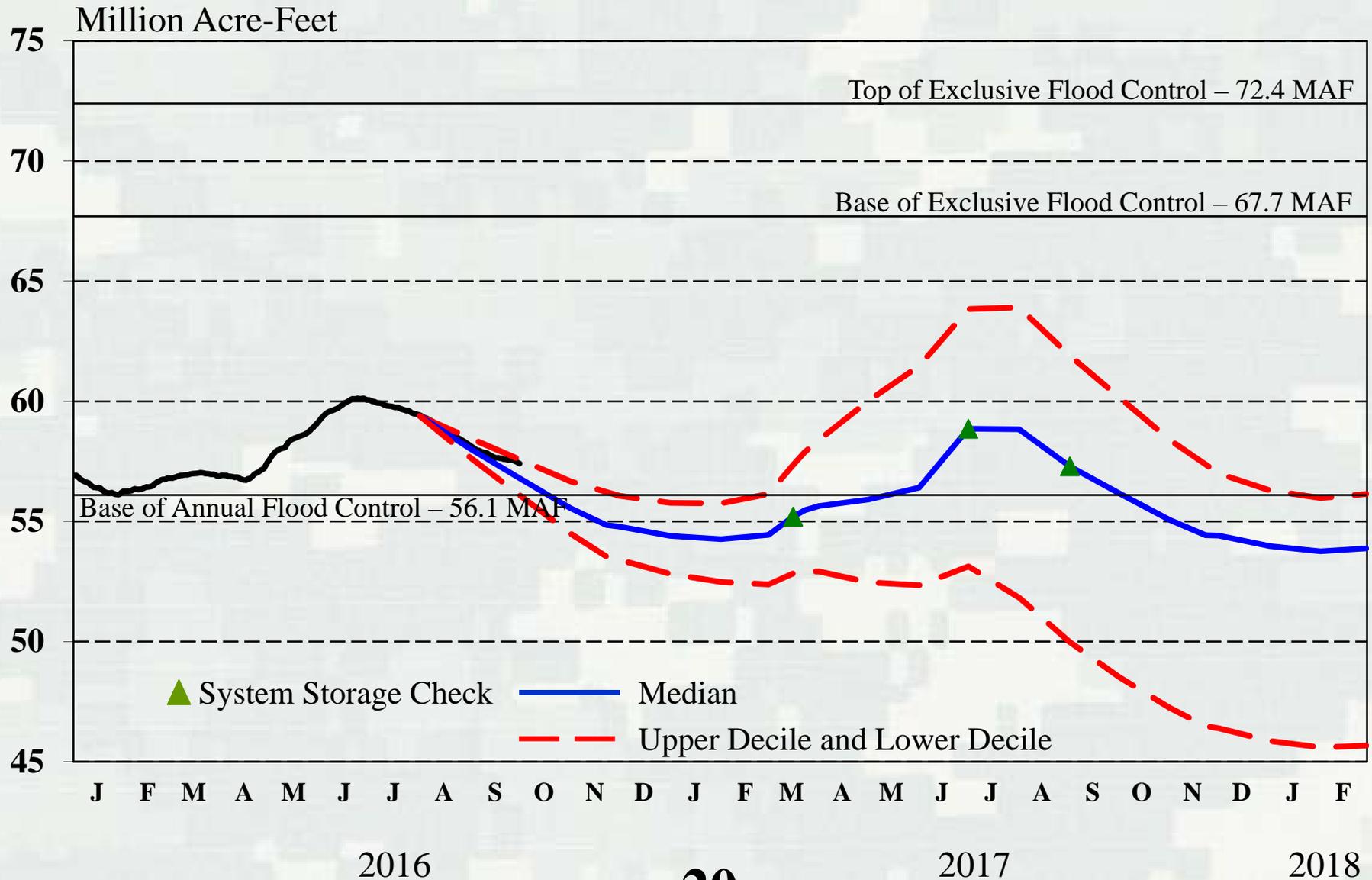


2.4 feet above base of Flood Control zone



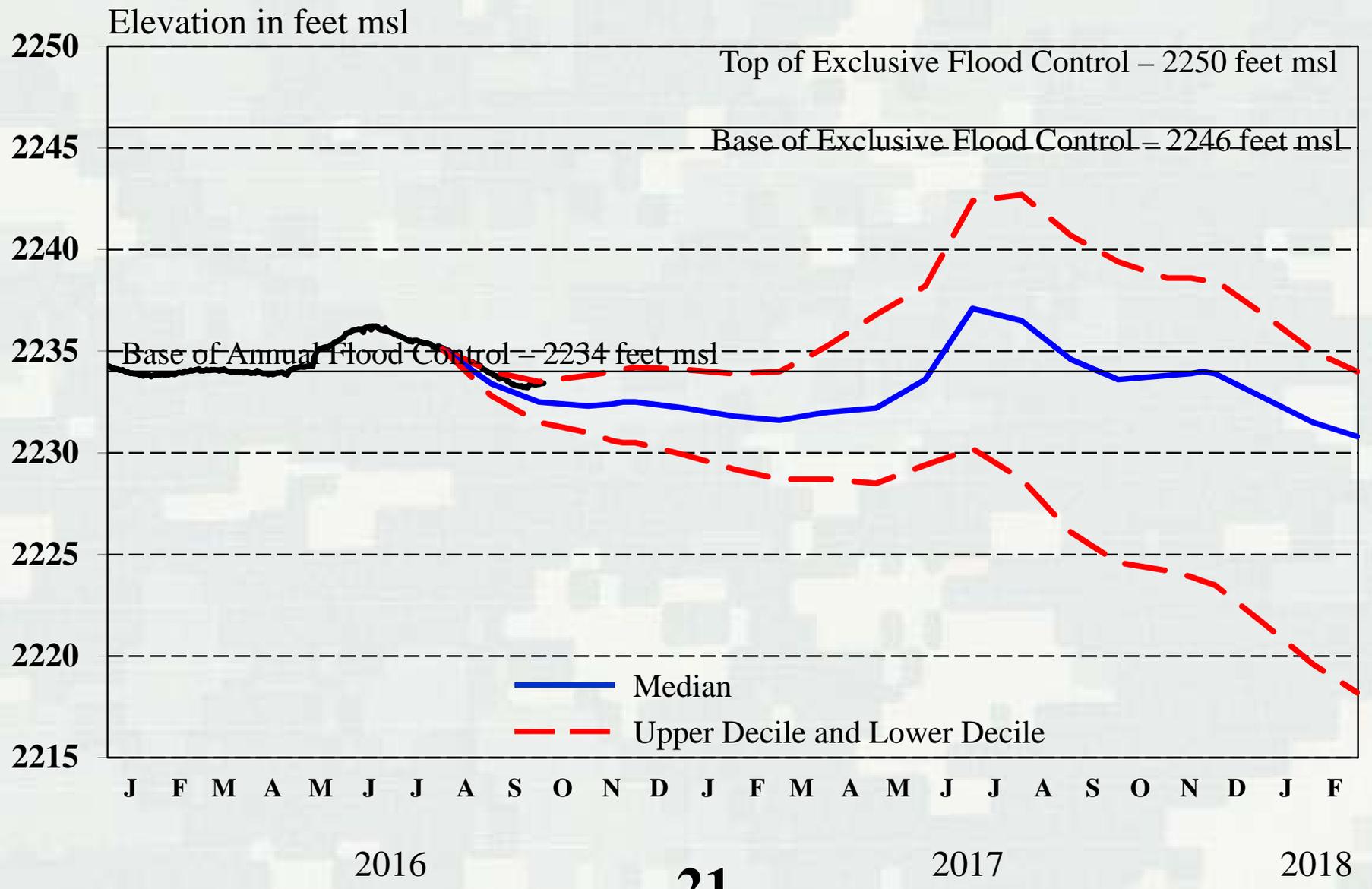
System Storage

2016-2017 Draft AOP



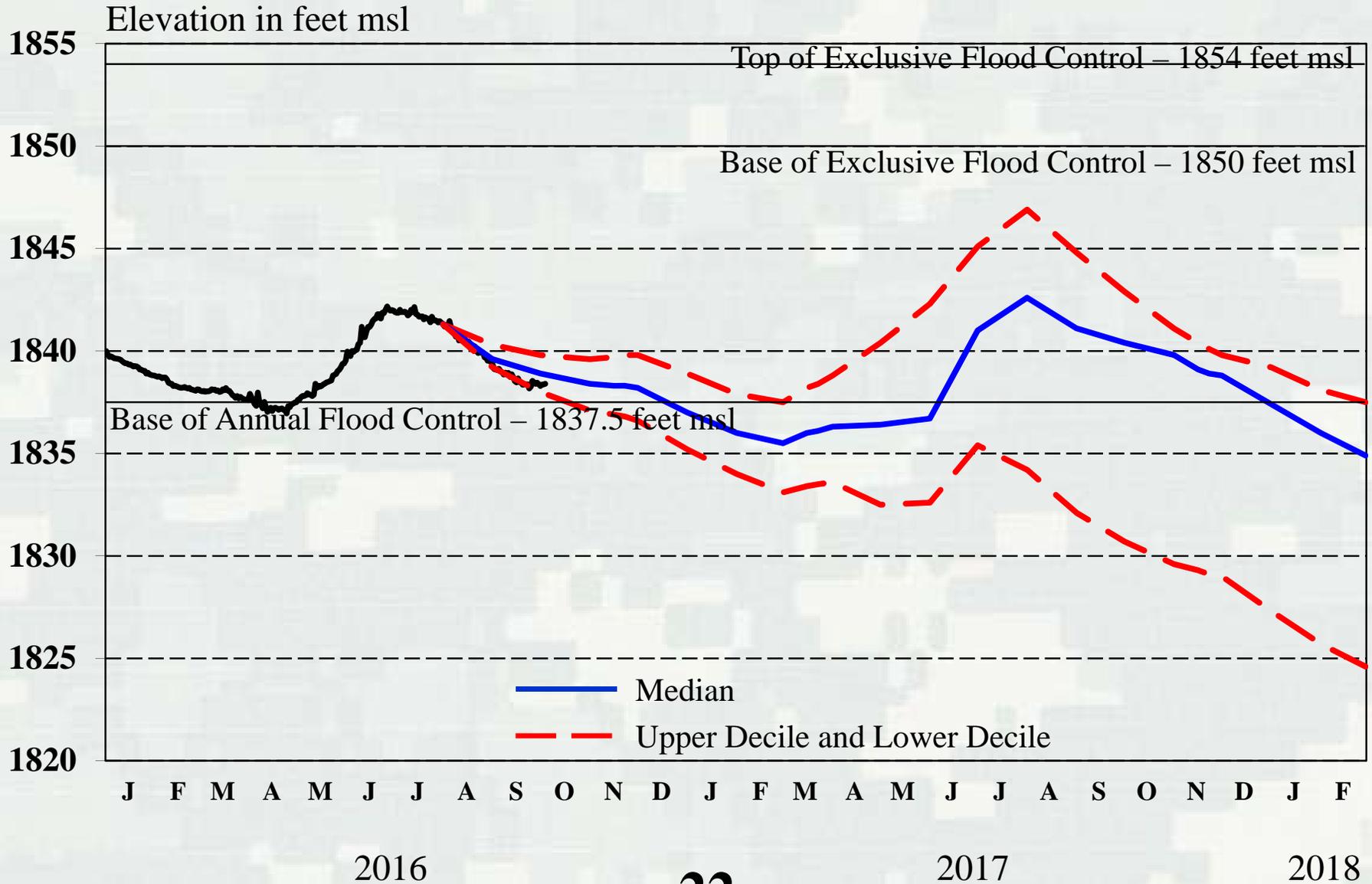
Fort Peck

2016-2017 Draft AOP



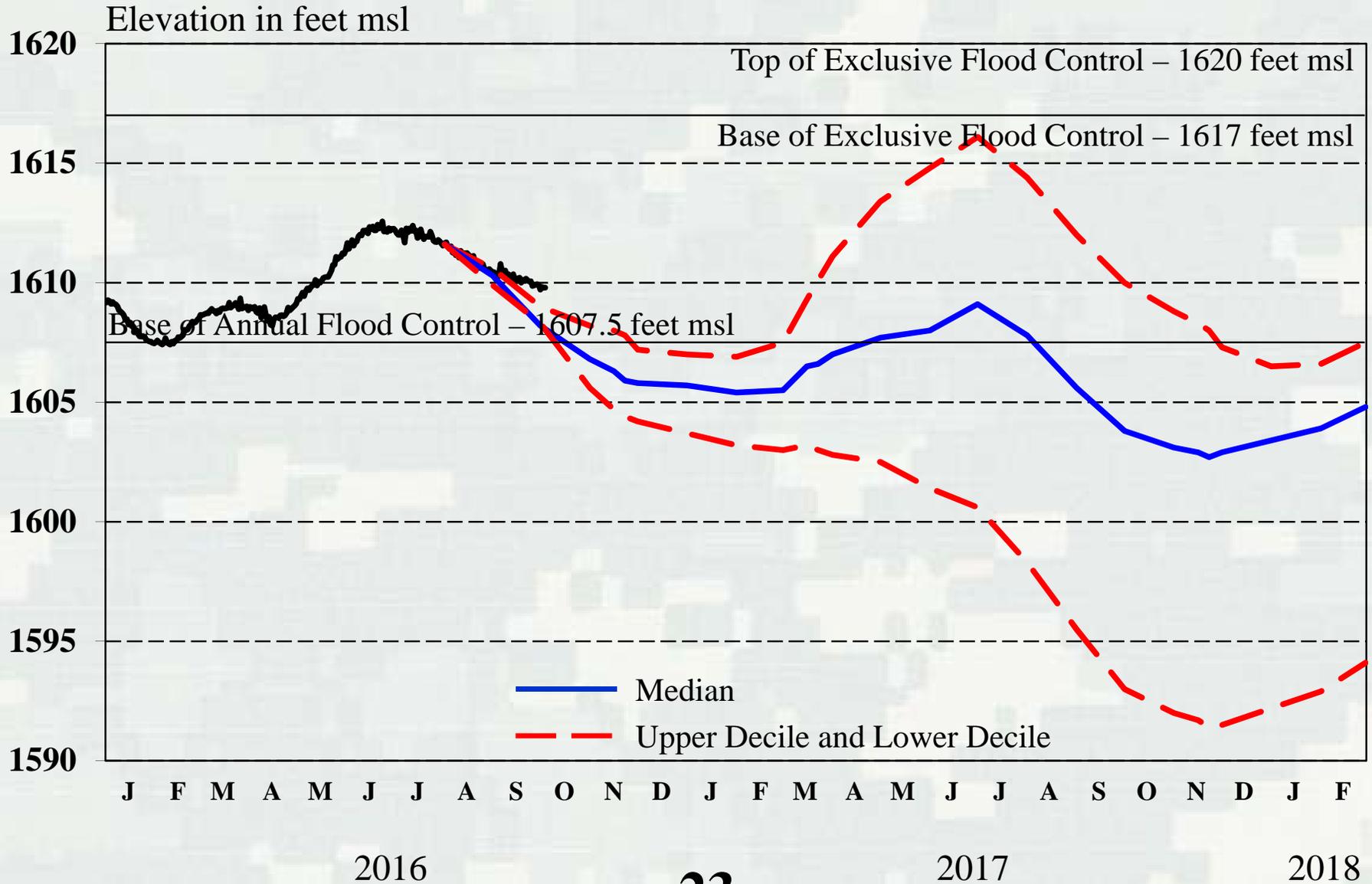
Garrison

2016-2017 Draft AOP

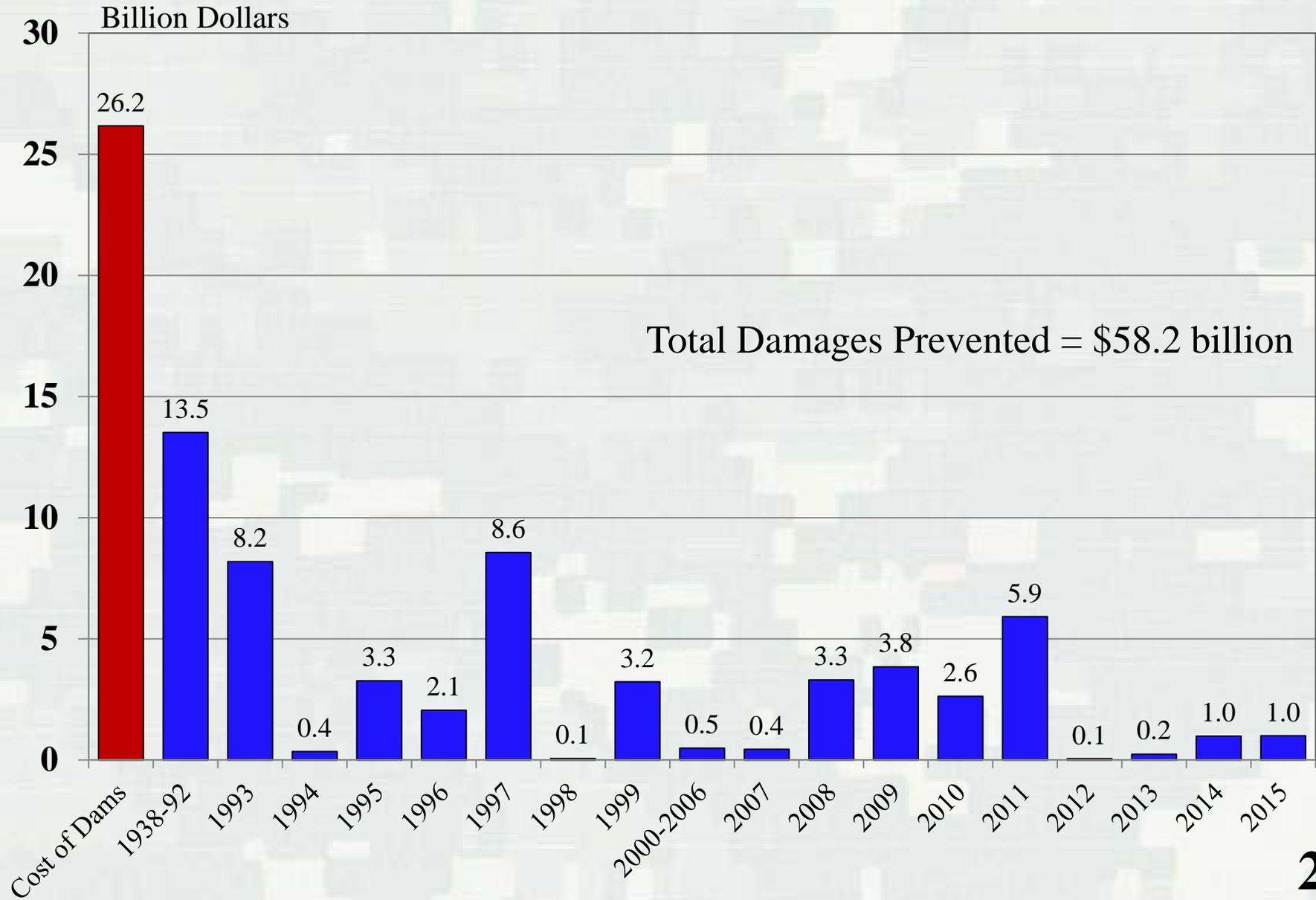


Oahe

2016-2017 Draft AOP



Flood Damages Prevented by Mainstem Dams Indexed to 2015 Levels



Flood Control

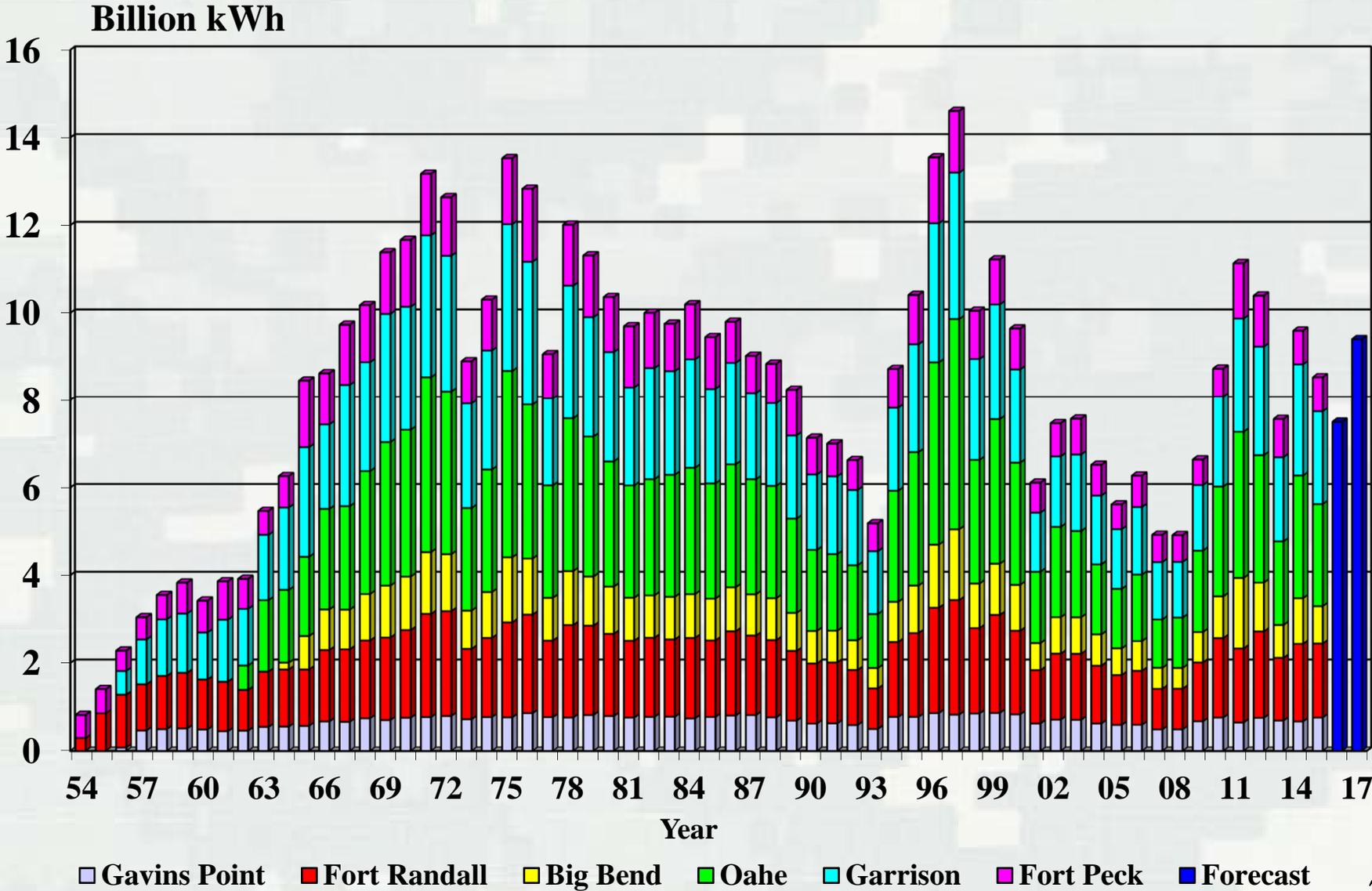
- **2016**

- ▶ All 2015 flood water evacuated from reservoir system by late January 2016
- ▶ System storage peaked on June 22 at 60.1 MAF, utilizing 25 percent of the system's flood control storage

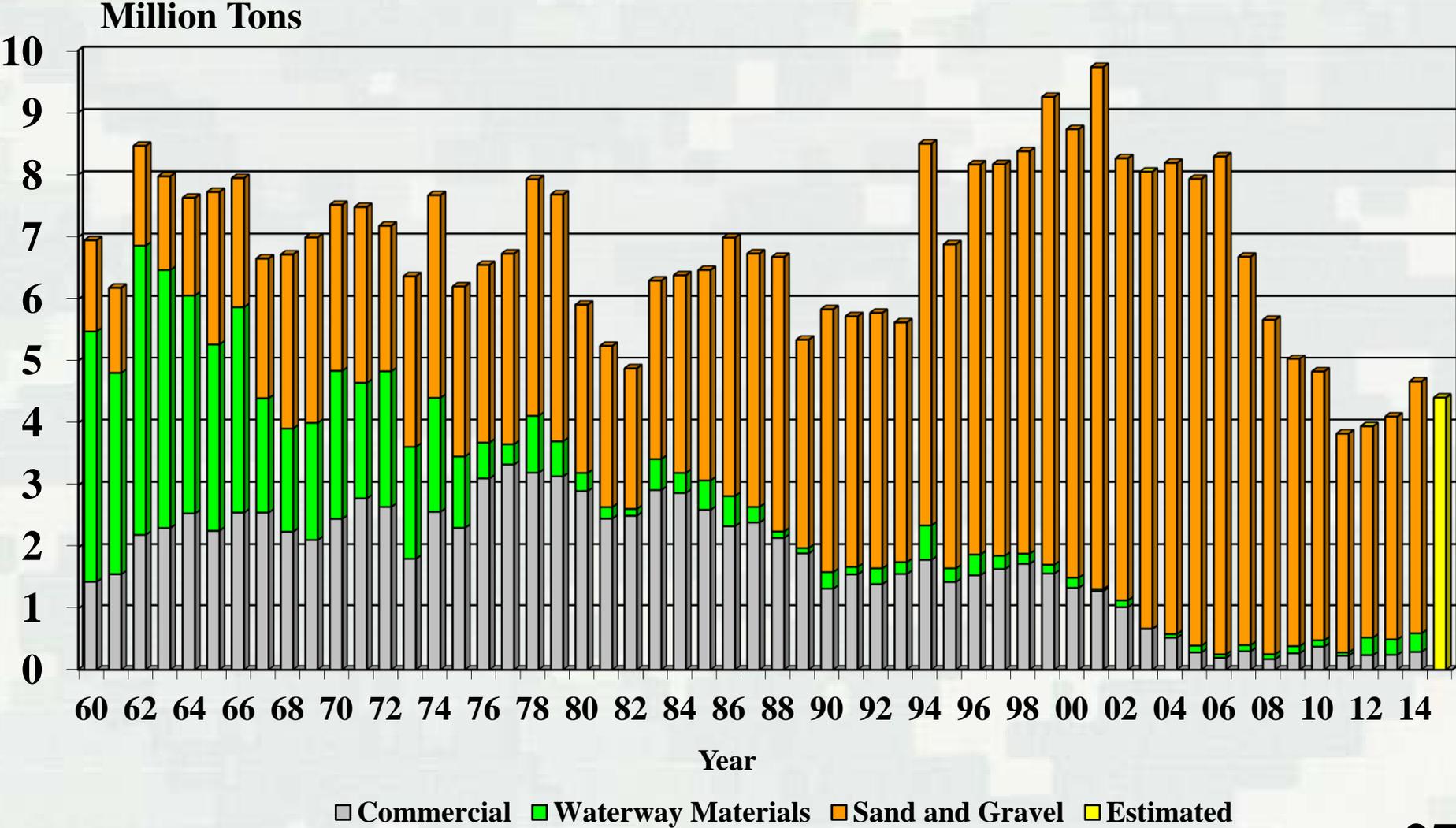
- **2017**

- ▶ All scenarios start next year's runoff season at or below the base of the annual flood control zone
- Flooding can still occur due to downstream rainfall

Hydropower



Missouri River Total Navigation Tonnage



Navigation

- **2016 – Full service, full length season**
- **2017 – March 15 Storage Check**
 - ▶ Full service level flow support median and above runoff
 - ▶ Reductions of 1,700 and 1,900 cfs for lower quartile and lower decile respectively
 - ▶ Target locations: Sioux City, Omaha, Nebraska City and Kansas City
- **2017 – July 1 Storage Check**
 - ▶ Full length season (all runoff scenarios)
 - 10-day extension for upper quartile and upper decile runoff
 - ▶ Full service level flow support for median runoff and above
 - ▶ Reductions of 2,400 and 3,600 cfs for lower quartile and lower decile, respectively

Water Supply – Water Quality Irrigation – Recreation

■ 2016

- ▶ Near average releases and reservoir elevations
 - Water supply intakes, recreation areas, irrigation, and marinas
- ▶ Gavins Point Dam winter releases of 17 kcfs

■ 2017

- ▶ Near normal reservoir levels and releases
- ▶ Gavins Point Dam winter releases of 16 kcfs under median runoff

2017 Fish and Wildlife

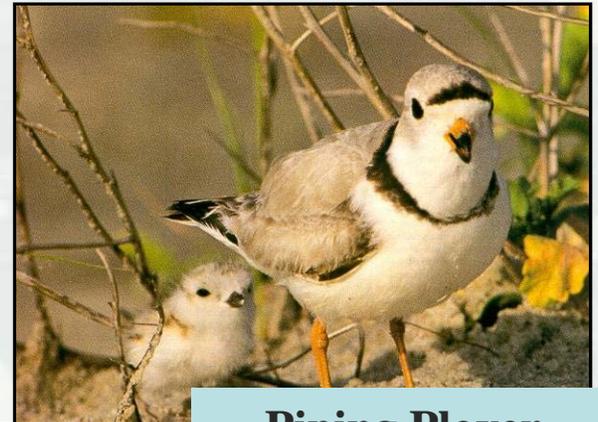
- Steady to rising levels at upper three reservoirs during forage fish spawn
 - ▶ Favor Fort Peck and Oahe if runoff below normal
- Minimize periods of zero releases at Fort Randall
- Coldwater habitat will be monitored

Endangered Species Act of 1973

Each Federal agency shall... ensure that any action authorized, funded, or carried out by such agency... is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat...



Interior Least Tern
Listed "Endangered" 1986



Piping Plover
Listed "Threatened" 1986



Pallid Sturgeon
Listed "Endangered" 1990

Threatened and Endangered Species

2016 Piping Plover and Least Tern

- Regulation from mid-May to late August
- Availability of sandbar habitat remains high
- Adult populations of both species remain strong
 - ▶ Highest recorded populations on the upper Missouri since monitoring began
- 3-year running average fledge ratios met for both species
- Weather events and predation affected nest success and productivity

Threatened and Endangered Species

2017 Piping Plover and Least Tern

- Gavins Point releases
 - ▶ Steady release – flow to target
 - ▶ Cycle Gavins Point releases
- Intra-day peaking patterns – Garrison and Fort Randall
- Measures to minimize take
 - ▶ Utilize Kansas River projects for navigation support
 - ▶ Target flows may not be met in reaches without commercial navigation

Threatened and Endangered Species

Bi-Modal Spring Pulse – Pallid Sturgeon

- 2003 Amended Biological Opinion – Reasonable and Prudent Alternative
- Neither pulse conducted in 2016
- Neither pulse planned in 2017
 - ▶ Pursuing independent science advisory panel (ISAP) recommendations
 - ▶ Forego spring pulse while developing management plan

Summary

- All flood storage space available to start 2017 runoff season
- Near normal releases and reservoir levels (median runoff)
- Good service to all authorized purposes