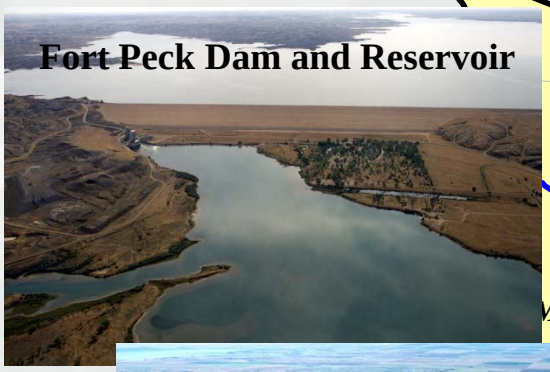
Missouri River Basin Water Management
Fall 2014 Public Meetings

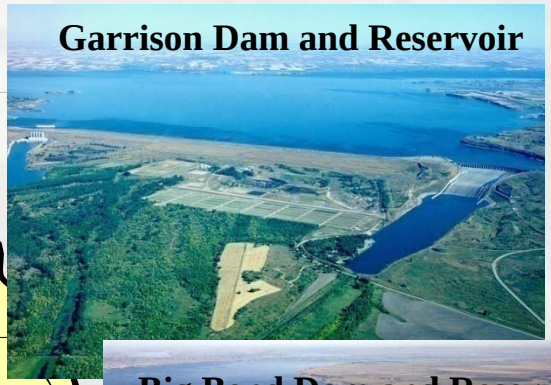
October 27th	6:00 p.m.	Fort Peck, MT
October 28th	11:00 a.m.	Bismarck, ND
October 28th	6:00 p.m.	Pierre, SD
October 29th	11:00 a.m.	Smithville, MO
October 29th	6:00 p.m.	Council Bluffs, IA

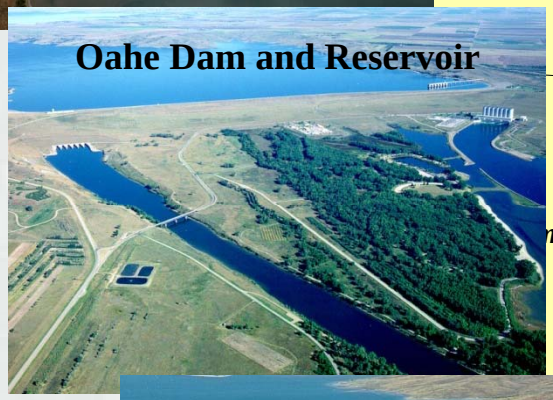
U.S.ARMY

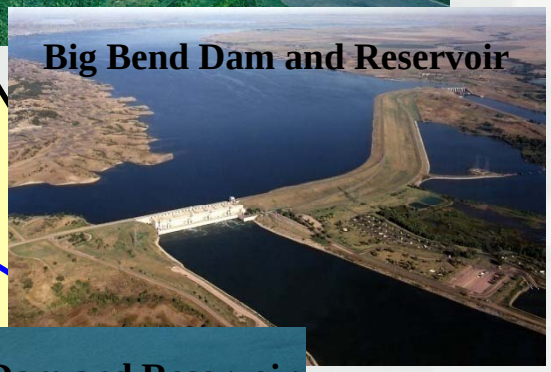
US Army Corps of Engineers
BUILDING STRONG®

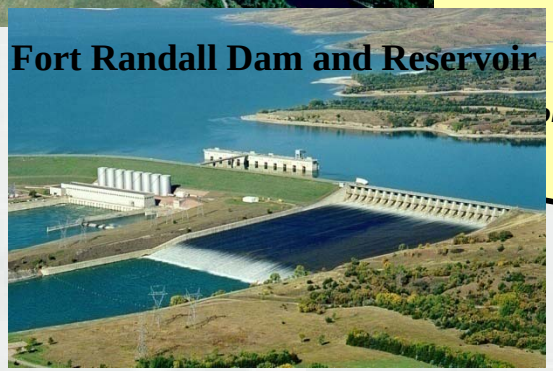
Missouri River Mainstem Reservoir System

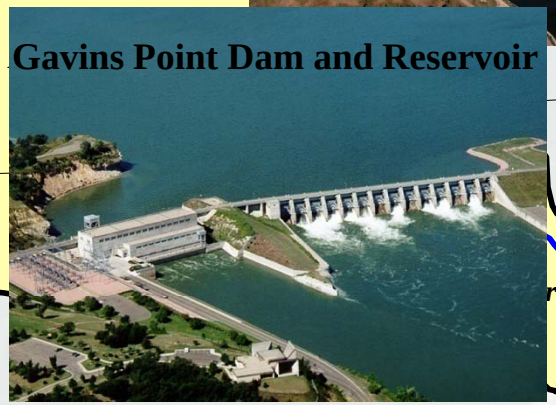








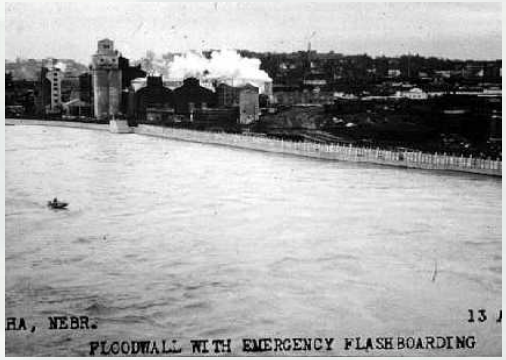




Our Mission

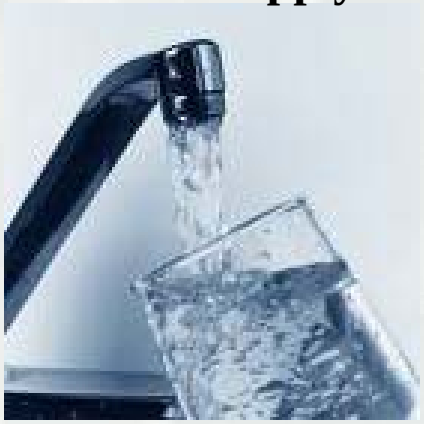
Regulate Missouri River Mainstem Reservoirs to Support Congressionally Authorized Purposes

Flood Control



Hydropower

Water Supply



Water Quality Control

Recreation

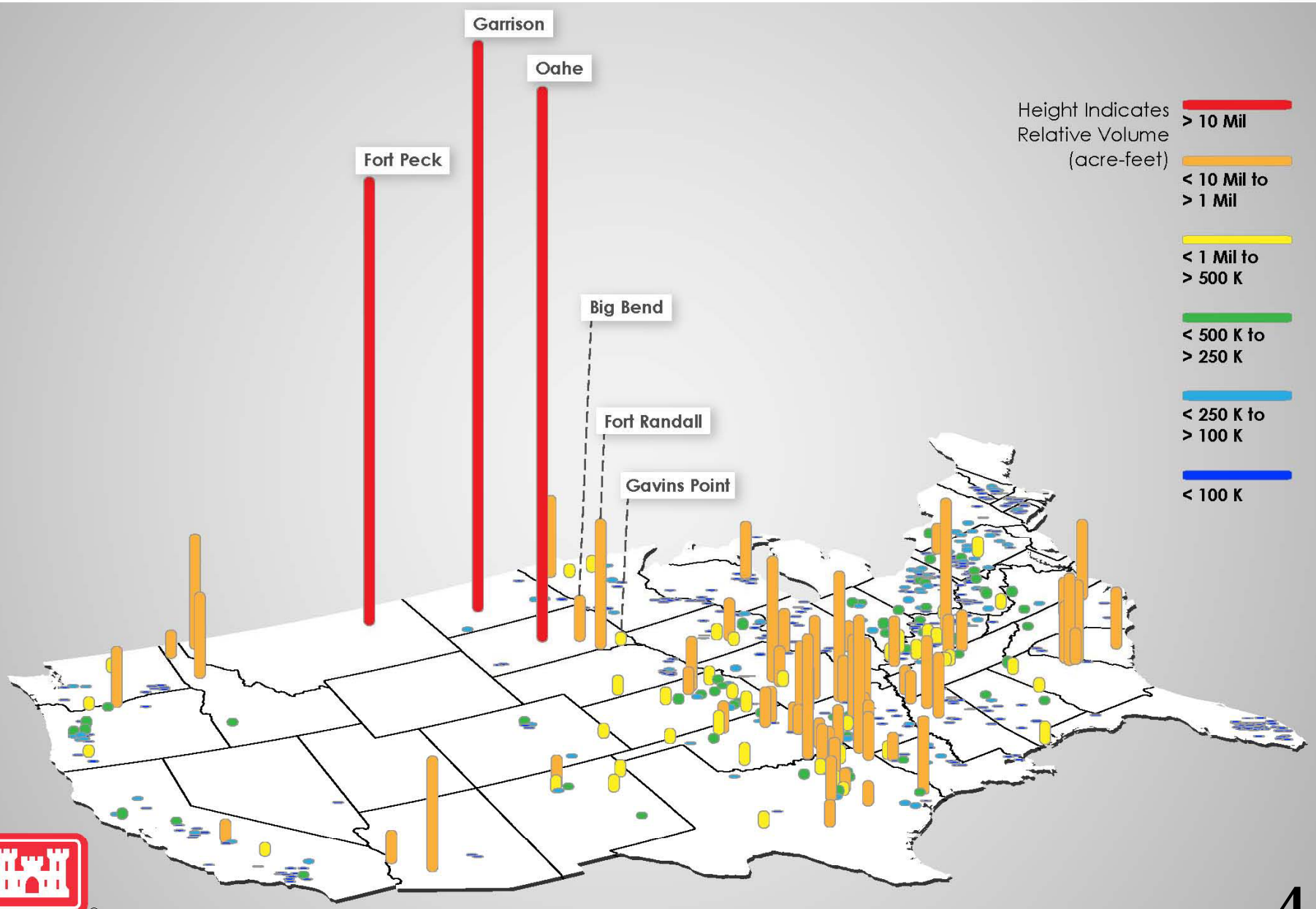
Navigation

Fish and Wildlife

Including Threatened and Endangered Species

Irrigation

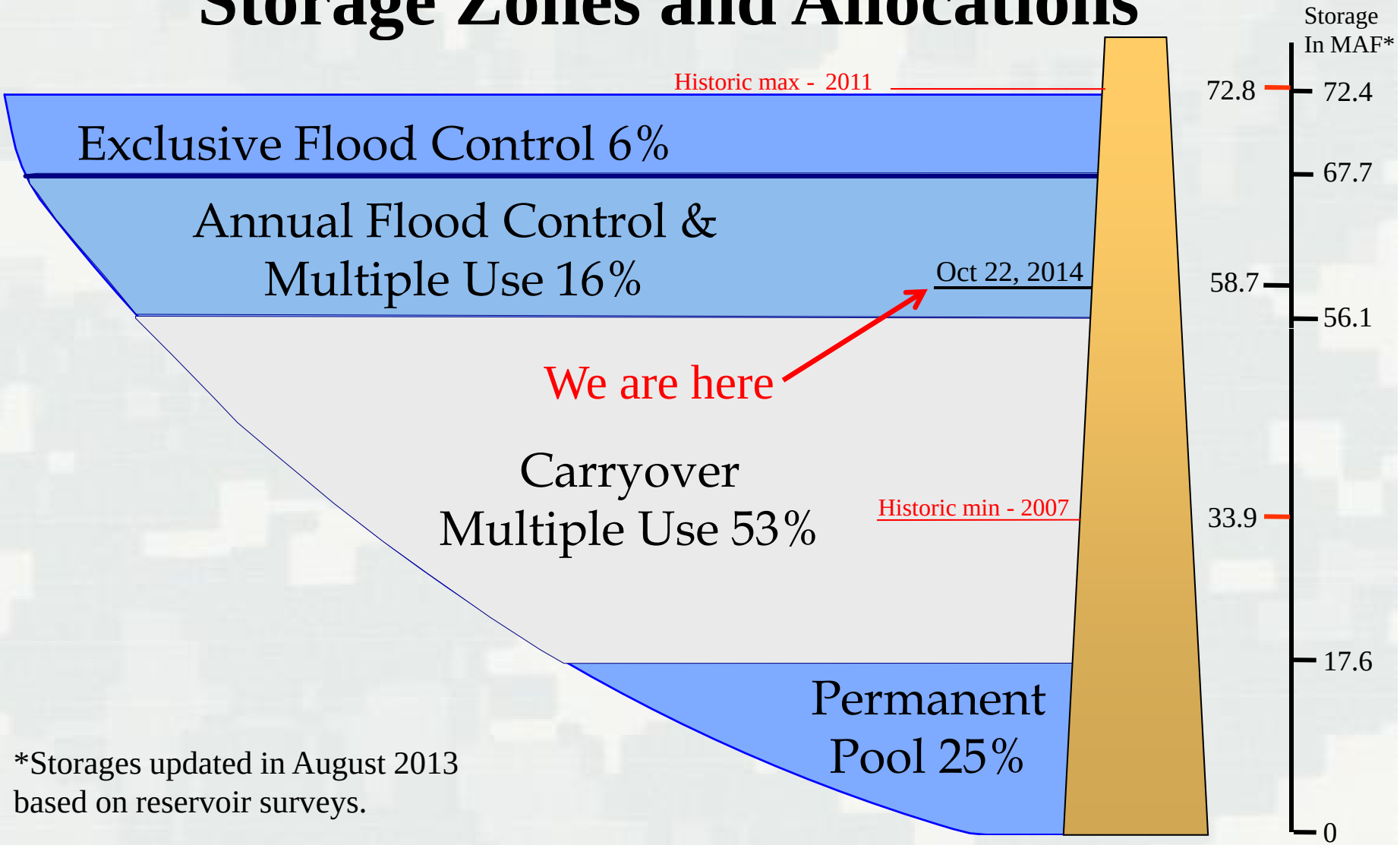
Storage Capacity of Corps Reservoirs



US Army Corps of Engineers
BUILDING STRONG

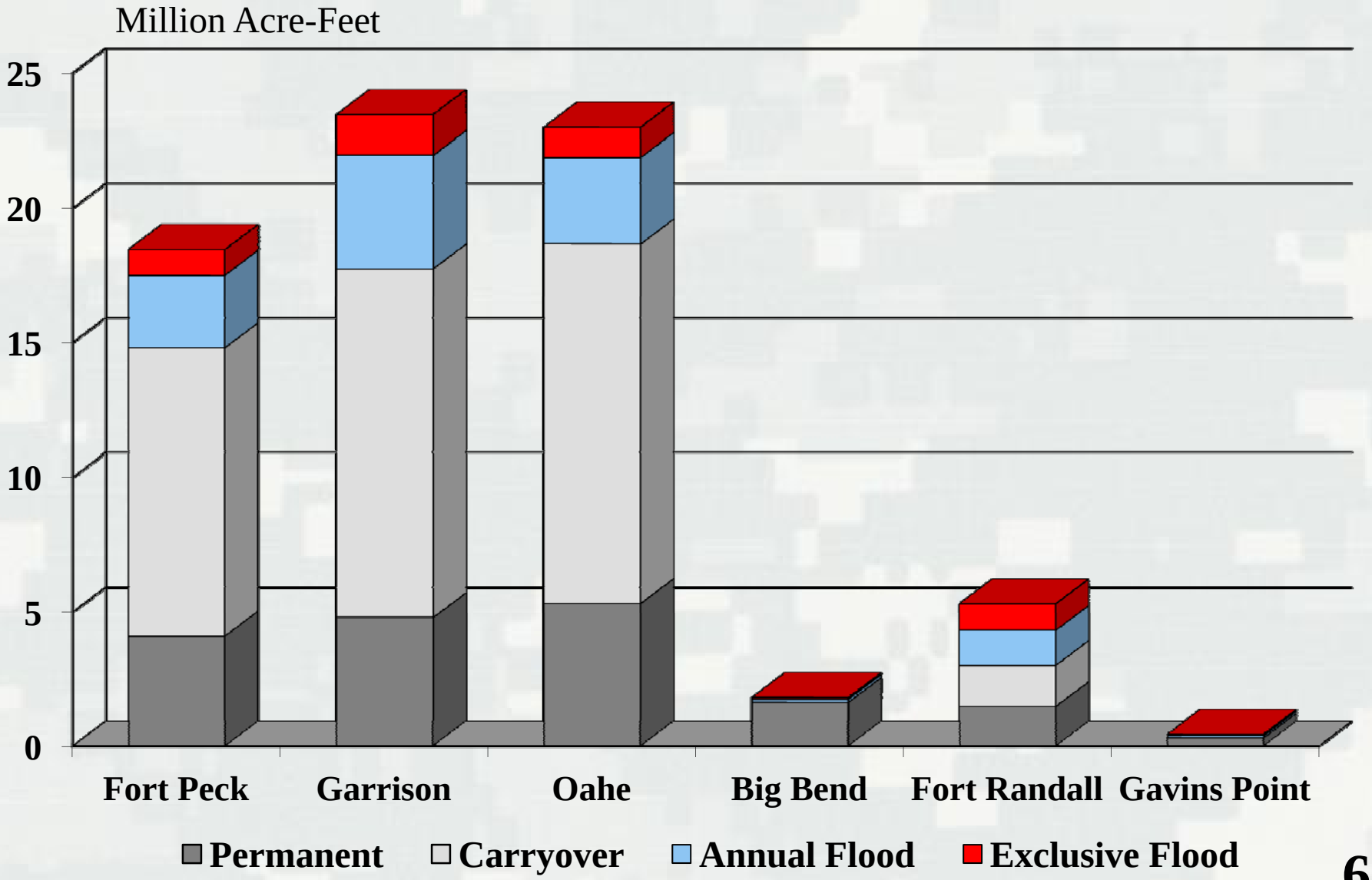
Prepared and Produced by the U.S. Army Corps of Engineers Omaha District 2010

Missouri River Mainstem System Storage Zones and Allocations

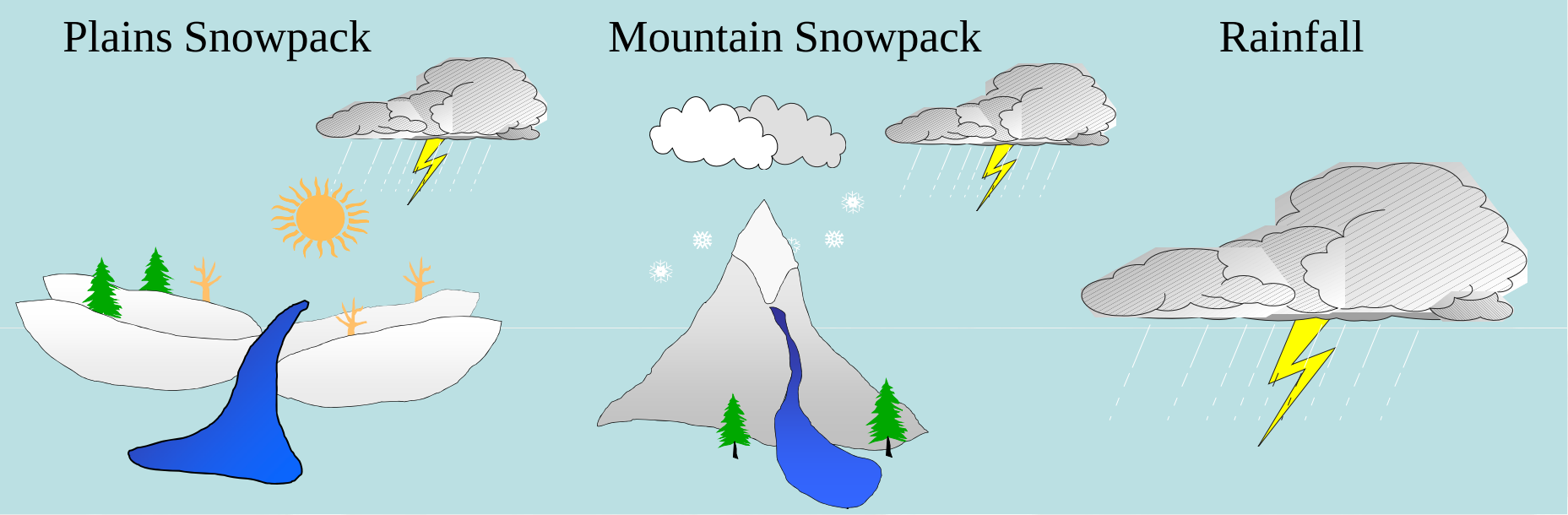


*Storages updated in August 2013 based on reservoir surveys.

Mainstem Reservoir Storage Capacity



Runoff Components

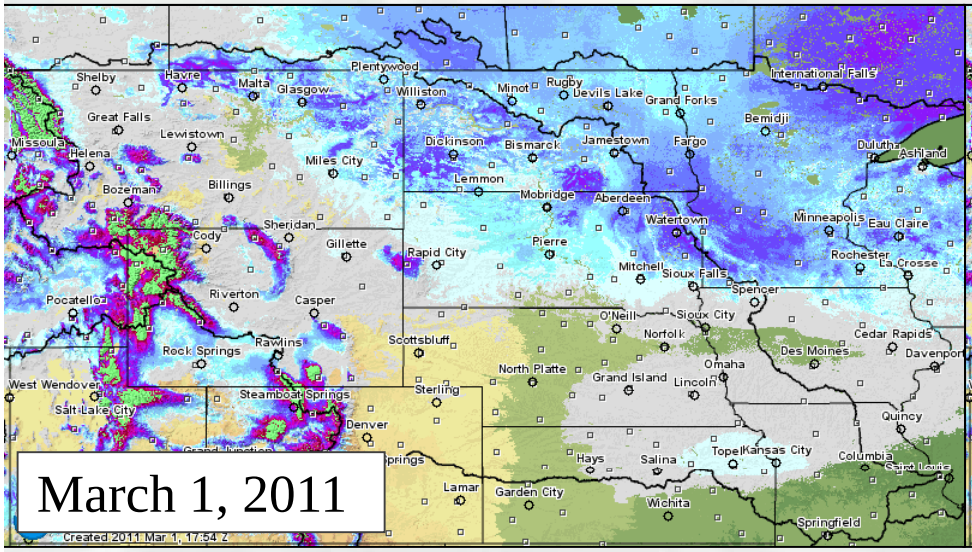


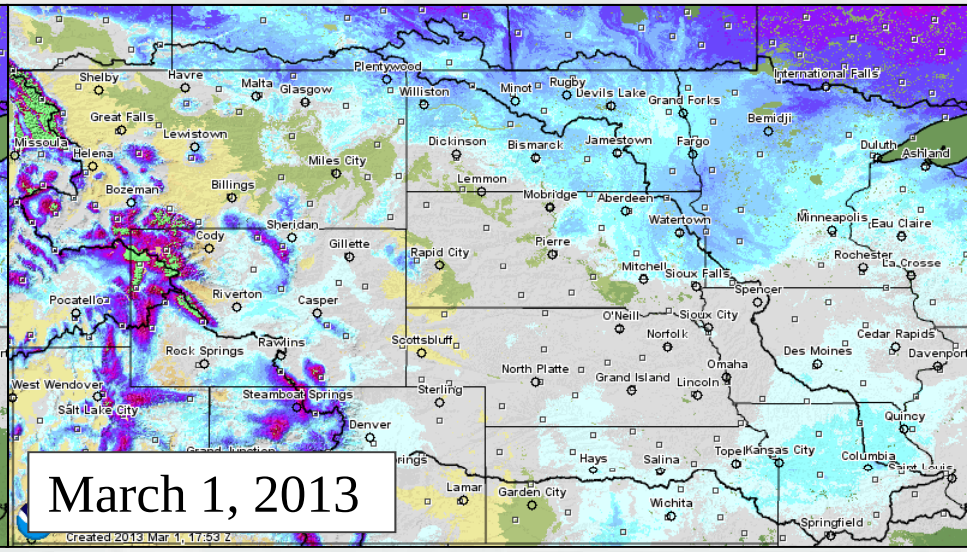
March and April	May, June and July	March through October

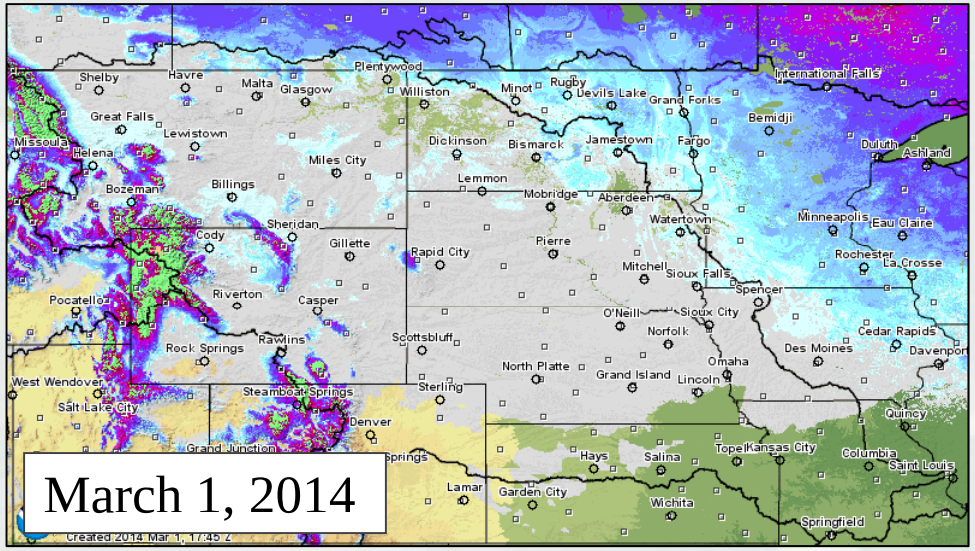
2014 Forecast = 35.5 MAF, 141% of normal*

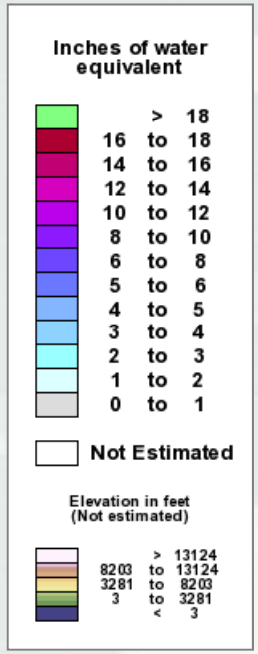
*October 1 forecast; normal runoff is 25.2 MAF

Plains Snowpack





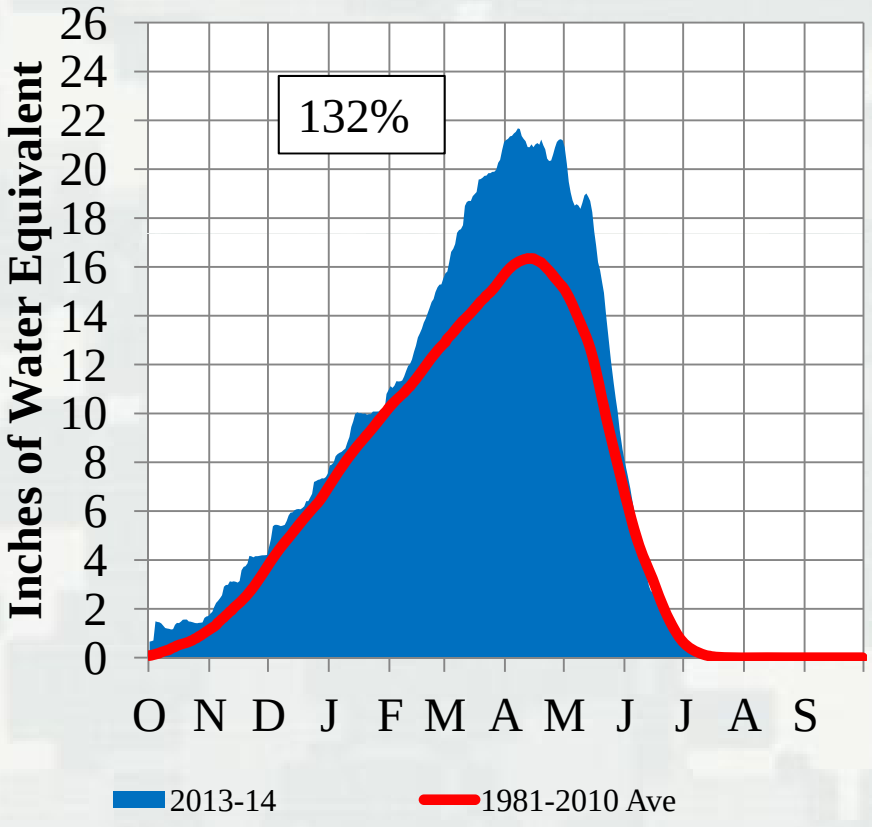




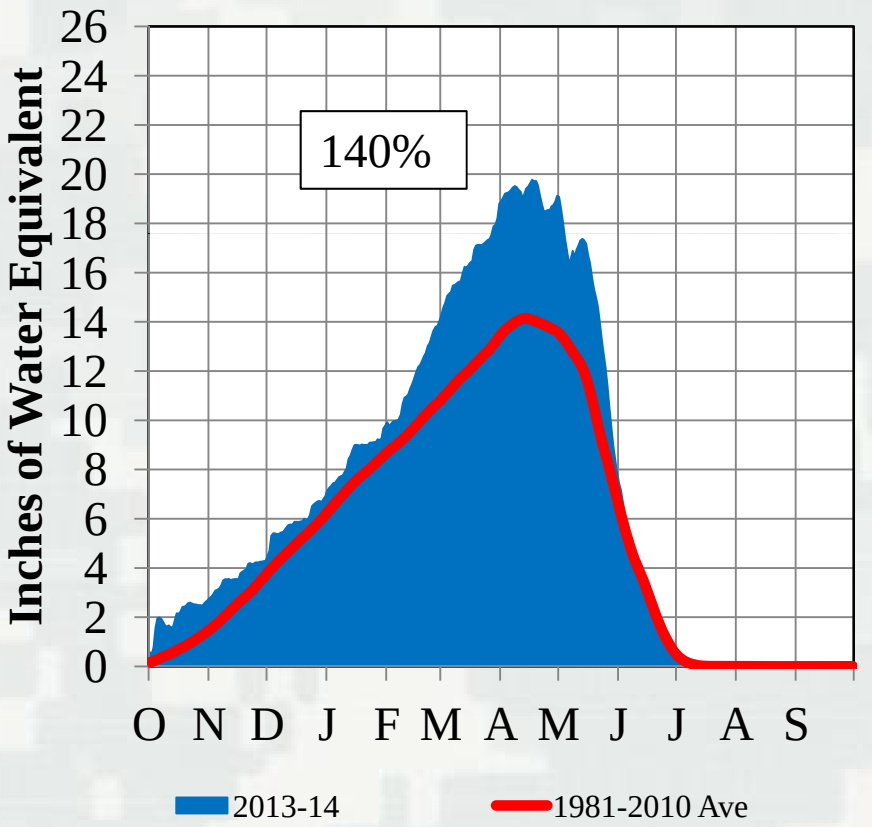
Source: NOAA National Operational Hydrologic Remote Sensing Center (NOHRSC)

Missouri River Basin
2013-14 Mountain Snowpack Water Content

Total above Fort Peck



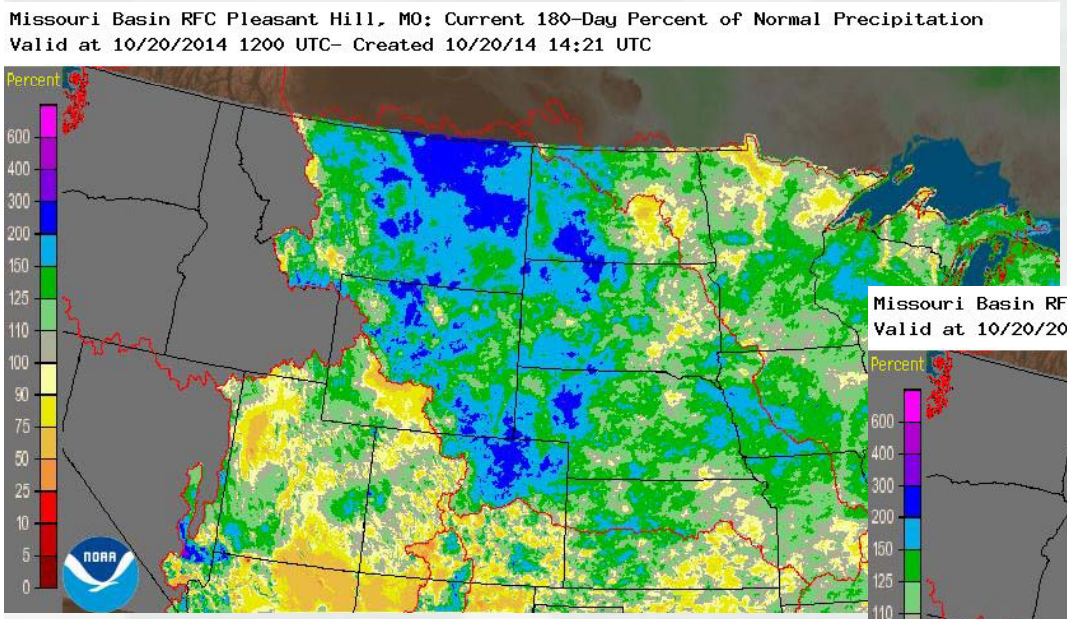
Total Fort Peck to Garrison



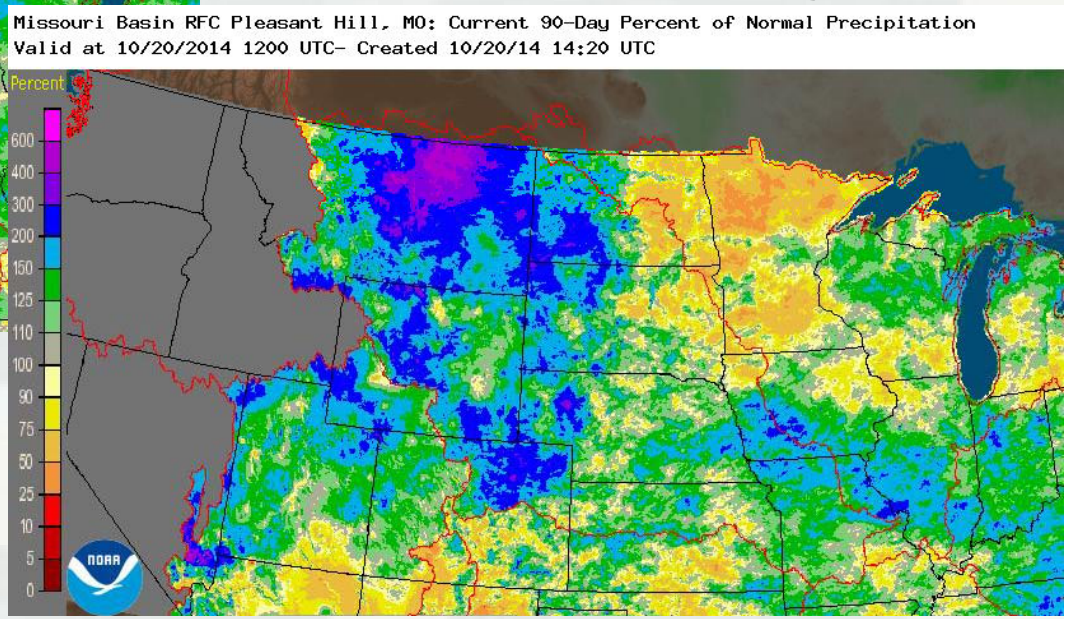
Source: USDA Natural Resource Conservation Service (NRCS)
Water and Climate Center

Precipitation Percent of Normal

Previous 180 Days



Previous 90 Days



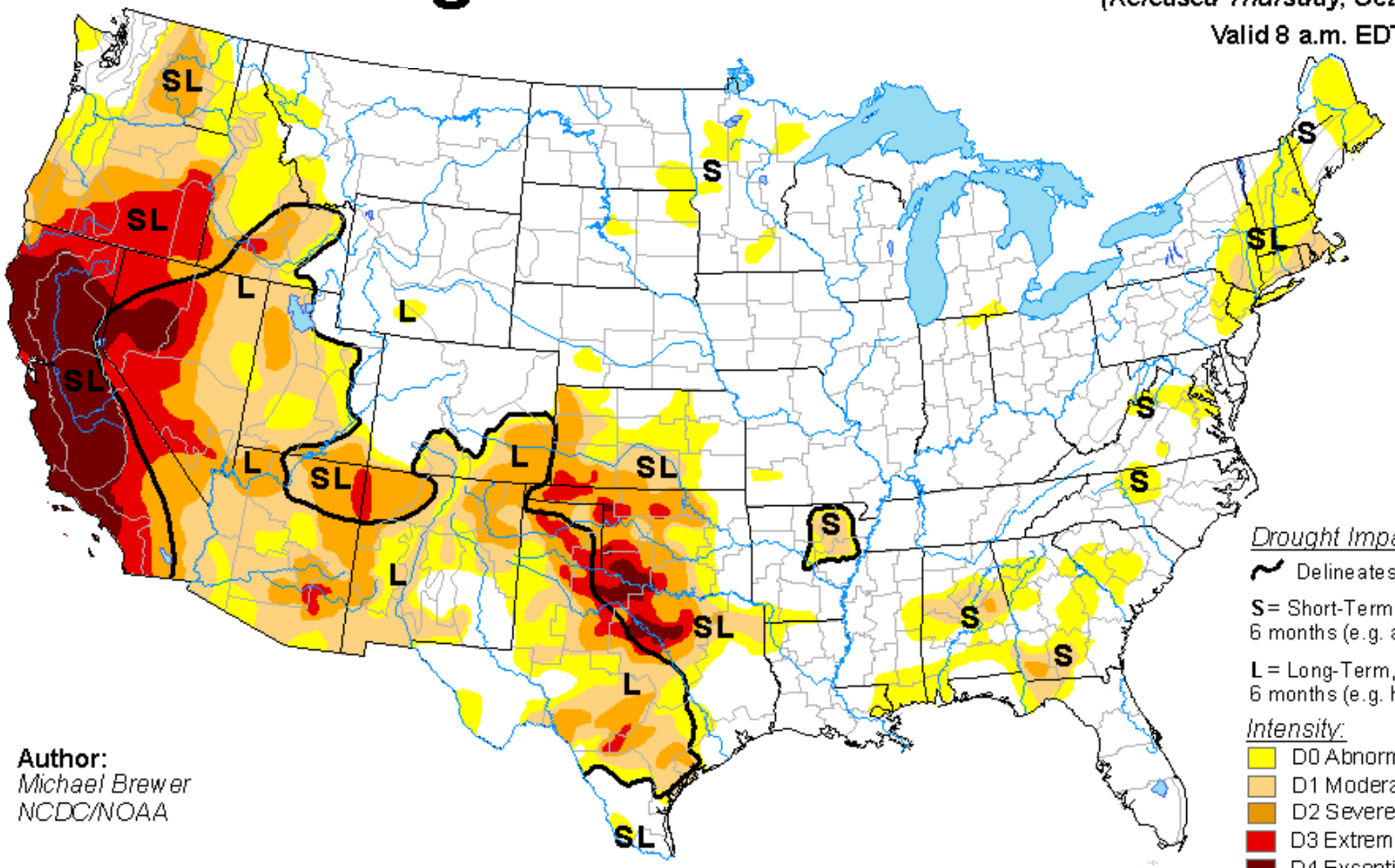
Source: National Weather Service, Missouri Basin River Forecast Center (MBRFC)

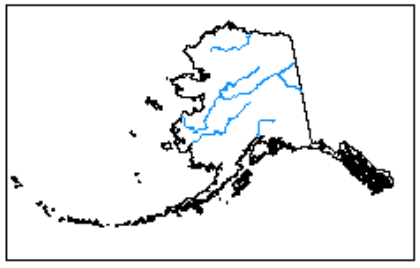
U.S. Drought Monitor

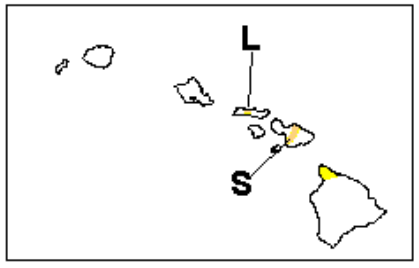
October 21, 2014

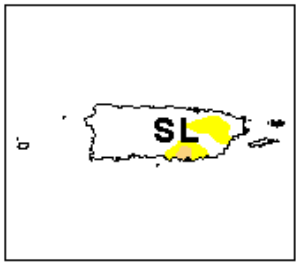
(Released Thursday, Oct. 23, 2014)

Valid 8 a.m. EDT









Author:
Michael Brewer
NCDC/NOAA

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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.

USDA National Drought Mitigation Center

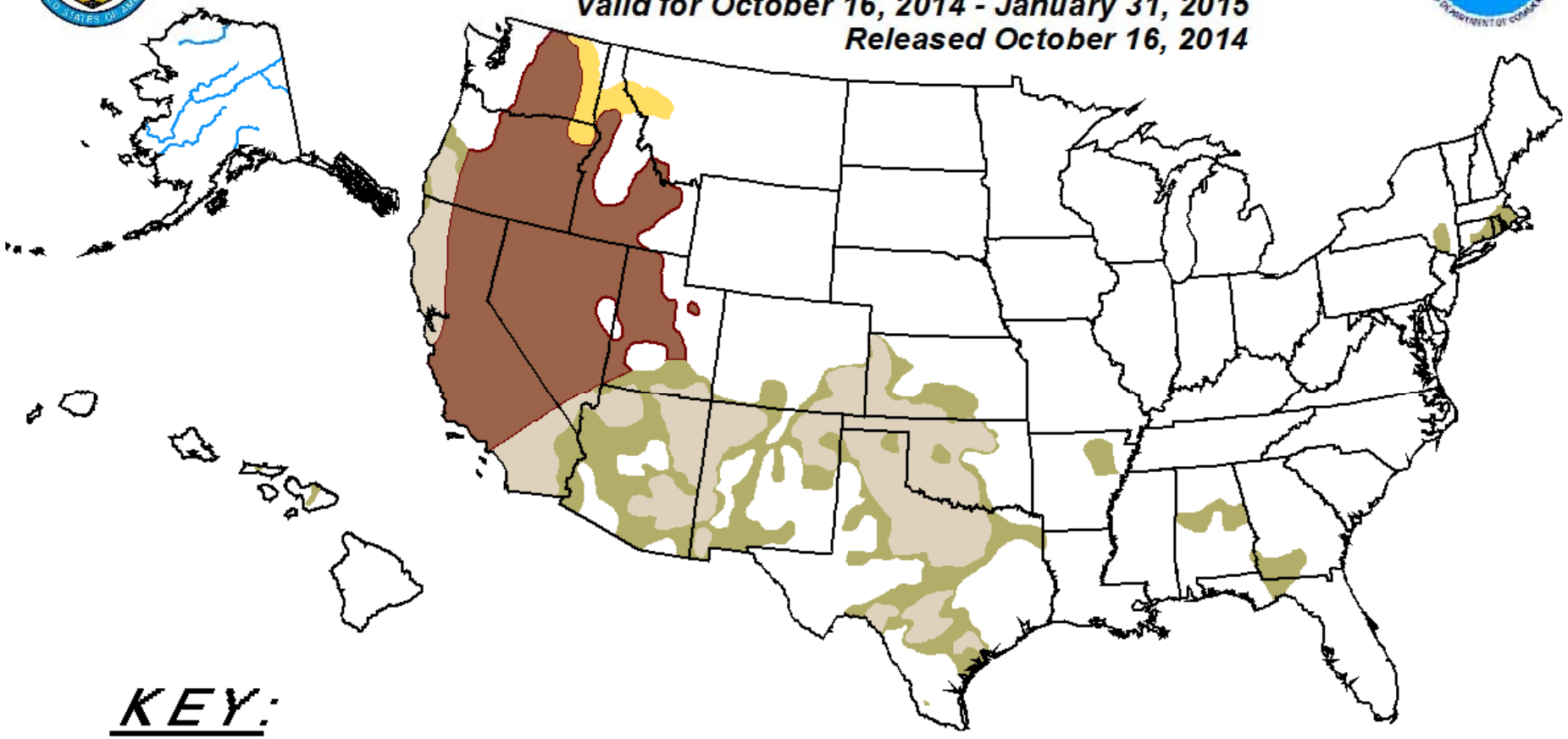
http://droughtmonitor.unl.edu/

U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period

Valid for October 16, 2014 - January 31, 2015

Released October 16, 2014



KEY:

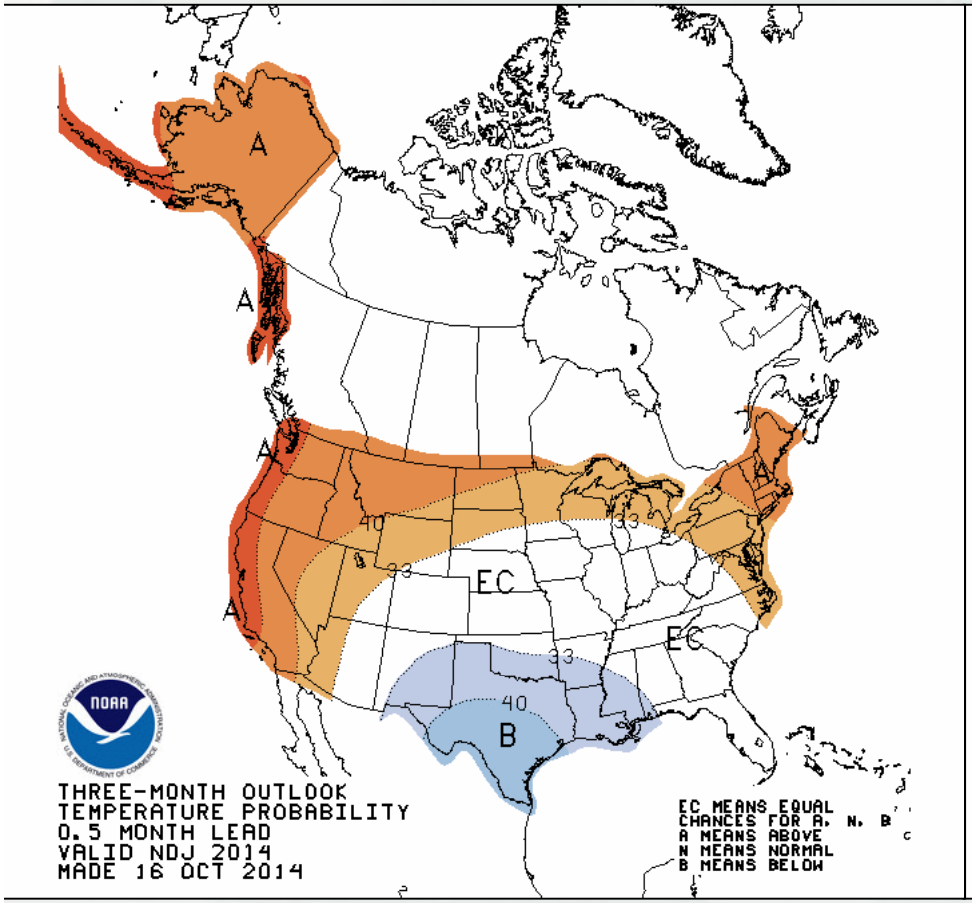
- **Drought persists or intensifies**
- **Drought remains but improves**
- **Drought removal likely**
- **Drought development likely**

Author: Brad Pugh, Climate Prediction Center, NOAA
http://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.html

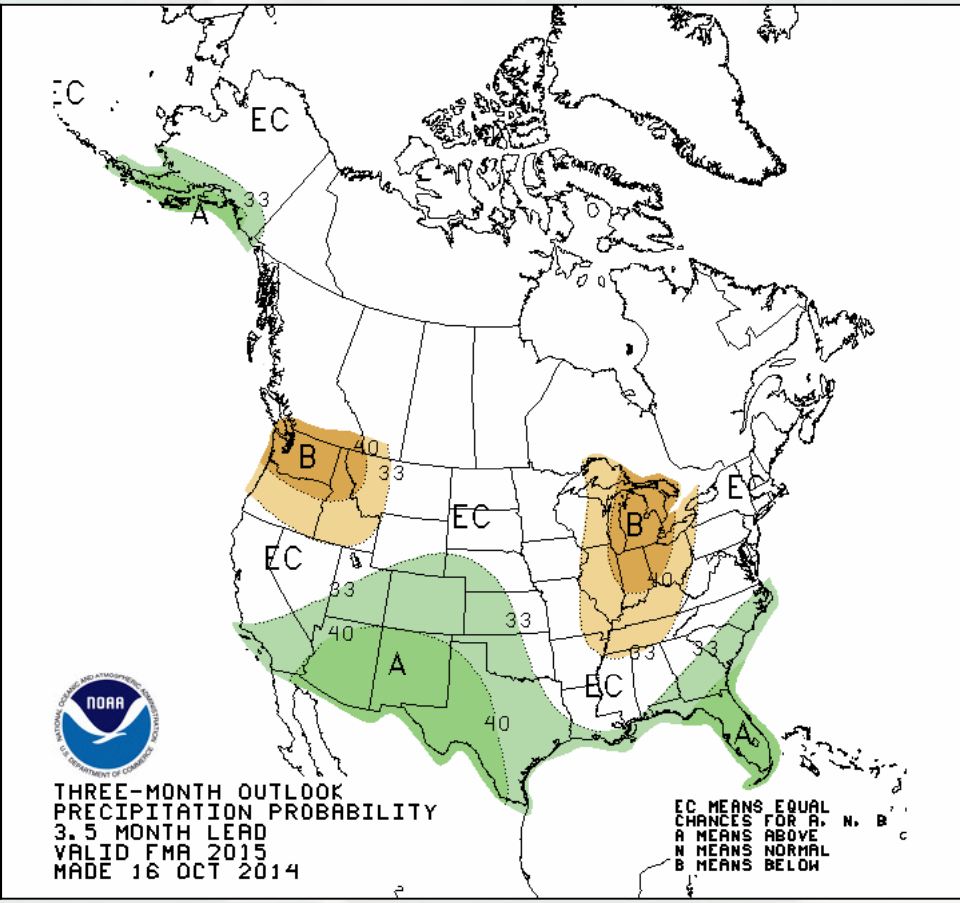
Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity).
For weekly drought updates, see the latest U.S. Drought Monitor.
NOTE: The tan area 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)

Long-Term Outlooks
Temperature and Precipitation

Nov-Dec-Jan



Nov-Dec-Jan



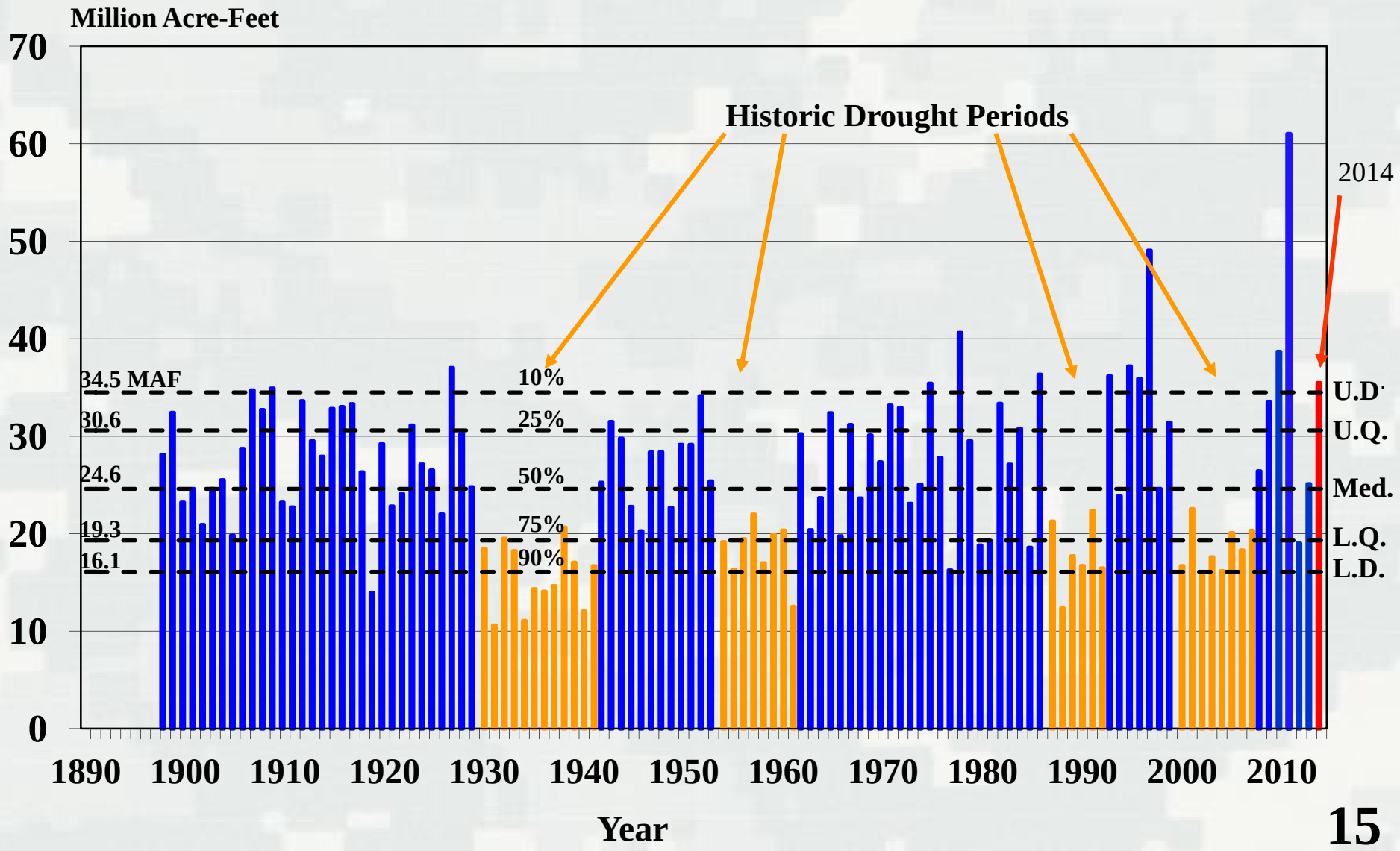
Source: National Weather Service, Climate Prediction Center (CPC)

NOAA Outlooks for 2014-15 Winter/Spring Missouri River Basin

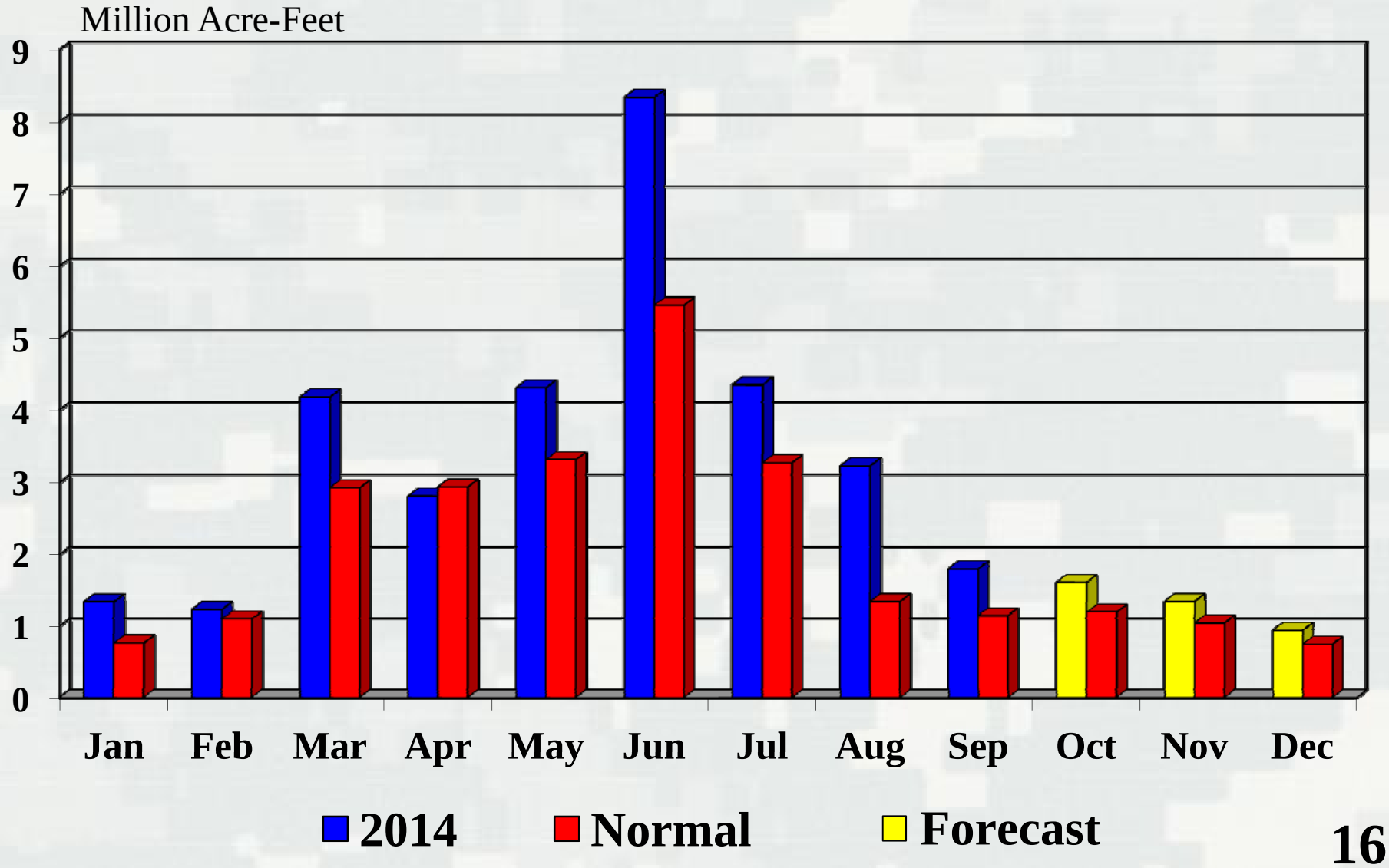
- The basin is predominantly drought free. Soil moisture in most of the basin is wetter than average entering the winter because of heavy summer and fall precipitation.
- Weak to moderate El Niño conditions are likely for winter (65% chance), which is reflected in the precipitation and temperature outlooks for the winter months.
- Temperature Outlook – increased chance of warmer than normal in the upper basin, and equal chances in the lower basin, for most of the winter and early spring based on El Niño conditions.
- Precipitation Outlook – no strong indicators; equal chances of dry, wet or close to normal for the winter and early spring for most of the basin. Weak chance of drier-than-average conditions in western Montana.
- Drought Outlook – no significant change in drought conditions expected.

Source: Doug Kluck, Regional Climate Services Director, Central Region, NOAA

Missouri River Mainstem System
Annual Runoff above Sioux City, IA



Missouri River Runoff above Sioux City, IA
2014 Actual and Forecast



Fall / Winter Releases

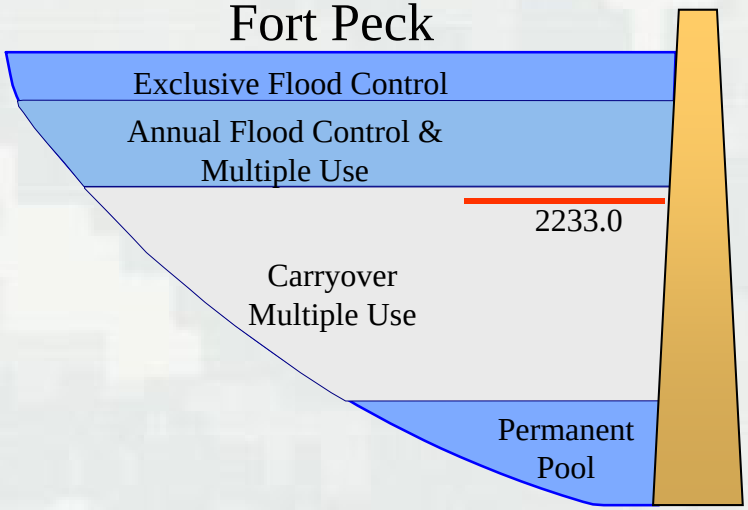
- Starting in late August releases have been above normal in order to evacuate stored flood waters and prepare the reservoir system for the 2015 runoff season
- Gavins Point Dam winter releases will be reduced to winter rate beginning approximately December 1st (10-day extension of navigation season)
- Will closely monitor channel/ice conditions between reservoirs and downstream of Gavins Point Dam
- Gavins Point Dam winter releases of 20 kcfs (1000 cfs) to complete evacuation of stored flood waters
- Expected releases in kcfs:

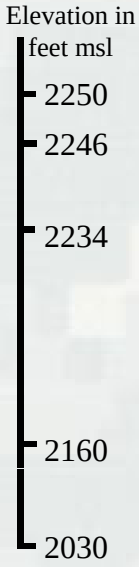
	Nov	Dec	Jan	Feb
Fort Peck	5.0	6.5	7.5	7.5
Garrison	22.0	19.0	24.0	24.0
Gavins Point	45.5	20.0	20.0	20.0

Results of 2014 Regulation and Planned Operation for Authorized Purposes in 2015

Current Reservoir Levels – October 22, 2014

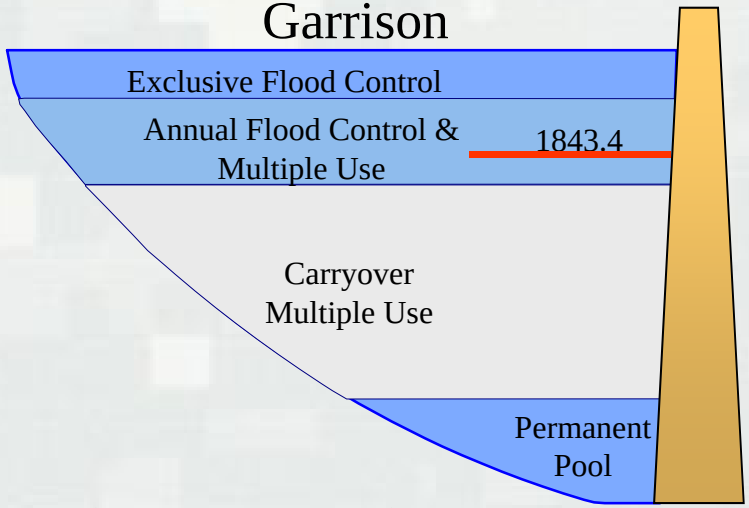
Fort Peck

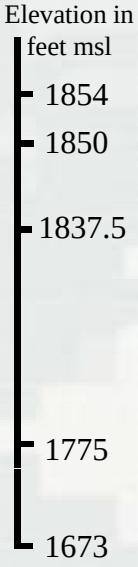




1.0 feet below base of Flood Control zone

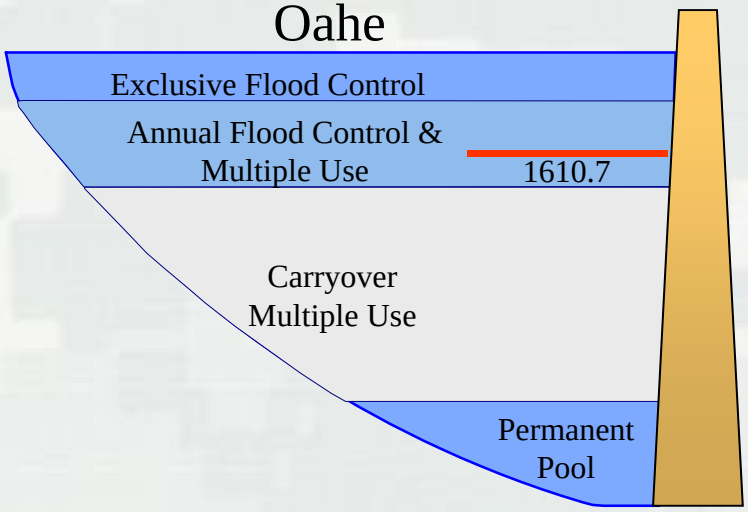
Garrison

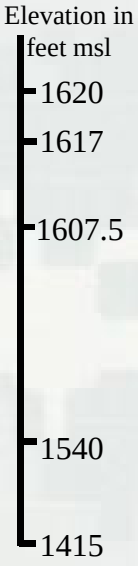




5.9 feet above base of Flood Control zone

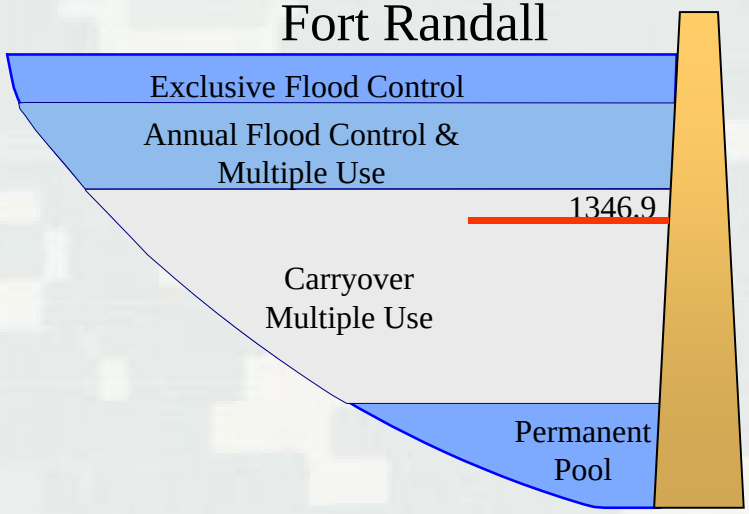
Oahe





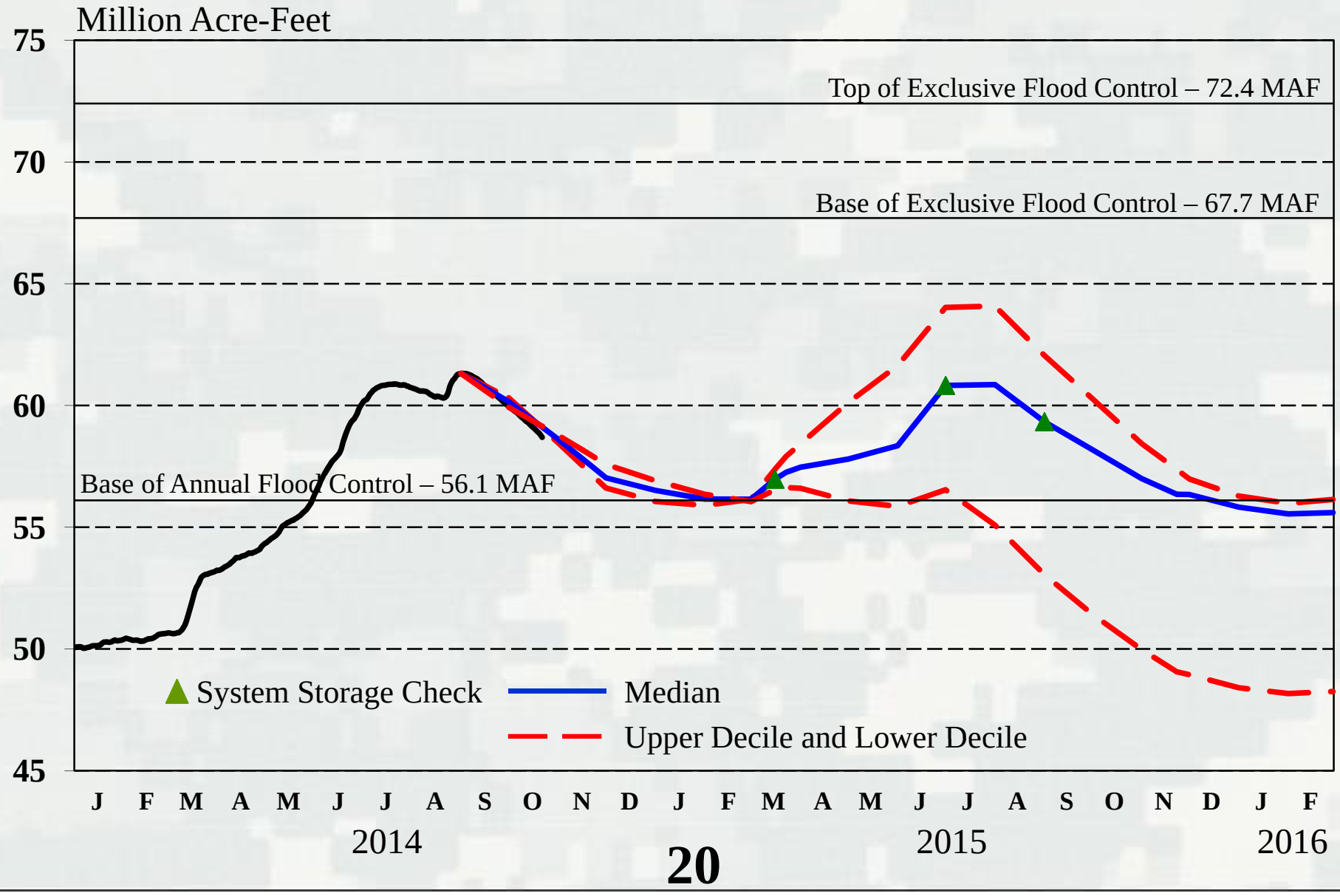
3.2 feet above base of Flood Control zone

Fort Randall

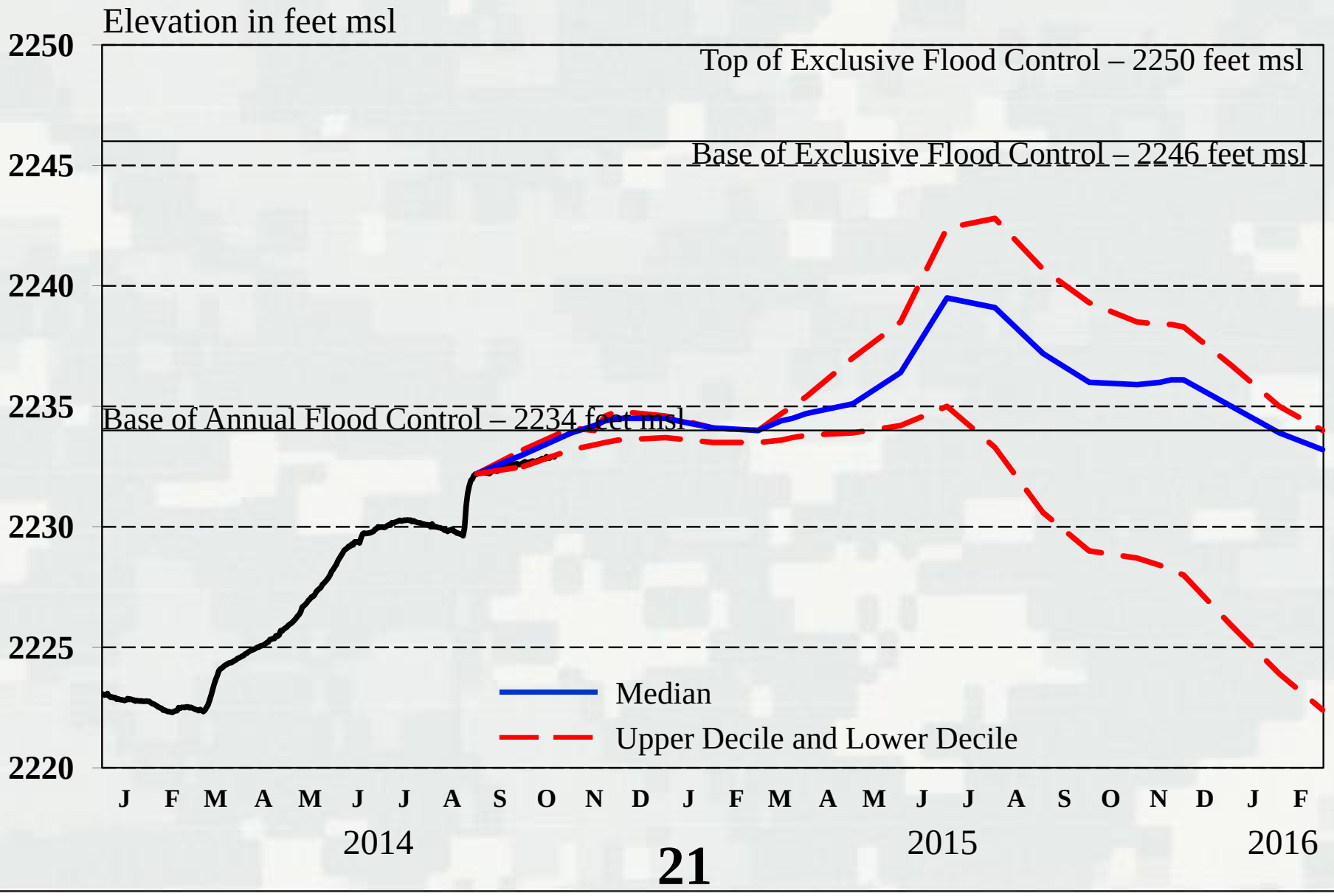


3.1 feet below base of Flood Control zone

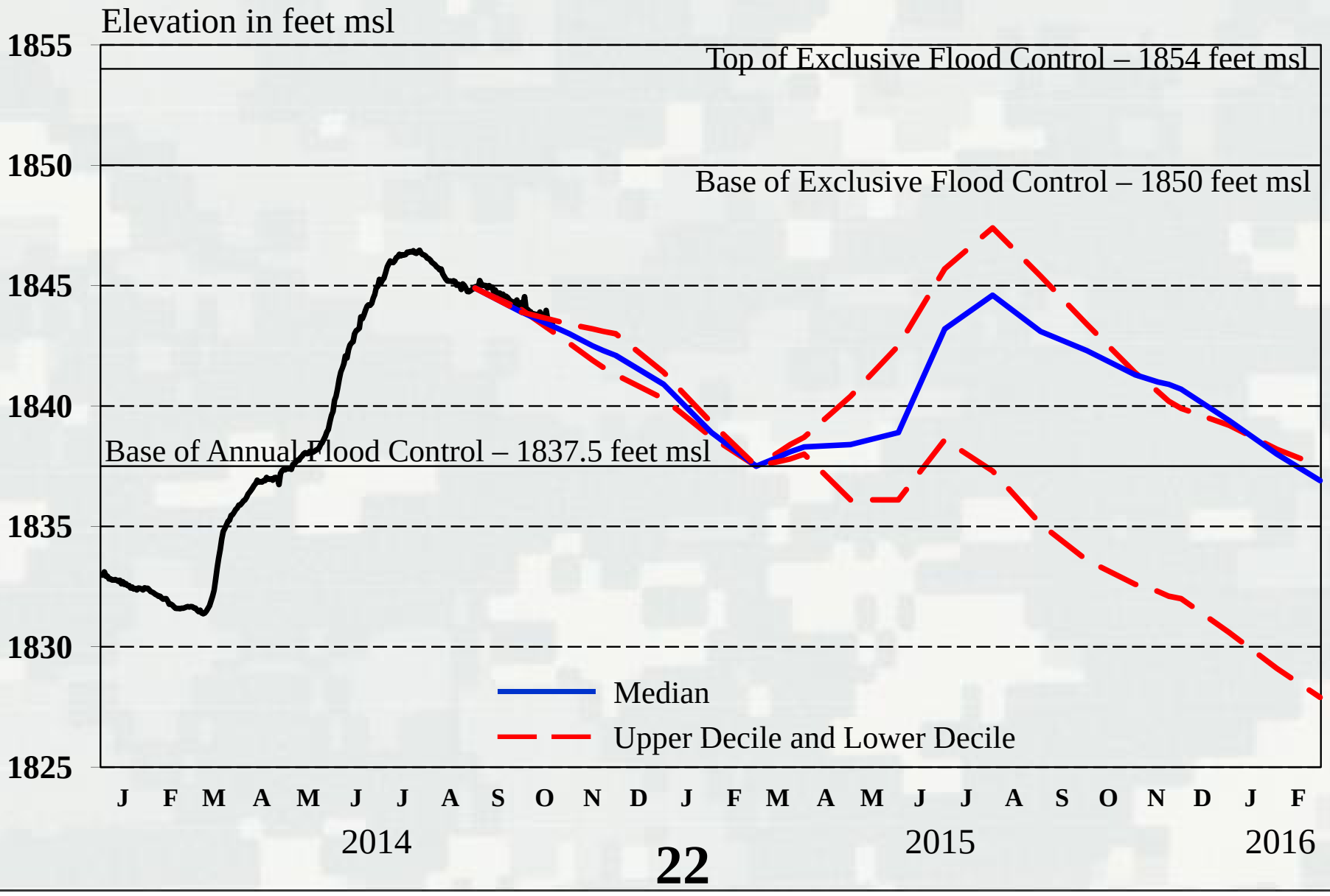
System Storage
2014-2015 Draft AOP



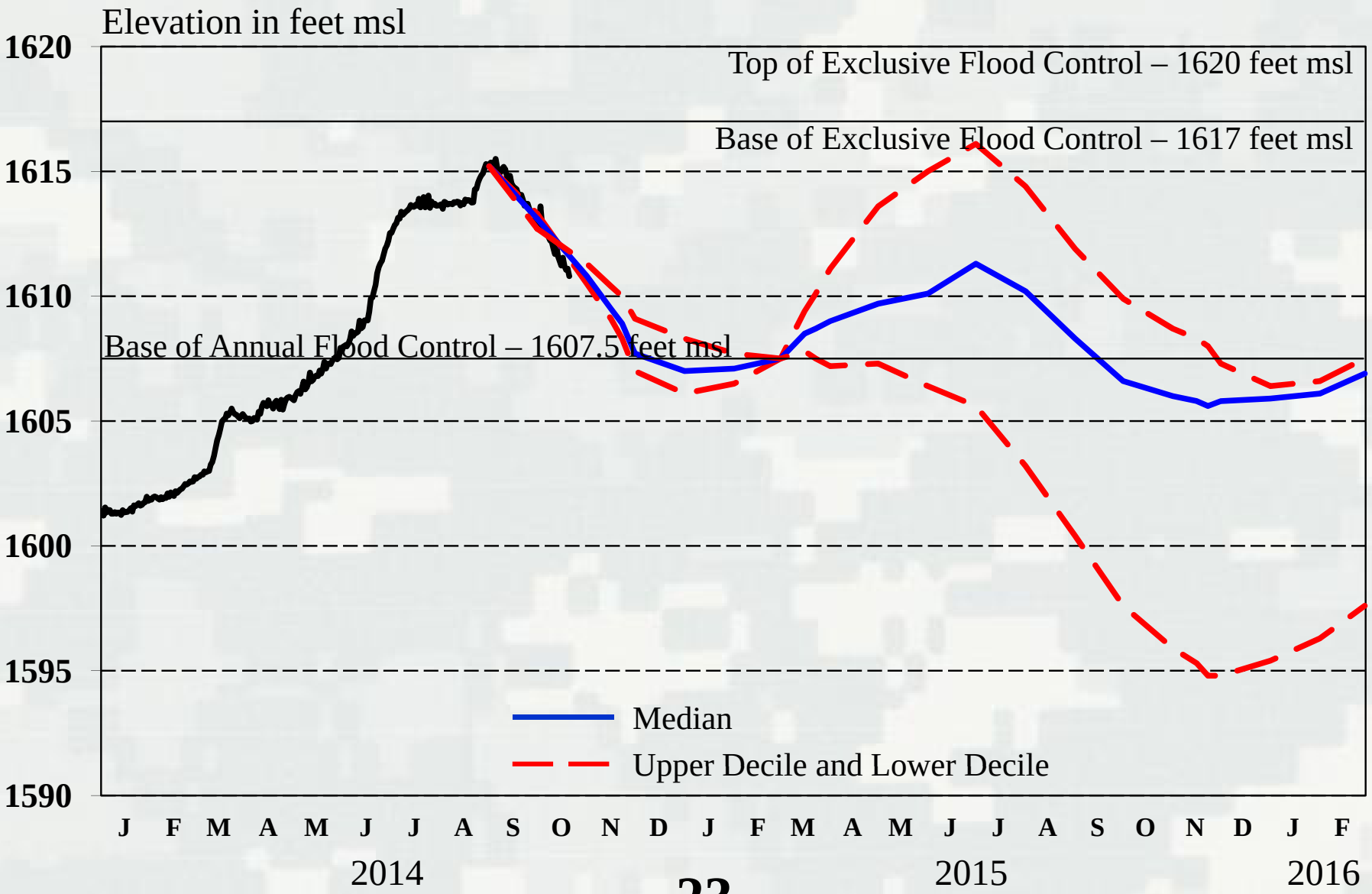
Fort Peck
2014-2015 Draft AOP



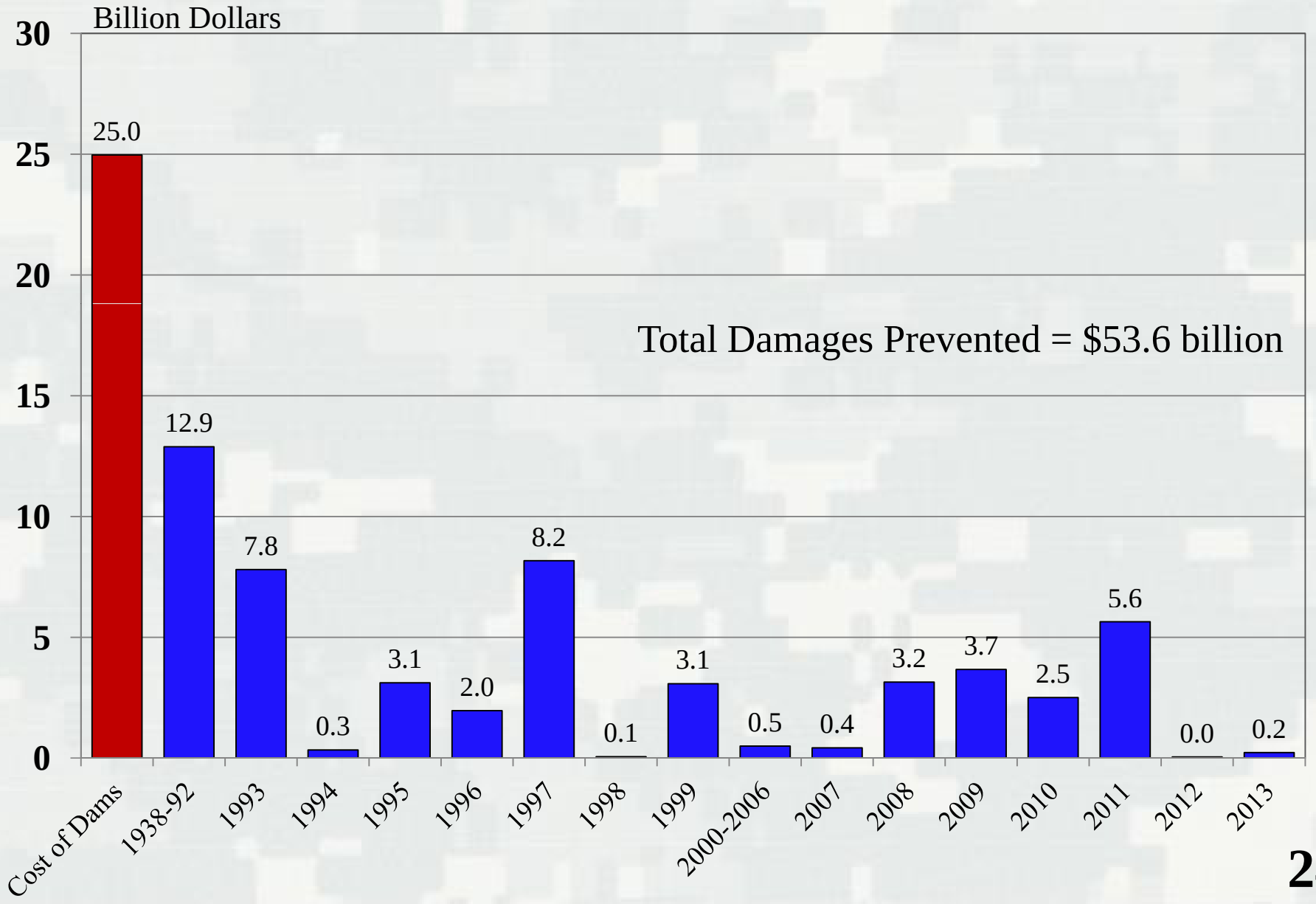
Garrison
2014-2015 Draft AOP



Oahe
2014-2015 Draft AOP



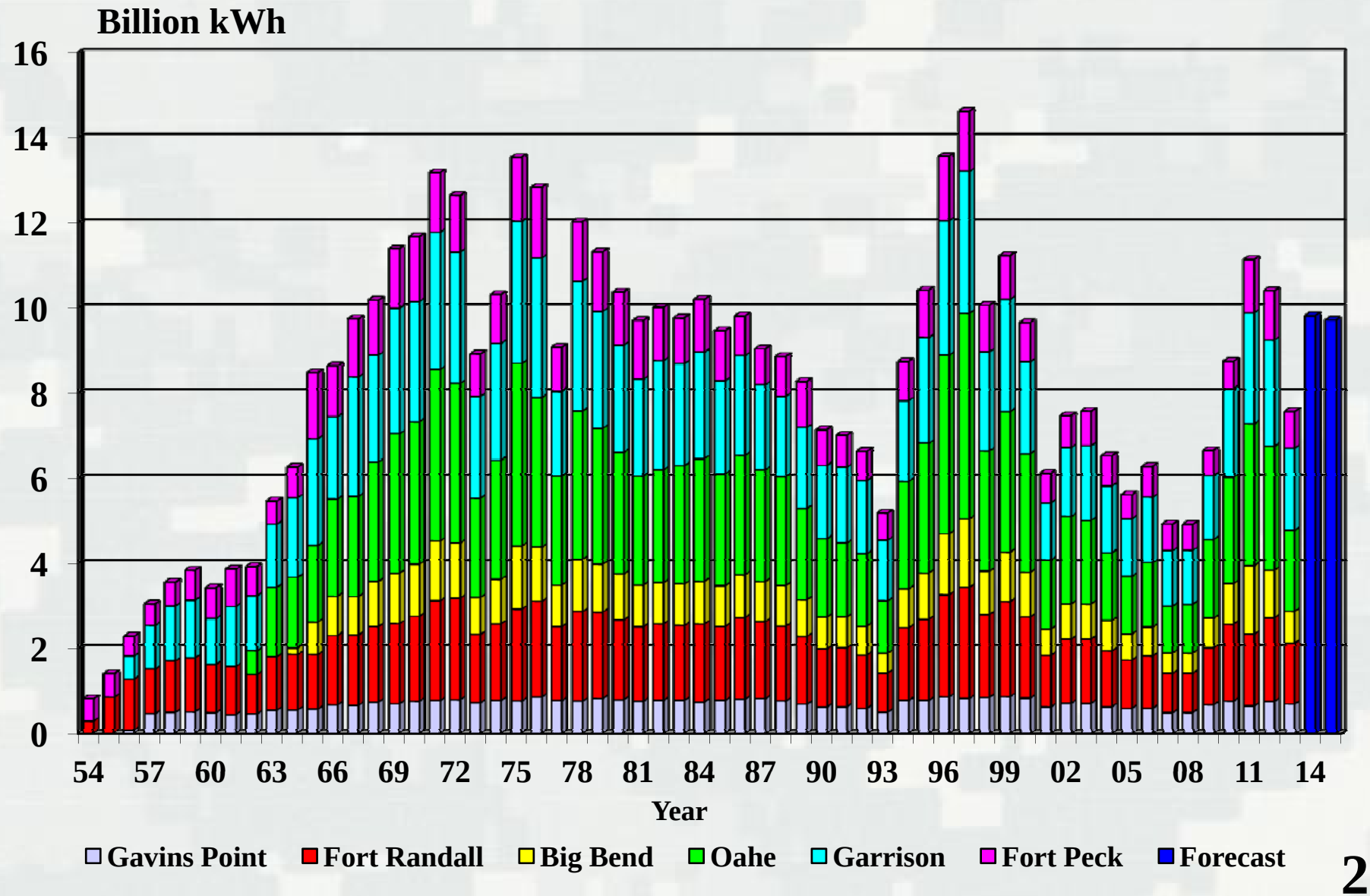
Flood Damages Prevented by Mainstem Dams
Indexed to 2013 Levels



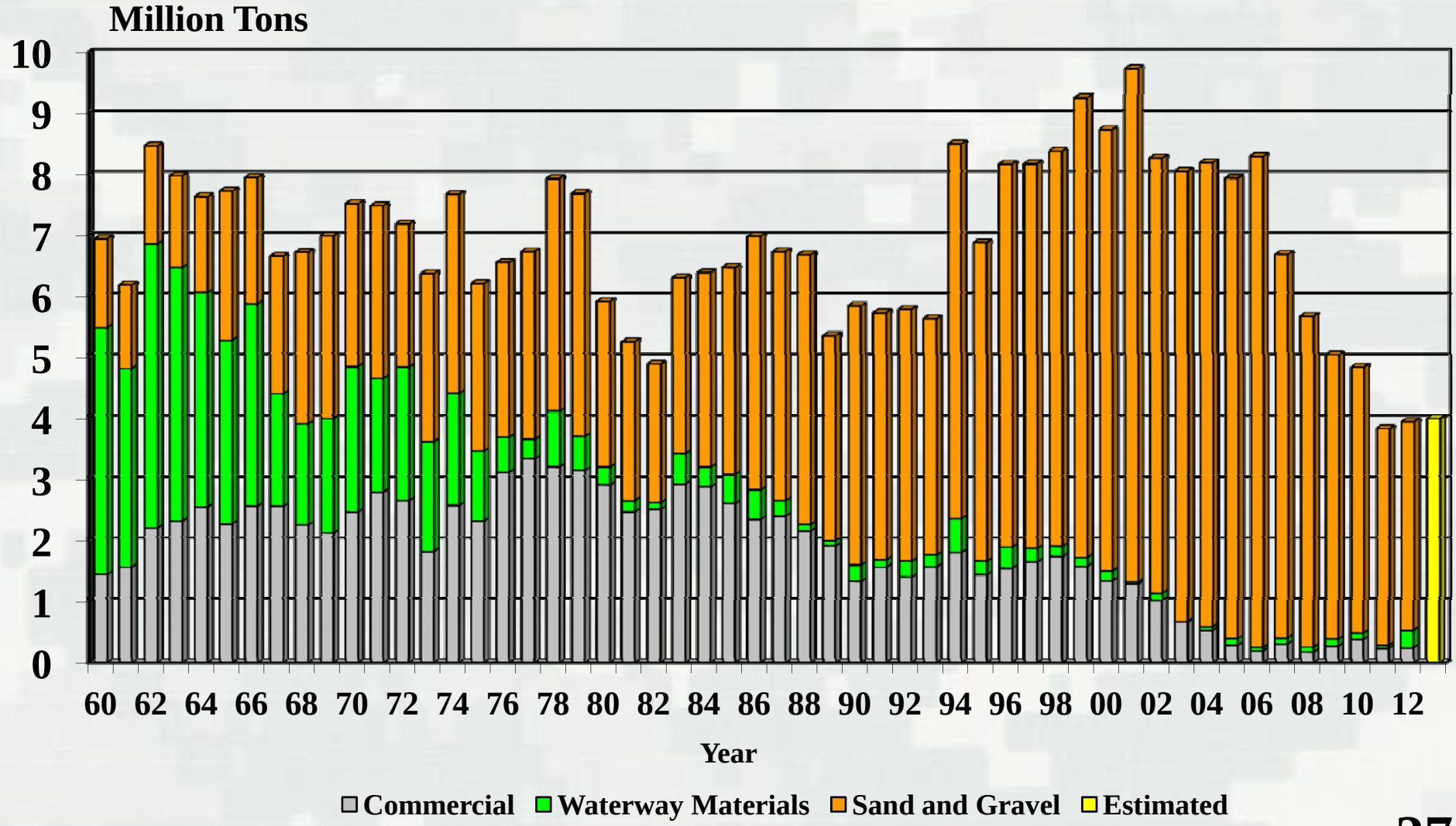
Flood Control

- System storage started this year 5.5 MAF below the base of the annual flood control zone
  - ►Peaked at 61.3 MAF, utilizing 32% of total flood storage
- All scenarios start next year's runoff season at the base of the annual flood control zone
- Flooding can still occur due to downstream rainfall

Hydropower


Billion kWh
16
14
12
10
8
6
4
2
0
54
57
60
63
66
69
72
75
78
81
84
87
90
93
96
99
02
05
08
11
14
Year
Gavins Point
Fort Randall
Big Bend
Oahe
Garrison
Fort Peck
Forecast

Missouri River
Total Navigation Tonnage



Navigation

- **2014 – Full length season + 10-day extension**
  - 3,000 cfs below full service first half of season
  - Service level increased to full service after July 1 storage check
  - Releases increased above full service in late August to evacuate stored flood water
- **2015 – March 15 Storage Check**
  - Full service level flow support (all runoff scenarios)
  - Target locations: Sioux City, Omaha, Nebraska City and Kansas City
- **2015 – 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 lower quartile runoff and above

Water Supply – Water Quality
Irrigation – Recreation

- **2014**
  - ►Normal to above normal elevations and releases
    - Water supply intakes, recreation areas, irrigation, and marinas
  - ►Gavins Point Dam winter releases of 20 kcfs
- **2015**
  - ►Near normal pool levels and releases
  - ►Gavins Point Dam winter releases of 17 kcfs under median runoff

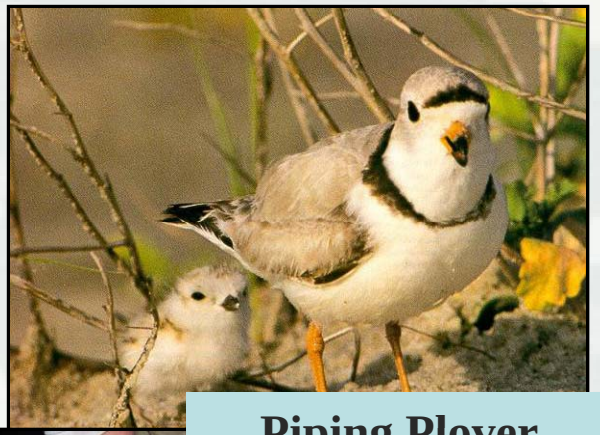
Fish and Wildlife

- 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
Piping Plover and Least Tern

- 2014 Regulation from mid-May to mid-August
- Availability of sandbar habitat remains high
- Adult populations and nest success down mainly due to high reservoir levels this summer
- Fledge ratios
  - ►Piping plover fledge ratios met on Garrison and Gavins Point river reaches

Threatened and Endangered Species
Piping Plover and Least Tern

- 2015 Gavins Point
  - 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 2014
- Neither pulse planned in 2015
  - ►Pursuing independent science advisory panel (ISAP) recommendations
  - ►Forego spring pulse while developing management plan

Summary

- All flood storage space available to start 2015 runoff season
- Near normal releases and reservoir levels (median runoff)
- Good service to all authorized purposes

Thank You!

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Written comments on draft AOP accepted through **November 21, 2014**.

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