

Missouri River Basin Water Management Fall 2013 Annual Operating Plan Public Meetings

Conference Call Information:

Monday, October 28th

1:00 pm CDT

1-888-431-3632

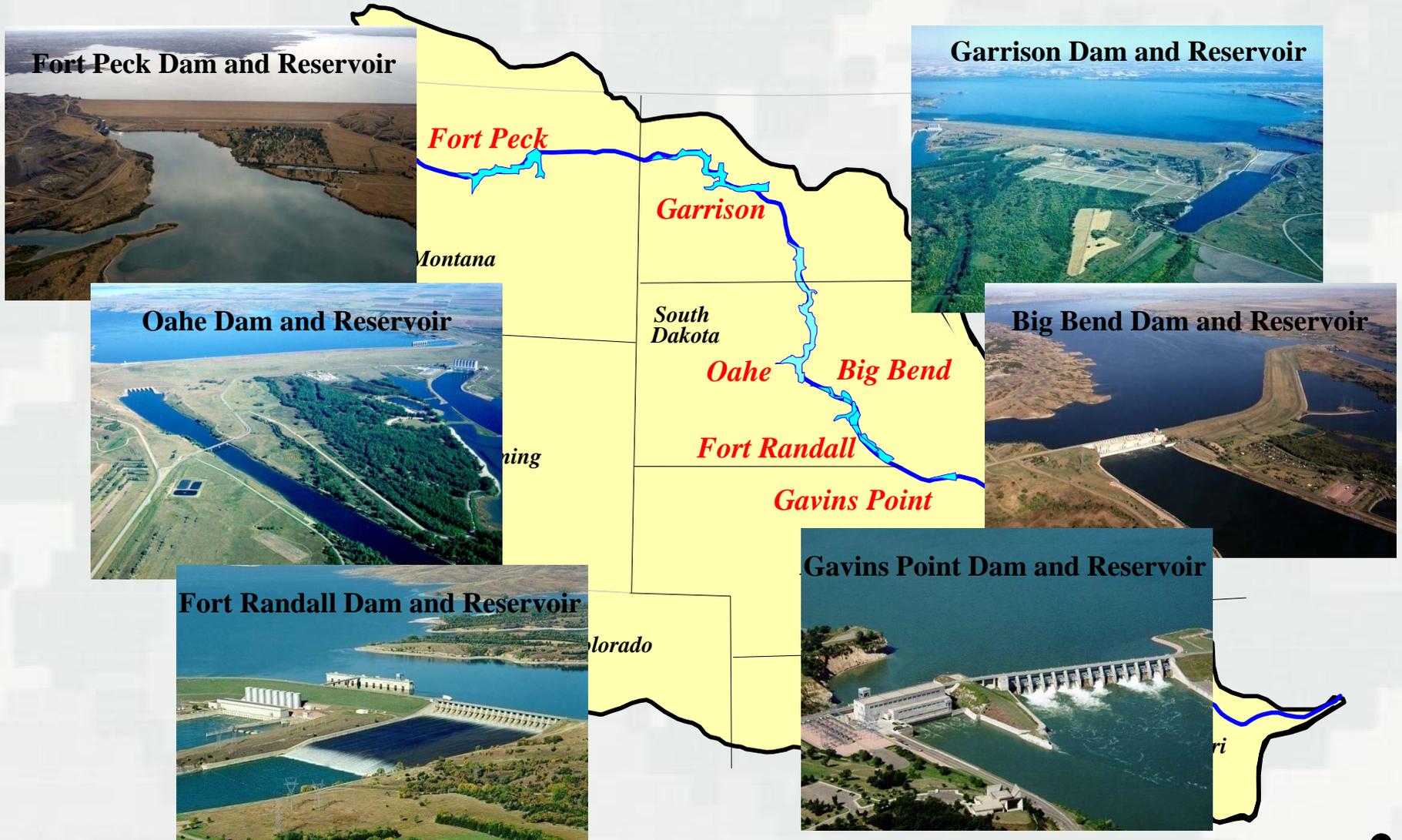
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US Army Corps of Engineers
BUILDING STRONG



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



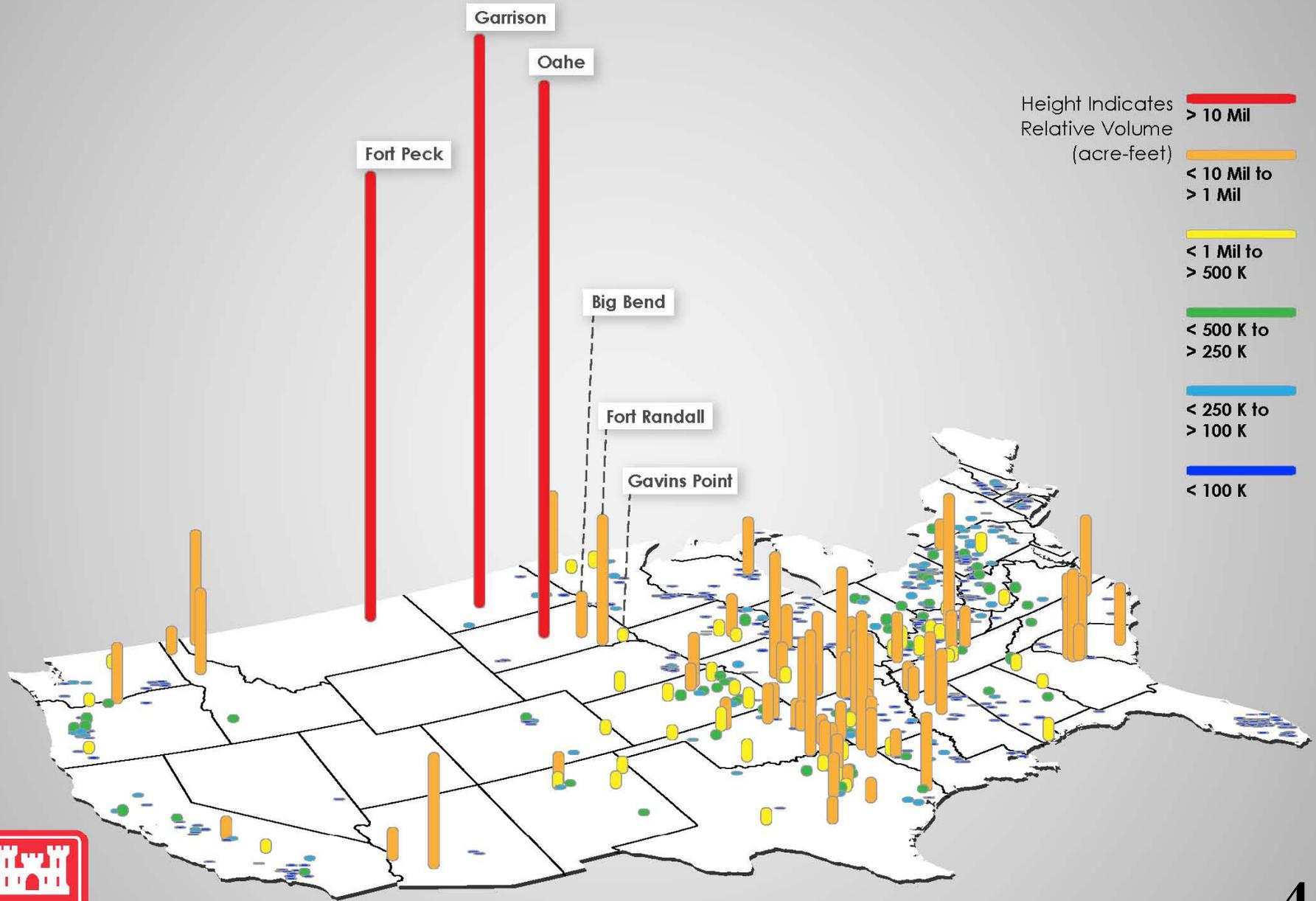
**Fish and Wildlife
Including Threatened and
Endangered Species**



Irrigation

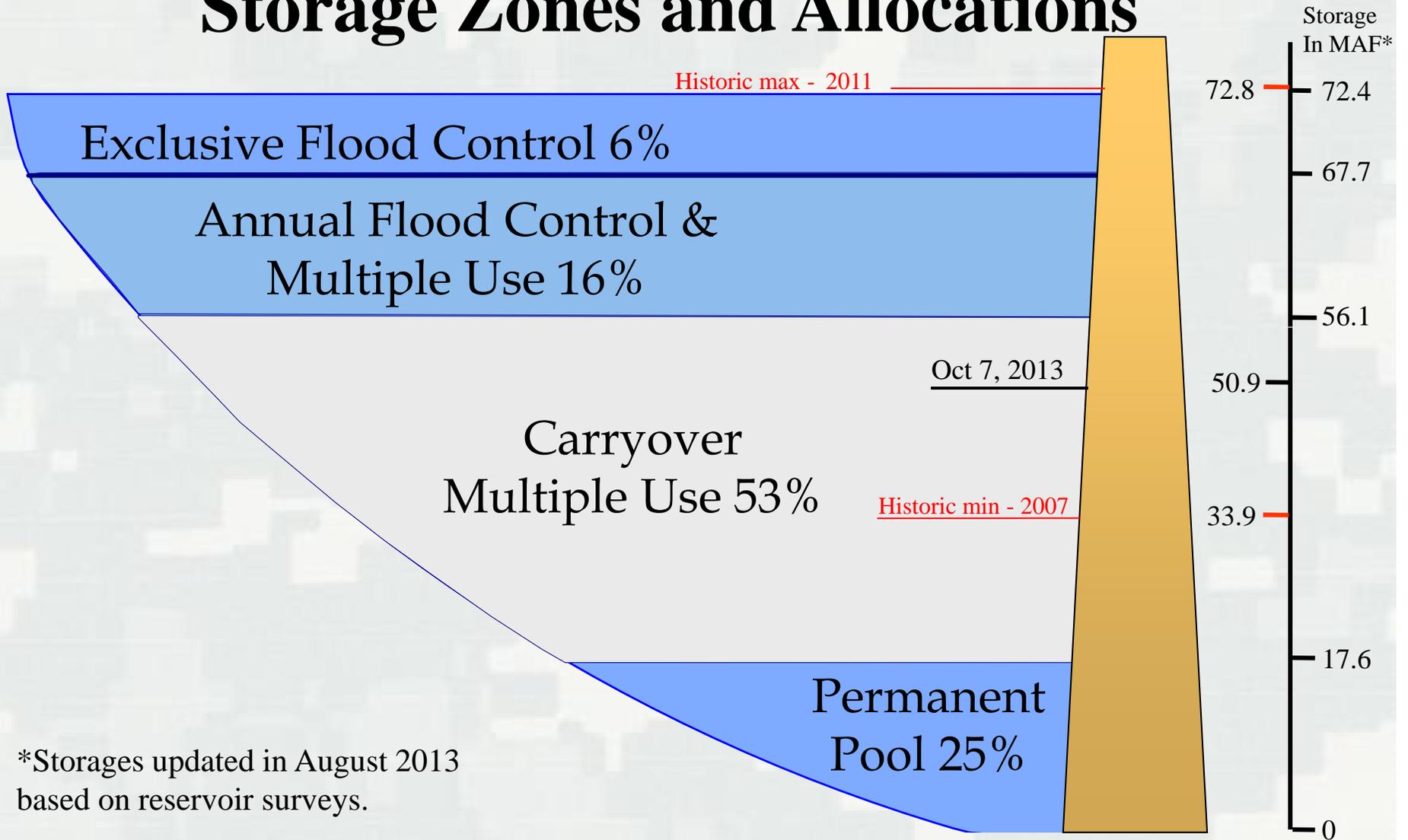


Storage Capacity of Corps Reservoirs



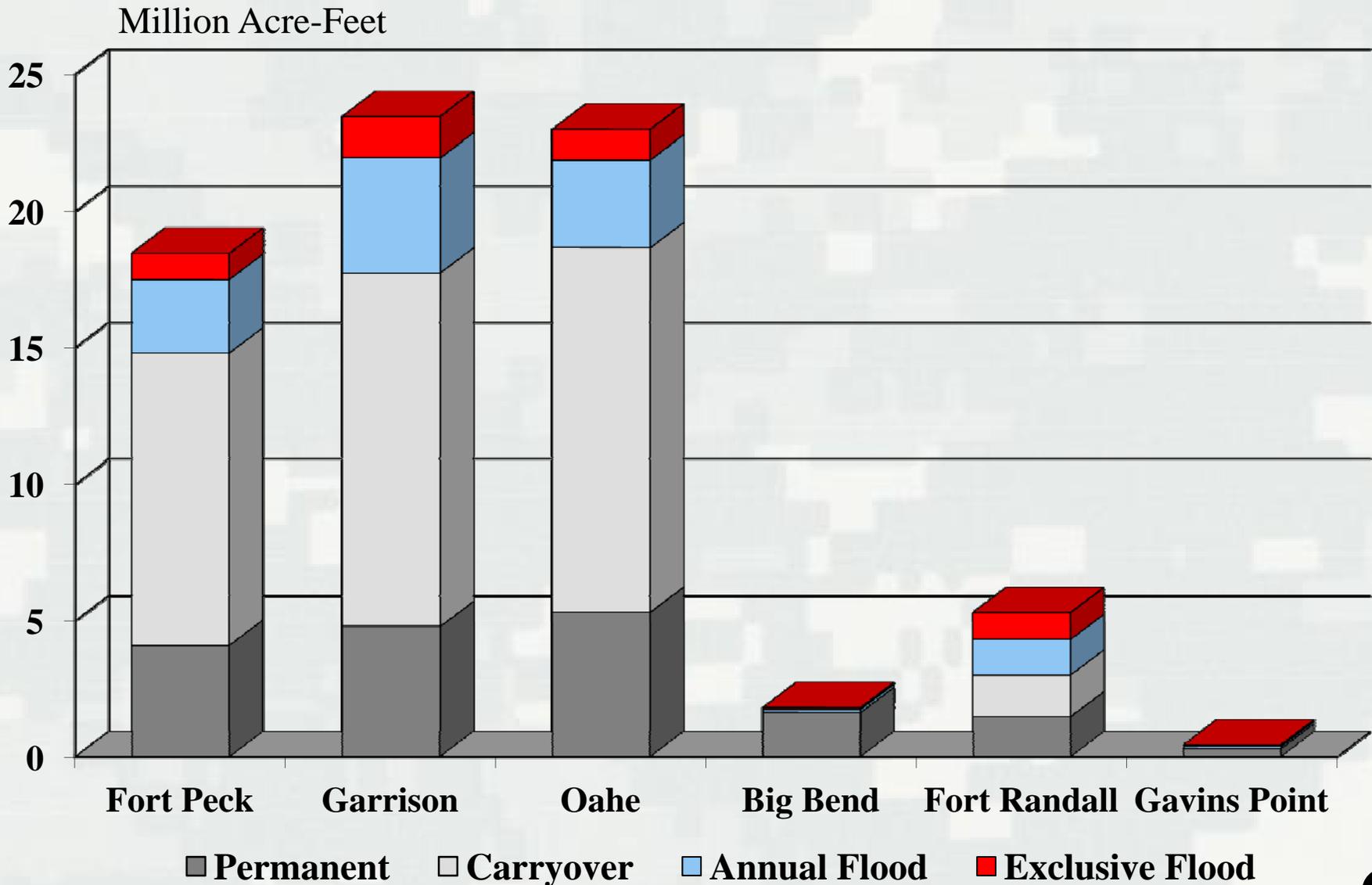
US Army Corps of Engineers
BUILDING STRONG

Missouri River Mainstem System Storage Zones and Allocations



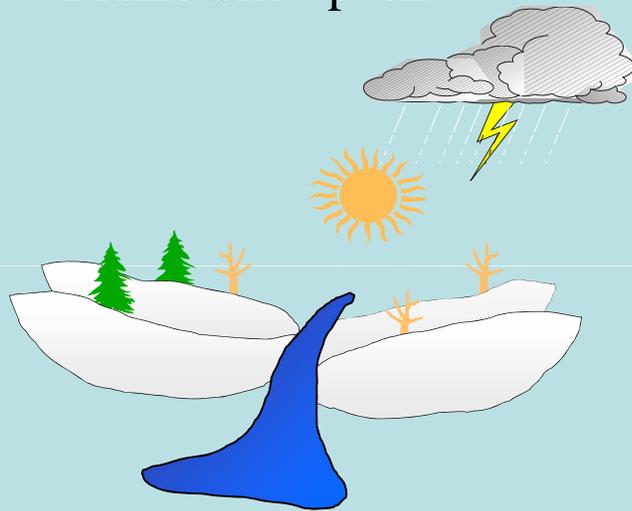
*Storages updated in August 2013
based on reservoir surveys.

Mainstem Reservoir Storage Capacity

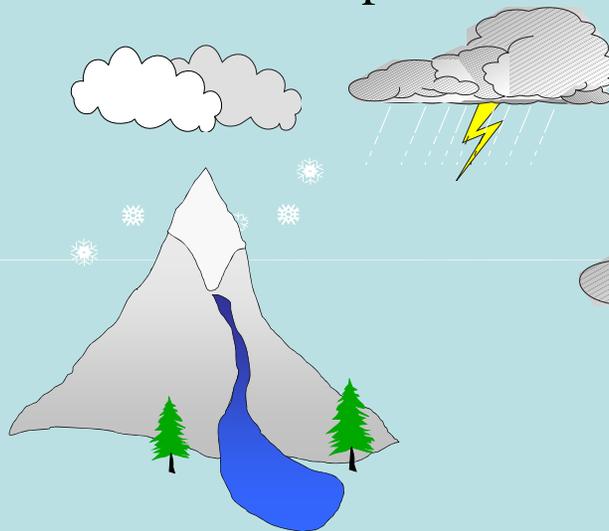


Runoff Components

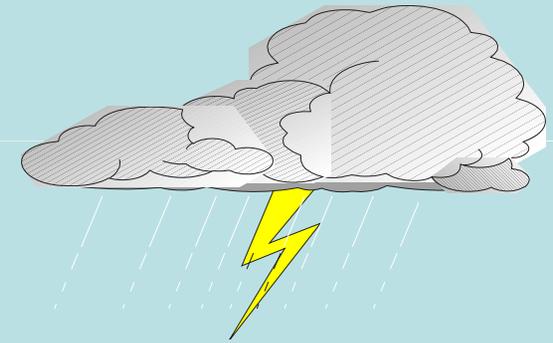
Plains Snowpack



Mountain Snowpack



Rainfall



March and
April

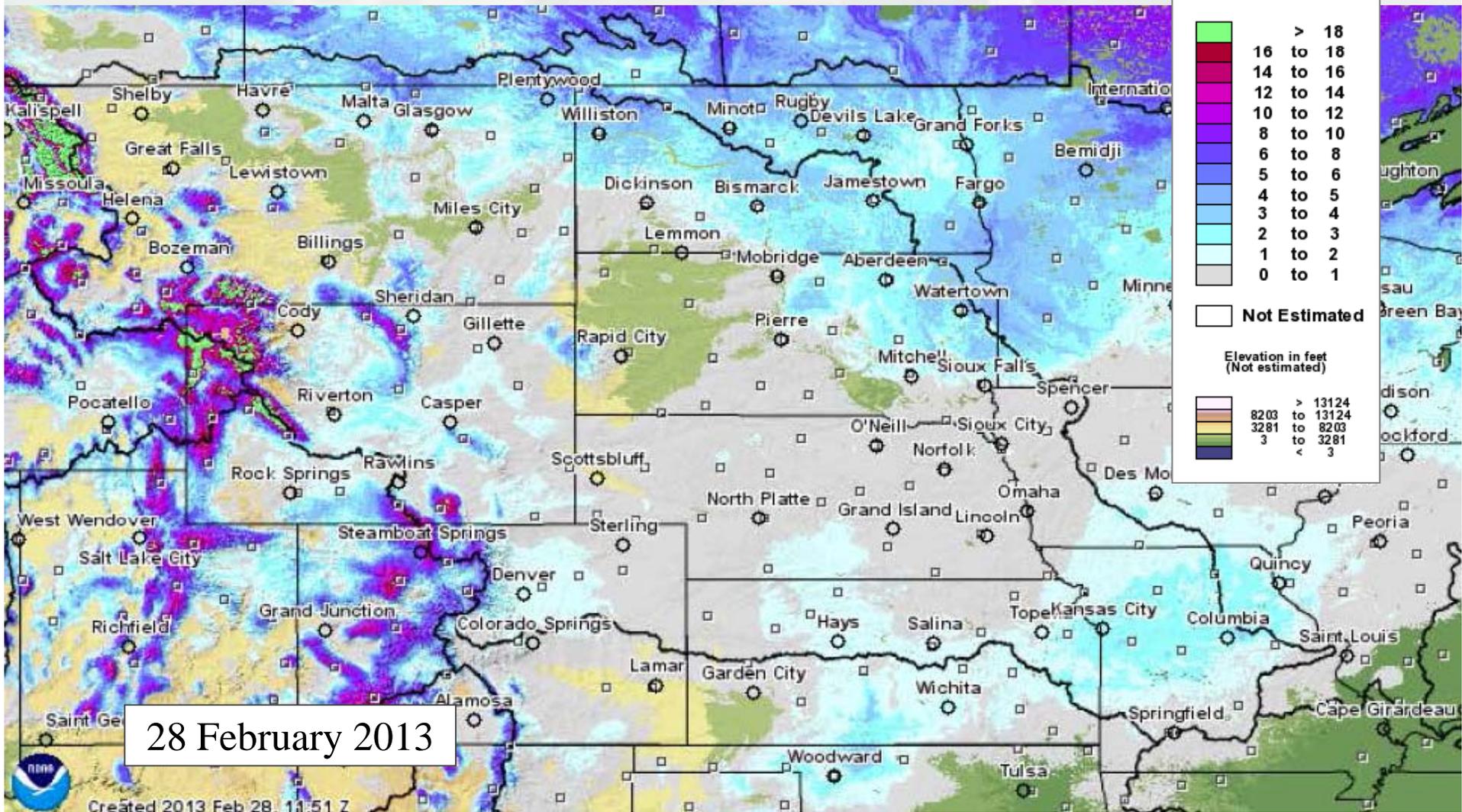
May, June
and July

March through
October

2013 Forecast = 23.2 MAF*

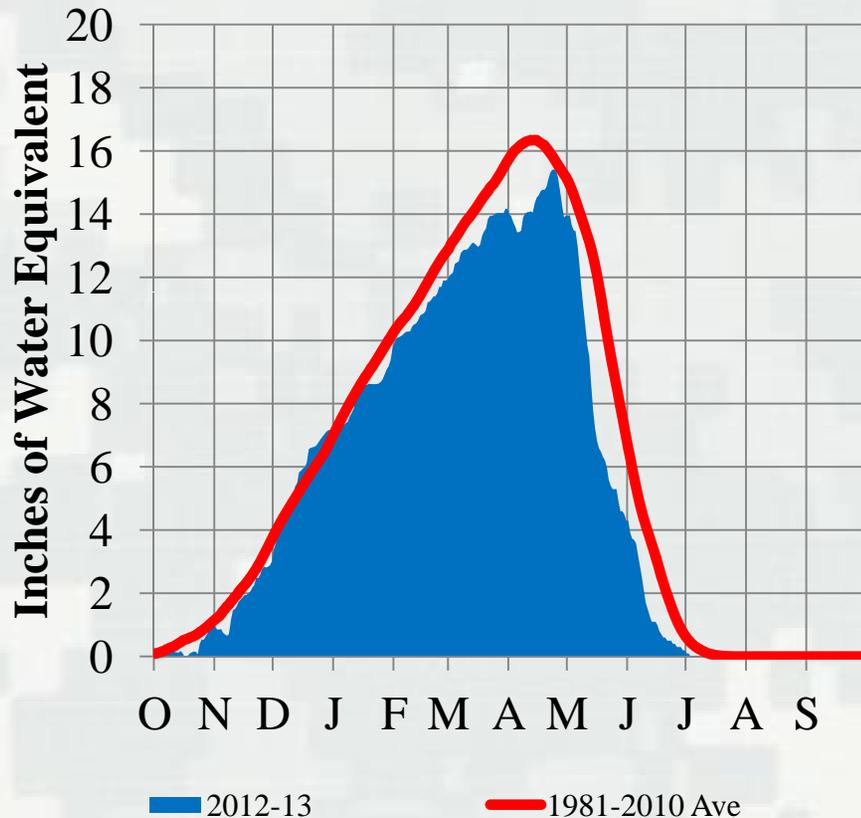
*October 1 forecast

Plains Snowpack

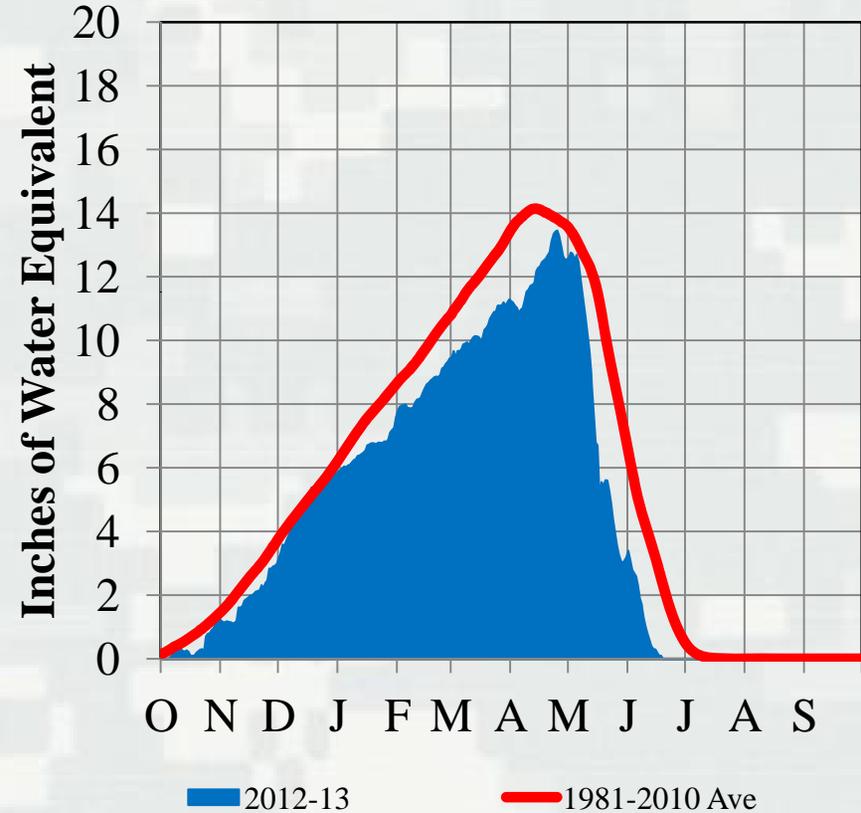


Missouri River Basin 2012-2013 Mountain Snowpack Water Content

Total above Fort Peck



Total Fort Peck to Garrison

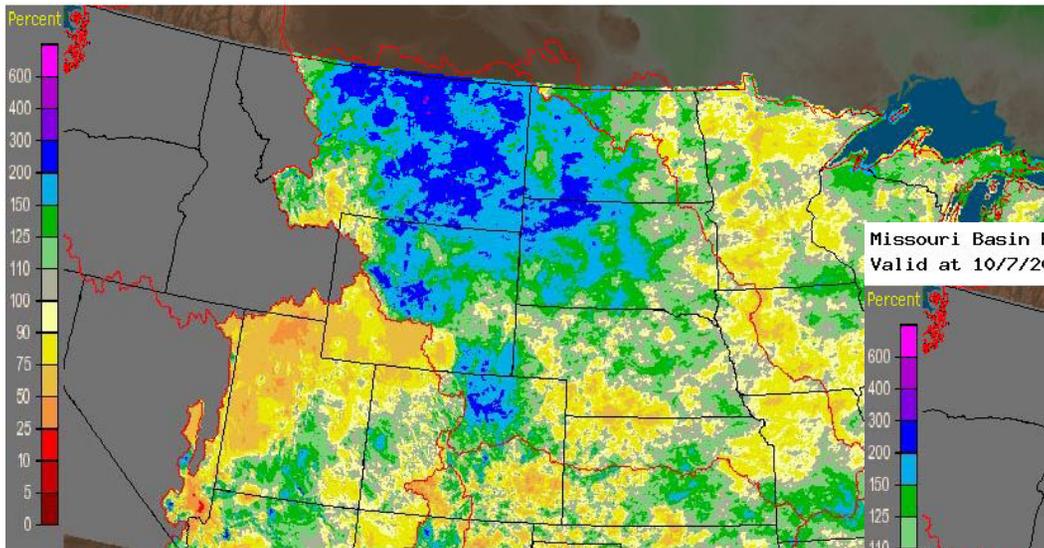


The Missouri River basin mountain snowpack normally peaks near April 15. The mountain snowpack in the “Total above Fort Peck” reach peaked on April 23 at 95% of the normal April 15 peak. The mountain snowpack in the “Total Fort Peck to Garrison” reach peaked on April 25 at 95% of the normal April 15 peak.

Precipitation Percent of Normal

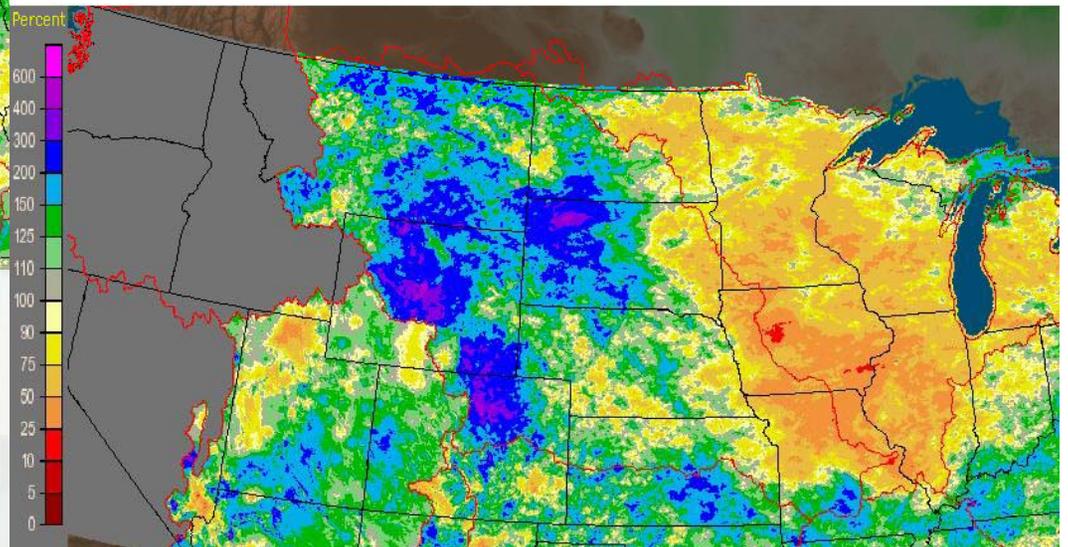
Previous 180 Days

Missouri Basin RFC Pleasant Hill, MO: Current 180-Day Percent of Normal Precipitation
Valid at 10/7/2013 1200 UTC- Created 10/7/13 14:18 UTC



Previous 90 Days

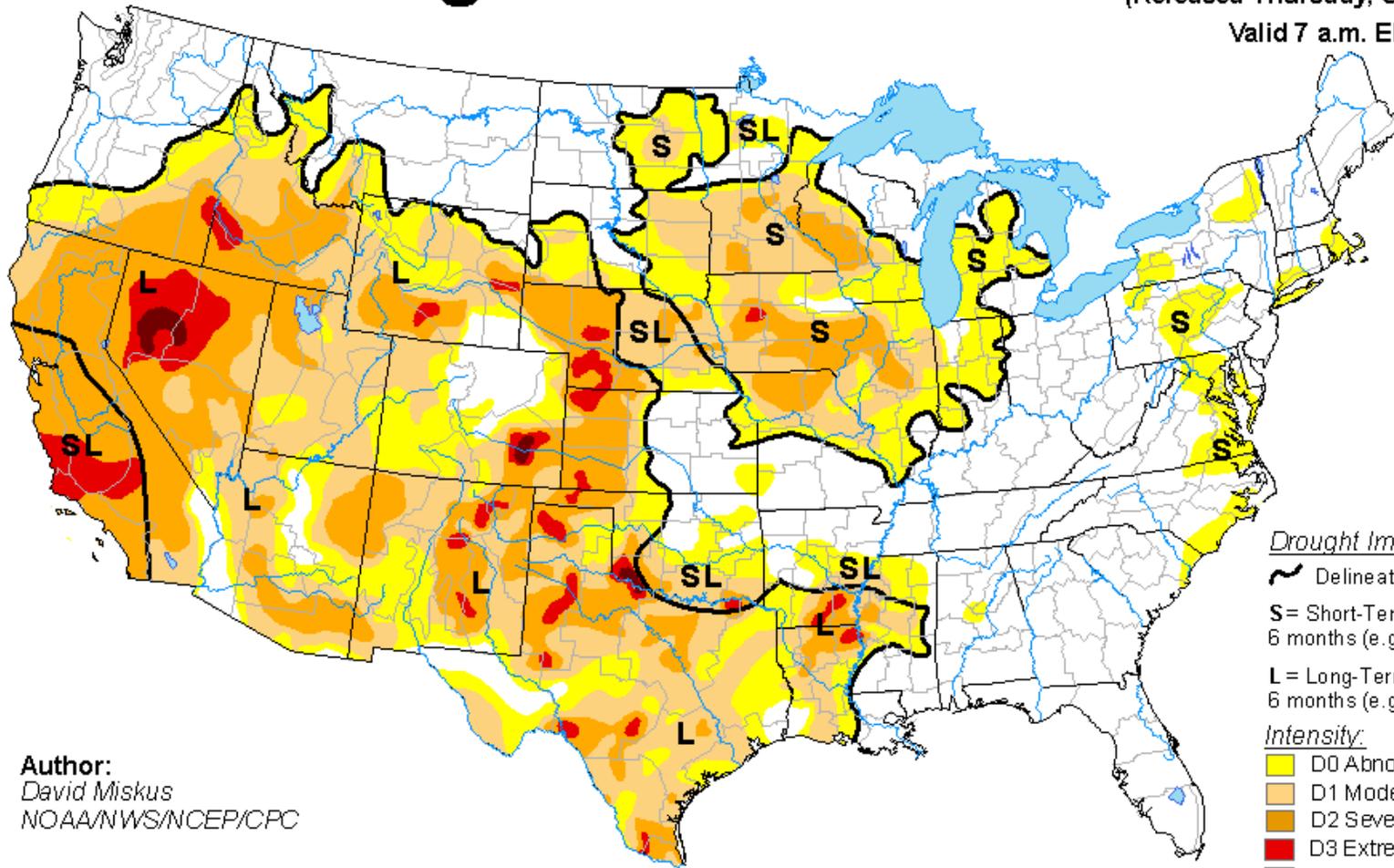
Missouri Basin RFC Pleasant Hill, MO: Current 90-Day Percent of Normal Precipitation
Valid at 10/7/2013 1200 UTC- Created 10/7/13 14:14 UTC



U.S. Drought Monitor

October 1, 2013
 (Released Thursday, Oct. 3, 2013)

Valid 7 a.m. EDT



11

Drought Impact Types:

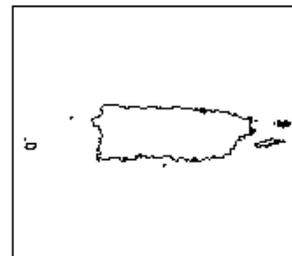
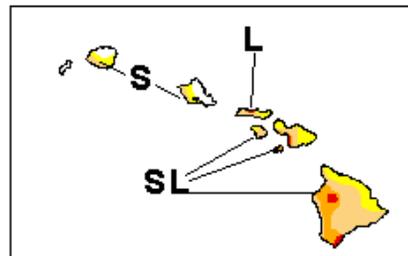
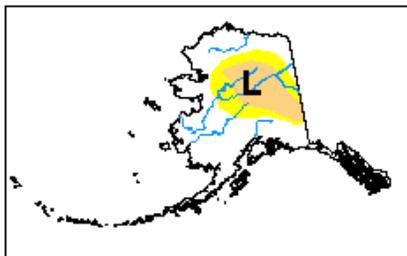
- Delineates dominant impacts
- S** = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L** = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

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:
 David Miskus
 NOAA/NWS/NCEP/CPC



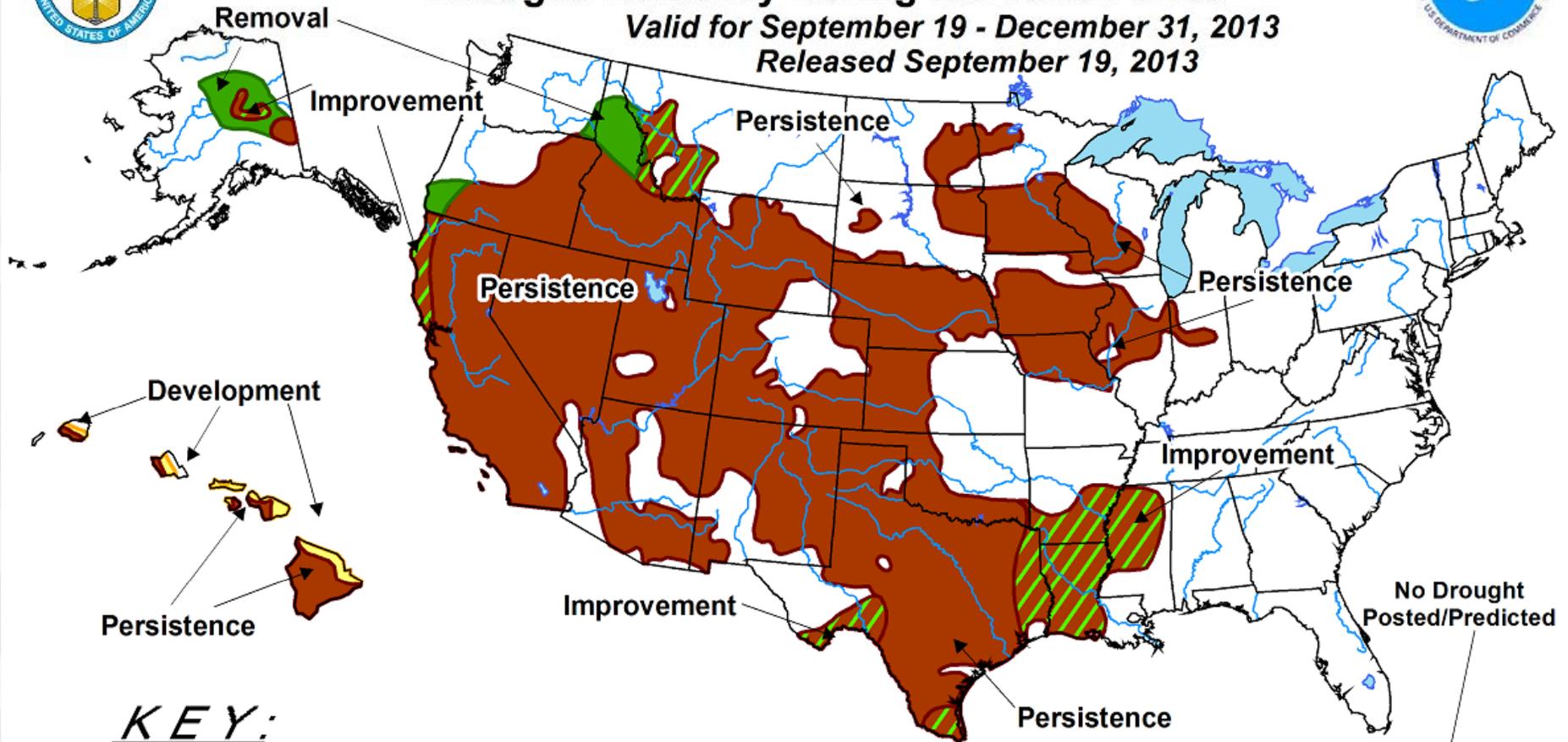
<http://droughtmonitor.unl.edu/>



U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period

Valid for September 19 - December 31, 2013
Released September 19, 2013



KEY:

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

Author: Anthony Artusa, Climate Prediction Center, NOAA

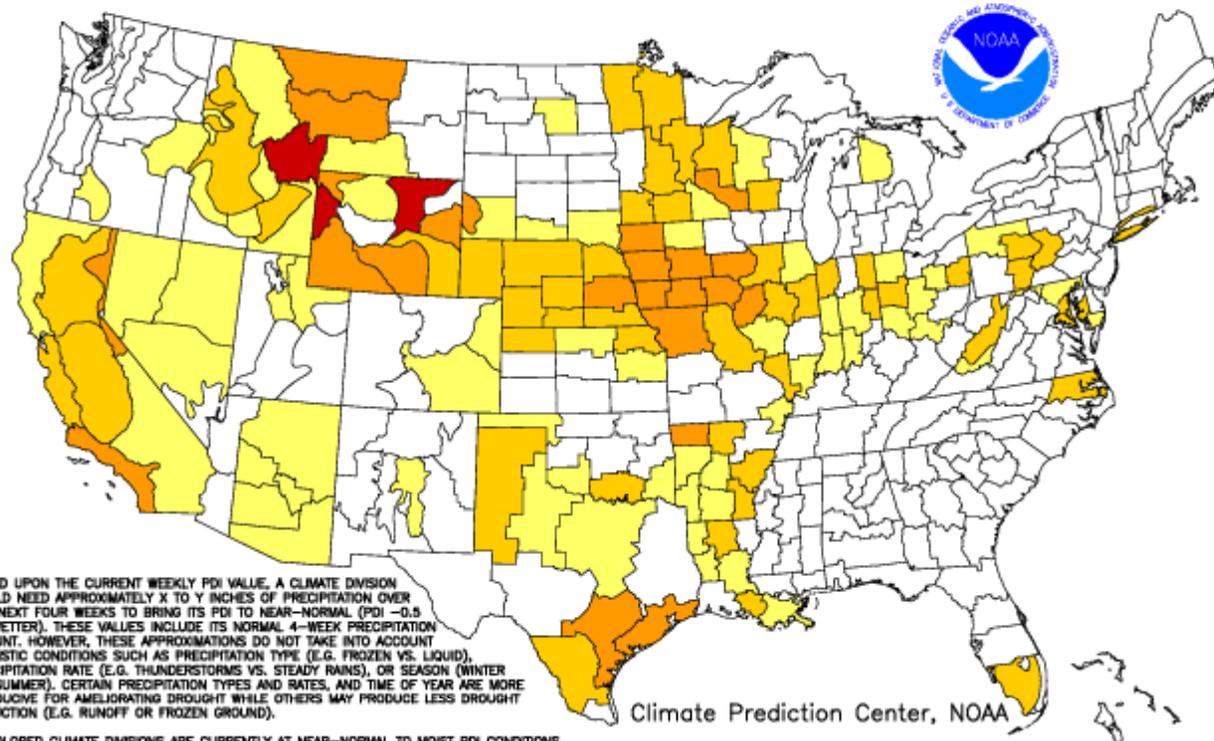
http://www.cpc.ncep.noaa.gov/products/expert_assessment/season_drought.html

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 Green and Brown hatched 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)

Precipitation Needed – Return to Normal

Additional Precip. Needed (In.) to Bring PDI to -0.5
 Weekly Value for Period Ending SEP 28, 2013
 Long Term Palmer Drought Severity Index (PDI)



BASED UPON THE CURRENT WEEKLY PDI VALUE, A CLIMATE DIVISION WOULD NEED APPROXIMATELY X TO Y INCHES OF PRECIPITATION OVER THE NEXT FOUR WEEKS TO BRING ITS PDI TO NEAR-NORMAL (PDI -0.5 OR WETTER). THESE VALUES INCLUDE ITS NORMAL 4-WEEK PRECIPITATION AMOUNT. HOWEVER, THESE APPROXIMATIONS DO NOT TAKE INTO ACCOUNT REALISTIC CONDITIONS SUCH AS PRECIPITATION TYPE (E.G. FROZEN VS. LIQUID), PRECIPITATION RATE (E.G. THUNDERSTORMS VS. STEADY RAINS), OR SEASON (WINTER VS. SUMMER). CERTAIN PRECIPITATION TYPES AND RATES, AND TIME OF YEAR ARE MORE CONDUCTIVE FOR AMELIORATING DROUGHT WHILE OTHERS MAY PRODUCE LESS DROUGHT REDUCTION (E.G. RUNOFF OR FROZEN GROUND).

UNCOLORED CLIMATE DIVISIONS ARE CURRENTLY AT NEAR-NORMAL TO MOIST PDI CONDITIONS.

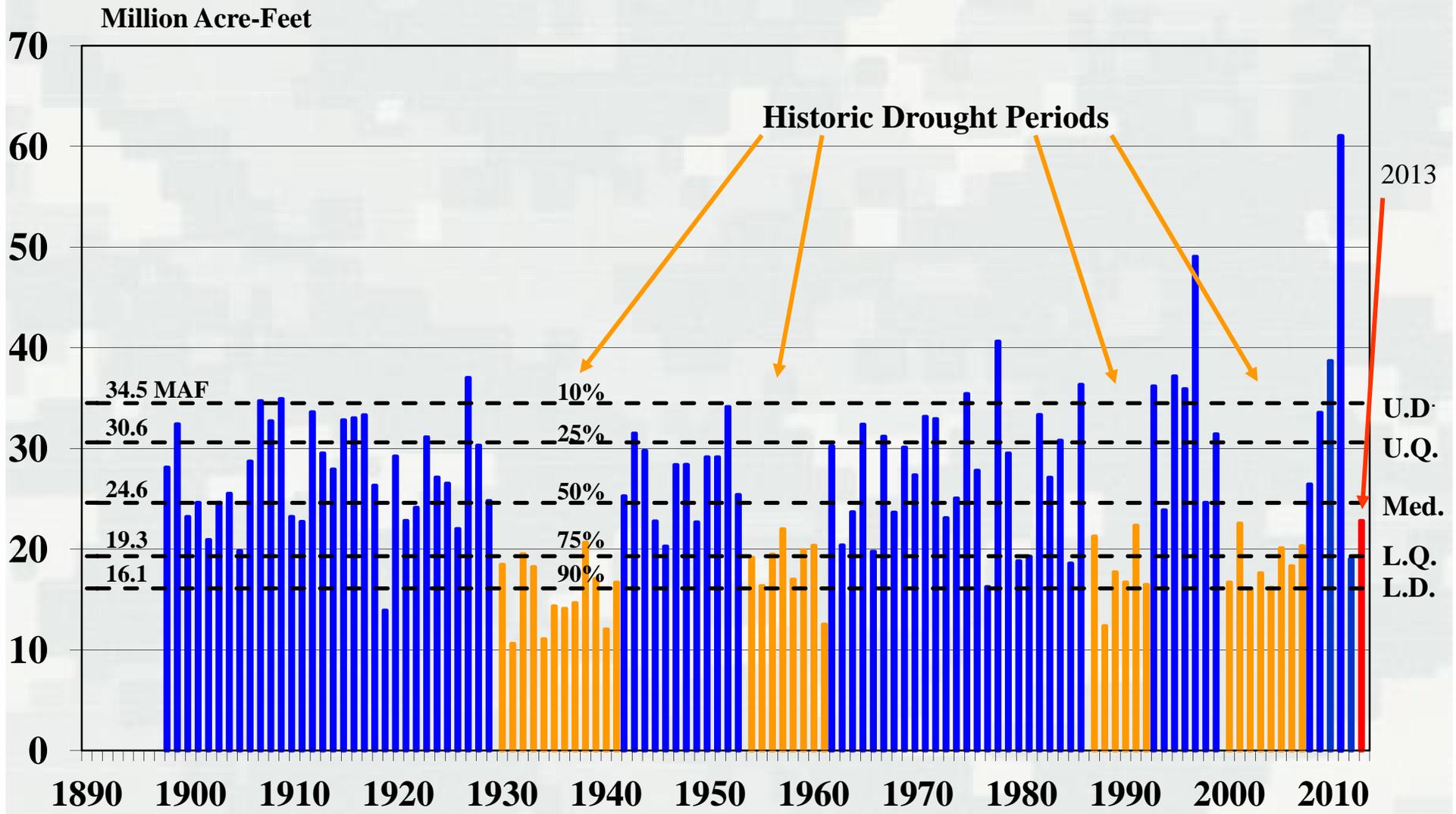
(EXAMPLE – IF 4-WEEK NORMAL PRECIPITATION IS 3 INCHES AND PDI DEFICIT TO BRING TO -0.5 IS 4 INCHES, THE VALUE IS 7)

- | | |
|--|--|
| <input type="checkbox"/> Zero Inches | <input type="checkbox"/> 9 to 12 Inches |
| <input type="checkbox"/> Trace to 3 Inches | <input type="checkbox"/> 12 to 15 Inches |
| <input type="checkbox"/> 3 to 6 Inches | <input type="checkbox"/> Over 15 Inches |
| <input type="checkbox"/> 6 to 9 Inches | |

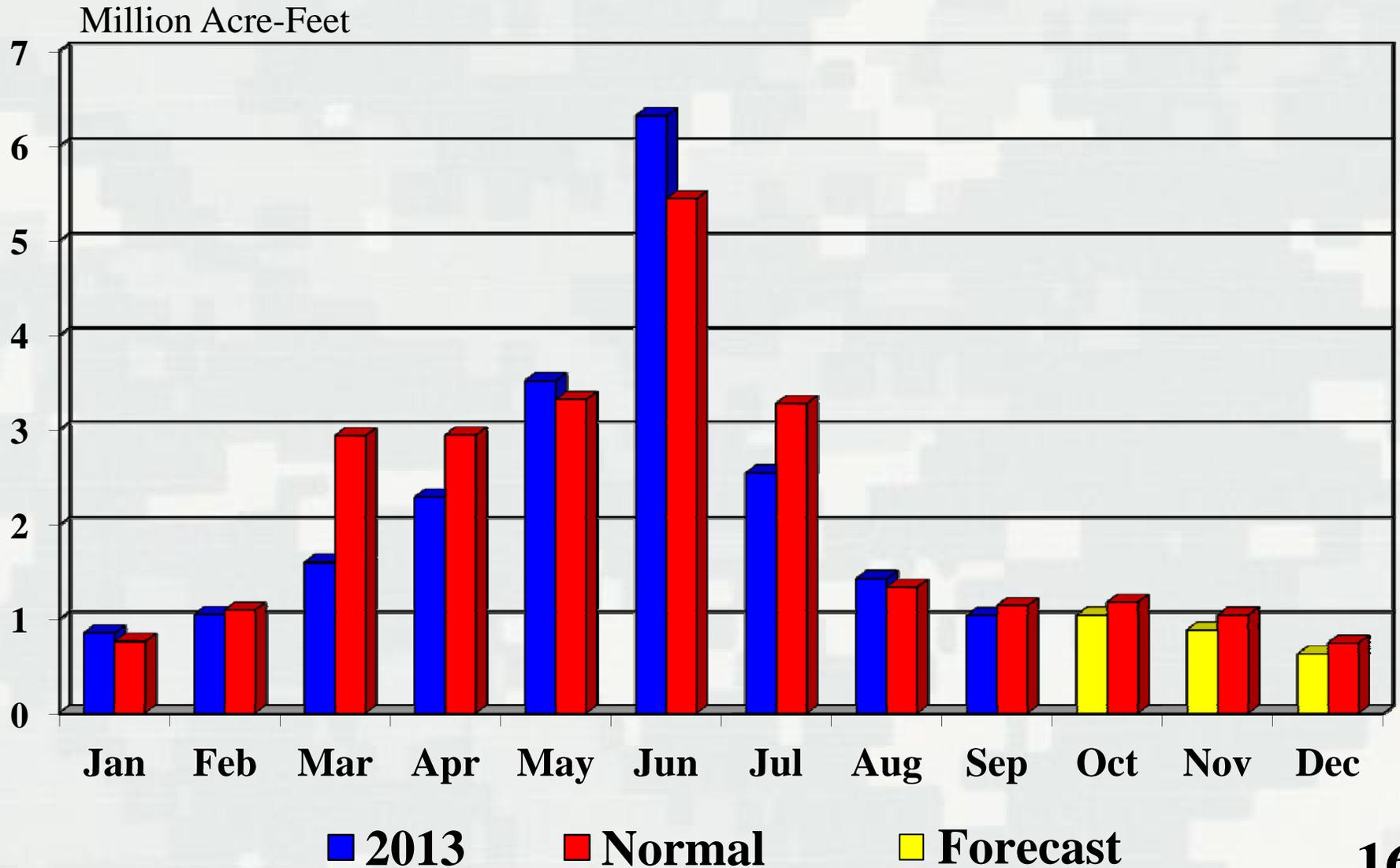
NOAA Outlooks for Winter/Spring for the Missouri River Basin

- Drought conditions have improved over the last year; however there are still significant portions of the basin in “abnormally dry” or “moderate drought” conditions. Fall soil moisture conditions are much improved compared to this time last year.
- “Neutral” El Niño/La Niña conditions most likely for winter, which means that there are no indicators regarding snow accumulation in mountains and plains.
- Temperature Outlook – increased chance of warmer than normal for most of the winter and early spring based on warming winter trend.
- Precipitation Outlook – no indicators; equal chances of dry, wet or close to normal for the winter and early spring (hints of possible wetness early winter in the upper basin).
- Drought Outlook – at this point it is still unknown as to whether the drought is nearing its end or whether it has just begun.

Missouri River Mainstem System Annual Runoff above Sioux City, IA



Missouri River Runoff above Sioux City 2013 Actual and Forecast

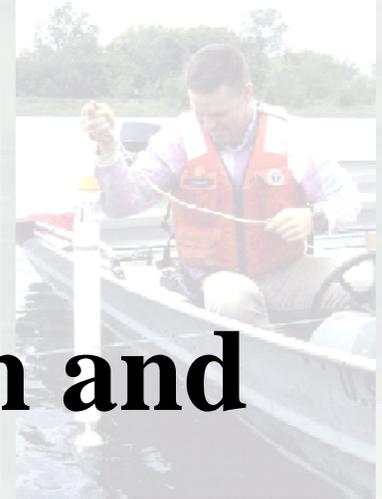


Fall / Winter Releases

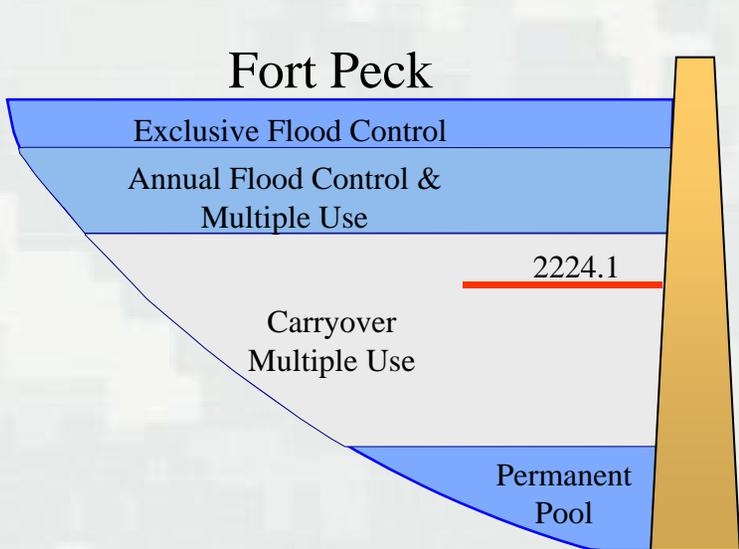
- Begin reducing to Gavins Point winter releases around November 22nd
- Will closely monitor channel conditions between reservoirs and downstream of Gavins Point
- Per September 1 storage check, minimum winter releases from Gavins Point dam
- Expected releases in kcfs

	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>
Fort Peck	6.5	7.0	7.0
Garrison	16.0	19.0	19.0 (target)
Gavins	12.5	12.5	12.5 (target)

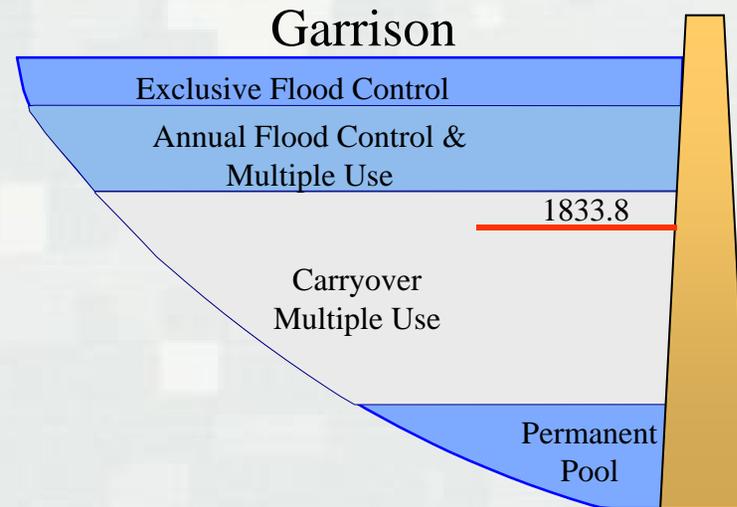
Results of 2013 Regulation and Planned Operation for Authorized Purposes in 2014



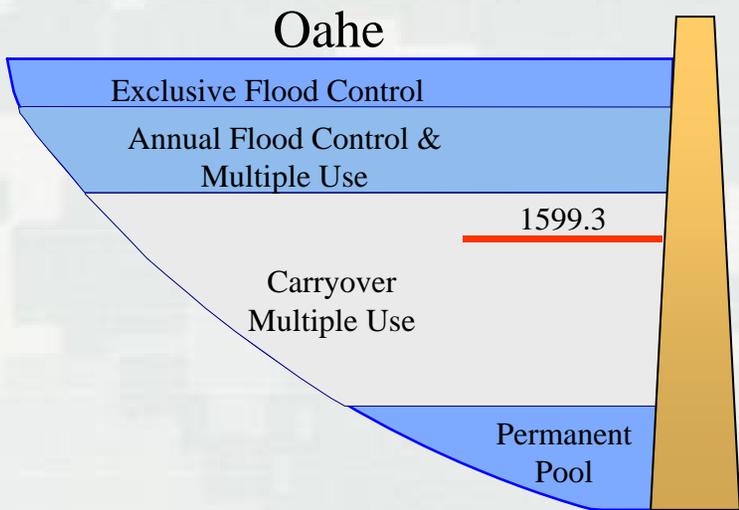
Current Reservoir Levels – October 7, 2013



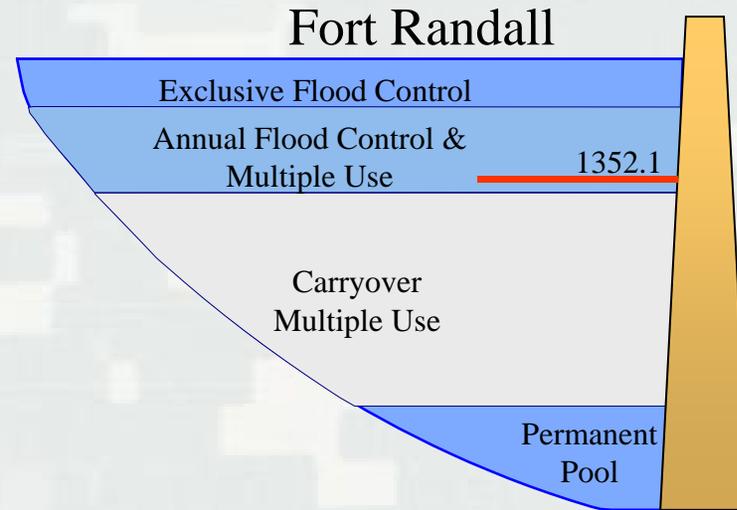
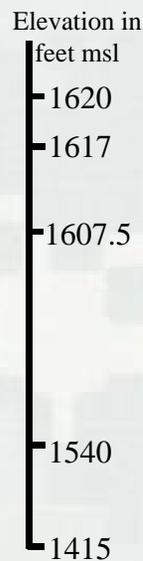
9.9 feet below base of Flood Control zone



3.7 feet below base of Flood Control zone



8.2 feet below base of Flood Control zone

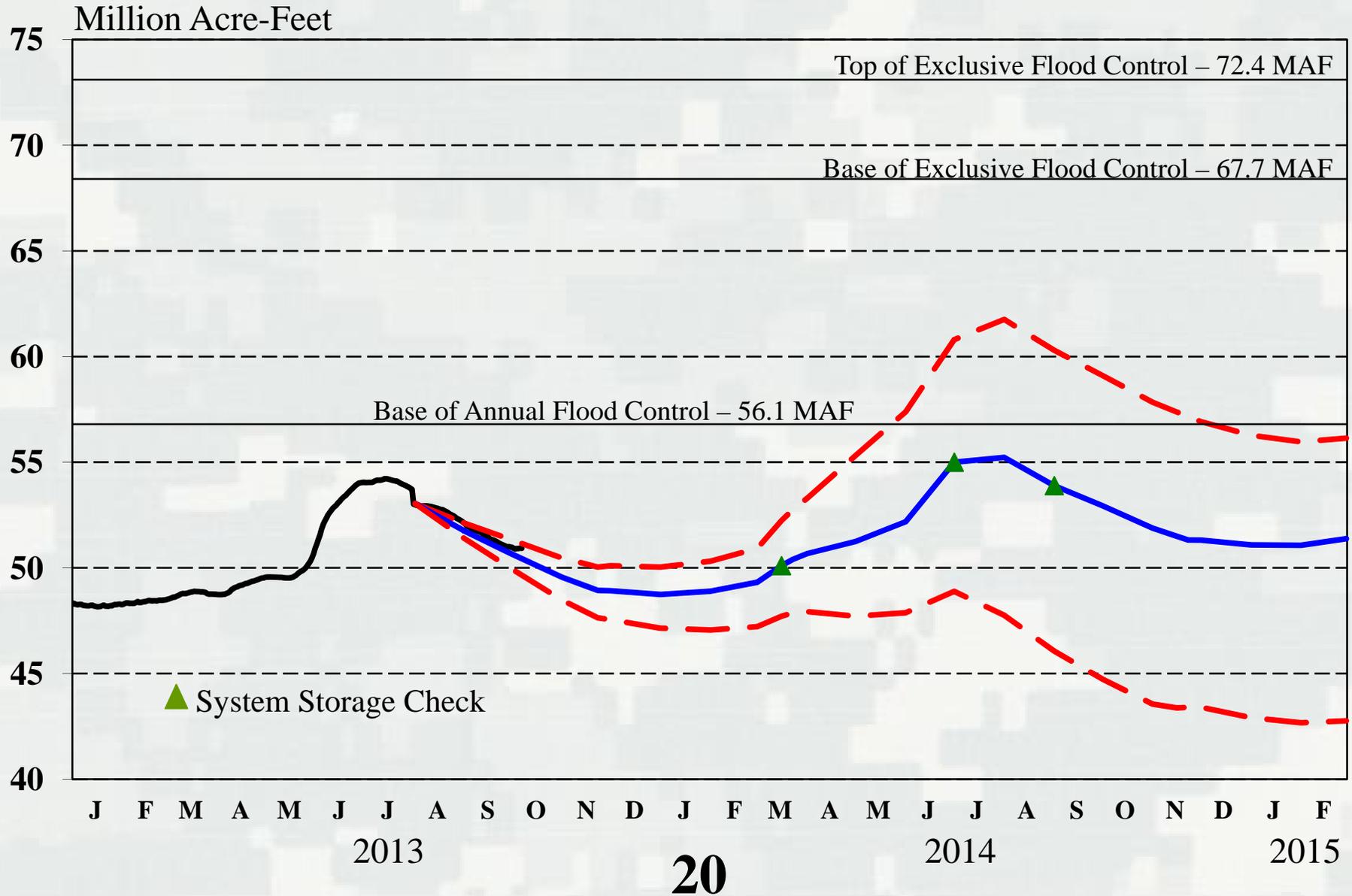


2.1 feet above base of Flood Control zone



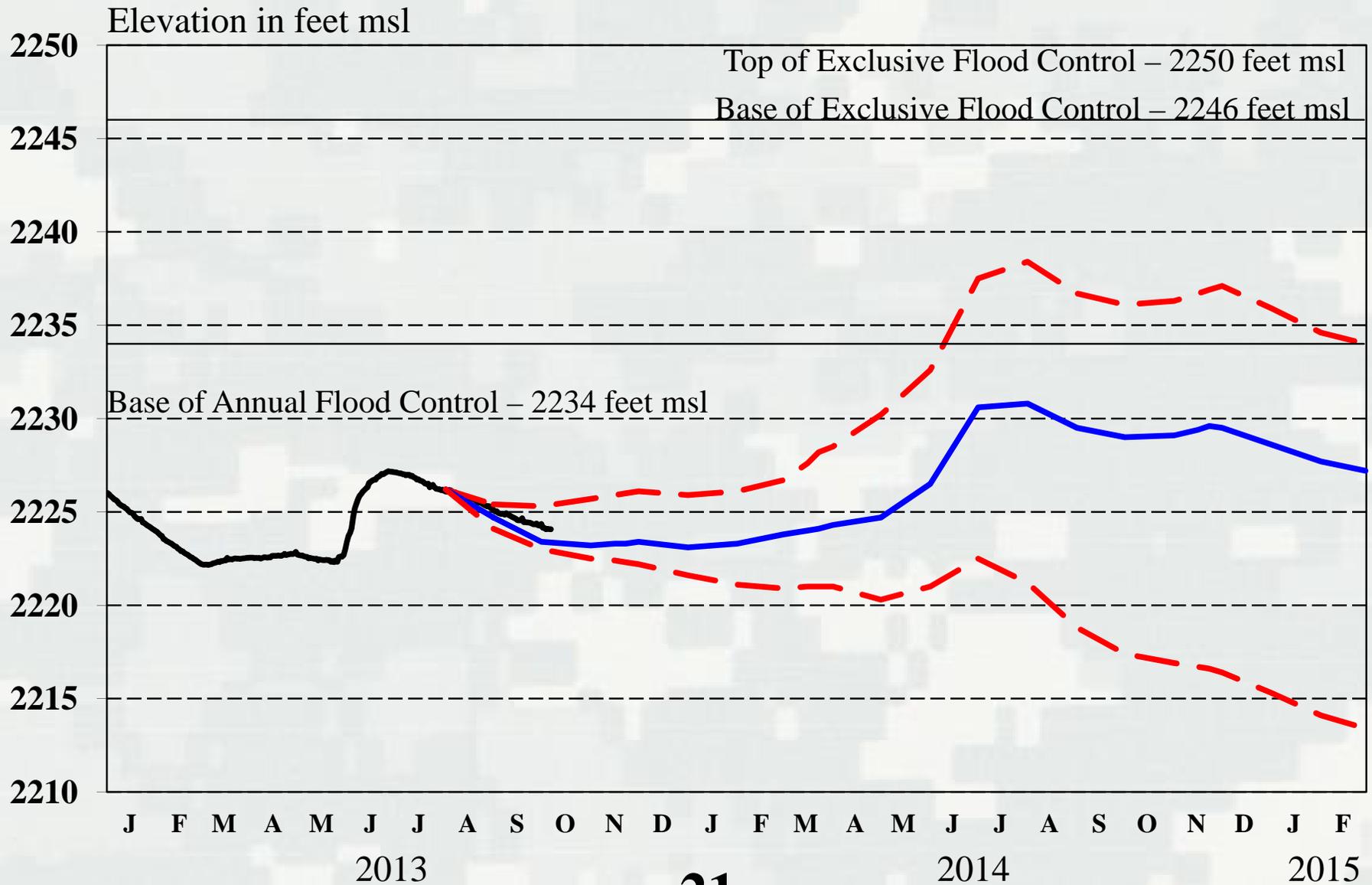
System Storage

2013-2014 Draft AOP



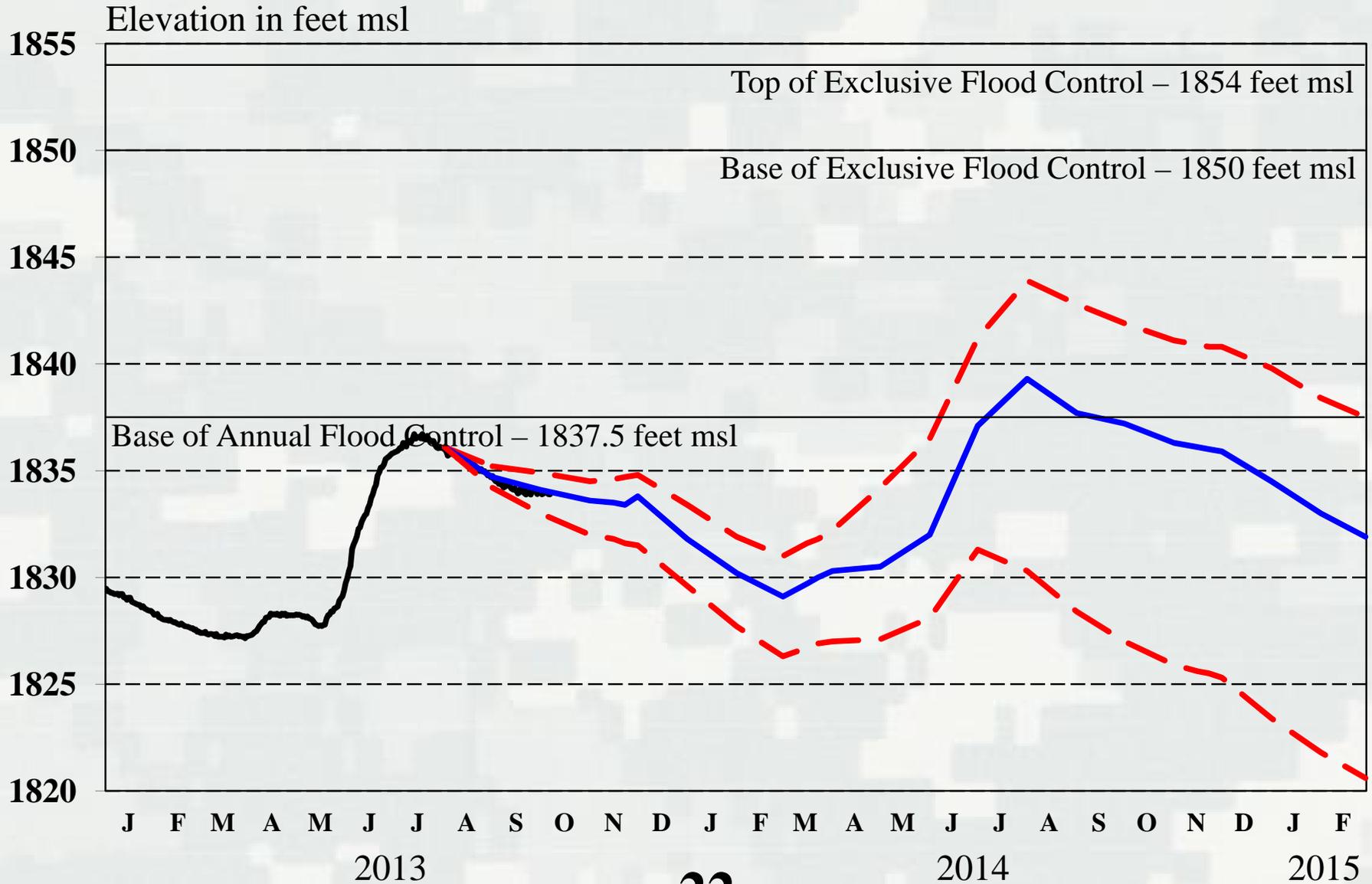
Fort Peck

2013-2014 Draft AOP



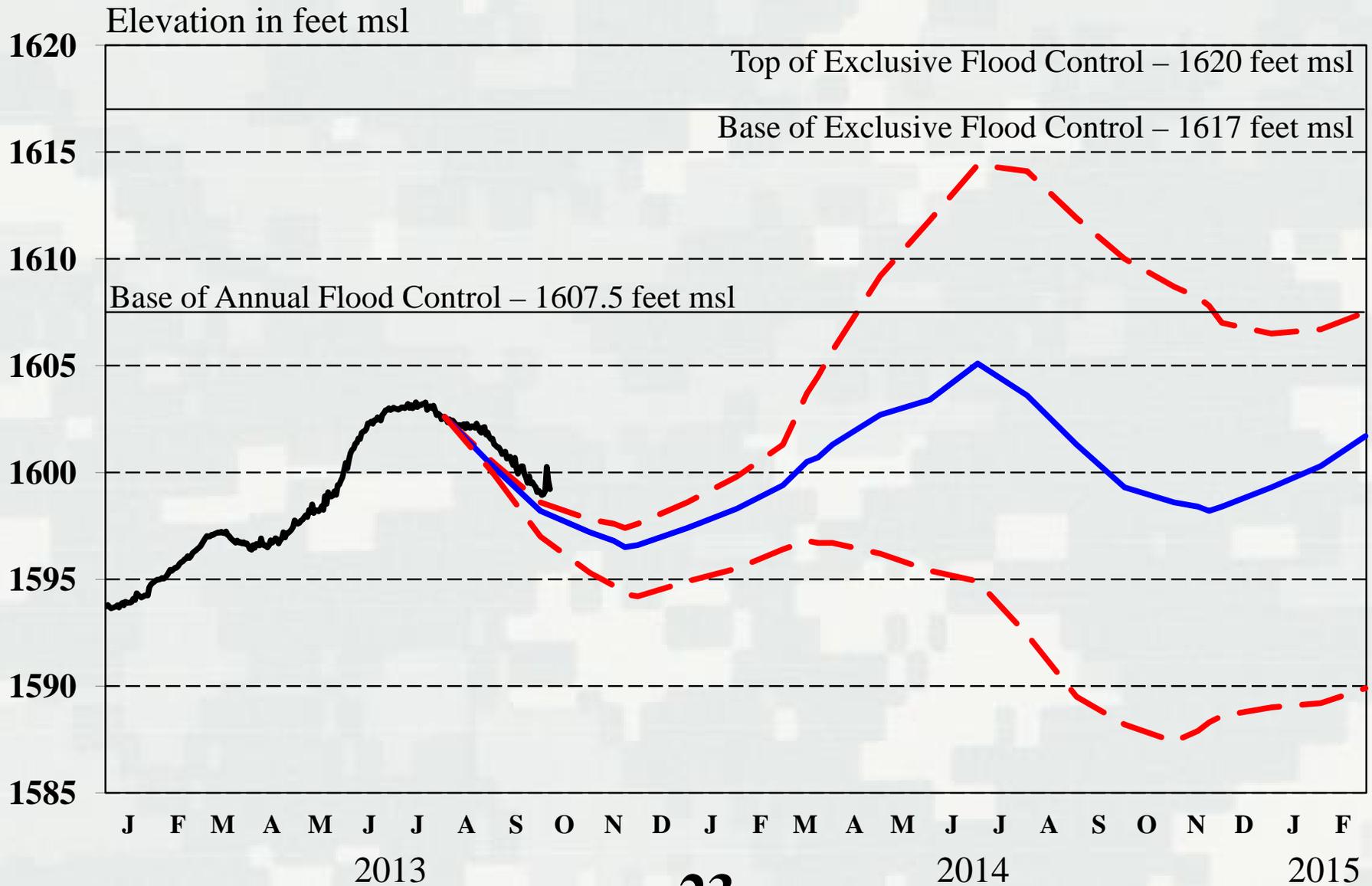
Garrison

2013-2014 Draft AOP

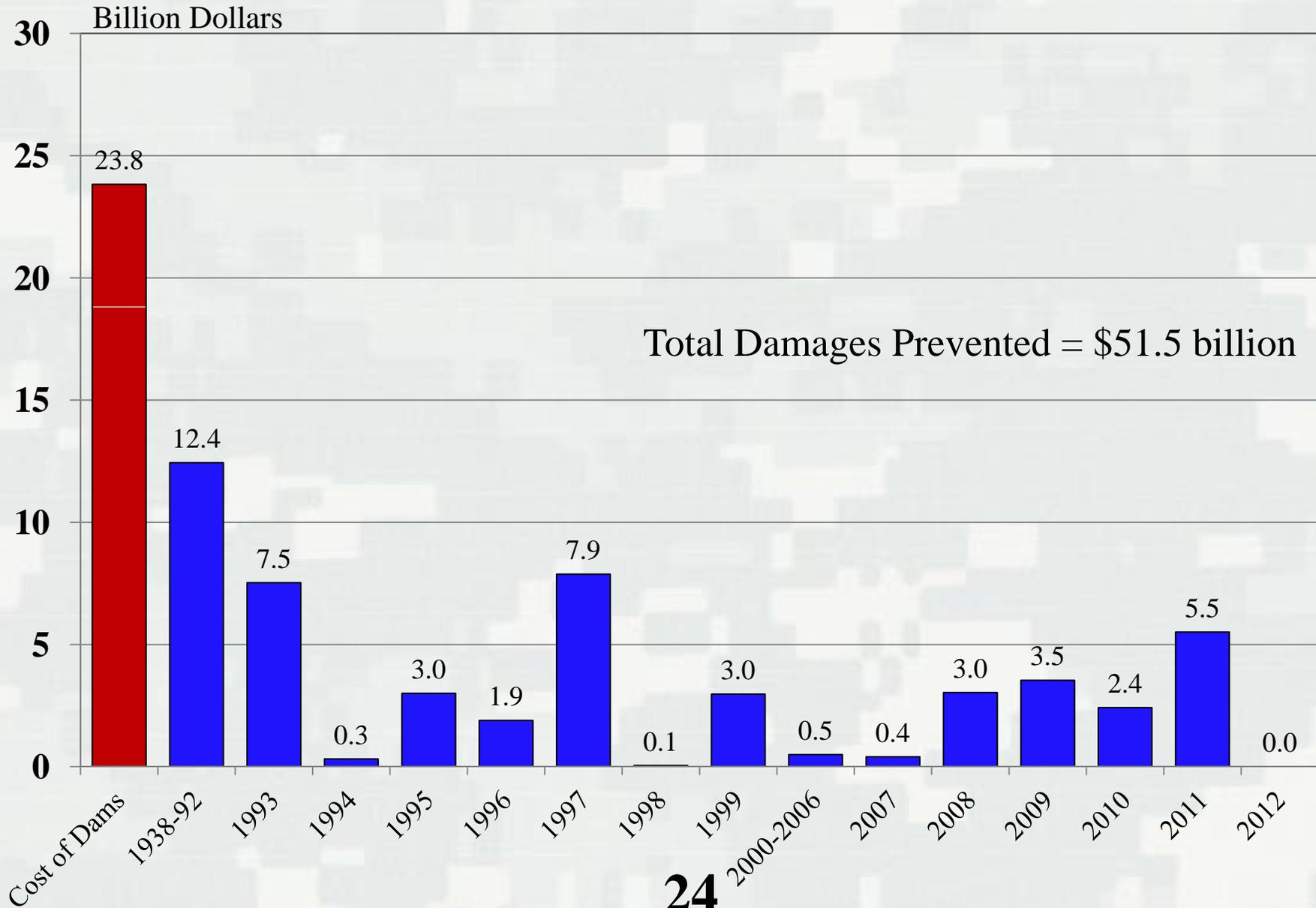


Oahe

2013-2014 Draft AOP



Flood Damages Prevented by Mainstem Dams Indexed to 2012 Levels



Flood Control

- All scenarios start the runoff year below the base of the annual flood control zone
 - ▶ Fort Peck, Garrison and Oahe 8-10 feet below base of flood control zone
 - ▶ System storage 6.8 MAF below base of flood control zone
- Downstream flooding can still occur even during droughts

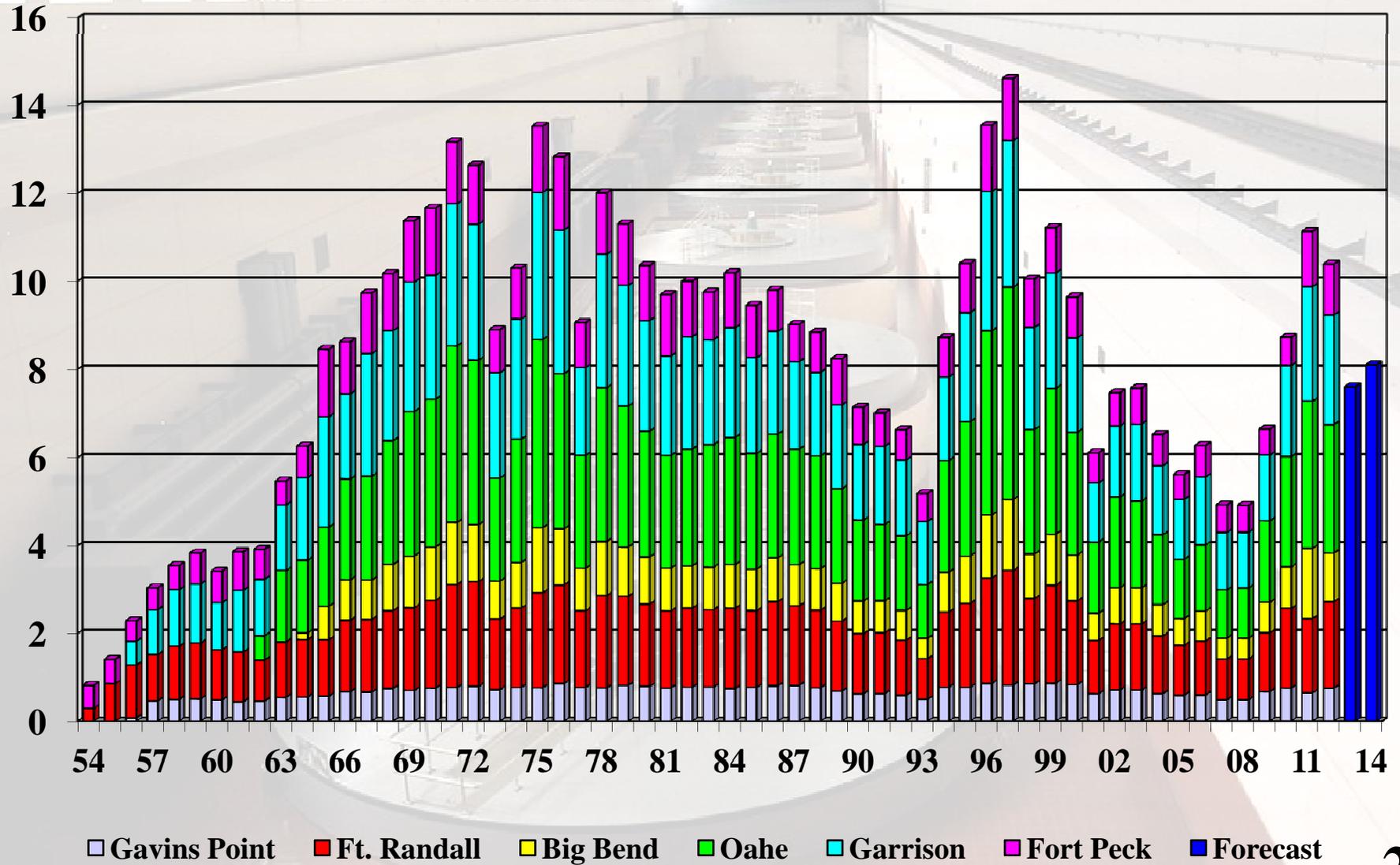
HA, NEBR.

13

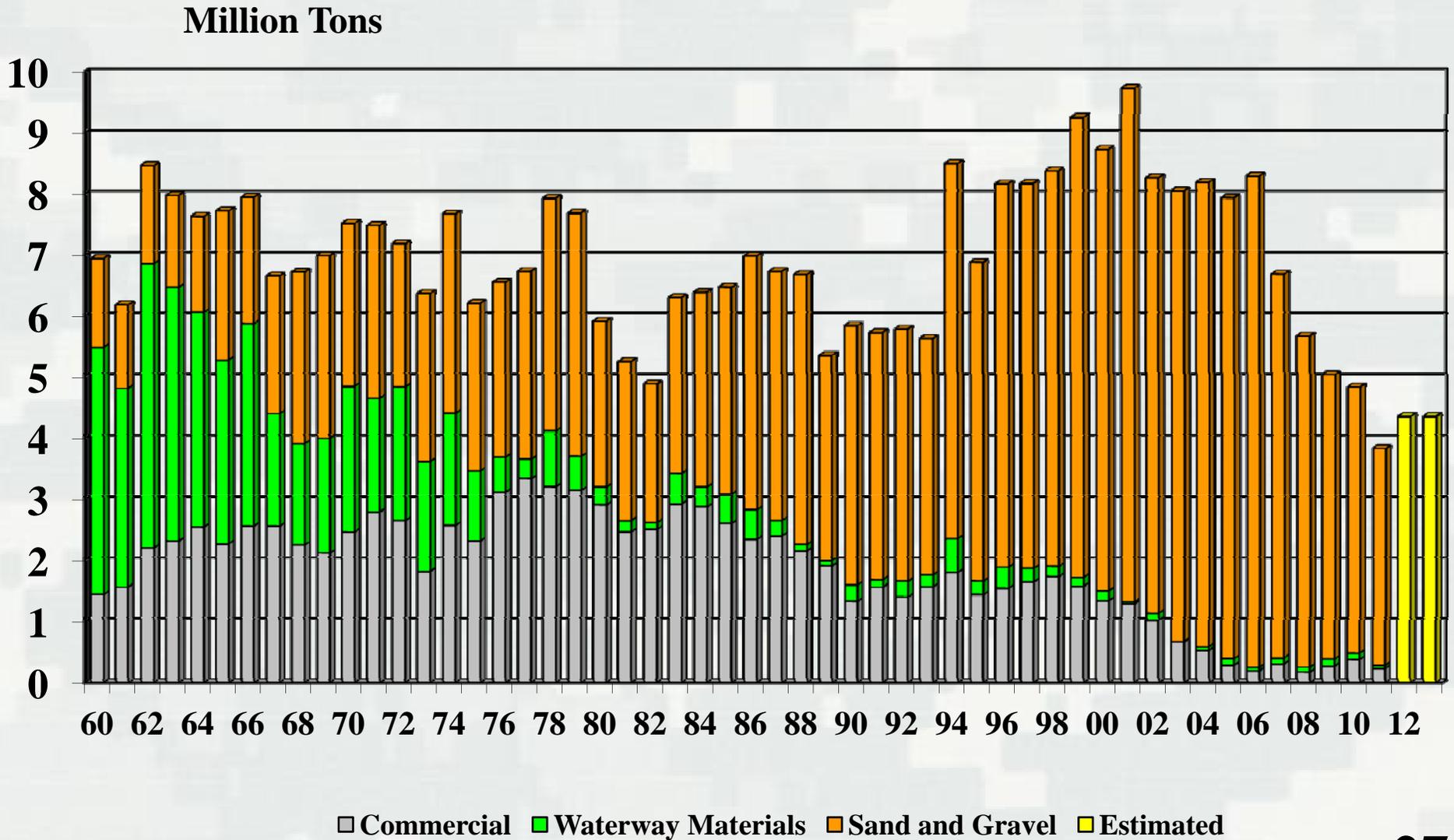
FLOODWALL WITH EMERGENCY FLASH BOARDING

Hydropower

Billion kWh



Missouri River Total Navigation Tonnage



Navigation

- **2013 – Full length season**

- ▶ Minimum service first half of season
- ▶ Service level increased 3,000 cfs after July 1 storage check

- **2014 – March 15 Storage Check**

- ▶ Below full service level flow support (all runoff scenarios)
- ▶ Target locations: Sioux City, Omaha, Nebraska City and Kansas City

- **2014 – July 1 Storage Check**

- ▶ Upper Decile: full service, full length season + 10 days
- ▶ Upper Quartile: full service, full length season + 10 days
- ▶ Median: intermediate service, full length season
- ▶ Lower Quartile: minimum service, 9-day season shortening
- ▶ Lower Decile: minimum service, 17-day season shortening

Water Supply – Water Quality

Irrigation – Recreation

■ 2013

- ▶ Recreation and irrigation impacts due to low reservoir elevations and releases
- ▶ Minimum Gavins Point winter releases

■ 2014

- ▶ Upper Decile, Upper Quartile and Median: Near normal pool levels and releases most of the year
- ▶ Lower Quartile and Lower Decile: Some access issues due to lower pools
- ▶ Median and lower runoff: minimum Gavins Point winter releases

Fish and Wildlife

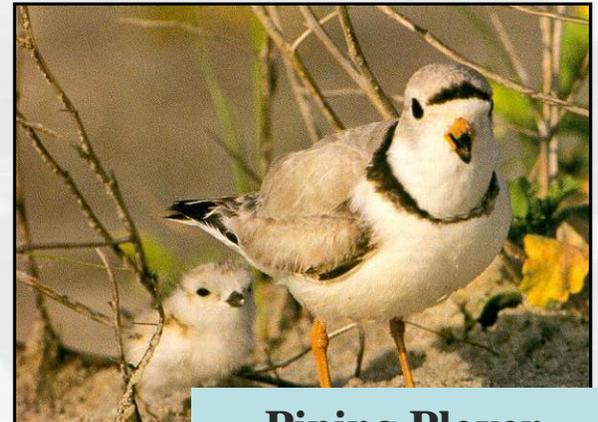
- Steady to rising levels at upper three reservoirs during forage fish spawn
 - ▶ Favor Garrison if runoff below normal
- Minimize periods of zero releases at Fort Randall
- Cold water habitat will be monitored

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

- 2013 Regulation from mid-May to mid-August
- Measure to minimize take
 - ▶ Target flows not met in reaches without commercial navigation
- Potential refinement of survey protocols evaluated
- Availability of sandbar habitat remains high
- Adult populations and nest success similar to 2012
- Fledge ratios
 - ▶ Least tern fledge ratios met on Fort Randall river reach
 - ▶ Piping plover fledge ratios met on Garrison, Fort Randall, and Gavins Point river reaches

Threatened and Endangered Species

Piping Plover and Least Tern

- 2014 Gavins Point
 - ▶ Steady release – flow to target
 - ▶ Cycle Gavins Point releases
- Intra-day peaking patterns – Garrison & 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 2013
- Neither pulse planned in 2014
 - ▶ Pursuing independent science advisory panel (ISAP) recommendations
 - ▶ Forego spring pulse while developing management plan/EIS

Summary

- Improvement in basin conditions, but water conservation measures still being implemented
- Reduced service levels for first half of 2014
- Median to lower runoff in 2014 will result in reduced service levels to authorized purposes