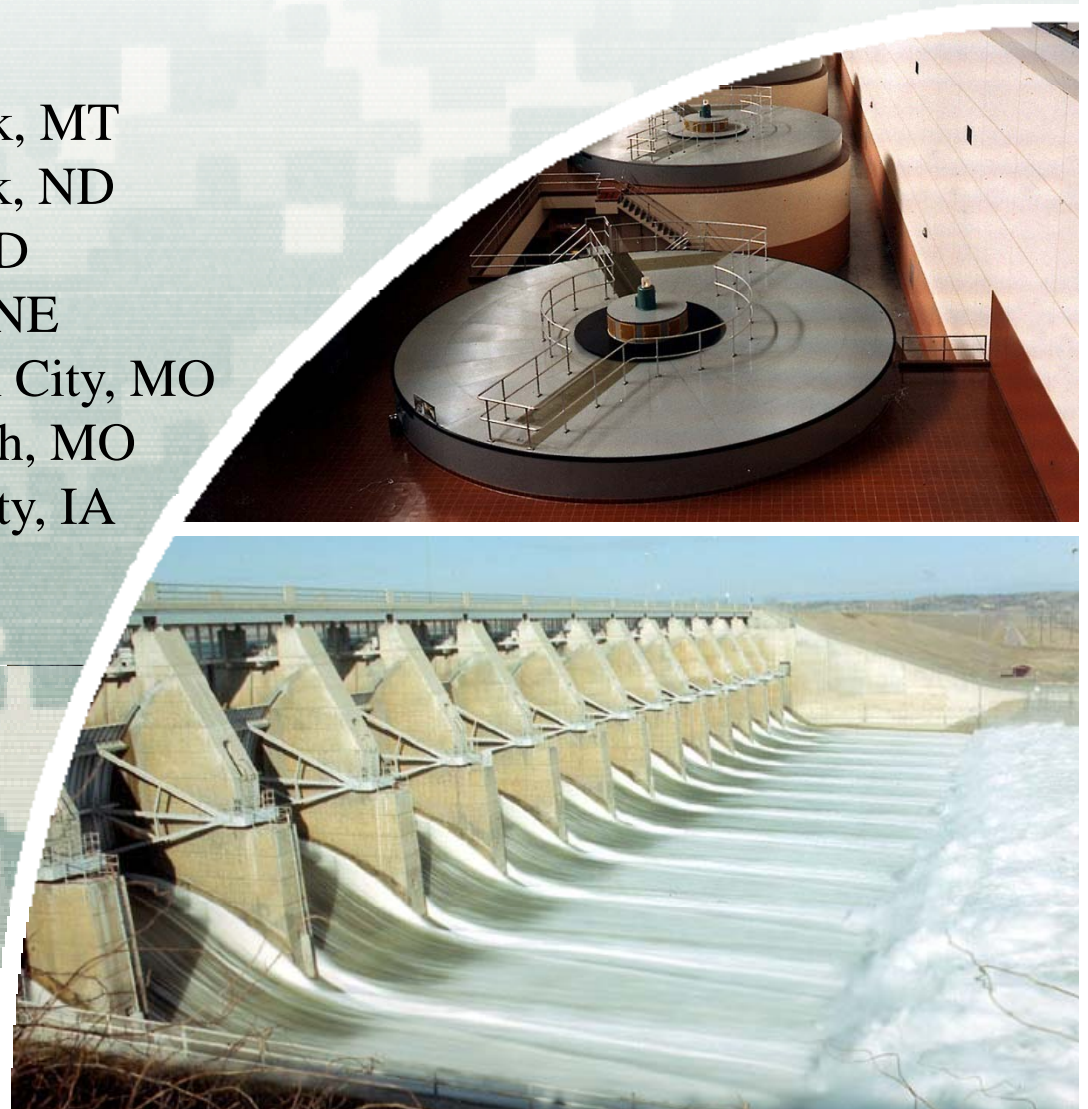


Missouri River Basin Water Management Spring 2012 Public Meetings

April 16 th	11:00 a.m.	Fort Peck, MT
April 16 th	7:00 p.m.	Bismarck, ND
April 17 th	11:00 a.m.	Pierre, SD
April 18 th	7:00 p.m.	Omaha, NE
April 19 th	1:00 p.m.	Jefferson City, MO
April 19 th	7:00 p.m.	St. Joseph, MO
April 20 th	11:00 a.m.	Sioux City, IA



US Army Corps of Engineers
BUILDING STRONG[®]



Independent External Review Panel

Panel Recommendations

1. Support a program of infrastructure enhancement.
2. Update hydrologic studies to include 2011.
3. Review of System storage allocations.
4. Improved cooperation/collaboration with NWS, USGS and NRCS.
5. Studies to enhance data collection and forecasting (especially plains snow).
6. Implement modern interactive, graphics decision support system.



Analysis of Missouri River Mainstem Flood Control Storage

- Two Step Process

- ▶ Determine the potential effect of additional flood control storage on 2011 releases.

- ▶ Evaluate potential economic impacts of alternative flood control scenarios.

- Report available at:

<http://www.nwd-mr.usace.army.mil/rcc/>



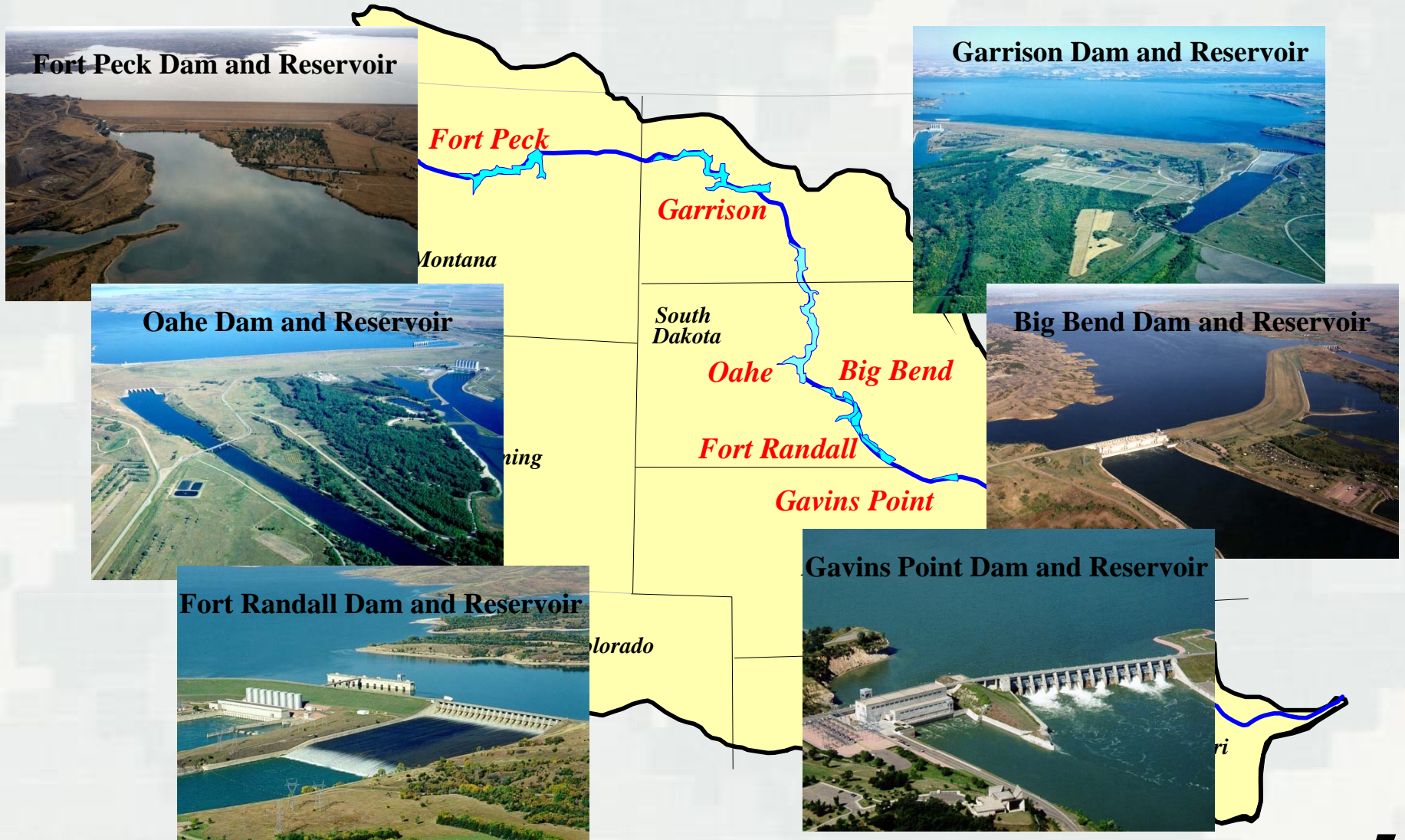
Analysis of Missouri River Mainstem Flood Control Storage

■ Conclusions

- ▶ Additional flood control storage would enhance flood risk reduction in a repeat of the 2011 flood, but would not have prevented record releases in 2011.
- ▶ Additional flood control storage would have a negative impact on other authorized purposes.
- ▶ Additional flood control storage would have little impact on lower basin rainfall driven flood events such as 2010.
- ▶ Flood control storage is one piece of the solution; increasing channel capacity and reducing encroachment in the flood plain would further enhance flood risk reduction.



Missouri River Mainstem Reservoir System



Our Mission

Regulate Missouri River Mainstem Reservoirs to Support Congressionally Authorized Purposes

Flood Control



Hydropower



Water Supply



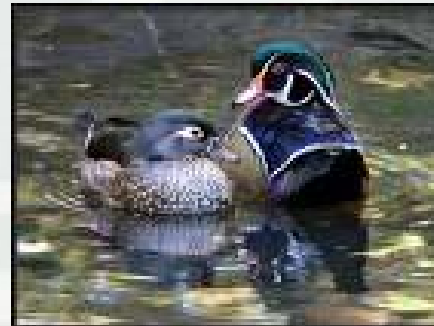
Water Quality Control



Recreation



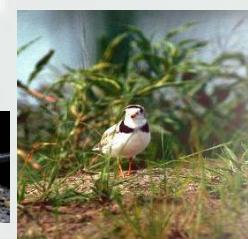
Navigation



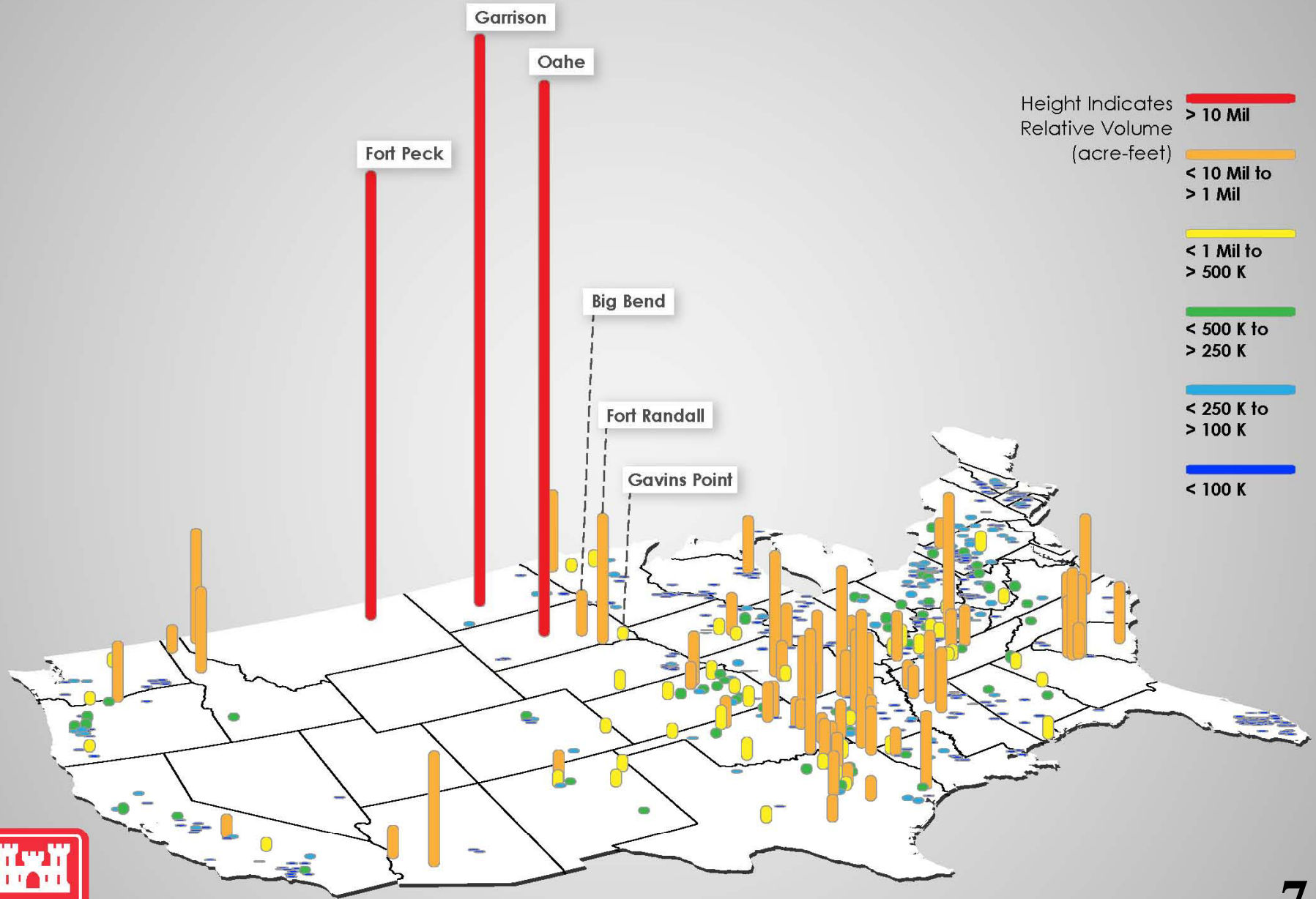
**Fish and Wildlife
Including Threatened and
Endangered Species**



Irrigation

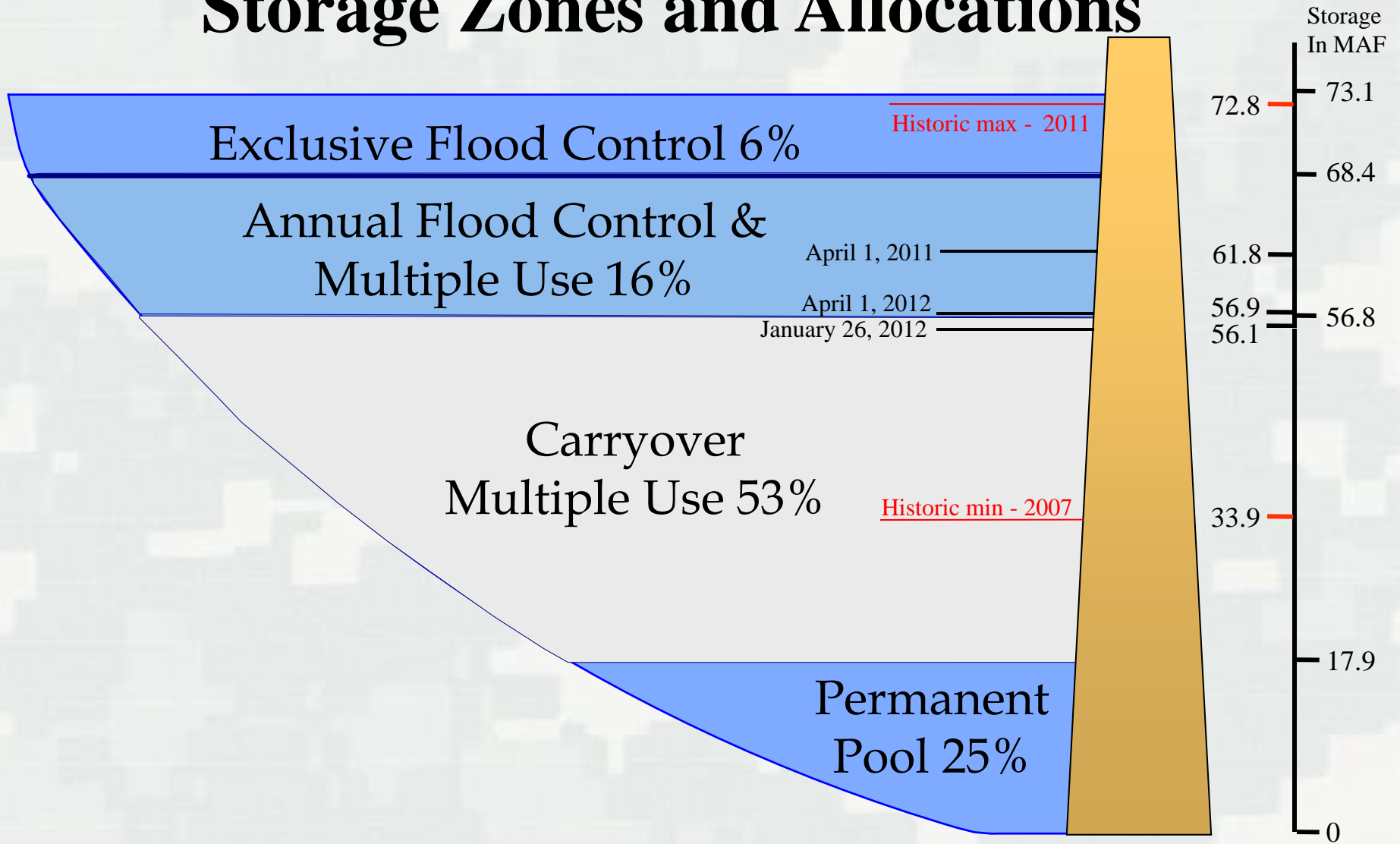


Storage Capacity of Corps Reservoirs

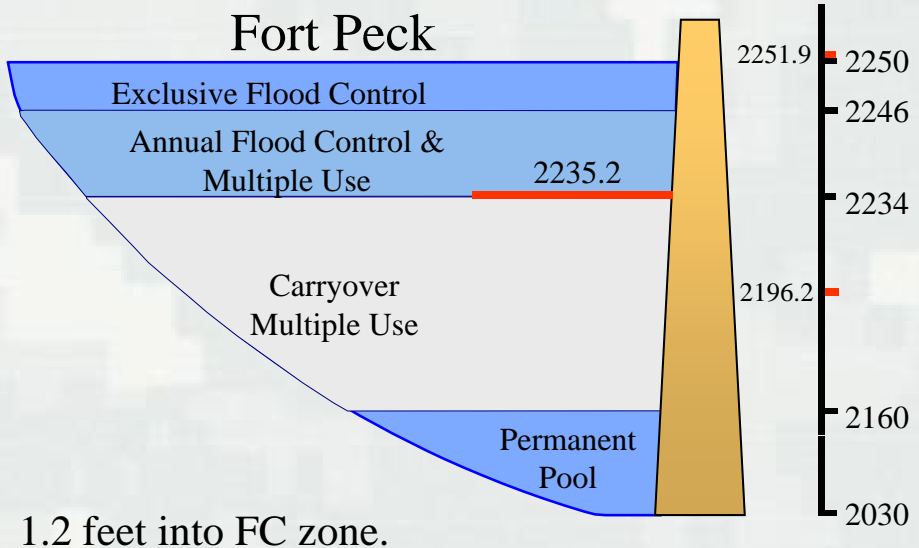


US Army Corps of Engineers
BUILDING STRONG

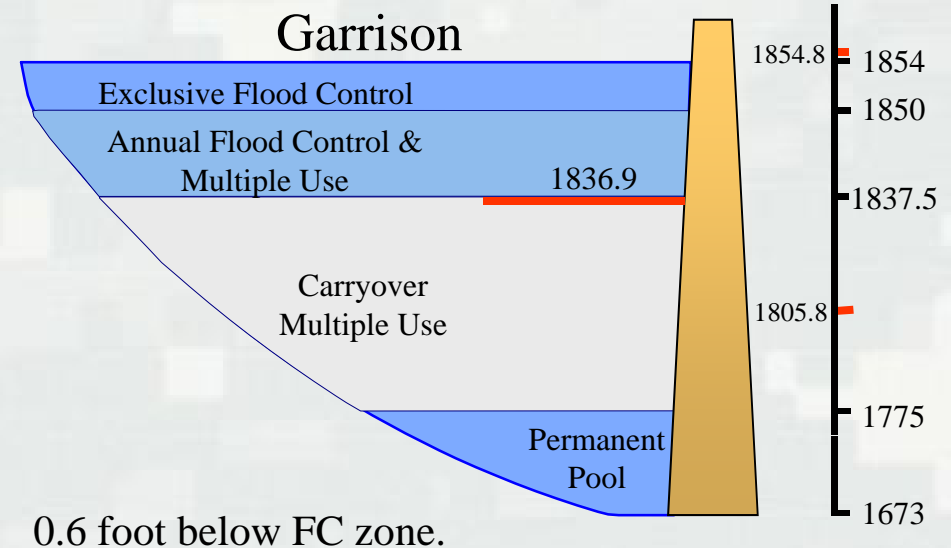
Missouri River Mainstem System Storage Zones and Allocations



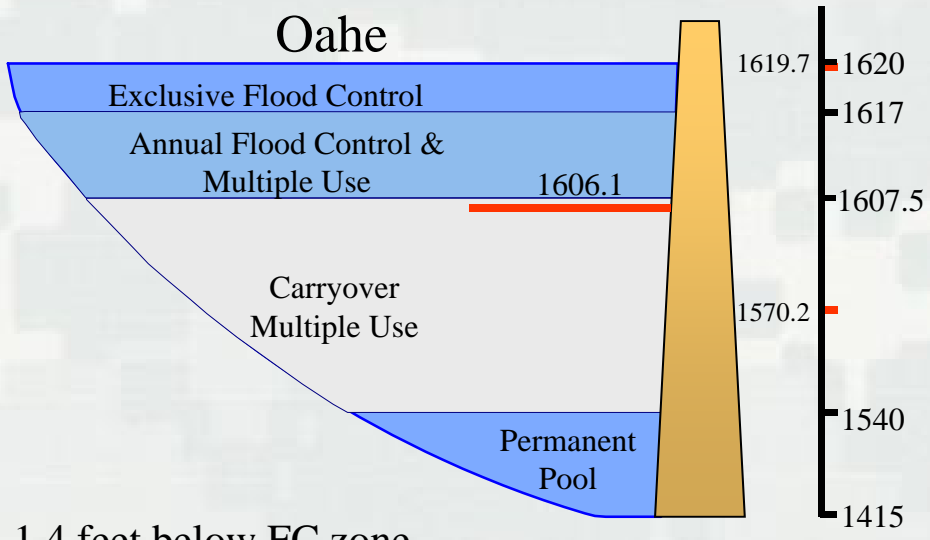
Current Reservoir Levels – April 15, 2012



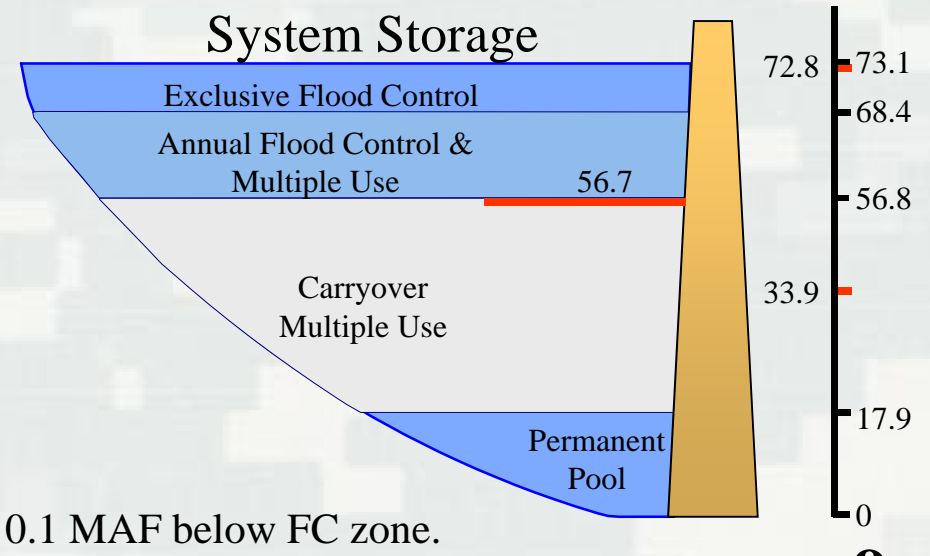
1.2 feet into FC zone.



0.6 foot below FC zone.

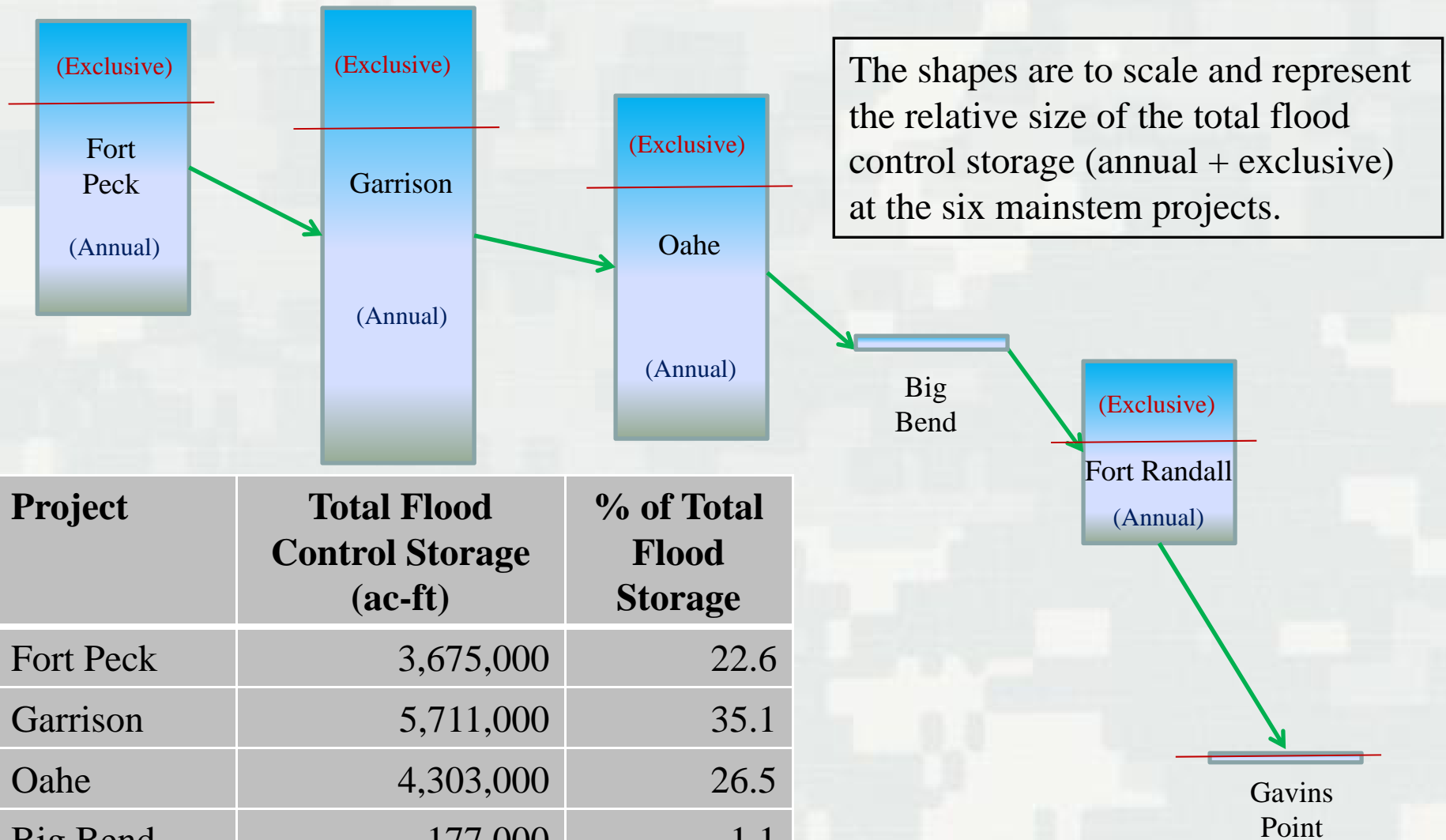


1.4 feet below FC zone.



0.1 MAF below FC zone.

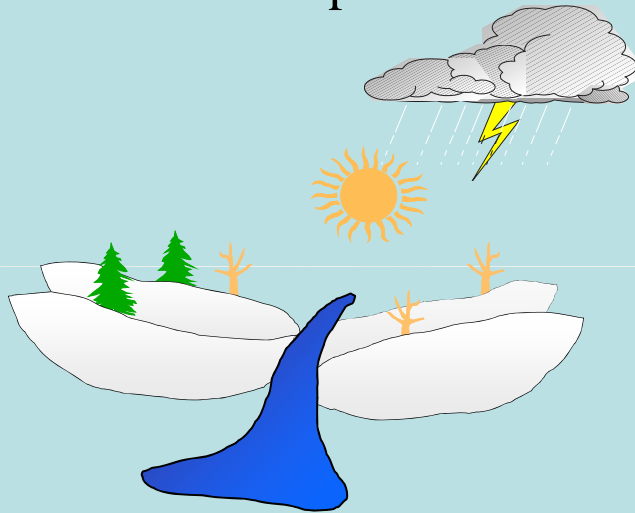
Flood Control Storage



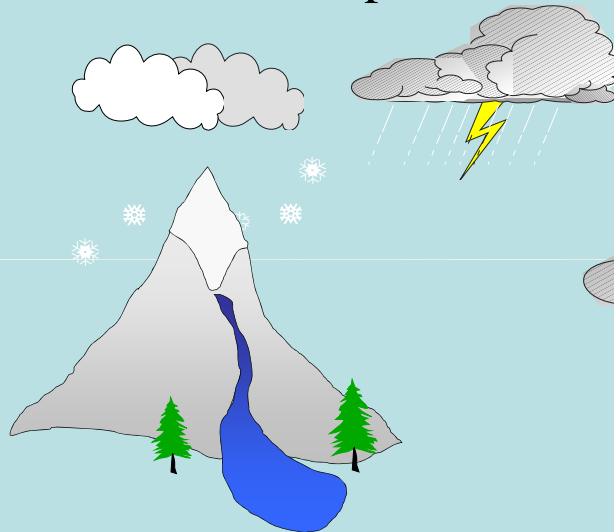
Project	Total Flood Control Storage (ac-ft)	% of Total Flood Storage
Fort Peck	3,675,000	22.6
Garrison	5,711,000	35.1
Oahe	4,303,000	26.5
Big Bend	177,000	1.1
Fort Randall	2,294,000	14.1
Gavins Point	108,000	0.7

Runoff Components

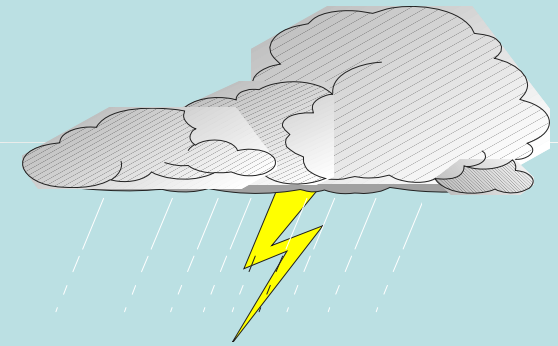
Plains Snowpack



Mountain Snowpack



Rainfall



March and
April

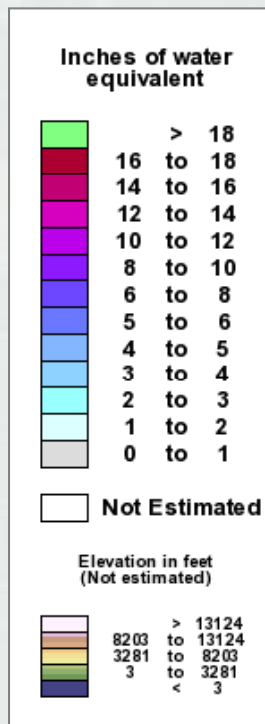
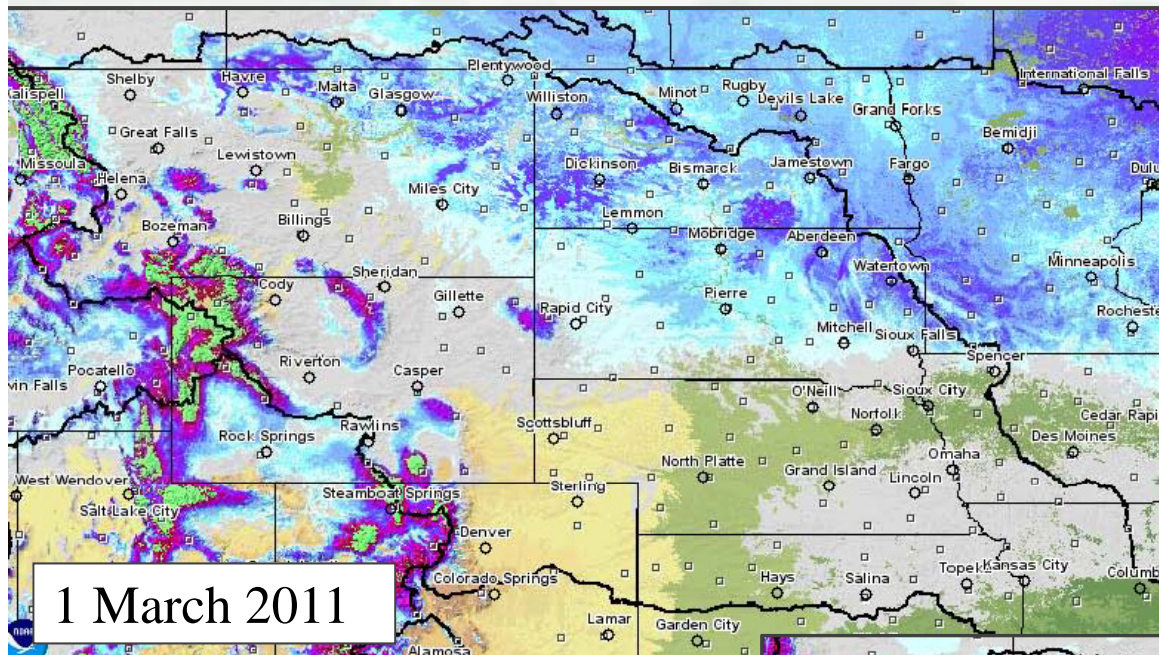
May, June
and July

March through
October

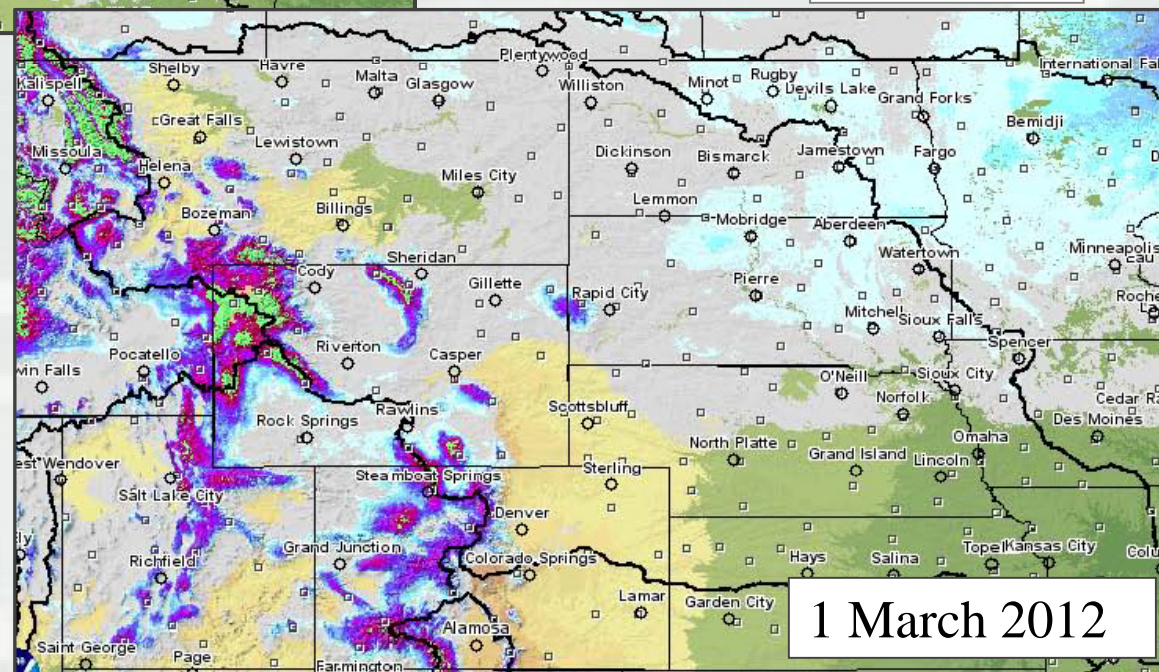
2012 Forecast* = 23.4 MAF

*April 1 Forecast

Plains Snowpack

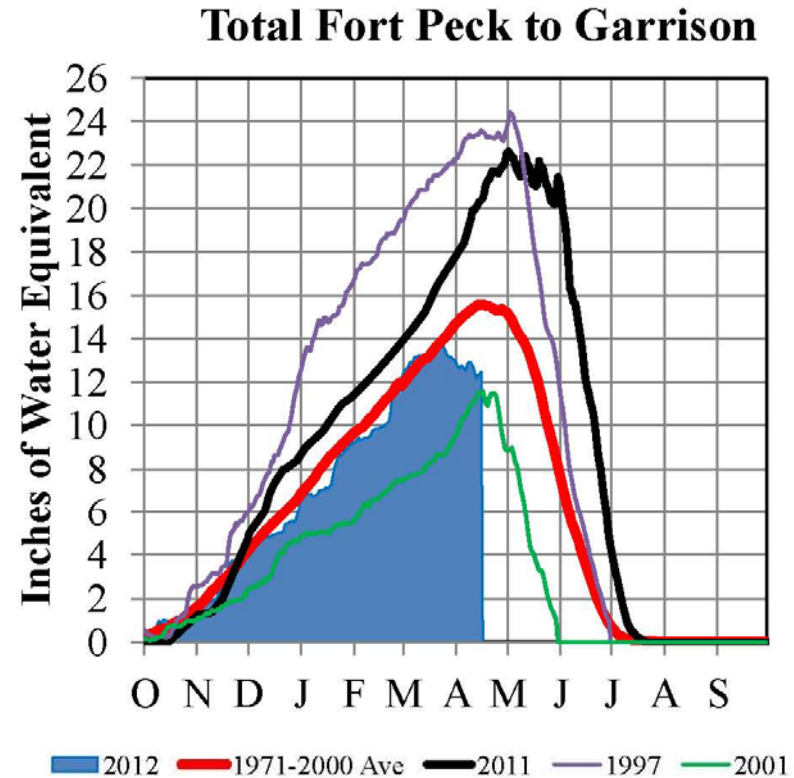
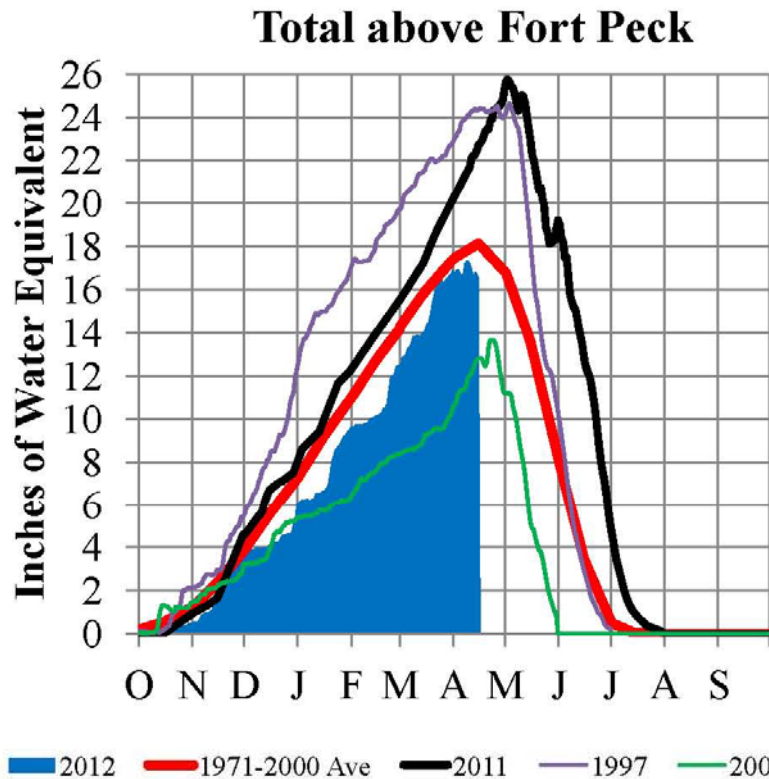


12



Missouri River Basin – Mountain Snowpack Water Content 2011-2012 with comparison plots from 1997*, 2001* and 2011

April 15, 2012

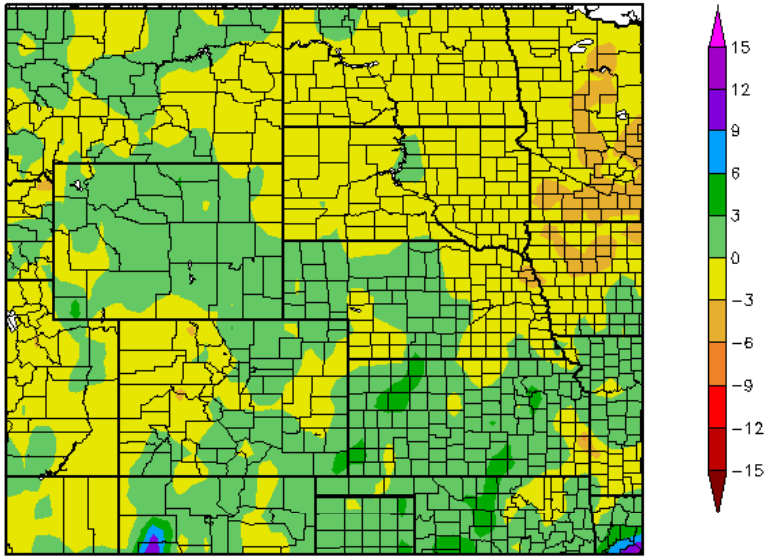


The Missouri River basin mountain snowpack normally peaks near April 15. Normally, 100 percent of the peak accumulation has occurred by April 15. On April 15 the mountain snowpack in the “Total above Fort Peck” reach is currently 92 percent of normal and the “Total Fort Peck to Garrison” reach is currently 80 percent of normal.

*Generally considered the high and low year of the last 20-year period.

Provisional data. Subject to revision.

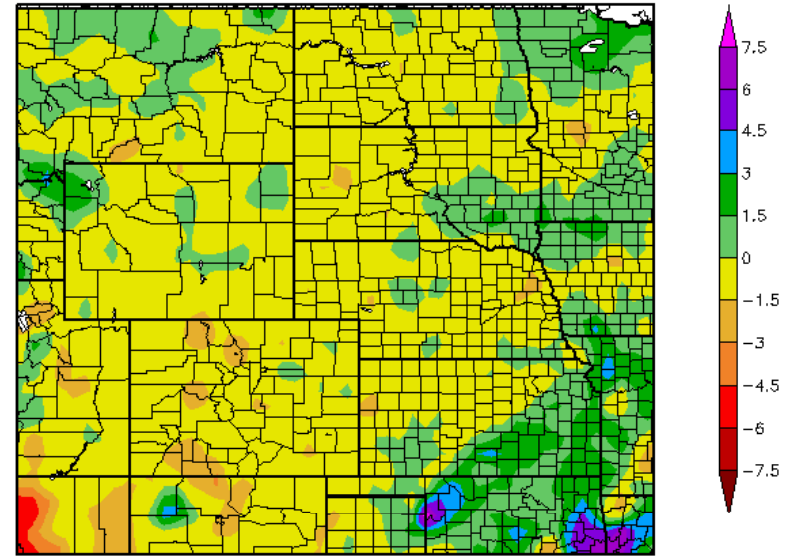
Departure from Normal Precipitation (in)
10/1/2011 – 12/31/2011



Generated 1/11/2012 at HPRCC using provisional data.

Regional Climate Centers

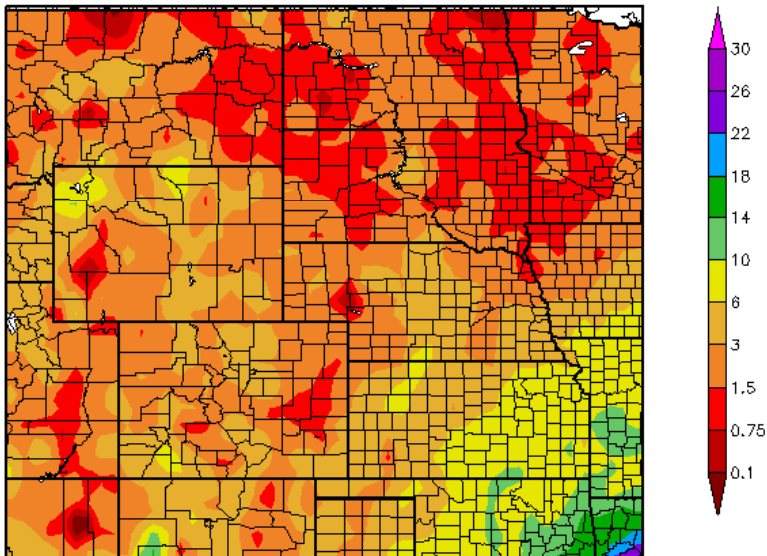
Departure from Normal Precipitation (in)
1/1/2012 – 3/31/2012



Generated 4/5/2012 at HPRCC using provisional data.

Regional Climate Centers

Precipitation (in)
10/1/2011 – 12/31/2011

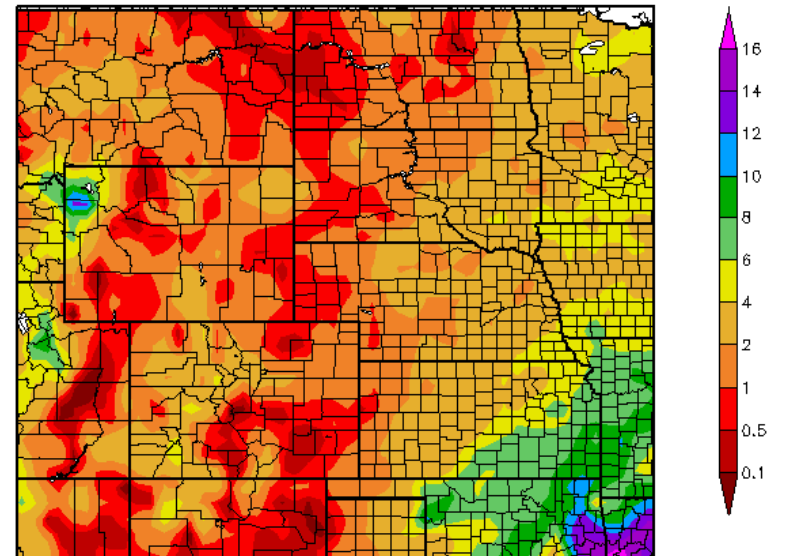


14

Generated 1/11/2012 at HPRCC using provisional data.

Regional Climate Centers

Precipitation (in)
1/1/2012 – 3/31/2012

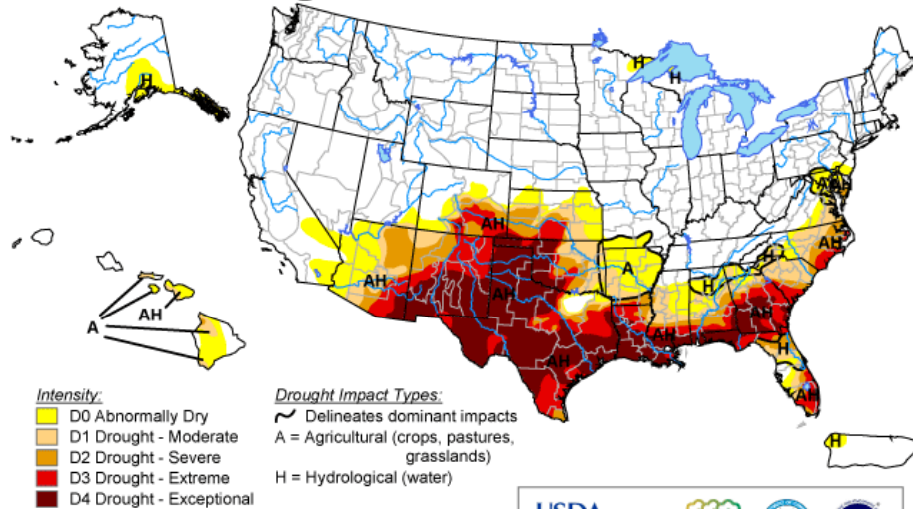


Generated 4/5/2012 at HPRCC using provisional data.

Regional Climate Centers

U.S. Drought Monitor

July 5, 2011
Valid 8 a.m. EDT



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

Drought Impact Types:
 ~ Delineates dominant impacts
 A = Agricultural (crops, pastures, grasslands)
 H = Hydrological (water)



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

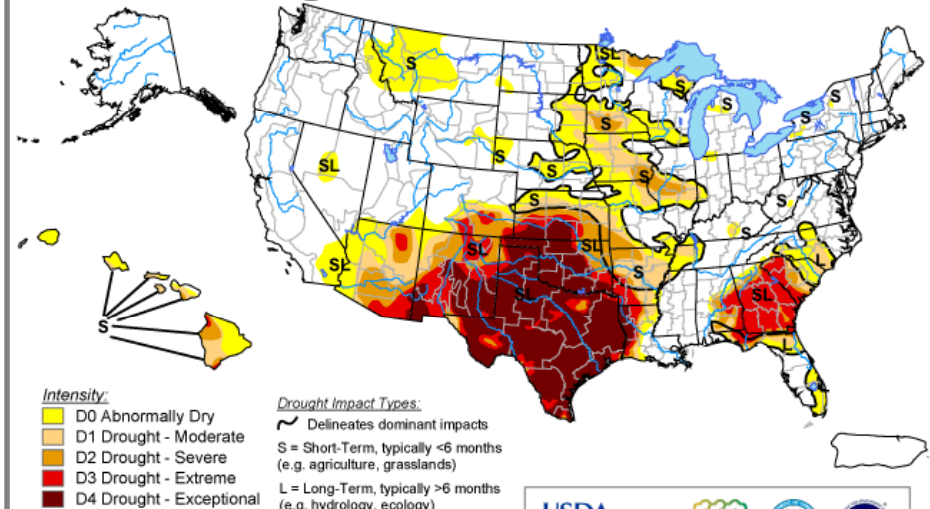
Released Thursday, July 7, 2011

Author: Richard Heim/Liz Love-Brotak, NOAA/NESDIS/NCDC

<http://drought.unl.edu/dm>

U.S. Drought Monitor

October 4, 2011
Valid 8 a.m. EDT



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

Drought Impact Types:
 ~ Delineates dominant impacts
 S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
 L = Long-Term, typically >6 months (e.g. hydrology, ecology)



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

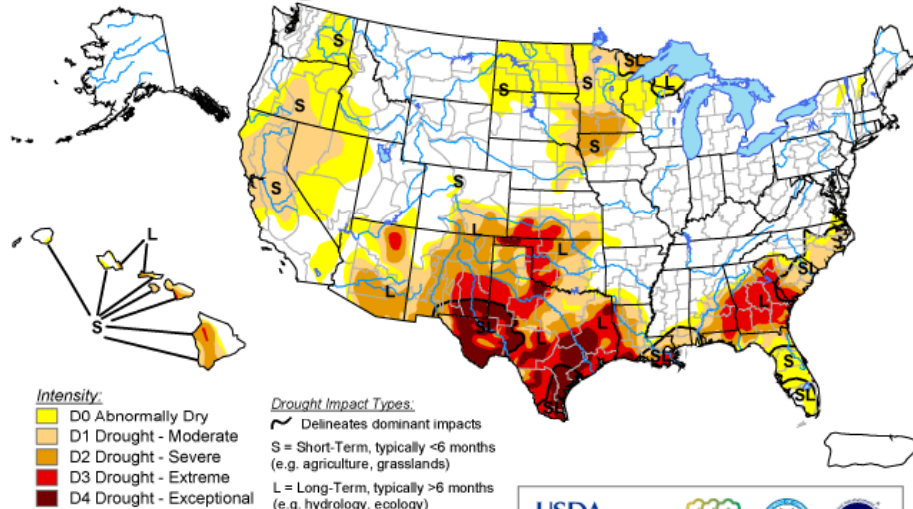
Released Thursday, October 6, 2011

Author: Rich Tinker, CPC/NCEP/NWS/NOAA

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

U.S. Drought Monitor

January 3, 2012
Valid 7 a.m. EST



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

Drought Impact Types:
 ~ Delineates dominant impacts
 S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
 L = Long-Term, typically >6 months (e.g. hydrology, ecology)



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

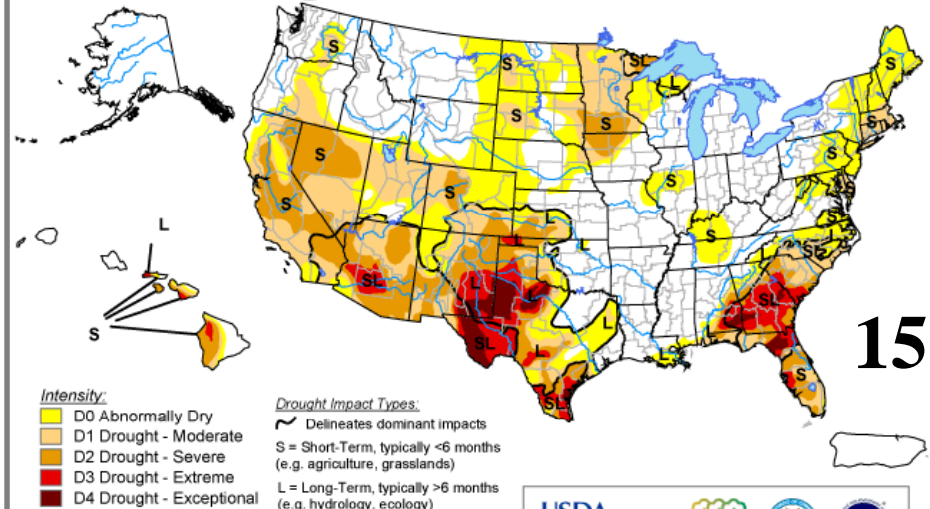
Released Thursday, January 5, 2012

Author: Brad Rippey, U.S. Department of Agriculture

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

U.S. Drought Monitor

April 3, 2012
Valid 7 a.m. EDT



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

Drought Impact Types:
 ~ Delineates dominant impacts
 S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
 L = Long-Term, typically >6 months (e.g. hydrology, ecology)



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

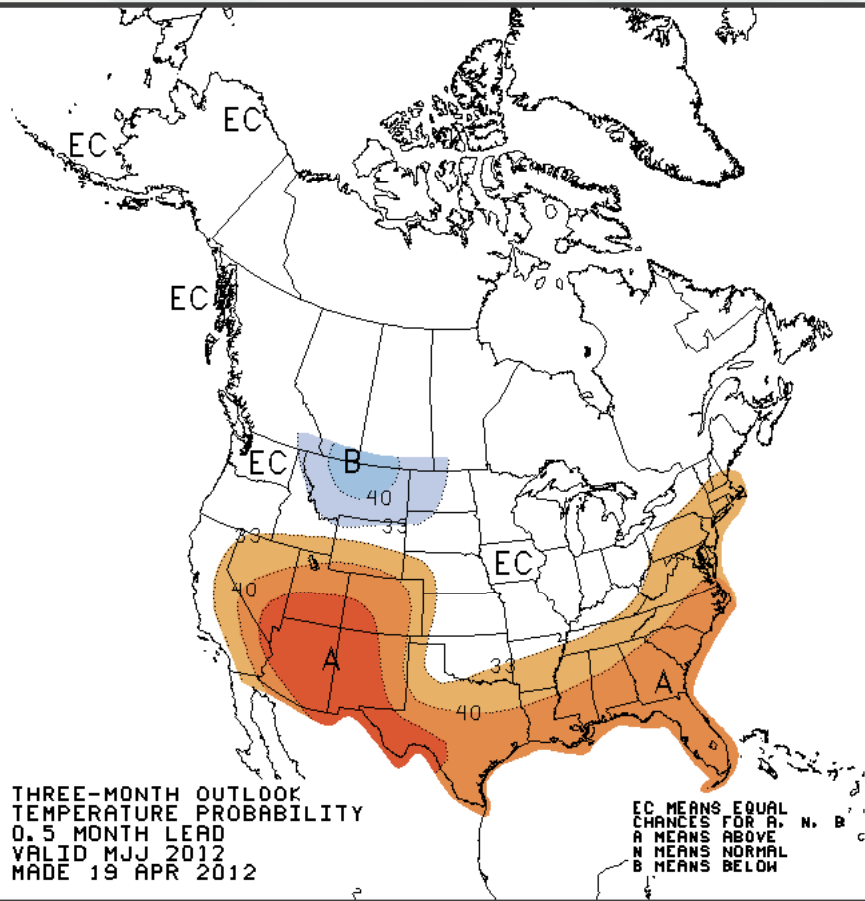
Released Thursday, April 5, 2012

Author: Brian Fuchs, National Drought Mitigation Center

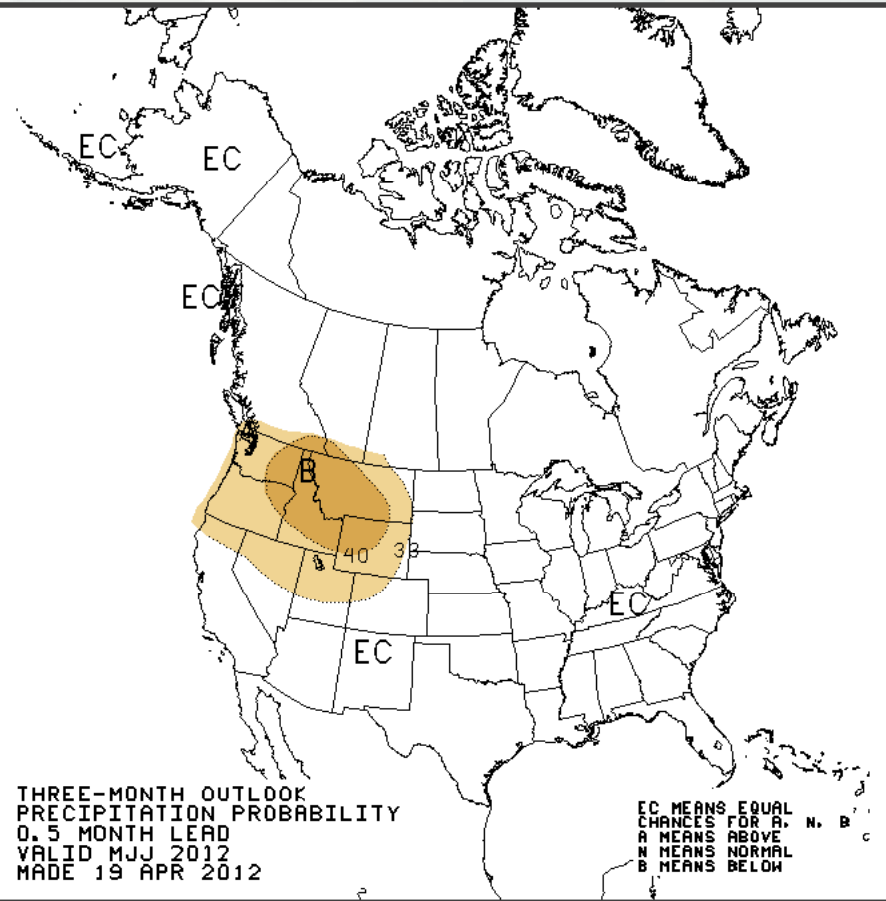
<http://droughtmonitor.unl.edu/>

Climate Outlooks May-June-July

Temperature

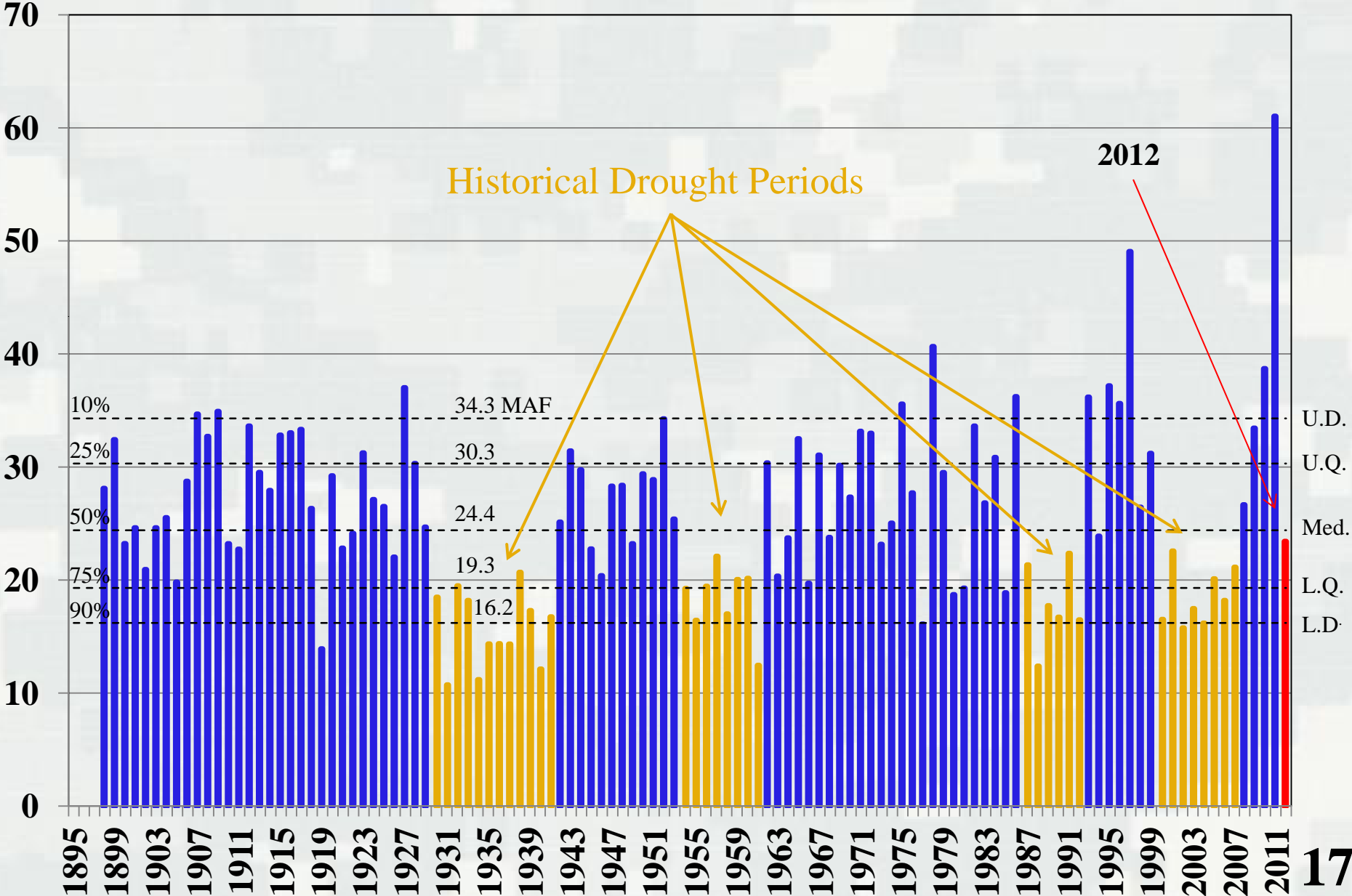


Precipitation

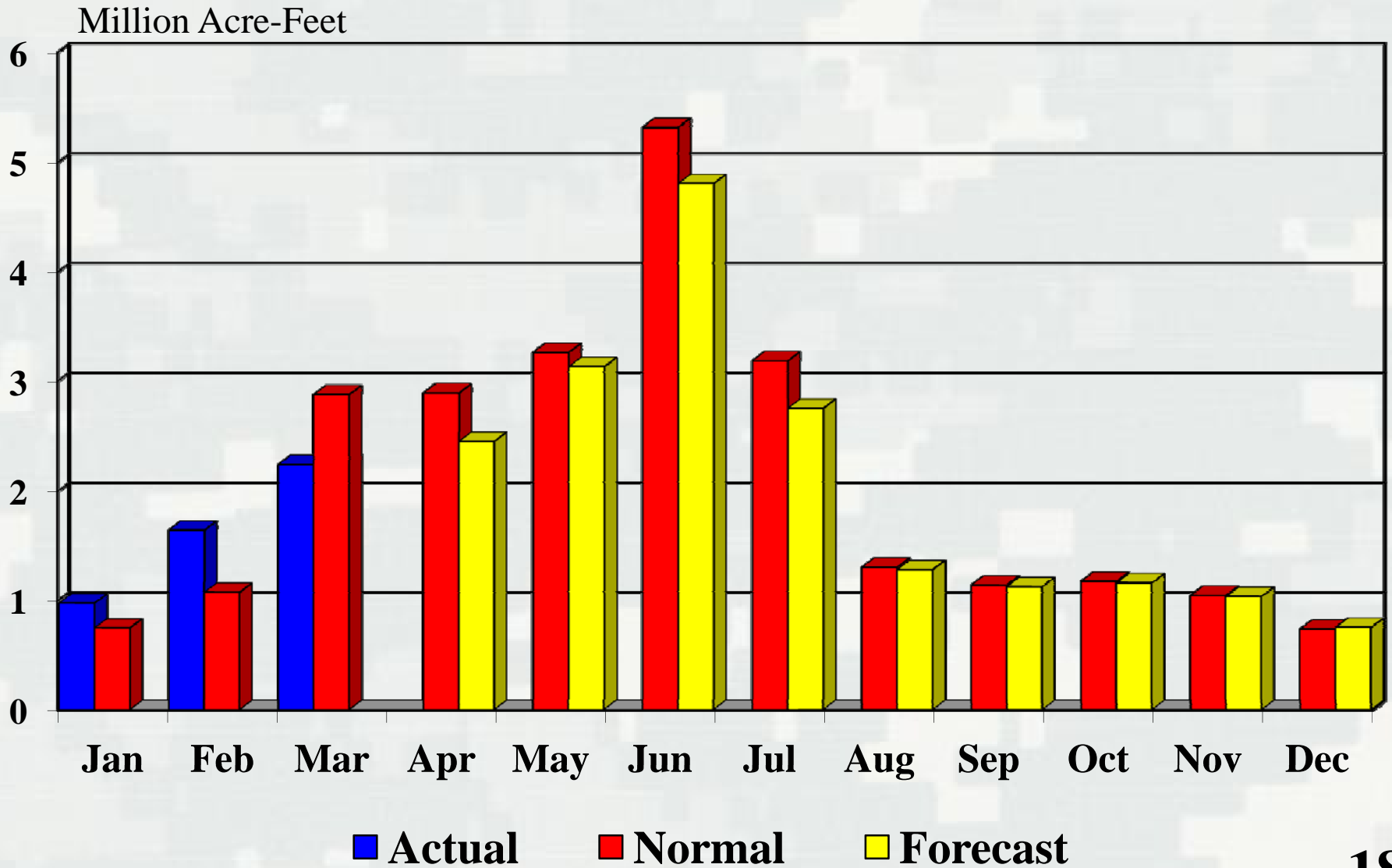


Annual Runoff above Sioux City, IA

Million Acre-Feet



Missouri River Runoff above Sioux City 2012 Actual and Forecasted



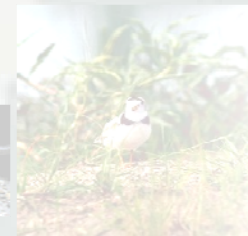
Damages Prevented

Corps Mainstem Projects	\$5.5 billion
Corps Tributary Projects	\$0.2 billion
USBR Projects	\$0.2 billion
Mainstem Urban Levees	\$1.5 billion
Mainstem Nonurban Levees	\$0.1 billion
Corps Local Protection	
Channels and Levees	\$0.2 billion
Emergency Measures	\$0.5 billion
 Total	 \$8.2 billion



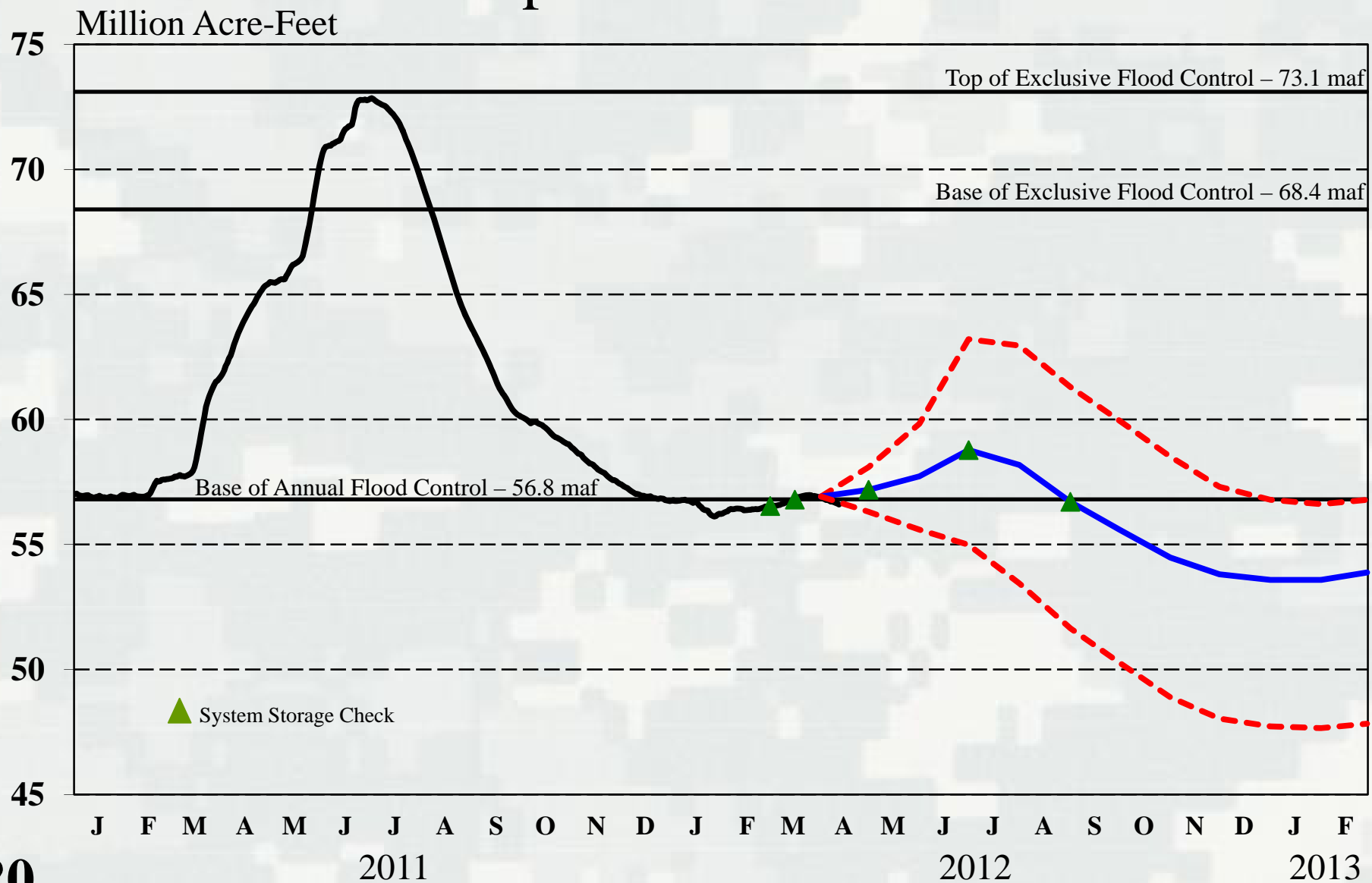
BUILDING STRONG®

Expected Results for Authorized Purposes in 2012



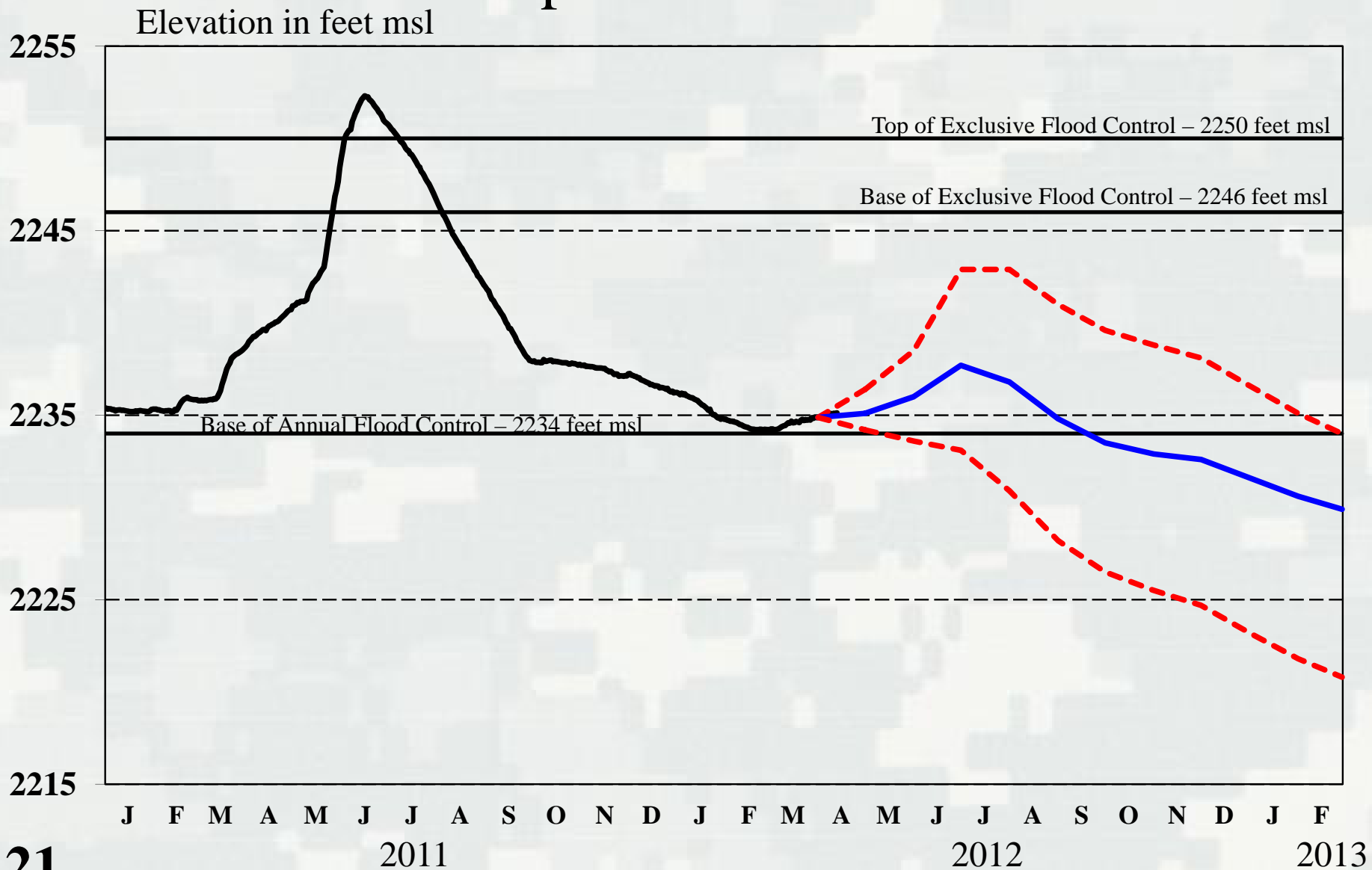
System Storage

April 1 Forecast



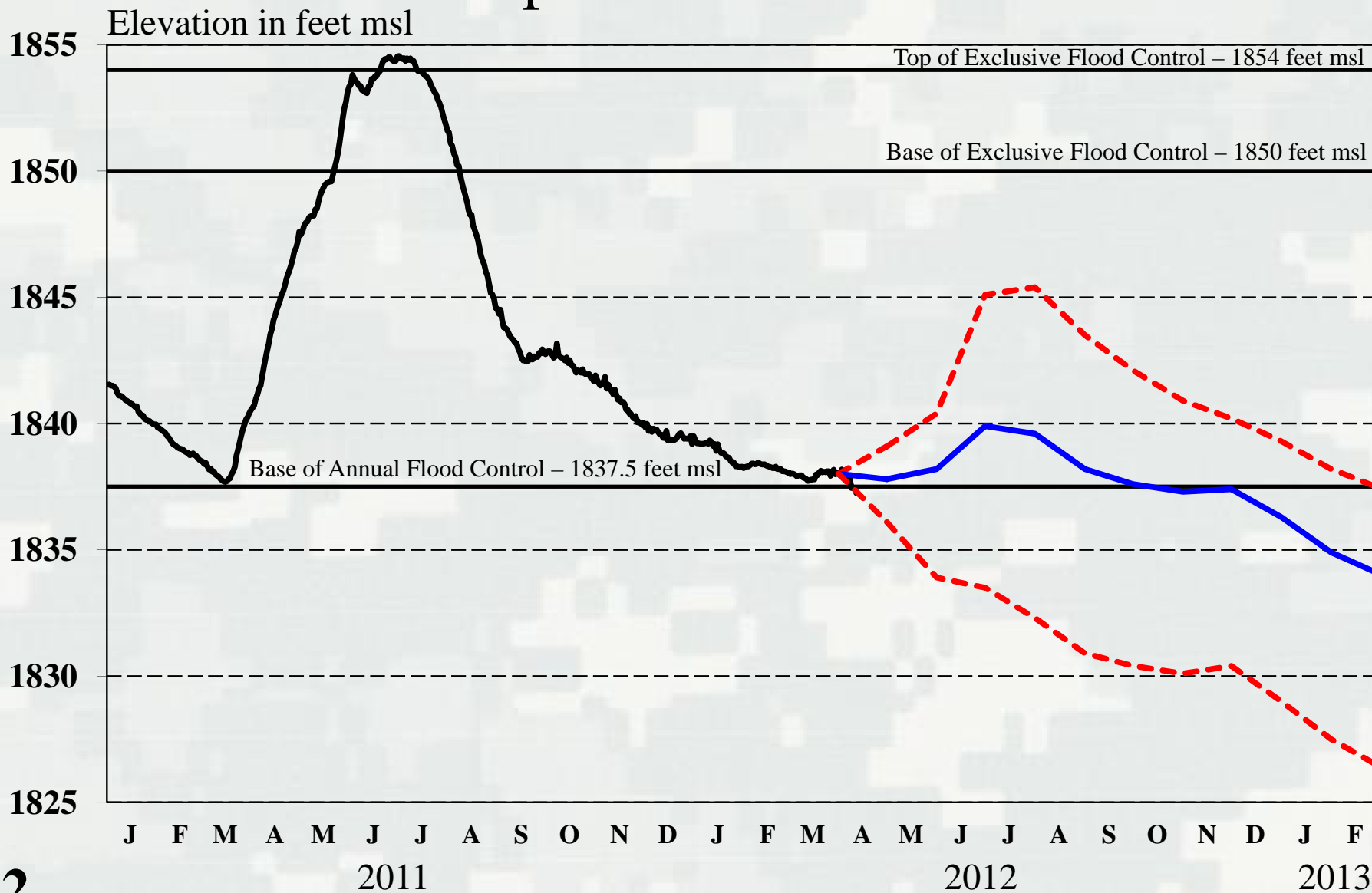
Fort Peck

April 1 Forecast



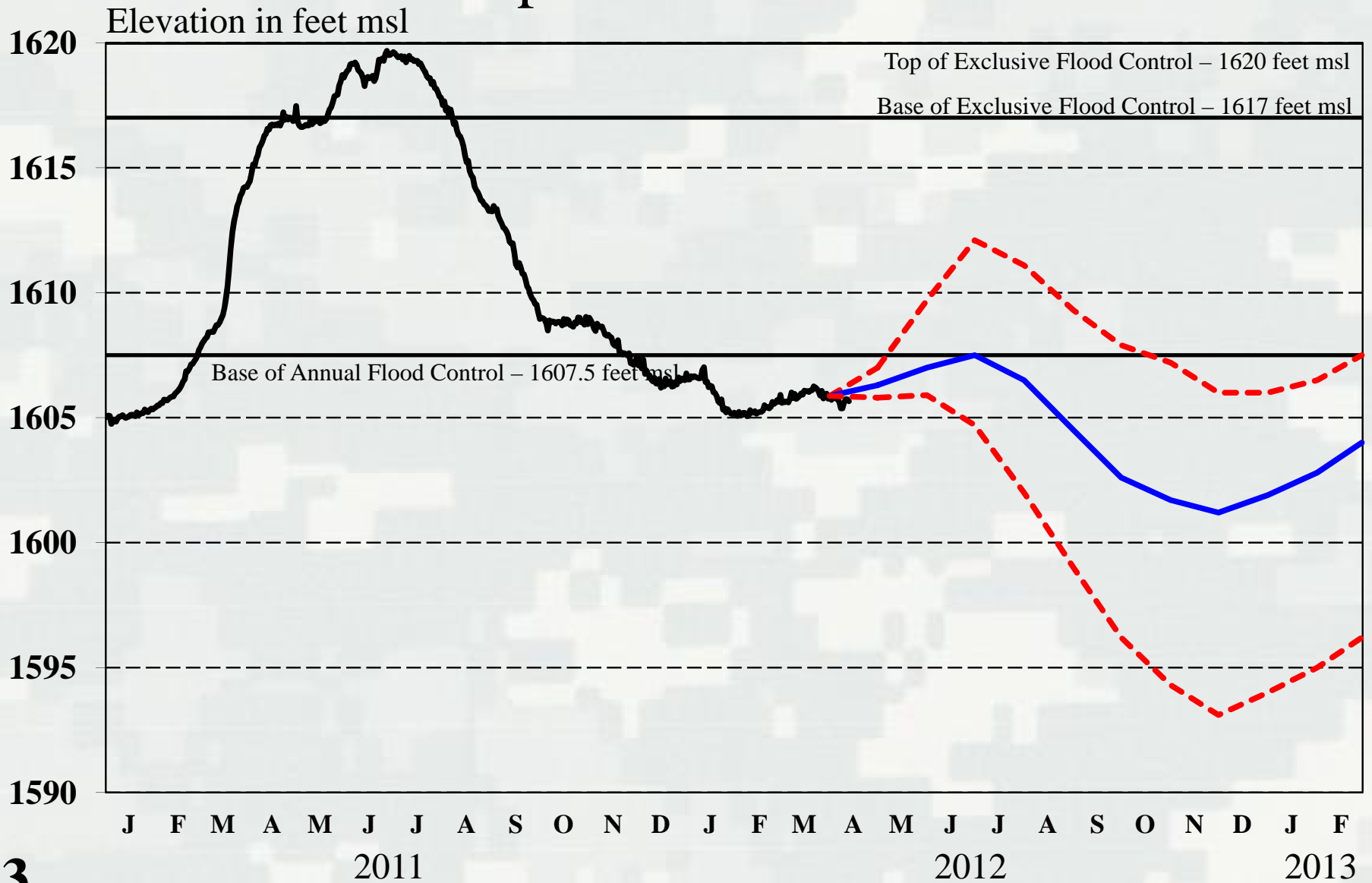
Garrison

April 1 Forecast



Oahe

April 1 Forecast



Flood Control

- All flood storage space available at start of runoff season (plus 0.7 MAF)
- Risk of snowmelt driven flooding is low, however rainfall driven flooding can still occur
- It's still early...

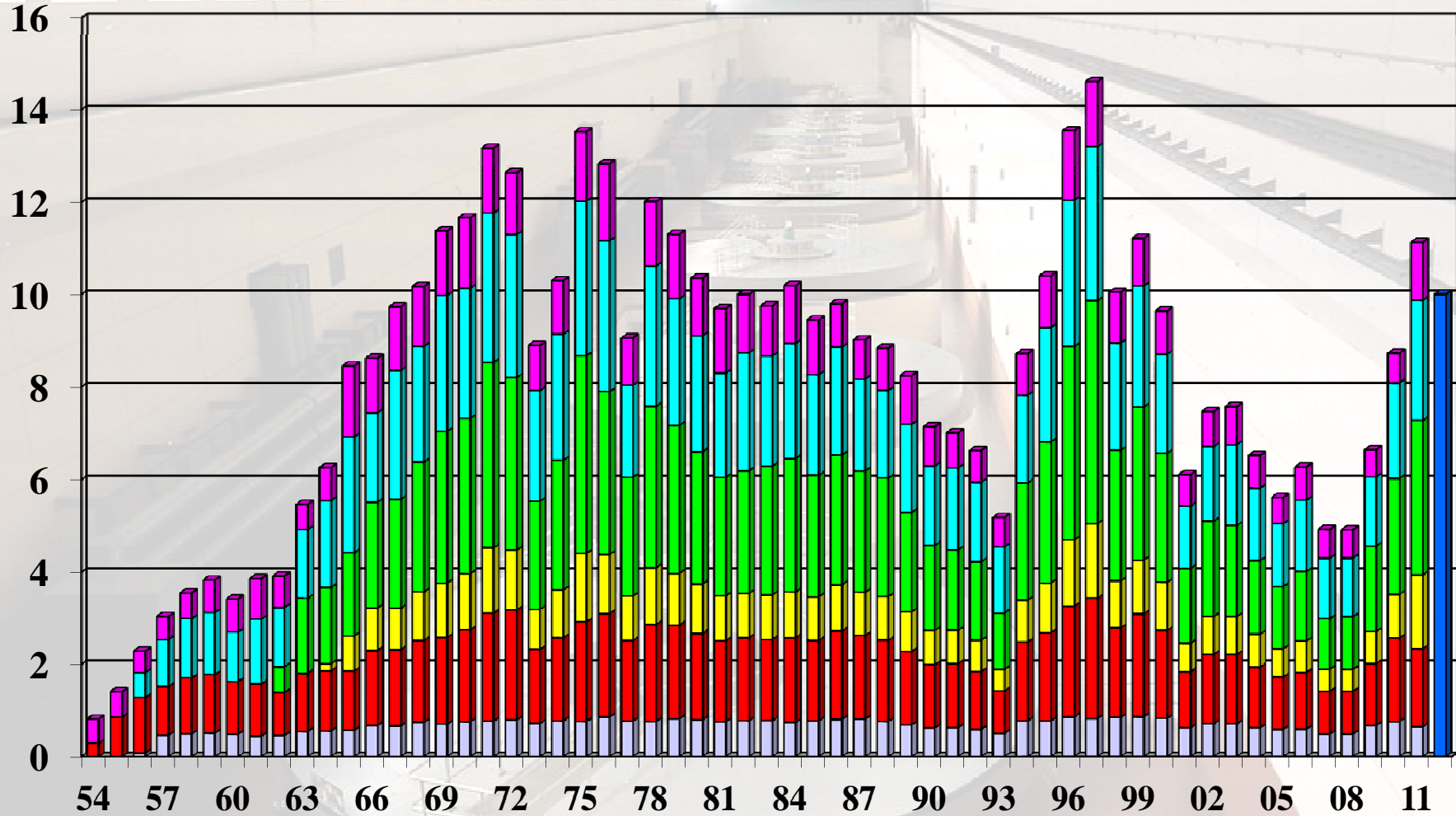
HA, NEBR.

13

FLOODWALL WITH EMERGENCY FLASH BOARDING

Hydropower

Billion kWh



□ Gavins Point ■ Ft. Randall ■ Big Bend ■ Oahe ■ Garrison ■ Fort Peck ■ Forecast

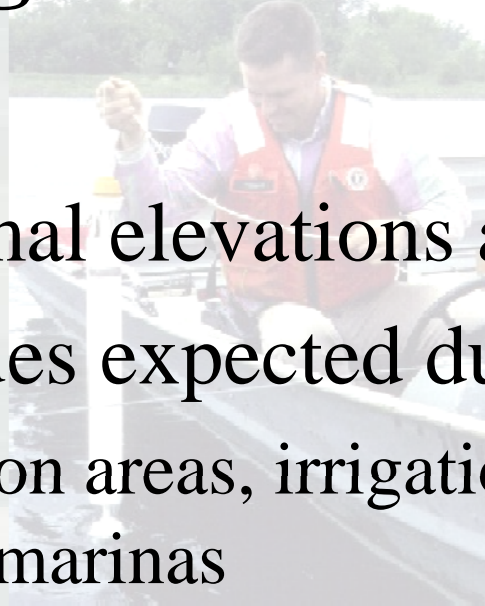
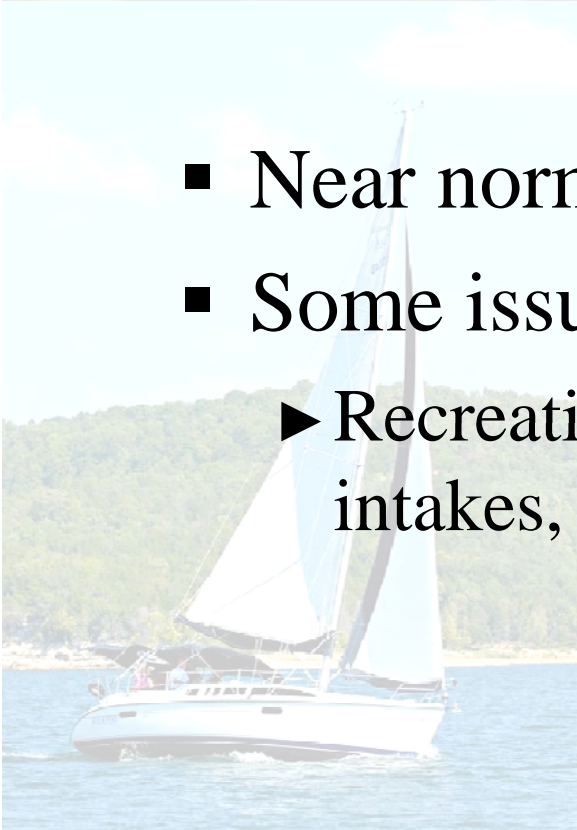
Navigation

- **March 15 storage check**
 - ▶ Full service flow support
 - ▶ Target locations
 - Sioux City (31,000 cfs)
 - Omaha (31,000 cfs)
 - Nebraska City (37,000 cfs)
 - Kansas City (41,000 cfs)
- **July 1 storage check**
 - ▶ Full service support for Basic and Upper Basic
 - ▶ 1,600 cfs below Full Service for Lower Basic
 - ▶ Full length season Basic and Lower Basic
 - ▶ 10-Day extension for Upper Basic

Water Supply – Water Quality

Irrigation – Recreation

- Near normal elevations and releases
- Some issues expected due to 2011 flood
 - ▶ Recreation areas, irrigation, water supply intakes, marinas



Fish and Wildlife

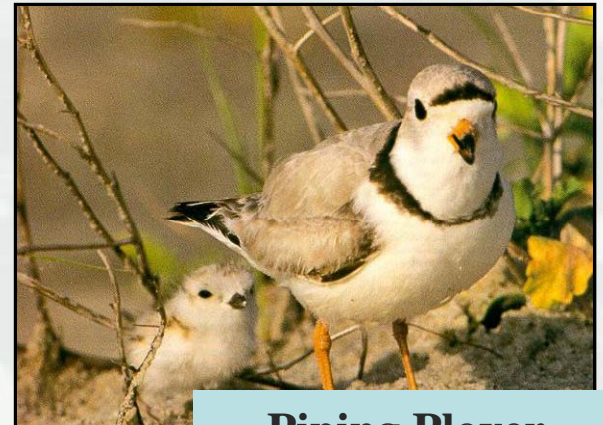
- Steady to rising levels at upper three reservoirs during forage fish spawn
 - ▶ Favor Fort Peck and Oahe if runoff not sufficient
- Minimize zero releases at Fort Randall

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

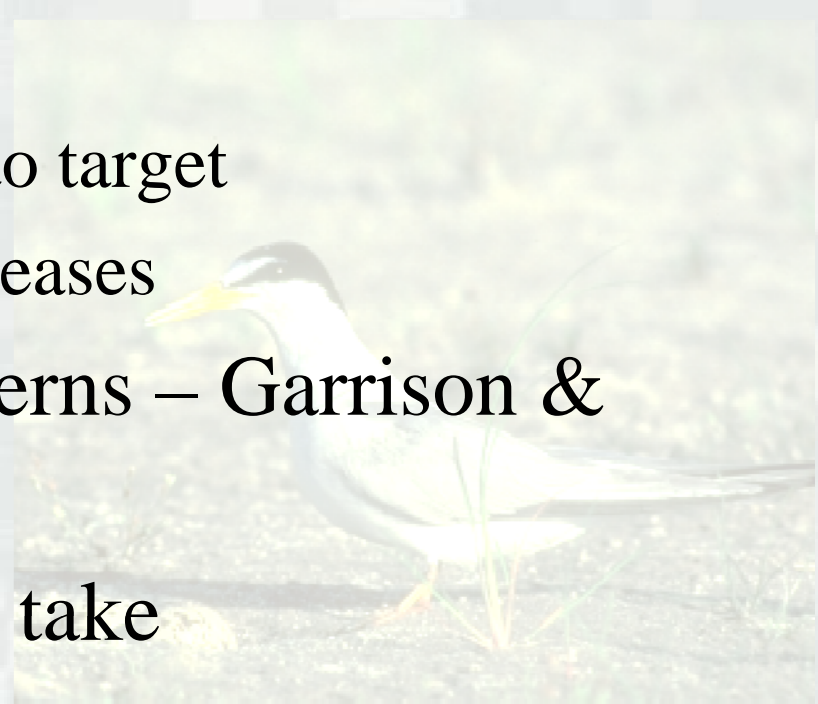
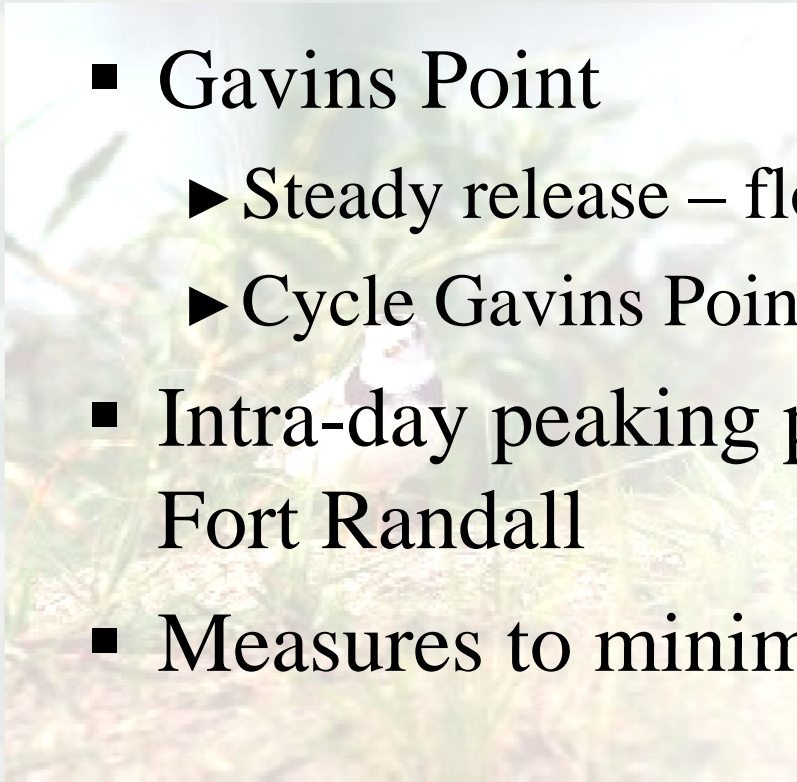


Pallid Sturgeon
Listed "Endangered" 1990

Threatened and Endangered Species

Piping Plover and Least Tern

- Gavins Point
 - ▶ Steady release – flow to target
 - ▶ Cycle Gavins Point releases
- Intra-day peaking patterns – Garrison & Fort Randall
- Measures to minimize take



Threatened and Endangered Species

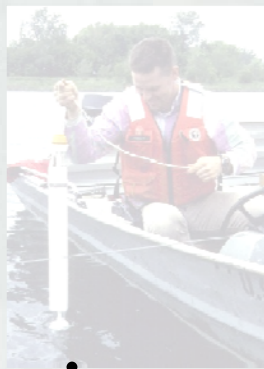
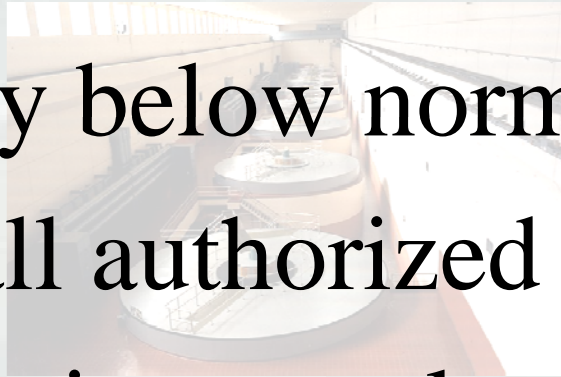
Bi-Modal Spring Pulse – Pallid Sturgeon

- 2003 Amended Biological Opinion – Reasonable and Prudent Alternative
- March and May pulses – not implemented in 2012
- Working with US Fish and Wildlife Service on path forward



Summary

- Slightly below normal runoff
- Meet all authorized purposes
- Addressing panel recommendations
- Flood repair work on-going



Thank You!

Jody Farhat, P.E.	402.996.3840	jody.s.farhat@usace.army.mil
Kevin Grode, P.E.	402.996.3870	kevin.r.grode@usace.army.mil
Mike Swenson, P.E.	402.996.3860	michael.a.swenson@usace.army.mil

<http://www.nwd-mr.usace.army.mil/rcc/>

