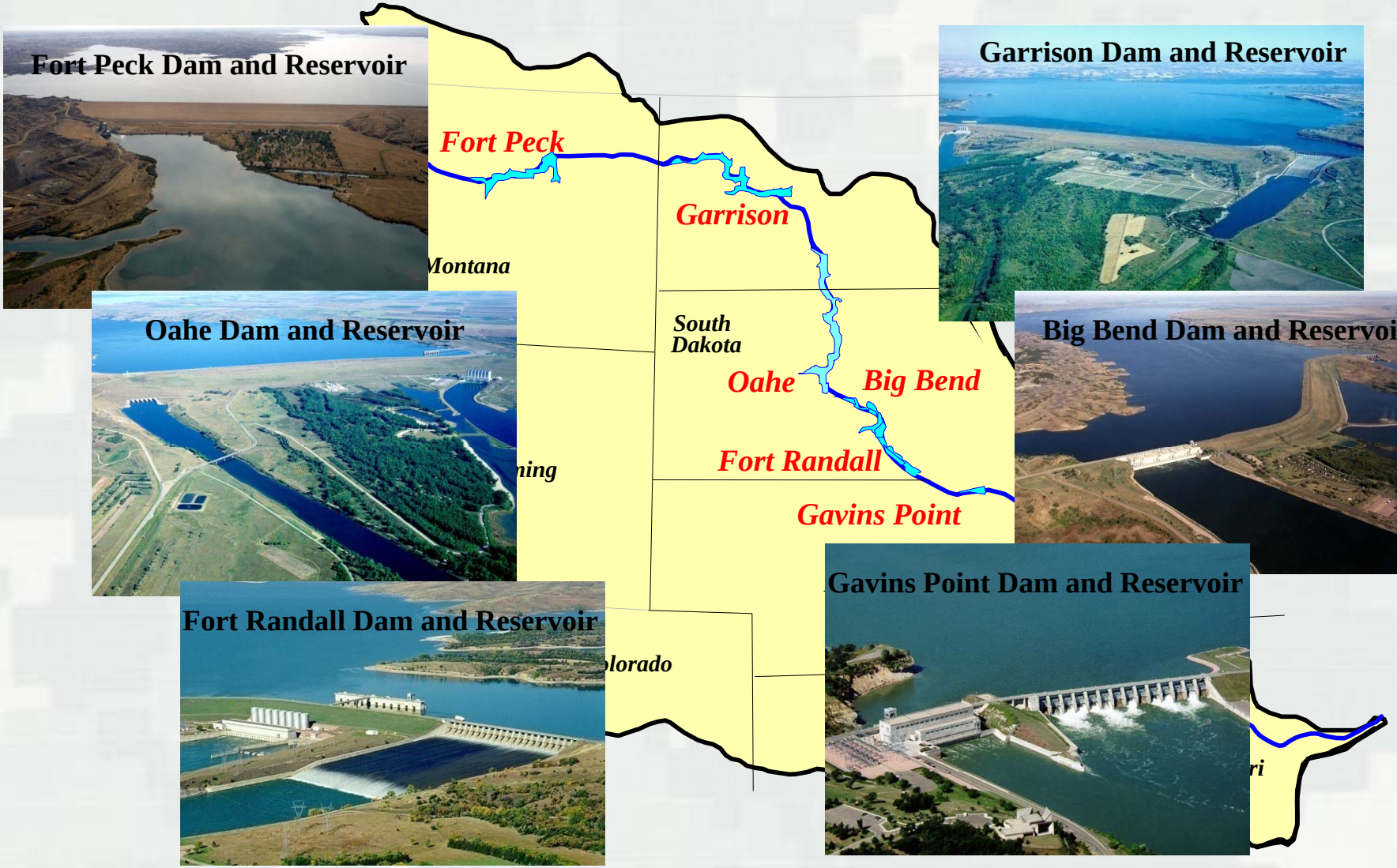
Missouri River Basin Water Management
Fall 2010 Annual Operating Plan Public Meetings

October 19th	11:00 a.m.	Fort Peck, MT
October 19th	7:00 p.m.	Bismarck, ND
October 20th	1:00 p.m.	Pierre, SD
October 20th	7:00 p.m.	S. Sioux City, NE
October 21st	1:00 p.m.	St. Joseph, MO
October 21st	7:00 p.m.	Jefferson City, MO

US Army Corps of Engineers
BUILDING STRONG®

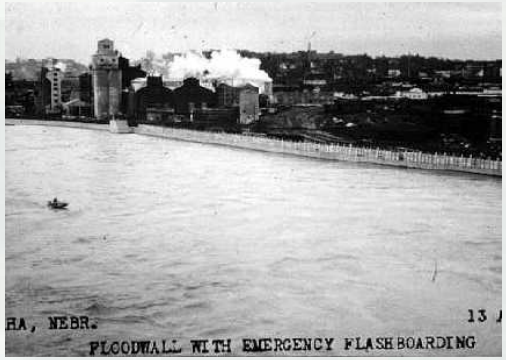
Missouri River Mainstem Reservoir System



Our Mission

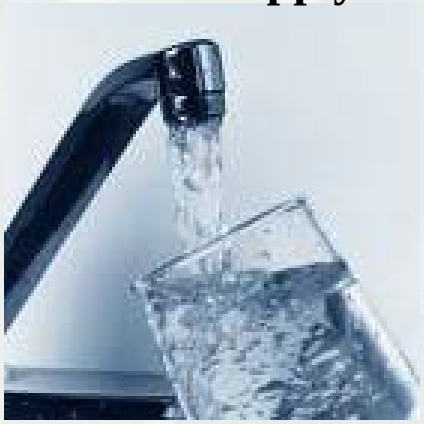
Regulate Missouri River Mainstem Reservoirs to Support Congressionally Authorized Purposes

Flood Control



Hydropower

Water Supply



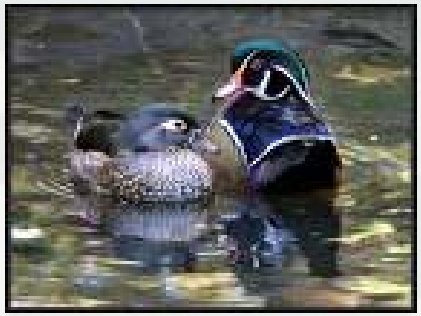
Water Quality Control

Recreation

Navigation

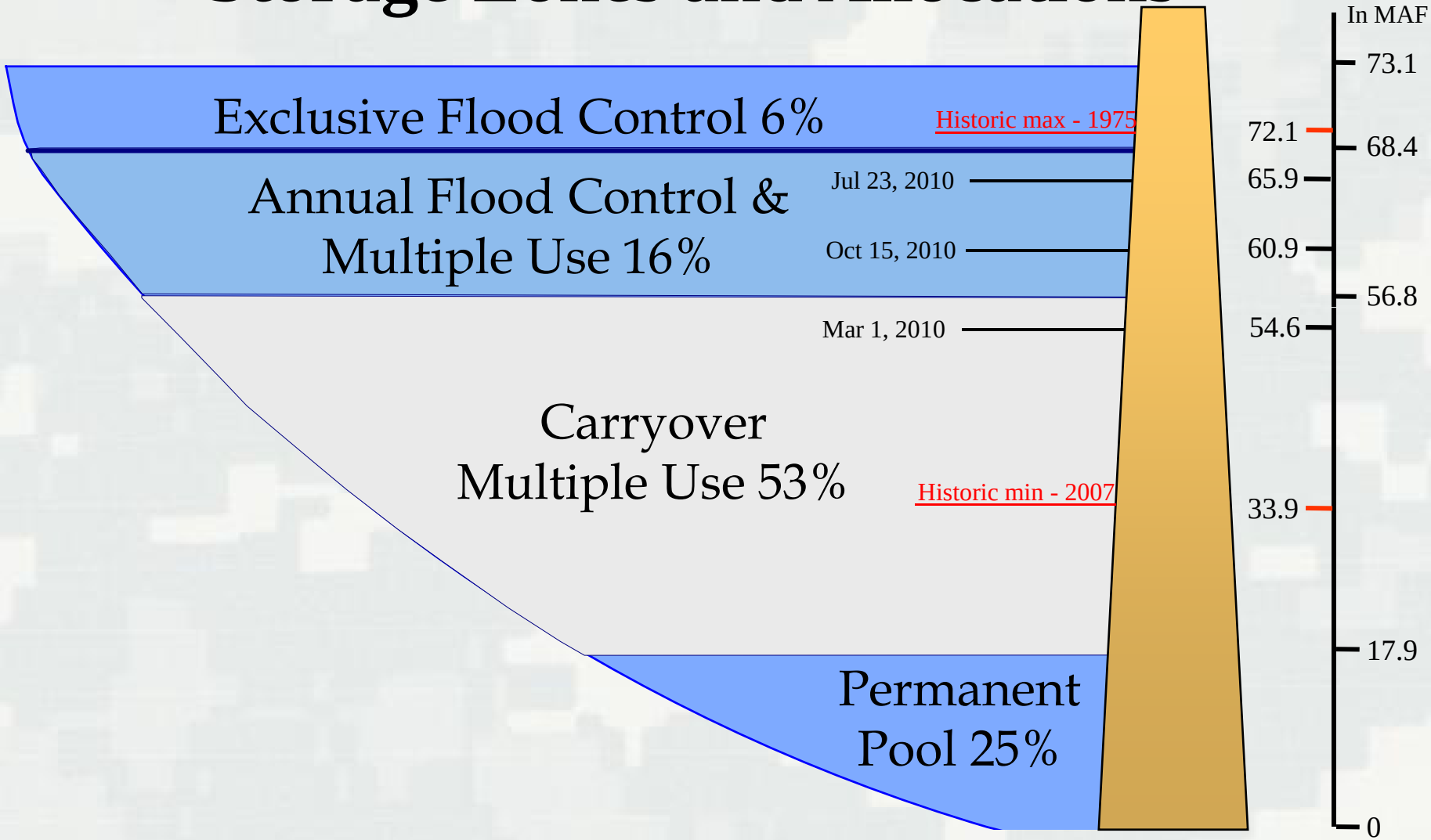
Irrigation

Fish and Wildlife

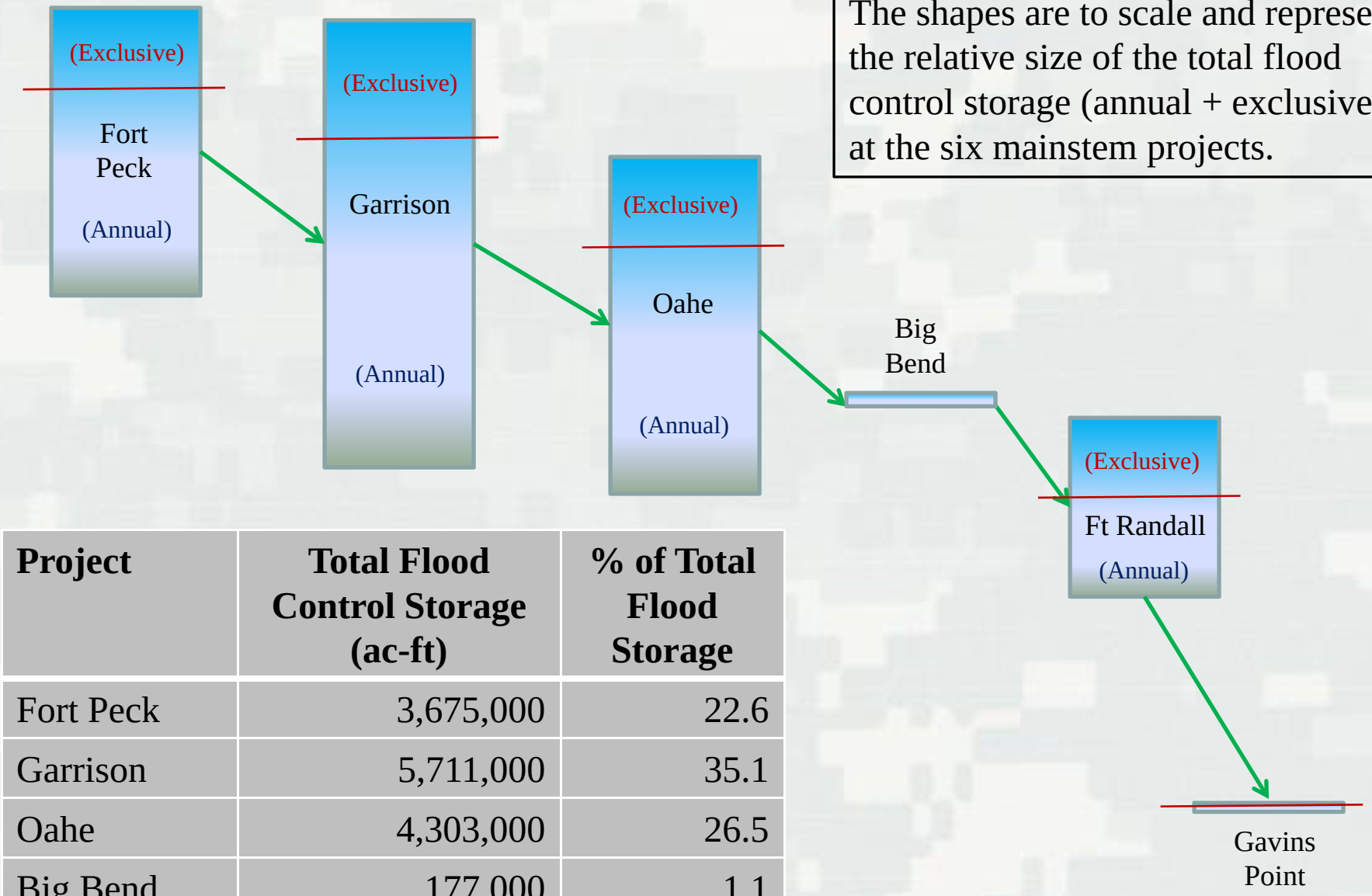


T&E

Missouri River Mainstem System Storage Zones and Allocations

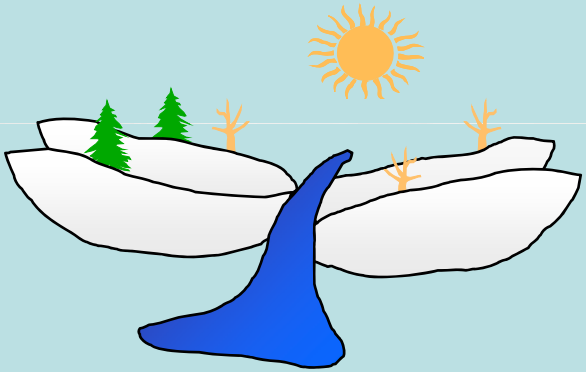
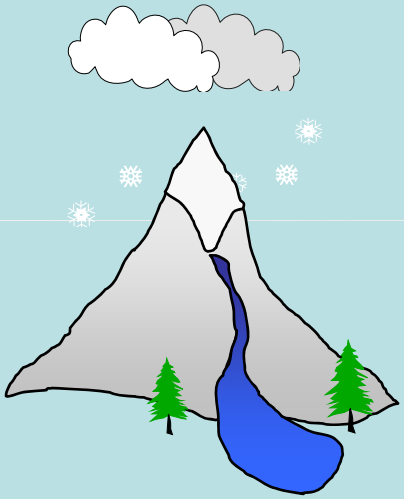
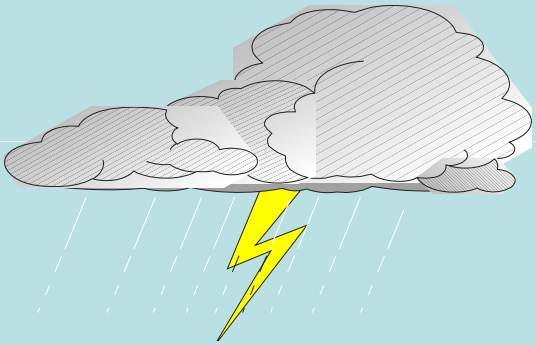


The shapes are to scale and represent the relative size of the total flood control storage (annual + exclusive) at the six mainstem projects.



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

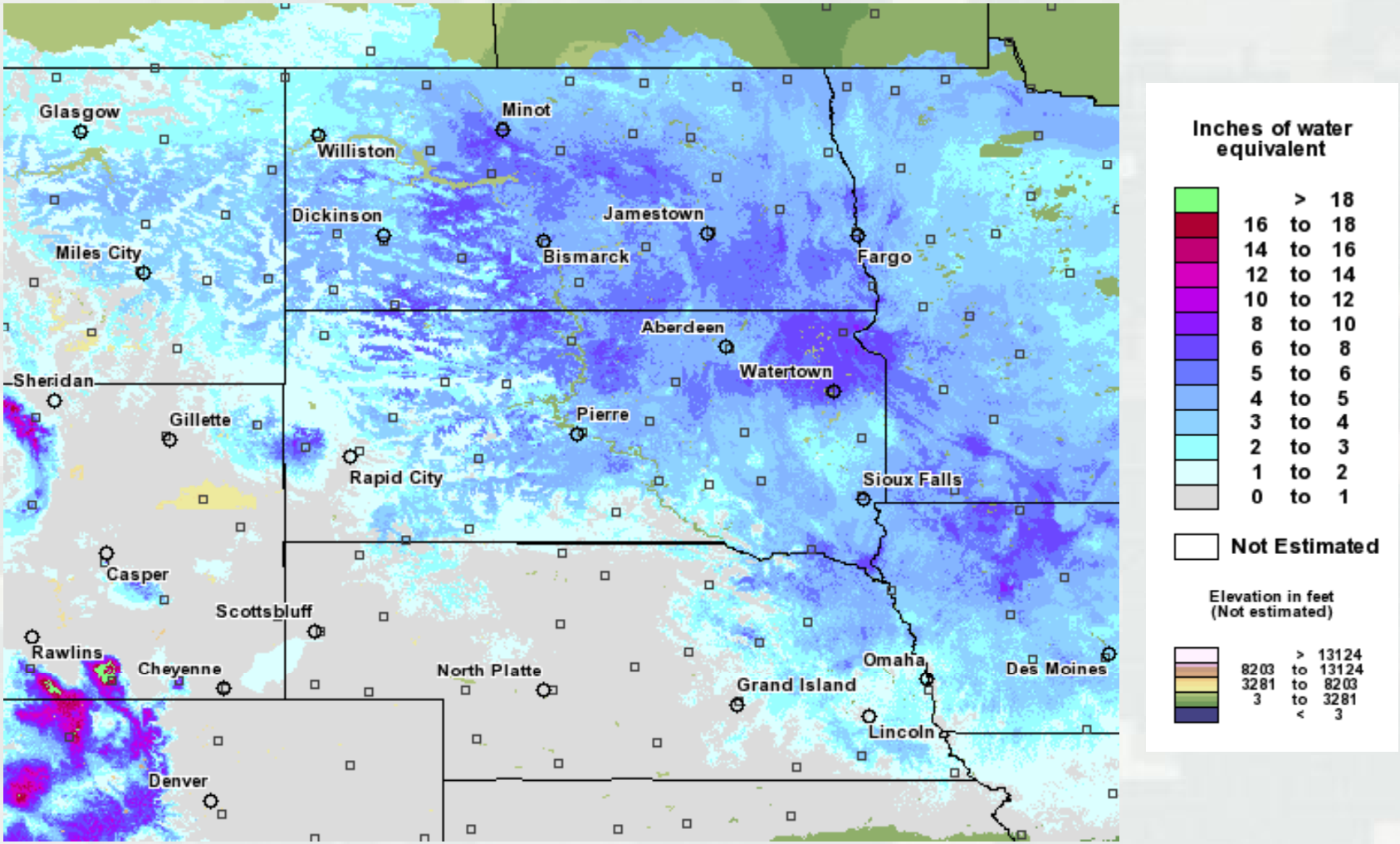
Runoff Components

Plains Snowpack	Mountain Snowpack	Rainfall
		
March and April	May, June and July	March through October

2010 Forecast = 38.7 MAF

(3rd highest of 113 years of record)

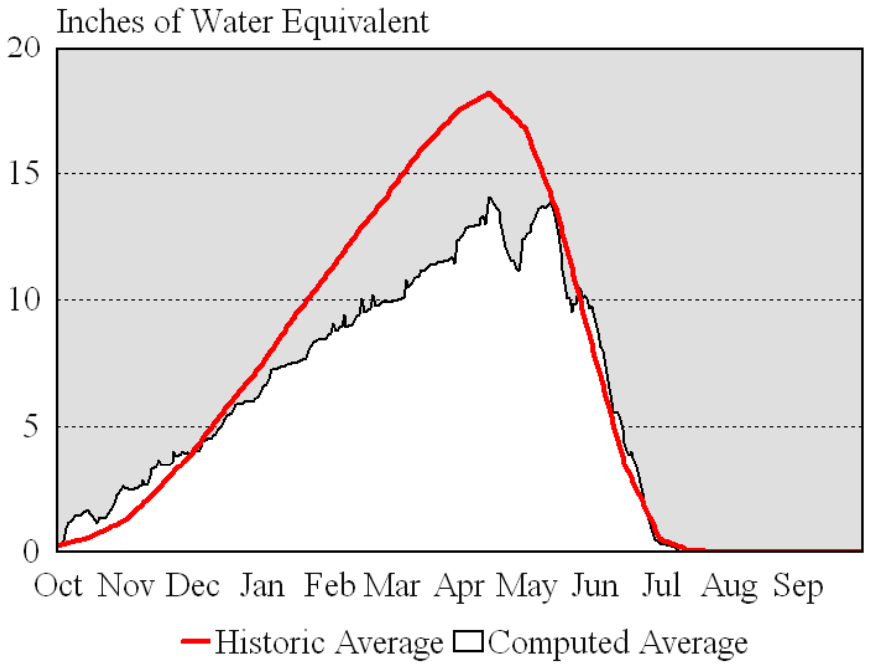
Plains Snowpack



20 February 2010

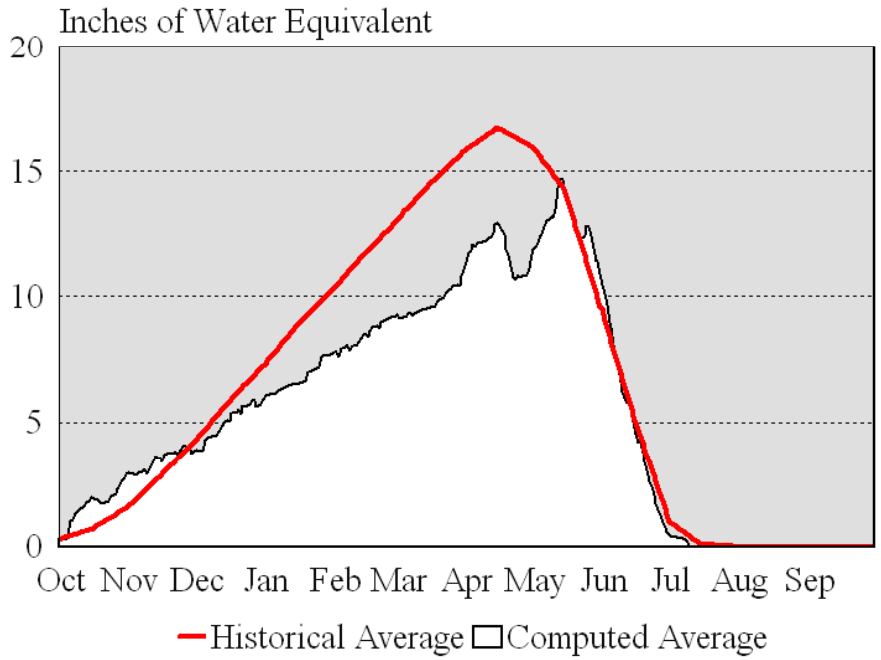
Missouri River Basin
Mountain Snowpack Water Content
2009-2010

Total Above Fort Peck



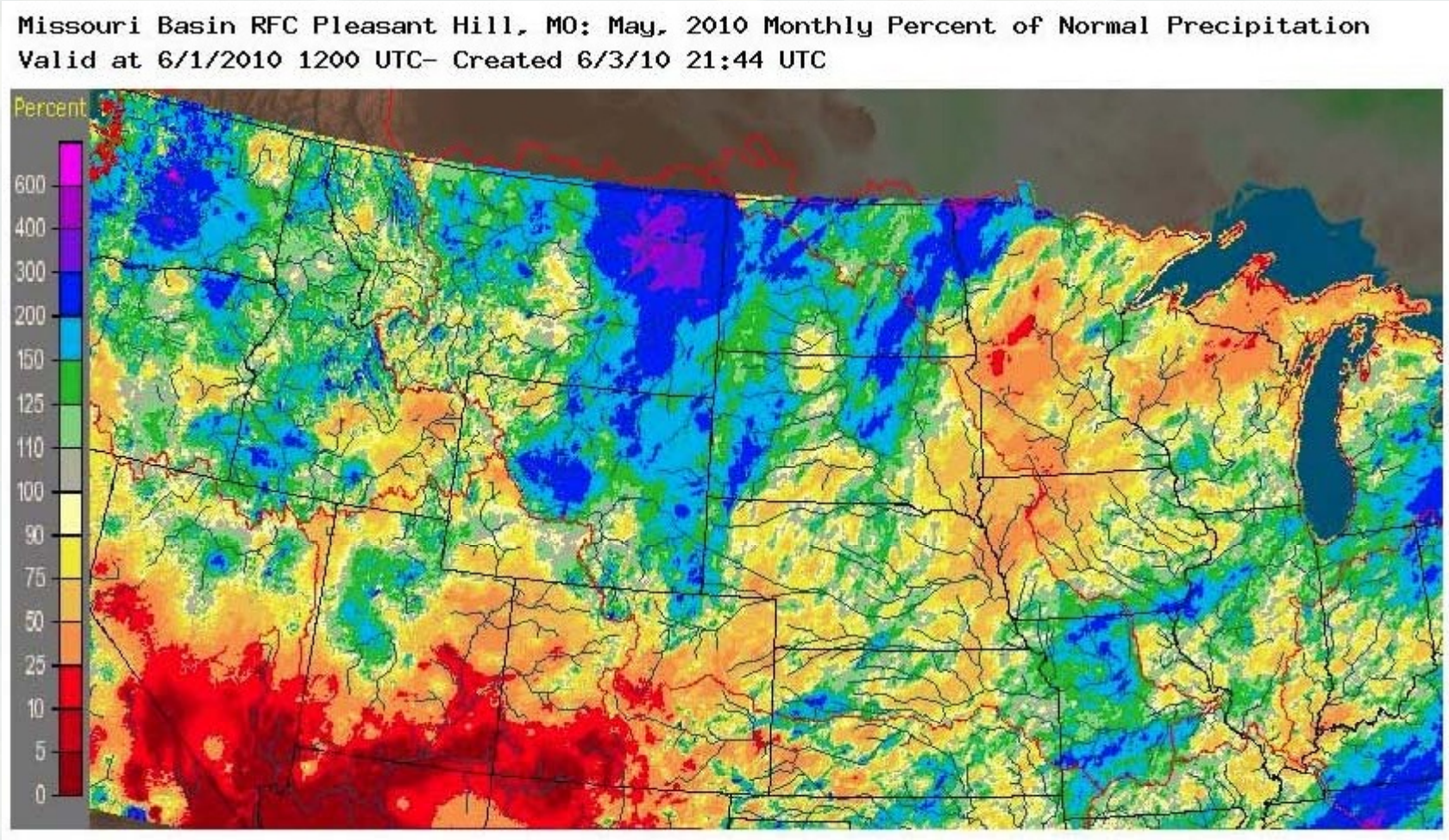
The Mountain snowpack in the reach above Fort Peck peaked on April 15 at 77% of the normal peak accumulation.

Total Fort Peck to Garrison

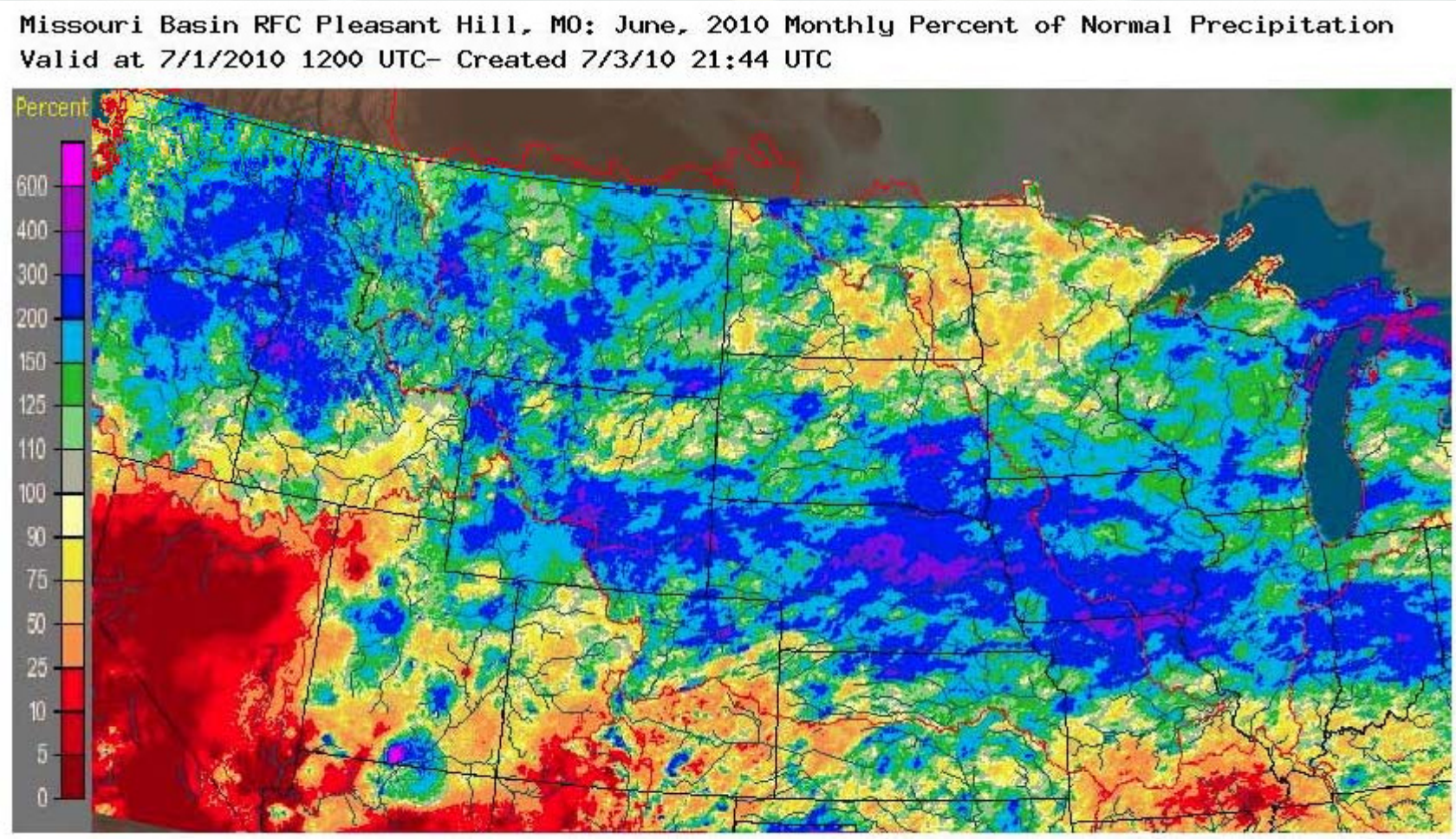


The Mountain snowpack in the reach between Fort Peck and Garrison peaked on May 13 at 88% of the normal peak accumulation.

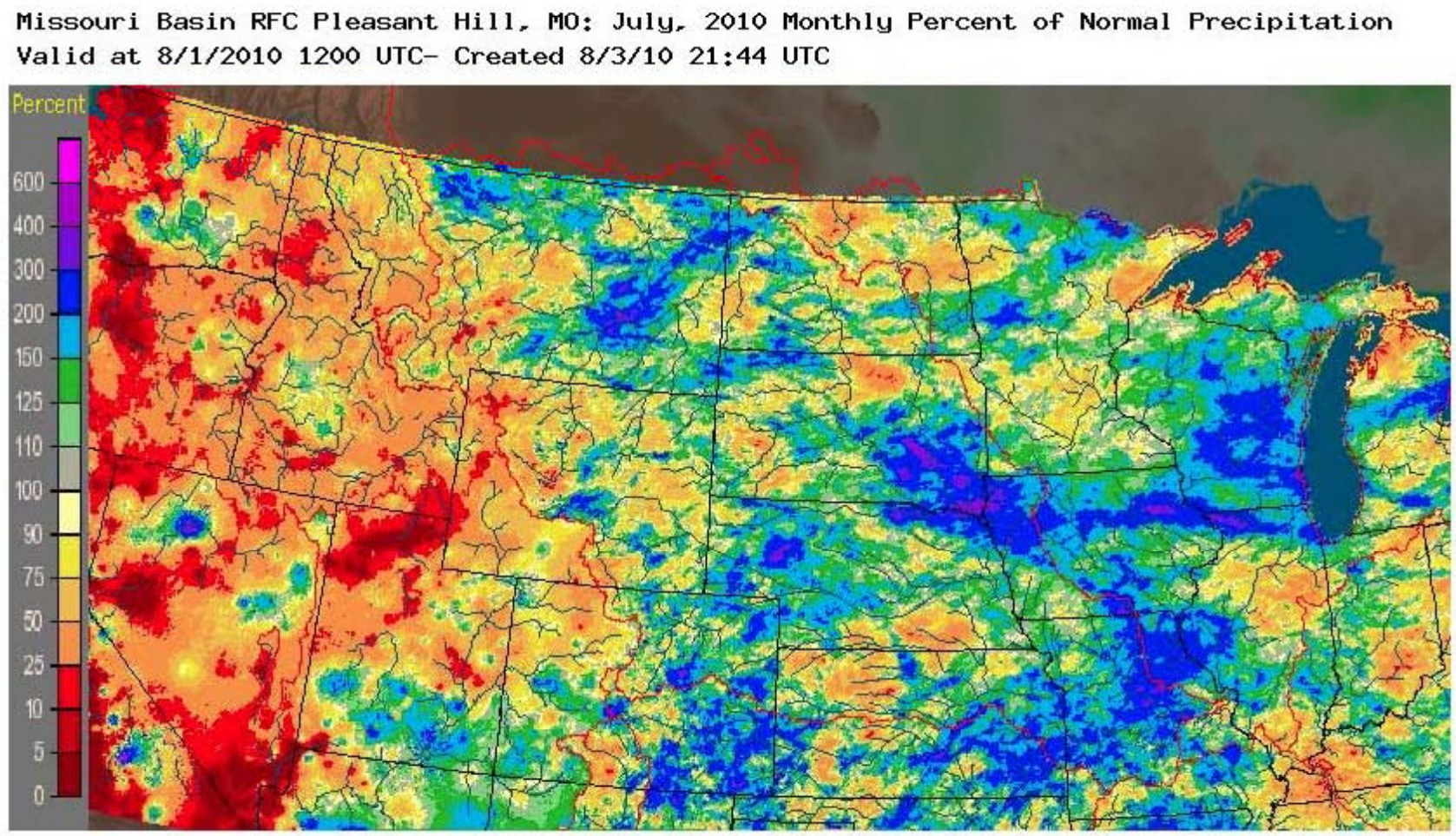
Spring/Summer Rainfall
May

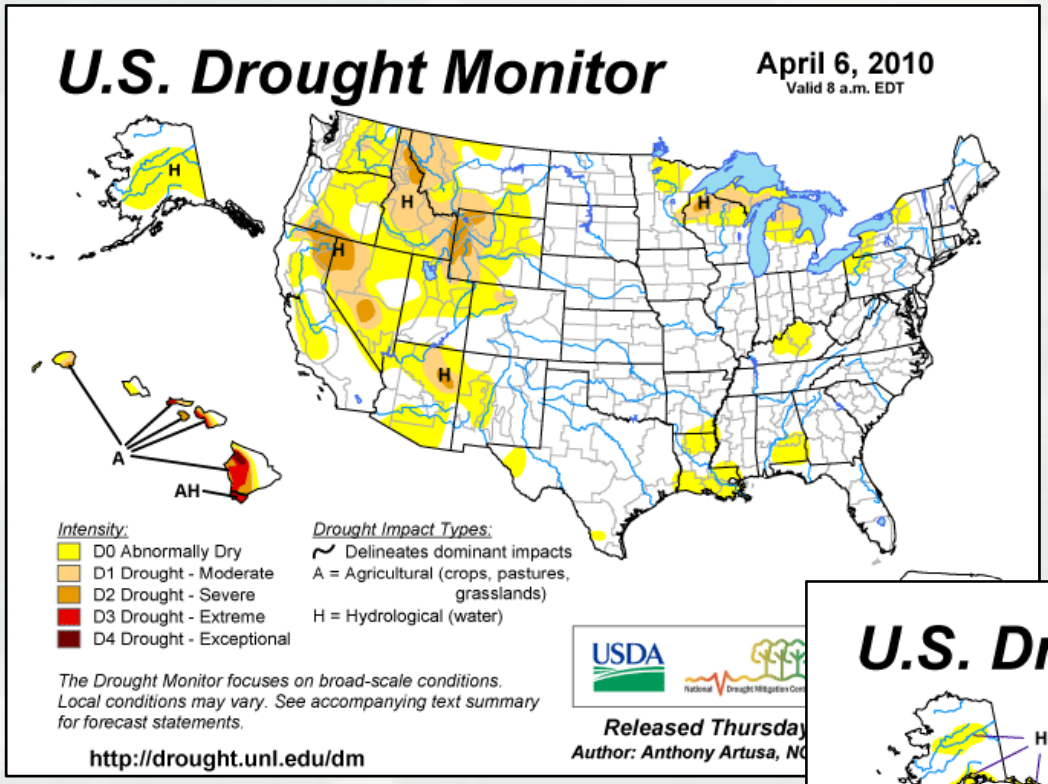


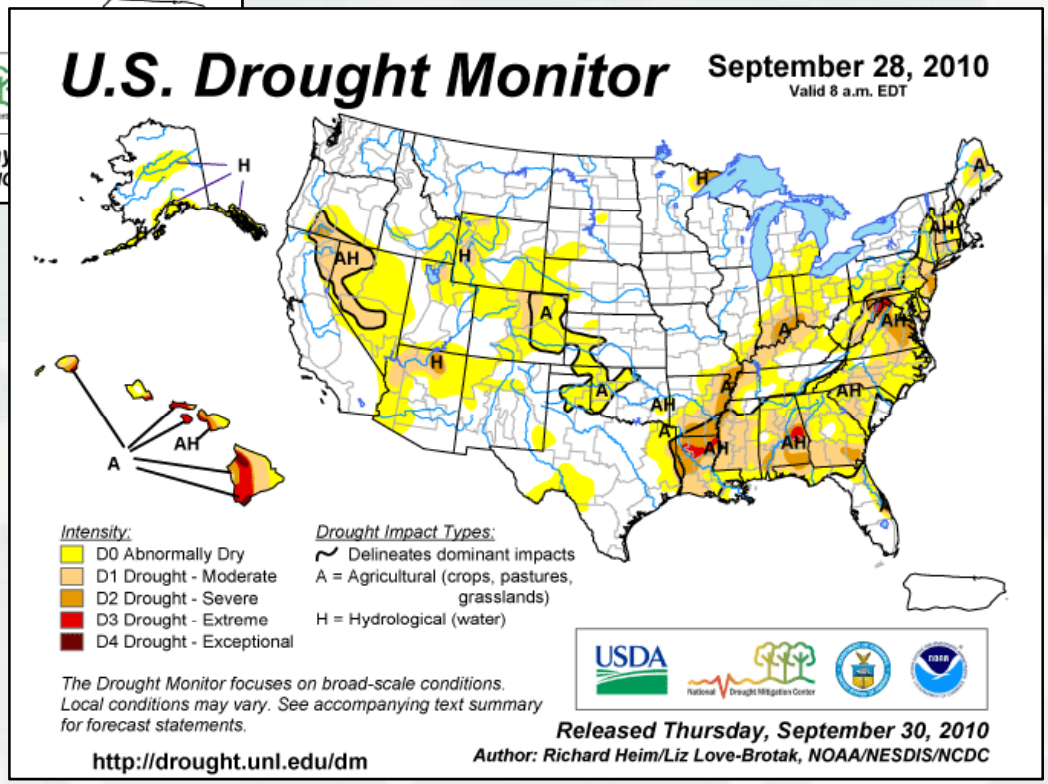
Spring/Summer Rainfall
June



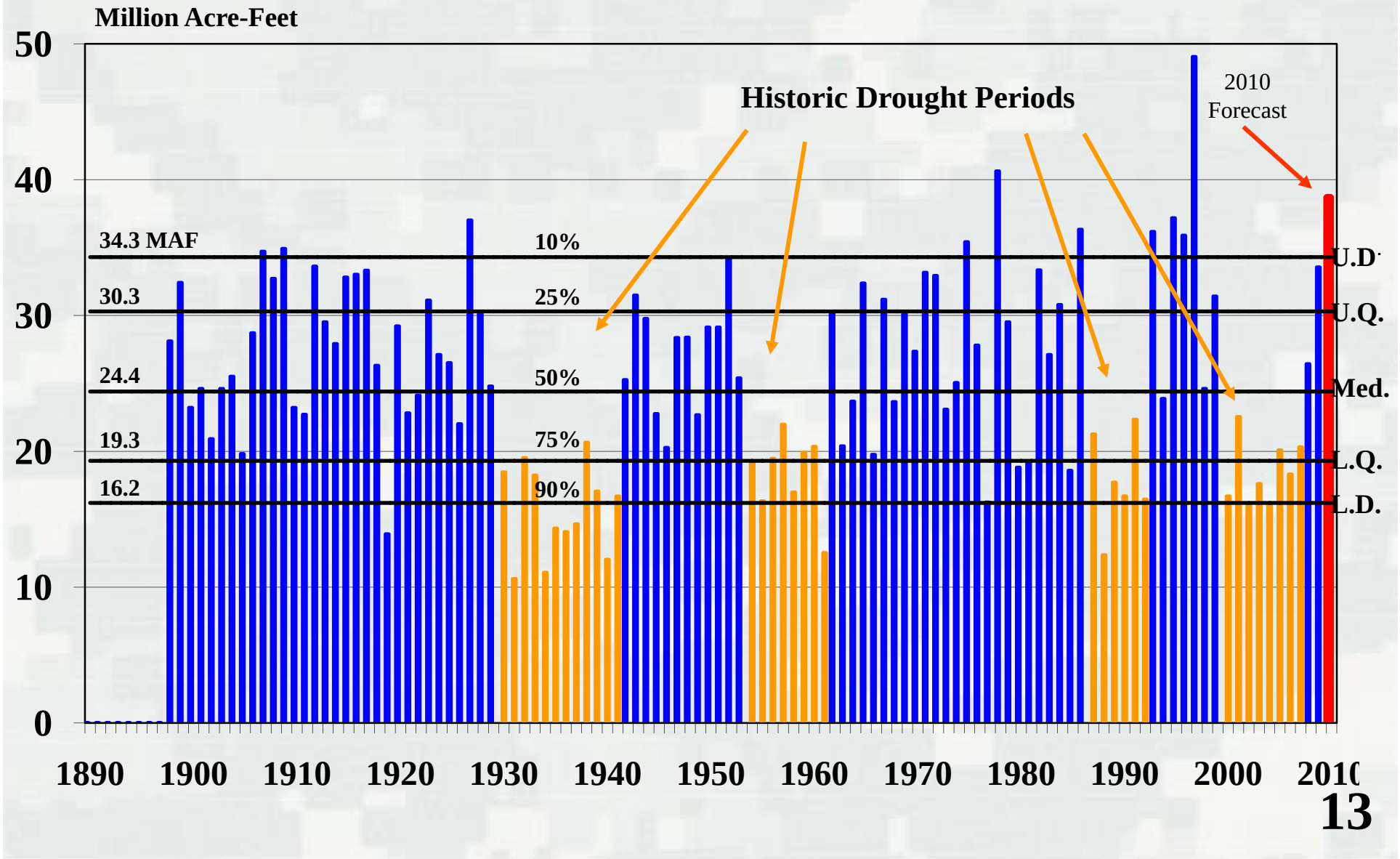
Spring/Summer Rainfall
July



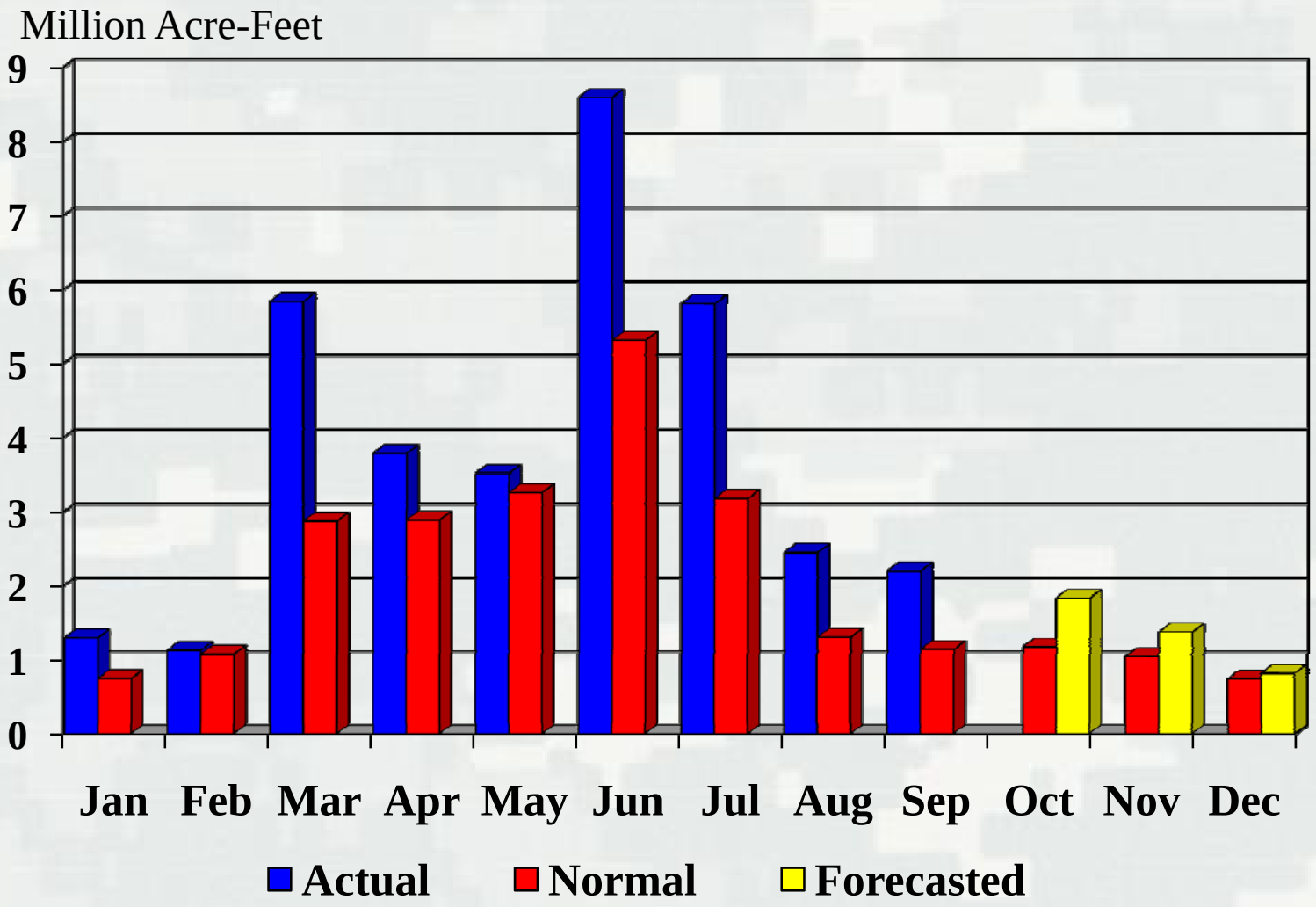

U.S. Drought Monitor
April 6, 2010
Valid 8 a.m. EDT
H
A
AH
Intensity:
D0 Abnormally Dry
D1 Drought - Moderate
D2 Drought - Severe
D3 Drought - Extreme
D4 Drought - Exceptional
Drought Impact Types:
Delineates dominant impacts
A = Agricultural (crops, pastures, grasslands)
H = Hydrological (water)
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.
http://drought.unl.edu/dm
USDA
Released Thursday
Author: Anthony Artusa, N


U.S. Drought Monitor
September 28, 2010
Valid 8 a.m. EDT
H
A
AH
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.
http://drought.unl.edu/dm
USDA
Released Thursday, September 30, 2010
Author: Richard Heim/Liz Love-Brotak, NOAA/NESDIS/NCDC

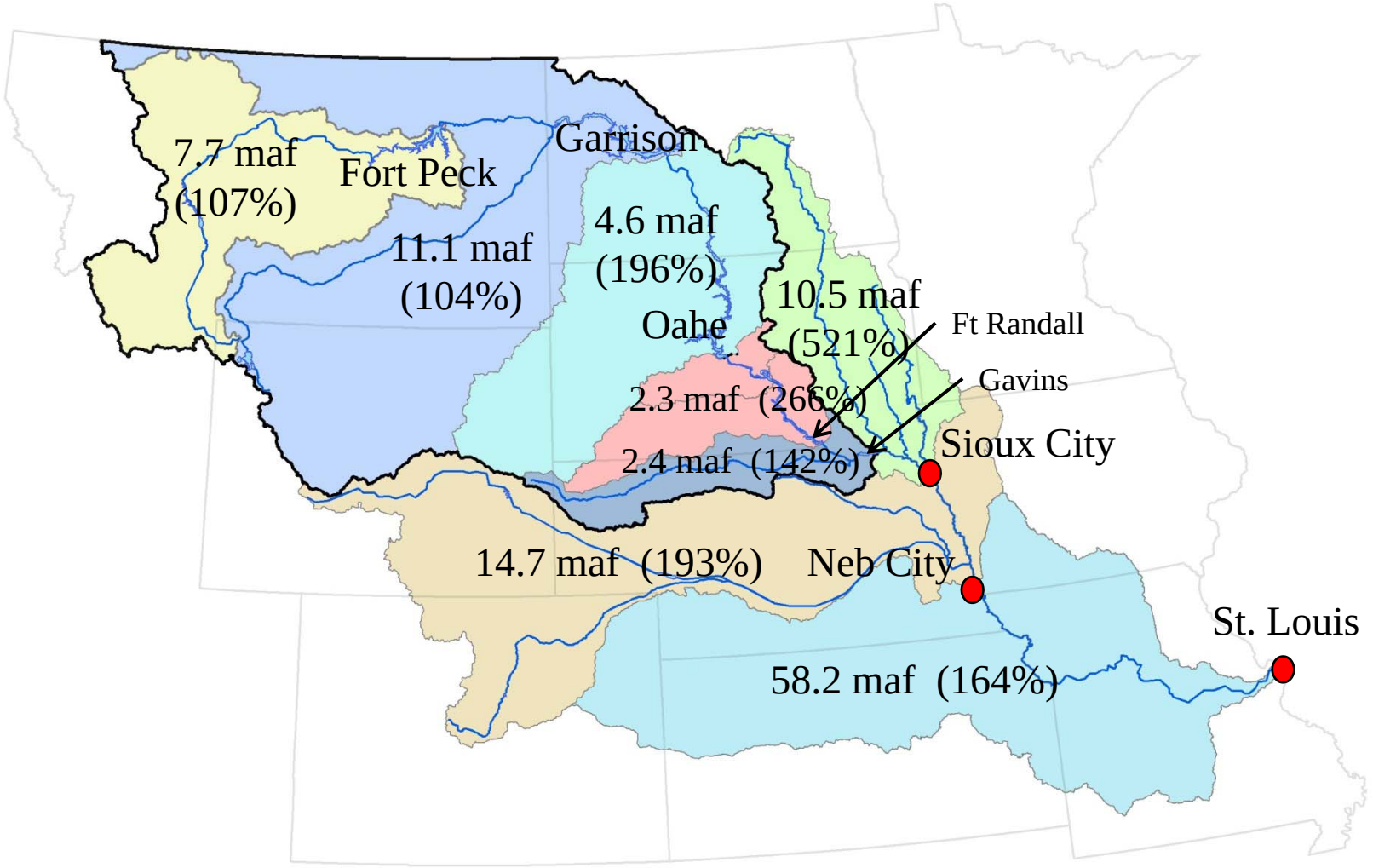
Missouri River Mainstem
Annual Runoff at Sioux City, Iowa



2010 Missouri River Runoff Above Sioux City, Iowa



Missouri River Basin – 2010 Runoff



Runoff is actual runoff (Jan – Sep) and forecasted runoff (Oct – Dec)

2010 Flood Operations

Gavins Point Dam at elevation 1209.7 ft (top of gates = 1210.0 ft)

2010 Flood Operations

Missouri River near Rulo, NE – June 26, 2010

2010 Flood Control Operations

- All flood control storage available at start of runoff season
- 9.1 MAF of flood waters stored
- Four of six reservoirs utilized their exclusive flood control zones
- Damages prevented from System regulation
  - ► Final numbers by mid-December
  - ► Stage Reductions
    - Omaha – 5 feet
    - Nebraska City – 4 feet
    - Rulo – 2 feet
- Evacuation of flood water ongoing – start 2011 runoff season at base of annual flood control zone

Missouri River Stages – Fall / Winter

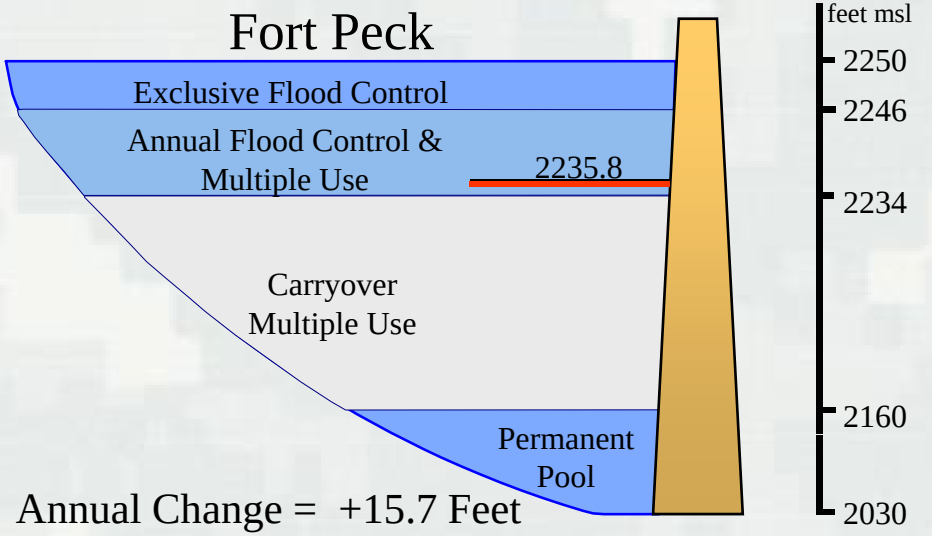
Location		Fall Evacuation Stage (Oct-Nov)		Winter Open Water Stage (Dec-Feb)	
	Flood Stage	2010	± (2009)	2010	± (2009)
Bismarck	16 ft	9 ft	+4 ft	varies	+2 ft
Sioux City	30 ft	21 ft	+6 ft	13 ft	+2 ft
Omaha	29 ft	22 ft	+5 ft	14 ft	+2 ft
Neb City	18 ft	15 ft	+5 ft	7 ft	+2 ft
St. Joseph	17 ft	14 ft	+5 ft	6 ft	+1 ft
Waverly	20 ft	16 ft	+3 ft	11 ft	+1 ft
Boonville	21 ft	15 ft	+3 ft	7 ft	+1 ft


Results in 2010 and Expected Results for Authorized Purposes in 2011




Current Reservoir Levels – October 17, 2010

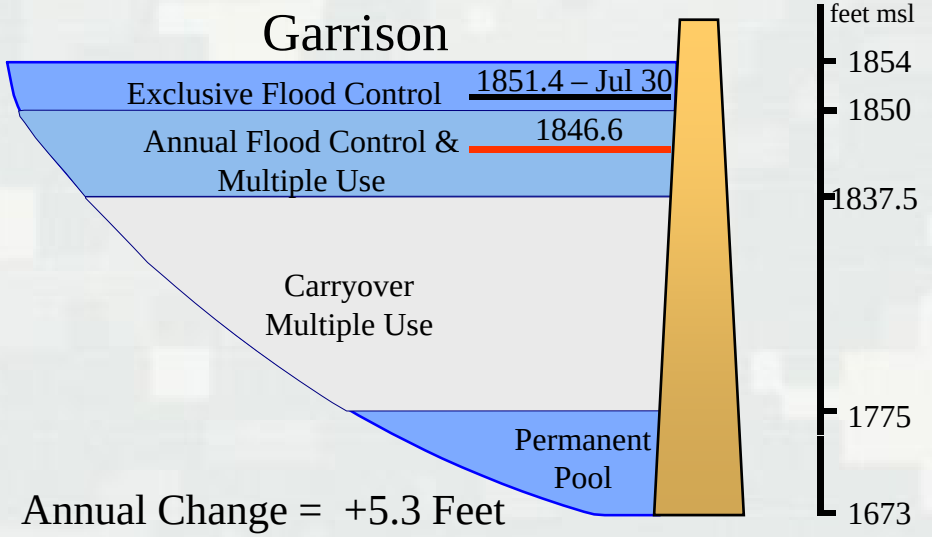
Fort Peck



Annual Change = +15.7 Feet

1.8 feet above top of Carryover

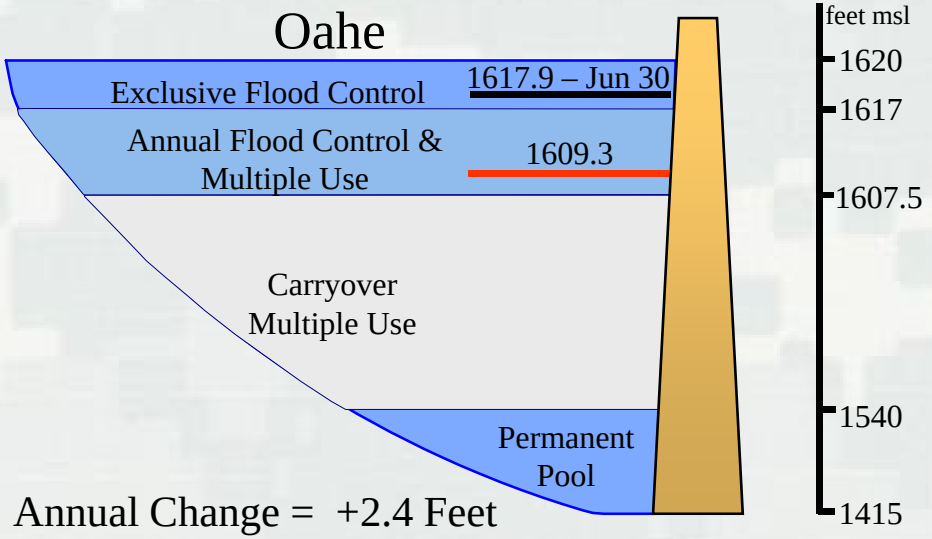
Garrison



Annual Change = +5.3 Feet

9.1 foot above top of Carryover

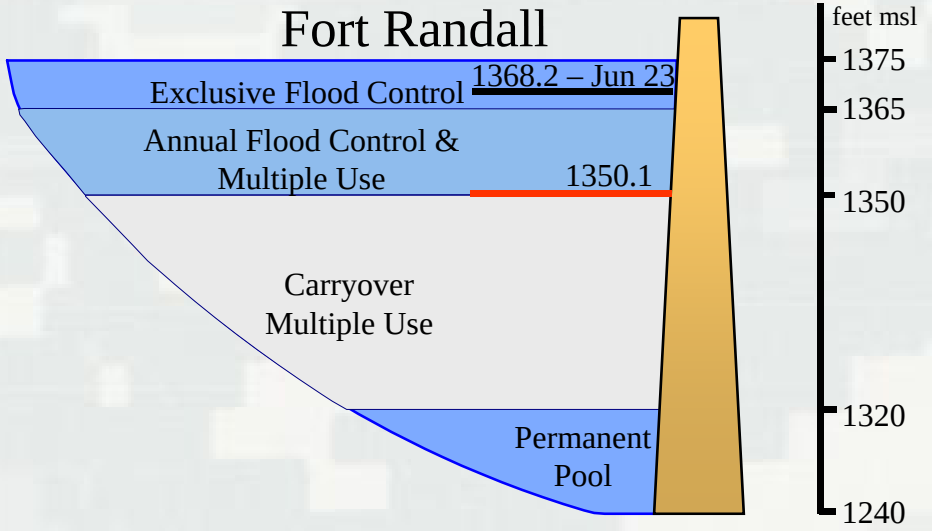
Oahe



Annual Change = +2.4 Feet

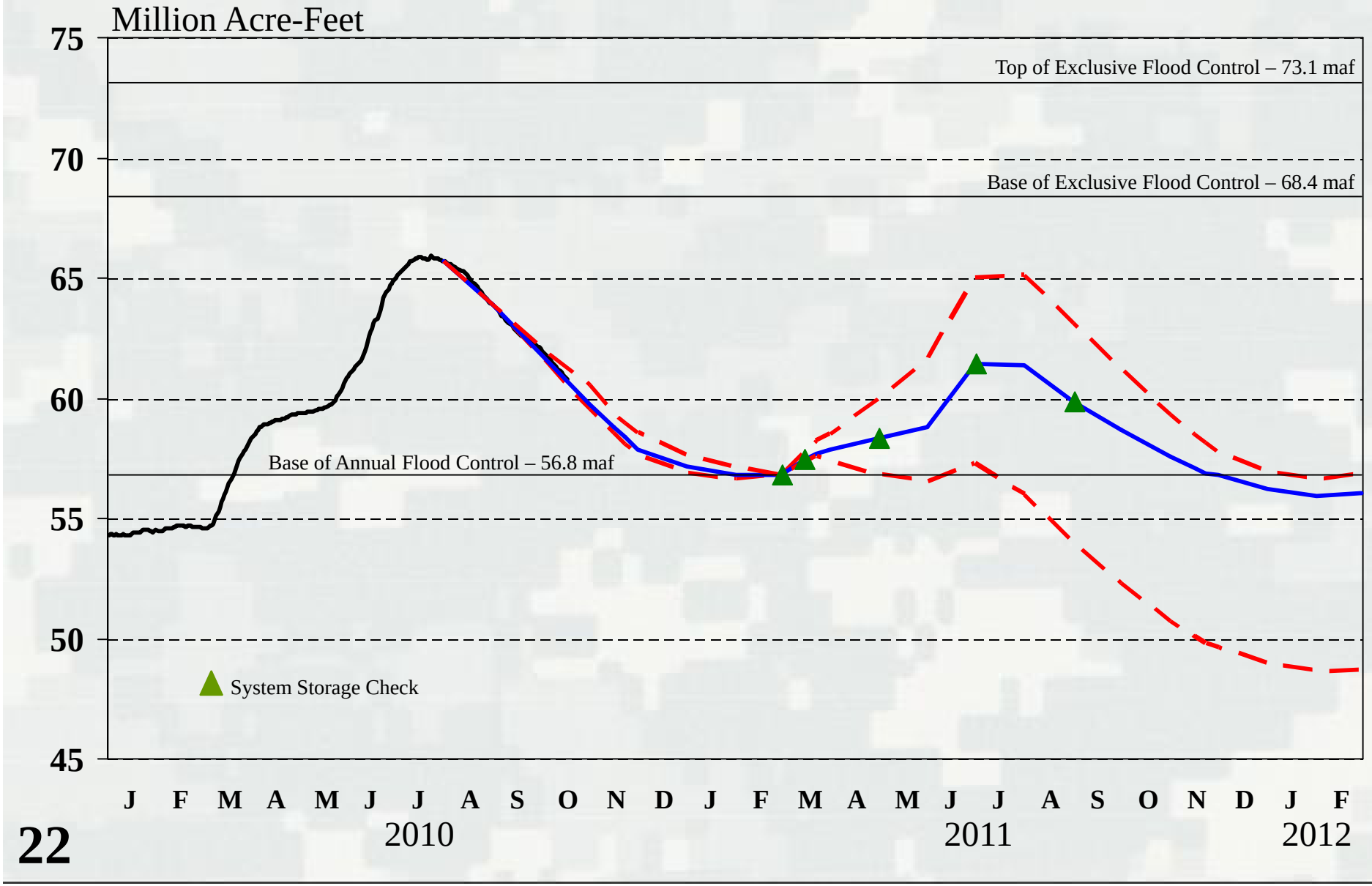
1.8 feet above top of Carryover

Fort Randall



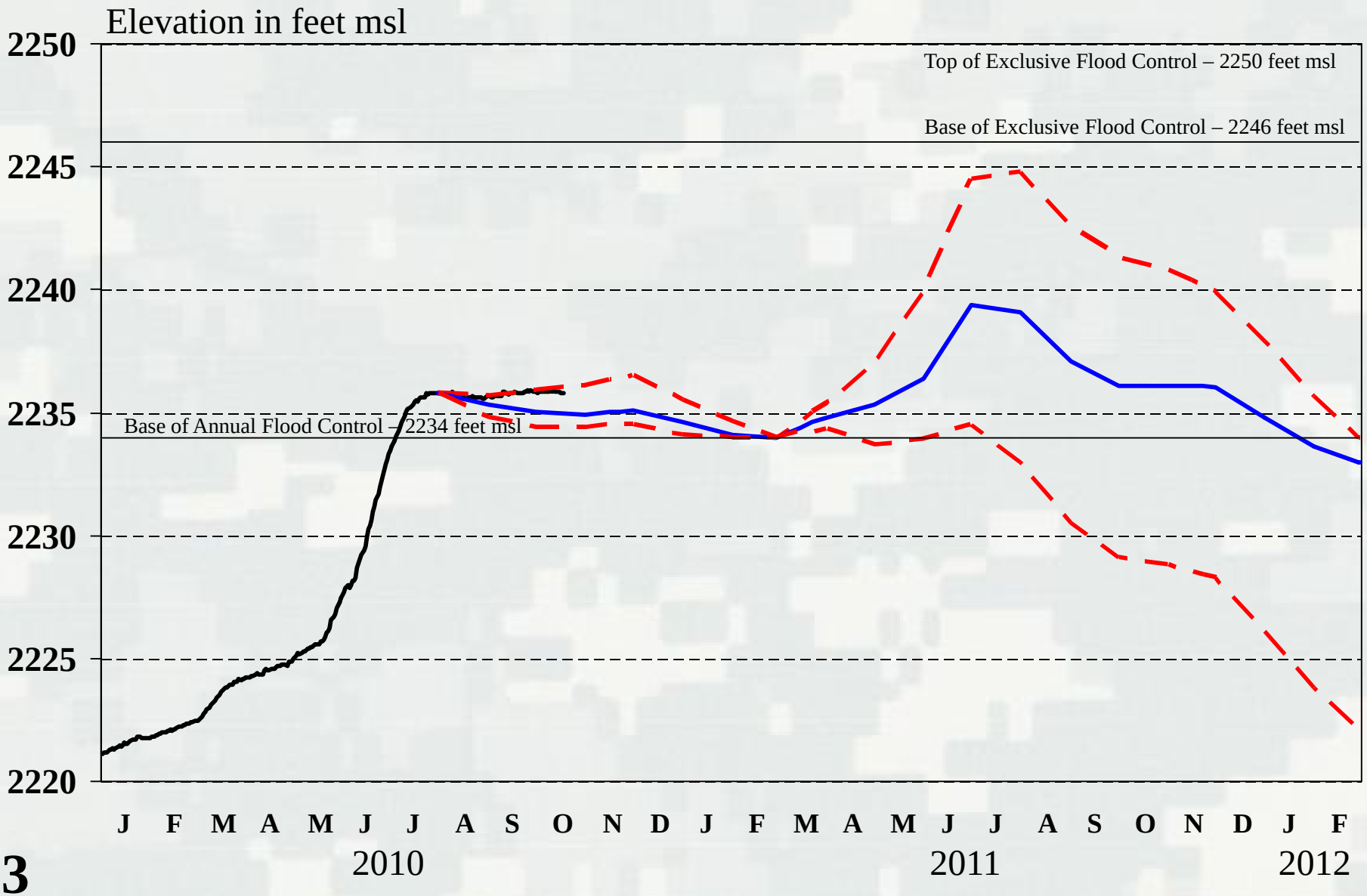
0.1 feet above top of Carryover

System Storage
2010-2011 Draft AOP



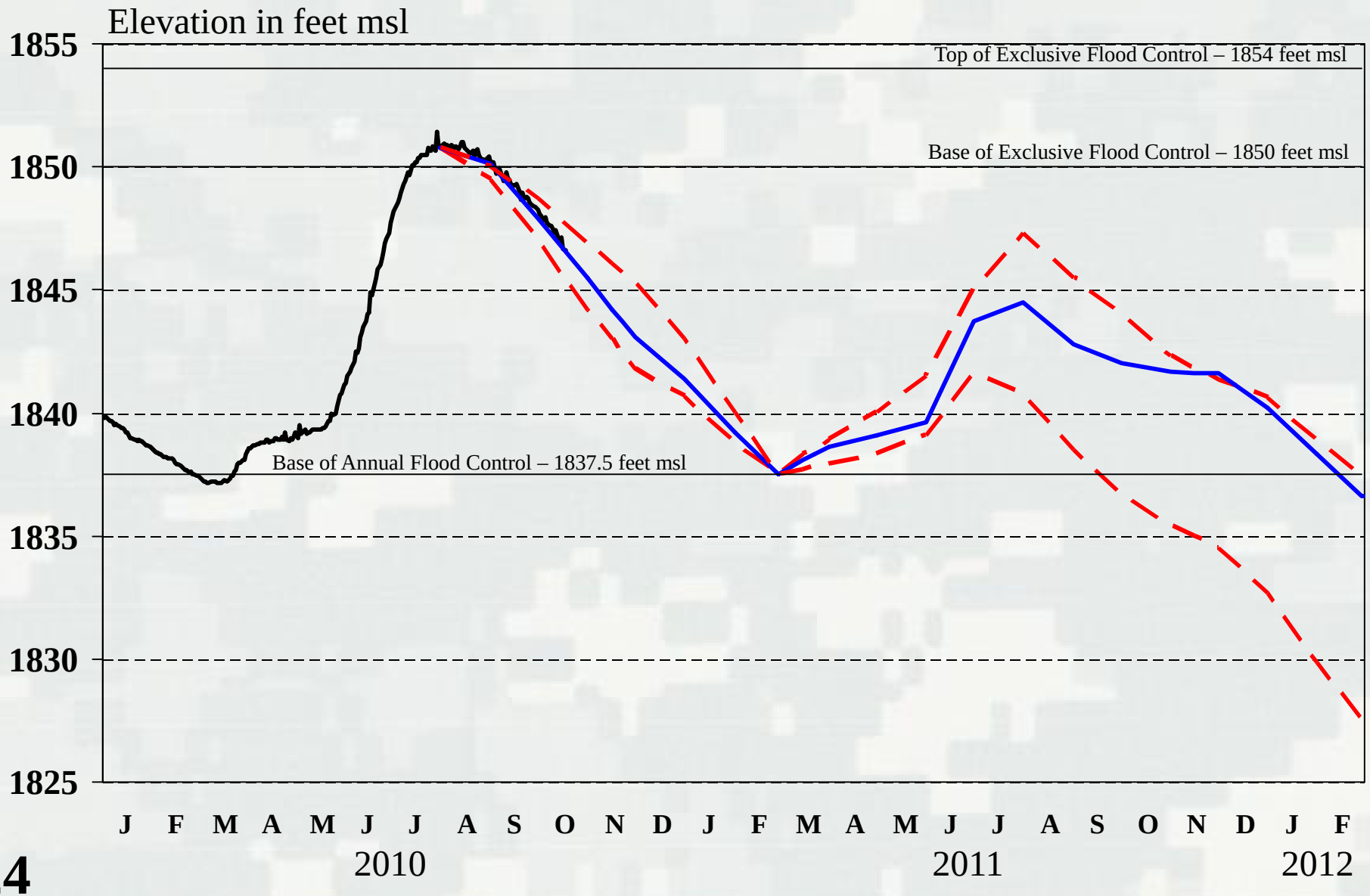
Fort Peck

2010-2011 Draft AOP



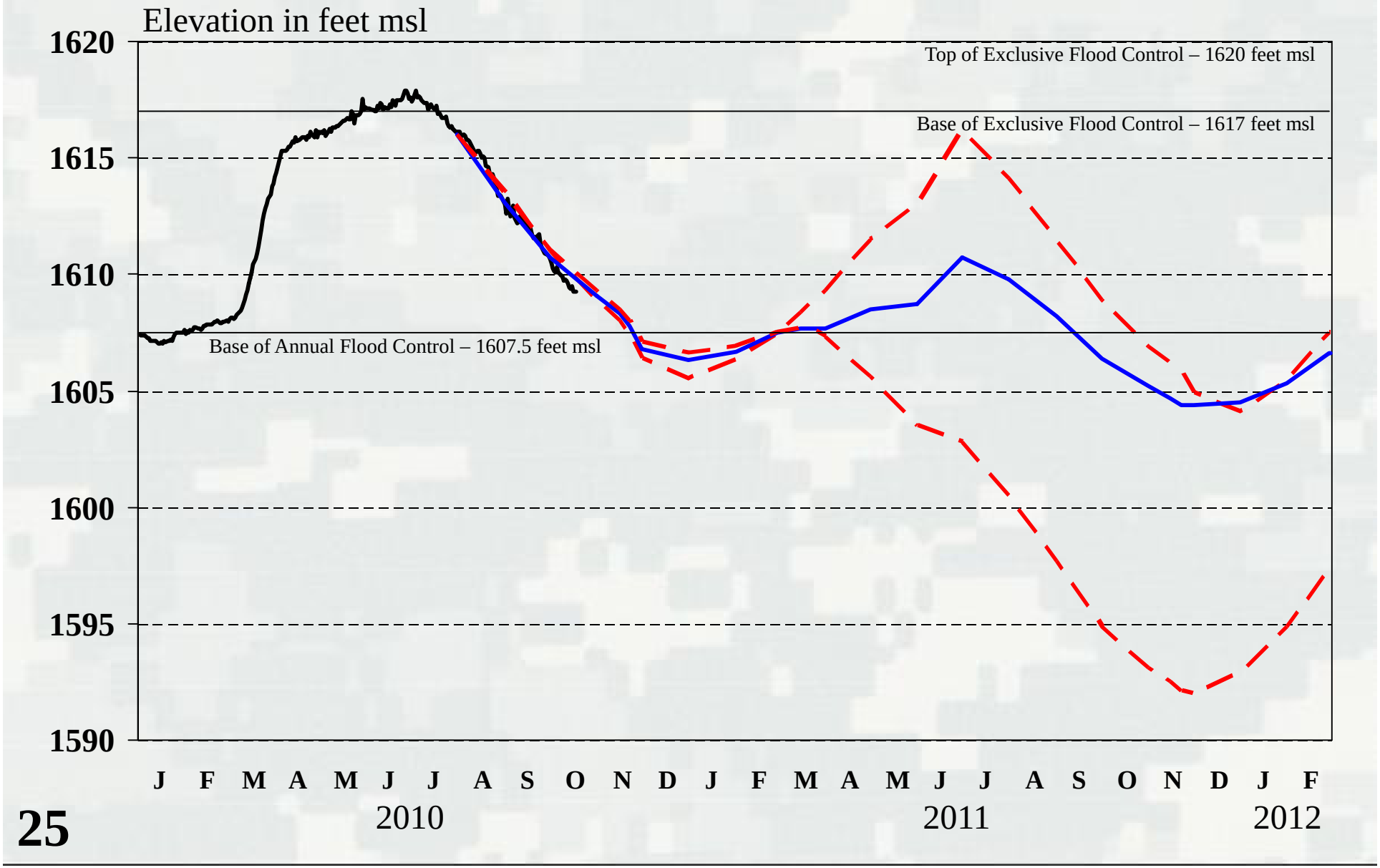
Garrison

2010-2011 Draft AOP

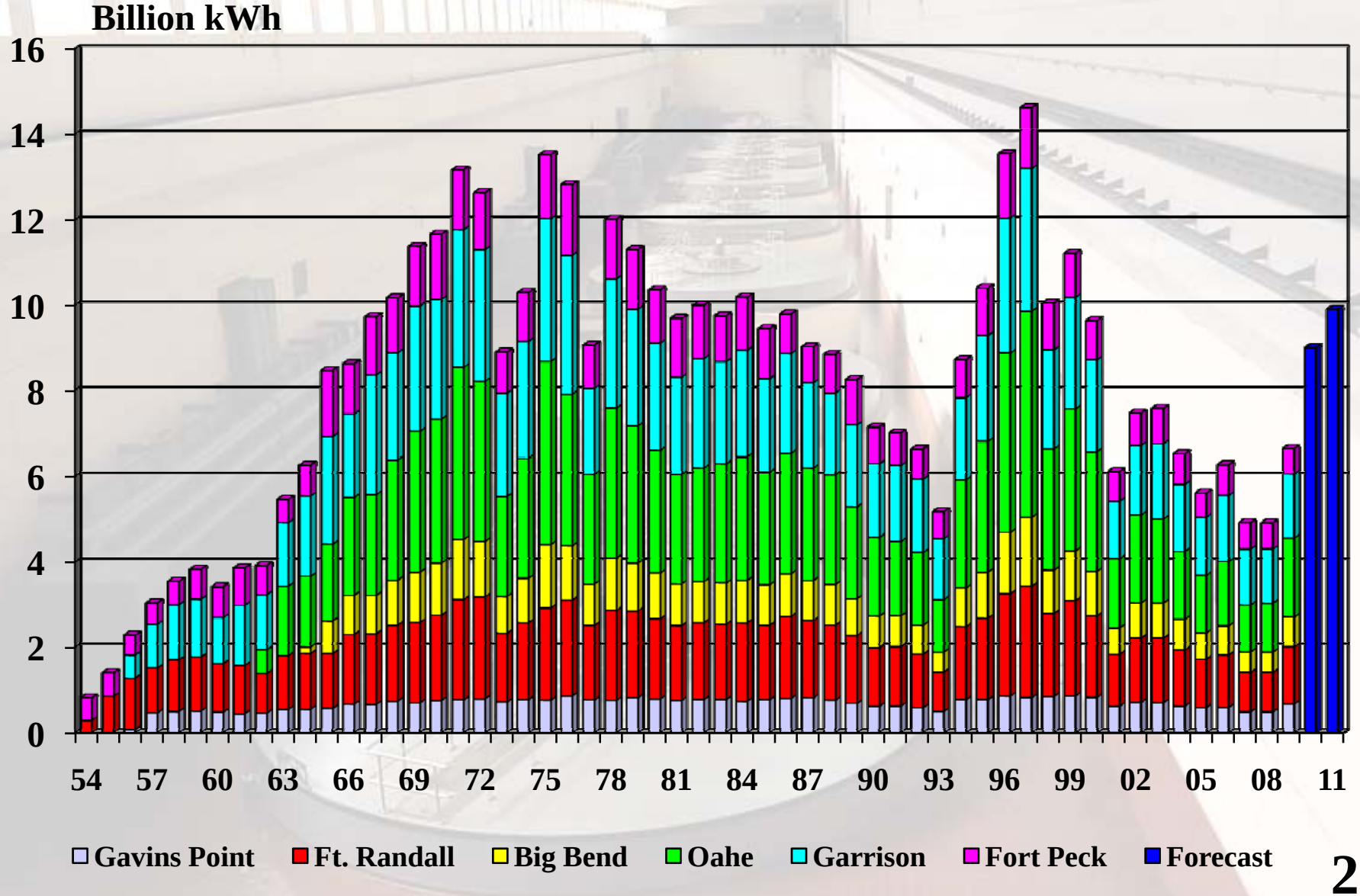


Oahe

2010-2011 Draft AOP

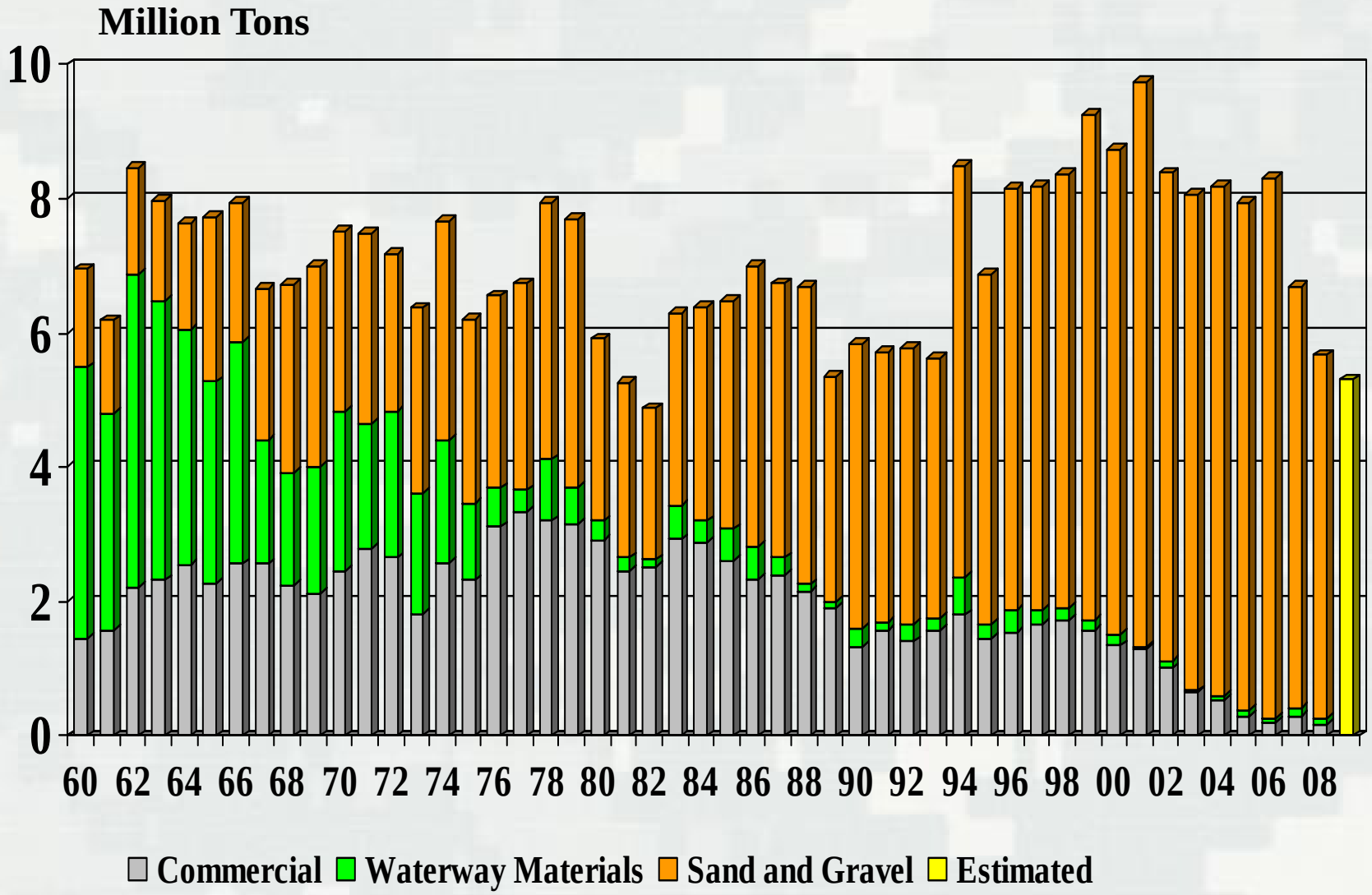


Hydropower


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

Missouri River

Total Navigation Tonnage



Navigation

- 2010 – Full service (+) & extended season
- 2011 March 15 Storage Check
  - ►Full service level
  - ►Target locations
    - Sioux City (31,000 cfs)
    - Omaha (31,000 cfs)
    - Nebraska City (37,000 cfs)
    - Kansas City (41,000 cfs)
- 2011 July 1 Storage Check
  - ►Full service level
  - ►Full season length

Water Supply – Water Quality
Irrigation – Recreation

- 2010
  - ►Recreation impacts due to high reservoir elevations
  - ►Fort Peck minimum releases for irrigators
  - ►Higher than normal winter releases (Garrison to Gavins Point)
- 2011 (Median Runoff)
  - ►Reservoirs return to more normal elevations and releases
  - ►No access issues expected

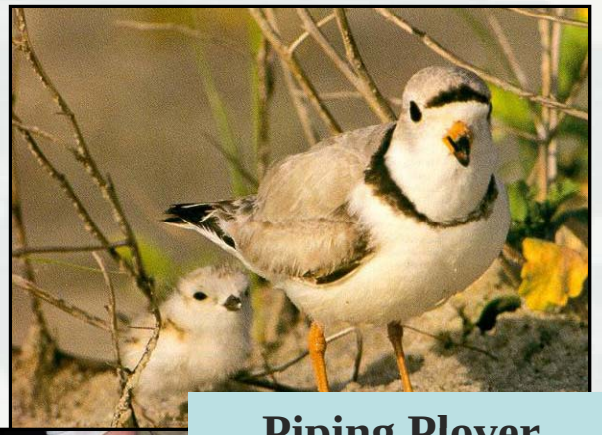
Fish and Wildlife

- Steady to rising levels at upper three reservoirs during forage fish spawn
  - ►Favor Garrison if runoff below normal
- Minimize zero releases at Fort Randall
- No cold water habitat issues expected

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

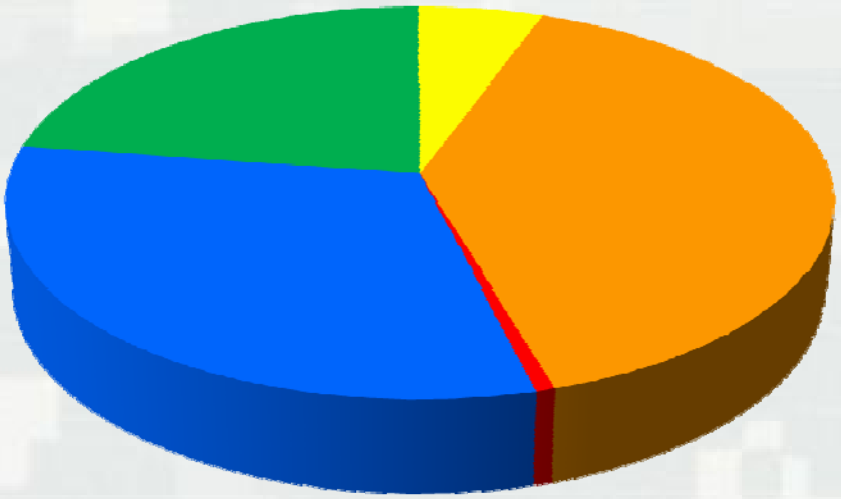


Piping Plover
Listed “Threatened” 1986

Pallid Sturgeon
Listed “Endangered” 1990

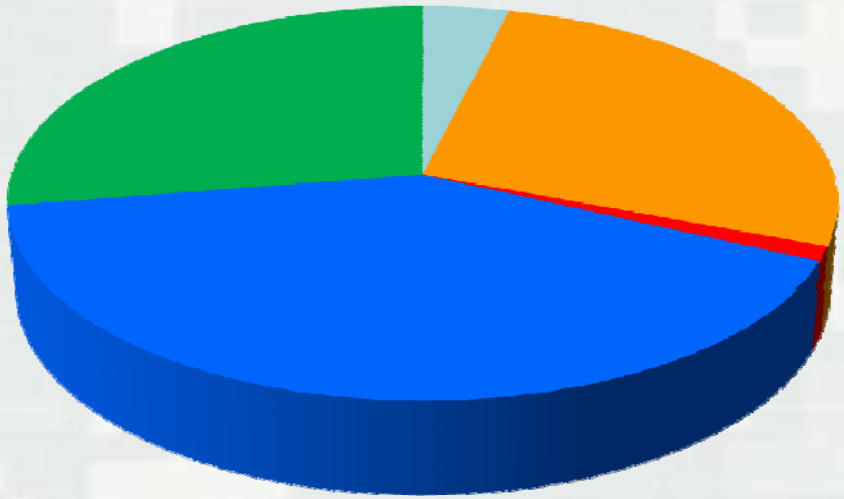
Fish and Wildlife
Threatened and Endangered Species

2010 Piping Plover Fledglings (304)



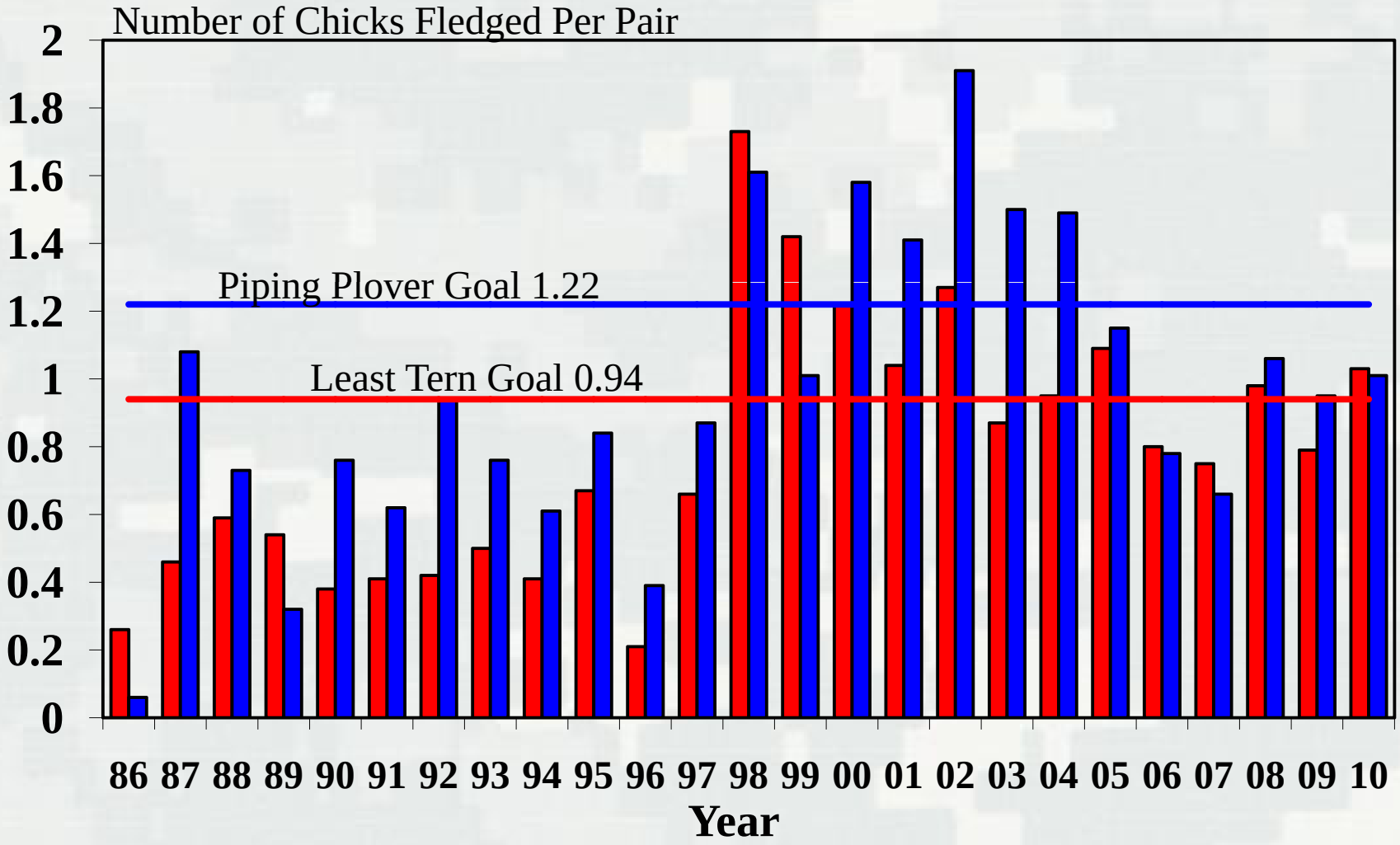
- Fort Peck
- Fort Peck River
- Garrison (17)
- Garrison River (121)
- Oahe (2)
- Big Bend
- Fort Randall River
- Gavins (95)
- Gavins River (69)

2010 Least Tern Fledglings (338)



- Fort Peck
- Fort Peck River (13)
- Garrison
- Garrison River (91)
- Oahe (4)
- Big Bend
- Fort Randall River
- Gavins (137)
- Gavins River (93)

Fish and Wildlife
Threatened and Endangered Species



Threatened and Endangered Species

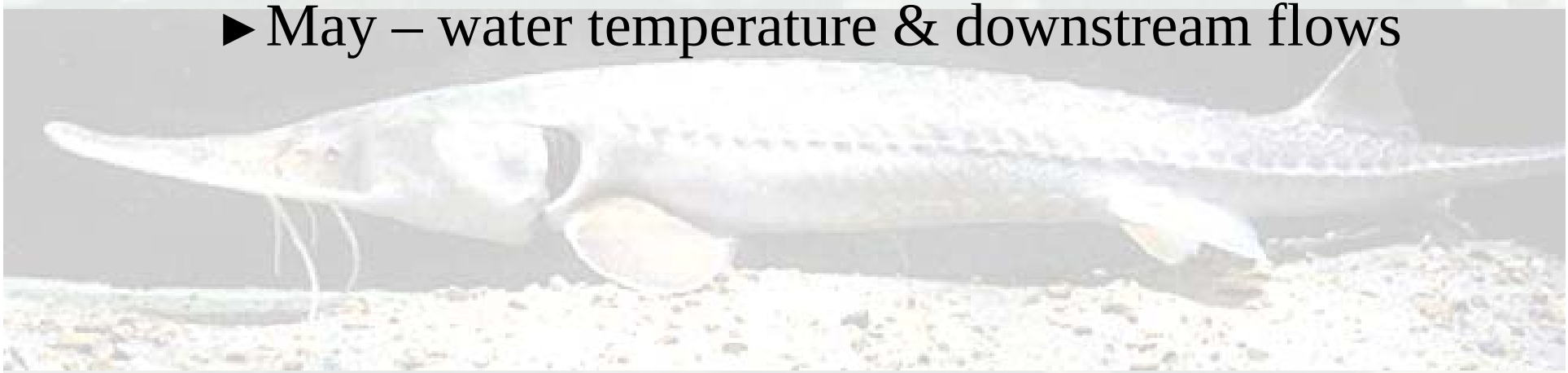
Piping Plover and Least Tern

- 2011 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 2010
  - ►March – downstream flows
  - ►May – water temperature & downstream flows



Threatened and Endangered Species

Bi-Modal Spring Pulse – Pallid Sturgeon

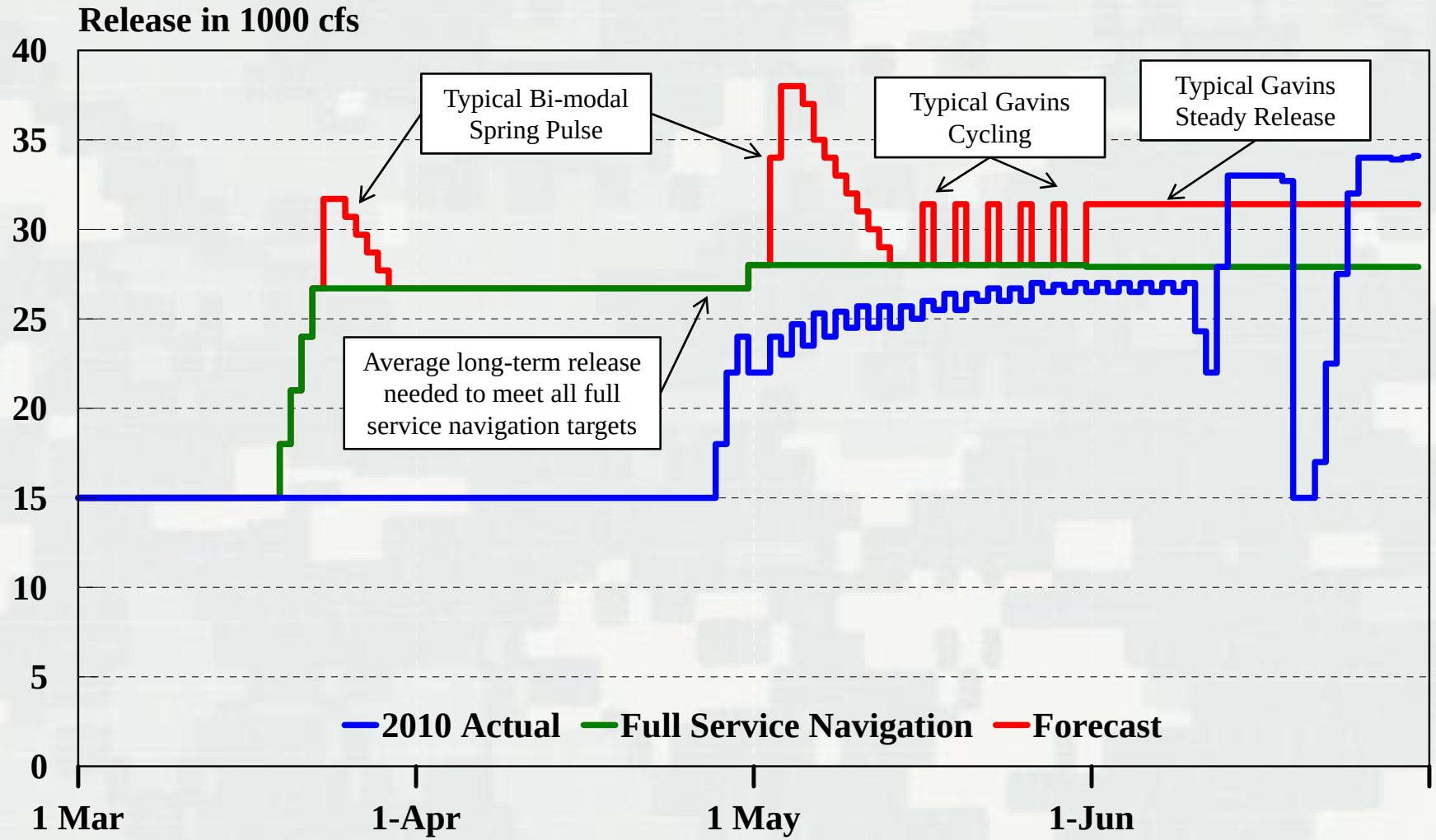
- 2011 March
  - ►March – magnitude 5 kcfs
- 2011 May
  - ►Magnitude from 9 kcfs to 20 kcfs
  - ►Timing between May 1 and May 19
    - Water Temperature
    - Nesting terns and plovers
    - Downstream flow limits

Threatened and Endangered Species

Bi-Modal Spring Pulse – Pallid Sturgeon

- Downstream flow limits
  - Omaha (41,000 cfs)
  - Nebraska City (47,000 cfs)
  - Kansas City (71,000 cfs)
- Eliminate pulse downstream of Kansas City using tributary reservoirs
- Monitoring in place
  - Biological
  - Interior drainage
  - Groundwater

Gavins Point Releases



Summary

- All flood storage space available to start 2011 runoff season
- Return to more normal releases and reservoir levels (median runoff)
- Good service to all authorized purposes

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/