

Missouri River Mainstem System 2010-2011 Draft Annual Operating Plan

*US Army
Corps of Engineers*

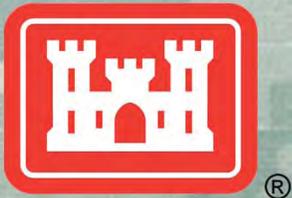
Joel Knofczynski P.E.

Hydraulic Engineer

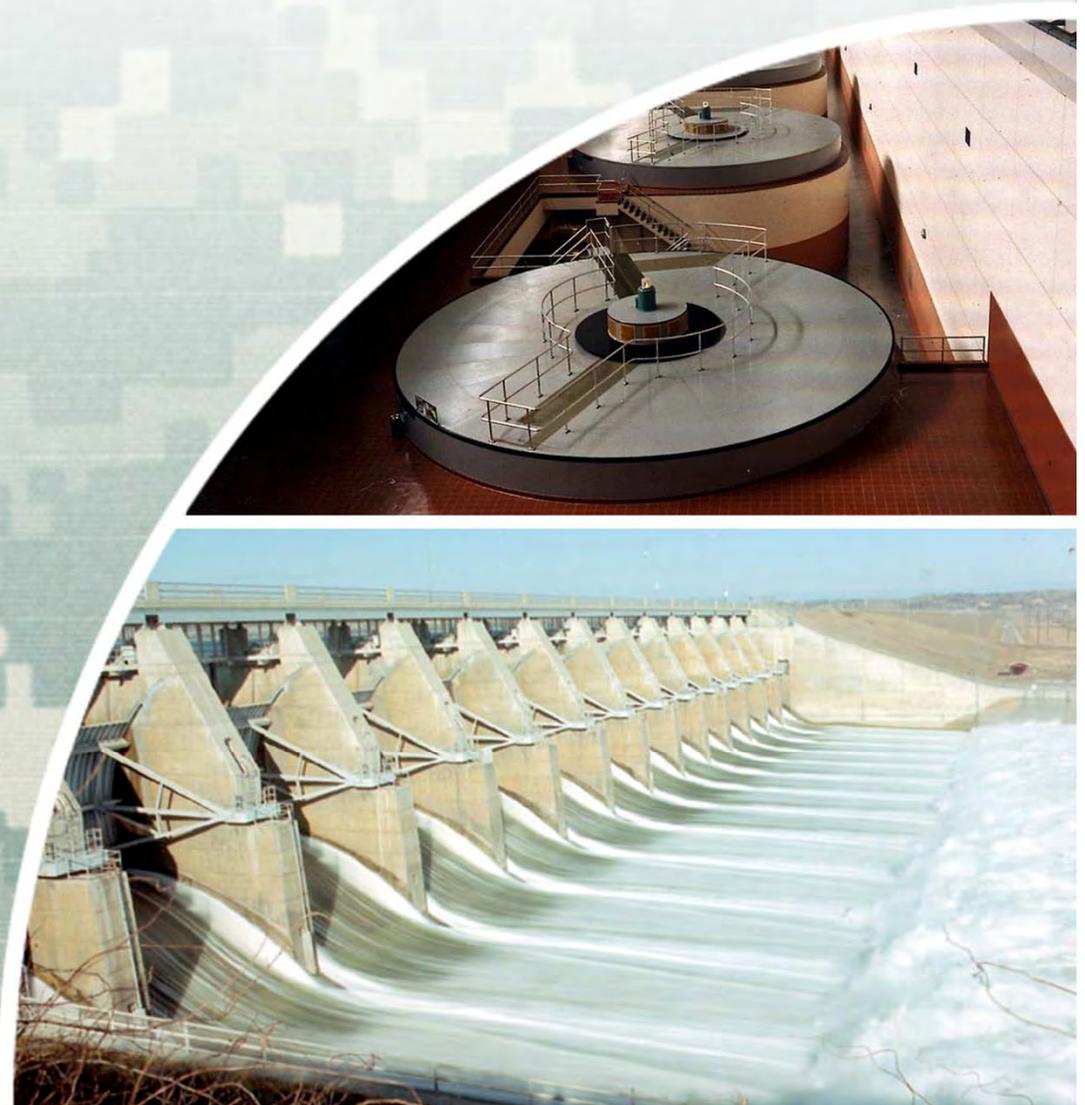
Power Production Team

Missouri River Basin Water Management Division

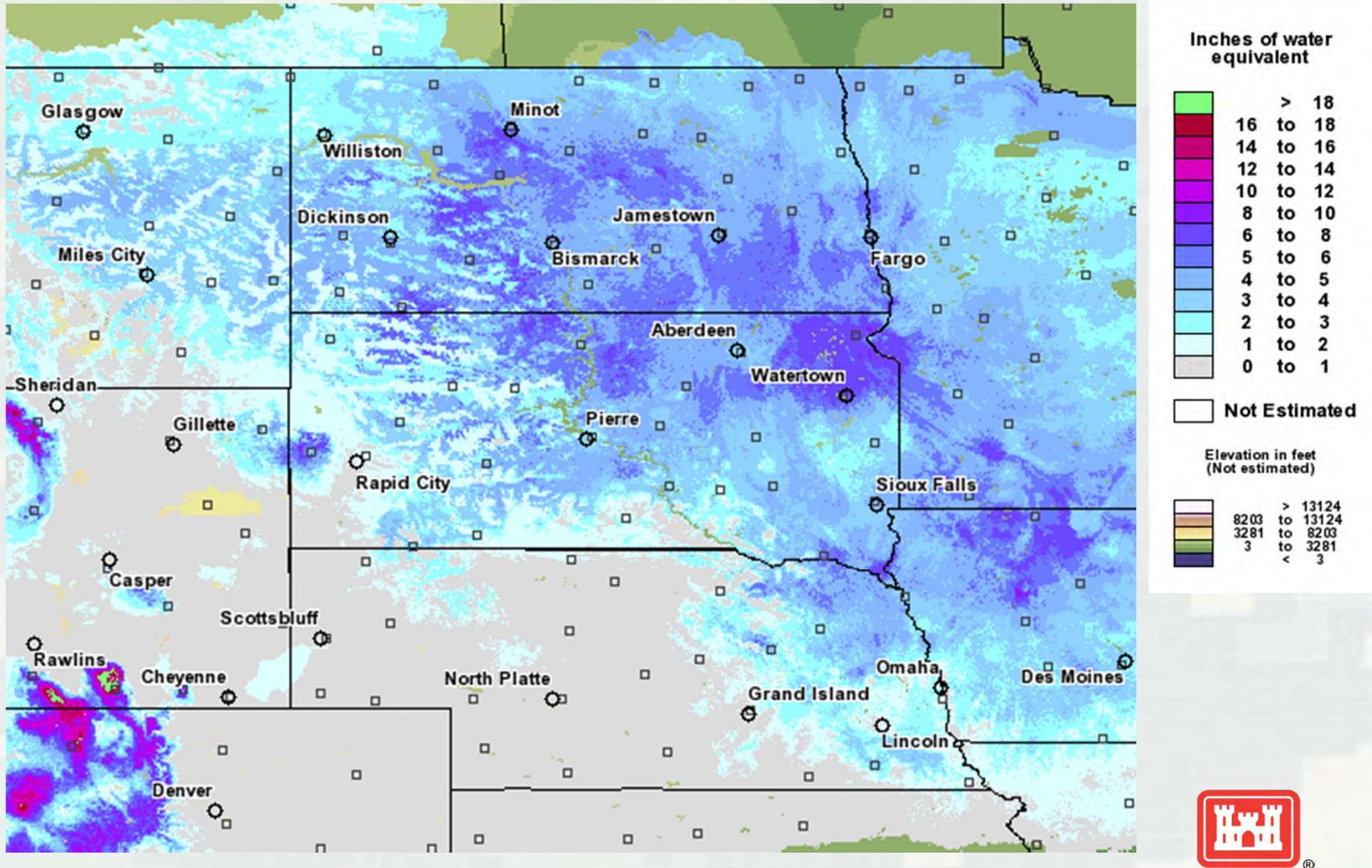
November 2010



US Army Corps of Engineers
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Snow Water Equivalent

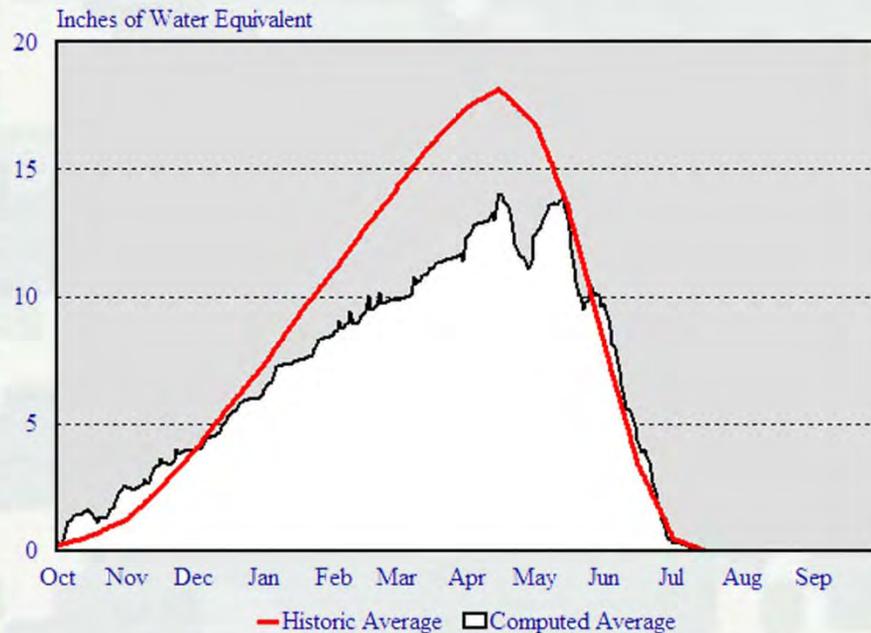


20 February

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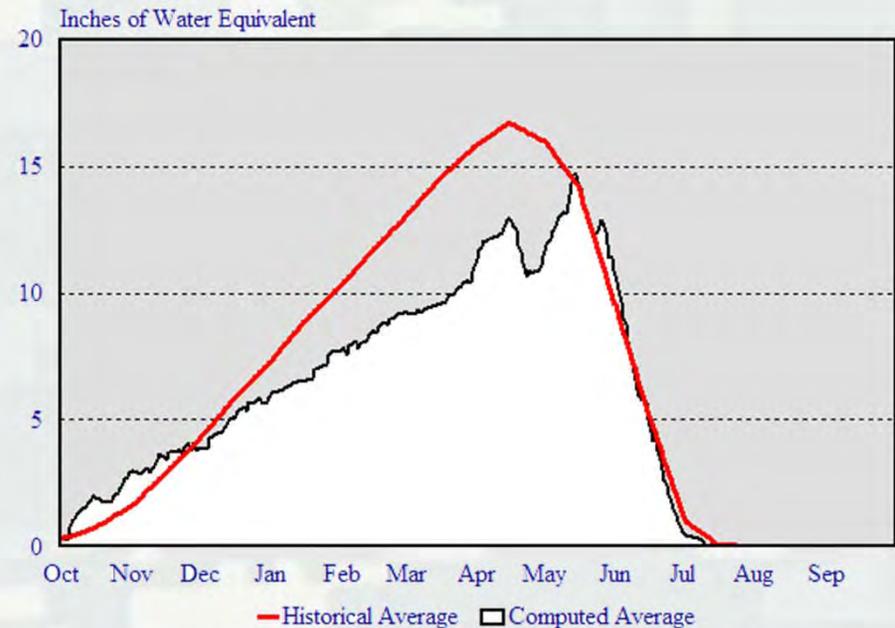
Missouri River Basin Mountain Snowpack Water Content 2009-2010

Total Above Fort Peck



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

Total Fort Peck to Garrison

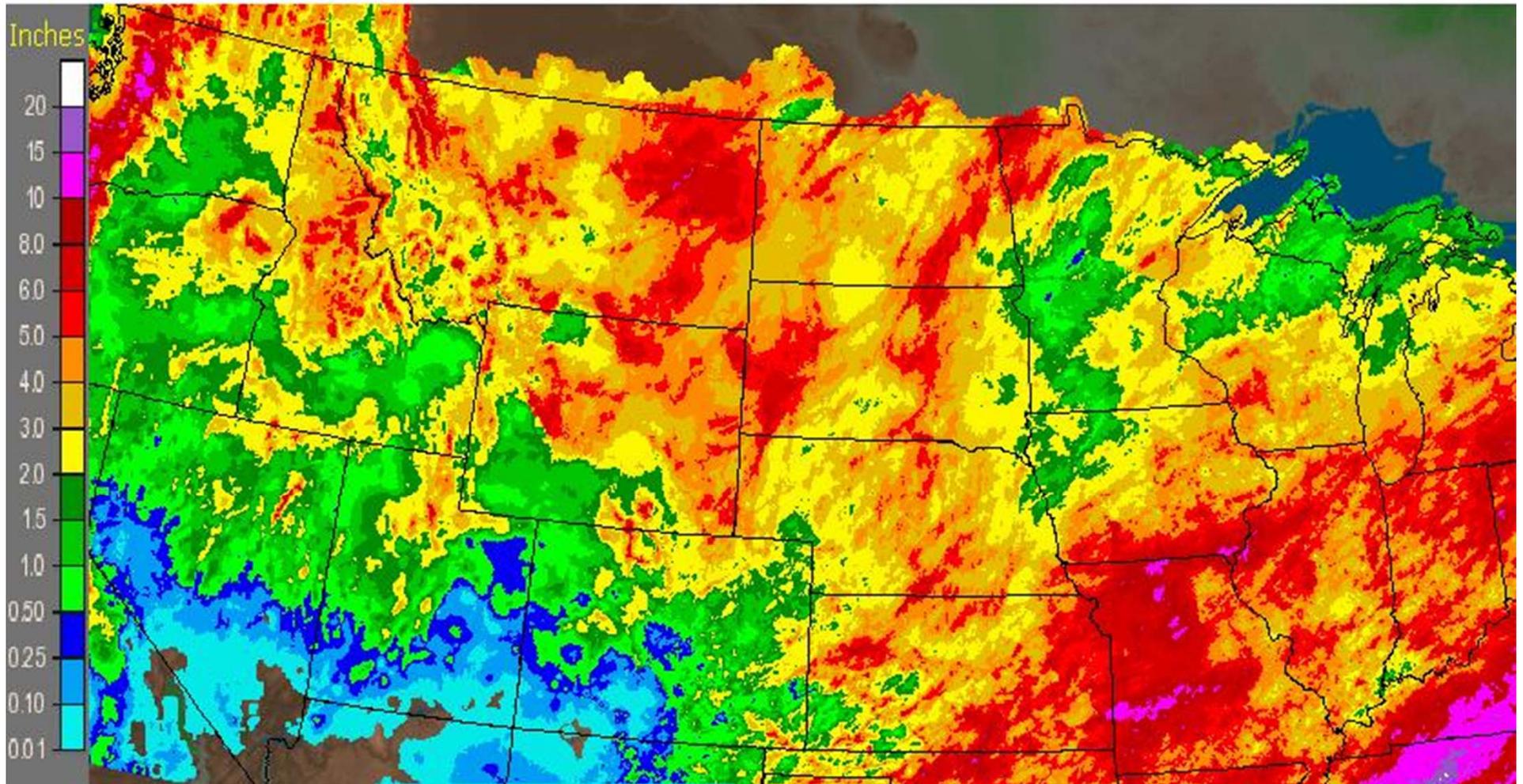


The Mountain Snowpack in the reach between Fort Peck and Garrison peaked at 88% of the normal peak accumulation on May 13.



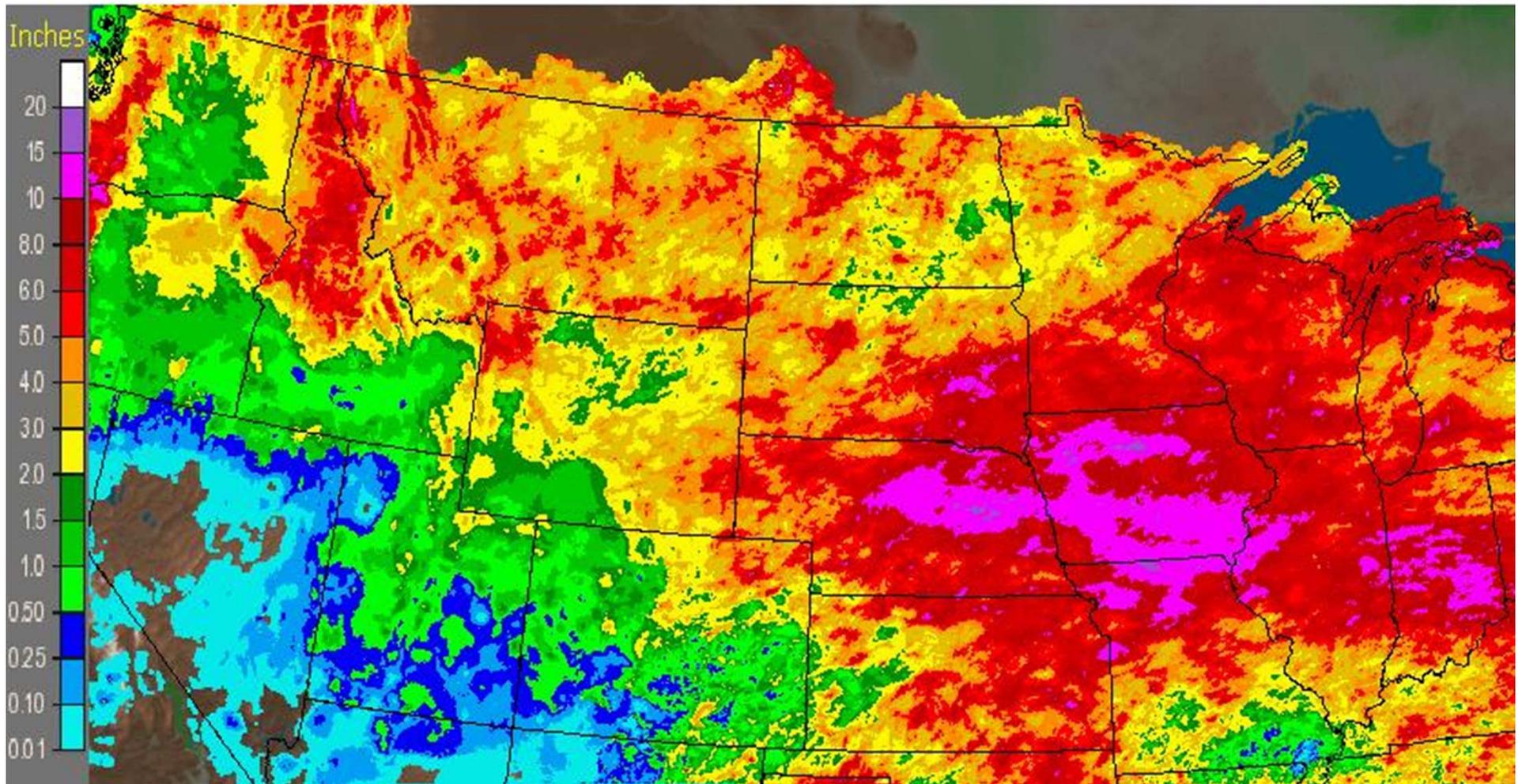
May 2010 Precipitation

Missouri Basin RFC Pleasant Hill, MO: May, 2010 Monthly Observed Precipitation
Valid at 6/1/2010 1200 UTC- Created 6/3/10 21:40 UTC



June 2010 Precipitation

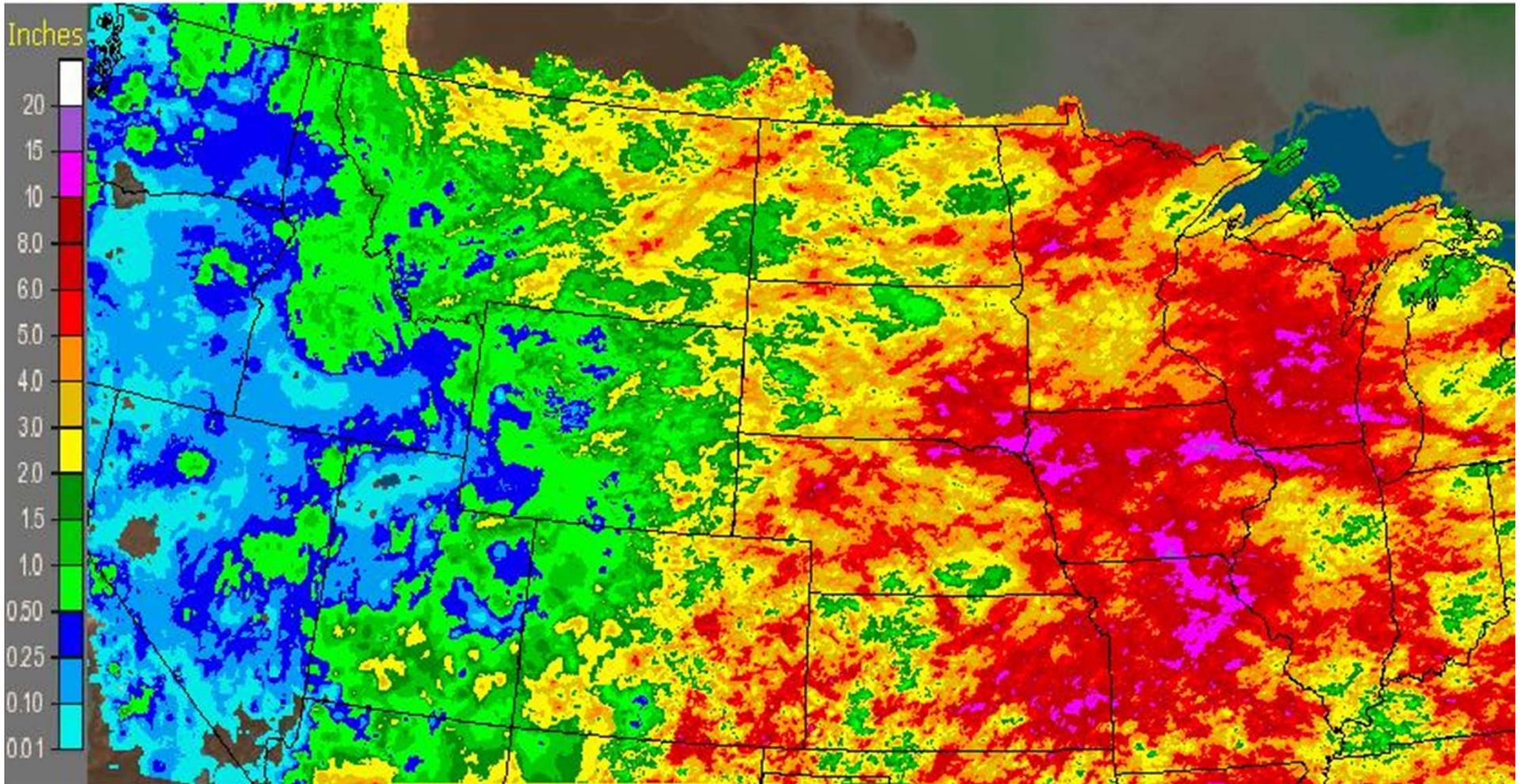
Missouri Basin RFC Pleasant Hill, MO: June, 2010 Monthly Observed Precipitation
Valid at 7/1/2010 1200 UTC- Created 7/3/10 21:40 UTC



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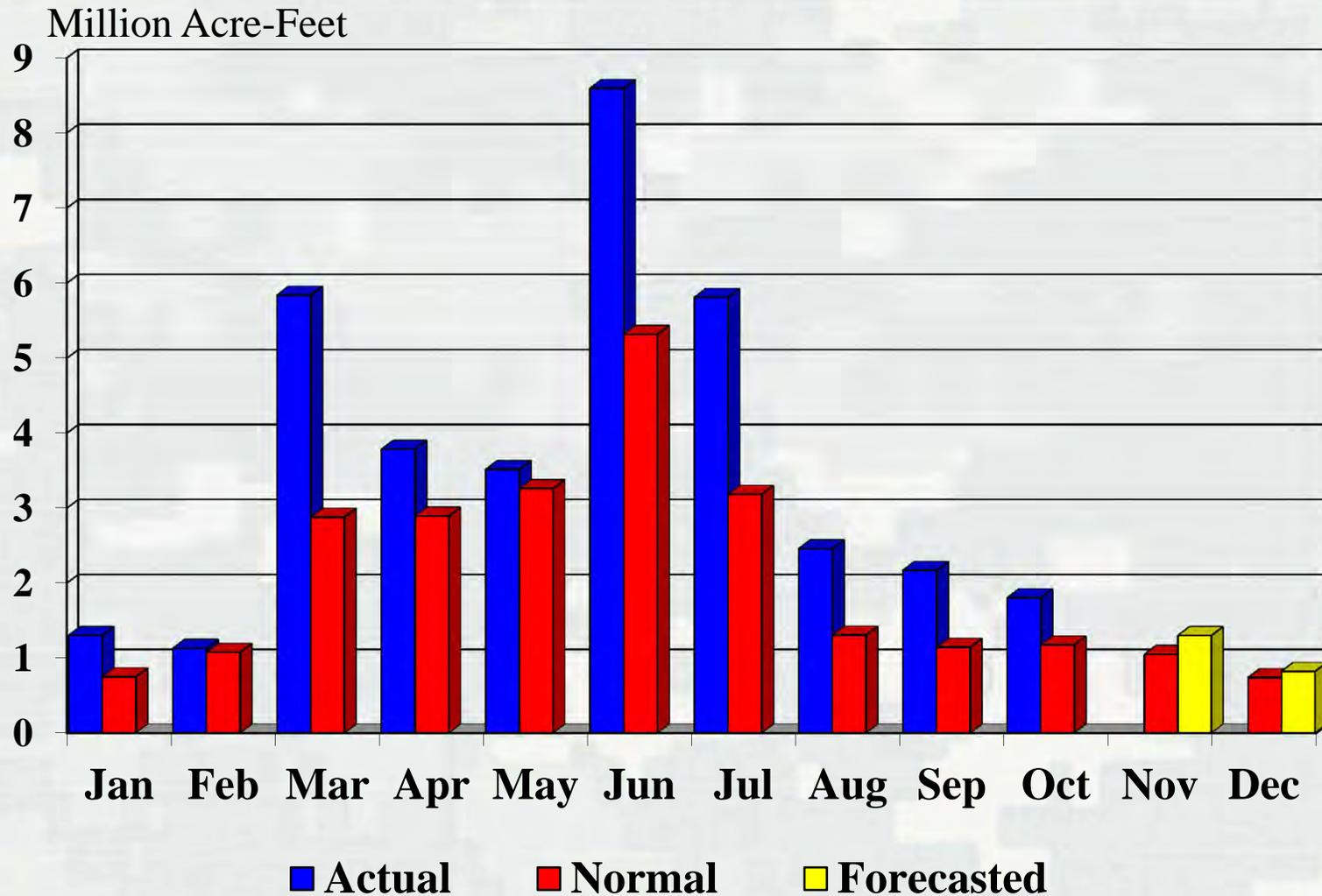
July 2010 Precipitation

Missouri Basin RFC Pleasant Hill, MO: July, 2010 Monthly Observed Precipitation
Valid at 8/1/2010 1200 UTC- Created 8/2/10 13:42 UTC

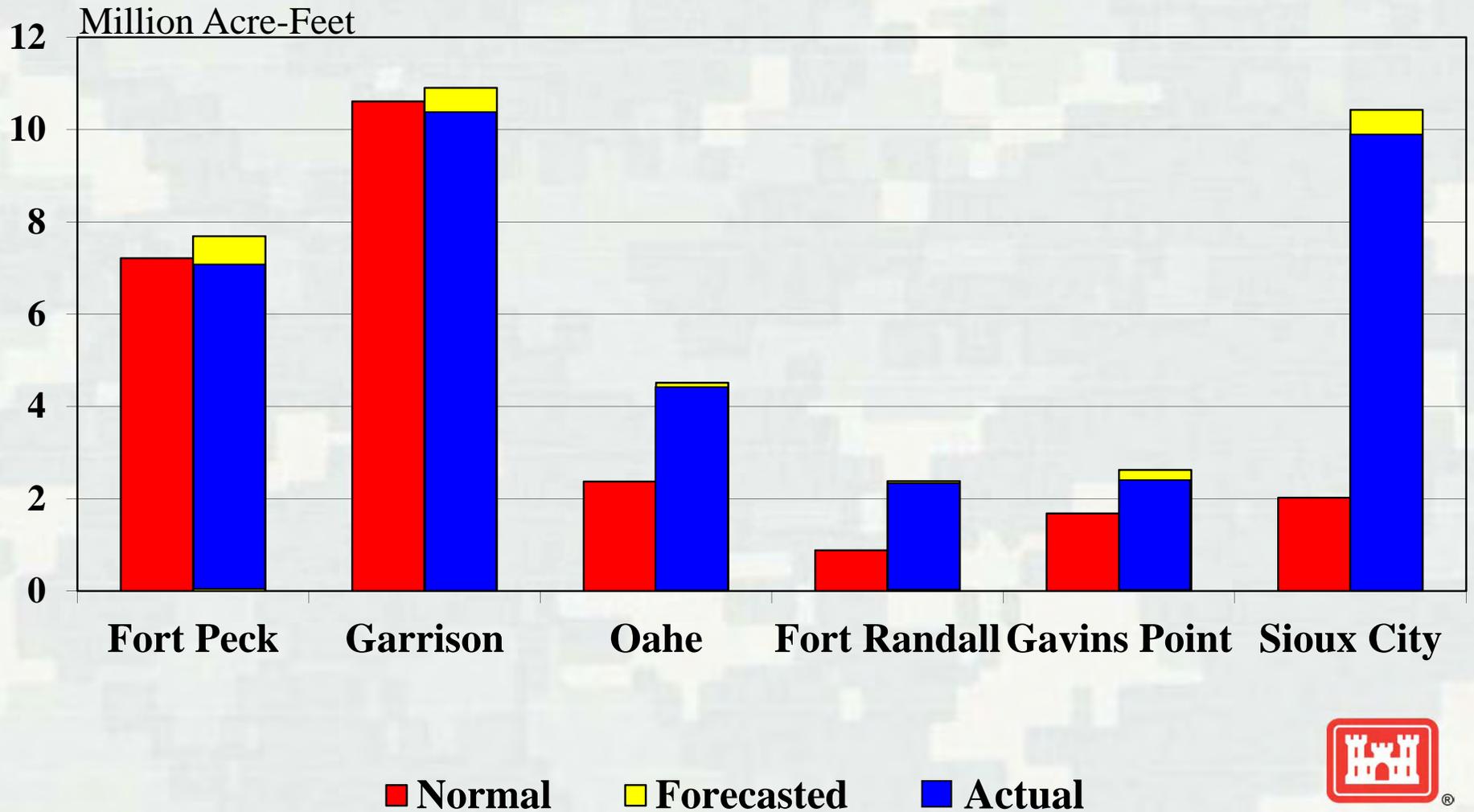


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2010 Missouri River Runoff Above Sioux City, Iowa

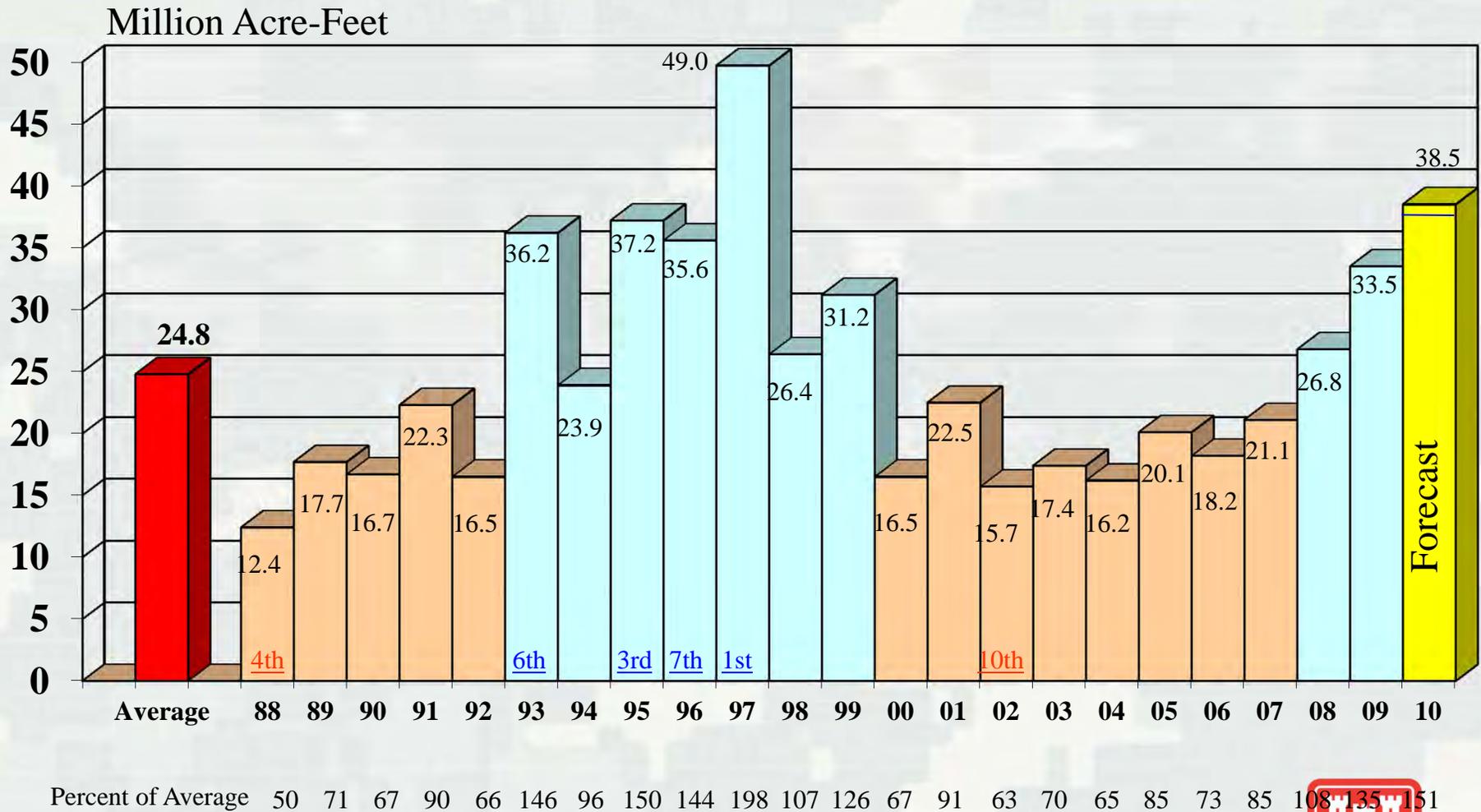


2010 Missouri River Runoff by Reaches



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Missouri River Runoff Above Sioux City 1988-2010 vs Average

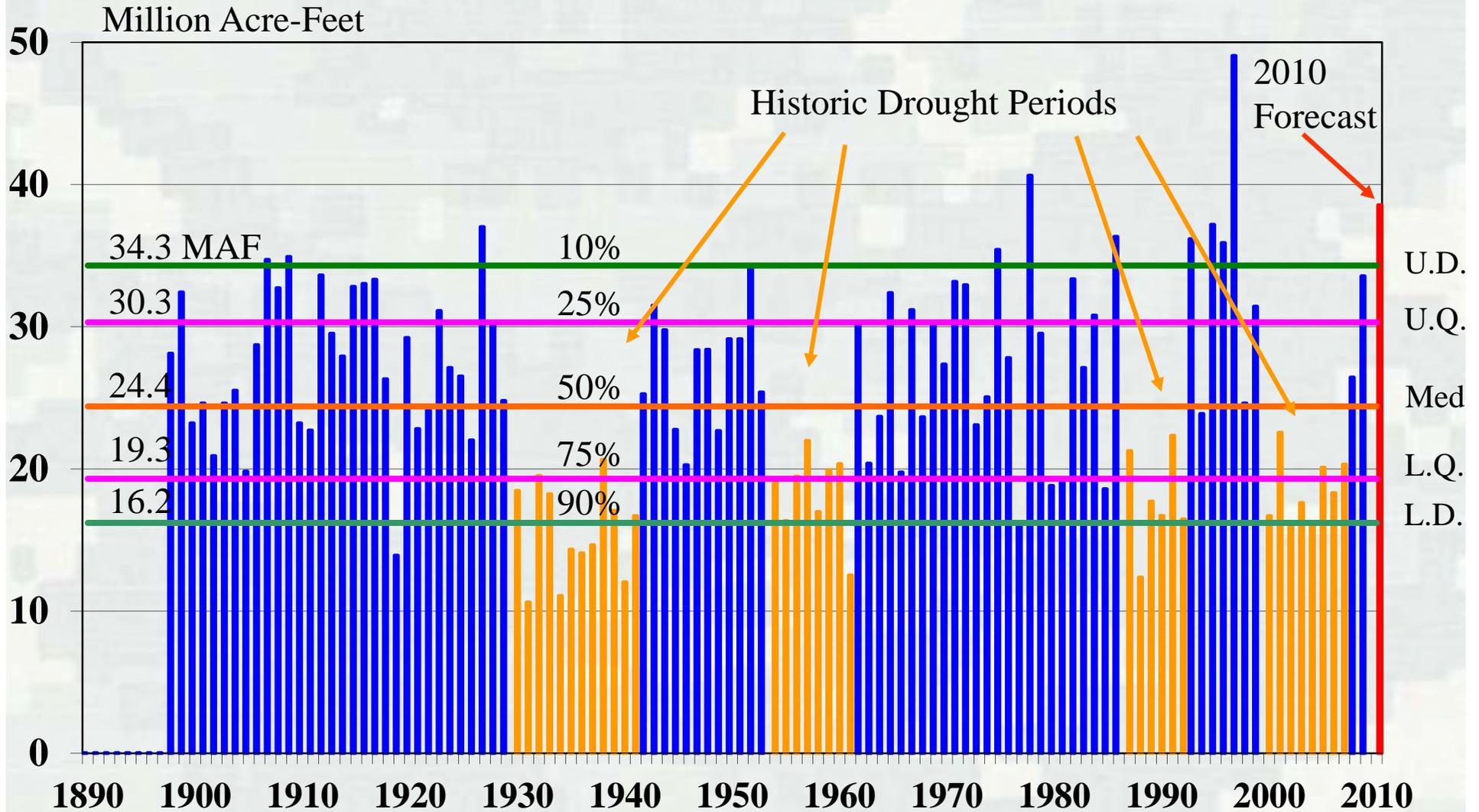


Statistics based on 112 years of record (1898 – 2009)

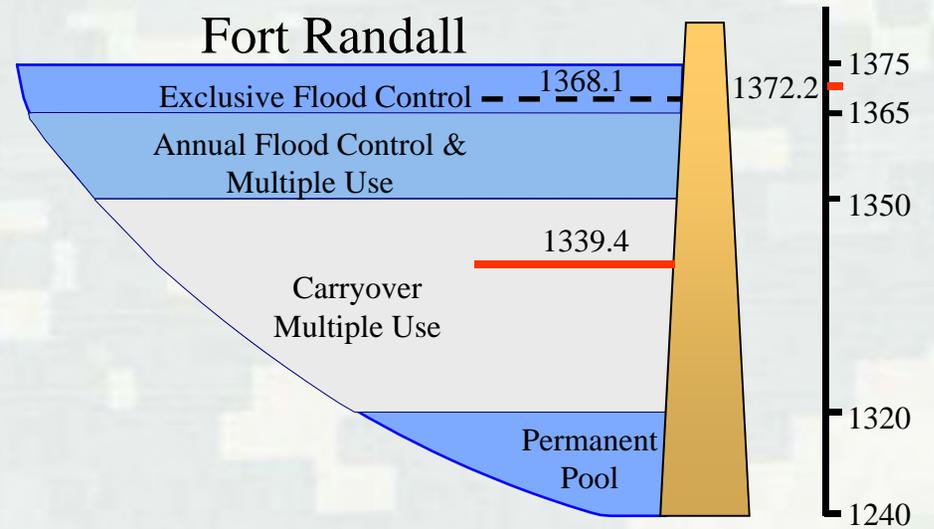
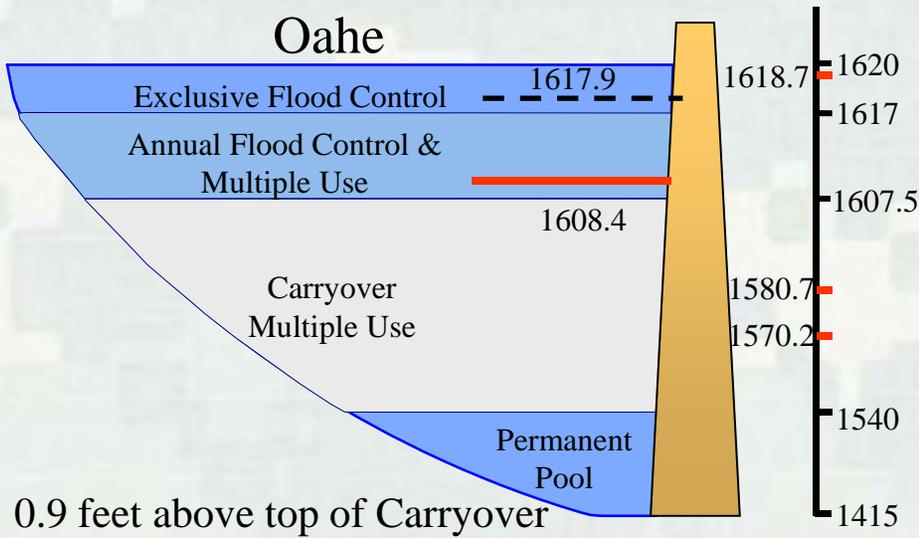
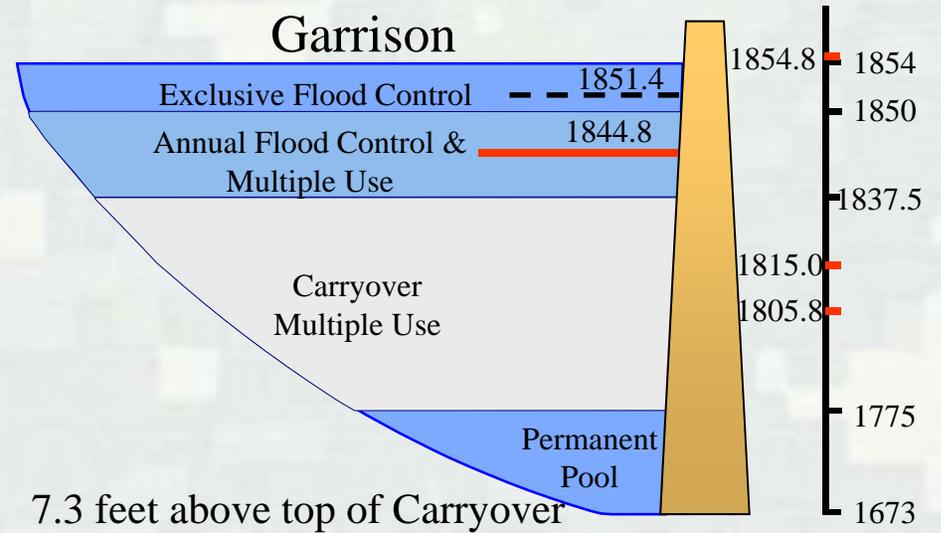
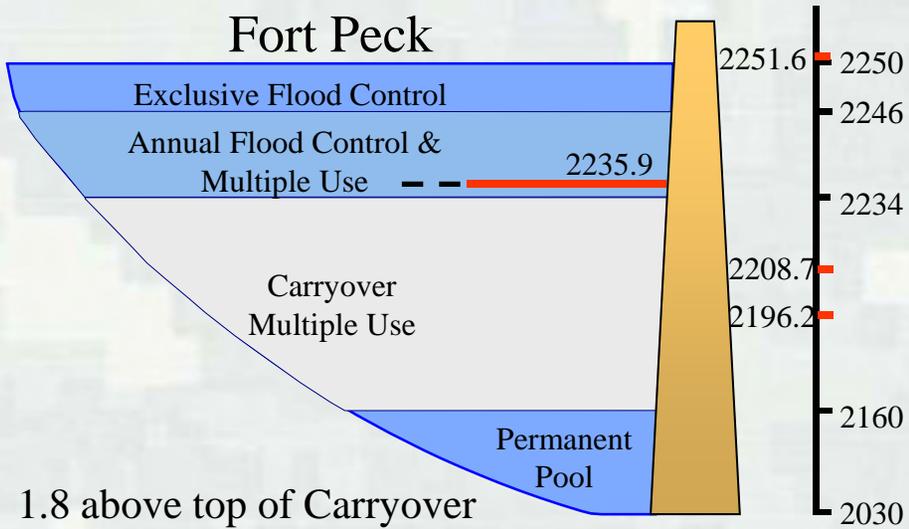
Red text – lowest ranked in 112 years; Blue text – highest ranked in 112 years



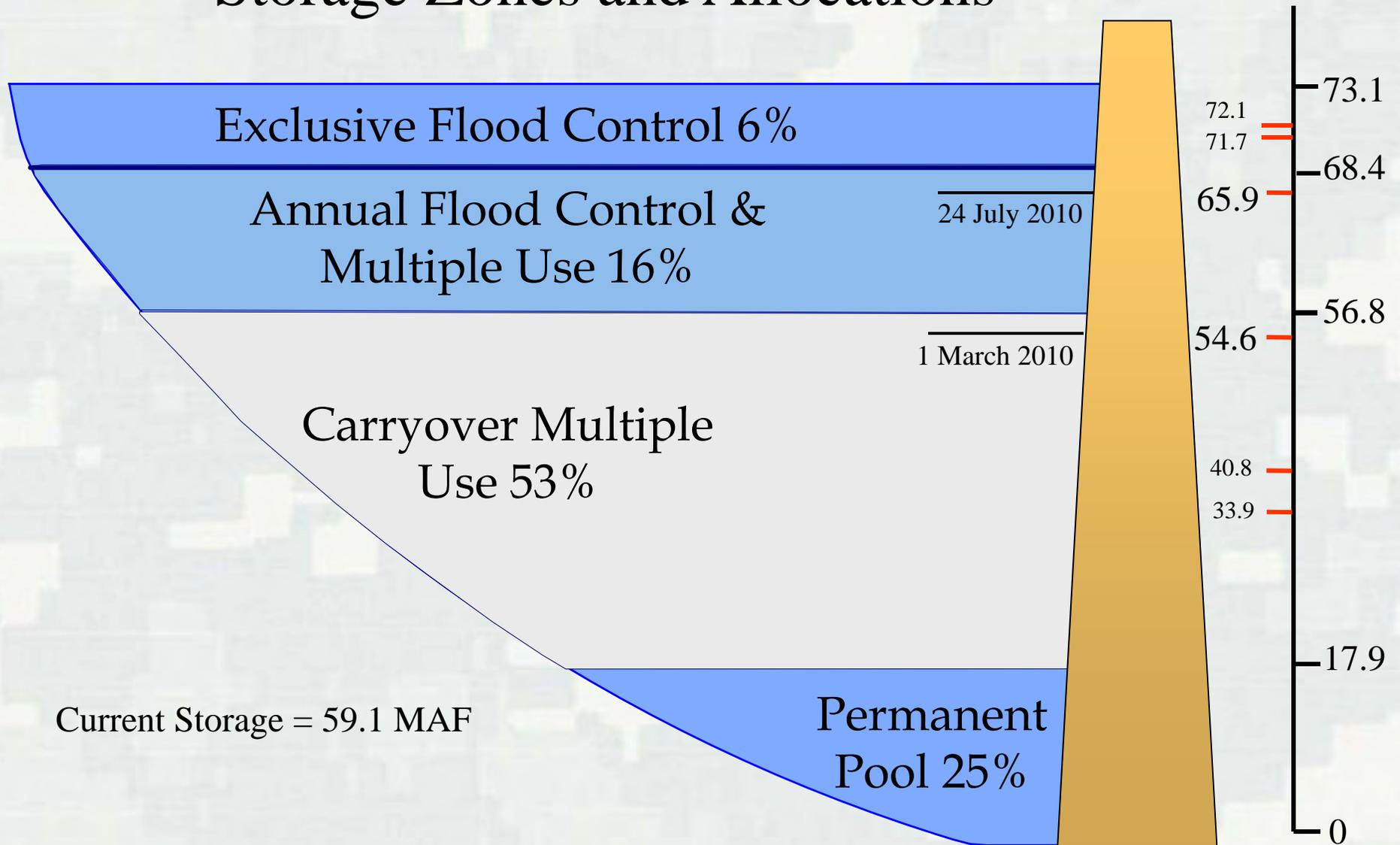
Missouri River Mainstem Annual Runoff at Sioux City, Iowa



Reservoir Levels – November 10, 2010



Missouri River Mainstem System Storage Zones and Allocations



2010 Operations & Storage Evacuation

- System storage peaked at 65.9 million acre-feet
 - ▶ More than 9 MAF of flood water to evacuate prior to start of next year's runoff season
 - ▶ System storage currently at 59.1 MAF
- Significant flood volume was captured in tributary reservoirs
- All reservoirs finally in annual flood control/multiple use zones.
- No March or May Spring pulses due to flooding downstream
- Full navigation service level and season length. 

2010 Operations & Storage Evacuation

- Mainstem system releases from Gavins Point set to continue evacuation of stored flood water
 - ▶ Fall releases ranged from 44,000 cfs to 49,000 cfs
 - ▶ Current release is 49,000 cfs. Drop to 43,000 cfs.
- Evacuation releases maintained through early December
 - ▶ 10-day extension to navigation season
- Release reductions starting in early December
 - ▶ Releases normally reduced 3,000 cfs per day
 - ▶ More gradual reductions if conditions allow



2010 Operations & Storage Evacuation

- Higher than normal winter releases planned
 - ▶ Good for winter energy production
 - ▶ Reduces intake concerns during periods of ice formation



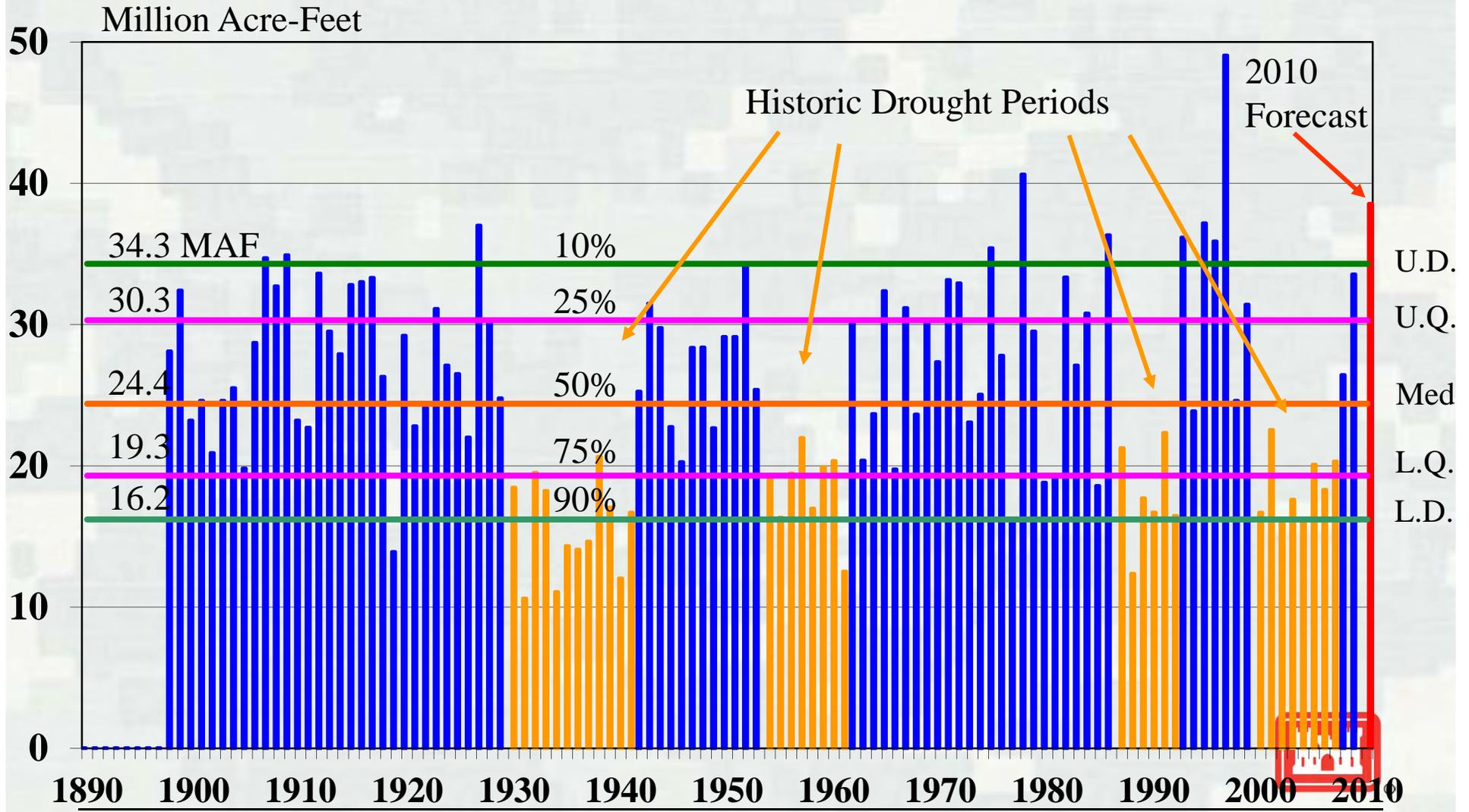
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Development of 2010-2011 Annual Operating Plan

- Studies based on August 1 starting conditions
- Draft AOP was released mid-September
- Public meetings held in mid-October
 - ▶ Oct 19 – Fort Peck, Montana and Bismarck, North Dakota
 - ▶ Oct 20 – Pierre, South Dakota and South Sioux City, Iowa
 - ▶ Oct 21 – St. Joseph and Jefferson City, Missouri
- Final AOP released in mid-December

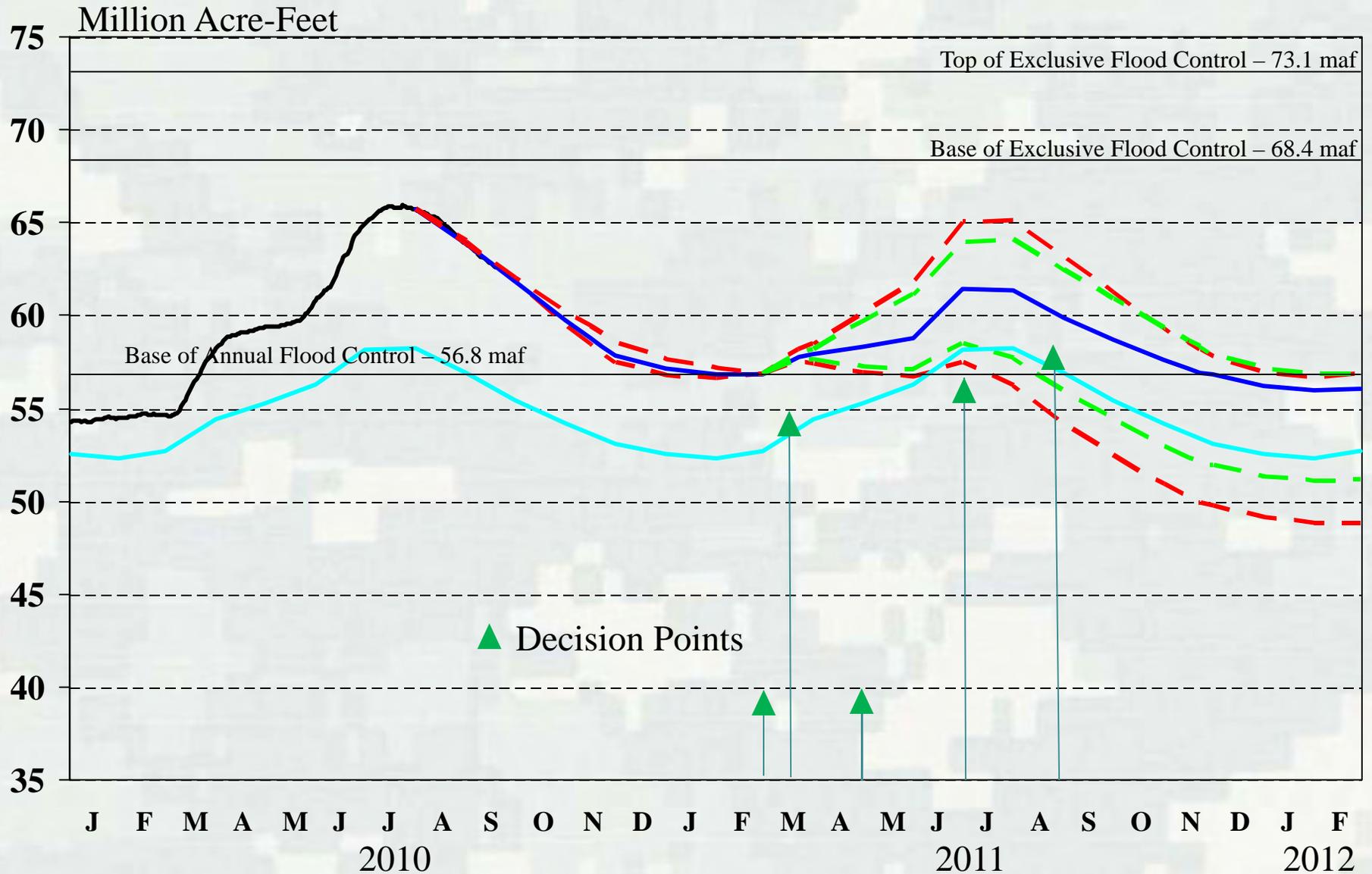


Missouri River Mainstem Annual Runoff at Sioux City, Iowa



System Storage

2010-2011 Preliminary Draft AOP



Draft 2010-2011 Annual Operating Plan (AOP) Median Runoff Condition

- Flood Control
 - ▶ Entire flood pool available in 2011
- Navigation
 - ▶ Full service flows to start season
 - ▶ Full service flows following July 1 storage check
 - ▶ Full length navigation season
- Hydropower – Annual Generation = 9.9 BkWh in 2011



Draft 2010-2011 Annual Operating Plan (AOP)

Median Runoff Condition

- Recreation, water supply and irrigation
 - ▶ Near normal due to higher reservoir levels and releases
 - ▶ Higher winter releases from Gavins Point
- Fish and Wildlife / Endangered Species
 - ▶ Favor Garrison during forage fish spawn
 - ▶ March and May spring pulses from Gavins Point
 - ▶ No intrasystem unbalancing in 2011
 - ▶ No Fort Peck spring rise pending results of modification of Intake Diversion Dam on the Yellowstone
 - ▶ Minimize zero releases at Fort Randall to the extent reasonably possible during the nesting season



Missouri River Downstream Flow Support Support for 2011 Navigation Season

Runoff Scenario	Annual Runoff Volume (MAF)	July 1 System Storage (MAF)	Flow Level Above or Below Full Service (in cfs)		Length of Shortening (Days)
			Spring	Fall	
Upper Decile	34.3	65.0	0	0	0
Median	24.4	61.4	0	0	0
Lower Decile	16.2	57.4	0	0	0



Missouri River Spring Pulses

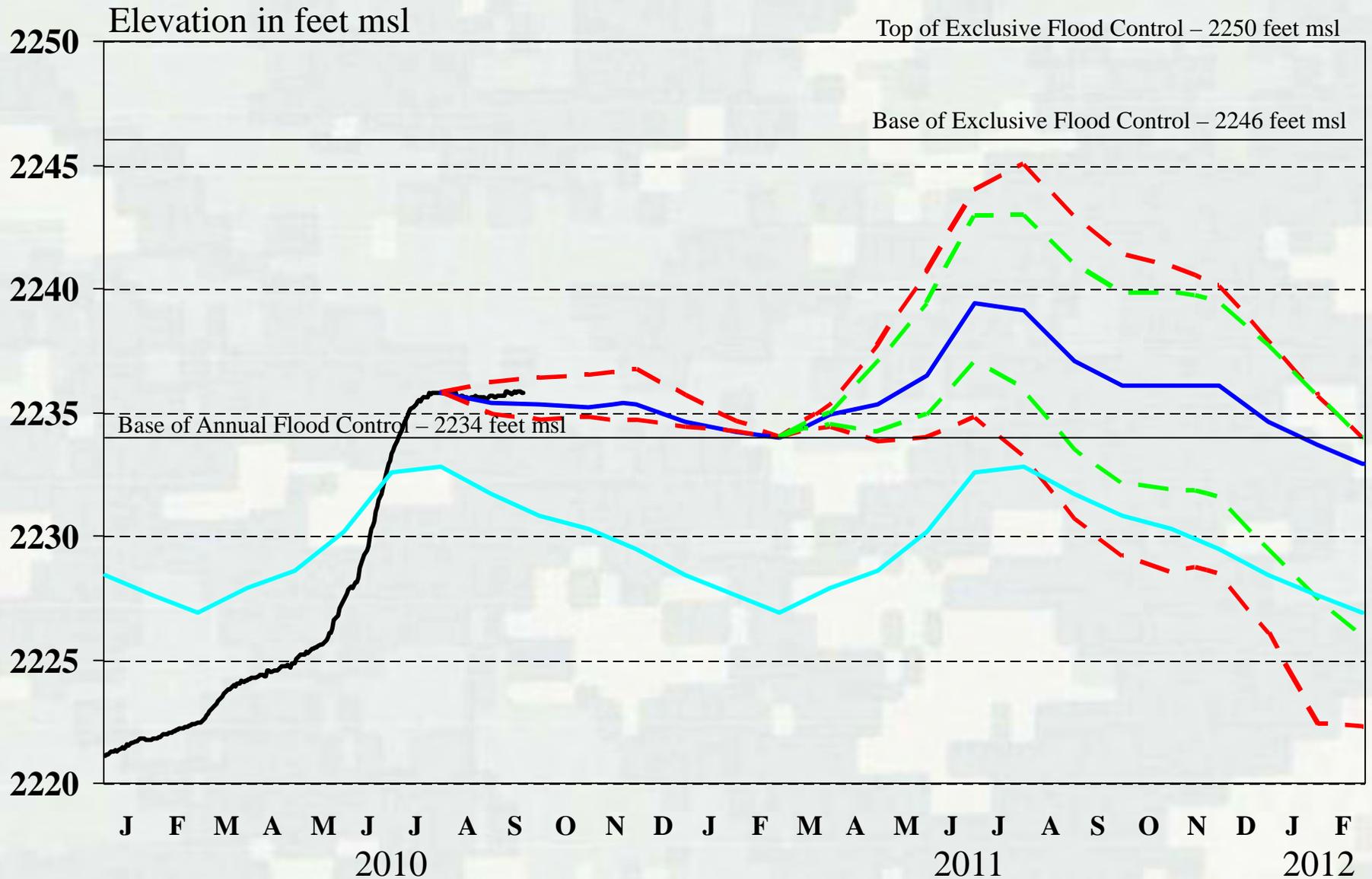
Runoff Scenario	Annual Runoff Volume (MAF)	March 1 System Storage (MAF)	March Spring Pulse (kcfs)	May 1 System Storage (MAF)	May Spring Pulse (kcfs)
Upper Decile	34.3	56.8	+5	60.1	+20
Upper Quartile	30.3	56.8	+5	59.6	+20
Median	24.4	56.8	+5	58.3	+16 (13)
Lower Quartile	19.3	56.8	+5	57.2	+12.5 (9.7)
Lower Decile	16.2	56.8	+5	56.9	+12.0 (9.7)



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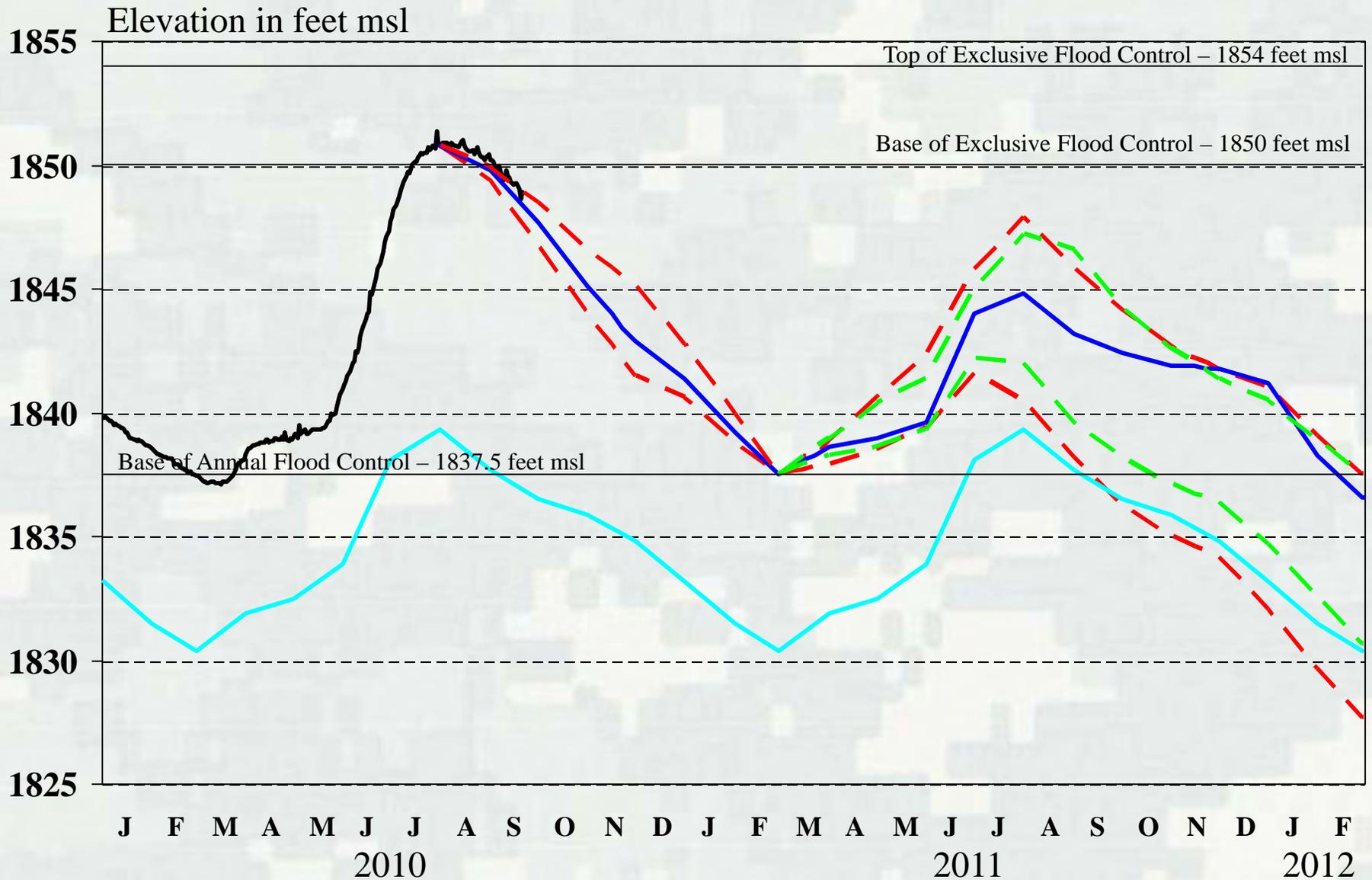
Fort Peck

2010-2011 Preliminary Draft AOP



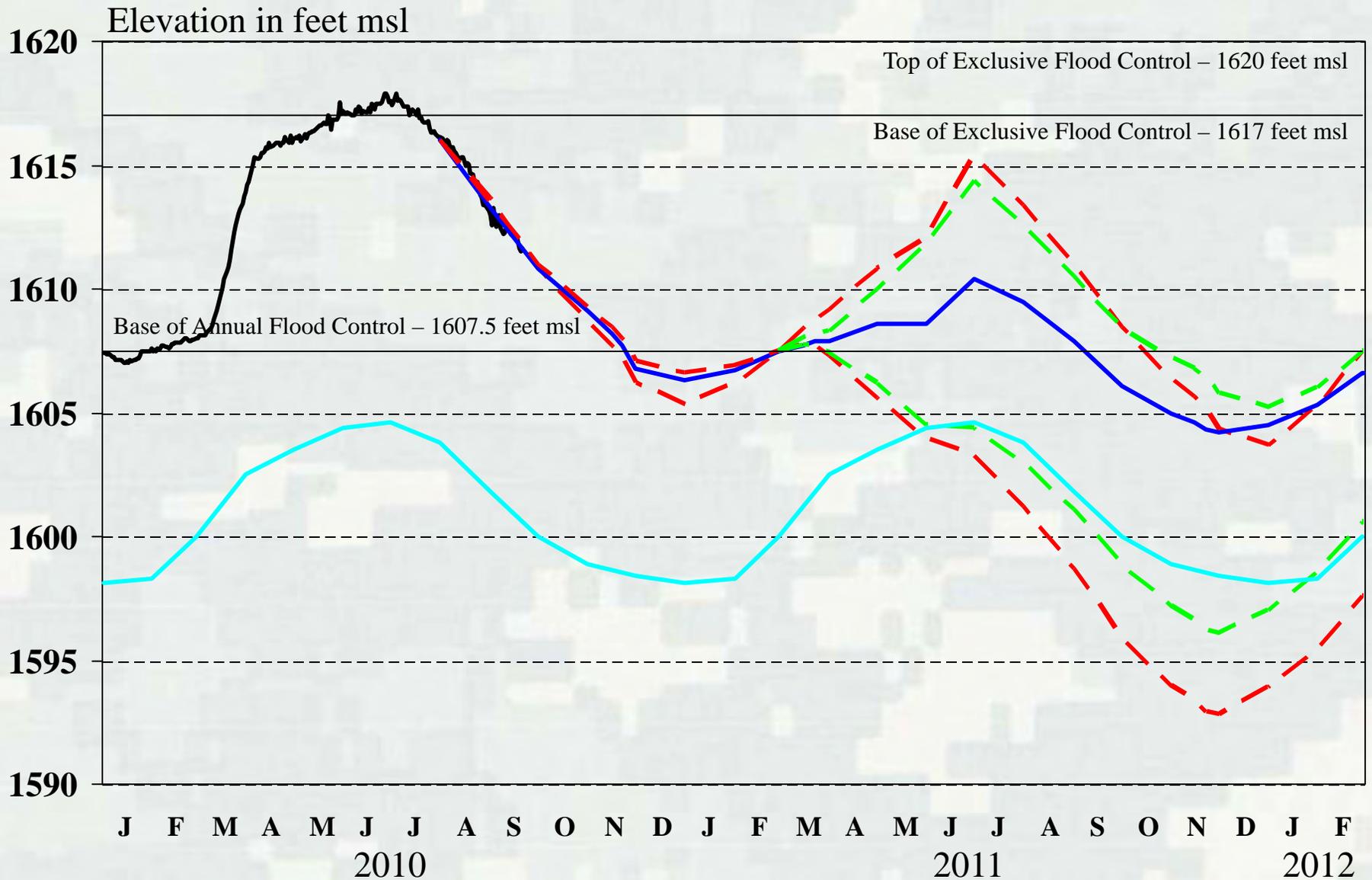
Garrison

2010-2011 Preliminary Draft AOP



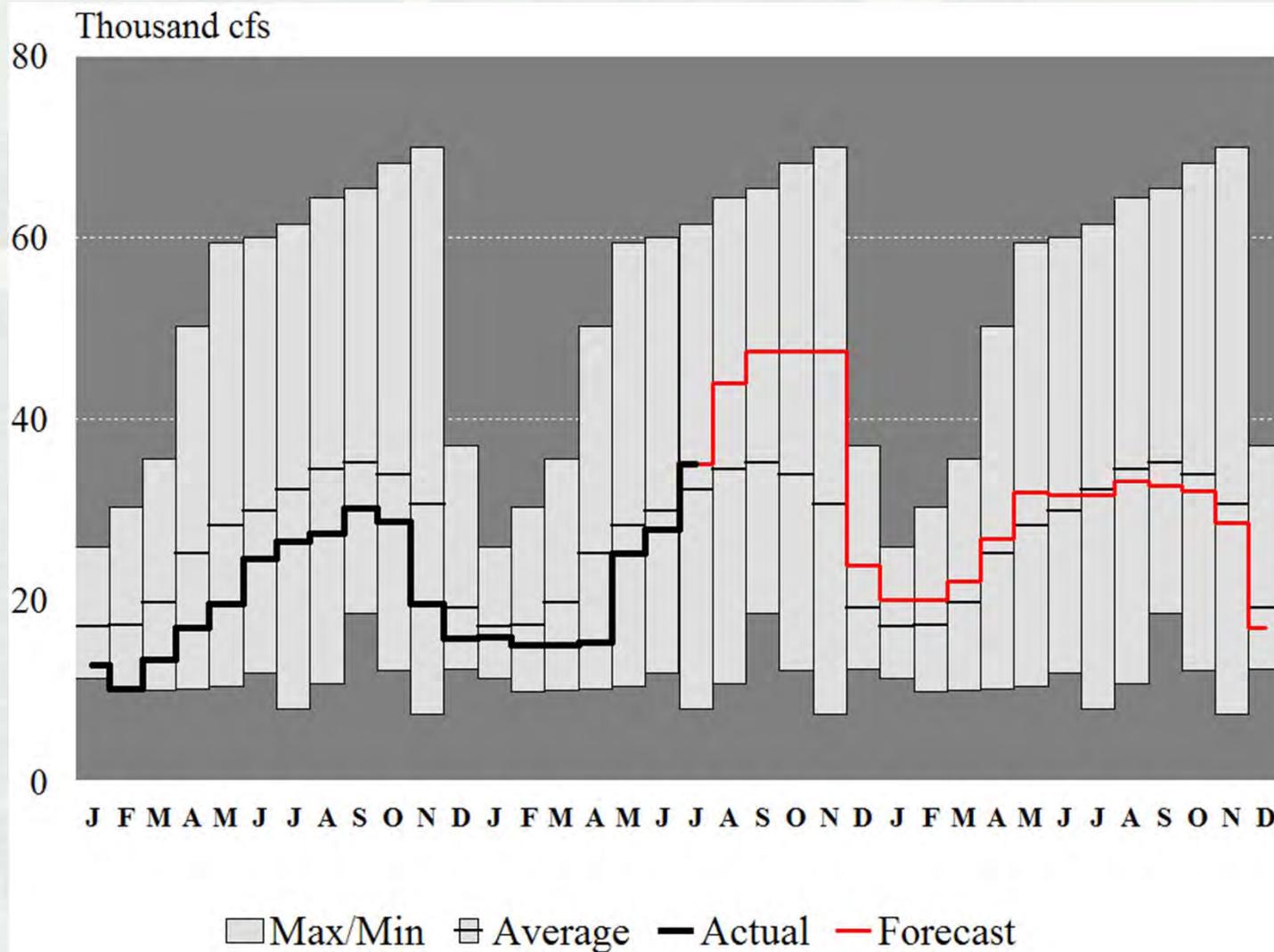
Oahe

2010-2011 Preliminary Draft AOP



Gavins Point Monthly Releases

2009 through 2010 & 2010-2011 AOP Releases

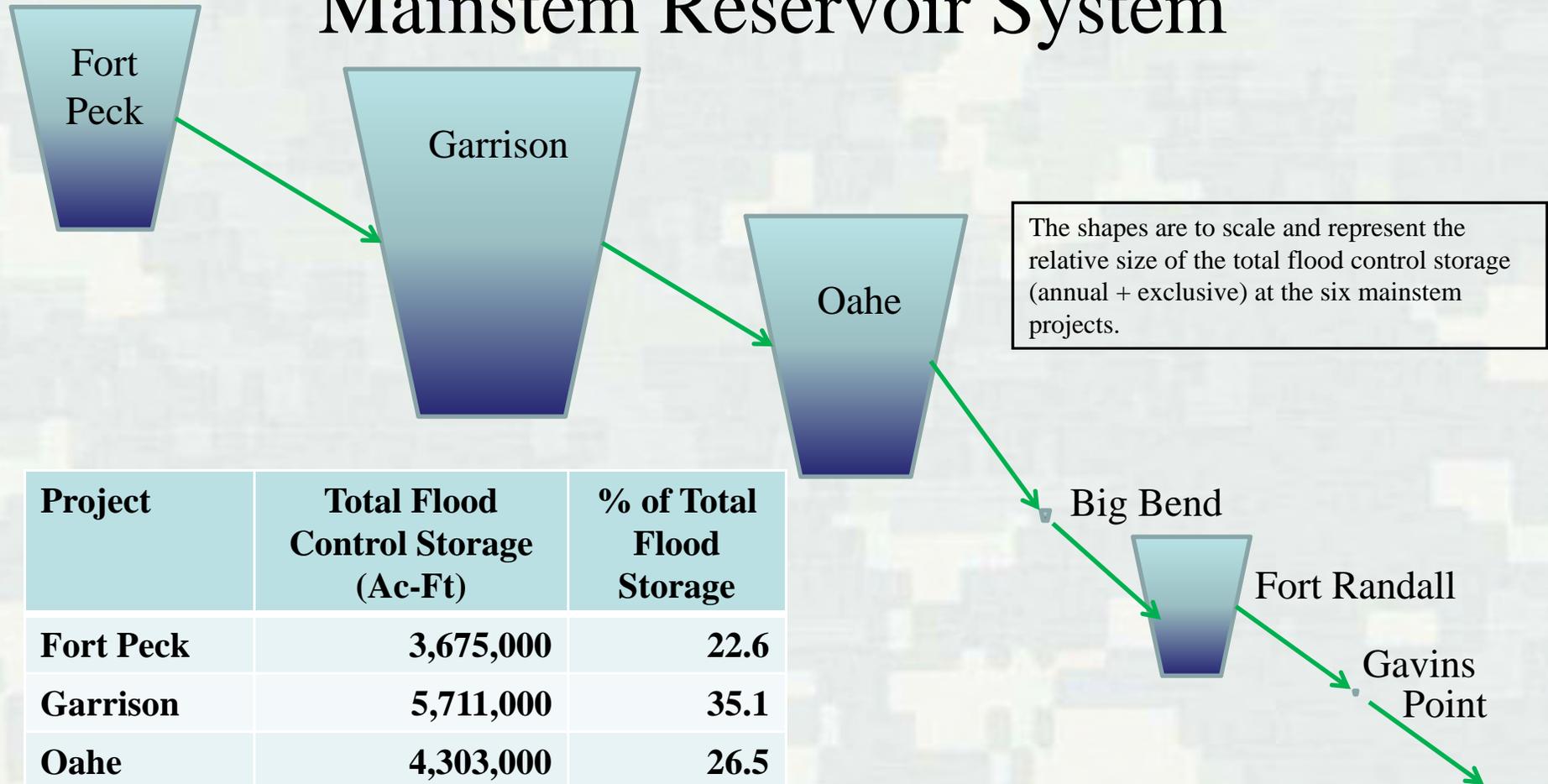


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Flood Control Storage Capacity Mainstem Reservoir System

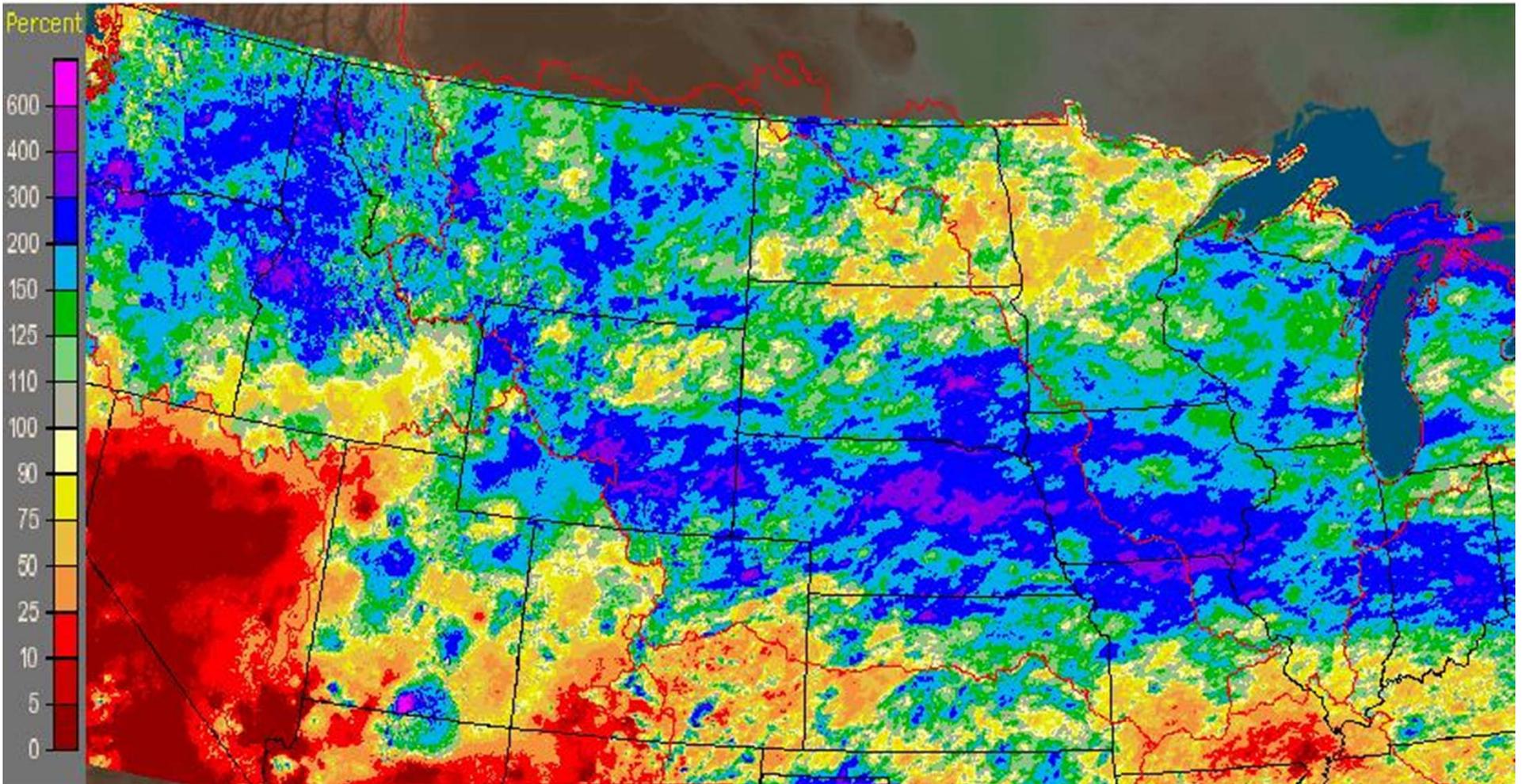


Project	Total Flood Control Storage (Ac-Ft)	% of Total Flood Storage
Fort Peck	3,675,000	22.6
Garrison	5,711,000	35.1
Oahe	4,303,000	26.5
Big Bend	177,000	1.1
Fort Randall	2,294,000	14.1
Gavins Point	108,000	0.7



June 2010 Precipitation – Percent of Normal

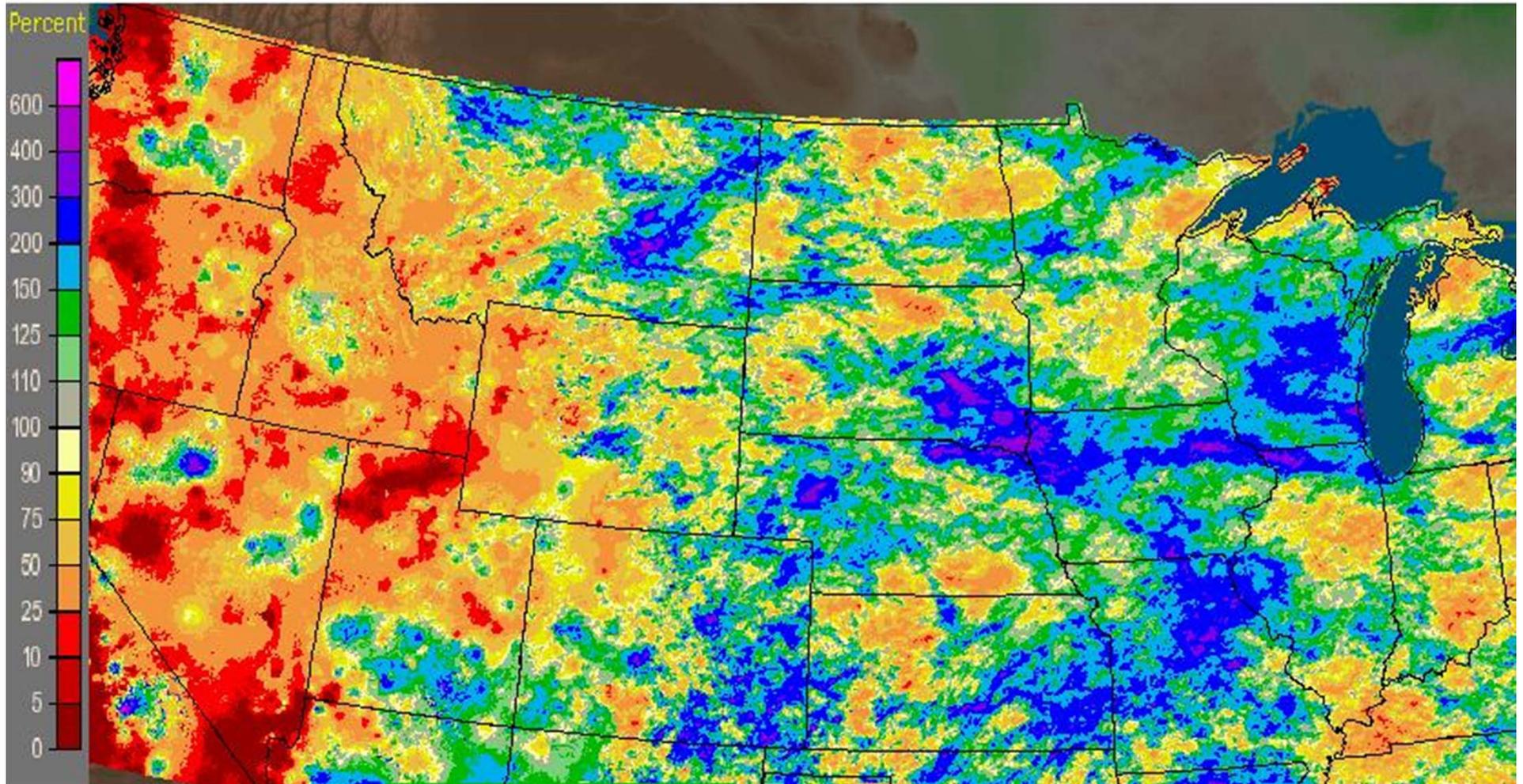
Missouri Basin RFC Pleasant Hill, MO: June, 2010 Monthly Percent of Normal Precipitation
Valid at 7/1/2010 1200 UTC– Created 7/3/10 21:44 UTC



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July 2010 Precipitation – Percent of Normal

Missouri Basin RFC Pleasant Hill, MO: July, 2010 Monthly Percent of Normal Precipitation
Valid at 8/1/2010 1200 UTC– Created 8/2/10 13:47 UTC

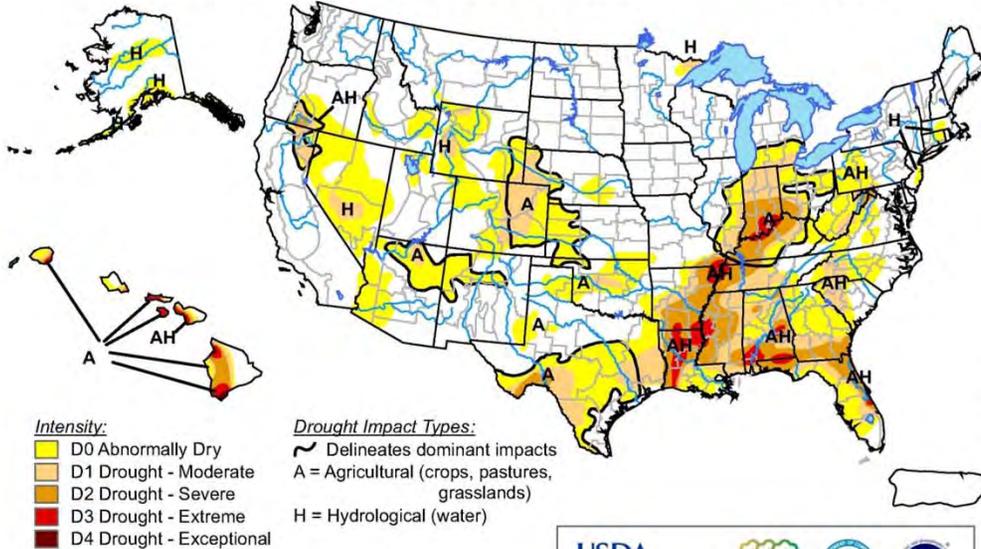


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Drought Monitor & Outlook

U.S. Drought Monitor

November 2, 2010
Valid 8 a.m. EDT



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

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

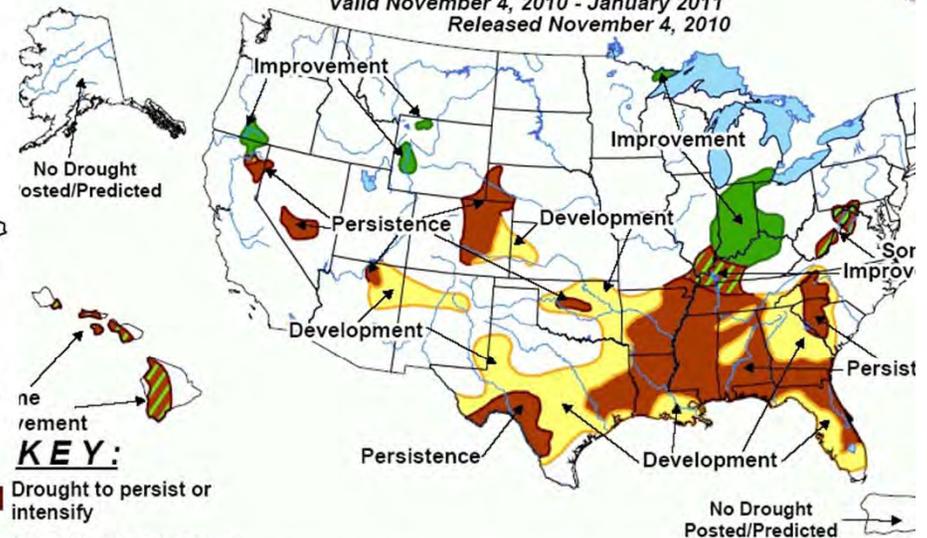


Released Thursday, November 4, 2010

Author: Mark Svoboda, National Drought Mitigation Center

U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period
Valid November 4, 2010 - January 2011
Released November 4, 2010



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 improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.



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