

# Summer 2012



NIDIS - UPPER COLORADO BASIN PILOT PROJECT

Weekly Climate, Water & Drought Assessment

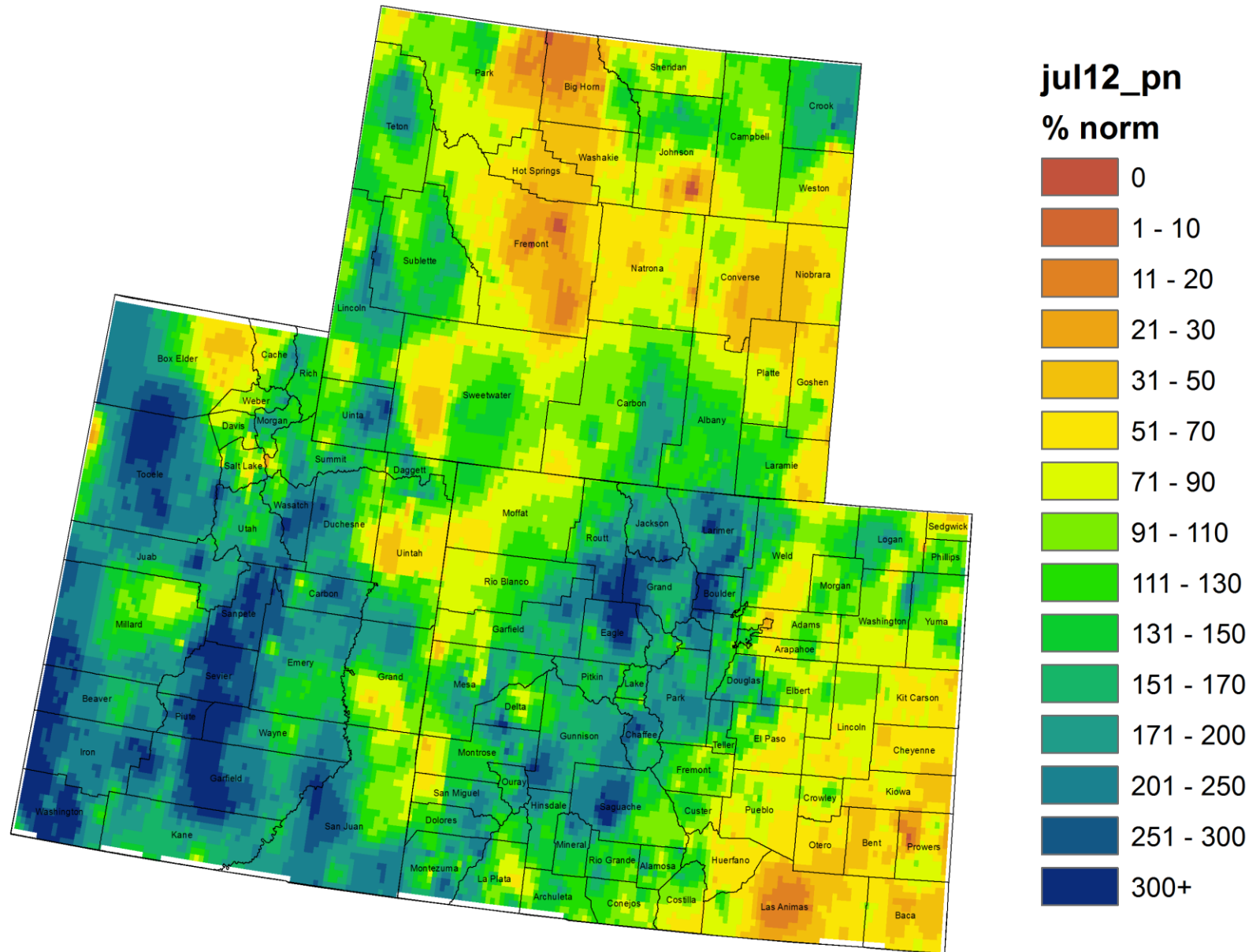
# Today's Agenda

- Assessment of current water conditions
- Precipitation Forecast
- Recommendations for Drought Monitor

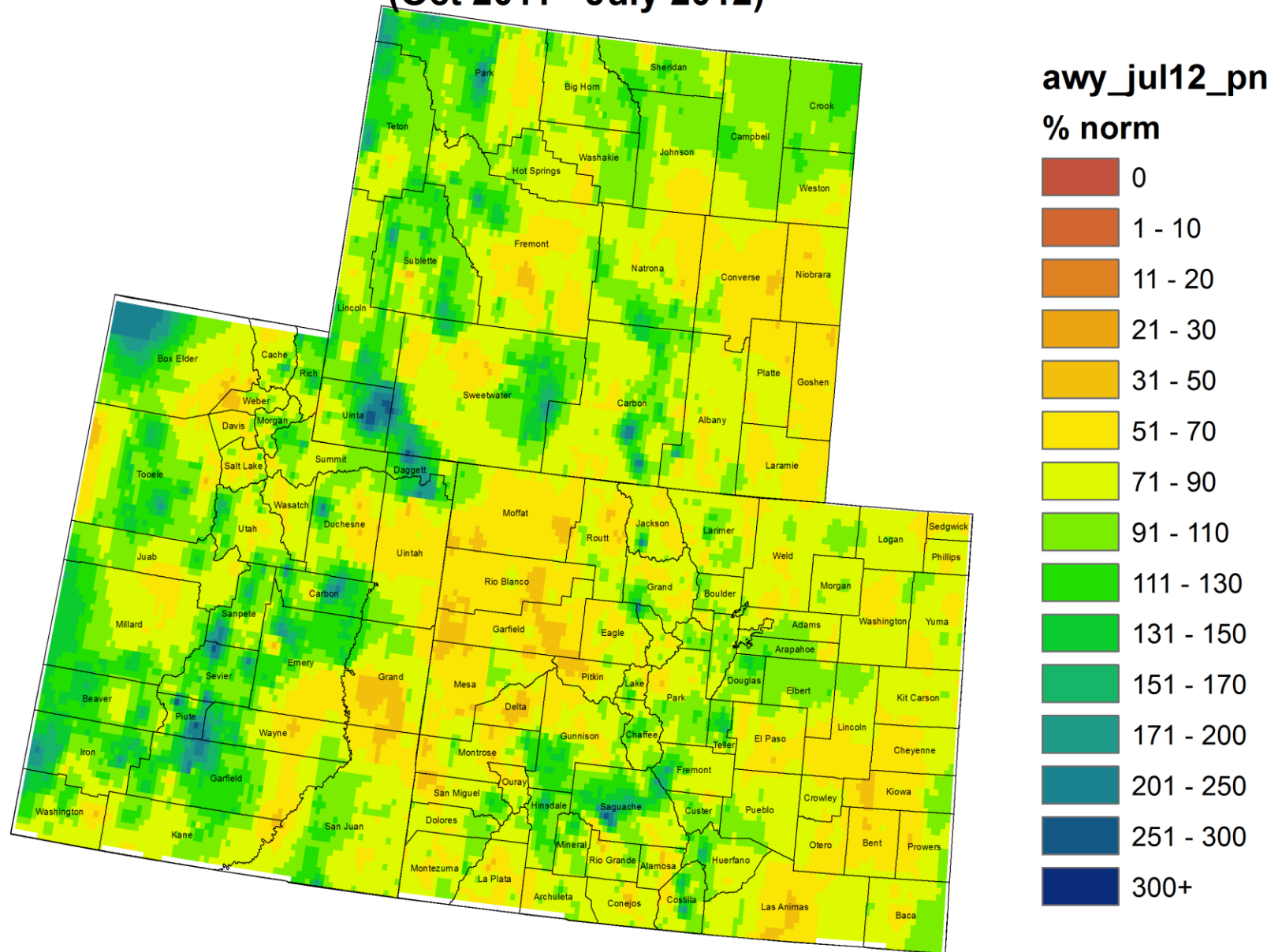
# Precipitation/Snowpack Update



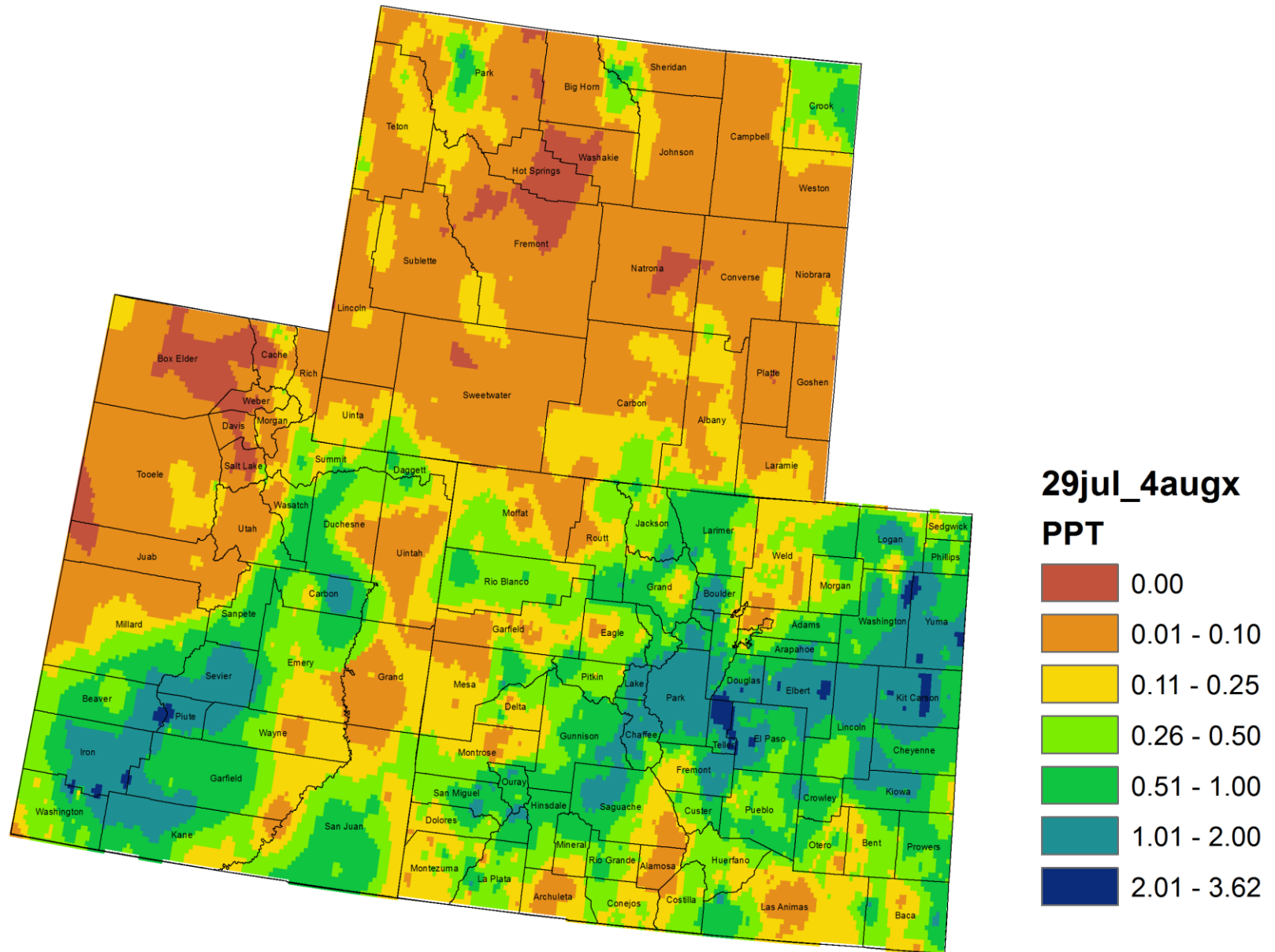
# Colorado, Utah and Wyoming July 2012 Precipitation as Percentage of Normal



# Colorado, Utah and Wyoming Water Year 2012 Precipitation as Percentage of Normal (Oct 2011 - July 2012)



# Colorado, Utah and Wyoming 7 Day Precipitation (in) 29 July - 4 August 2012

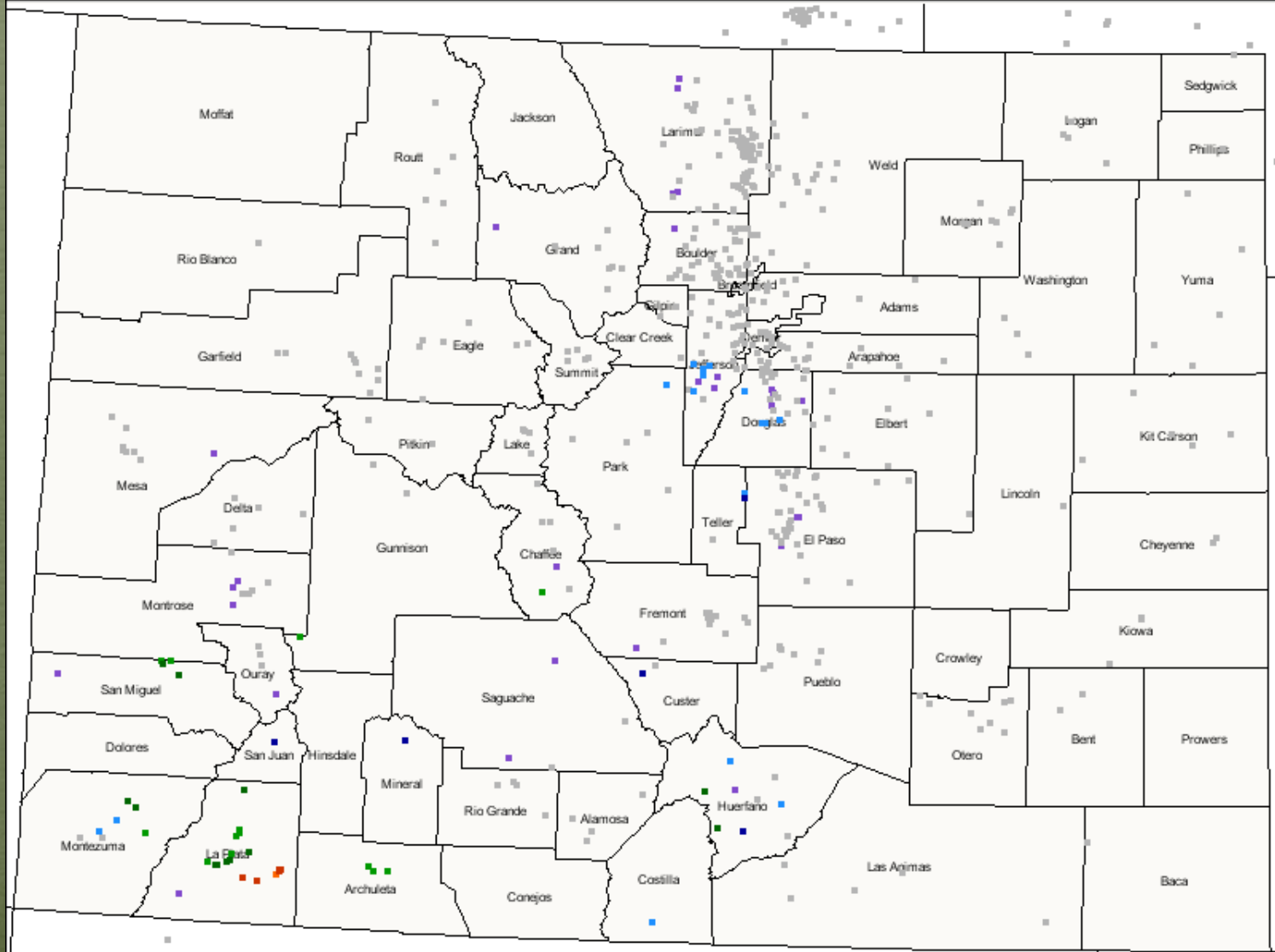


# CoCoRaHS 8/6/12

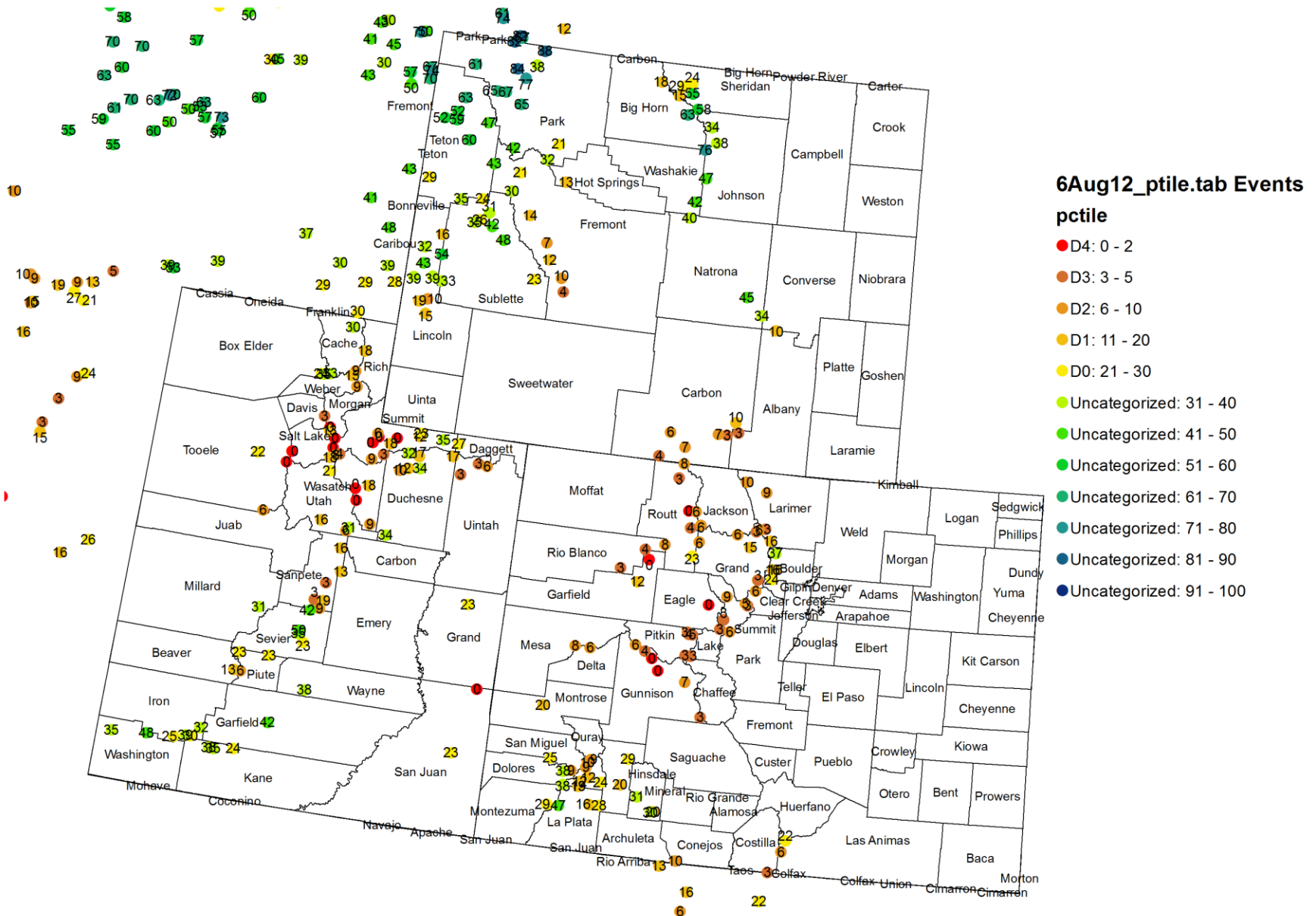
Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am

Colorado 8/6/2012

0.0 Trace 0.01 - 0.04 0.05 - 0.08 0.09 - 0.19 0.20 - 0.46 0.47 - 0.69 0.70 - 0.76



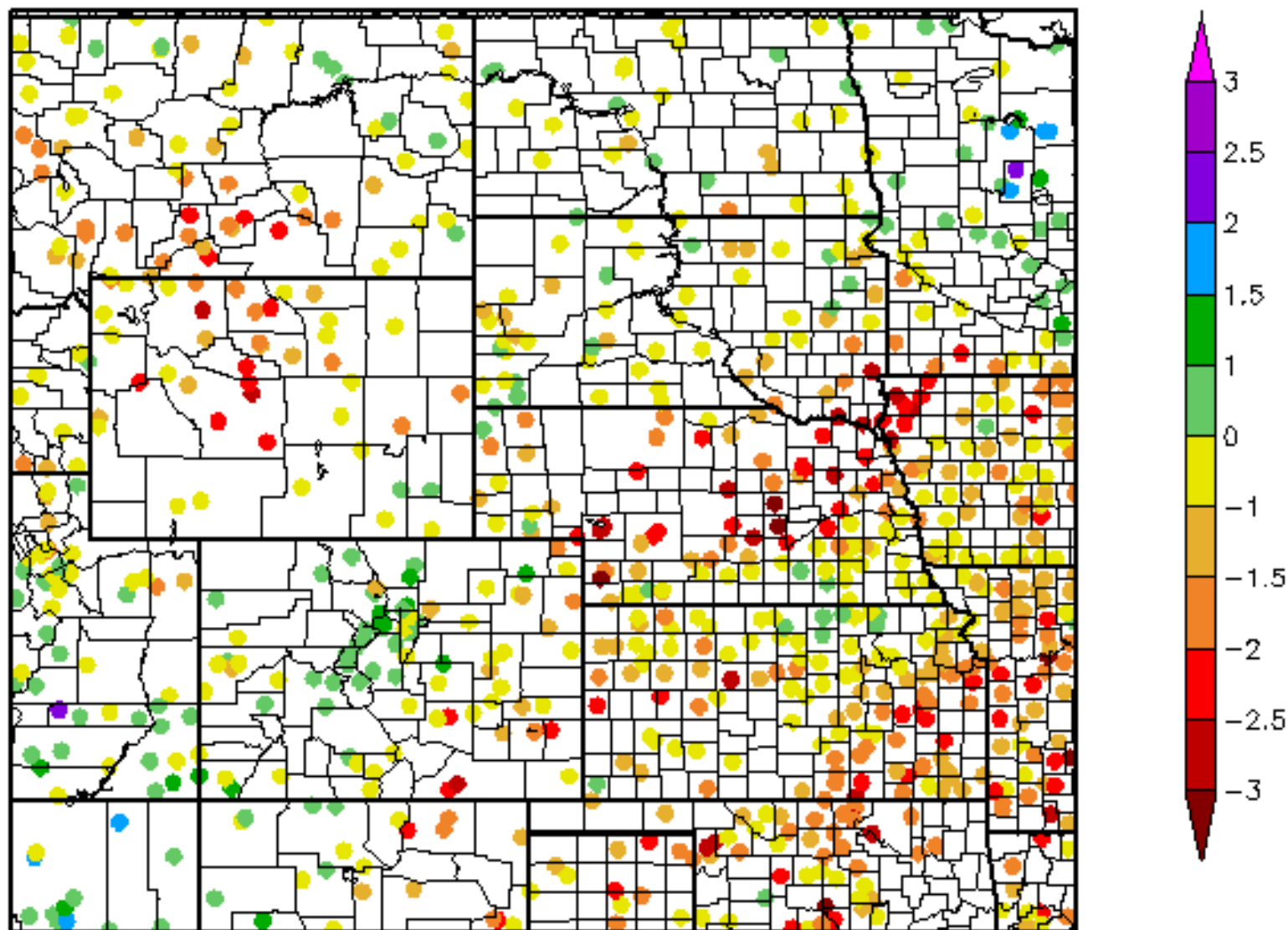
# Snotel Water Year Precipitation Percentile Ranking for 6 August 2012 (Stations with 15+ years of data only)



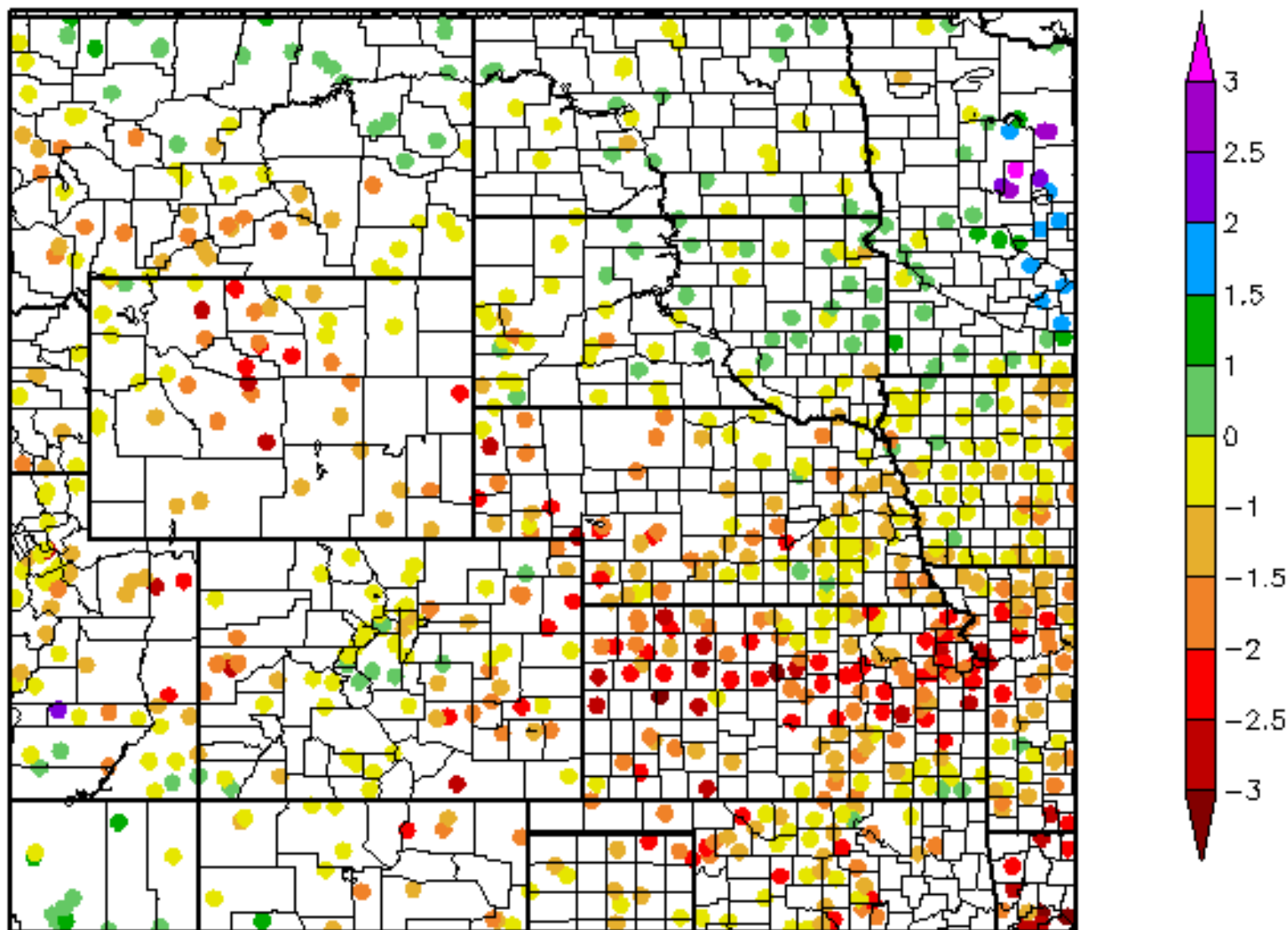


# 60 Day SPI

6/8/2012 - 8/6/2012



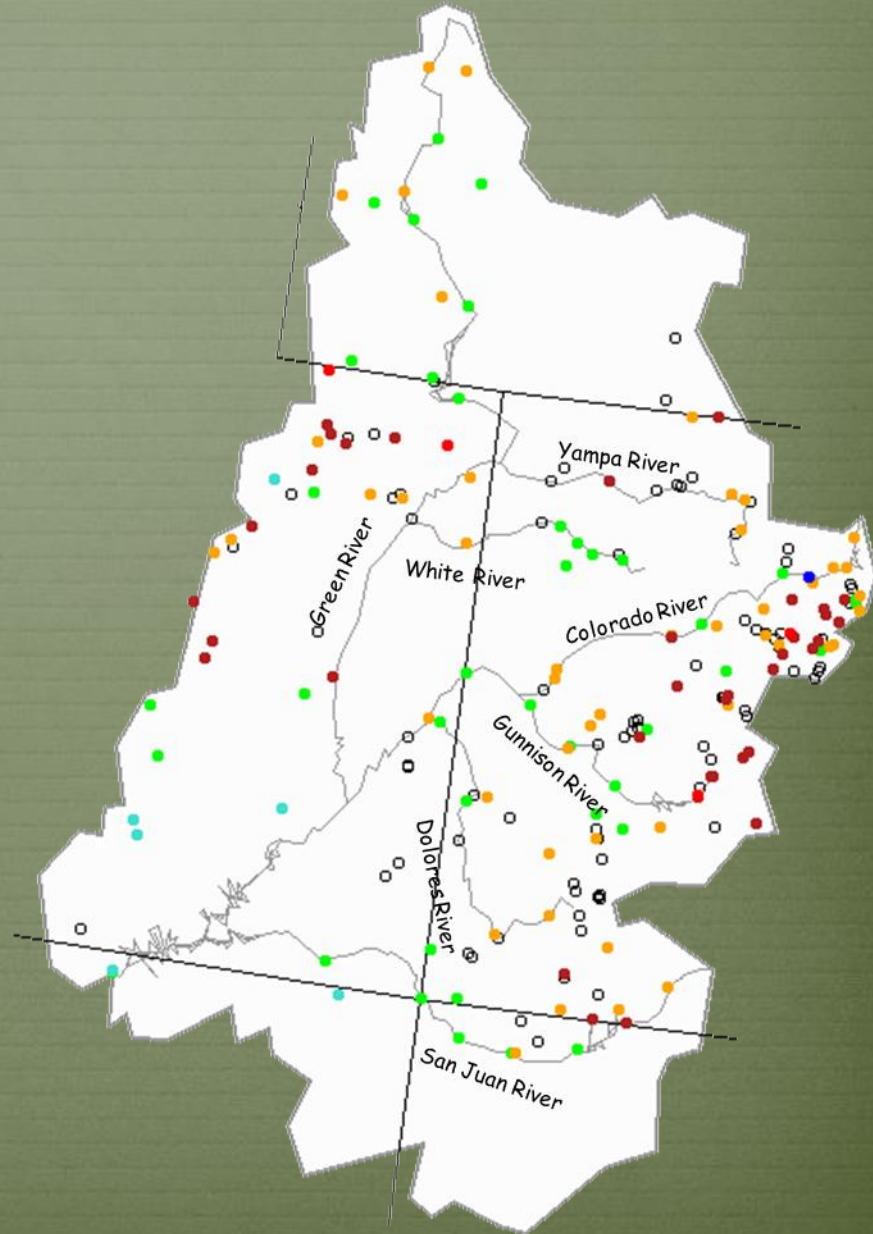
120 Day SPI  
4/9/2012 - 8/6/2012



# Streamflow Update

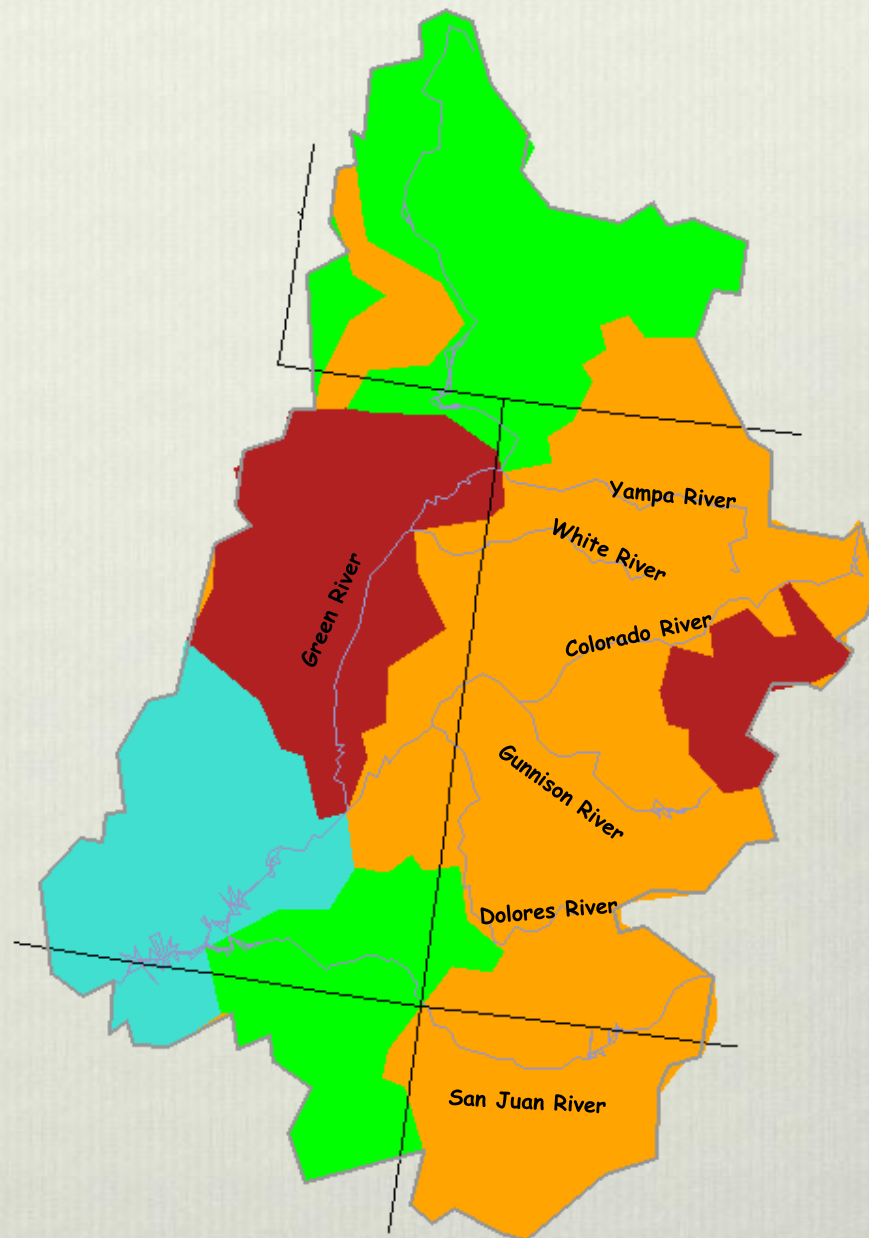


7-day average discharge compared to historical discharge for the day of the year (Aug 5th)



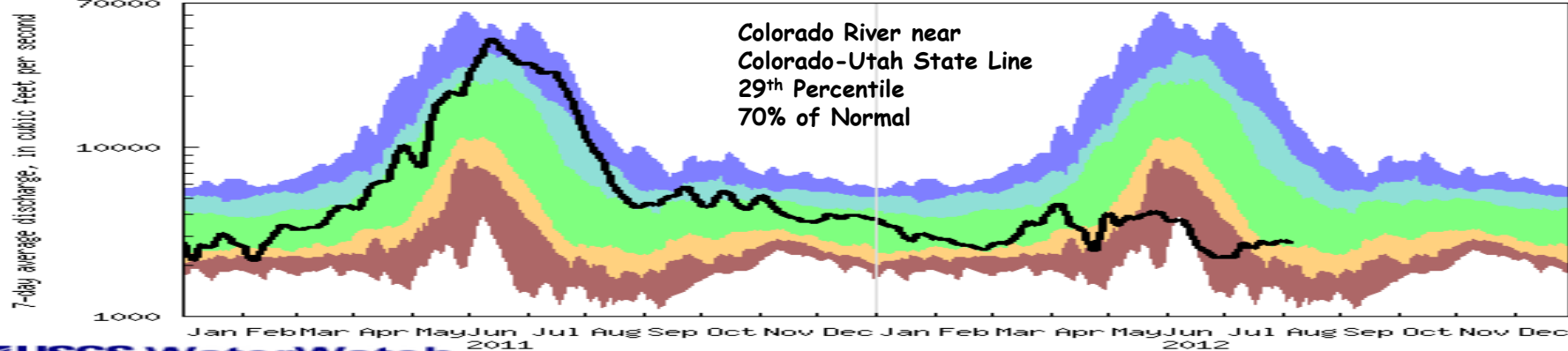
Explanation - Percentile classes							
Low	<10	10-24	25-75	76-90	>90	High	Not-ranked
	Much below normal	Below normal	Normal	Above normal	Much above normal		

# 7-day average discharge compared to historical discharge for the day of the year (Aug 5)

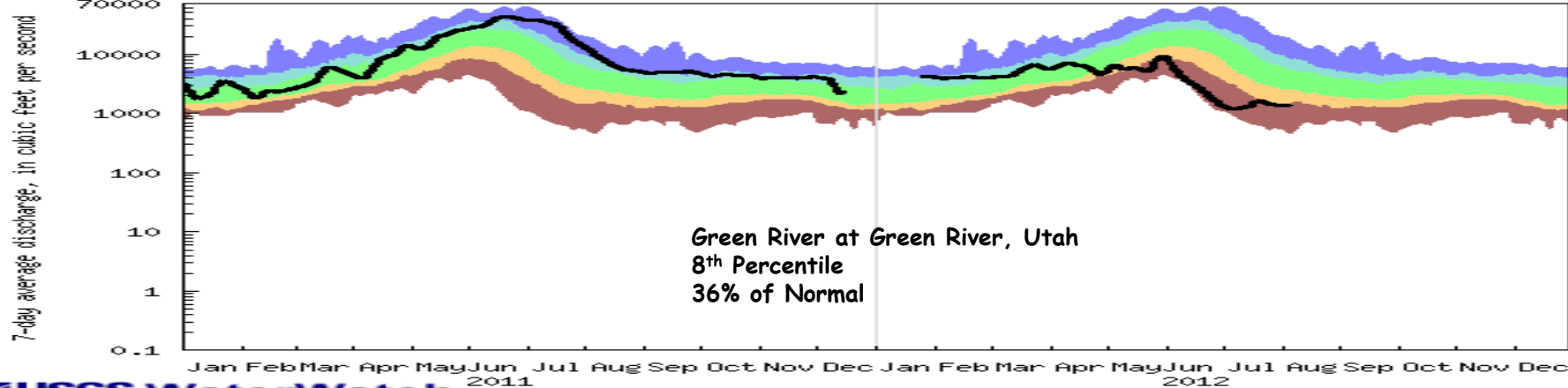


Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	

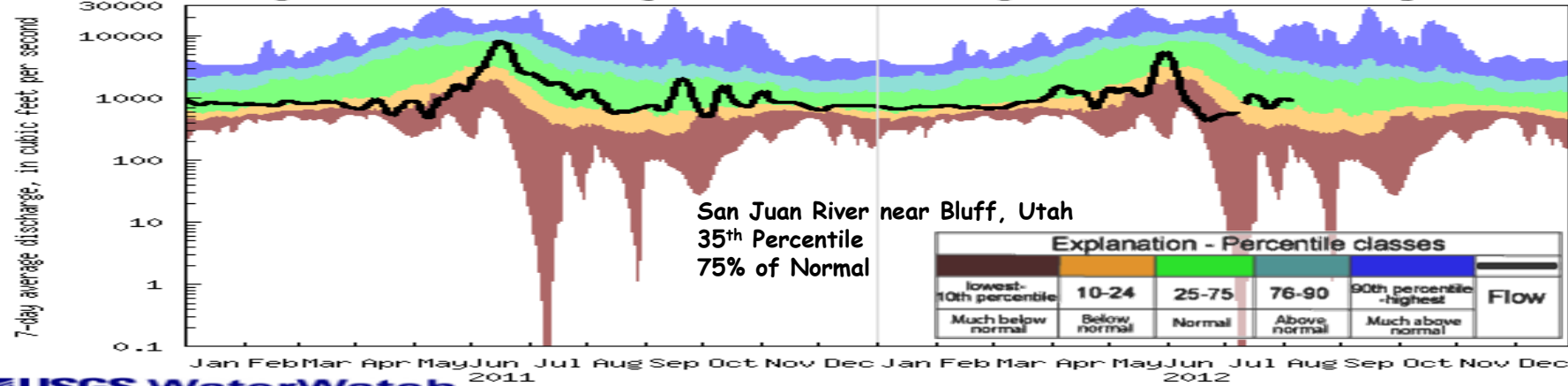
Duration hydrograph of 7-day average streamflow for USGS 09163500 (Drainage Area: 17843 square miles, Length of Record: 61 years)



Duration hydrograph of 7-day average streamflow for USGS 09315000 (Drainage Area: 44850 square miles, Length of Record: 117 years)

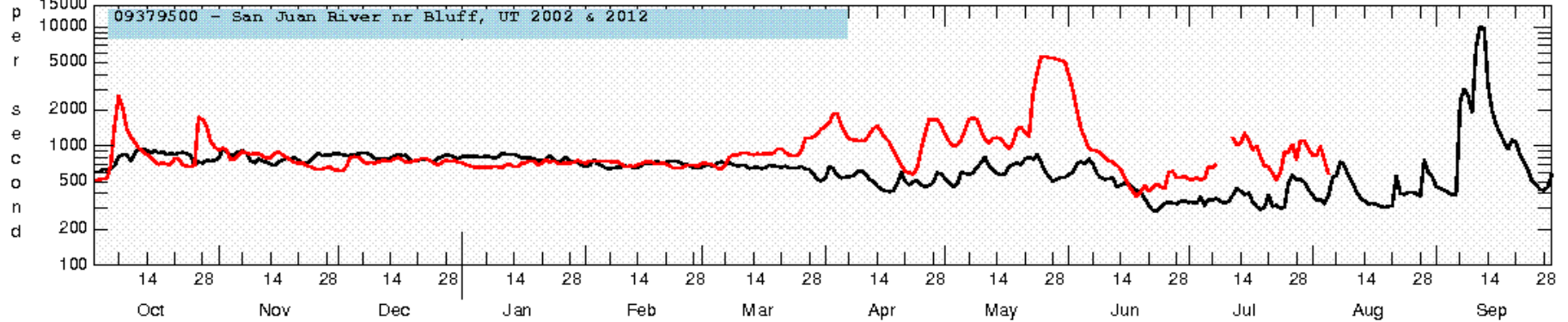
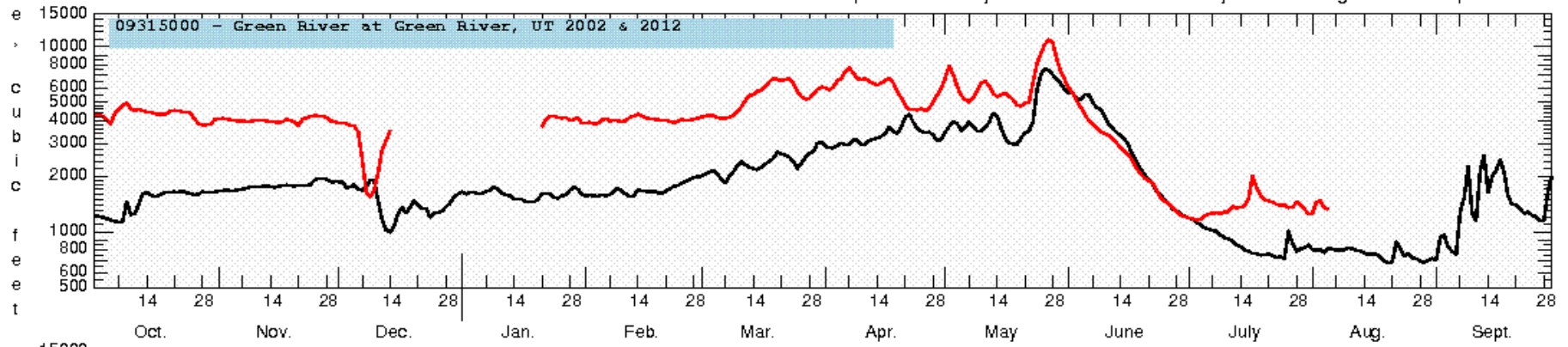
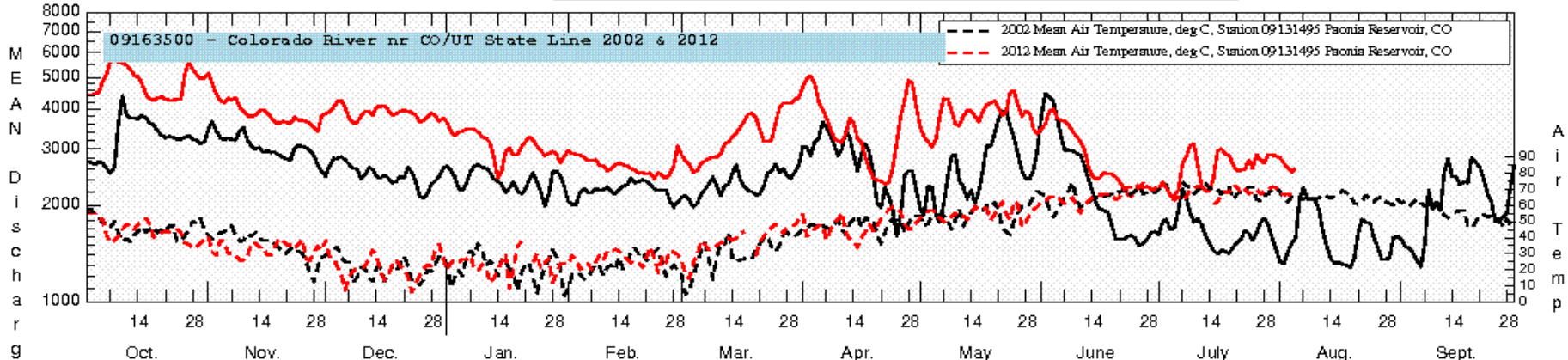


Duration hydrograph of 7-day average streamflow for USGS 09379500 (Drainage Area: 23000 square miles, Length of Record: 97 years)



# Colorado River Basin 2002 vs. 2012 Mean Daily Discharge Comparison at Select Stations

— Water Year 2002 Mean Daily Discharge  
— Water Year 2012 Mean Daily Discharge (Provisional)

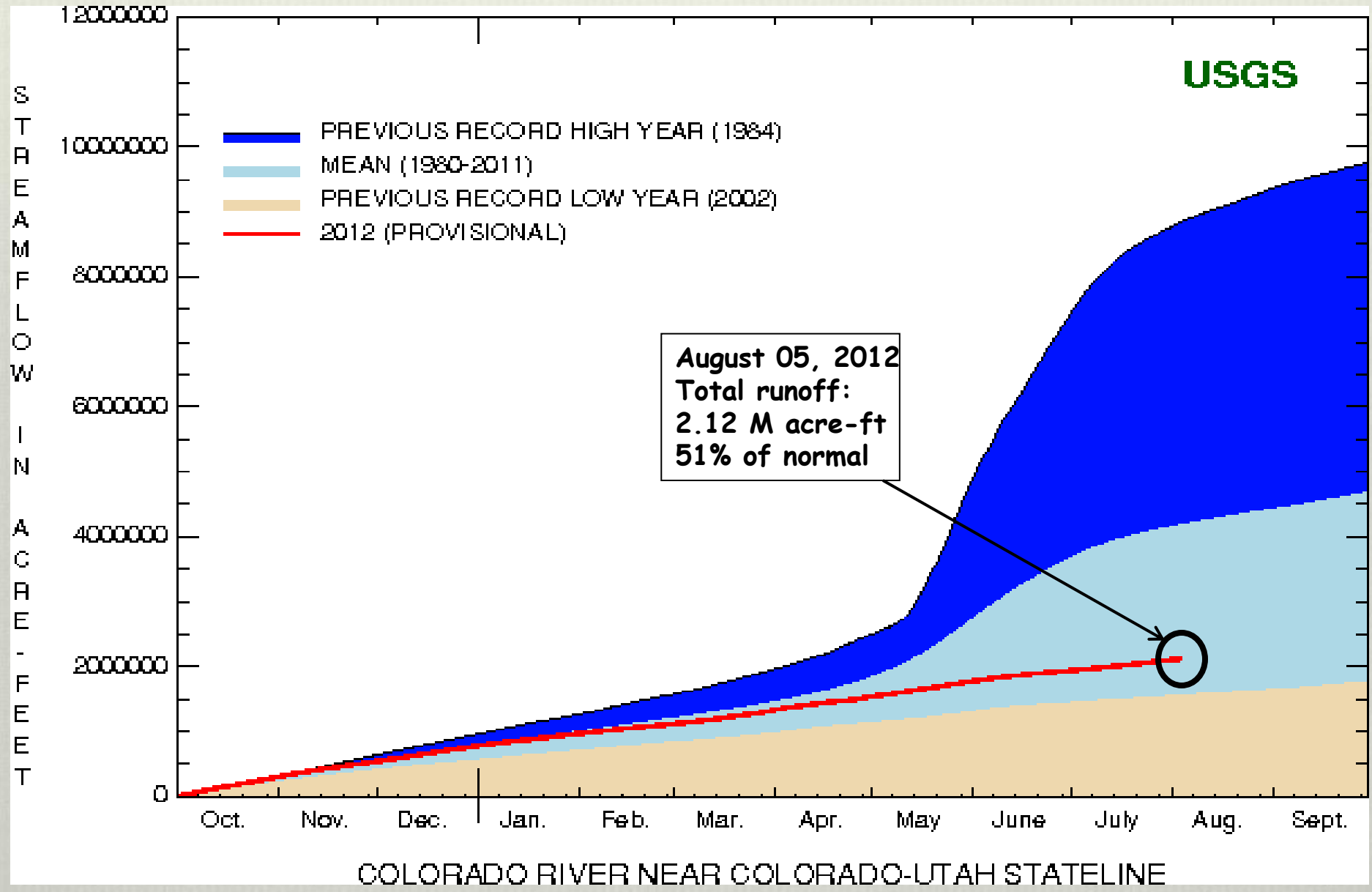


# Total Streamflow Volume Colorado River nr CO/UT State Line Oct 1, 2011 to August 05, 2012

USGS

- PREVIOUS RECORD HIGH YEAR (1984)
- MEAN (1980-2011)
- PREVIOUS RECORD LOW YEAR (2002)
- 2012 (PROVISIONAL)

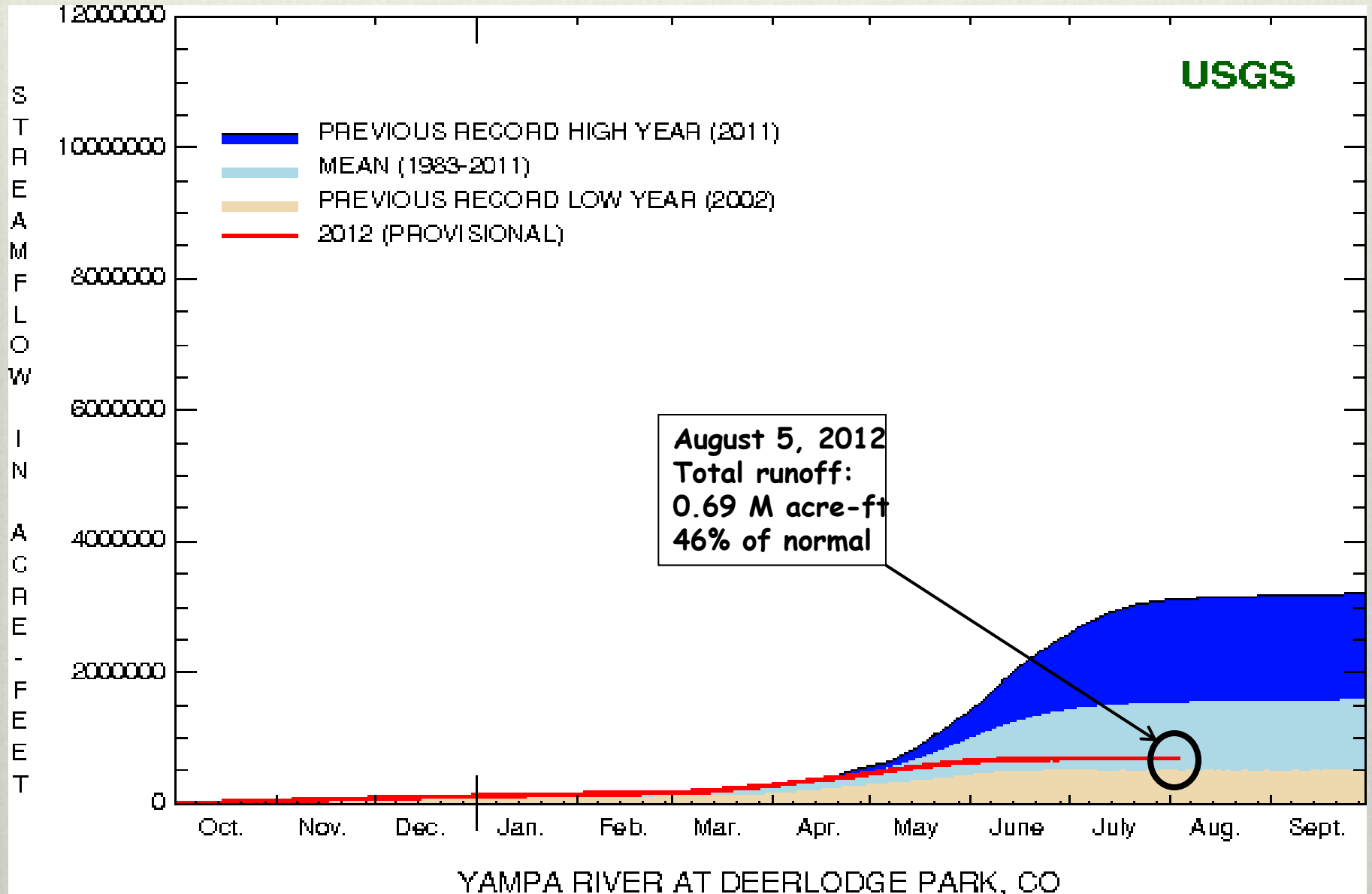
August 05, 2012  
Total runoff:  
2.12 M acre-ft  
51% of normal



COLORADO RIVER NEAR COLORADO-UTAH STATELINE

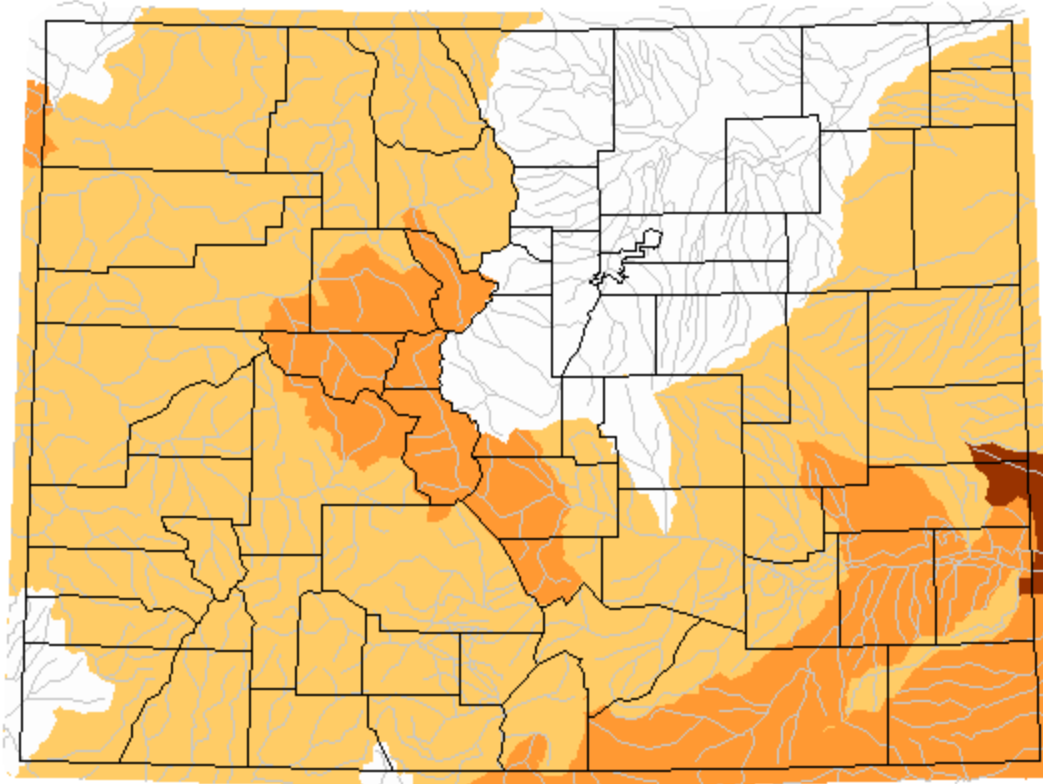


# Total Streamflow Volume Yampa River at Deerlodge Park, CO Oct 1, 2011 to August 5, 2012



# 7-day average streamflow compared to historical streamflow

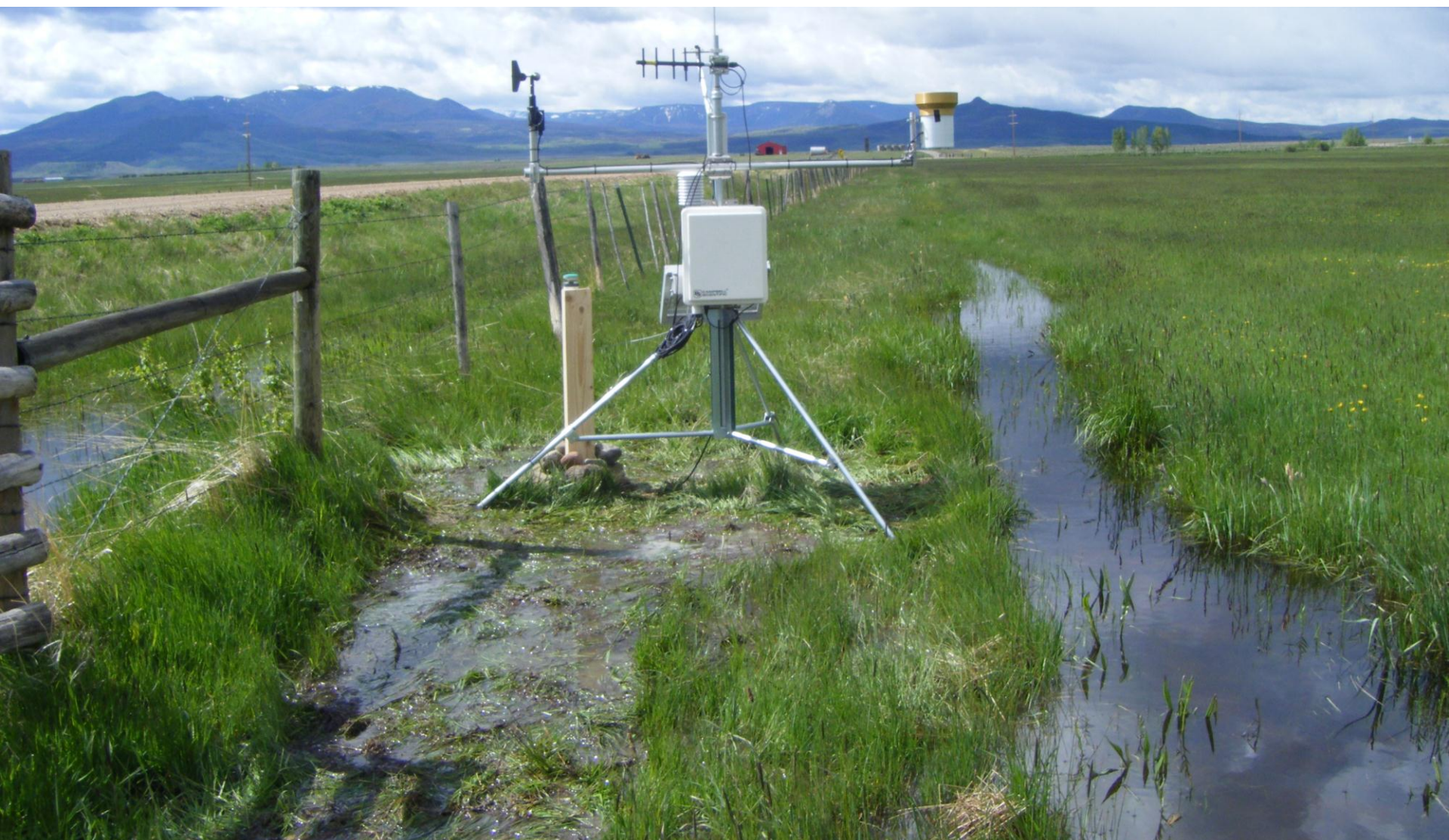
Sunday, August 05, 2012



Explanation - Percentile classes

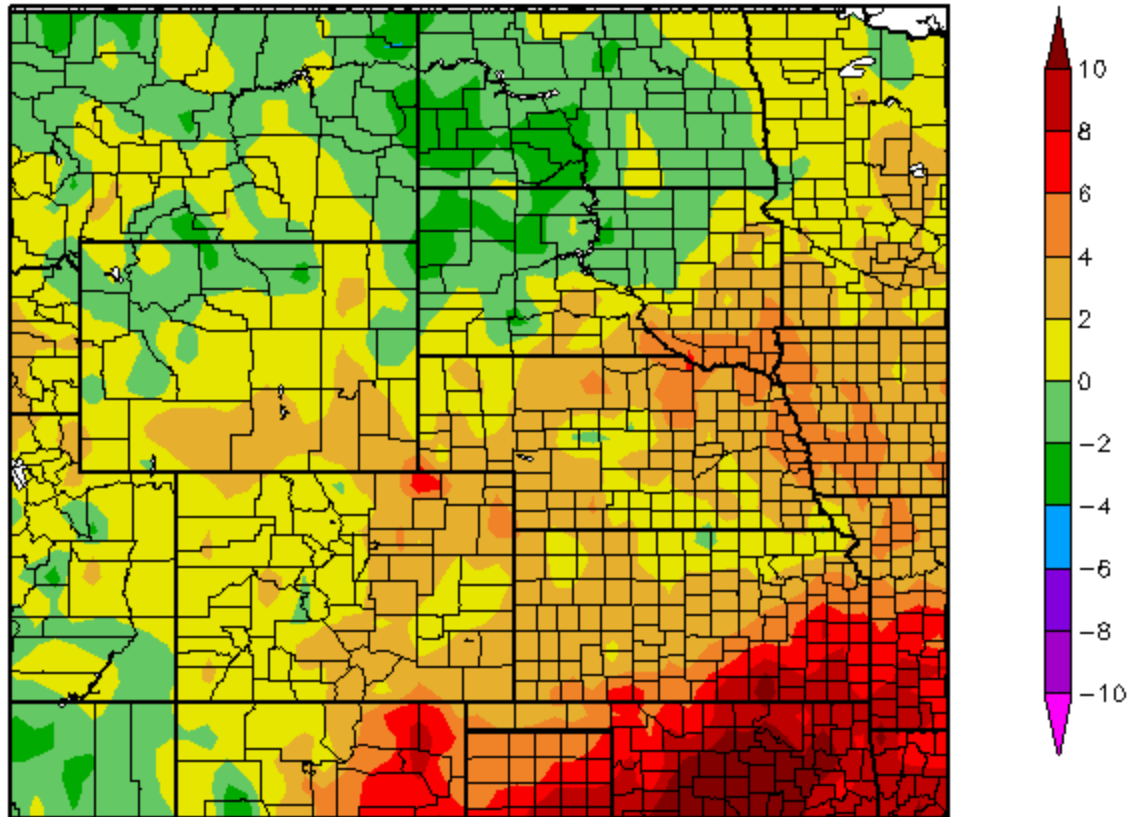
Low	<=5	6-9	10-24	Insufficient data for a hydrologic region
Extreme hydrologic drought	Severe hydrologic drought	Moderate hydrologic drought	Below normal	

# Water Demand



# Temperature Departure from Normal 07/31/2012 – 08/06/2012

Departure from Normal Temperature (F)  
7/31/2012 – 8/6/2012

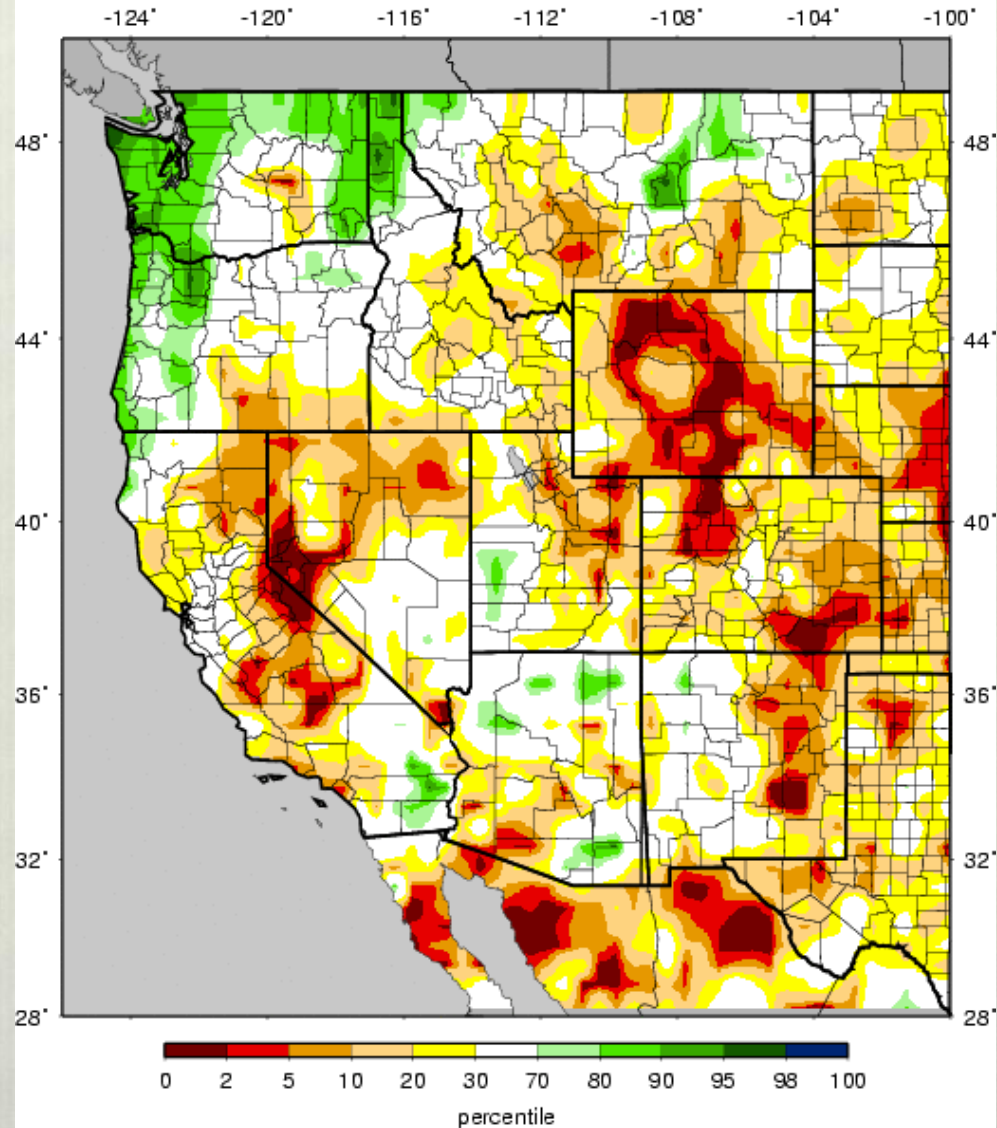


Generated 8/7/2012 at HPRCC using provisional data.

Regional Climate Centers

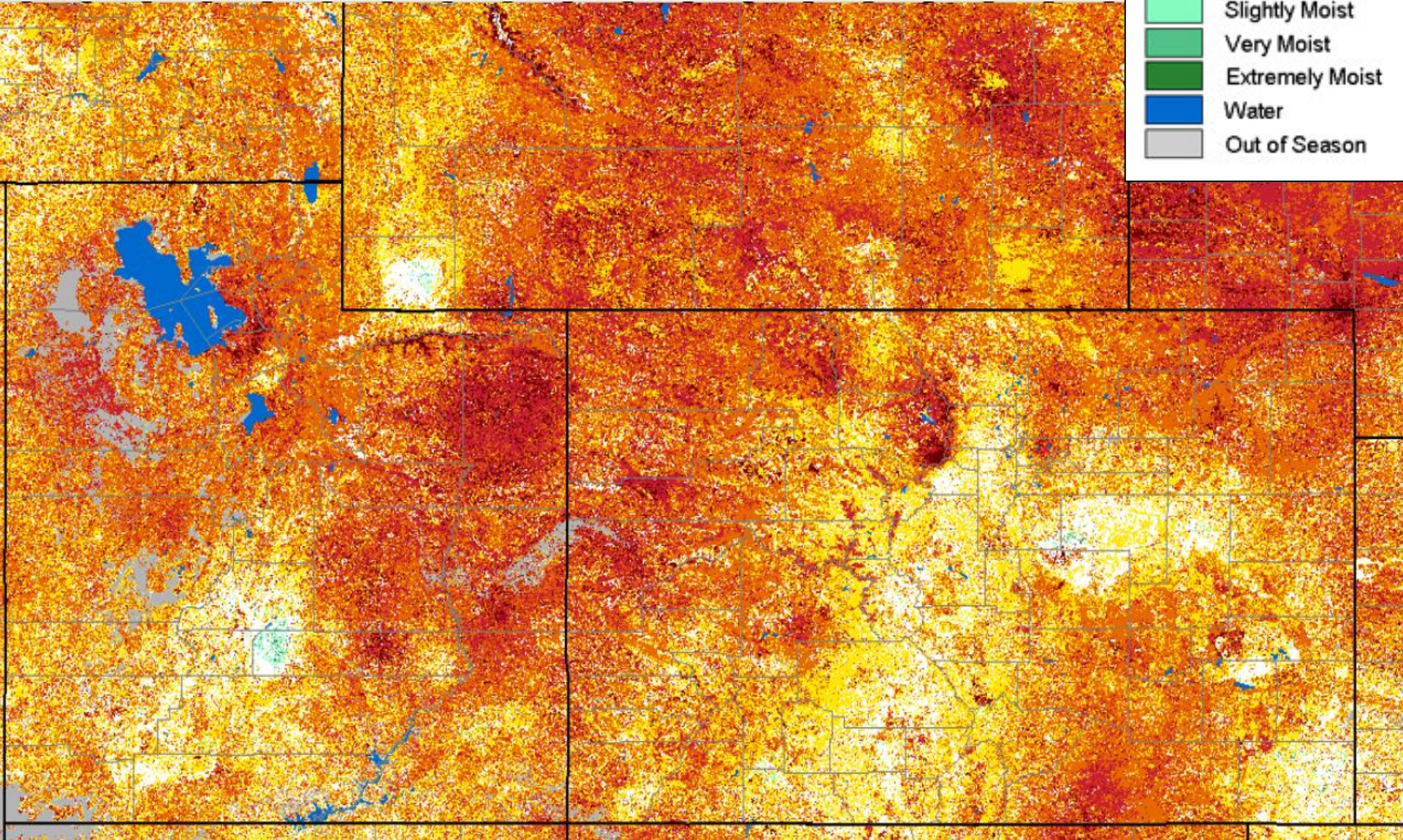
# VIC Soil Moisture 5 August 12

VIC Soil Moisture Percentiles (wrt/ 1916-2004)  
Western United States - 20120805

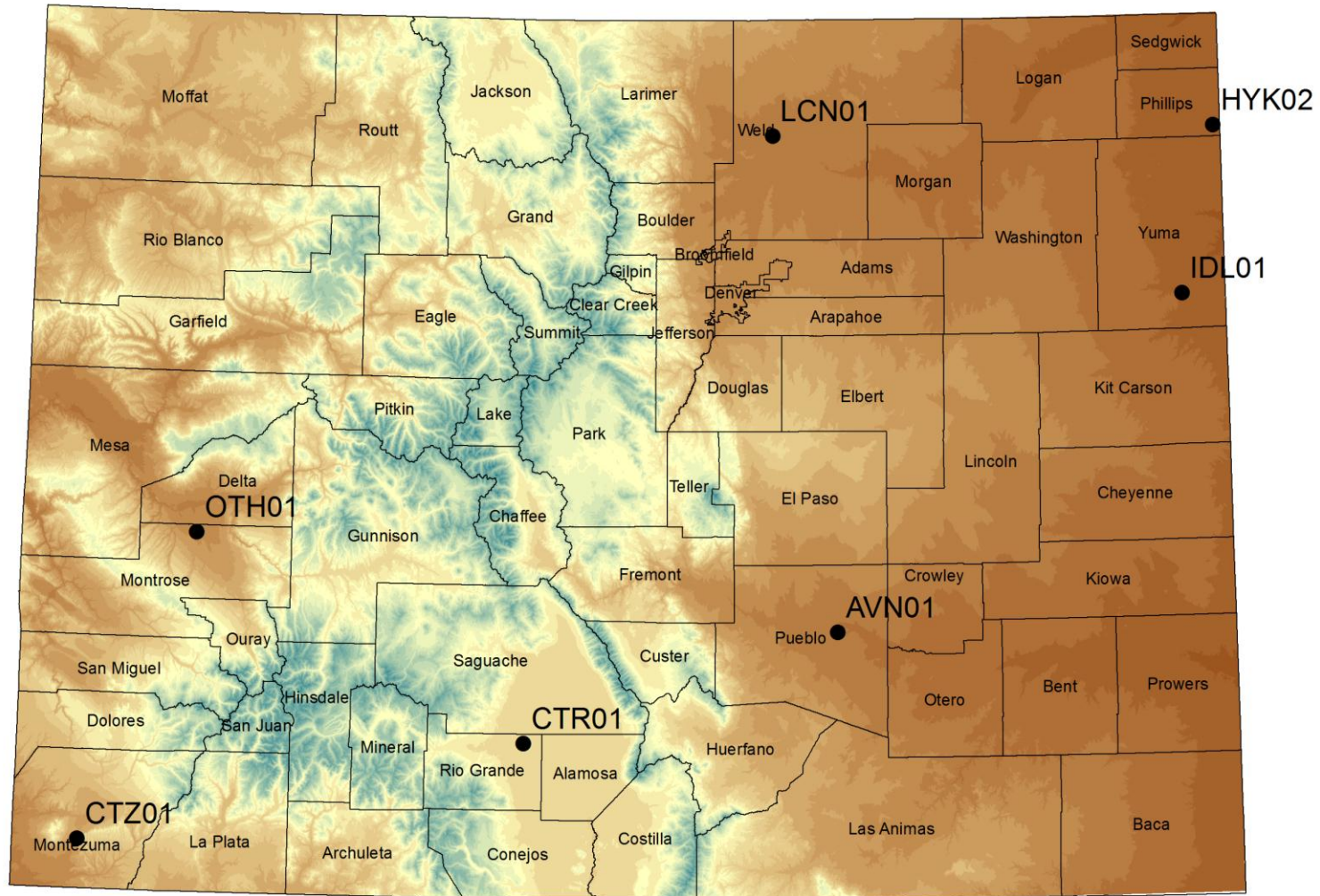


# eMODIS VegDRI Vegetation

## 8 July 2012

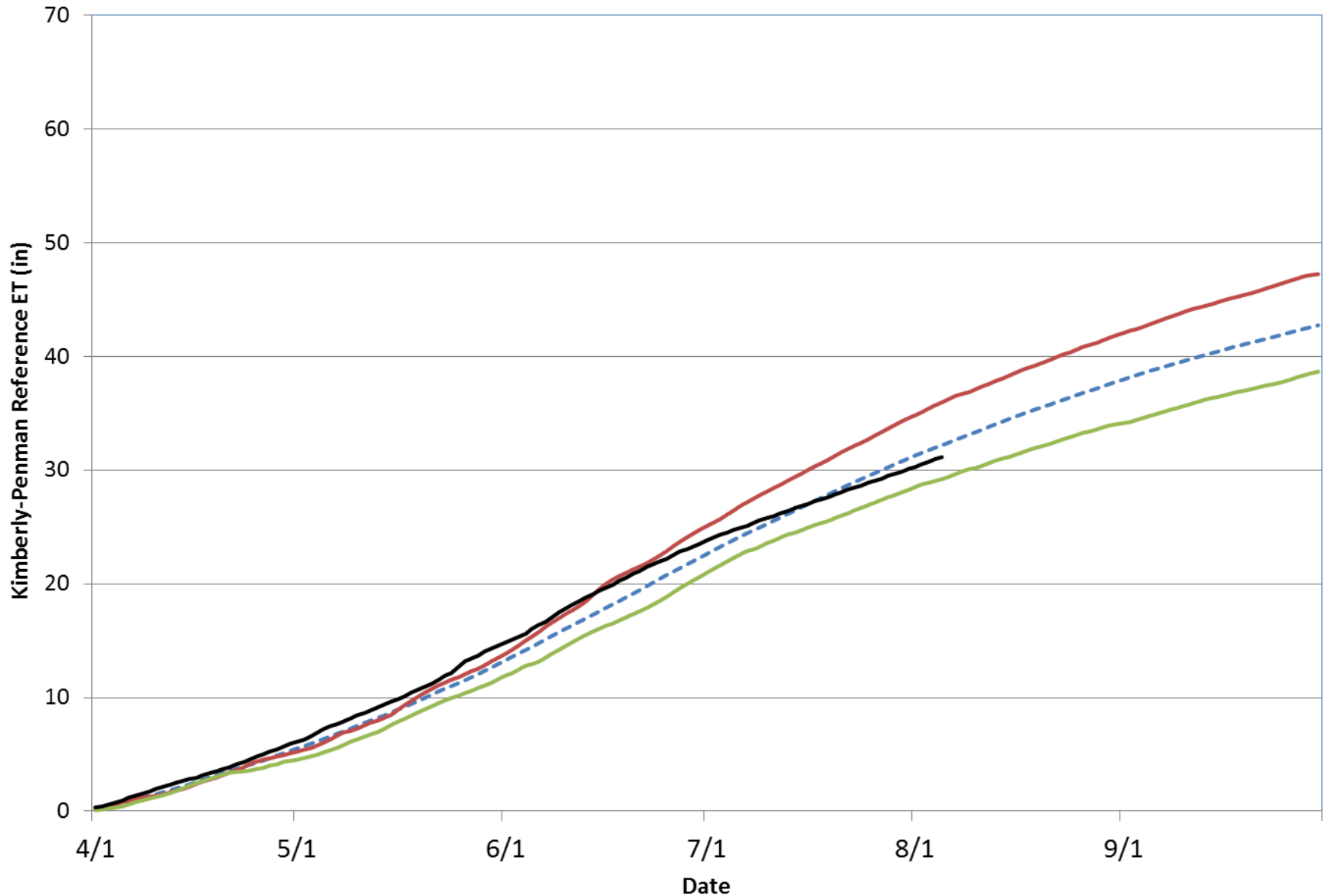


# CoAgMet Reference Evapotranspiration Stations



# Olathe Kimberly-Penman Reference ET (1993 - 2012)

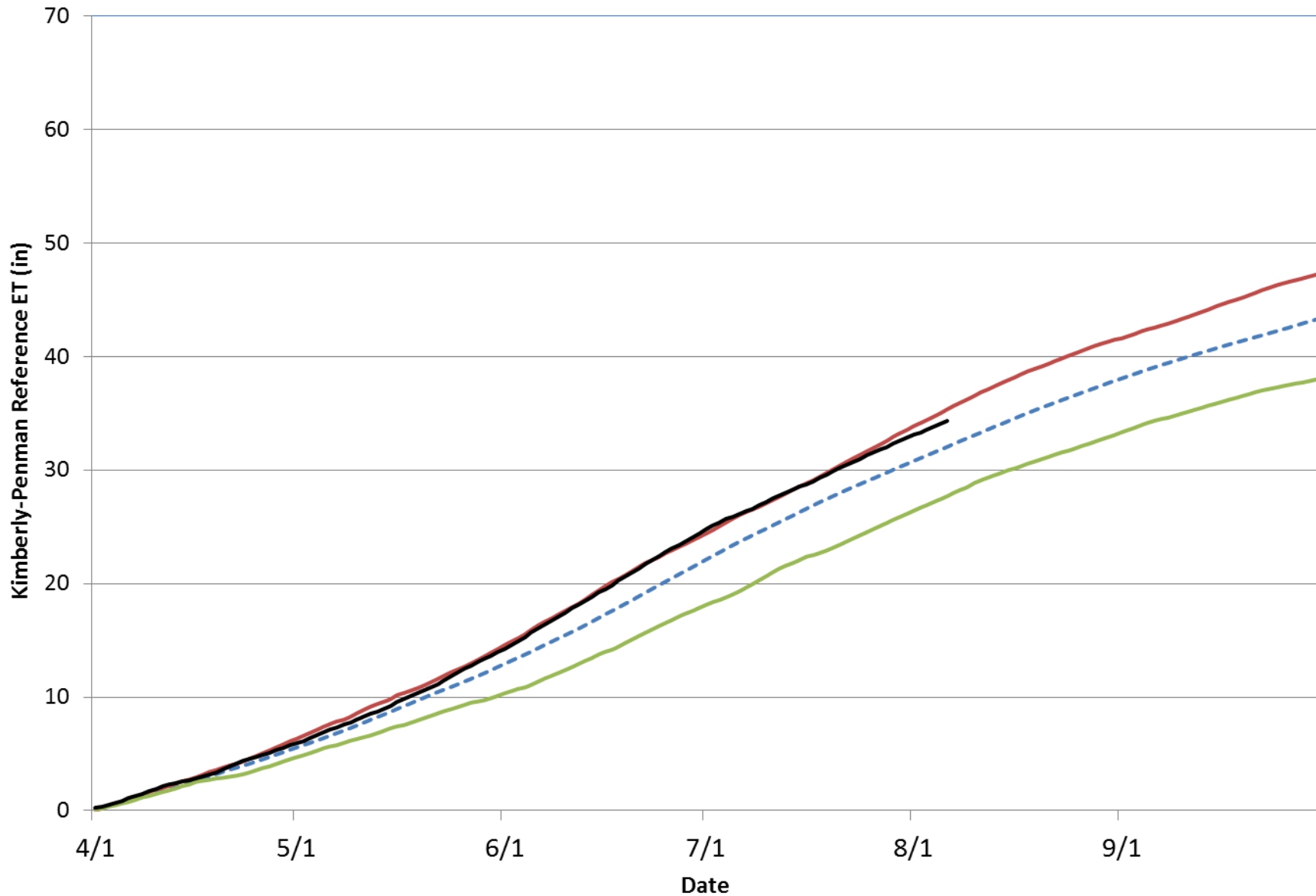
--- Average    — 1994    — 1999    — 2012





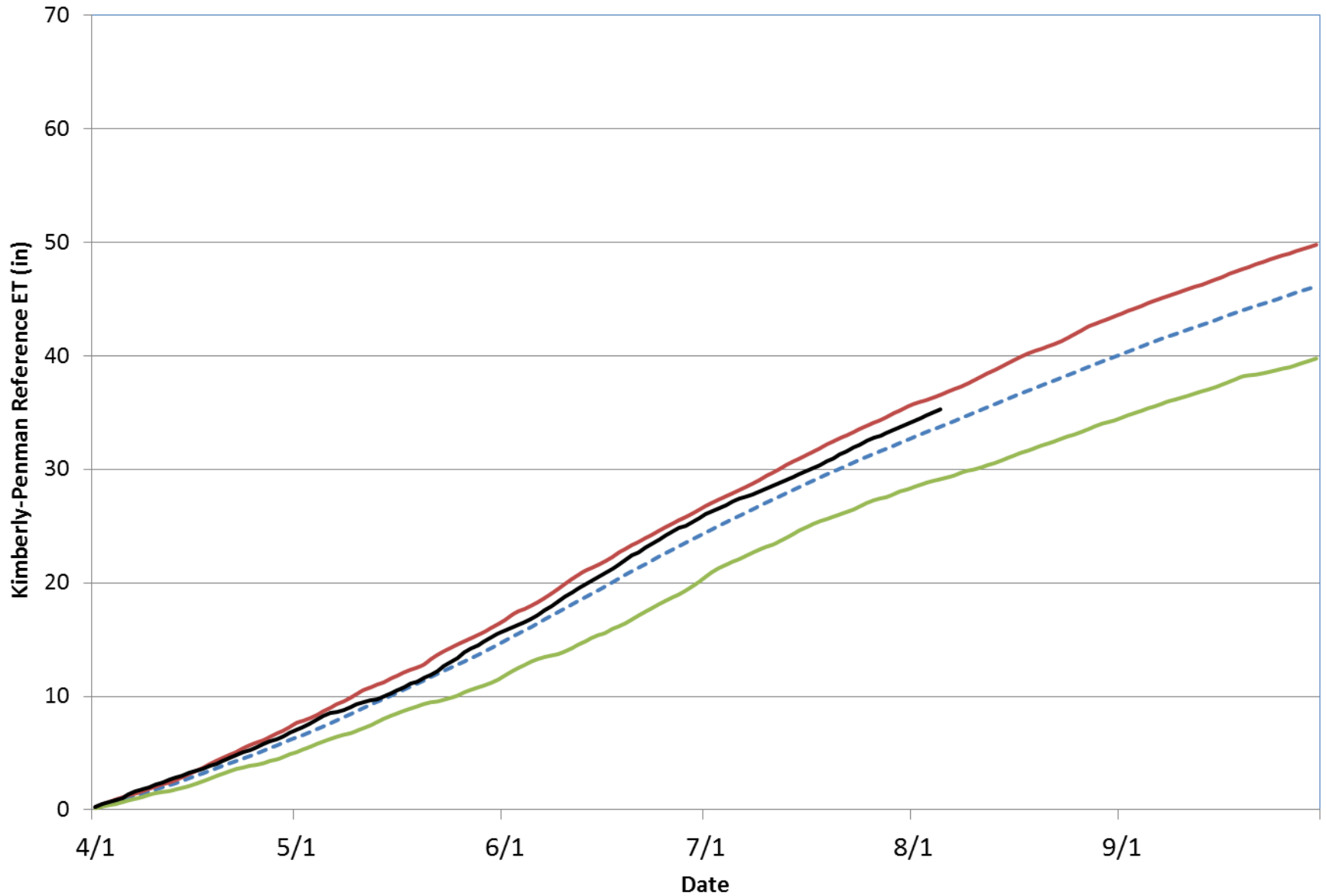
# Cortez Kimberly-Penman Reference ET (1992 - 2012)

--- Average    — 2000    — 1995    — 2012



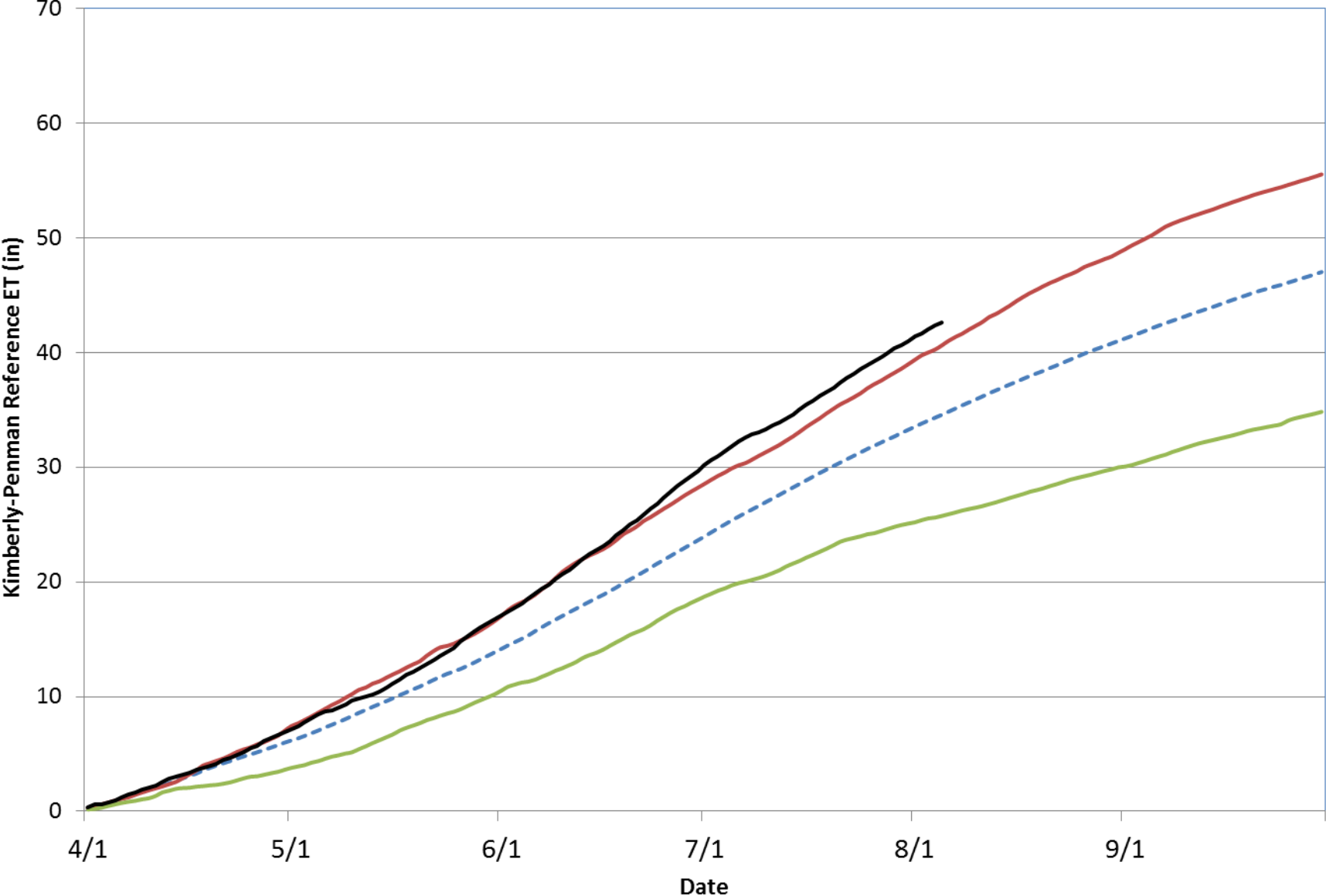
# Center Kimberly-Penman Reference ET (1994 - 2012)

--- Average    — 2002    — 1997    — 2012



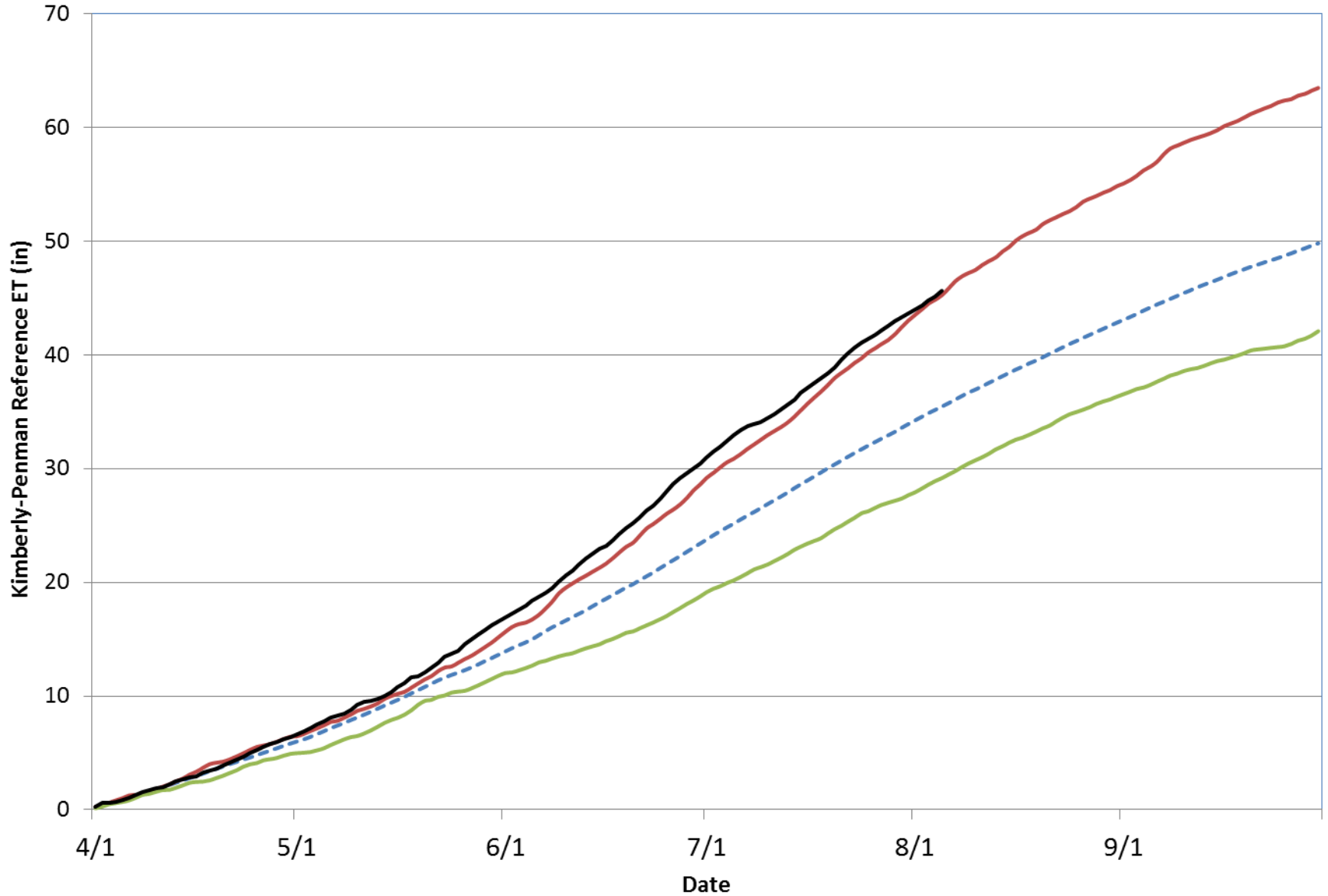
# Avondale Kimberly-Penman Reference ET (1993 - 2012)

--- Average    — 2002    — 1998    — 2012

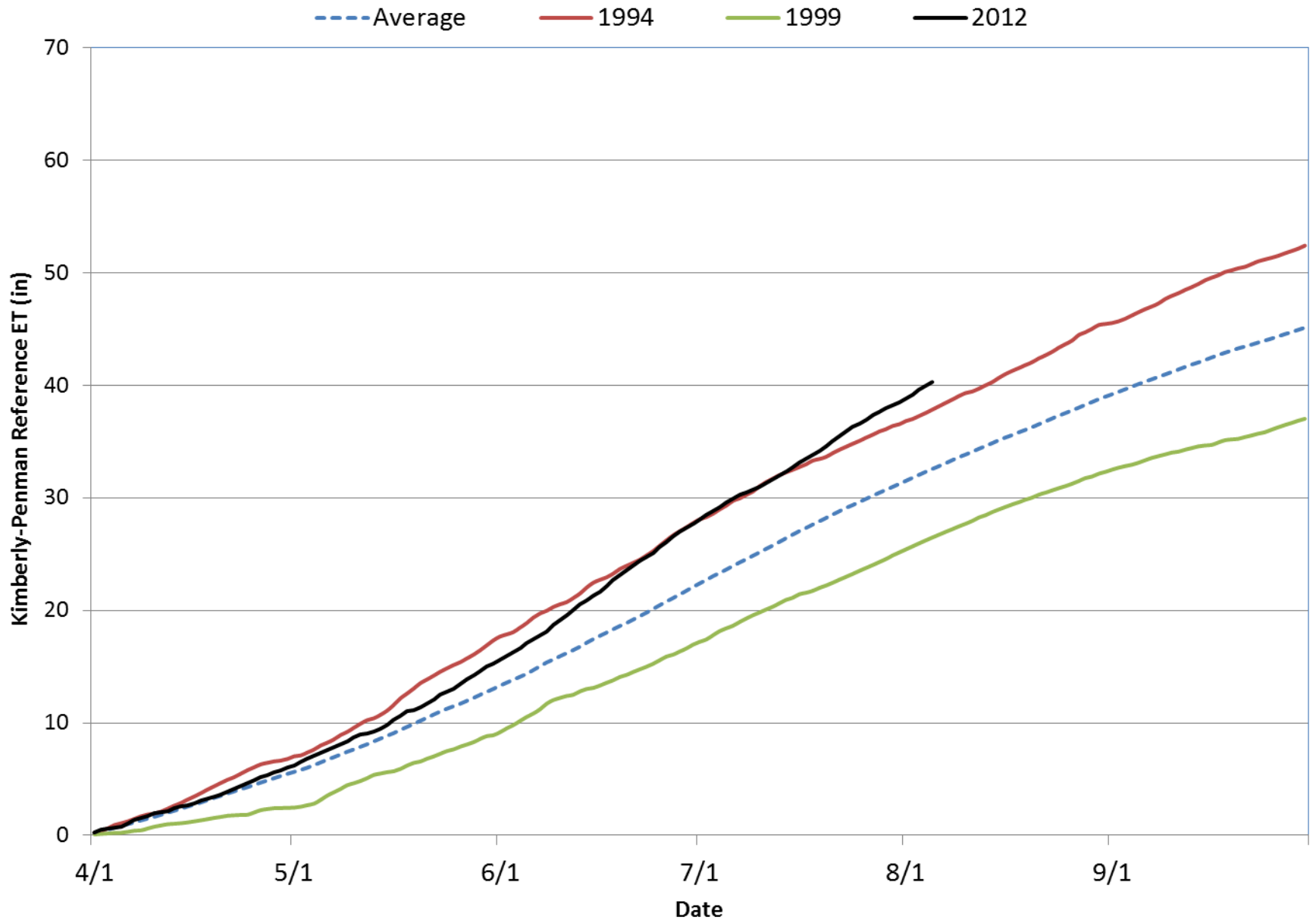


# Idalia Kimberly-Penman Reference ET (1992 - 2012)

--- Average    — 2002    — 2009    — 2012

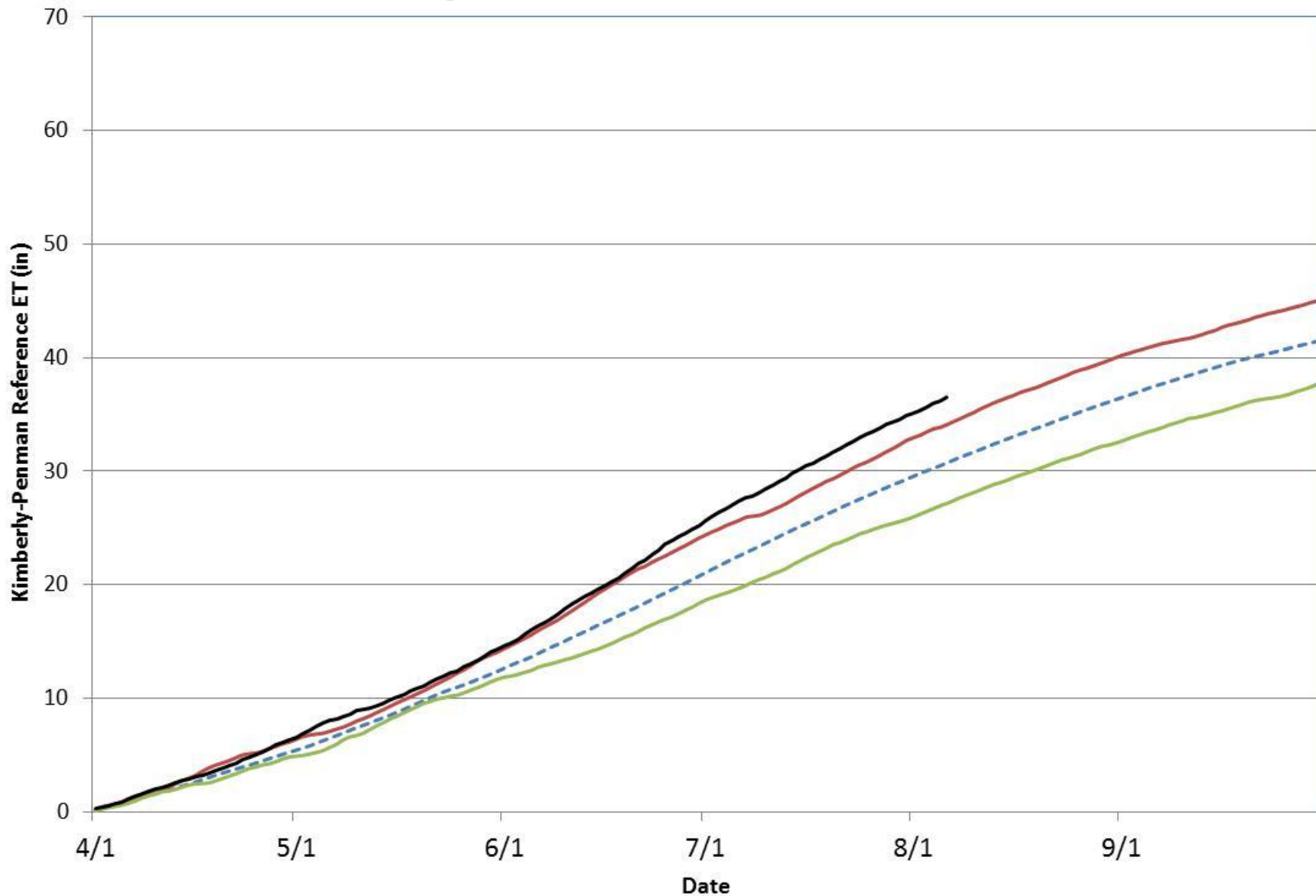


# Holyoke Kimberly-Penman Reference ET (1992 - 2012)



# Lucerne Kimberly-Penman Reference ET (1992 - 2012)

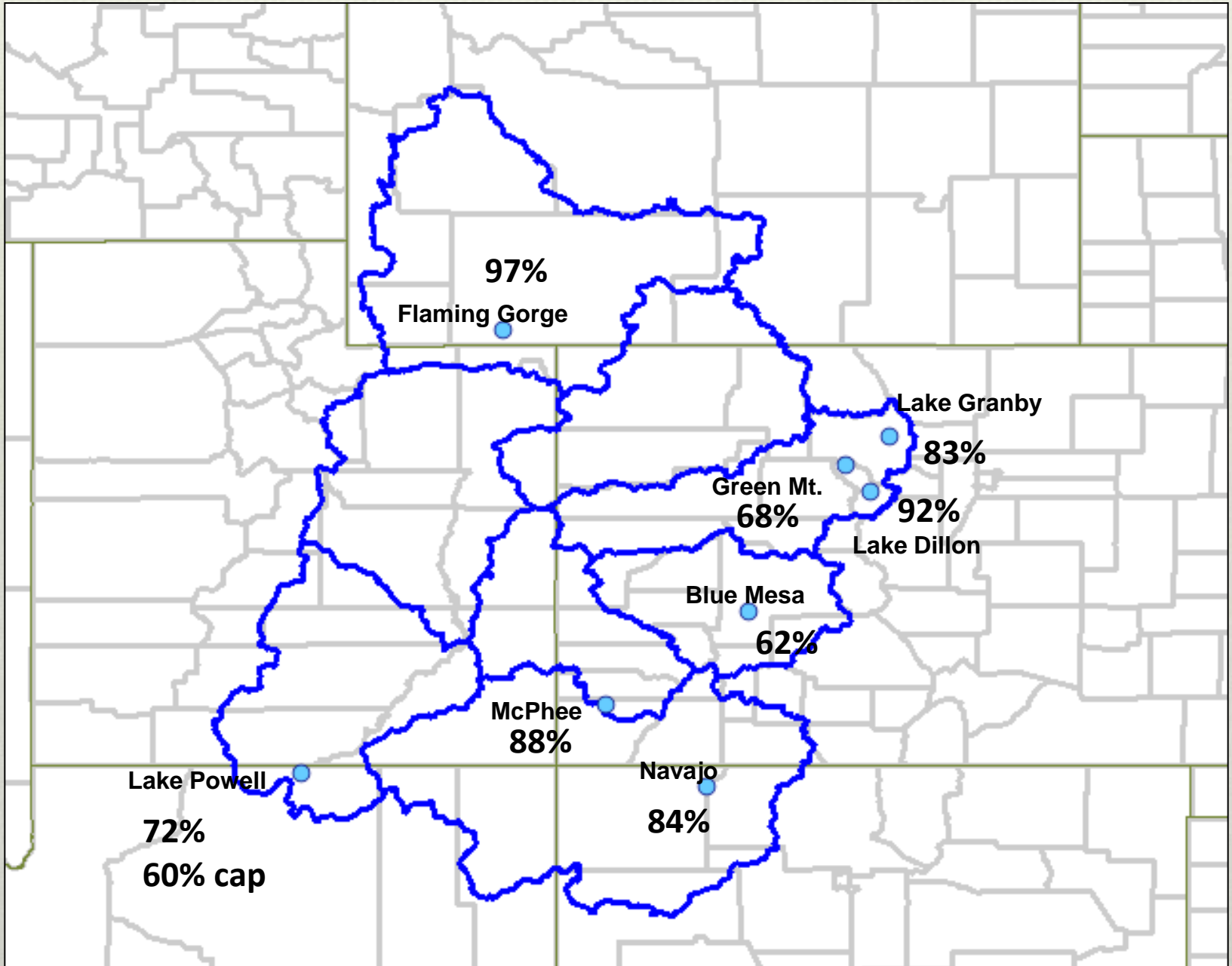
--- Average    — 2006    — 2009    — 2012



# Reservoir Update



# August Average Reservoir Storage Volume

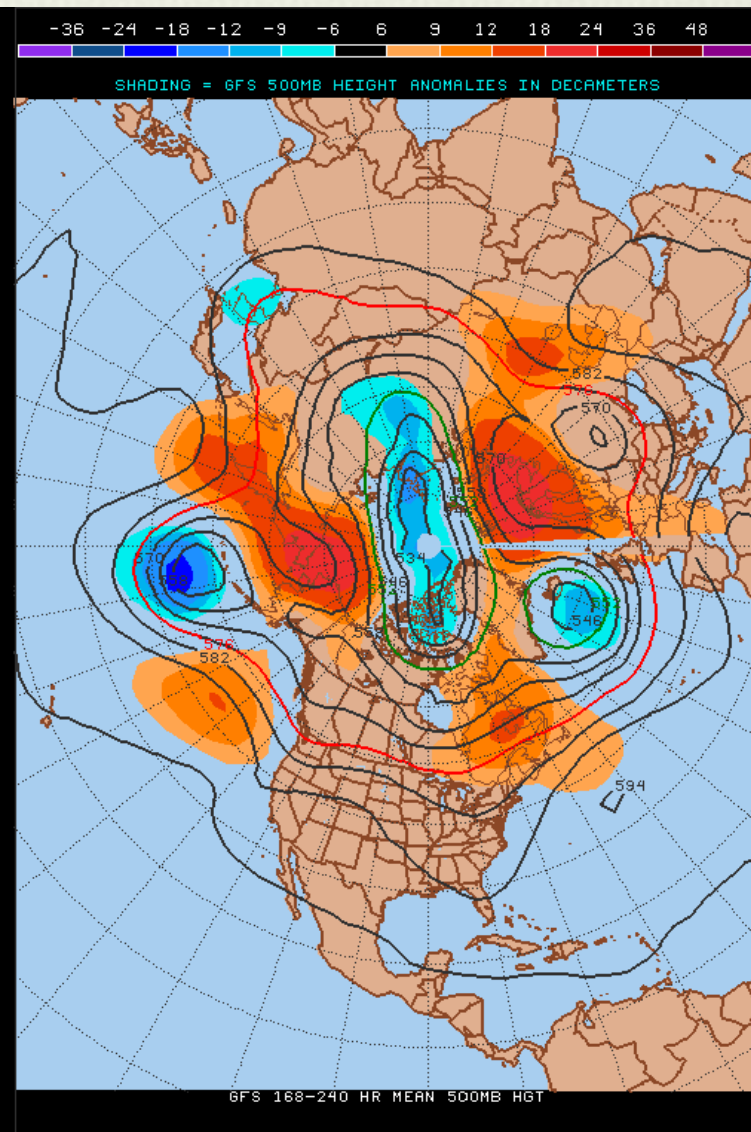
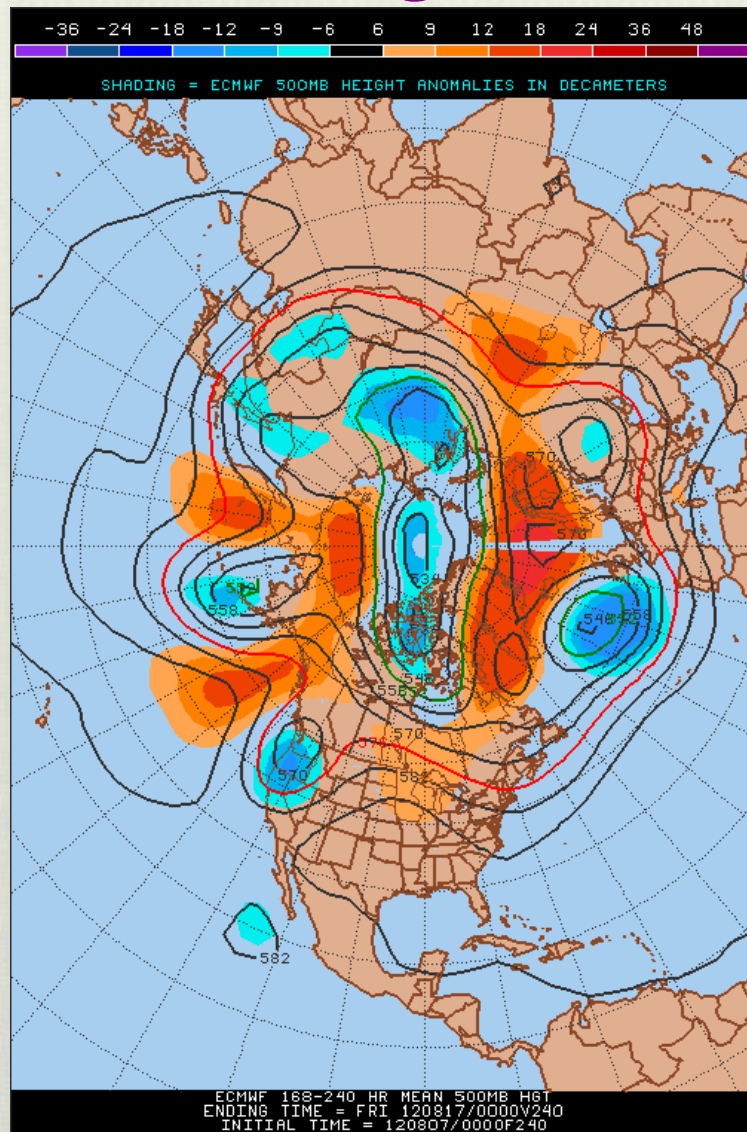




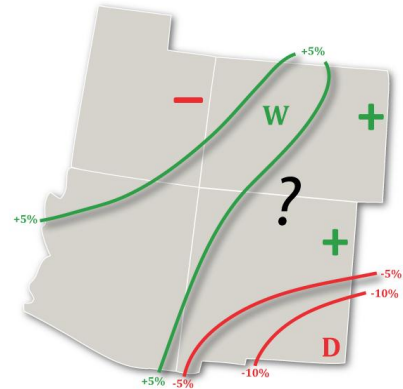
# Precipitation Forecast



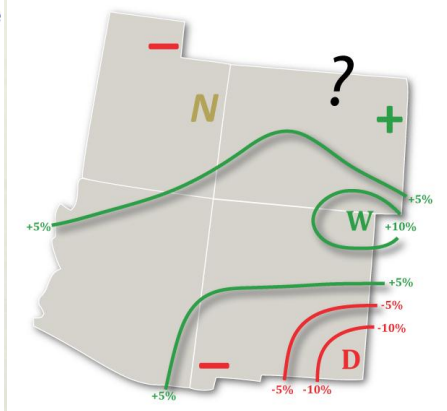
# Something to look forward to next week?!



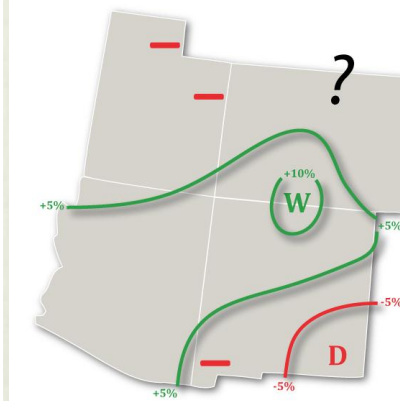
Experimental PSD Precipitation Forecast Guidance  
JUL - SEP 2012 (Issued April 16, 2012)



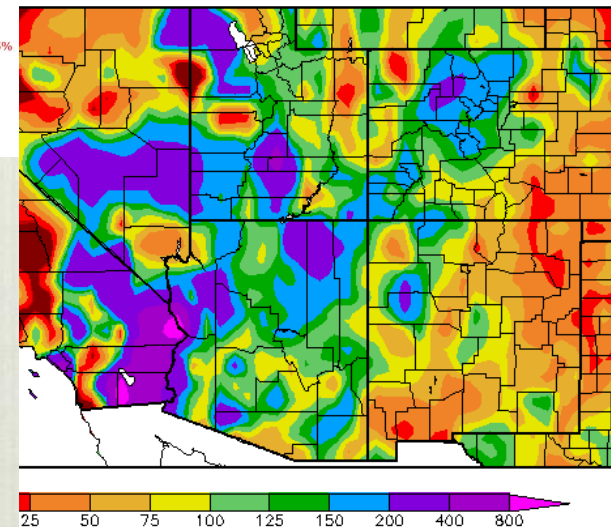
Experimental PSD Precipitation Forecast Guidance  
JUL - SEP 2012 (Issued May 16, 2012)



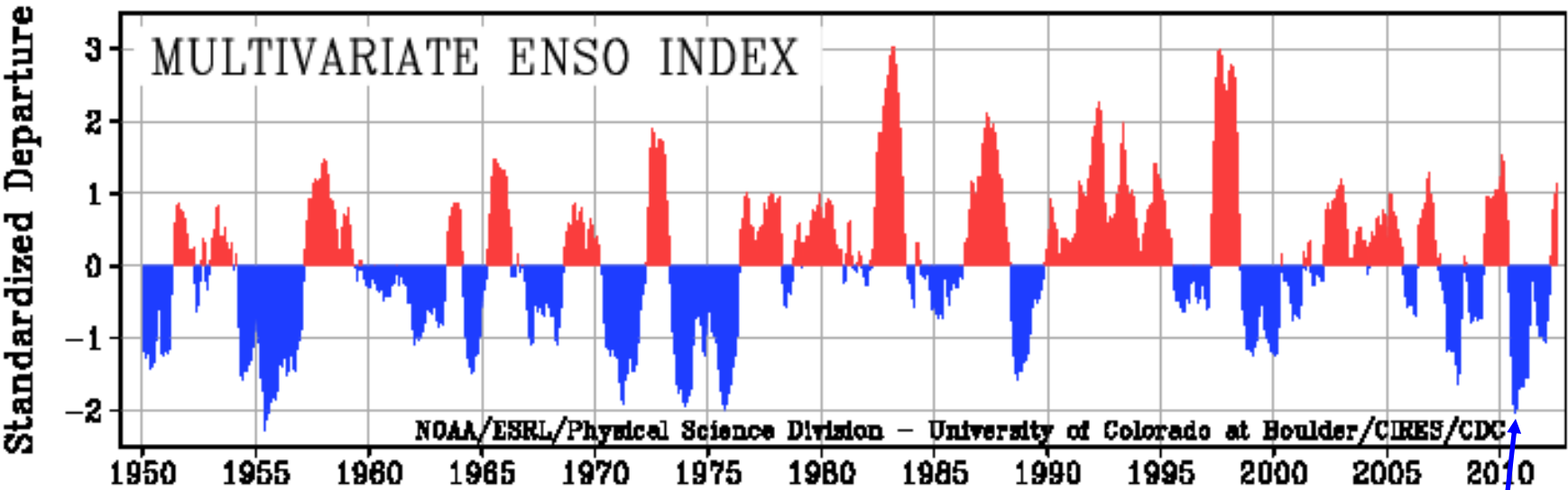
Experimental PSD Precipitation Forecast Guidance  
JUL - SEP 2012 (Issued July 19, 2012)



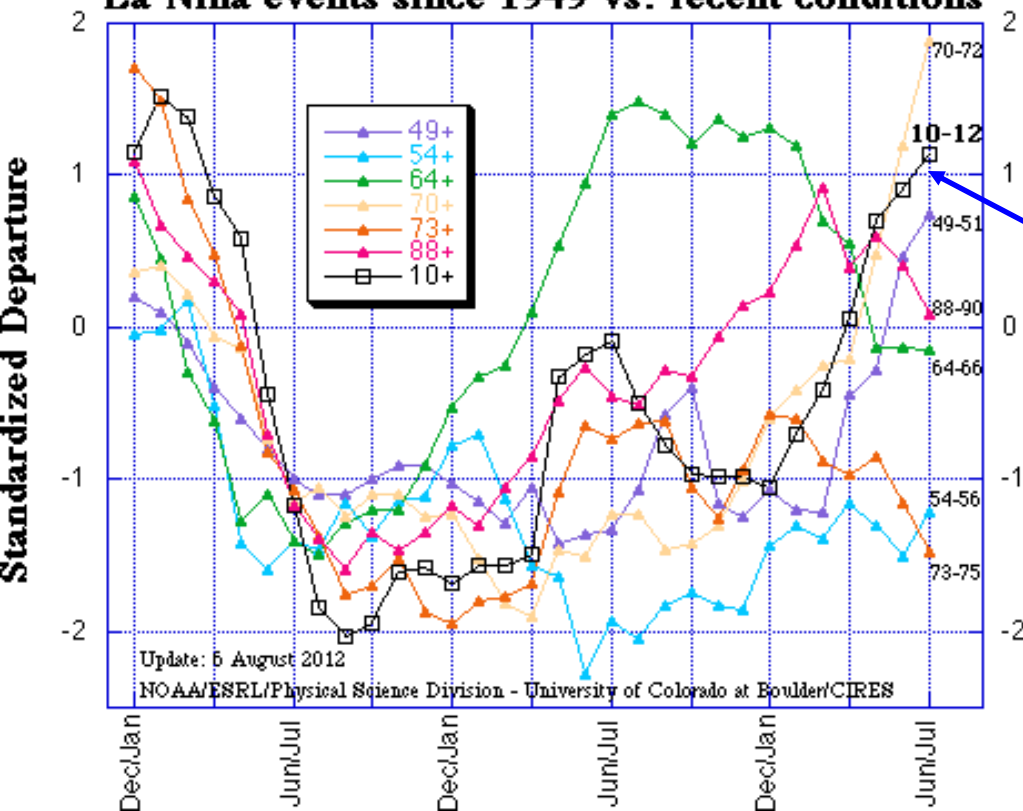
Percent of Normal Precipitation (%)  
7/1/2012 - 8/6/2012



April's forecast for July-September 2012 (left) was optimistic from AZ into CO, pessimistic for eastern UT and southern NM. The May forecast (2nd) remained guardedly optimistic for most of Colorado. Operational skill has been best over UT, northwest and eastern Colorado, as well as from southwest to northeast NM. There has been little skill from AZ into southwest Colorado, as well as over southeast NM. Update in July (3rd) was slightly dry in NW CO, undecided in Front Range, 'EC' in eastern plains, and tilting towards a wet monsoon over southern CO. Observed pattern so far is consistent with thrust of monsoon from AZ into NC Colorado.



Multivariate ENSO Index (MEI) for six strong La Niña events since 1949 vs. recent conditions

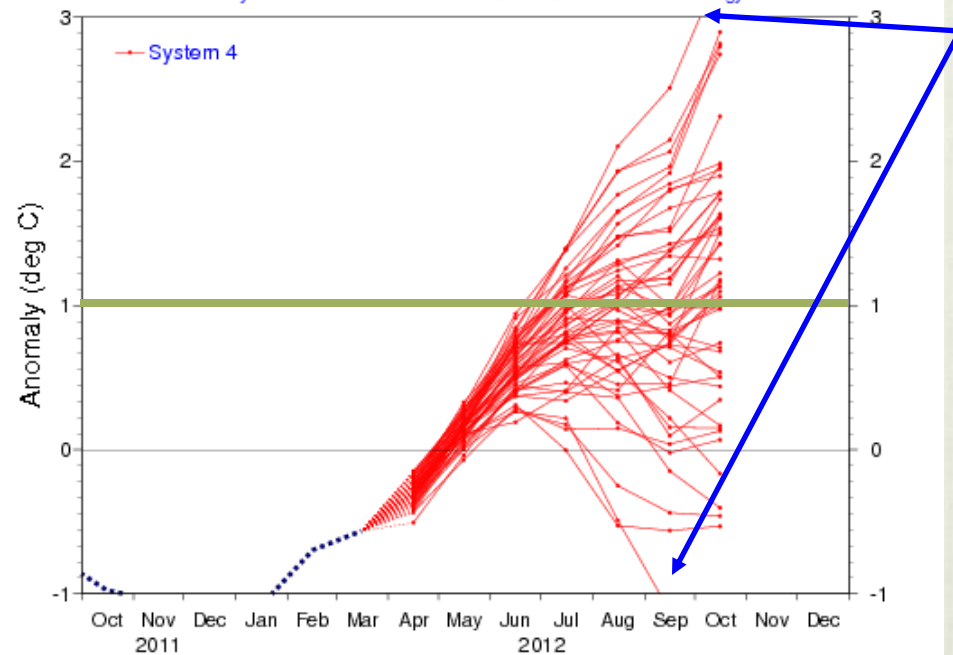


*2010-12 La Niña event reached its biggest peak since the mid-70s in late 2010, followed by a brief excursion to ENSO-neutral conditions during mid-2011; it reached a second peak last winter, and is now being followed by a rapid transition to El Niño.*

<http://www.esrl.noaa.gov/psd/ens/o/mei>

NINO3.4 SST anomaly plume  
ECMWF forecast from 1 Apr 2012

Monthly mean anomalies relative to NCEP OIv2 1981-2010 climatology

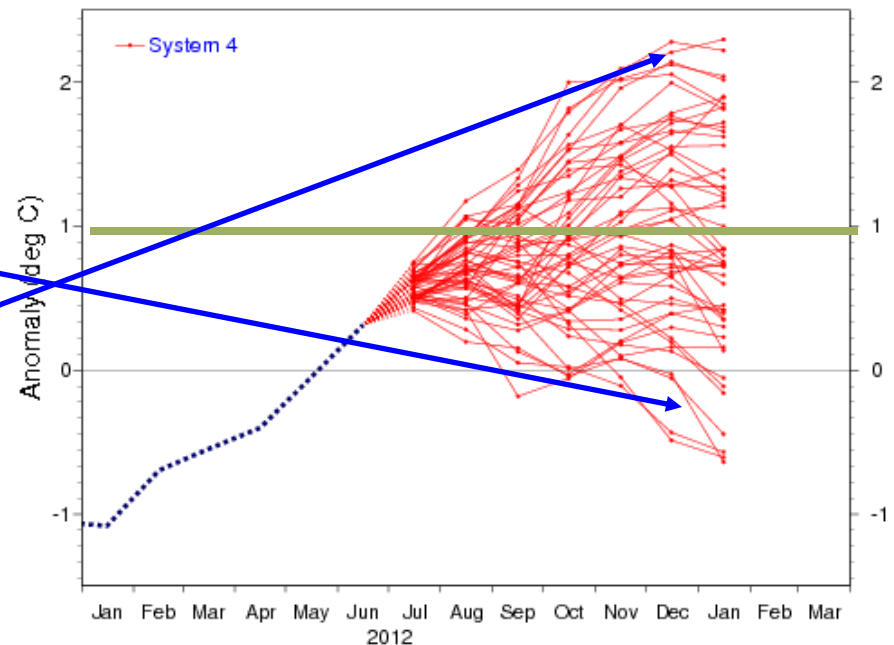


ECMWF

The ECMWF April 2012 forecast (left) showed an astonishing range – with a single member in the moderate-to-strong *La Niña* category ( $-1^{\circ}$  C) to seven members reaching ‘Super-*El Niño*-size’ of  $+2^{\circ}$  C or more by October 2012. The mean outcome (close to  $+1^{\circ}$  C) was El Niño by about August 2012.

NINO3.4 SST anomaly plume  
ECMWF forecast from 1 Jul 2012

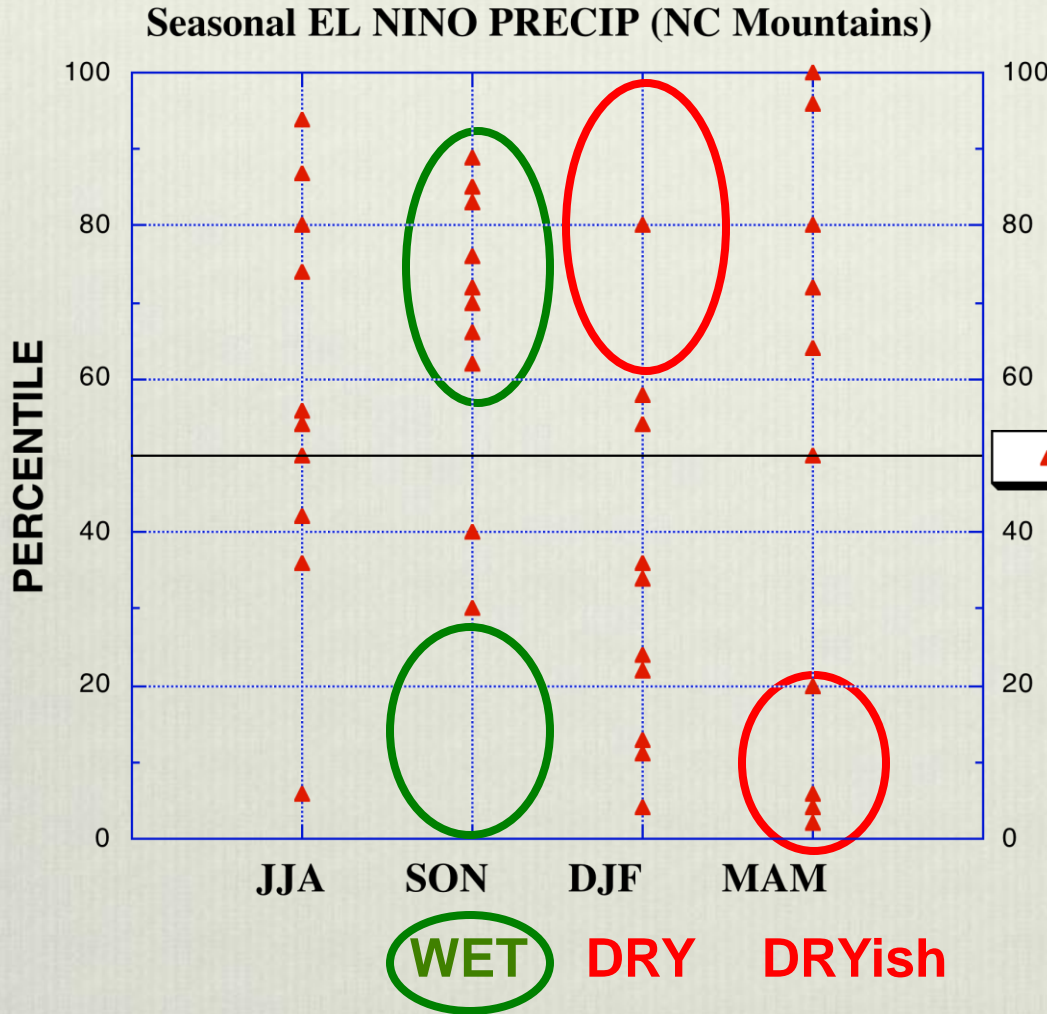
Monthly mean anomalies relative to NCEP OIv2 1981-2010 climatology



ECMWF

The ECMWF **July 2012** forecast (right) shows a smaller, but still substantial range – with seven members below  $0^{\circ}$  C and five members reaching ‘Super-*El Niño*-size’ of  $+2^{\circ}$  C or in next six months. *Compared to earlier forecasts, the transition to El Niño is virtually certain this summer, but it may be a short-lived event.*

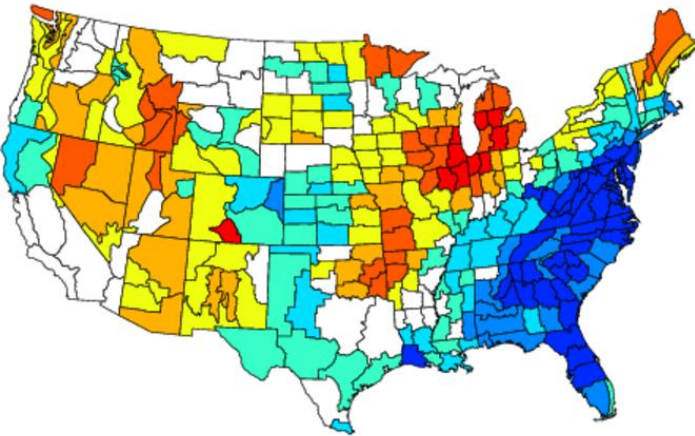
# What does El Niño mean for the Upper CO Basin?



2006-07: ✓ ✓ ✓  
 2009-10: NO ✓ ~

Seasonal precipitation amounts (in %iles for 1950-99) for 10 El Niño cases: 1957-8, 65-6, 72-3, 77-8, 82-3, 86-7, 87-8, 91-2, 94-5, and 97-8, based on the MEI in fall&winter. If 8 or more cases out of 10 reside above or below the median, the distribution is shifted significantly. If 4 or more cases reside in the upper (80%) or lower (20%) quintile, there is only a 10% chance that this result is by accident. The 2002-3 El Niño event ended up ranked 10th, pushing 1977-78 into 11th place. In turn, 2006-07 took the 10th place from 2002-03. And, finally, 2009-10 took it from 2006-07!

Standardized Precipitation Anomalies  
Oct to Jun 2002-03  
Versus 1971-2000 Longterm Average



NOAA/ESRL PSD and CIRES-CDC

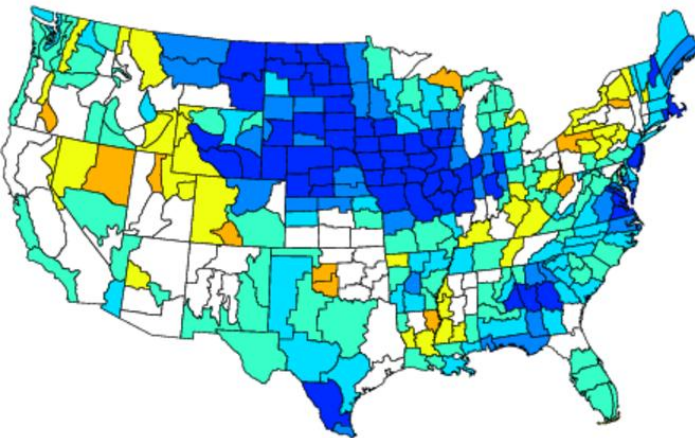
-1.40 -1.00 -0.60 -0.20 0.20 0.60 1.00 1.40

## Los Niños since 2002

Last decade had many El Niño events, in 2002-03 (top left), 04-05 (top right), 06-07 (bottom right), and 09-10 (bottom left).

Somewhat erratic impacts in the U.S., except for *TX where every single one of them ended up on the wet side* –

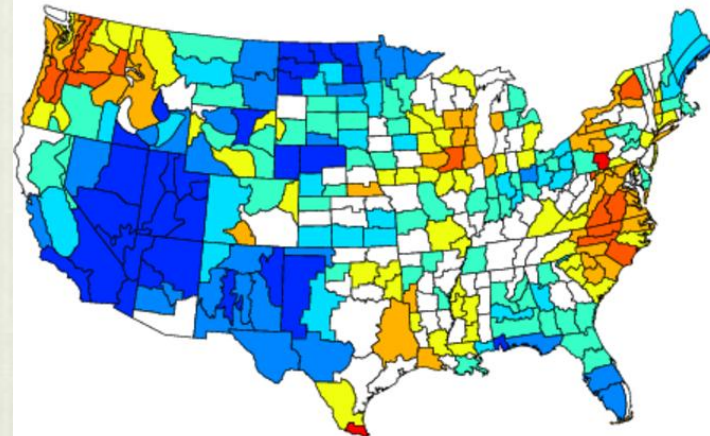
Standardized Precipitation Anomalies  
Oct to Jun 2009-10  
Versus 1971-2000 Longterm Average



NOAA/ESRL PSD and CIRES-CDC

-1.40 -1.00 -0.60 -0.20 0.20 0.60 1.00 1.40

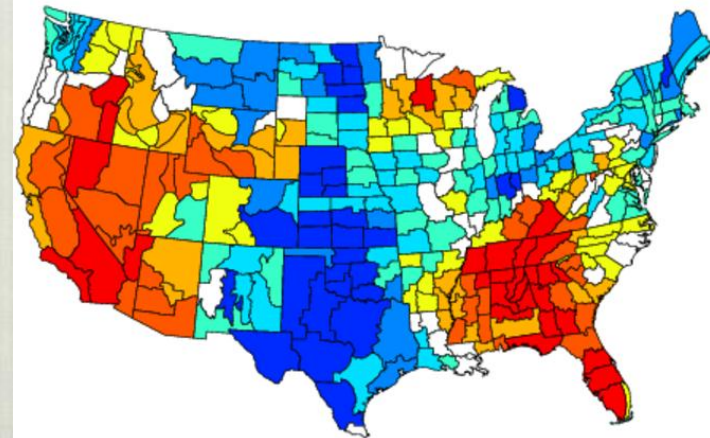
Standardized Precipitation Anomalies  
Oct to Jun 2004-05  
Versus 1971-2000 Longterm Average



NOAA/ESRL PSD and CIRES-CDC

-1.40 -1.00 -0.60 -0.20 0.20 0.60 1.00 1.40

Standardized Precipitation Anomalies  
Oct to Jun 2006-07  
Versus 1971-2000 Longterm Average

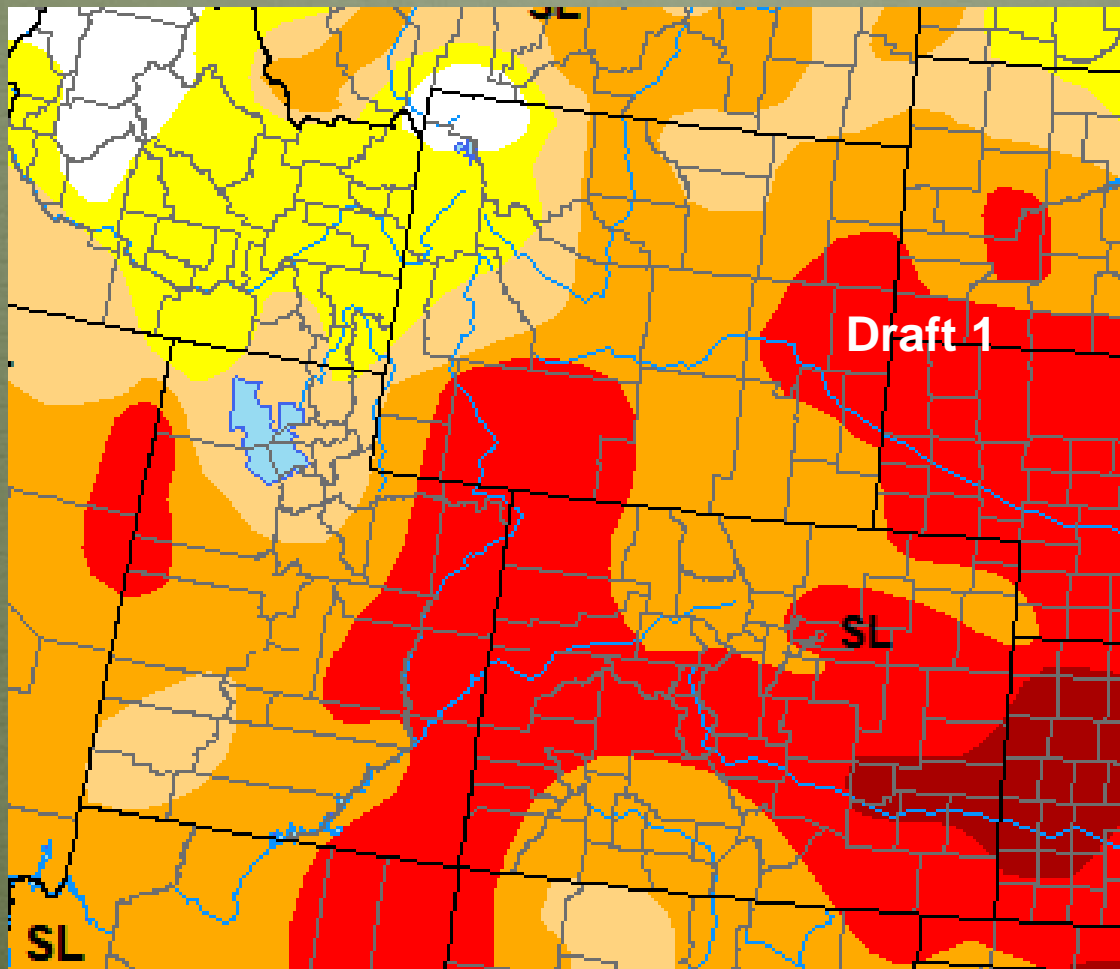


NOAA/ESRL PSD and CIRES-CDC

-1.40 -1.00 -0.60 -0.20 0.20 0.60 1.00 1.40

In CO, eastern plains have the best chances for good moisture for October-June, especially Northern Front Range. *West slope/Upper Basin will be lucky to get near-normal for the 9-month period!*

# Recommendations



Connected D4  
in SE Colorado  
with Kansas



**O  
F  
N  
I**



**CONTACT:**

**COLORADO CLIMATE CENTER**

**COLORADO STATE UNIVERSITY**

**FORT COLLINS, CO 80523**

**970 - 491 - 8545**

**NIDIS - UPPER COLORADO BASIN PILOT PROJECT**

**F o r m o r e i n f o r m a t i o n**