Colorado Climate Update – 2015 and the story of a 'Miracle May'

Nolan Doesken

Colorado Water Congress 2015 Summer Meeting

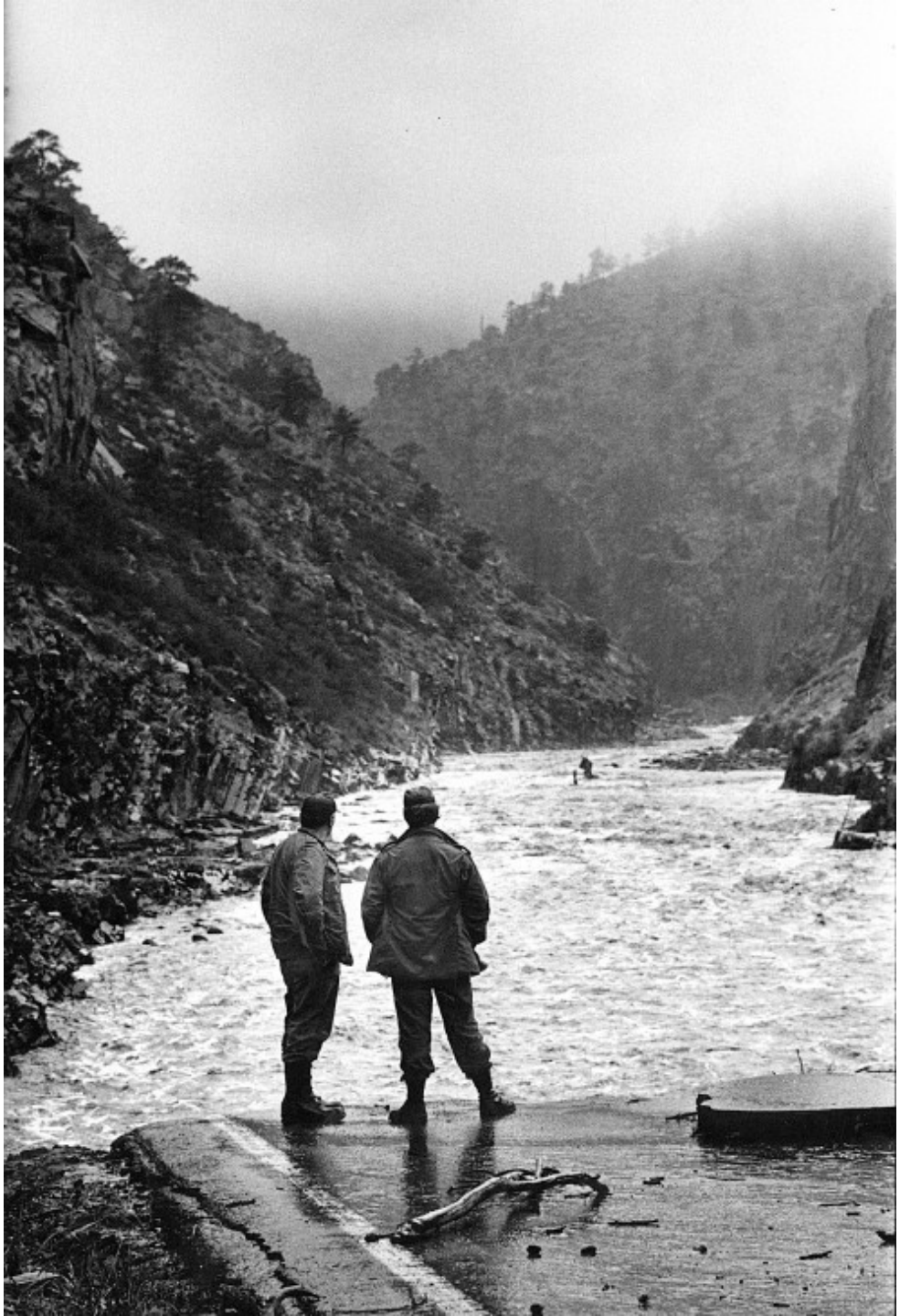
Vail, Colorado

8/19/15, Wednesday Workshop Sessions


Where do we start?
Only two years ago it was this
Photo by Lyric Lucero
2013 Manzanola, CO


And This
NIDIS
NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM
COLORADO
CLIMATE
CENTER
Colorado
State
University

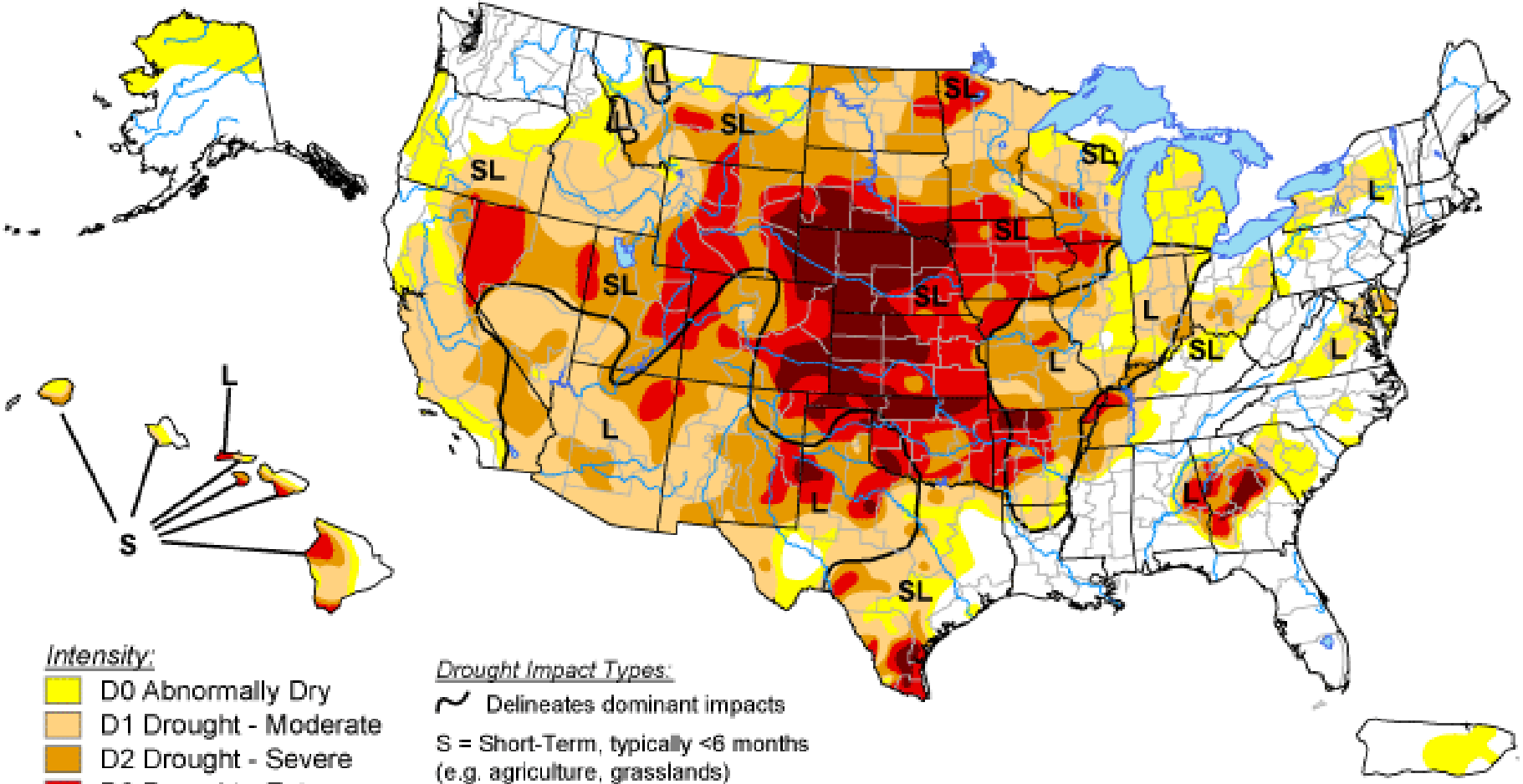
And then This



Credit: Denver Post

U.S. Drought Monitor

October 2, 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.

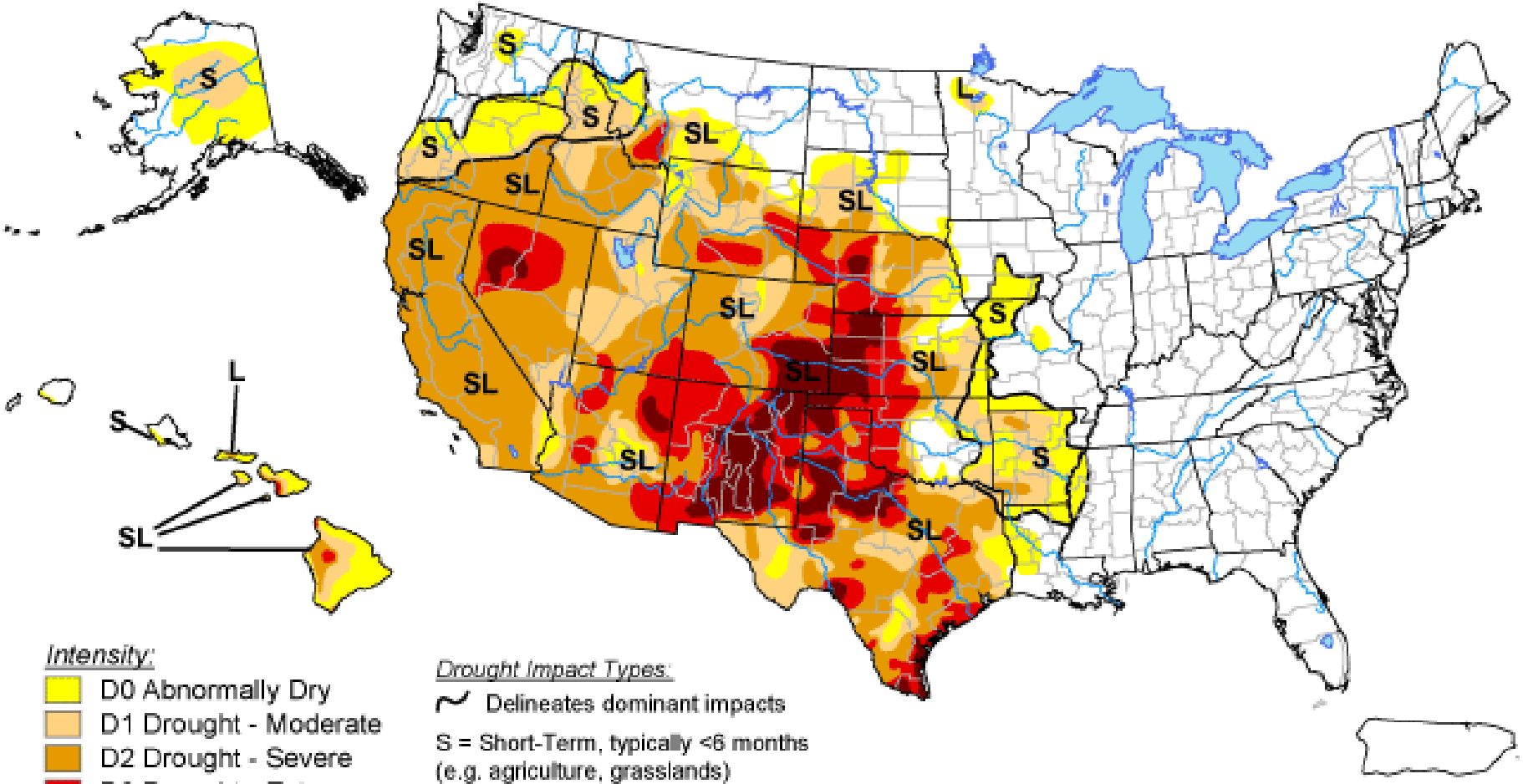
http://droughtmonitor.unl.edu/

Released Thursday, October 4, 2012

Author: Anthony Artusa, NOAA/NWS/NCEP/CPC

U.S. Drought Monitor

July 16, 2013
Valid 7 a.m. EDT



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http://droughtmonitor.unl.edu/

Released Thursday, July 18, 2013

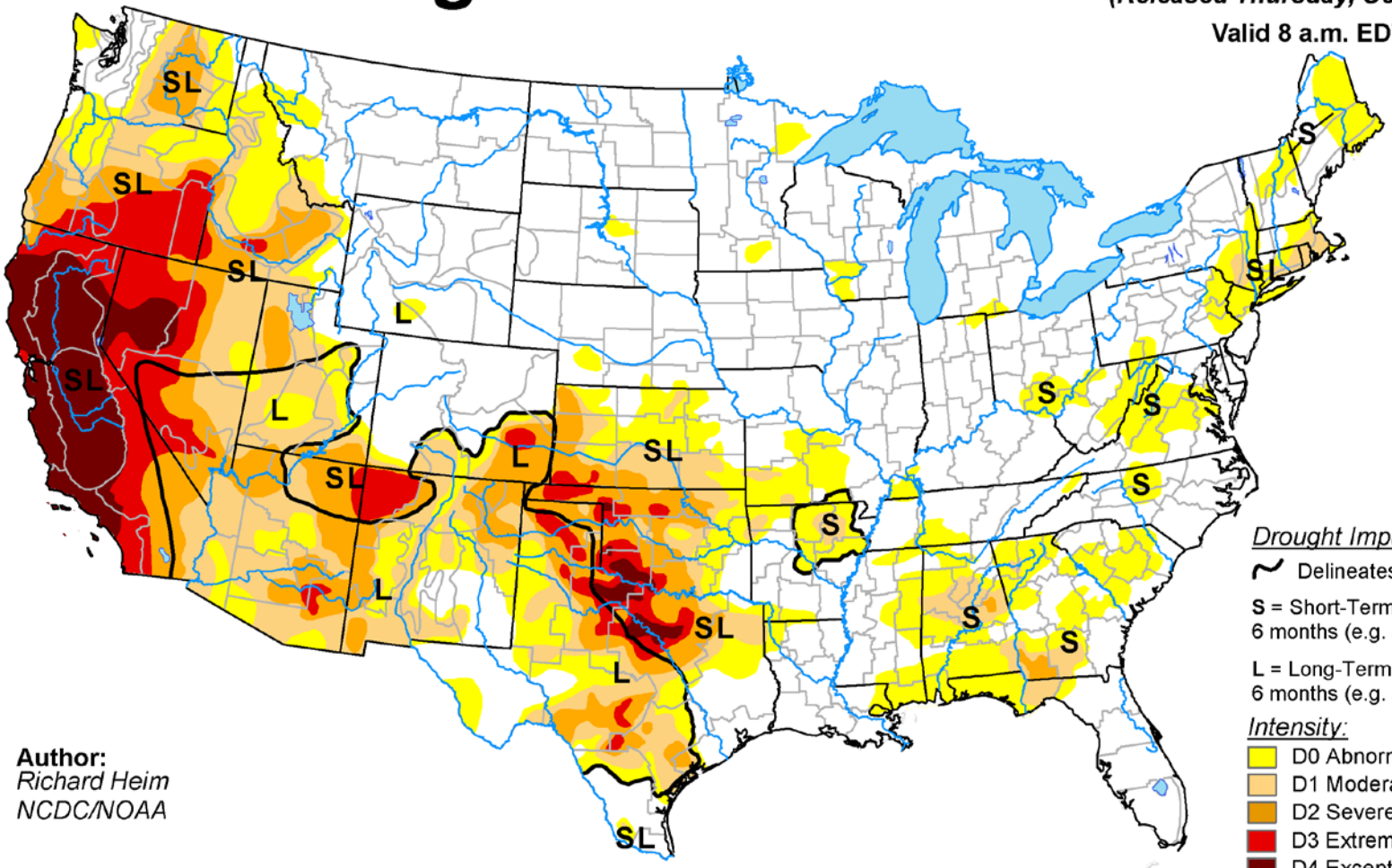
Author: Richard Heim, NOAA/NESDIS/NCDC

U.S. Drought Monitor

September 30, 2014

(Released Thursday, Oct. 2, 2014)

Valid 8 a.m. EDT



Author:
Richard Heim
NCDC/NOAA

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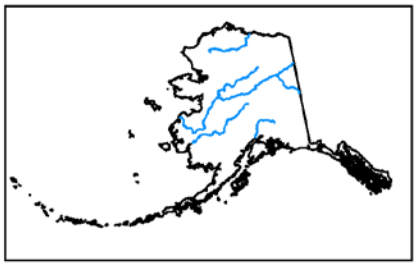
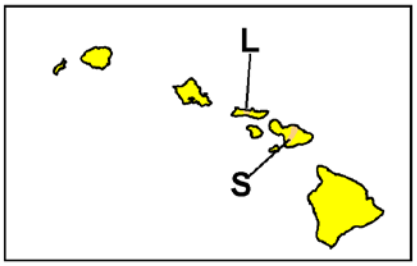
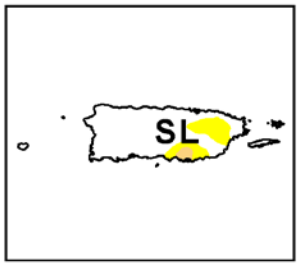






USDA National Drought Mitigation Center

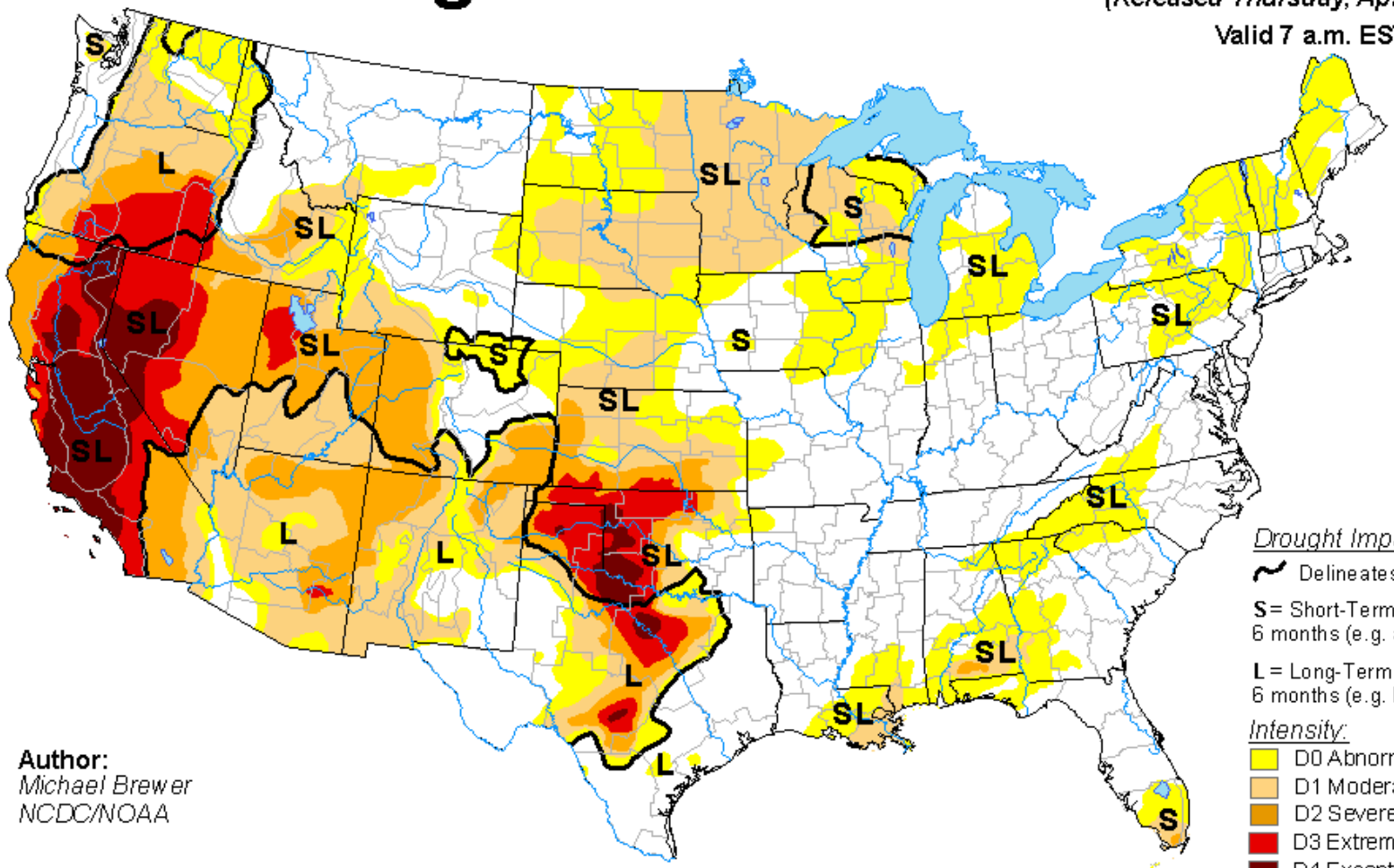
http://droughtmonitor.unl.edu/

U.S. Drought Monitor

April 14, 2015

(Released Thursday, Apr. 16, 2015)

Valid 7 a.m. EST



Author:
Michael Brewer
NCDC/NOAA

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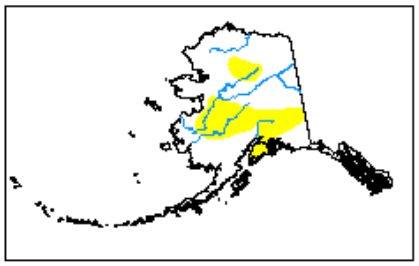
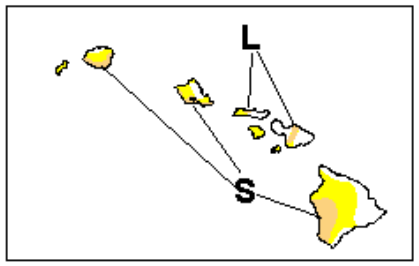
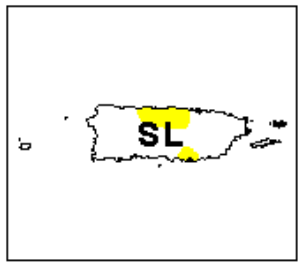




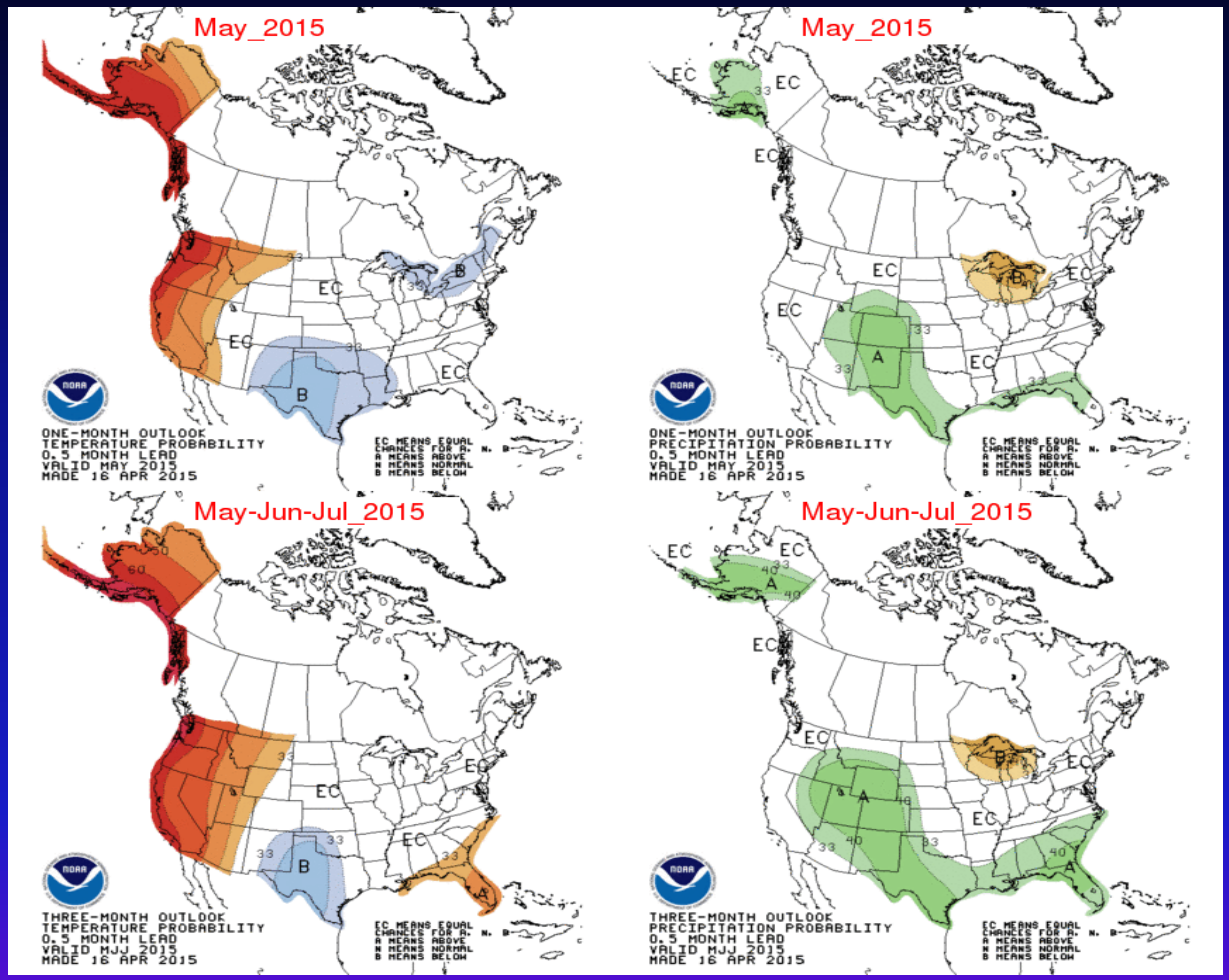


USDA National Drought Mitigation Center

http://droughtmonitor.unl.edu/

And Then

Something happened



The long-range seasonal forecast went from looking very wrong

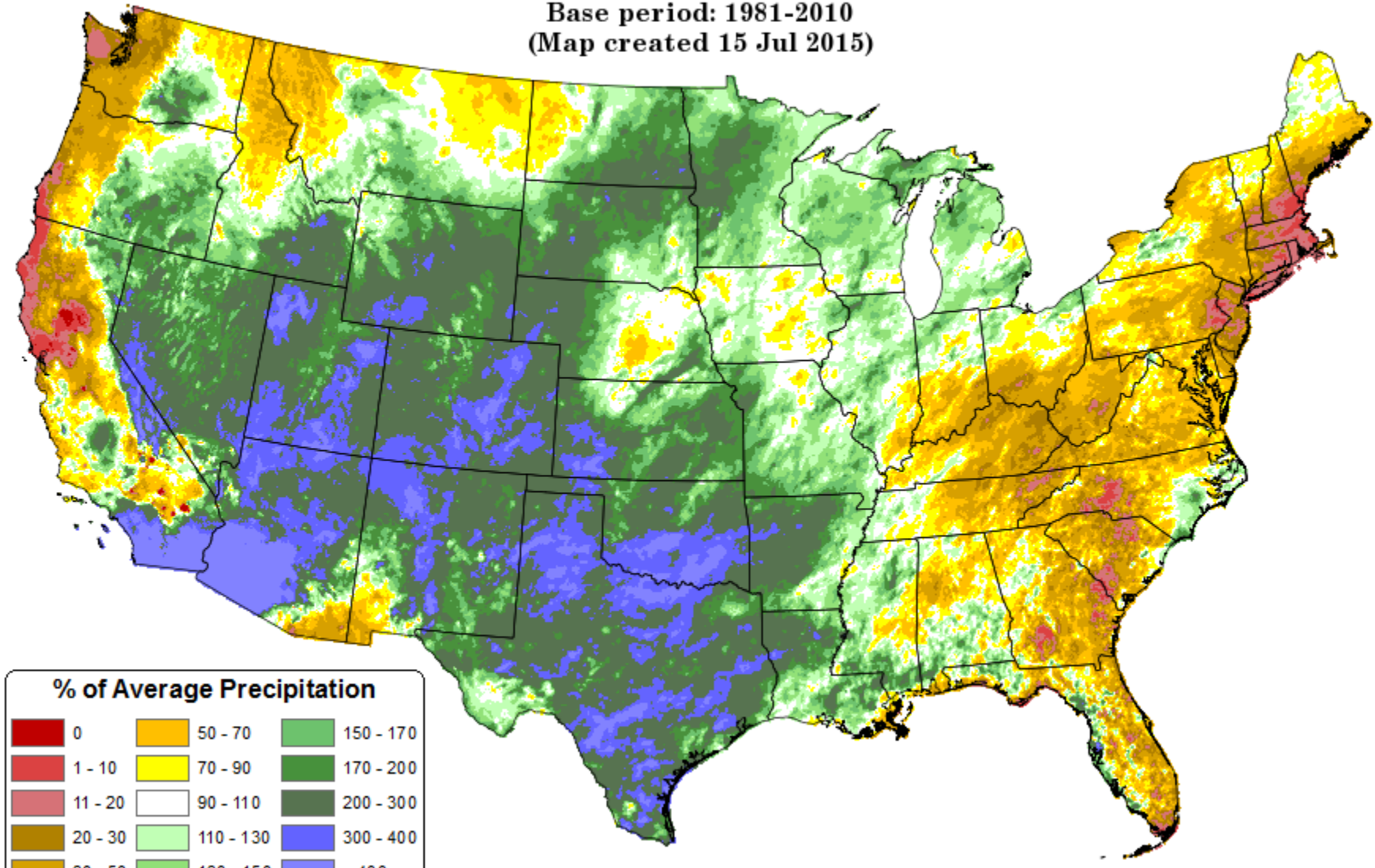
to being reasonably right

First, a couple of late April storms bought us a little time and slowed the ridiculously early snowmelt

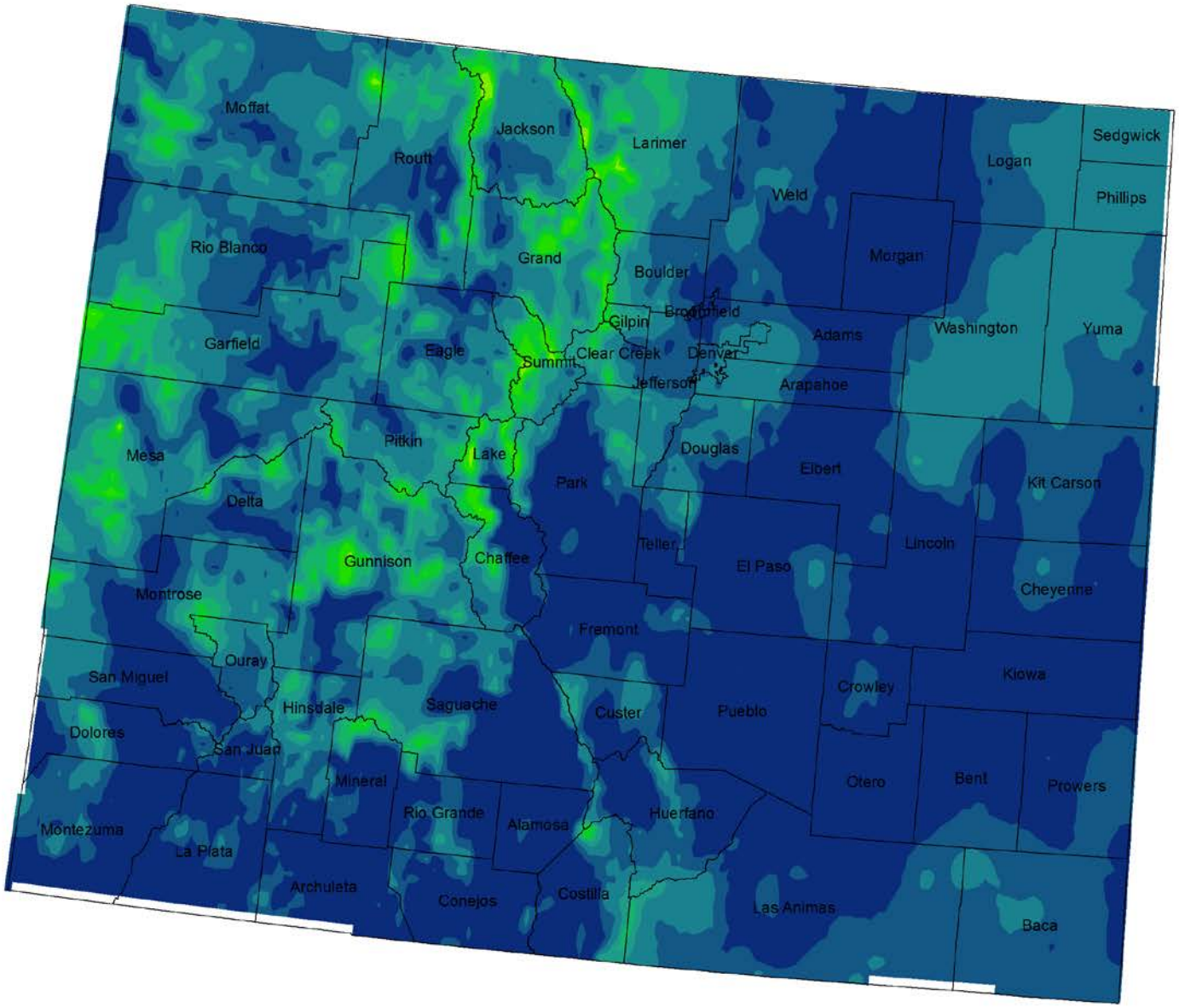
Then came MAY!!!!

Total Precipitation Anomaly: May 2015

Period ending 31 May 2015
Base period: 1981-2010
(Map created 15 Jul 2015)



Colorado May 2015 Precipitation as a Percentage of Normal

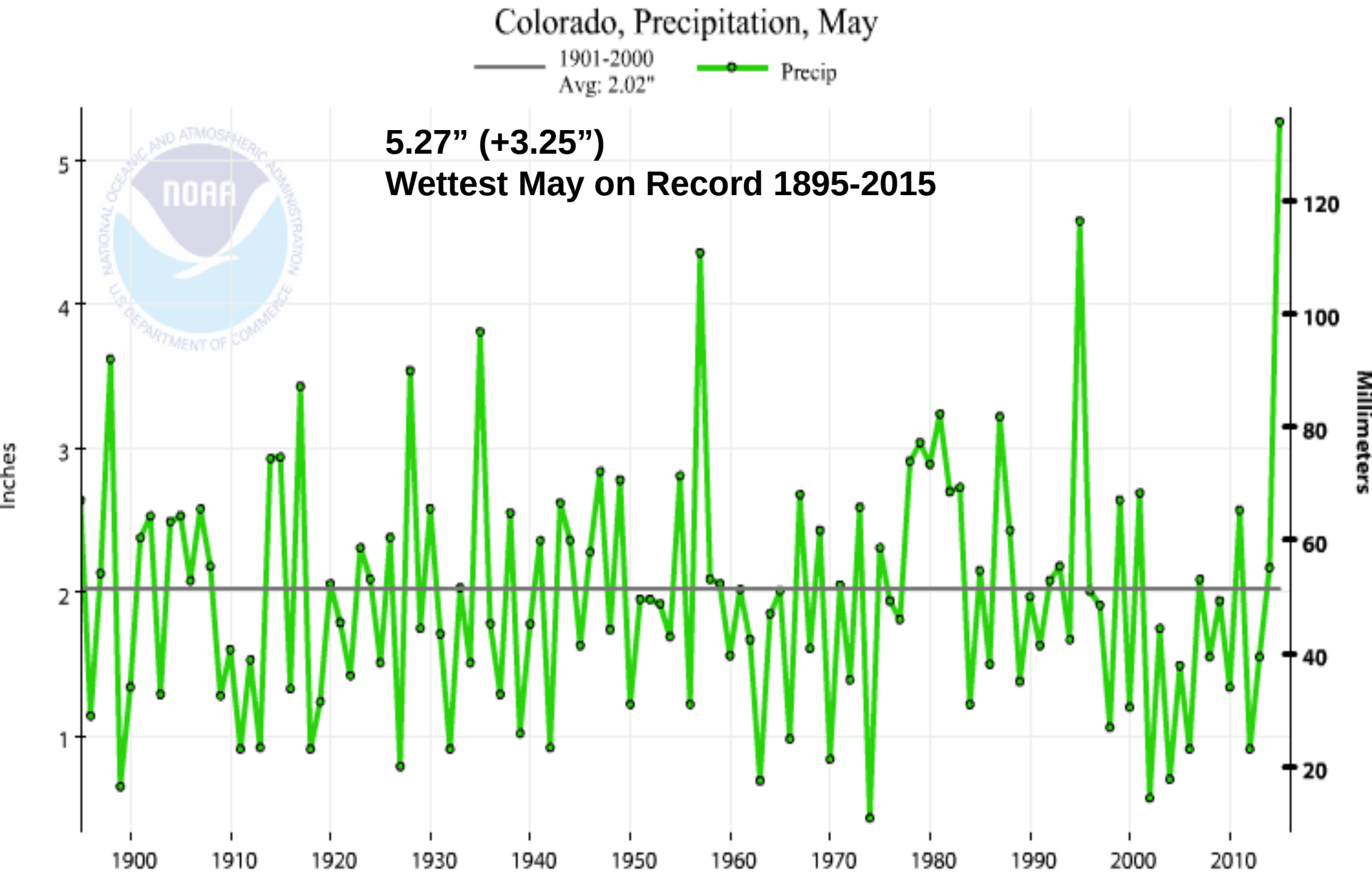


may15_pnCO

Precip % of Normal

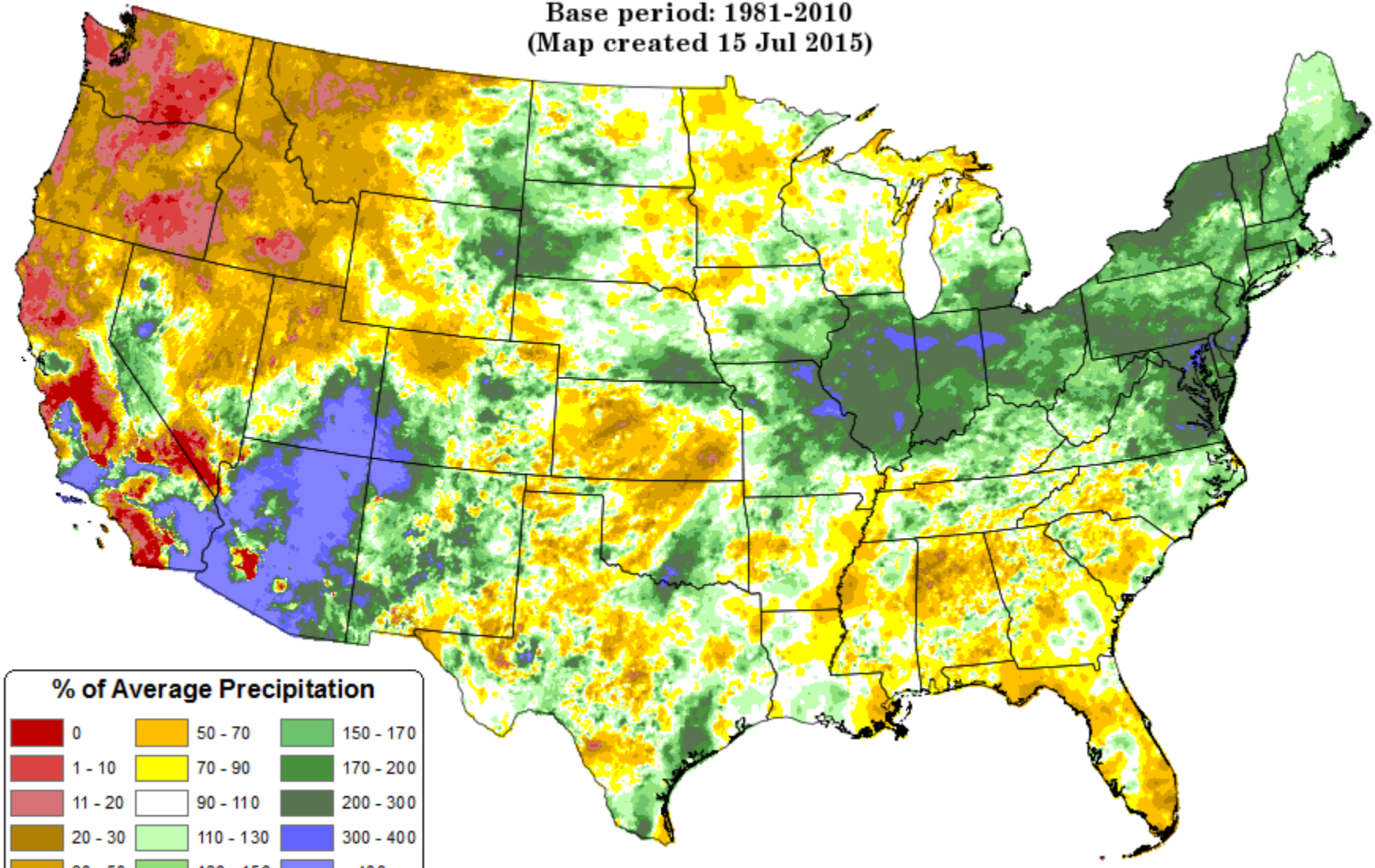
- 0
- 1 - 10
- 11 - 20
- 21 - 30
- 31 - 50
- 51 - 70
- 71 - 90
- 91 - 110
- 111 - 130
- 131 - 150
- 151 - 170
- 171 - 200
- 201 - 250
- 251 - 300
- 300+

May 2015 Statewide Precipitation

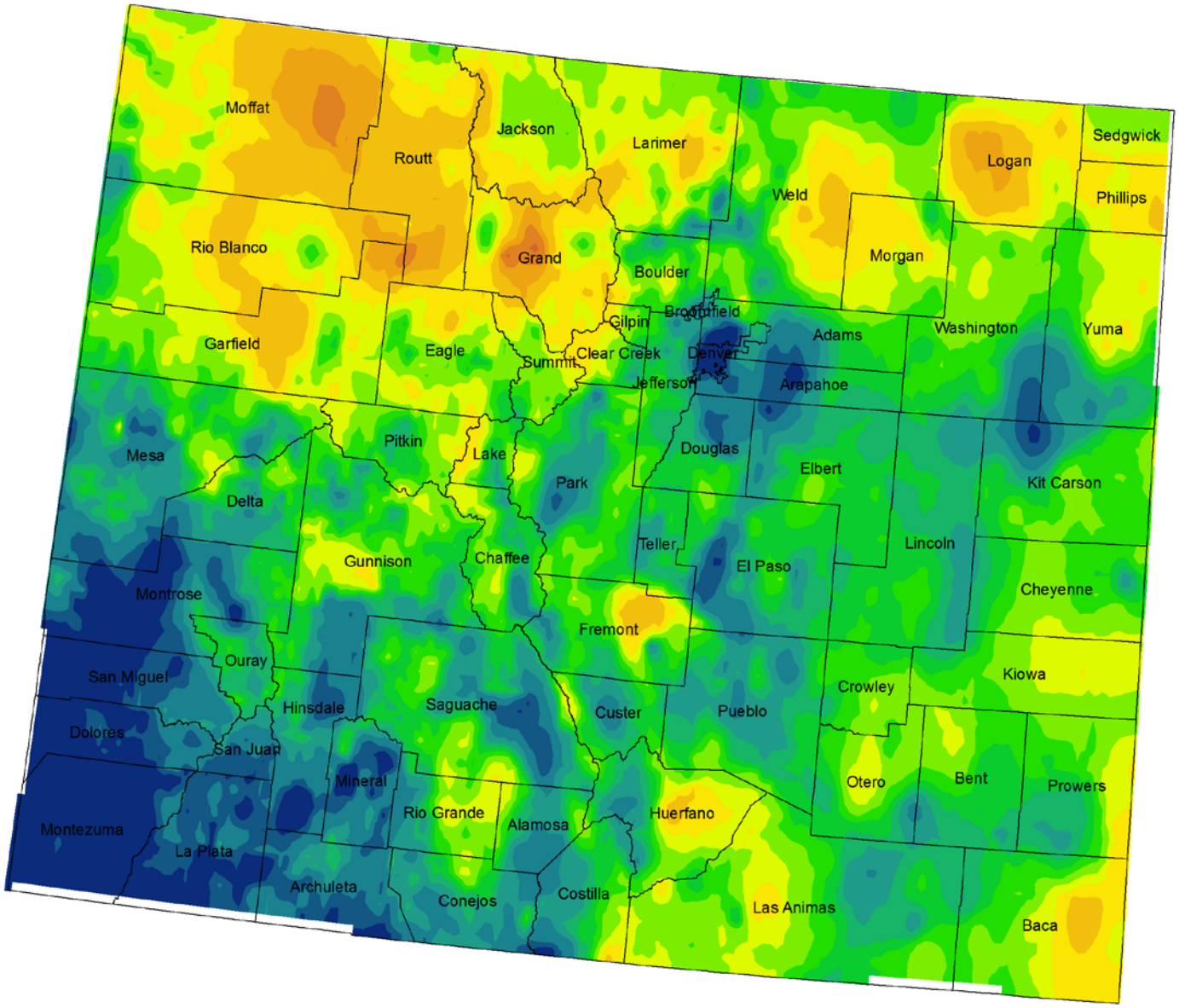


Total Precipitation Anomaly: June 2015

Period ending 30 Jun 2015
Base period: 1981-2010
(Map created 15 Jul 2015)



Colorado June 2015 Precipitation as a Percentage of Normal

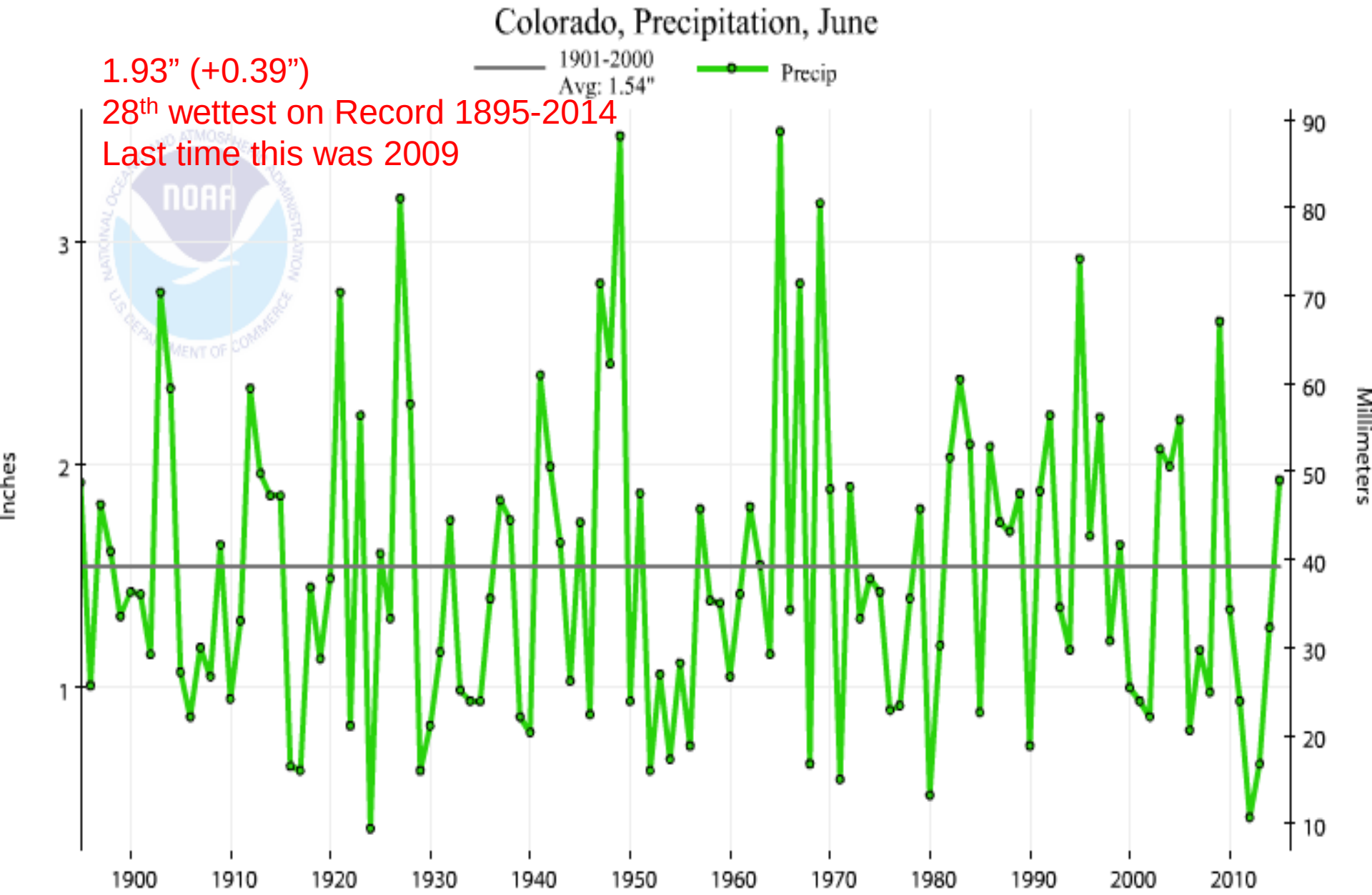


june15_pn_co

Precip % of Normal

- 0
- 1 - 10
- 11 - 20
- 21 - 30
- 31 - 50
- 51 - 70
- 71 - 90
- 91 - 110
- 111 - 130
- 131 - 150
- 151 - 170
- 171 - 200
- 201 - 250
- 251 - 300
- 300+

June 2015 Statewide Precipitation

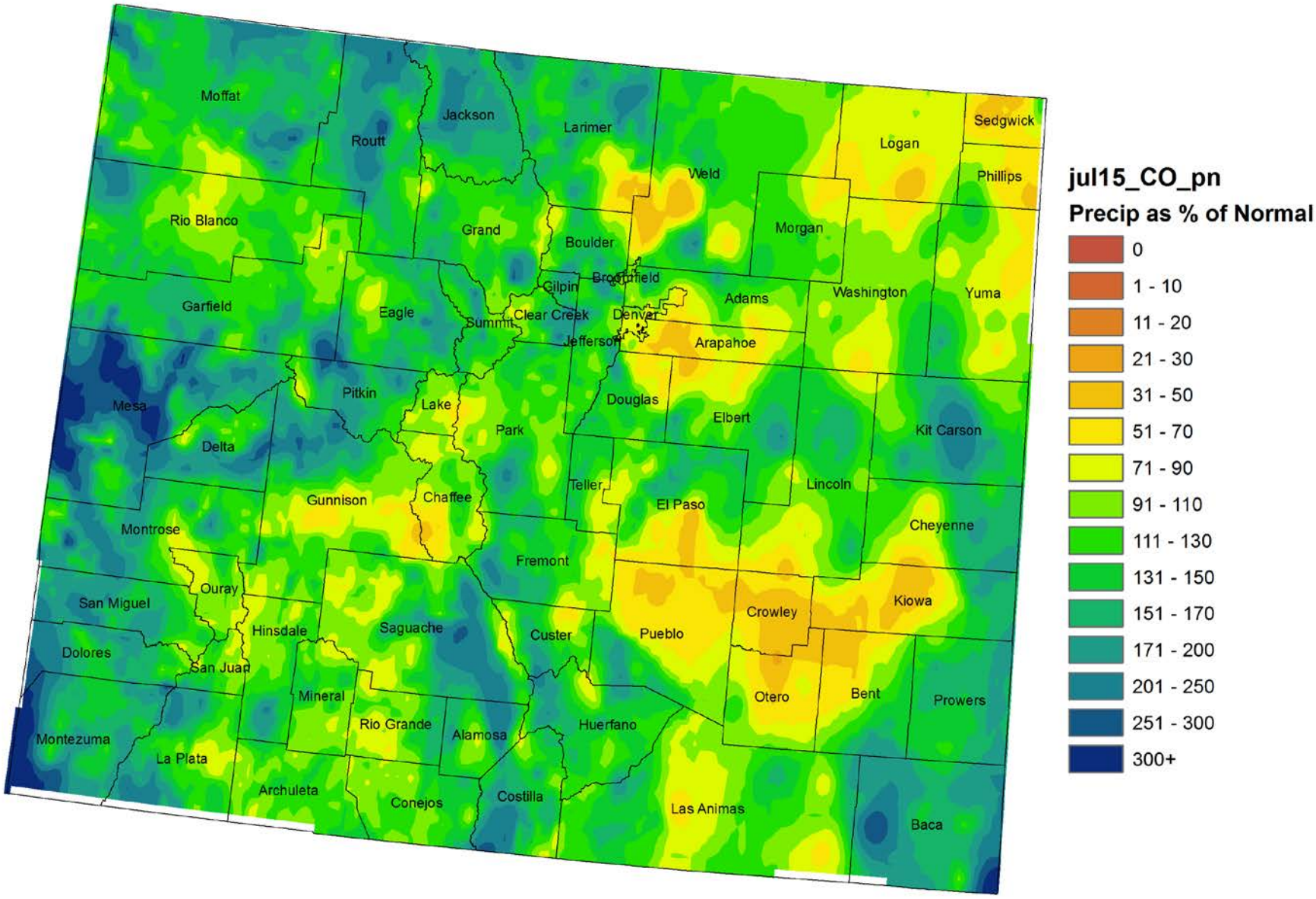


1.93” (+0.39”)

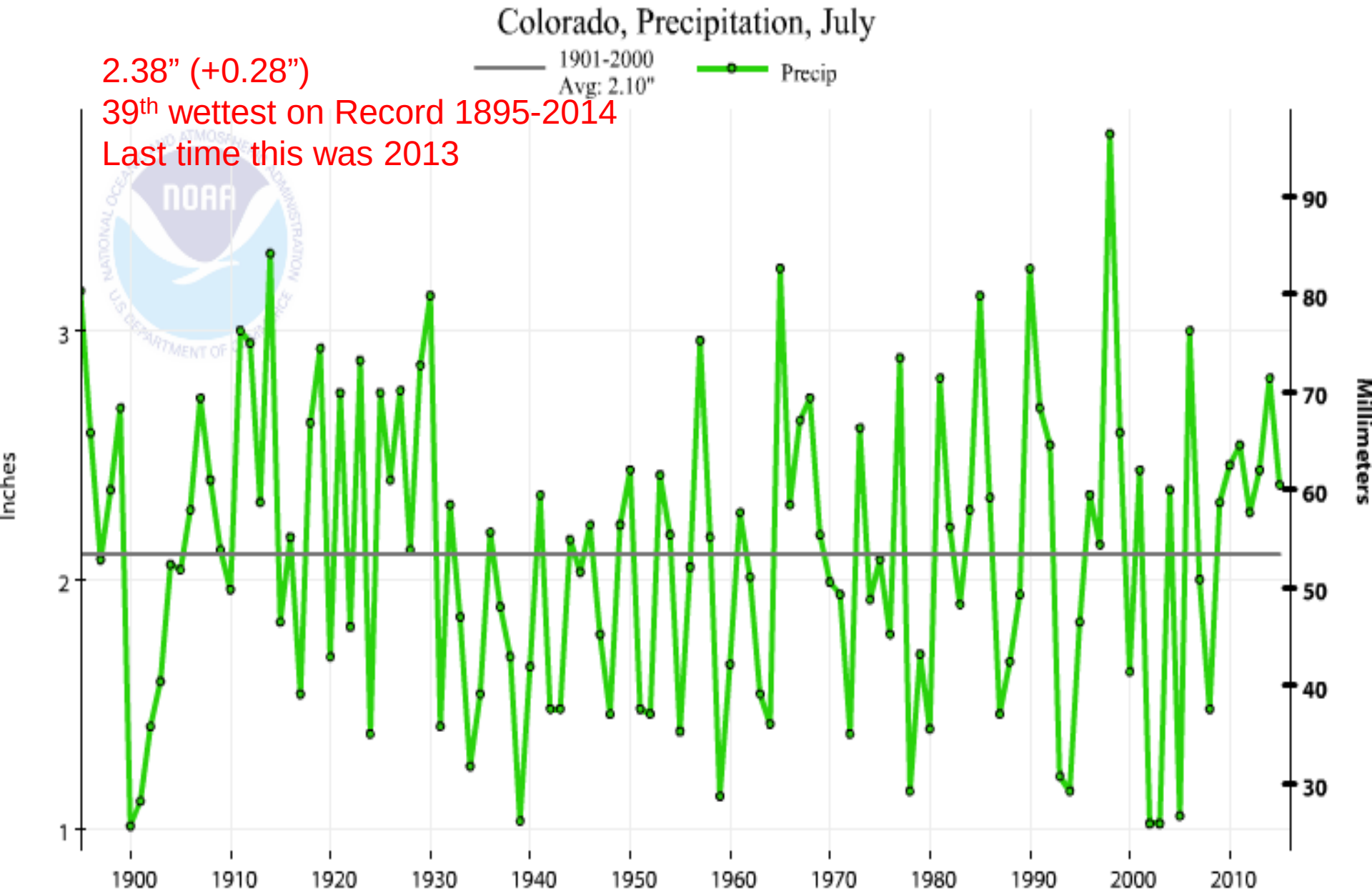
28th wettest on Record 1895-2014

Last time this was 2009

Colorado July 2015 Precipitation as a Percentage of Normal

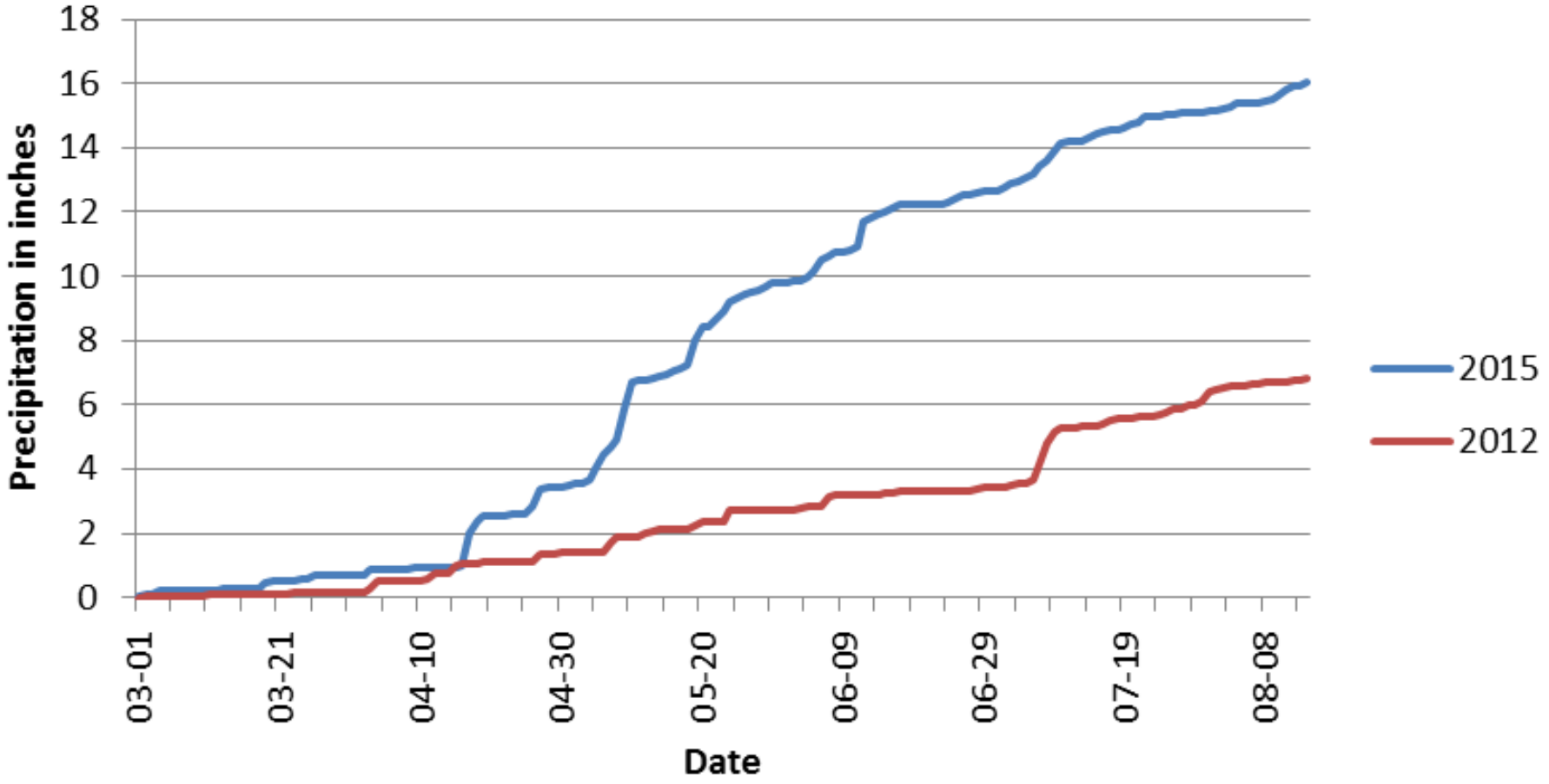


July 2015 Statewide Precipitation



Colorado Statewide Daily Accumulated Precipitation

Similar dry starts March – mid April Then DIFFERENT



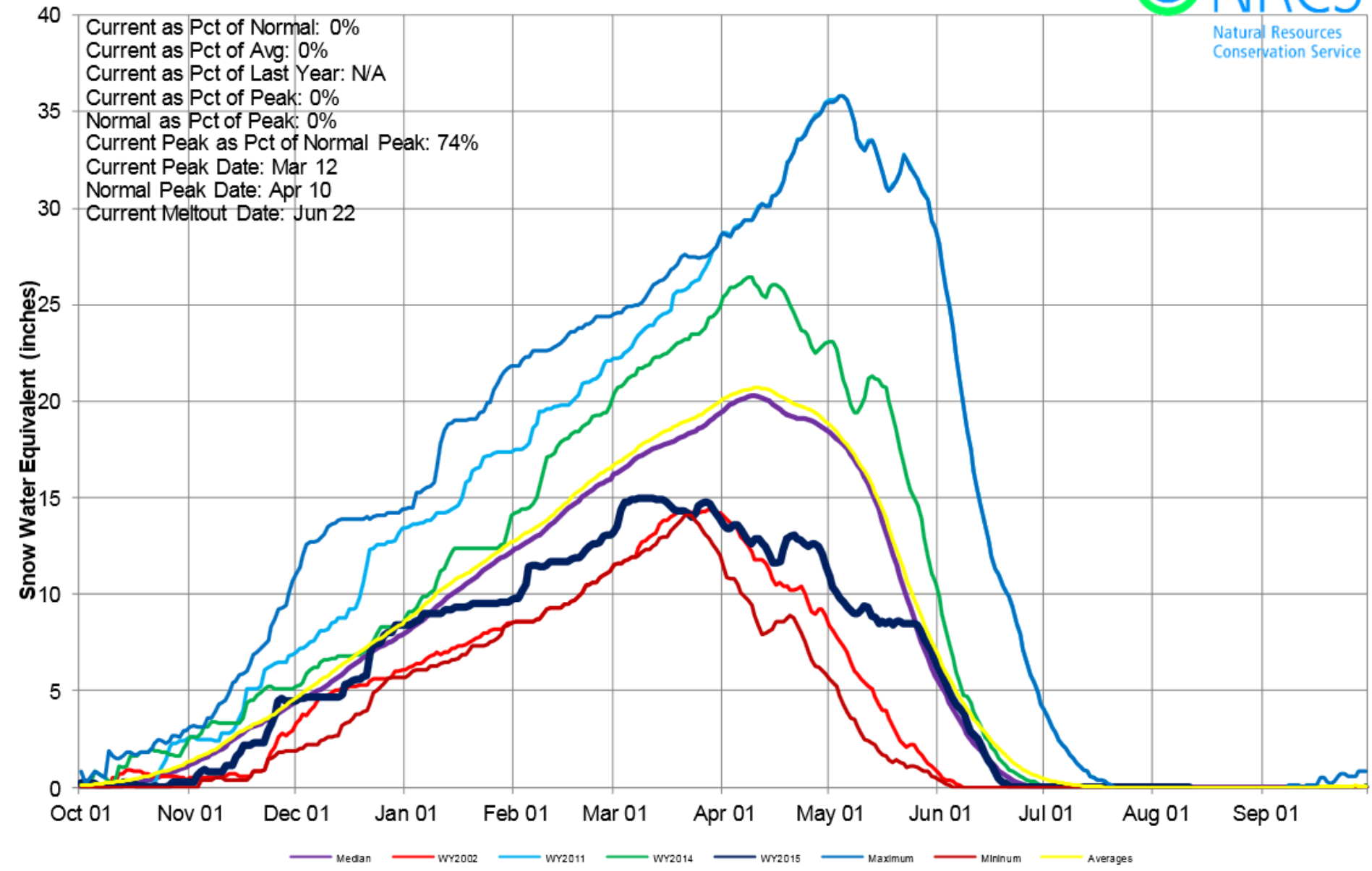
Data source: CoCoRaHS


How did it go for our snow?

Yampa, White & North Platte River Basins High/Low Snowpack Summary

Based on Provisional SNOTEL data as of Aug 11, 2015

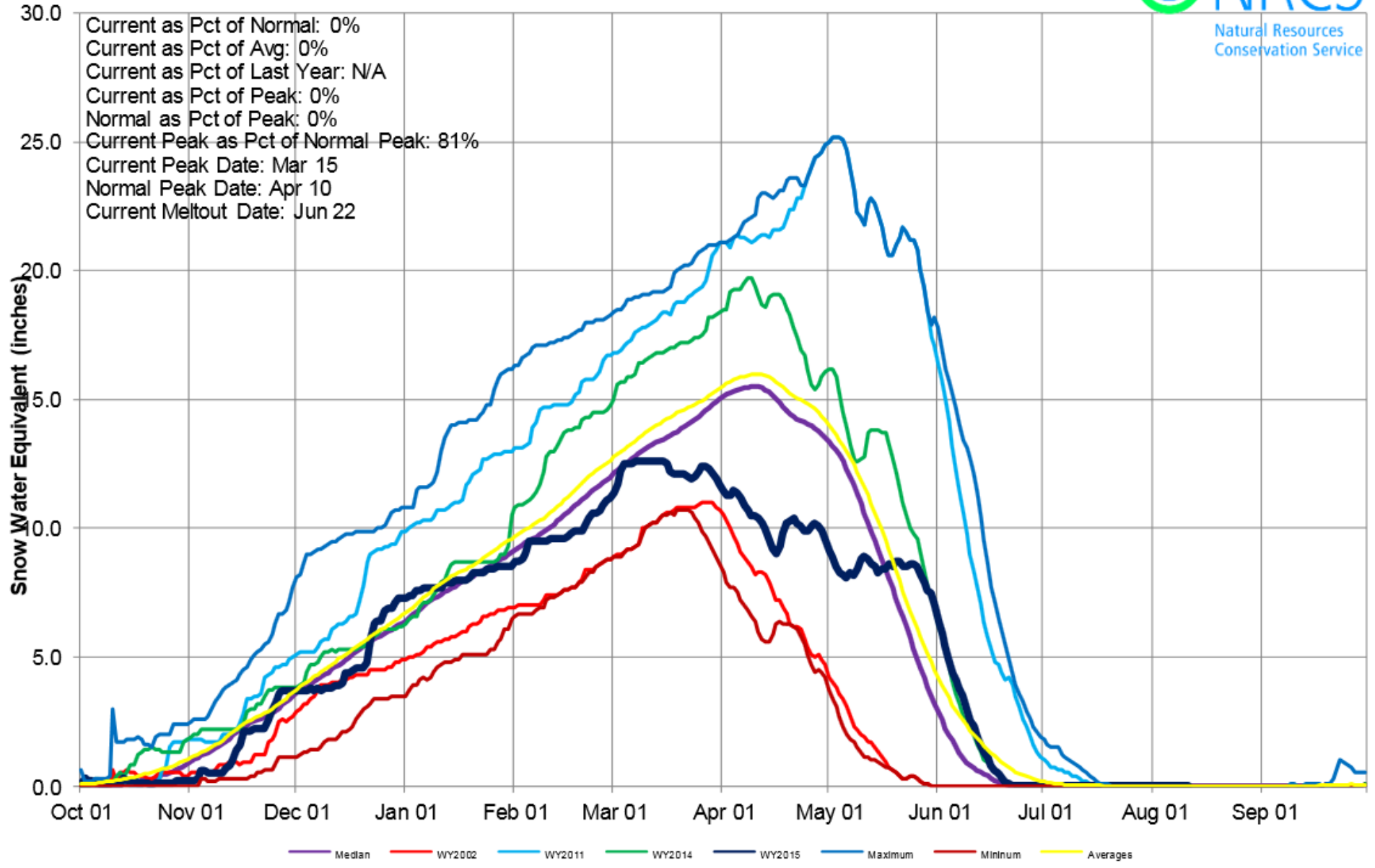
NRCS
Natural Resources Conservation Service



Upper Colorado River Basin High/Low Snowpack Summary

Based on Provisional SNOTEL data as of Aug 11, 2015

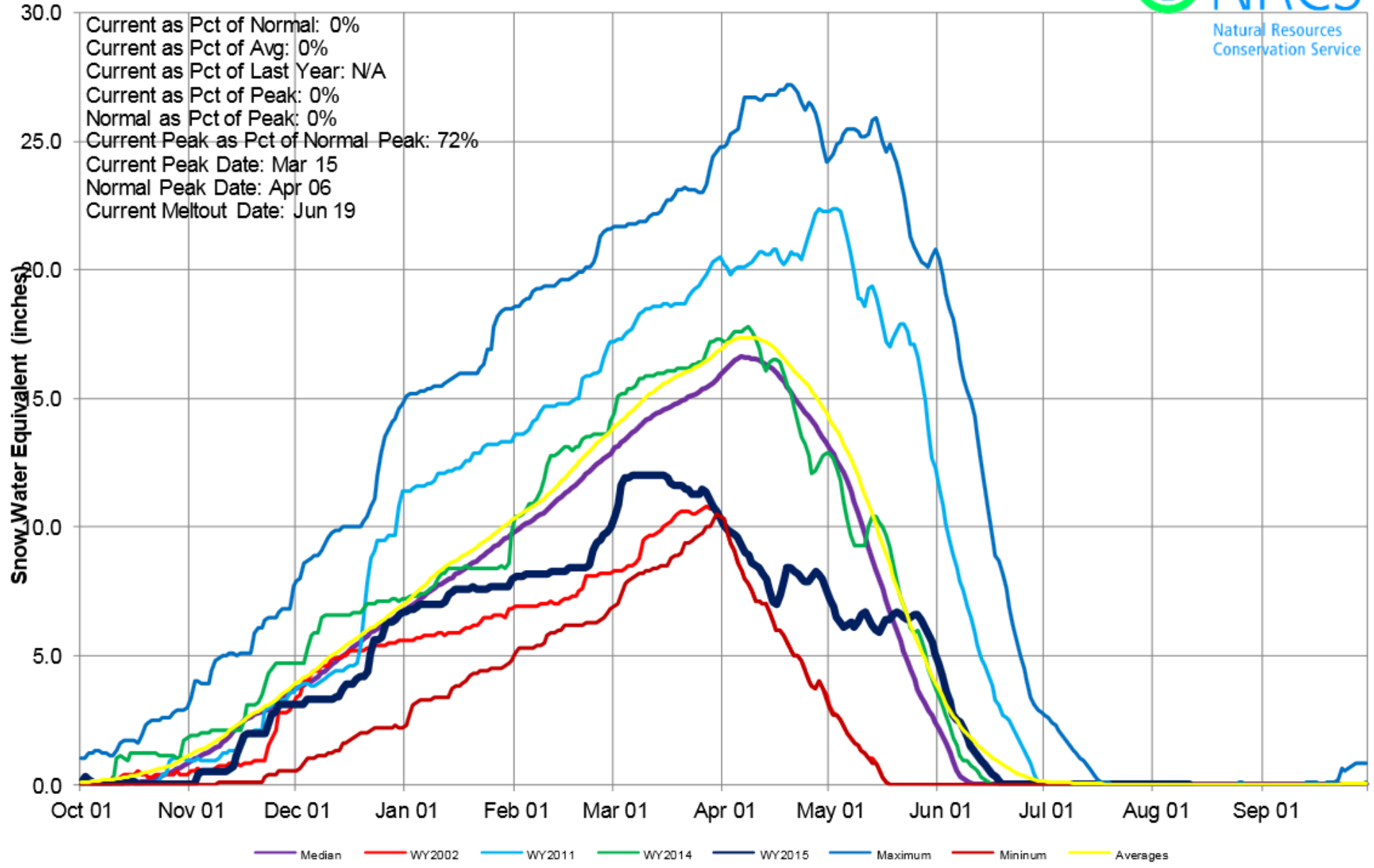
NRCS
Natural Resources Conservation Service



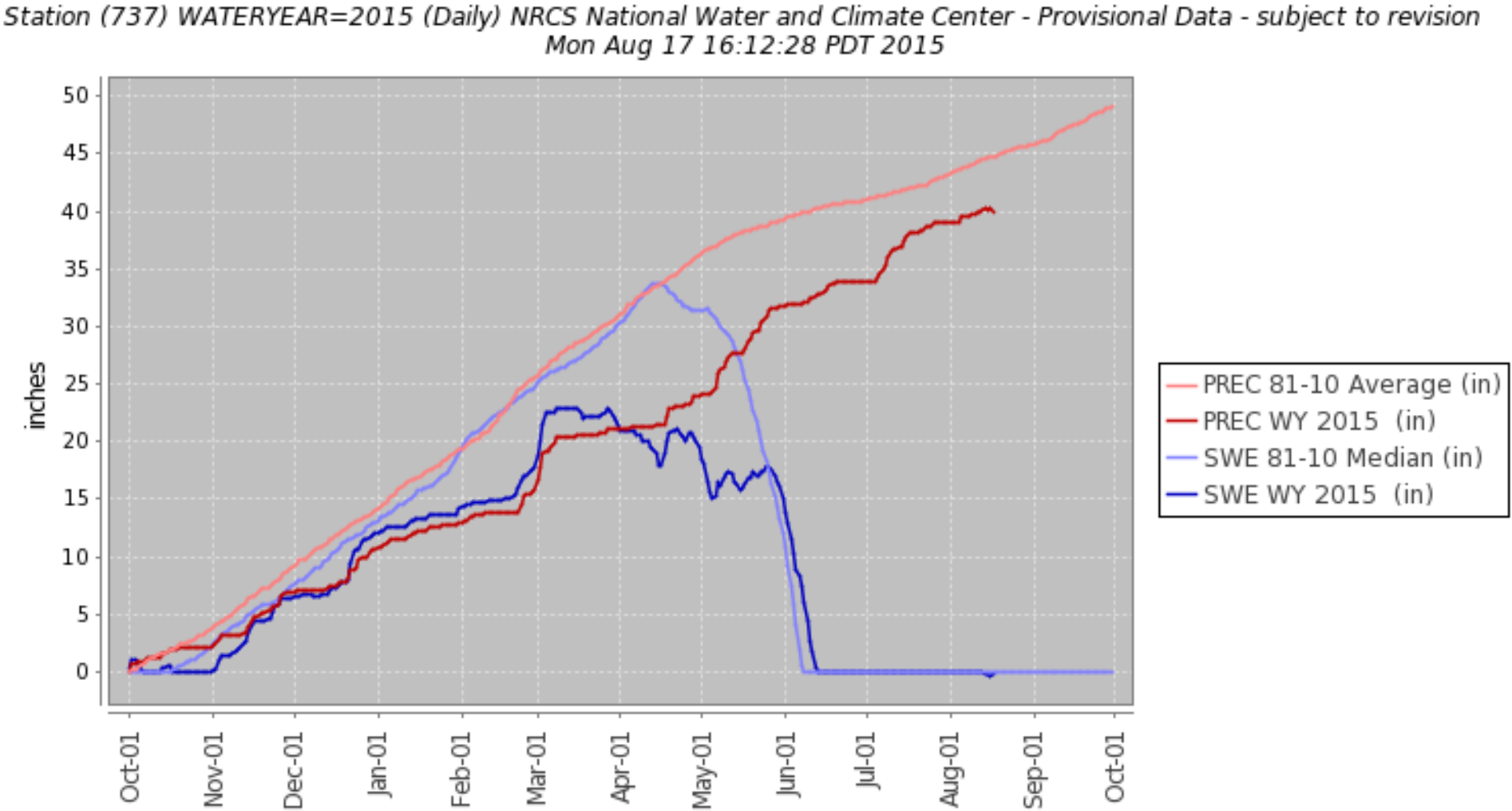
Gunnison River Basin High/Low Snowpack Summary

Based on Provisional SNOTEL data as of Aug 11, 2015

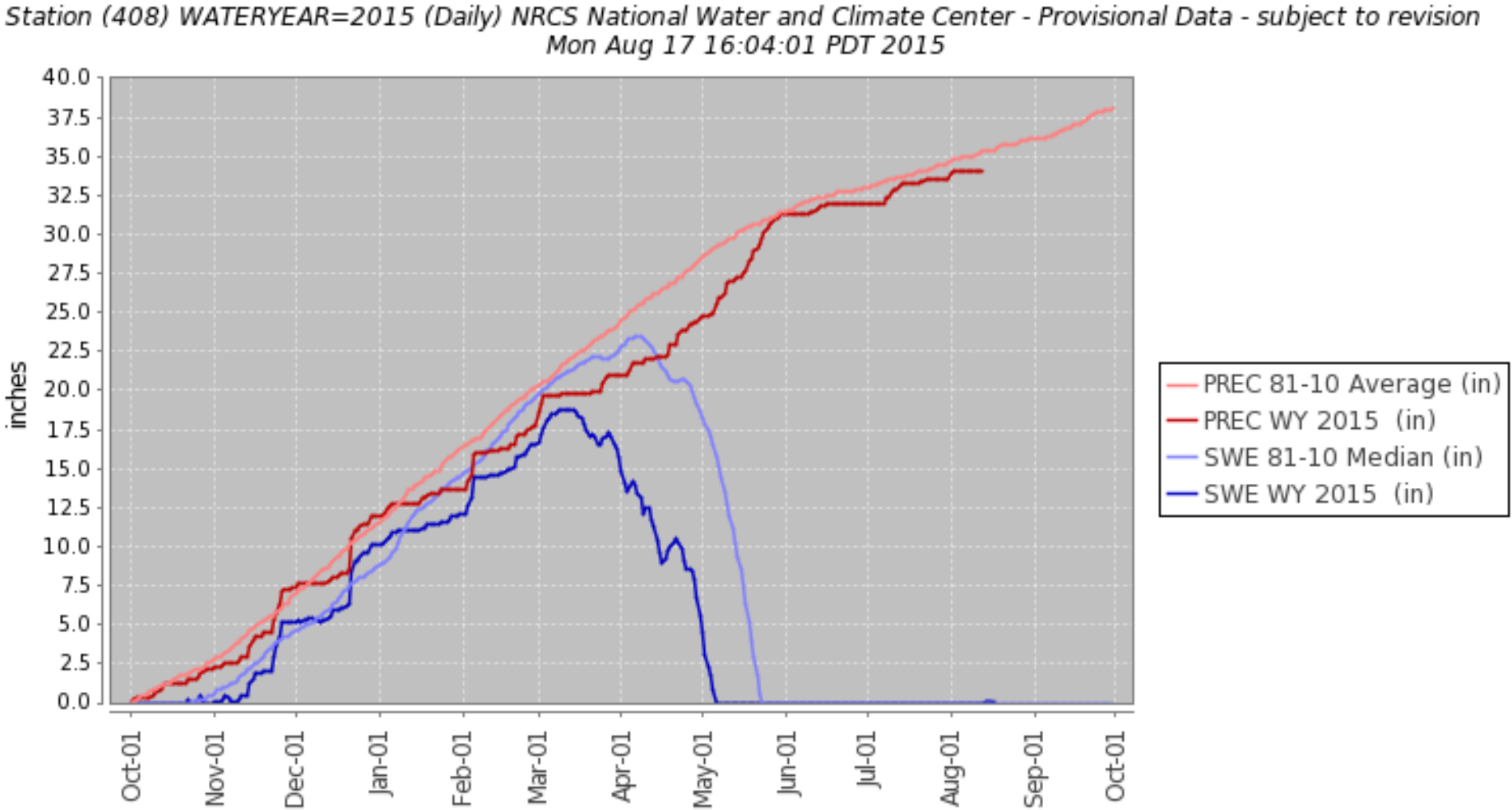
NRCS
Natural Resources Conservation Service



Schofield Pass Snotel 10,700 feet



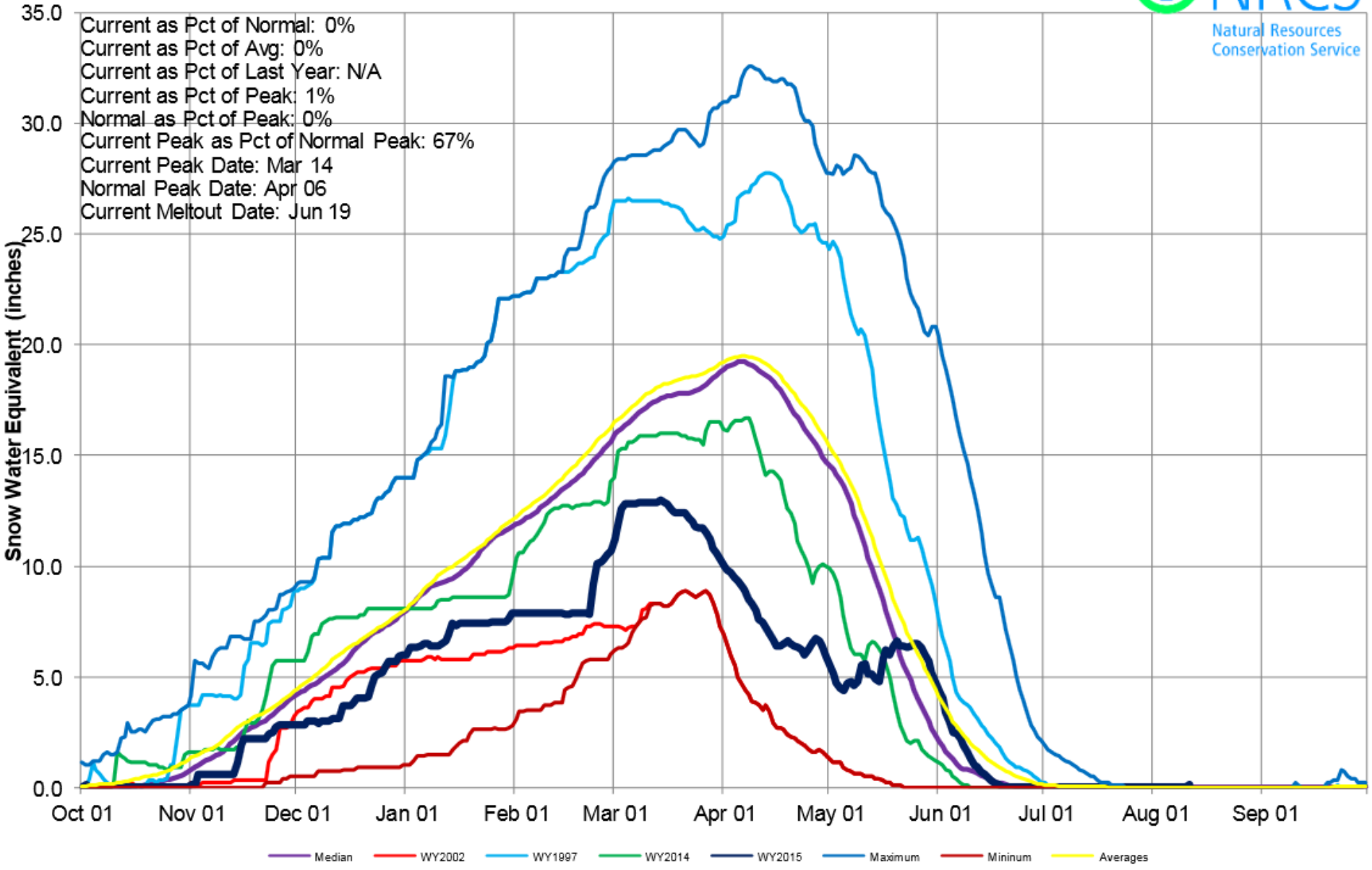
Columbine Pass Snotel, 9400 feet



San Miguel, Dolores, Animas and San Juan River Basins High/Low Snowpack Summary

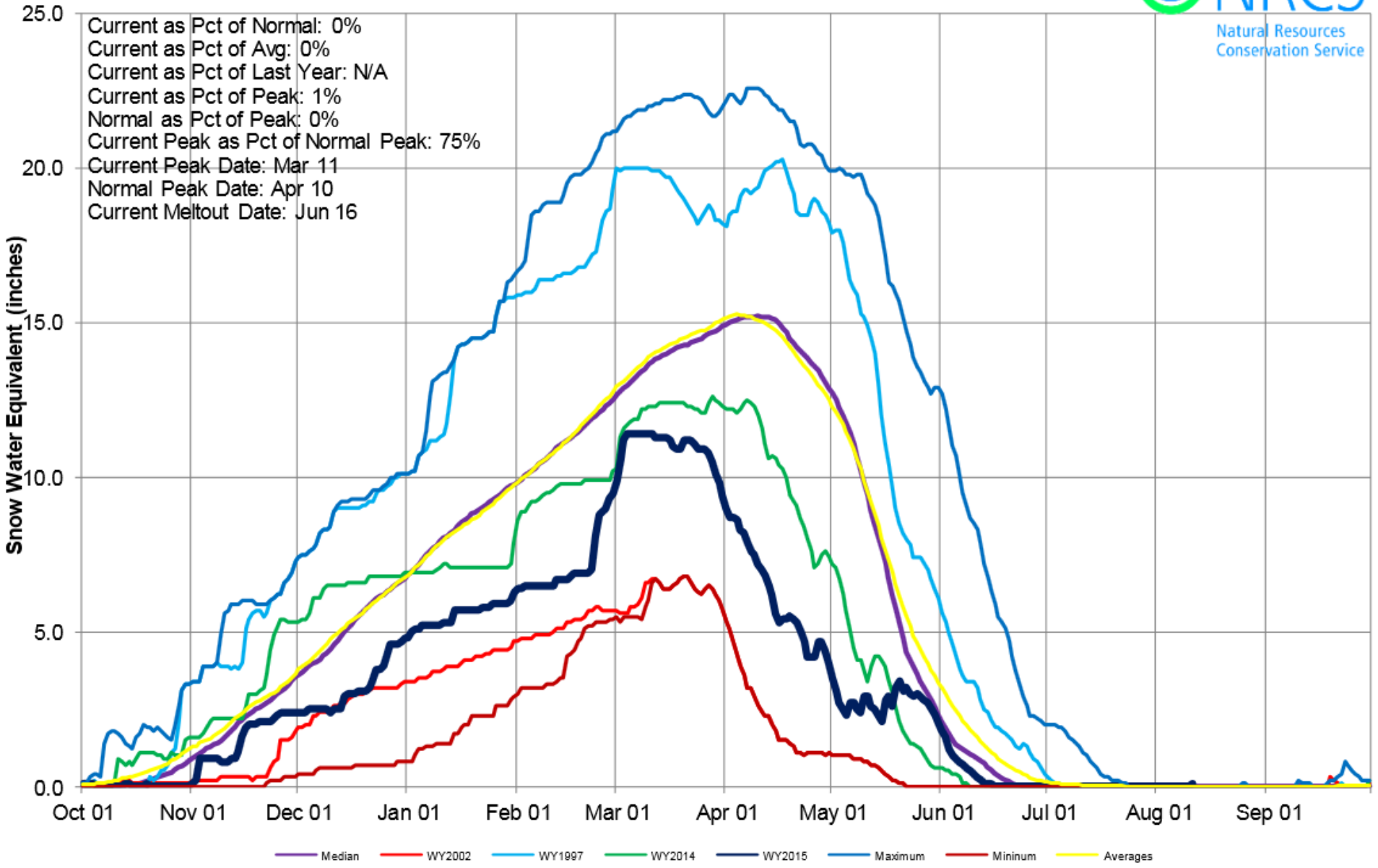
Based on Provisional SNOTEL data as of Aug 11, 2015

NRCS
Natural Resources Conservation Service



Upper Rio Grande Basin High/Low Snowpack Summary

Based on Provisional SNOTEL data as of Aug 11, 2015

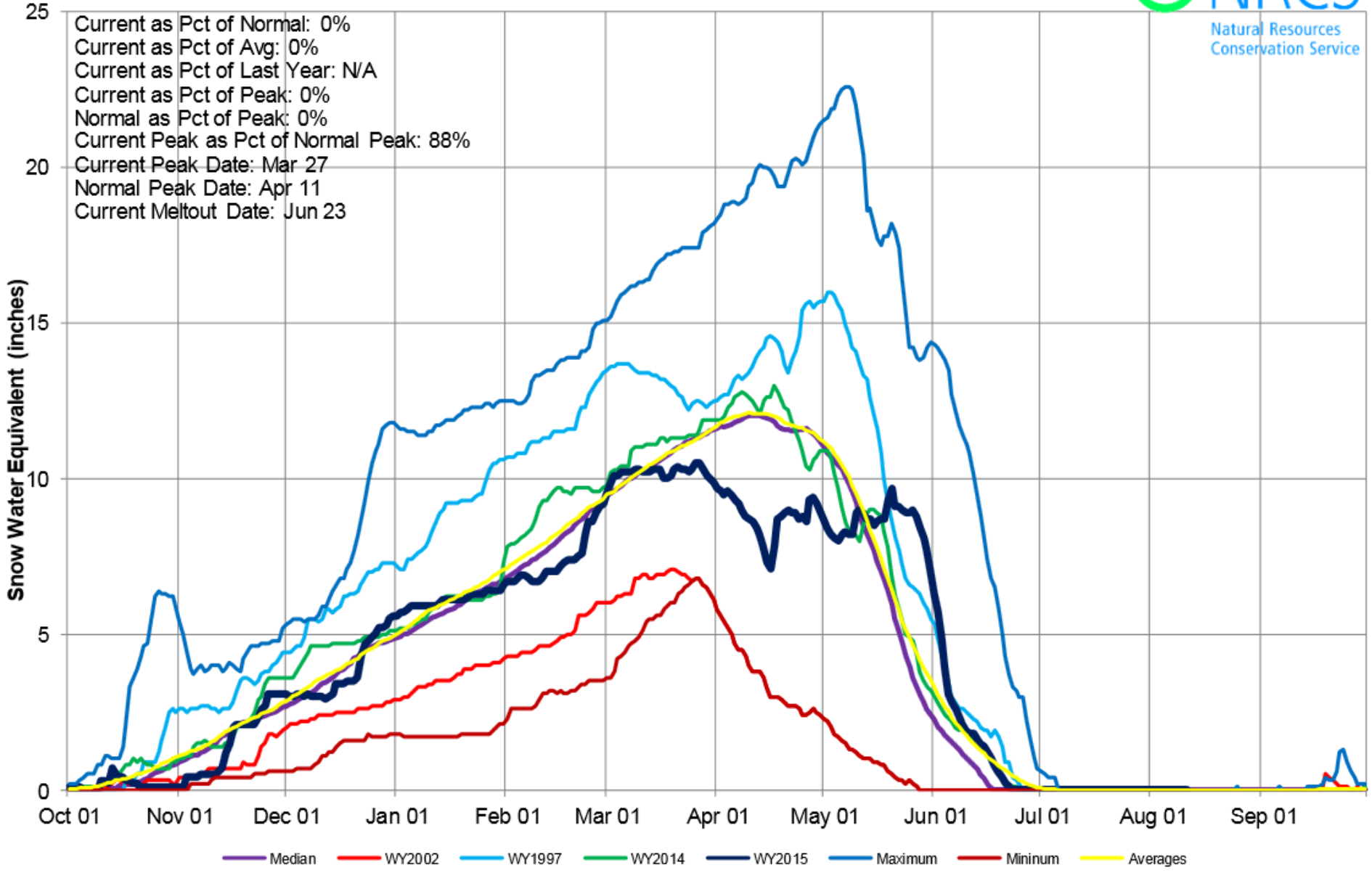


Natural Resources Conservation Service

Arkansas River Basin High/Low Snowpack Summary

Based on Provisional SNOTEL data as of Aug 11, 2015

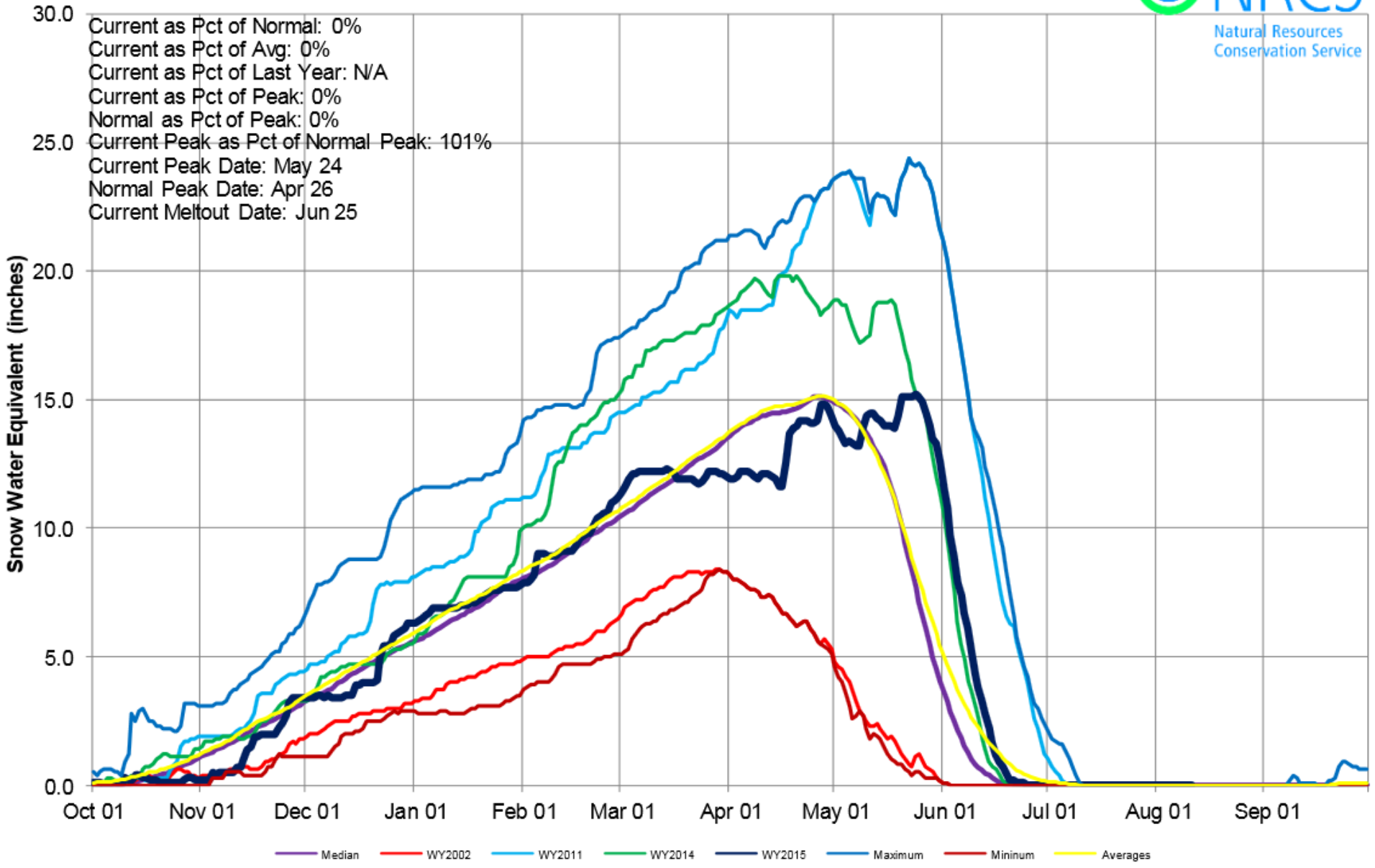
Natural Resources Conservation Service



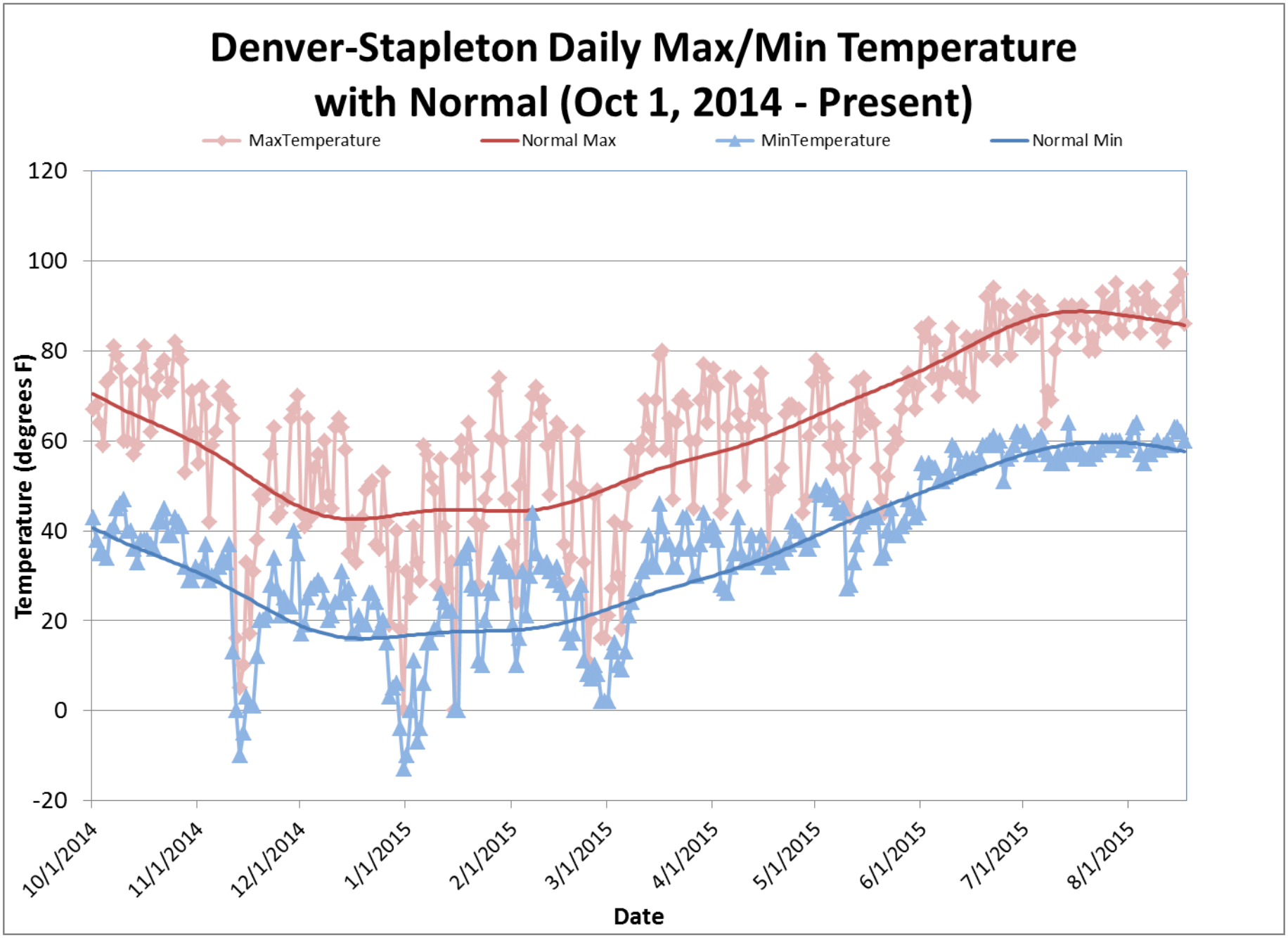
South Platte River Basin High/Low Snowpack Summary

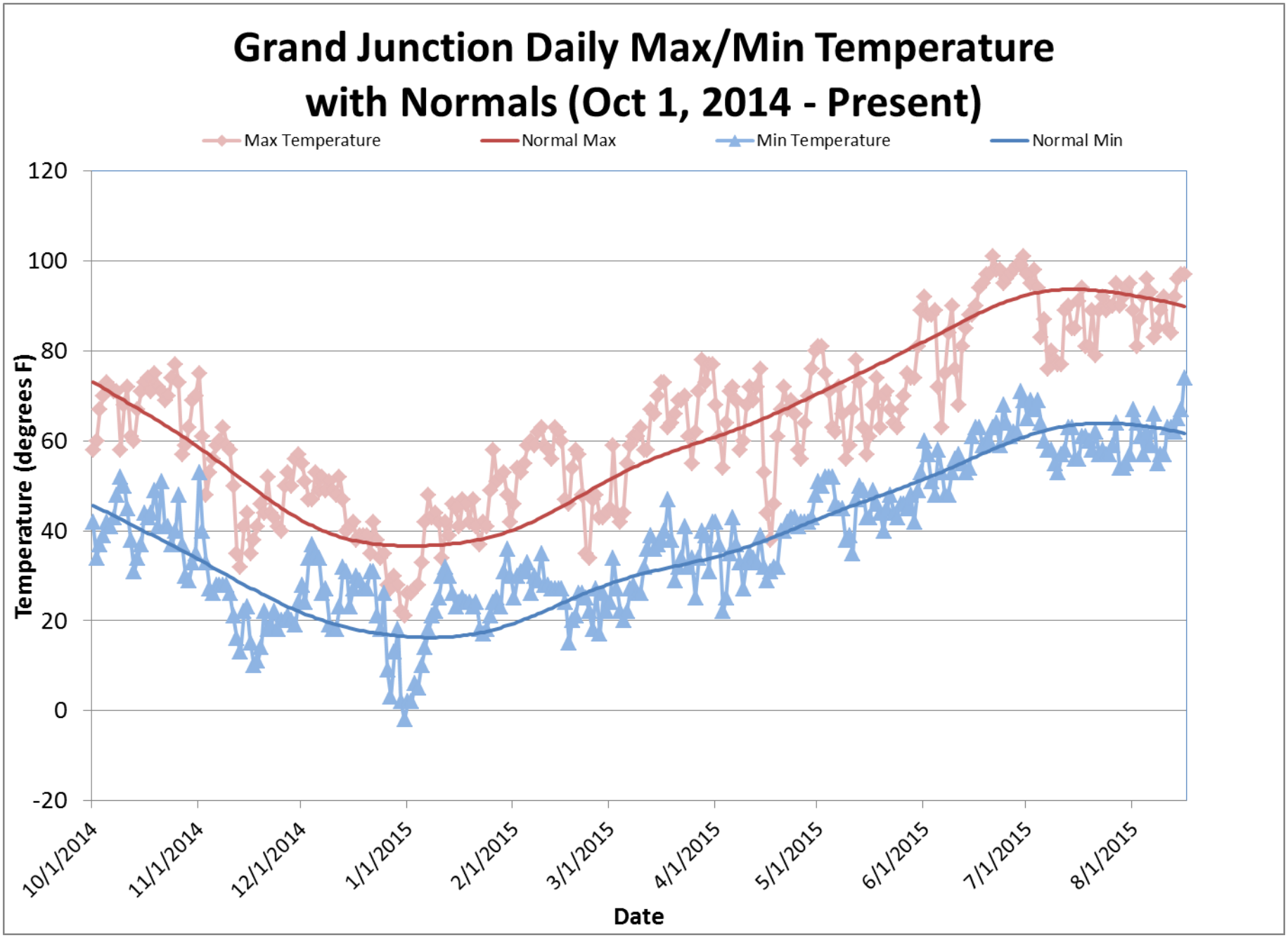
Based on Provisional SNOTEL data as of Aug 11, 2015

NRCS
Natural Resources Conservation Service



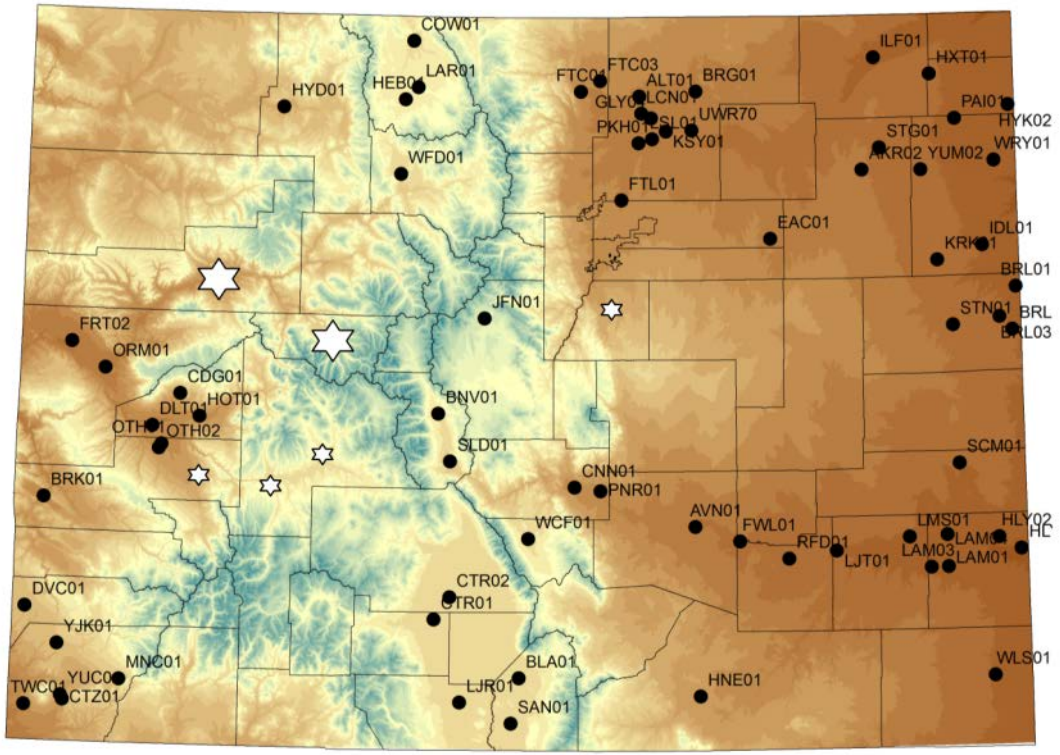
Check out these odd spring temperatures


Denver-Stapleton Daily Max/Min Temperature with Normal (Oct 1, 2014 - Present)
MaxTemperature
Normal Max
MinTemperature
Normal Min
120
100
80
60
40
20
0
-20
Temperature (degrees F)
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
5/1/2015
6/1/2015
7/1/2015
8/1/2015
Date

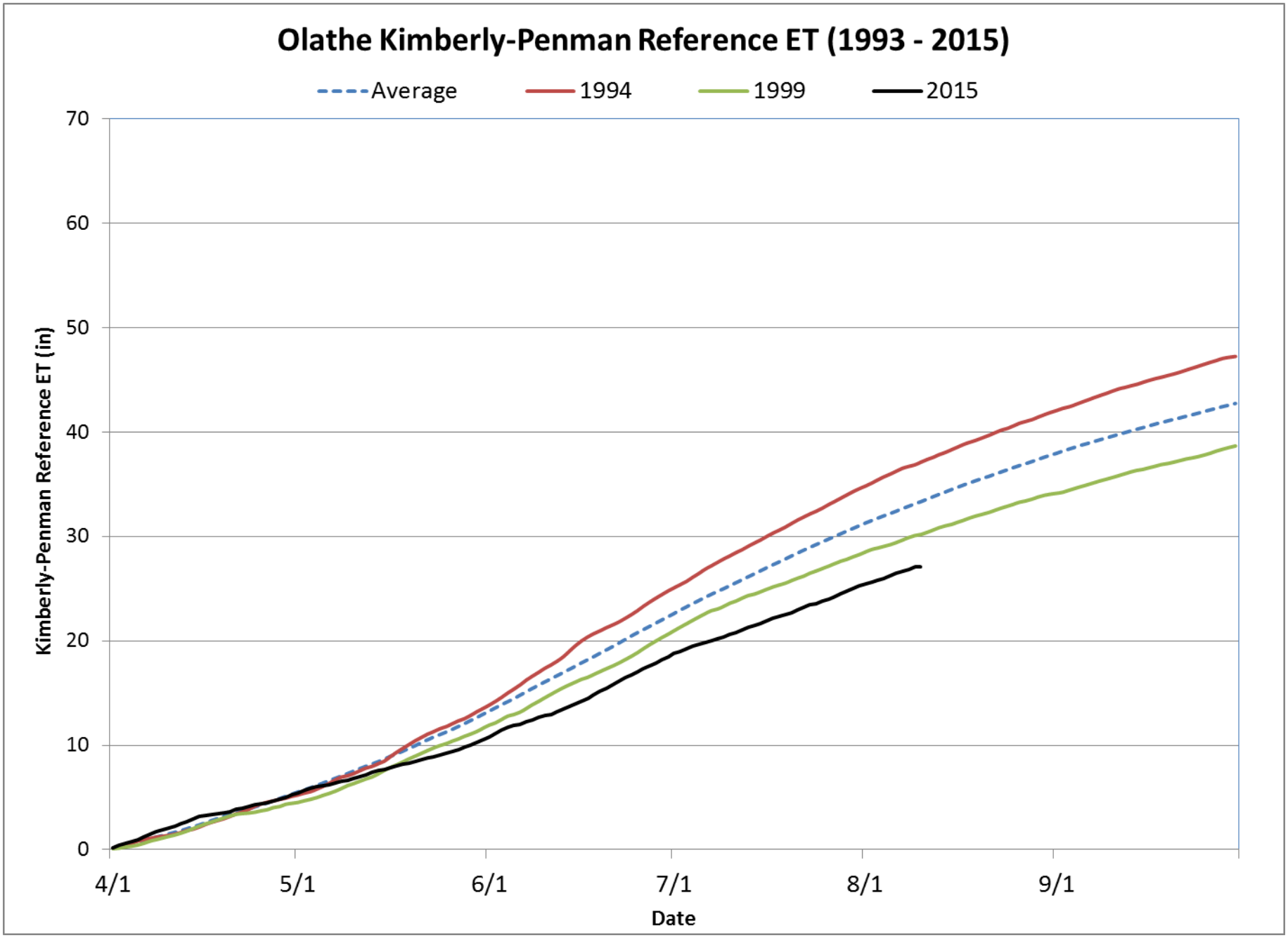

Grand Junction Daily Max/Min Temperature with Normals (Oct 1, 2014 - Present)
Max Temperature
Normal Max
Min Temperature
Normal Min
120
100
80
60
40
20
0
-20
Temperature (degrees F)
10/1/2014
11/1/2014
12/1/2014
1/1/2015
2/1/2015
3/1/2015
4/1/2015
5/1/2015
6/1/2015
7/1/2015
8/1/2015
Date

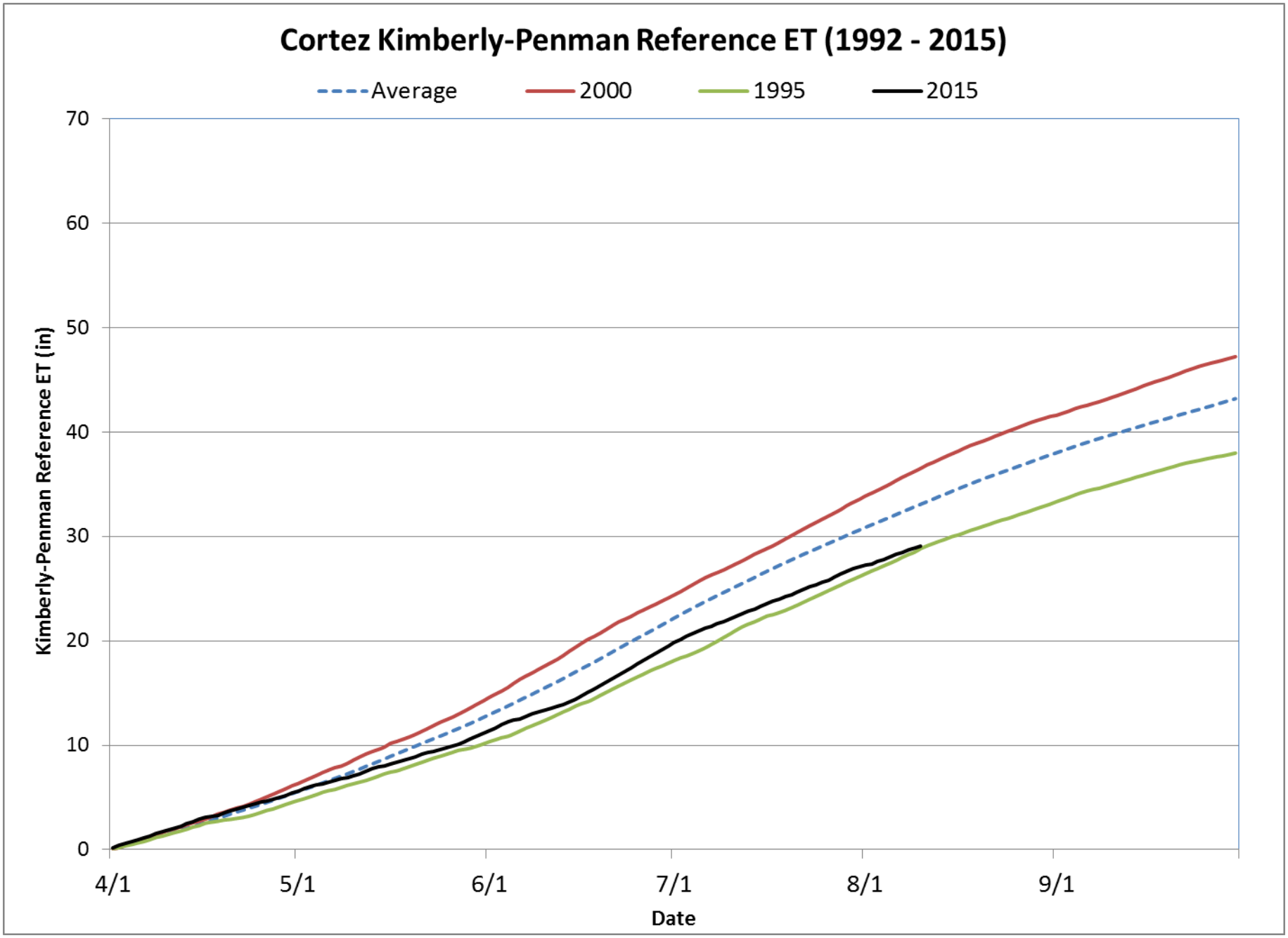
And there's more to the story
Did you notice the ET?

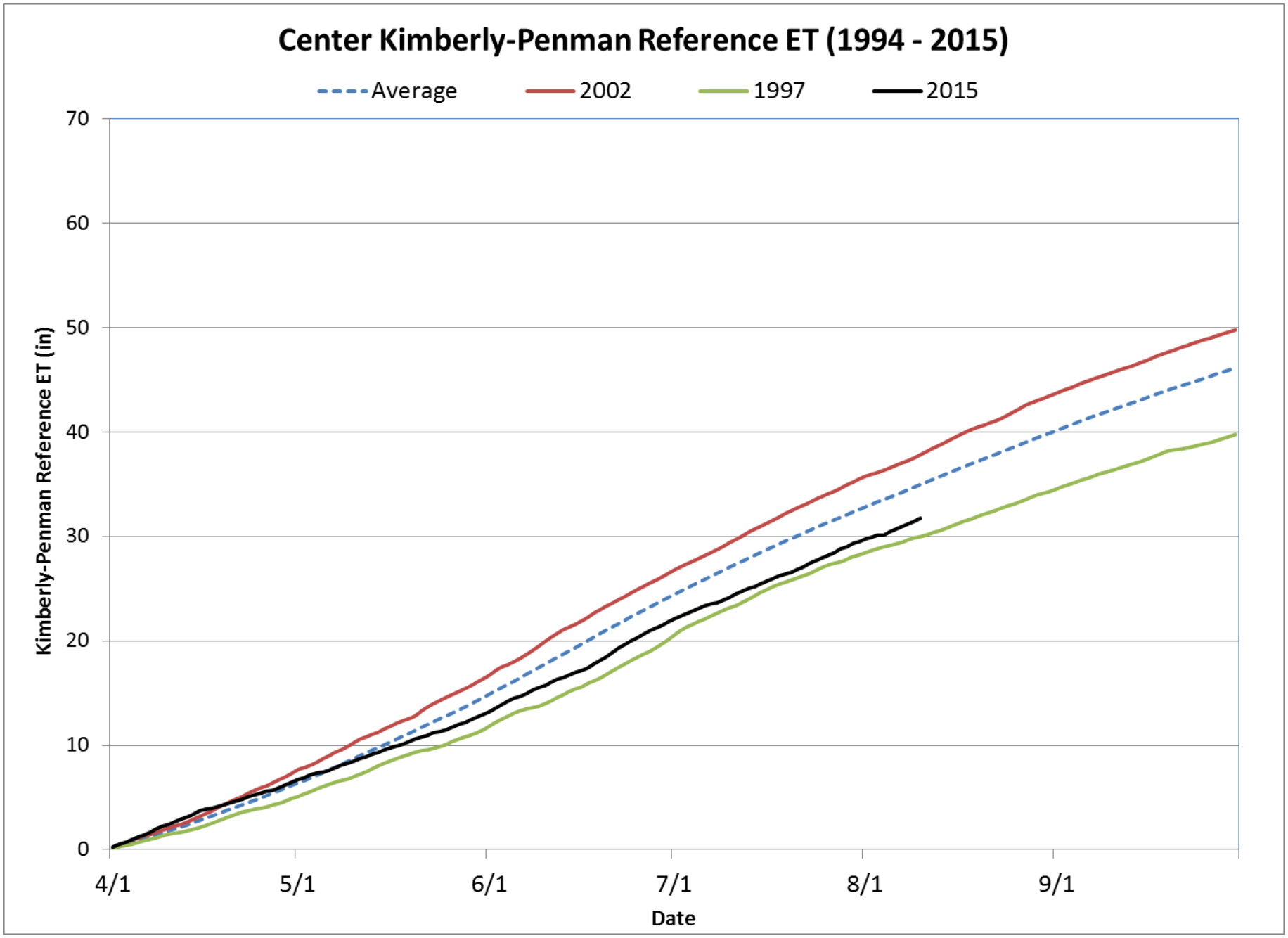
CSU's **Colorado Agricultural Meteorological Network "CoAgMet"**

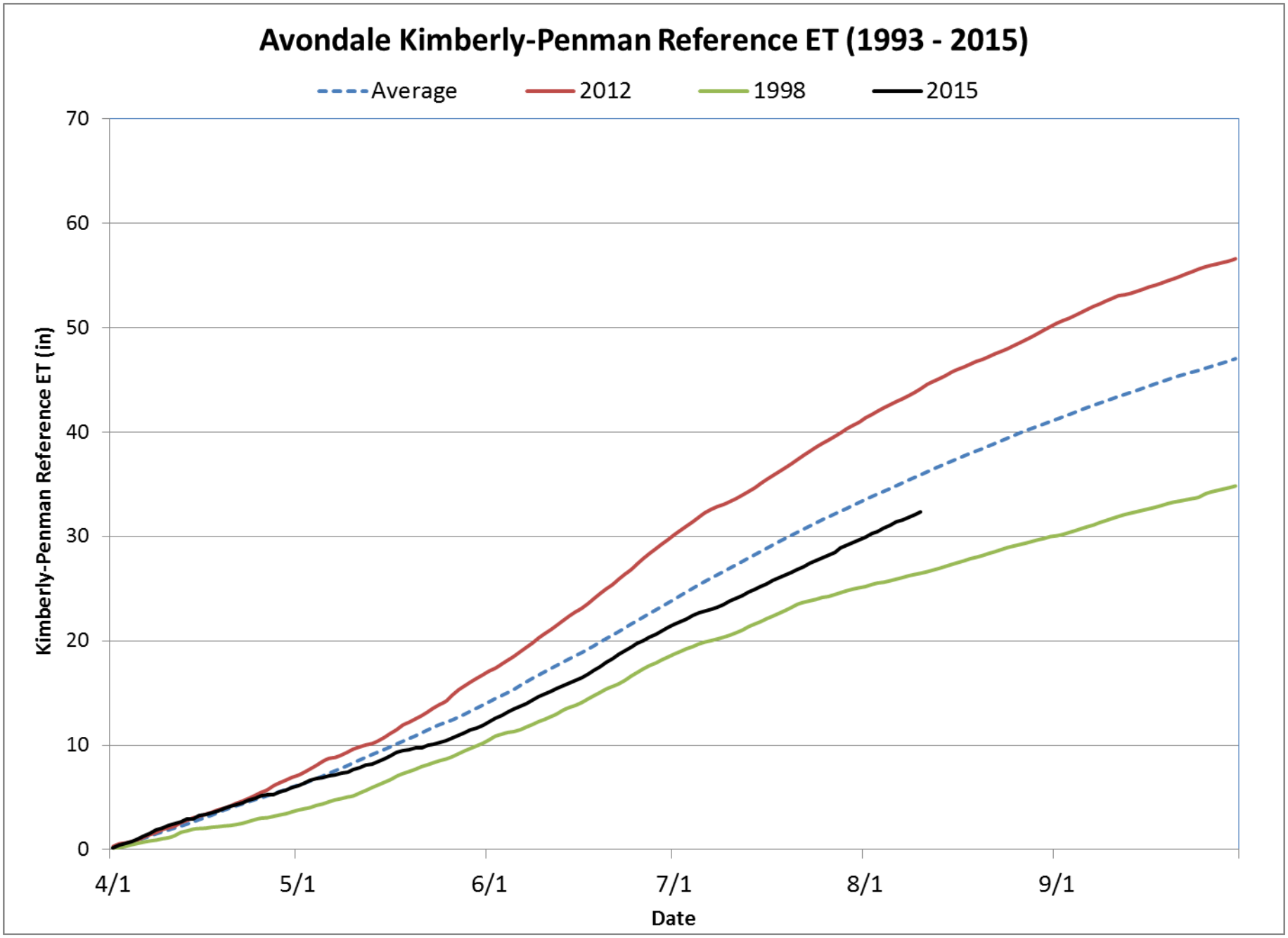


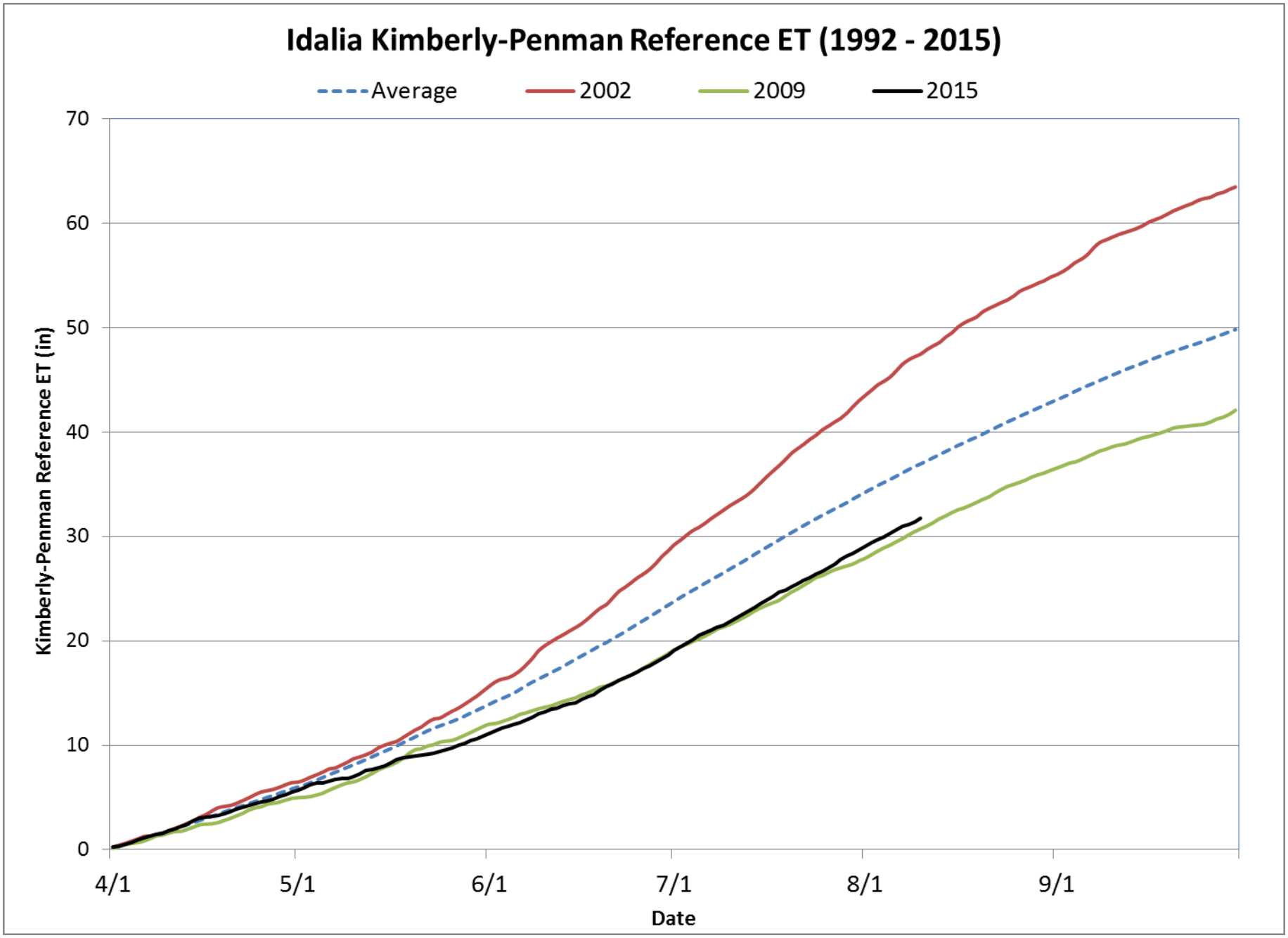
THANKS!! to those of You who help support CoAgMet

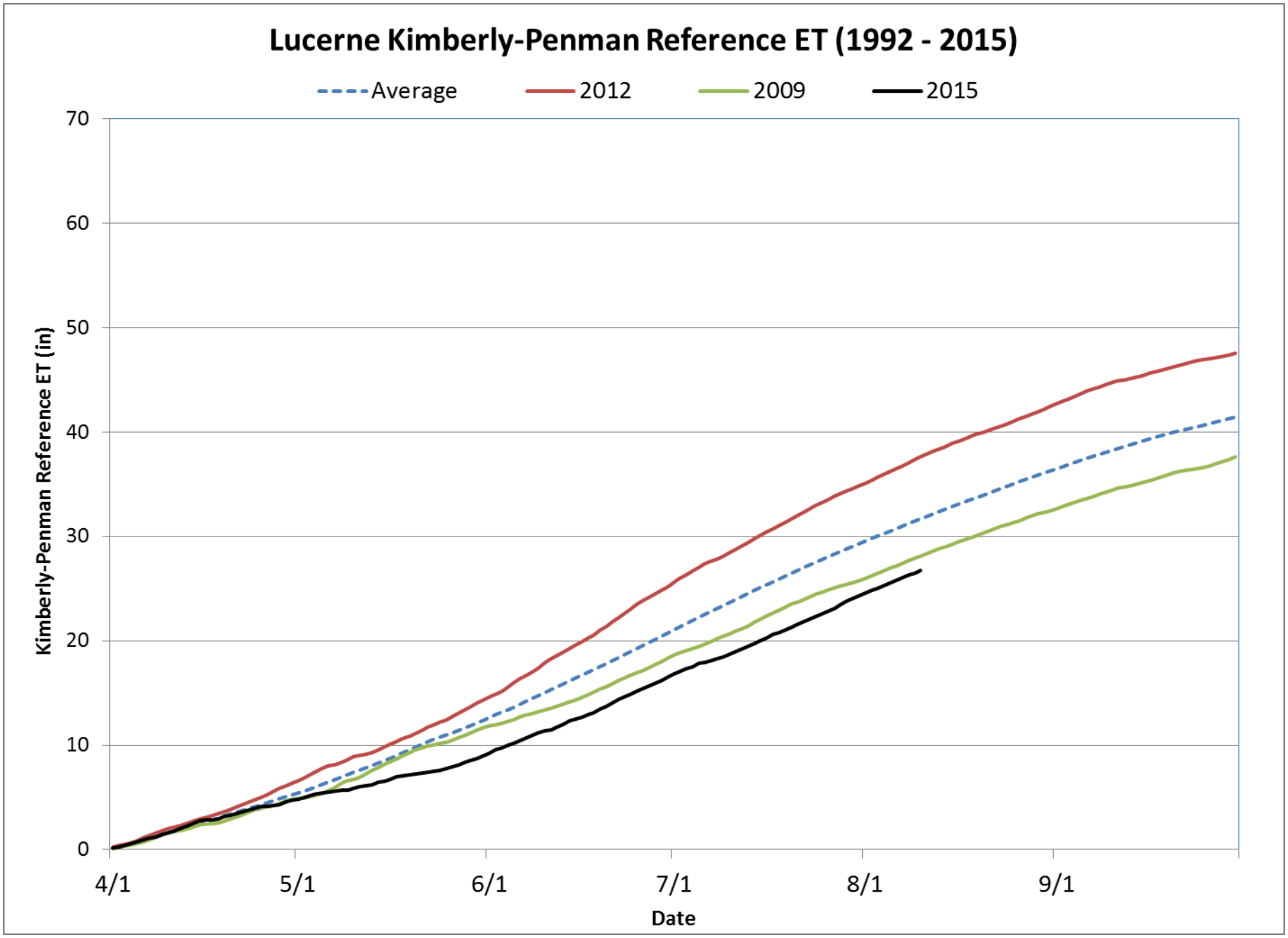

Olathe Kimberly-Penman Reference ET (1993 - 2015)
Average
1994
1999
2015
70
60
50
40
30
20
10
0
Kimberly-Penman Reference ET (in)
4/1
5/1
6/1
7/1
8/1
9/1
Date


Cortez Kimberly-Penman Reference ET (1992 - 2015)
Average
2000
1995
2015
70
60
50
40
30
20
10
0
Kimberly-Penman Reference ET (in)
4/1
5/1
6/1
7/1
8/1
9/1
Date


Center Kimberly-Penman Reference ET (1994 - 2015)
Average
2002
1997
2015
70
60
50
40
30
20
10
0
Kimberly-Penman Reference ET (in)
4/1
5/1
6/1
7/1
8/1
9/1
Date

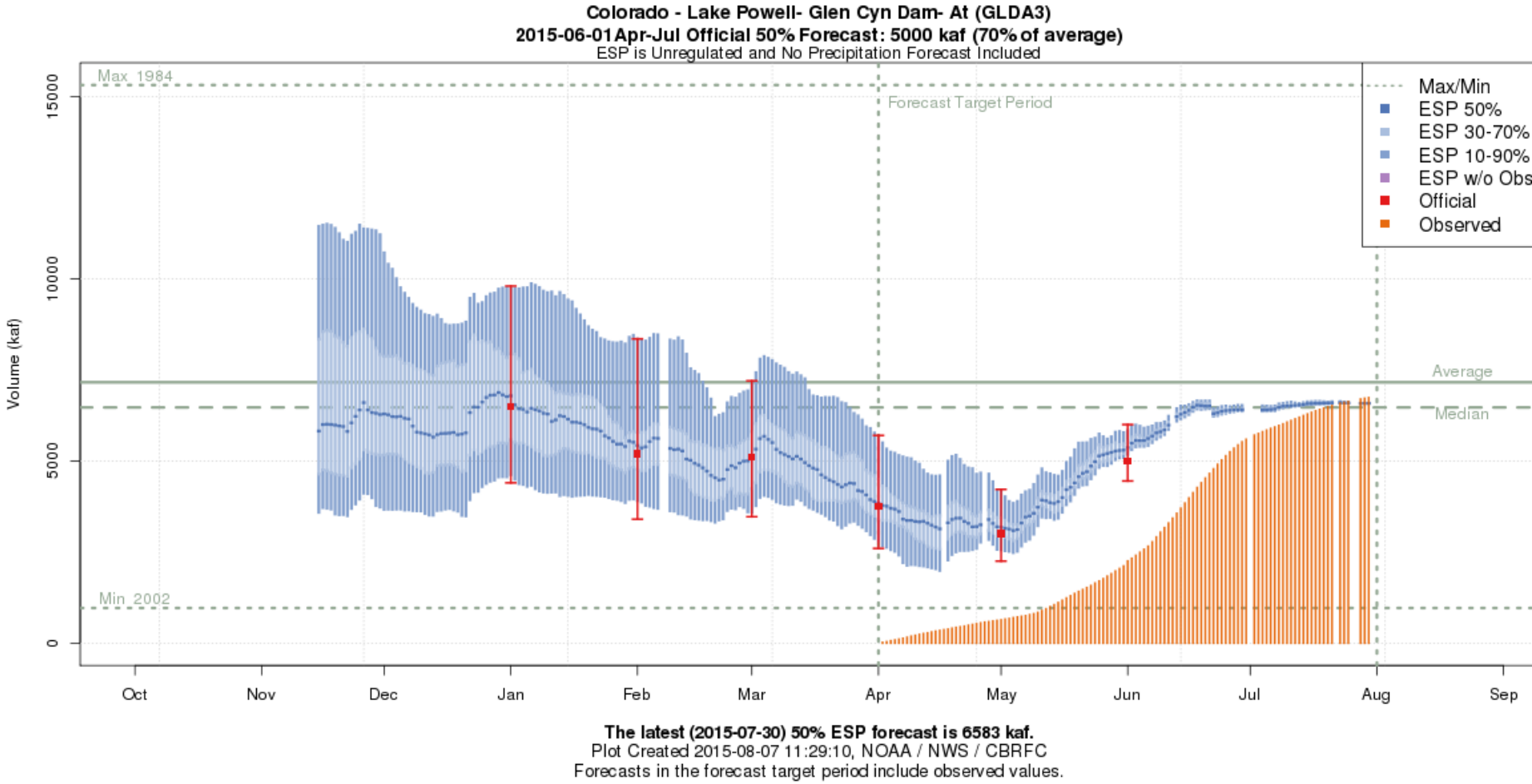

Avondale Kimberly-Penman Reference ET (1993 - 2015)
Average
2012
1998
2015
70
60
50
40
30
20
10
0
Kimberly-Penman Reference ET (in)
4/1
5/1
6/1
7/1
8/1
9/1
Date

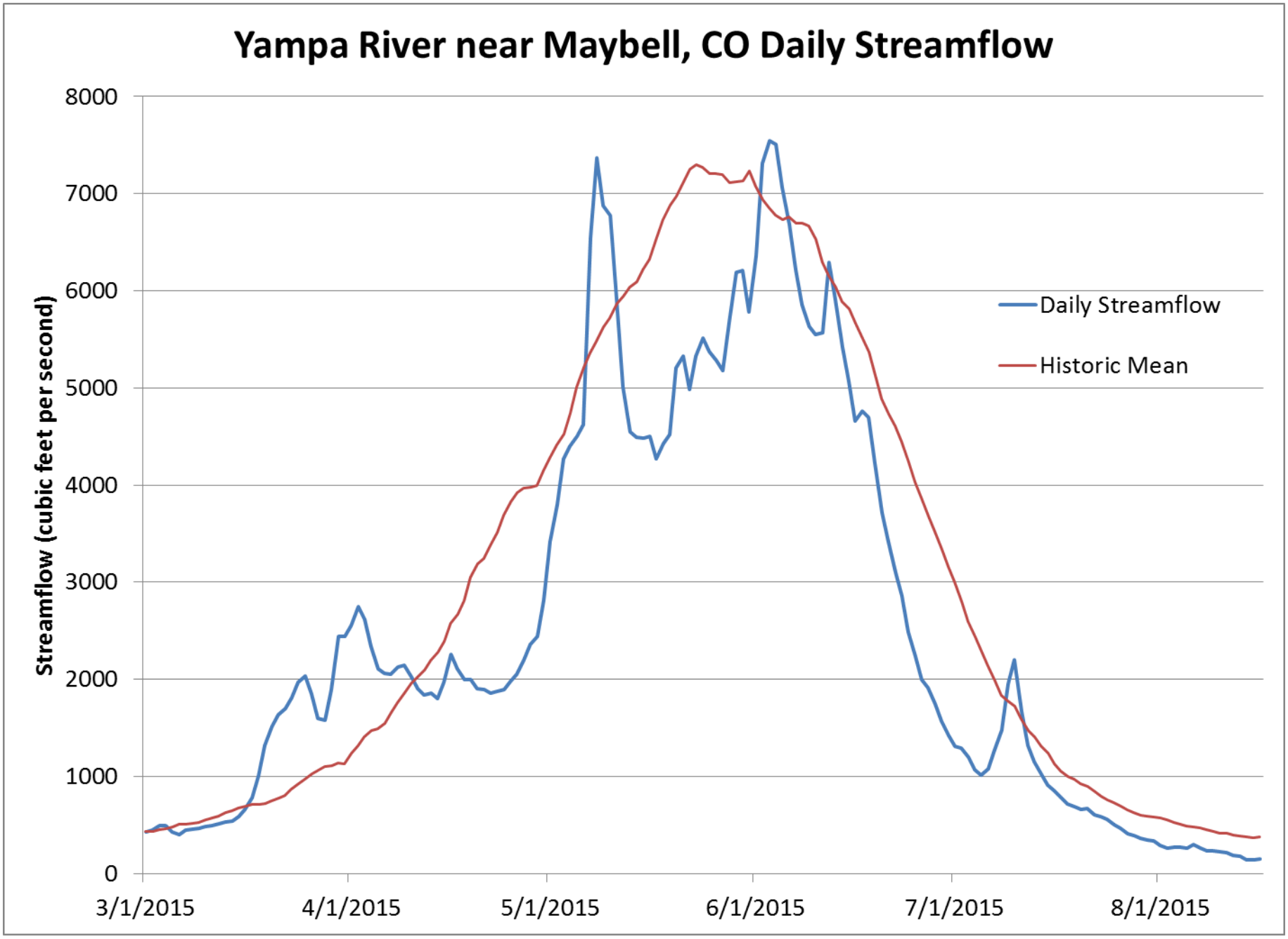

Idalia Kimberly-Penman Reference ET (1992 - 2015)
Average
2002
2009
2015
70
60
50
40
30
20
10
0
Kimberly-Penman Reference ET (in)
4/1
5/1
6/1
7/1
8/1
9/1
Date

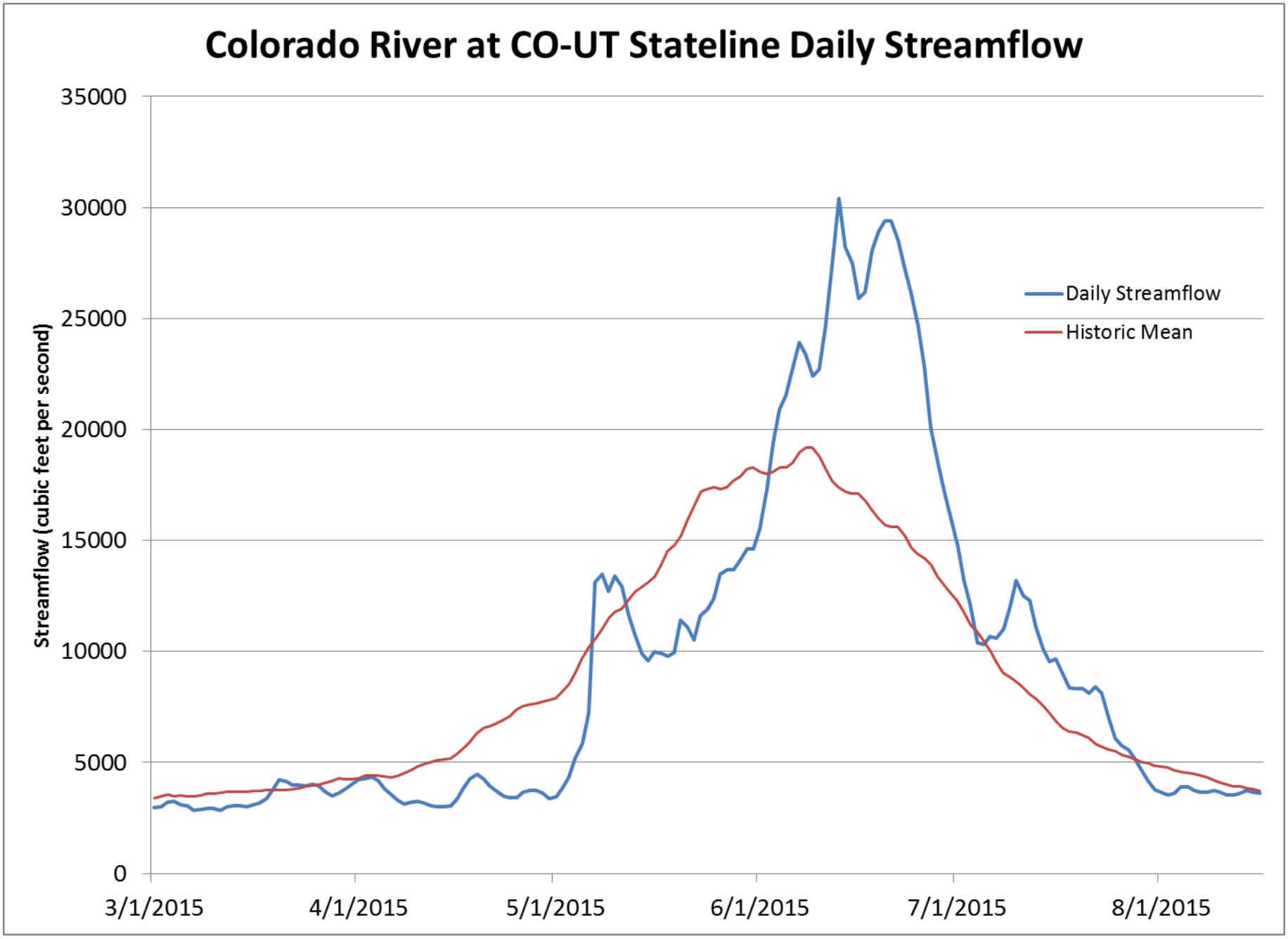

Lucerne Kimberly-Penman Reference ET (1992 - 2015)
Average
2012
2009
2015
70
60
50
40
30
20
10
0
Kimberly-Penman Reference ET (in)
4/1
5/1
6/1
7/1
8/1
9/1
Date

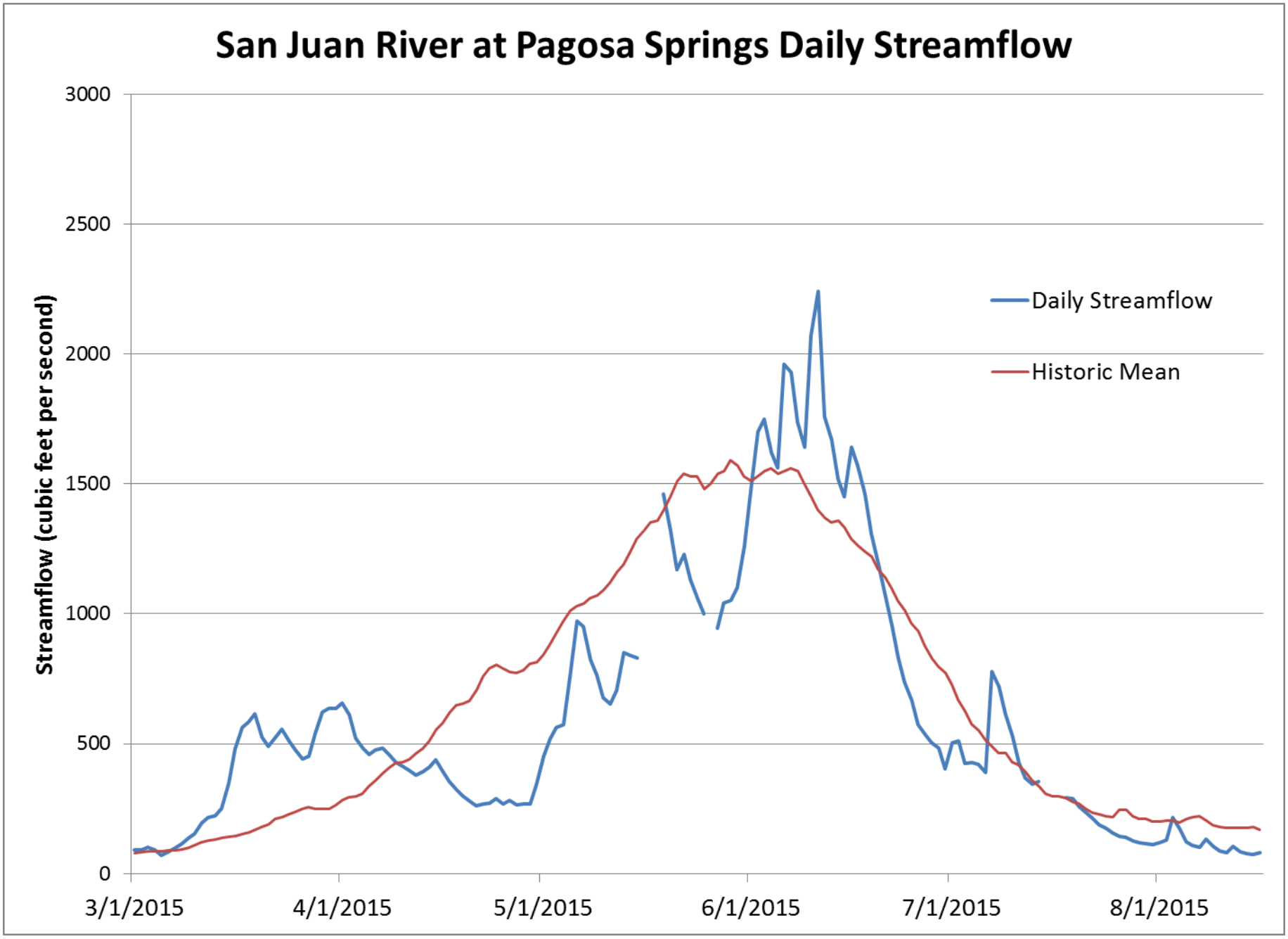
Streamflow

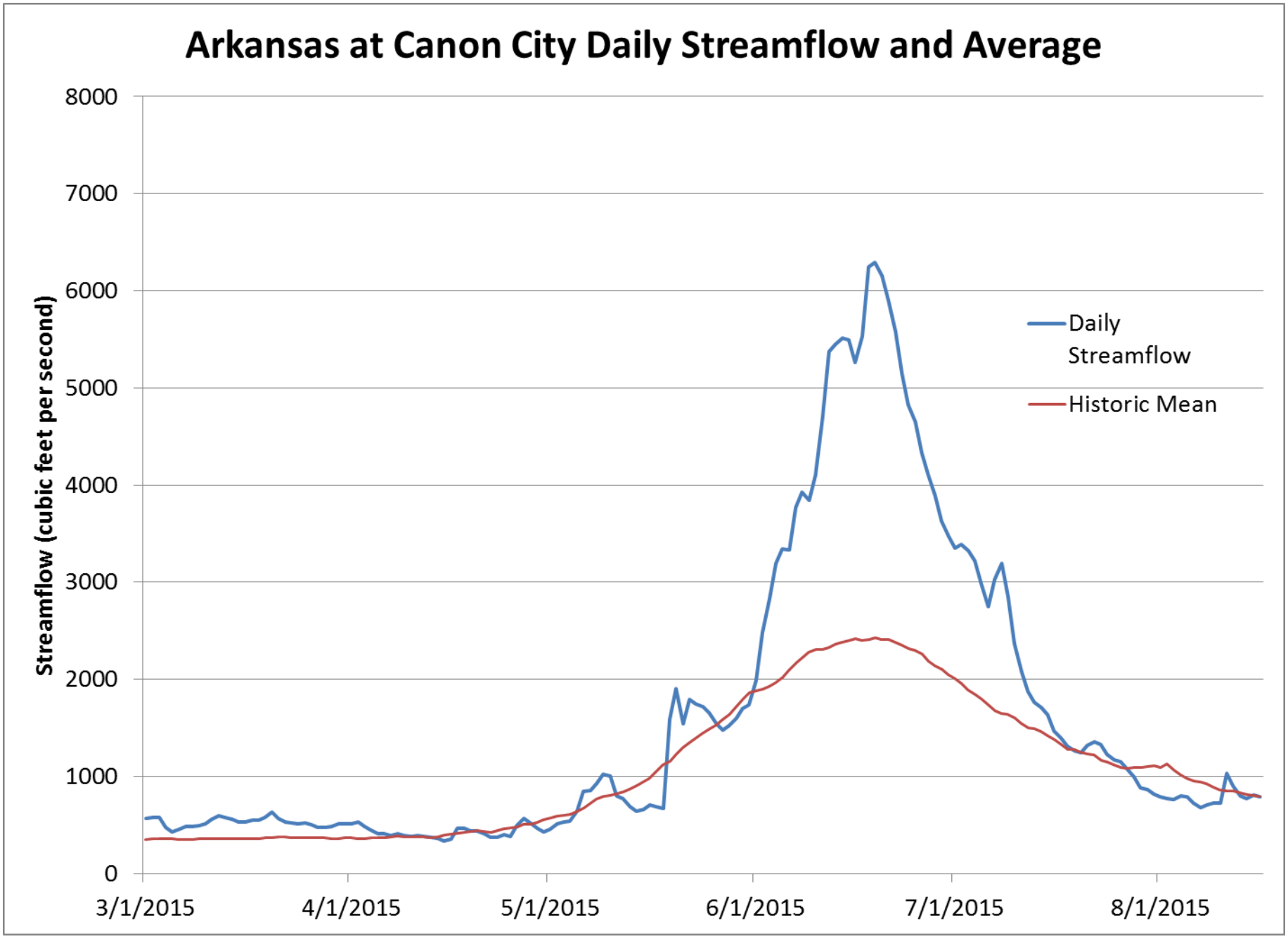
The great "integrator" of the water budget


Colorado - Lake Powell- Glen Cyn Dam- At (GLDA3)
2015-06-01 Apr-Jul Official 50% Forecast: 5000 kaf (70% of average)
ESP is Unregulated and No Precipitation Forecast Included
Max 1984
Min 2002
Forecast Target Period
Average
Median
Max/Min
ESP 50%
ESP 30-70%
ESP 10-90%
ESP w/o Obs
Official
Observed
Volume (kaf)
0
5000
10000
15000
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
The latest (2015-07-30) 50% ESP forecast is 6583 kaf.
Plot Created 2015-08-07 11:29:10, NOAA / NWS / CBRFC
Forecasts in the forecast target period include observed values.


Yampa River near Maybell, CO Daily Streamflow
Streamflow (cubic feet per second)
8000
7000
6000
5000
4000
3000
2000
1000
0
3/1/2015
4/1/2015
5/1/2015
6/1/2015
7/1/2015
8/1/2015
Daily Streamflow
Historic Mean


Colorado River at CO-UT Stateline Daily Streamflow
Streamflow (cubic feet per second)
35000
30000
25000
20000
15000
10000
5000
0
3/1/2015
4/1/2015
5/1/2015
6/1/2015
7/1/2015
8/1/2015
Daily Streamflow
Historic Mean


San Juan River at Pagosa Springs Daily Streamflow
Streamflow (cubic feet per second)
3000
2500
2000
1500
1000
500
0
3/1/2015
4/1/2015
5/1/2015
6/1/2015
7/1/2015
8/1/2015
Daily Streamflow
Historic Mean

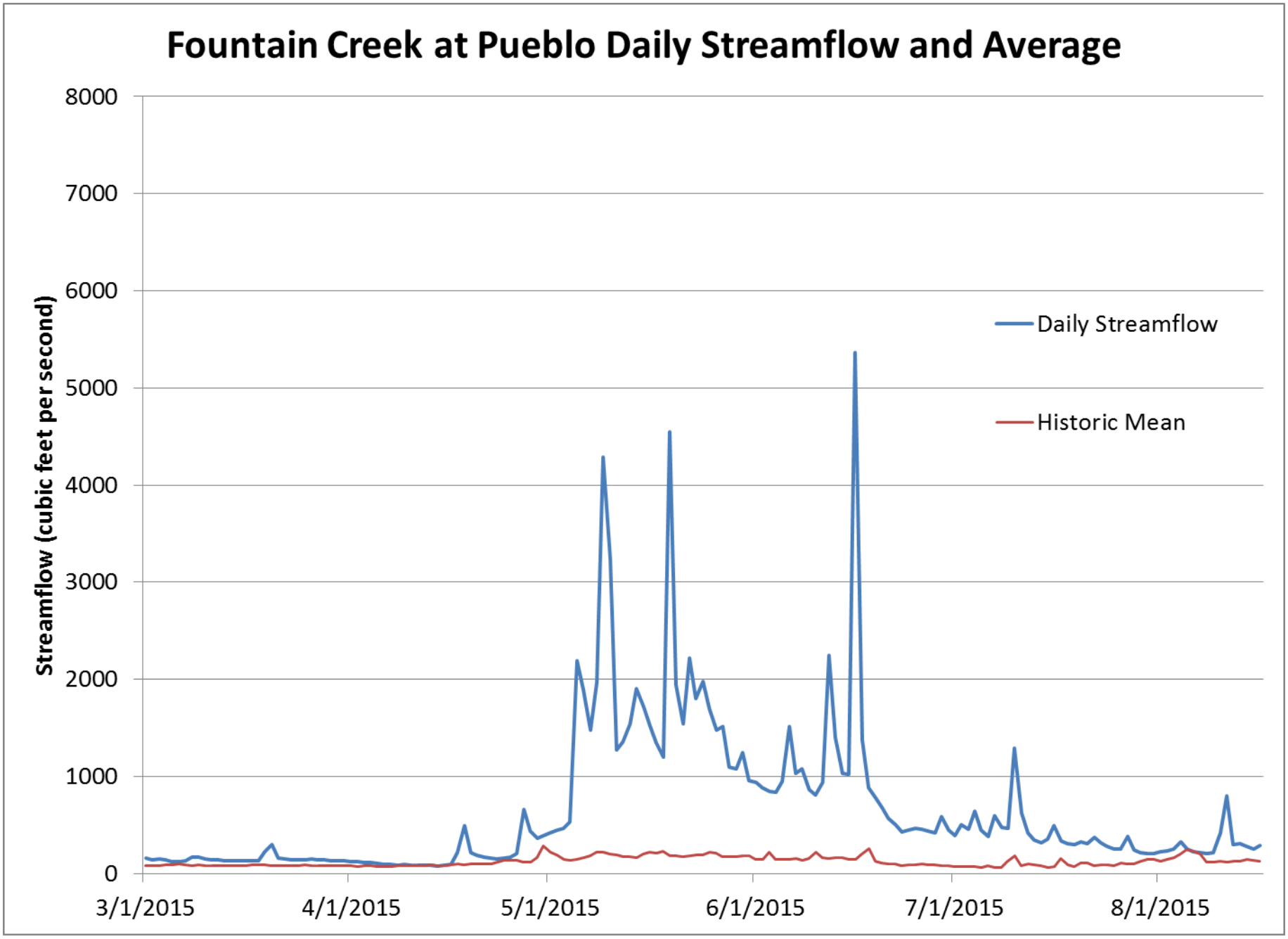

Arkansas at Canon City Daily Streamflow and Average
Streamflow (cubic feet per second)
8000
7000
6000
5000
4000
3000
2000
1000
0
3/1/2015
4/1/2015
5/1/2015
6/1/2015
7/1/2015
8/1/2015
Daily Streamflow
Historic Mean

And the South Platte

Was a big River

For a long time

And maybe oddest of all –
Fountain Creek

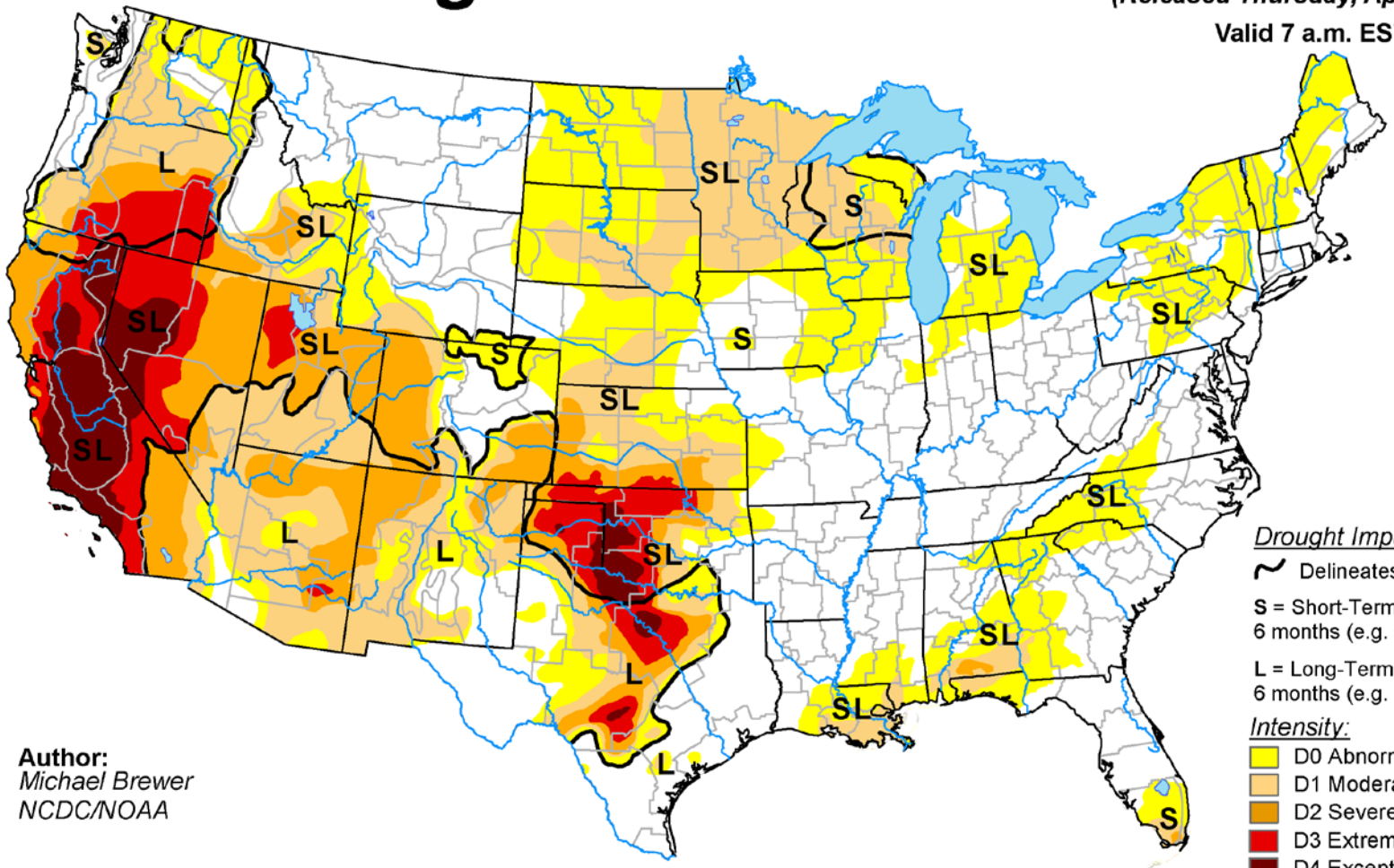

Fountain Creek at Pueblo Daily Streamflow and Average
Streamflow (cubic feet per second)
8000
7000
6000
5000
4000
3000
2000
1000
0
3/1/2015
4/1/2015
5/1/2015
6/1/2015
7/1/2015
8/1/2015
Daily Streamflow
Historic Mean

U.S. Drought Monitor

April 7, 2015

(Released Thursday, Apr. 9, 2015)

Valid 7 a.m. EST



Author:
Michael Brewer
NCDC/NOAA

Drought Impact Types:

~ Delineates dominant impacts

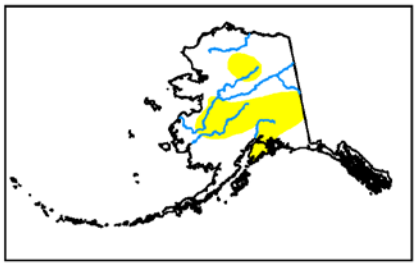
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

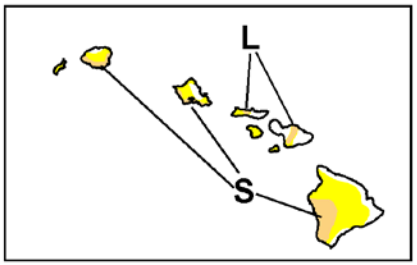
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

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.





USDA National Drought Mitigation Center

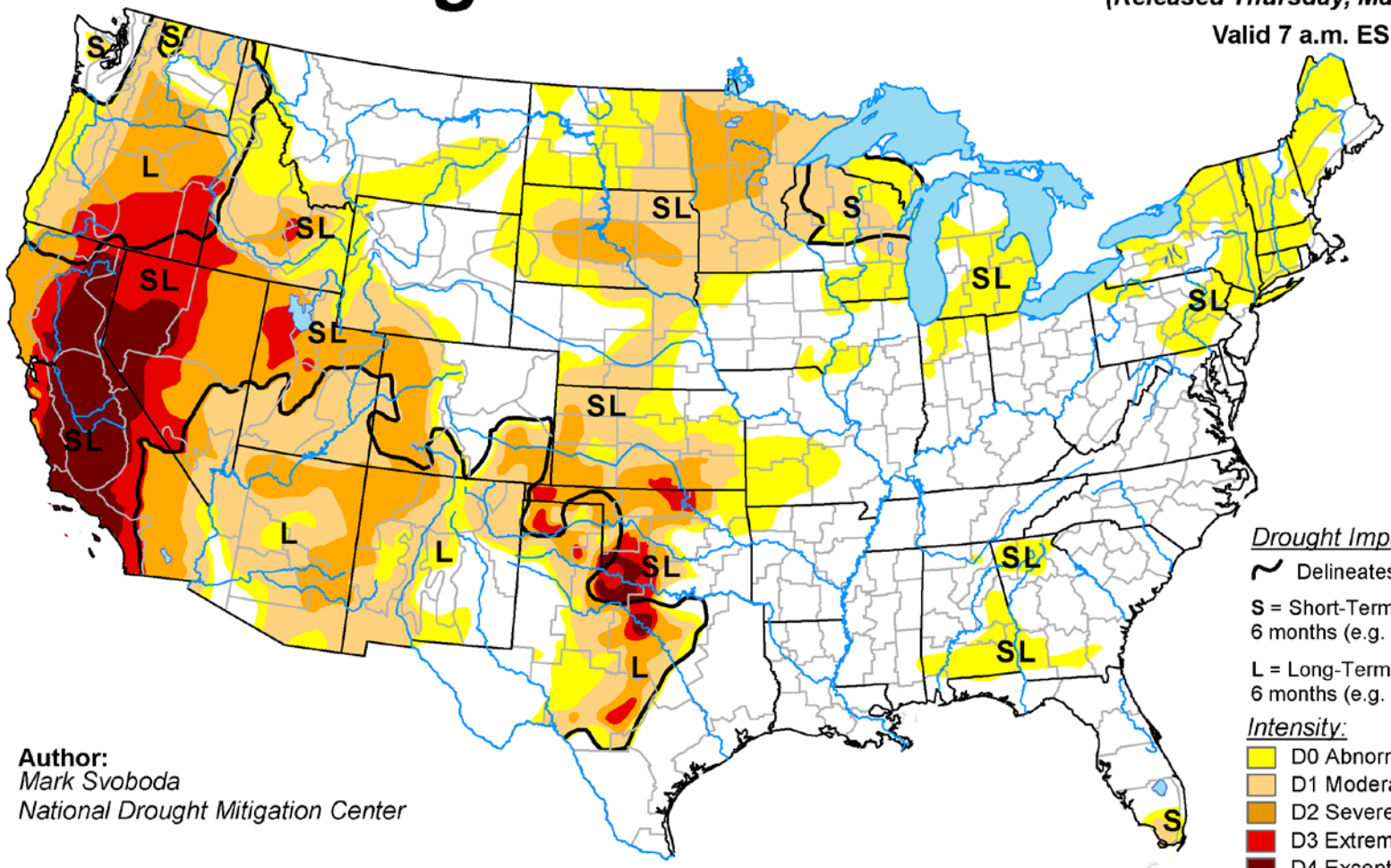
http://droughtmonitor.unl.edu/

U.S. Drought Monitor

May 5, 2015

(Released Thursday, May. 7, 2015)

Valid 7 a.m. EST



Author:
Mark Svoboda
National Drought Mitigation Center

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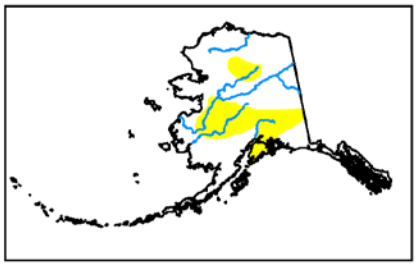
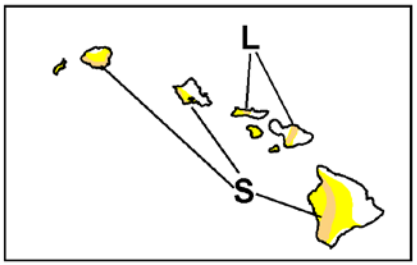
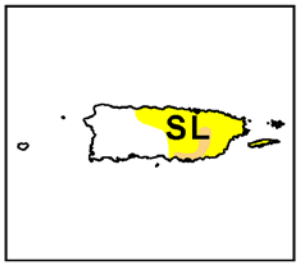






USDA National Drought Mitigation Center

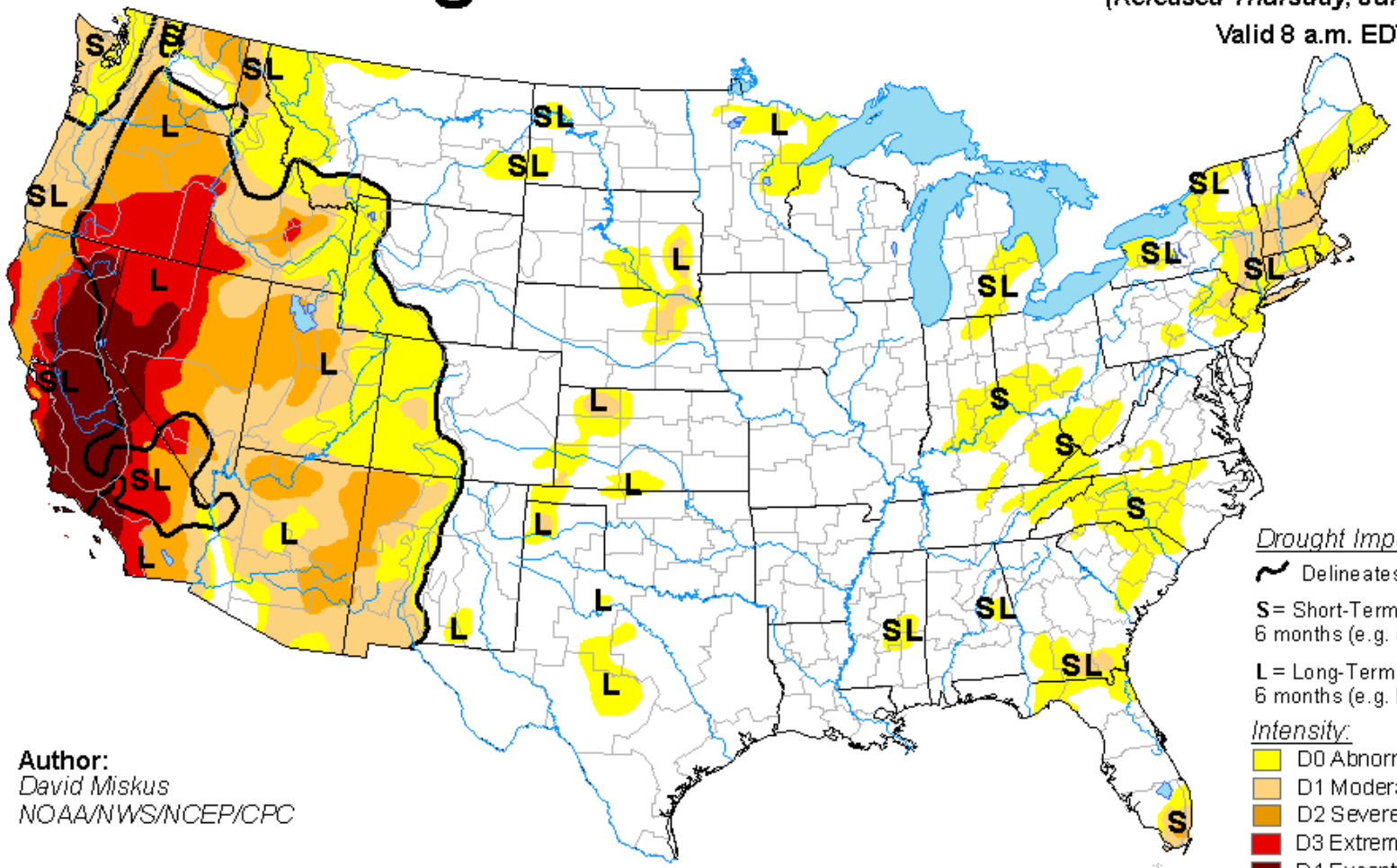
http://droughtmonitor.unl.edu/

U.S. Drought Monitor

June 9, 2015

(Released Thursday, Jun. 11, 2015)

Valid 8 a.m. EDT



Author:
David Miskus
NOAA/NWS/NCEP/CPC

Drought Impact Types:

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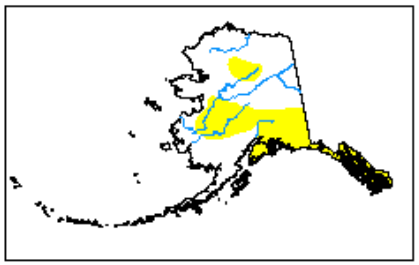
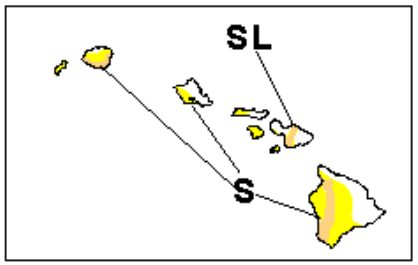
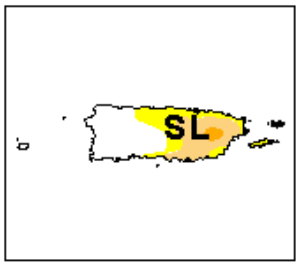






USDA National Drought Mitigation Center

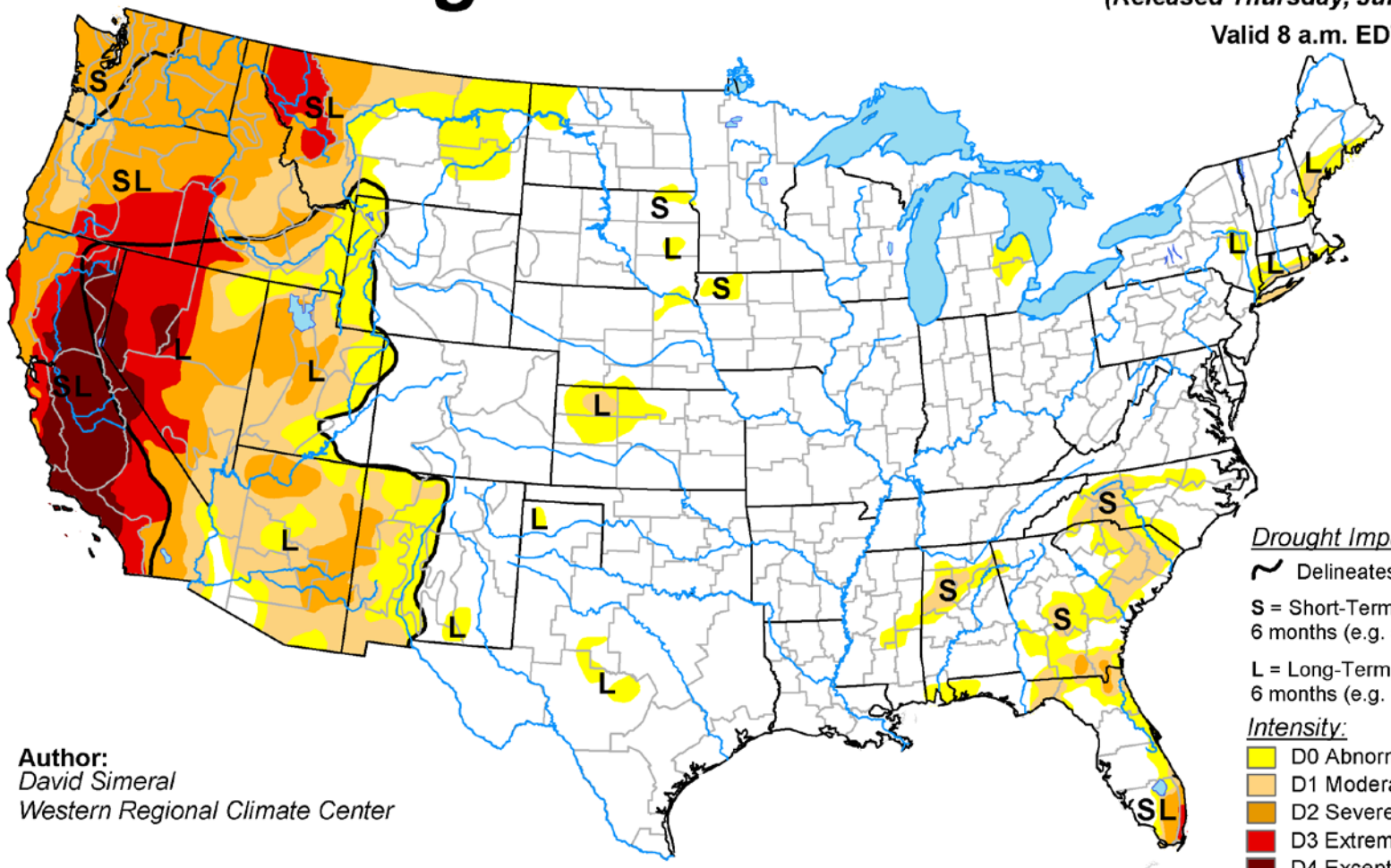
http://droughtmonitor.unl.edu/

U.S. Drought Monitor

July 14, 2015

(Released Thursday, Jul. 16, 2015)

Valid 8 a.m. EDT



Author:
David Simeral
Western Regional Climate Center

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)

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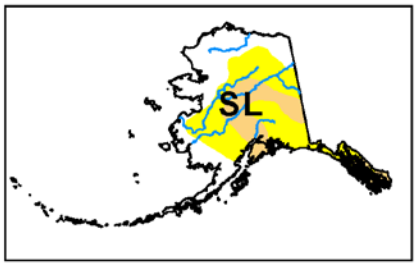
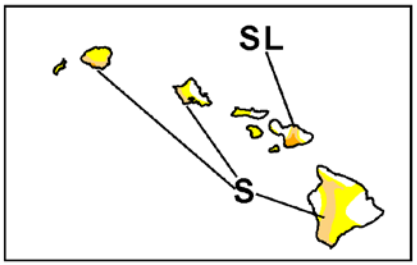
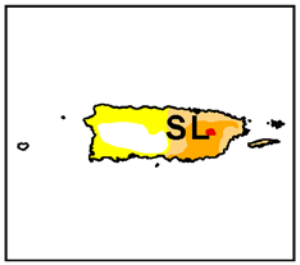






USDA National Drought Mitigation Center

http://droughtmonitor.unl.edu/

Ding, Dong, the Drought is Dead in Colorado, at least

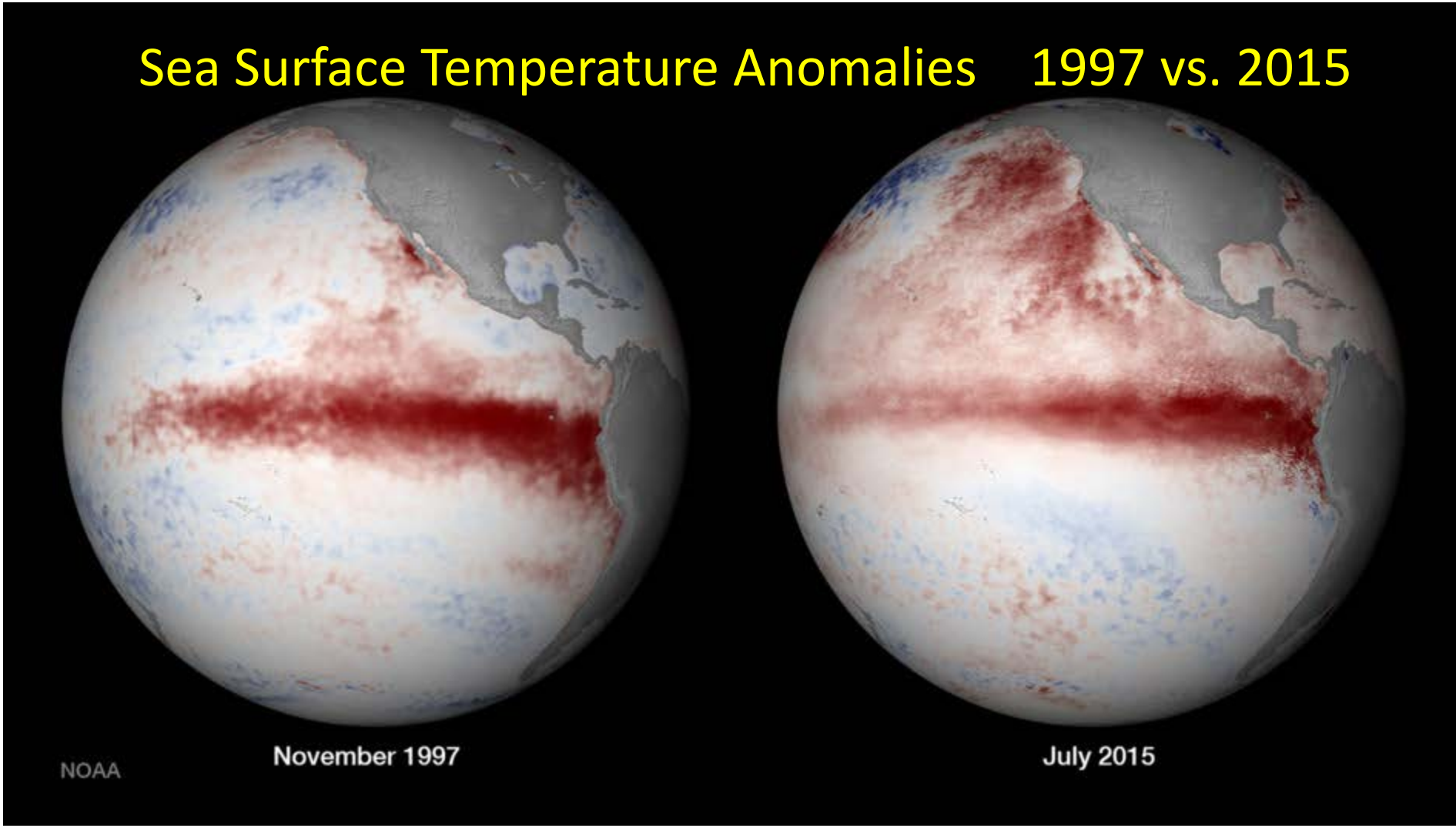
Thanks to our "Miracle May"

- **So now we can get ready for the next one**

Are you buried in information?

Or are you still digging for more?

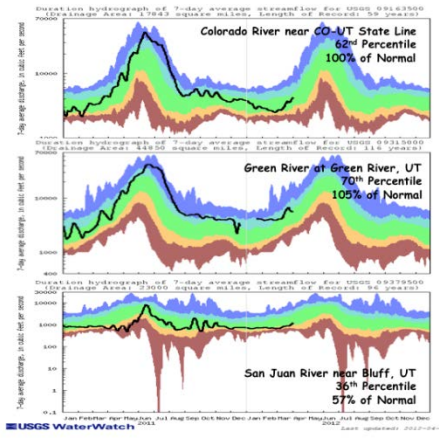
“Godzilla El Nino” says NASA

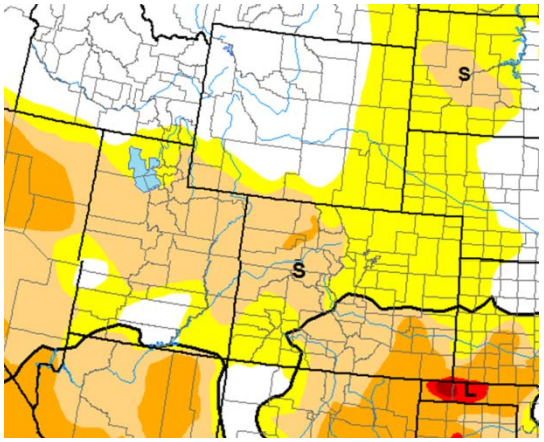


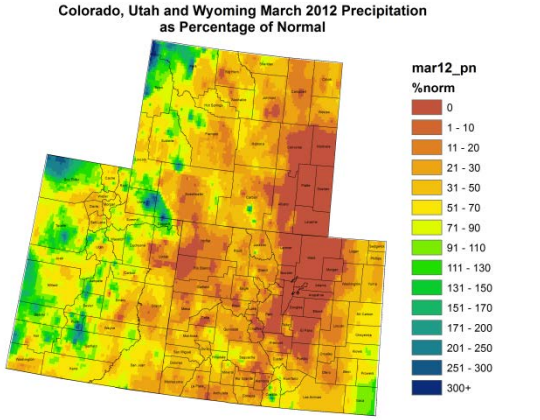
We’ll be watching how it plays out

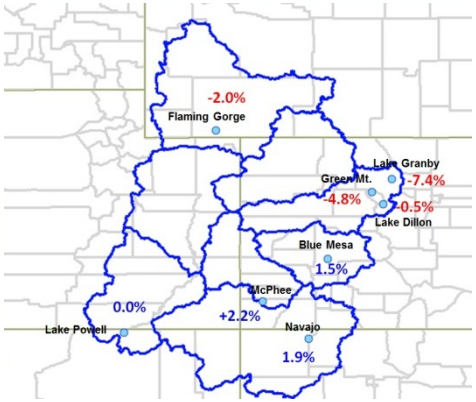
Weekly Climate Updates Available

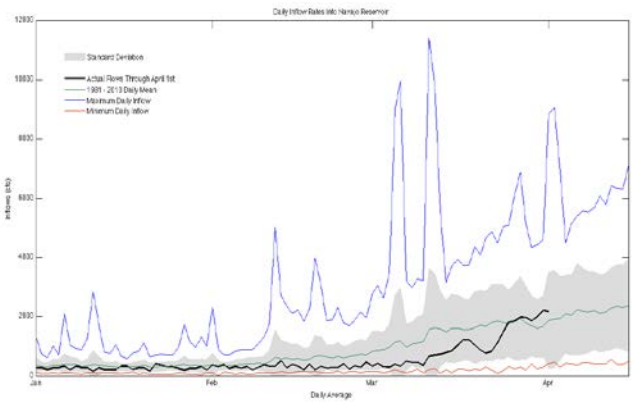
Upper Colorado Regional Drought Early Warning

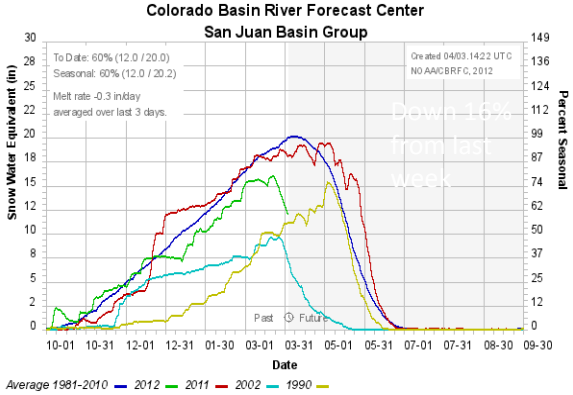












If you'd like to get a weekly update on current climate, water and drought conditions

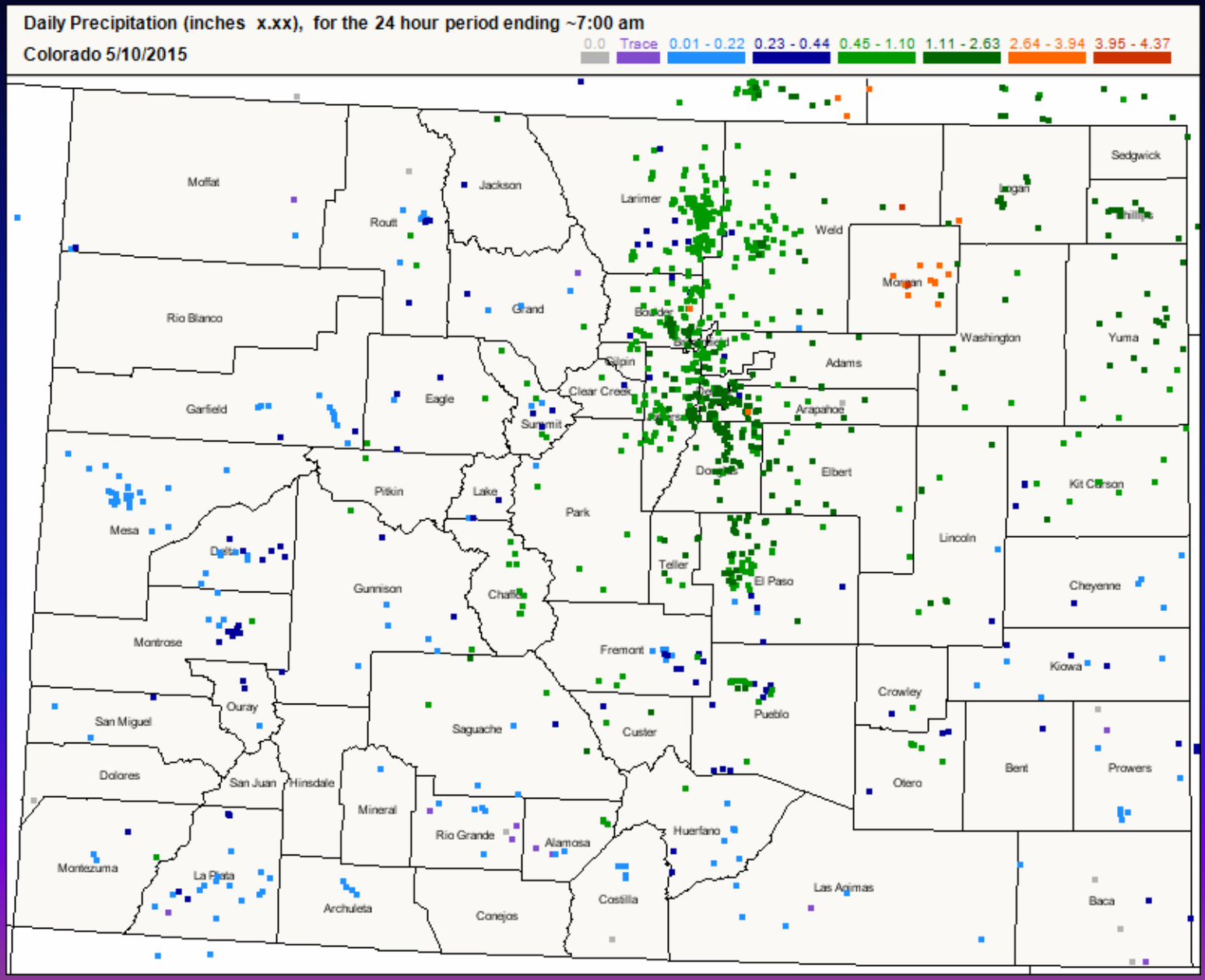
Please give me a business card or a note with your contact info today

If you are interested in weather and the variations in precipitation, please join the Community Collaborative Rain, Hail and Snow Network

http://www.cocorahs.org

or see me today

There's room for you in CoCoRaHS too



Please Help Us Monitor Precipitation

How did spring 2015 affect you and your water?

Let’s hear a few good water stories