



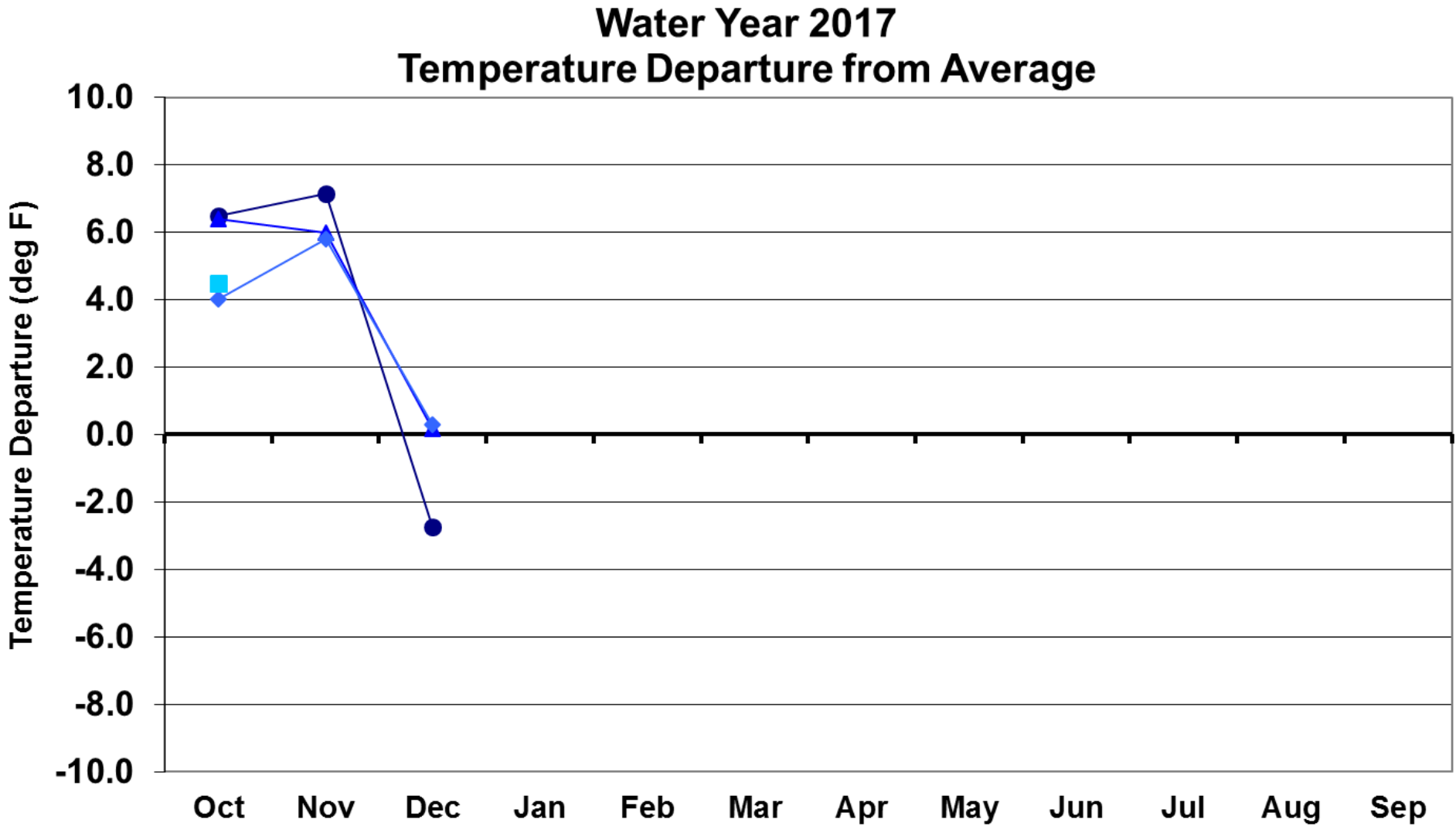
Climate Update



Nolan Doesken
Colorado Climate Center

Presented to
Water Availability Task Force
January 19, 2017
Denver, CO

Water Year 2017 Temperature Departures



● Eastern Plains

▲ Foothills

◆ Mountains

■ Western Valleys

Nov 2016 Average Temperature History for Colorado (NCEI)

Colorado, Average Temperature, November

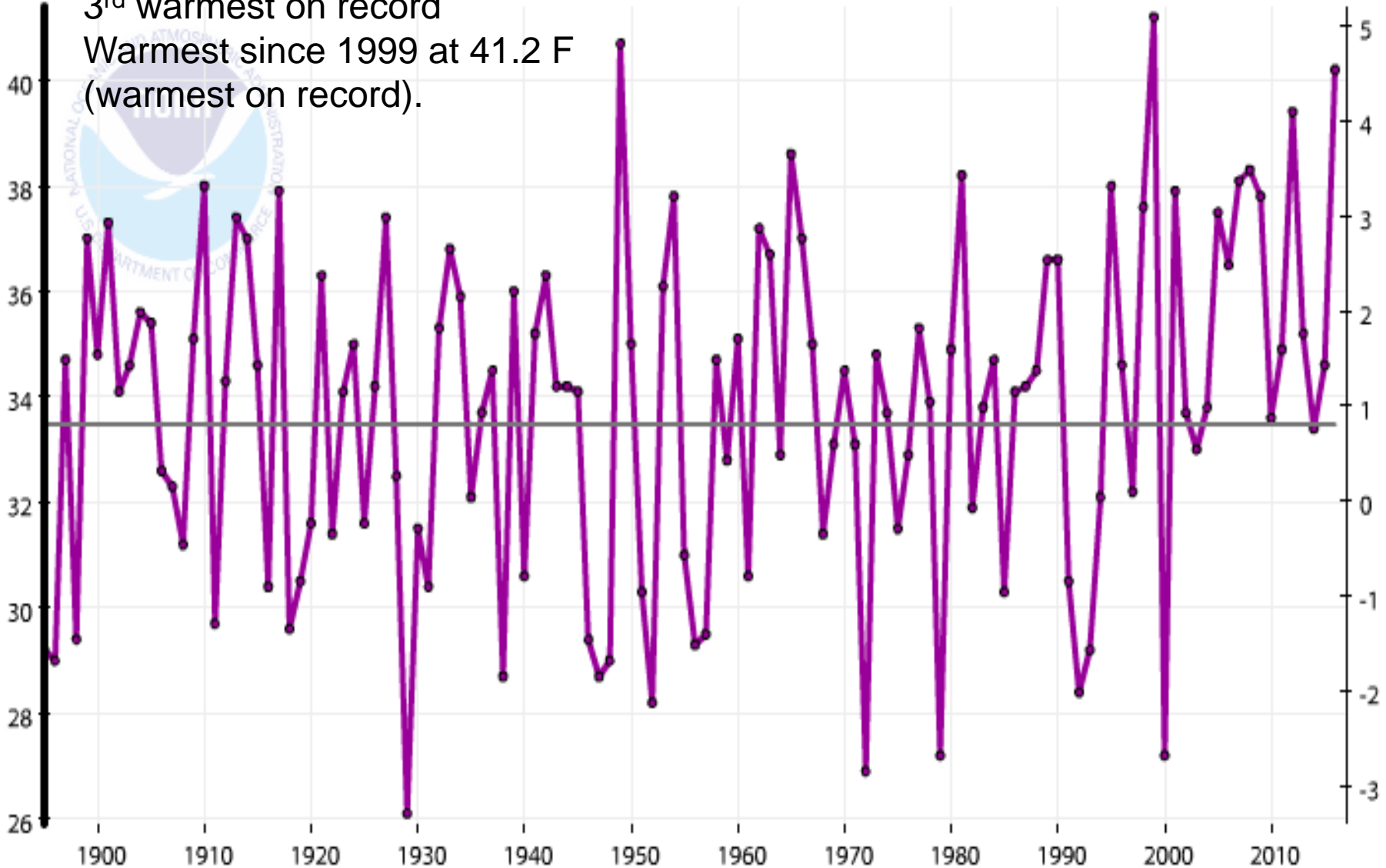
40.2 F (+6.7)

3rd warmest on record

Warmest since 1999 at 41.2 F
(warmest on record).

— 1901-2000
Mean: 33.5°F

● Avg Temperature



Dec 2016 Average Temperature History for Colorado (NCEI)

Colorado, Average Temperature, December

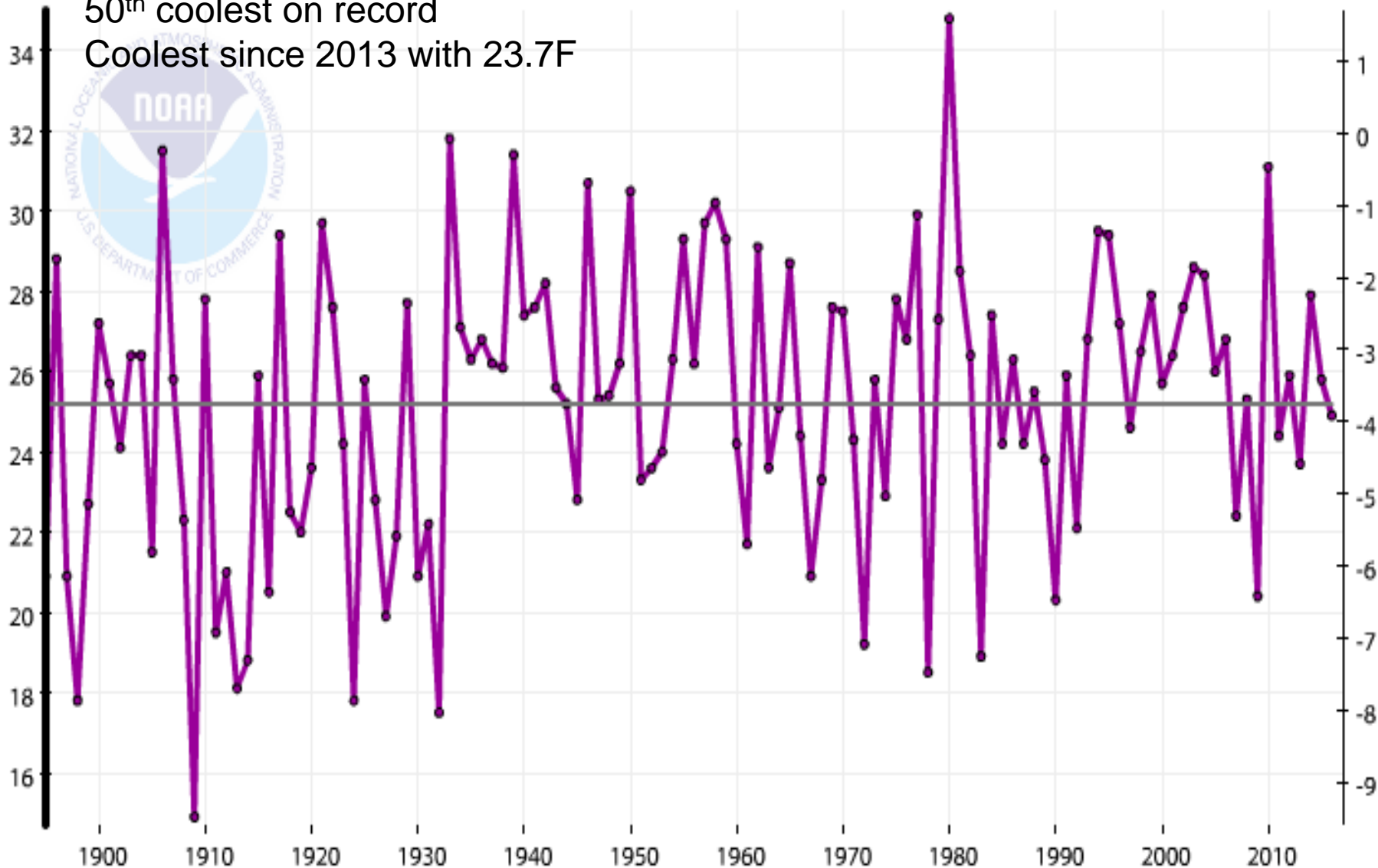
24.9 F (-0.3F)

50th coolest on record

Coollest since 2013 with 23.7F

— 1901-2000
Mean: 25.2°F

—●— Avg Temperature



2016 Average Temperature History for Colorado (NCEI)

Colorado, Average Temperature, January-December

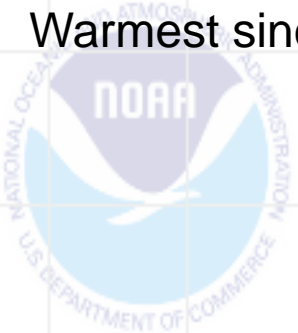
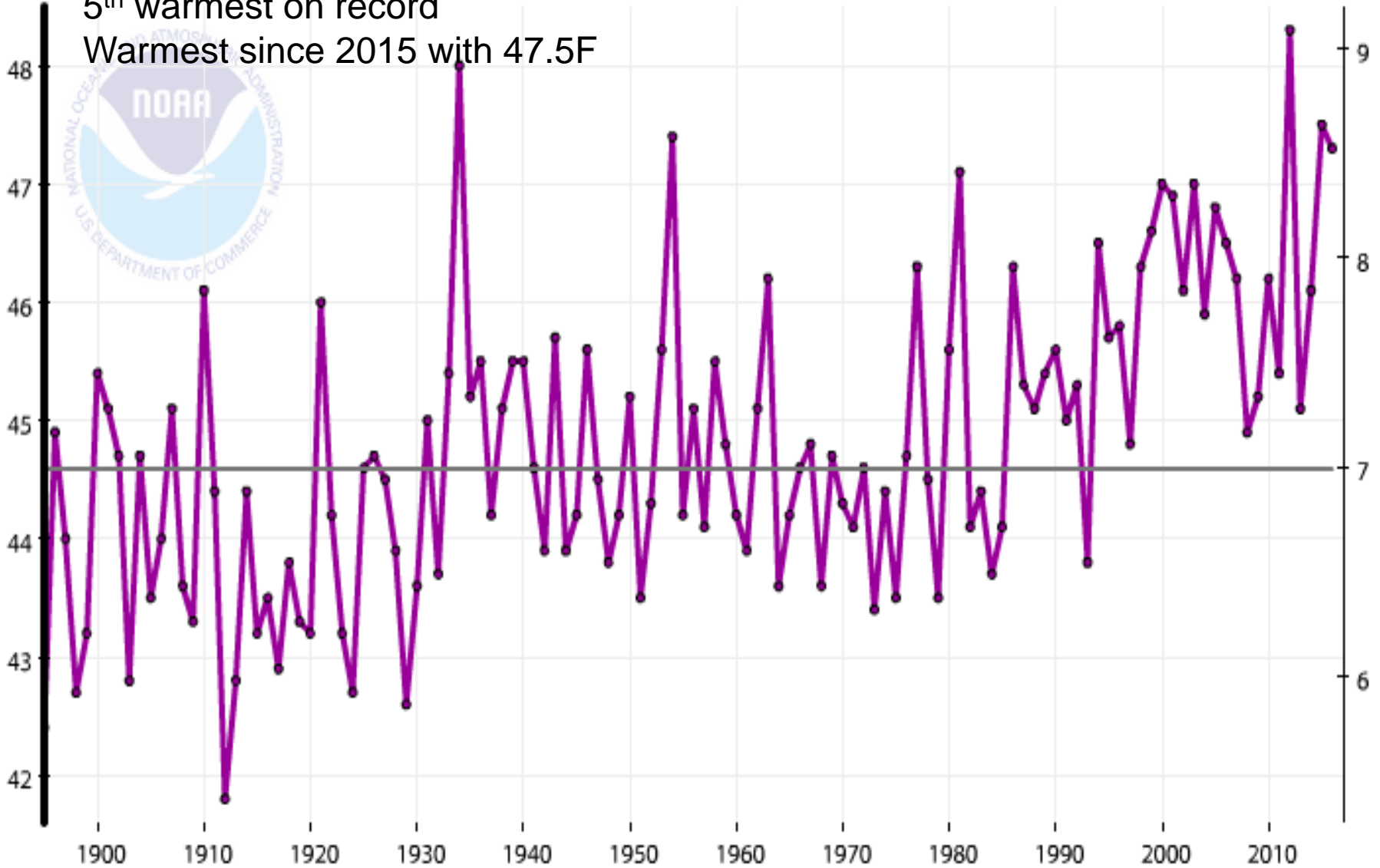
47.3 F (+2.7F)

5th warmest on record

Warmest since 2015 with 47.5F

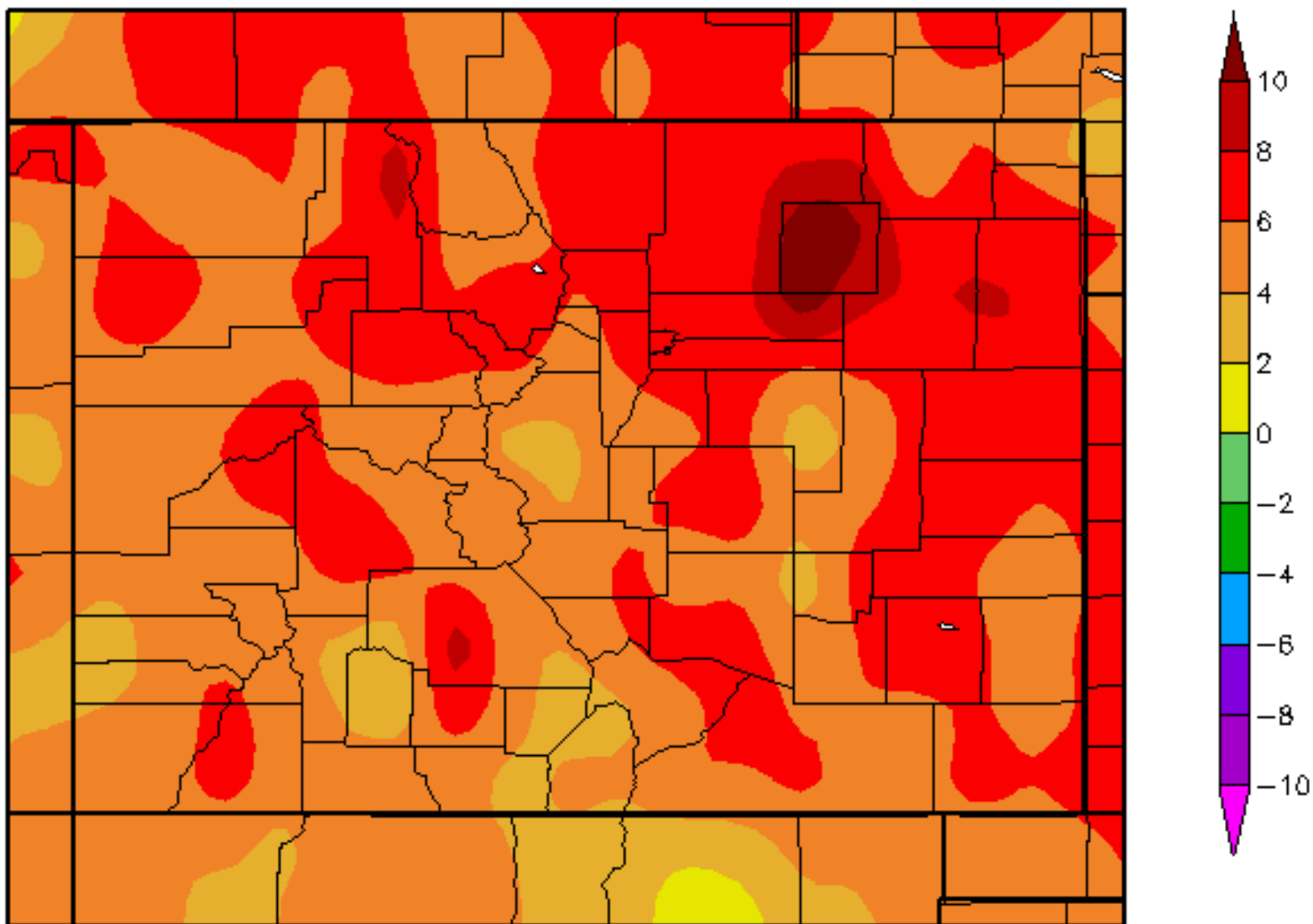
— 1901-2000
Mean: 44.6°F

● Avg Temperature



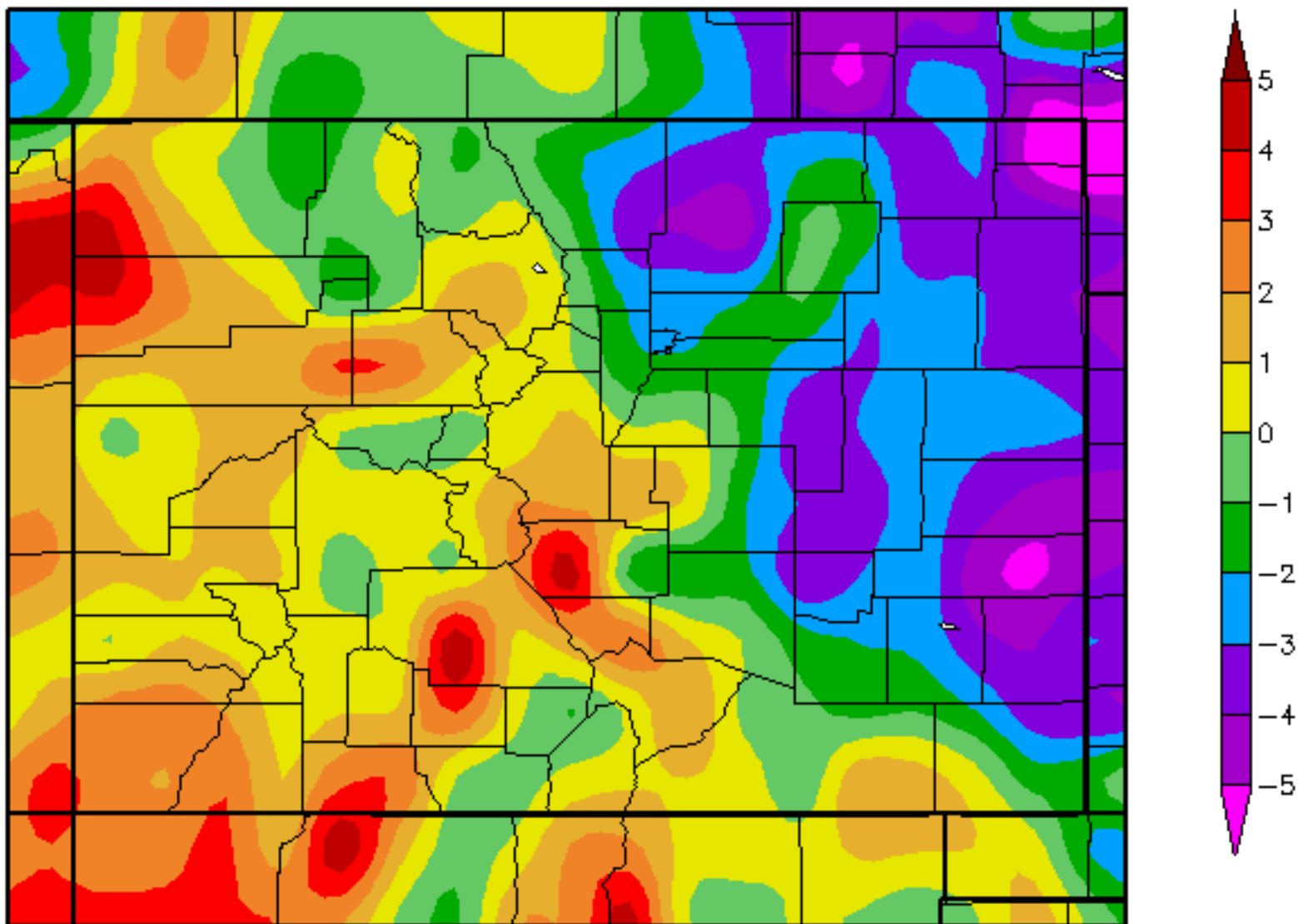
Departure from Normal Temperature (F)

11/1/2016 – 11/30/2016



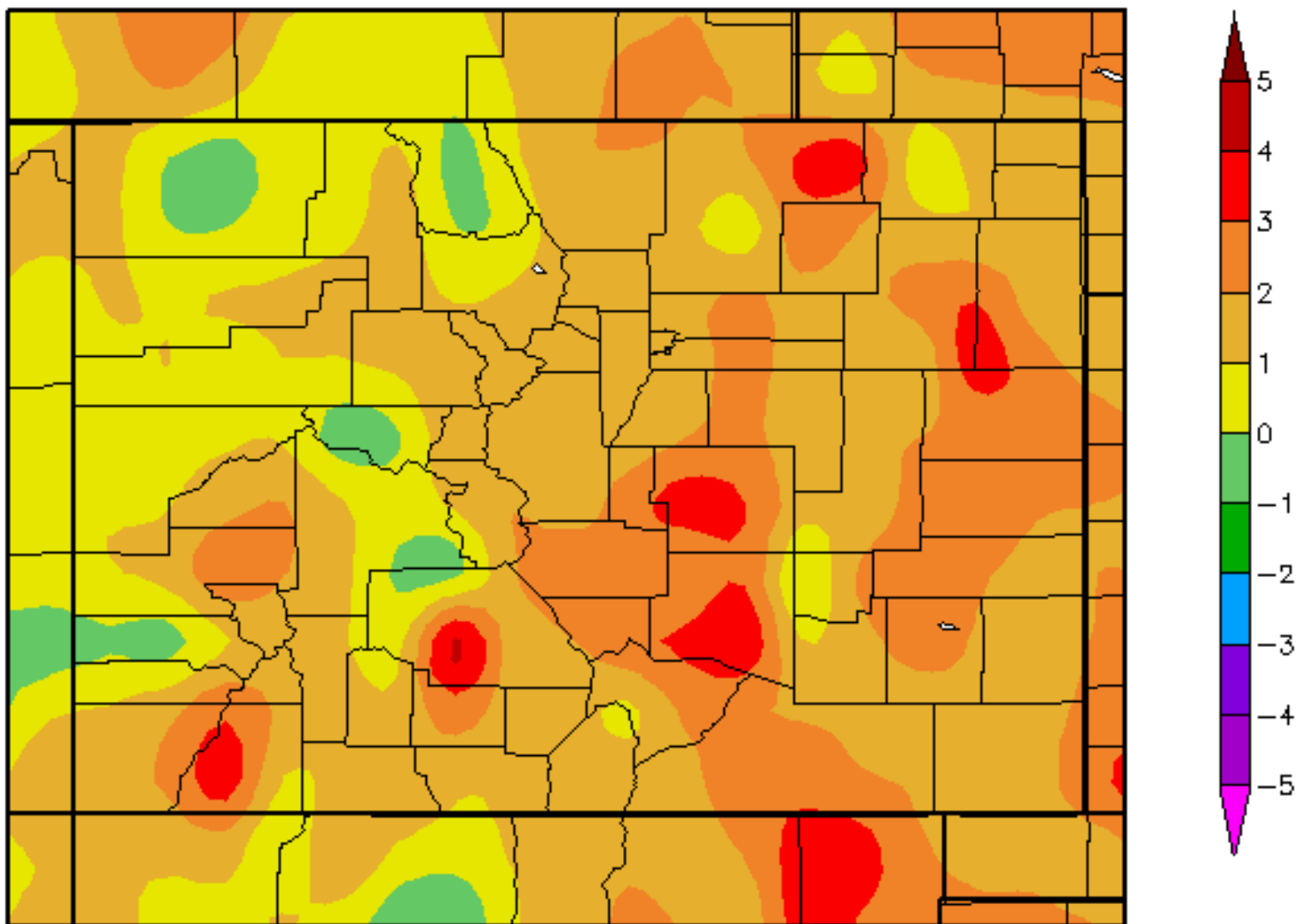
Departure from Normal Temperature (F)

12/1/2016 – 12/31/2016



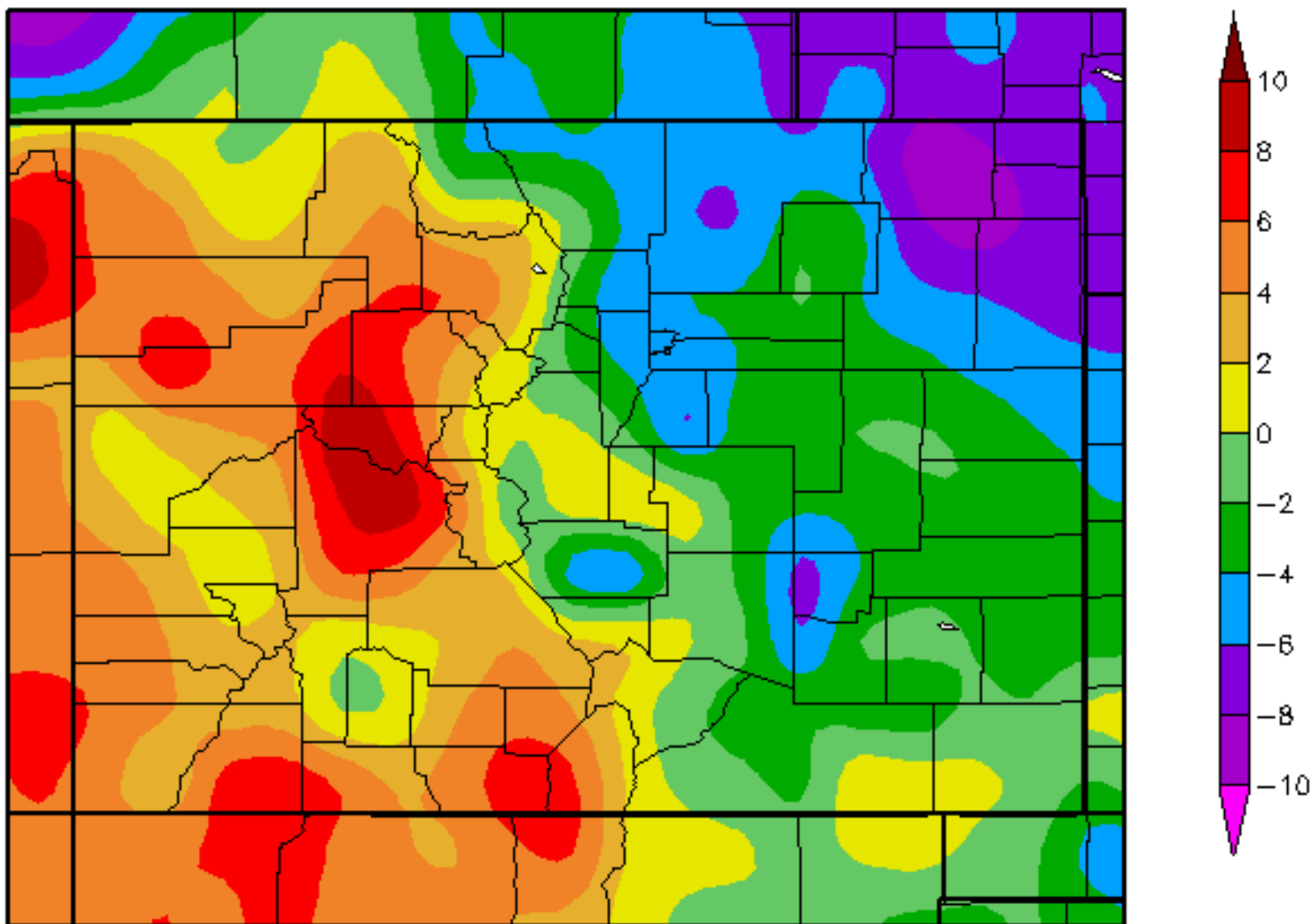
Departure from Normal Temperature (F)

1/1/2016 – 12/31/2016



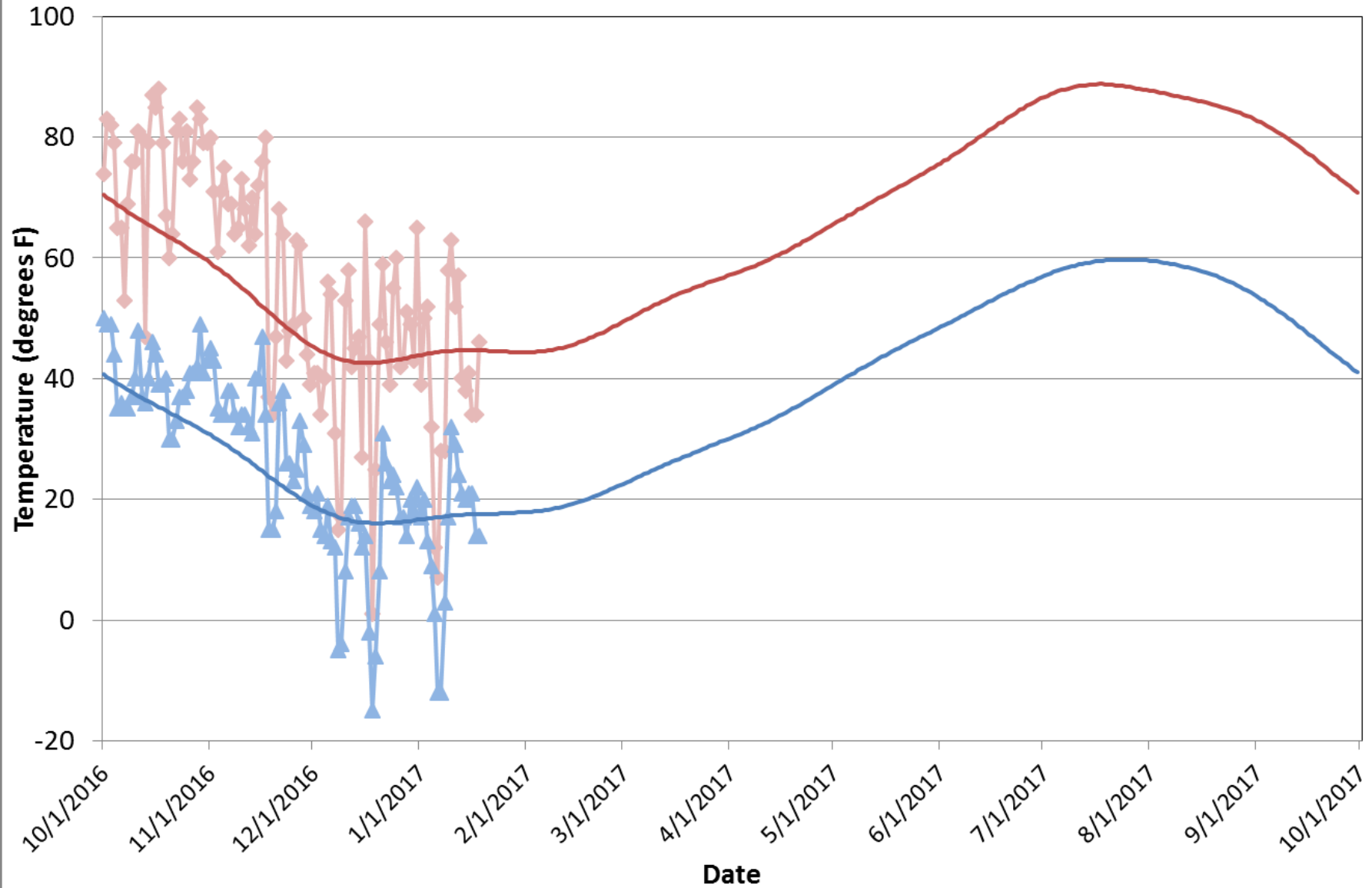
Departure from Normal Temperature (F)

1/1/2017 - 1/17/2017



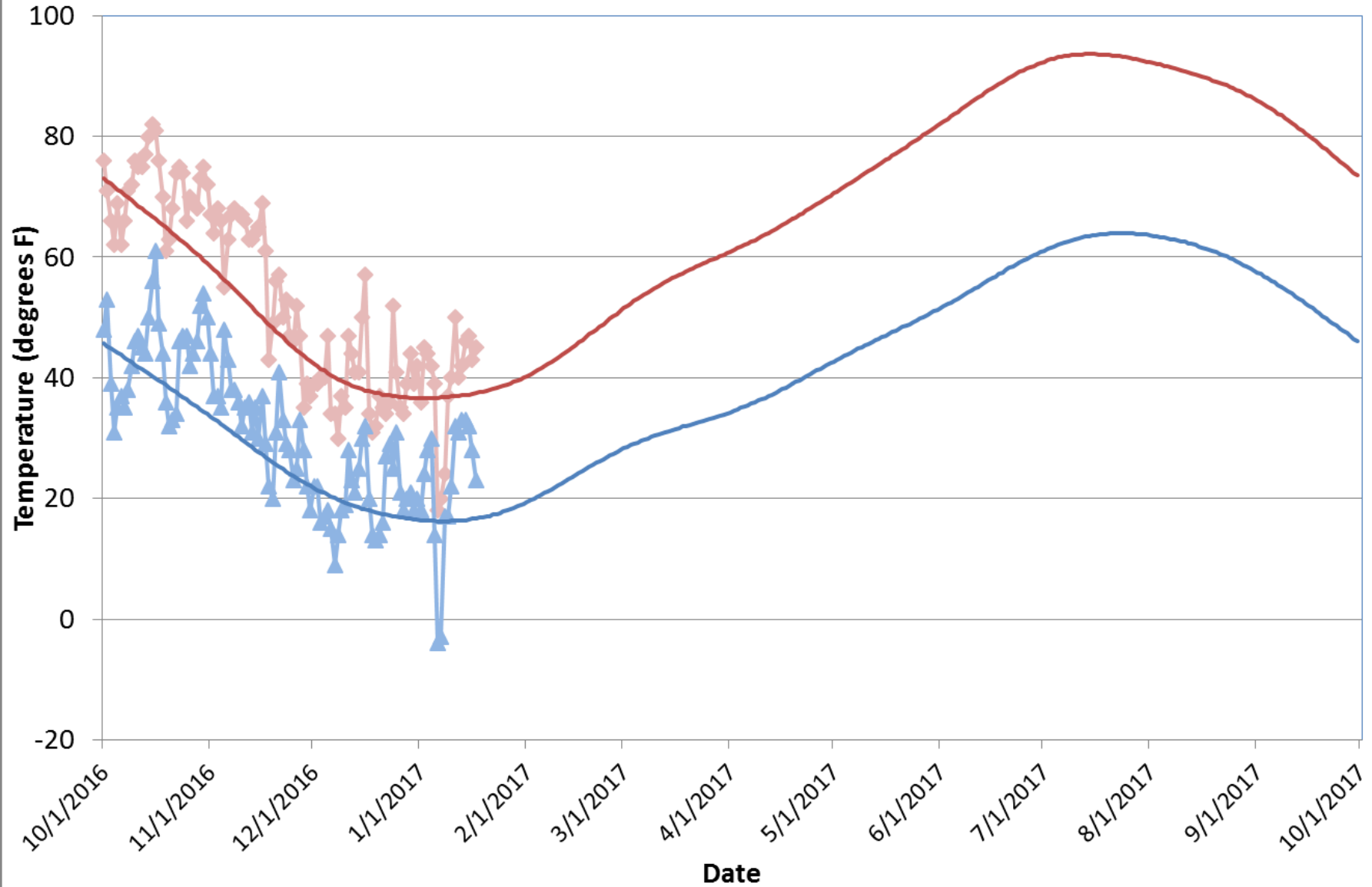
Denver-Stapleton Daily Max/Min Temperatures with Normals, Water Year 2017

Max Temperature Normal Max Temp Min Temperature Normal Min Temp

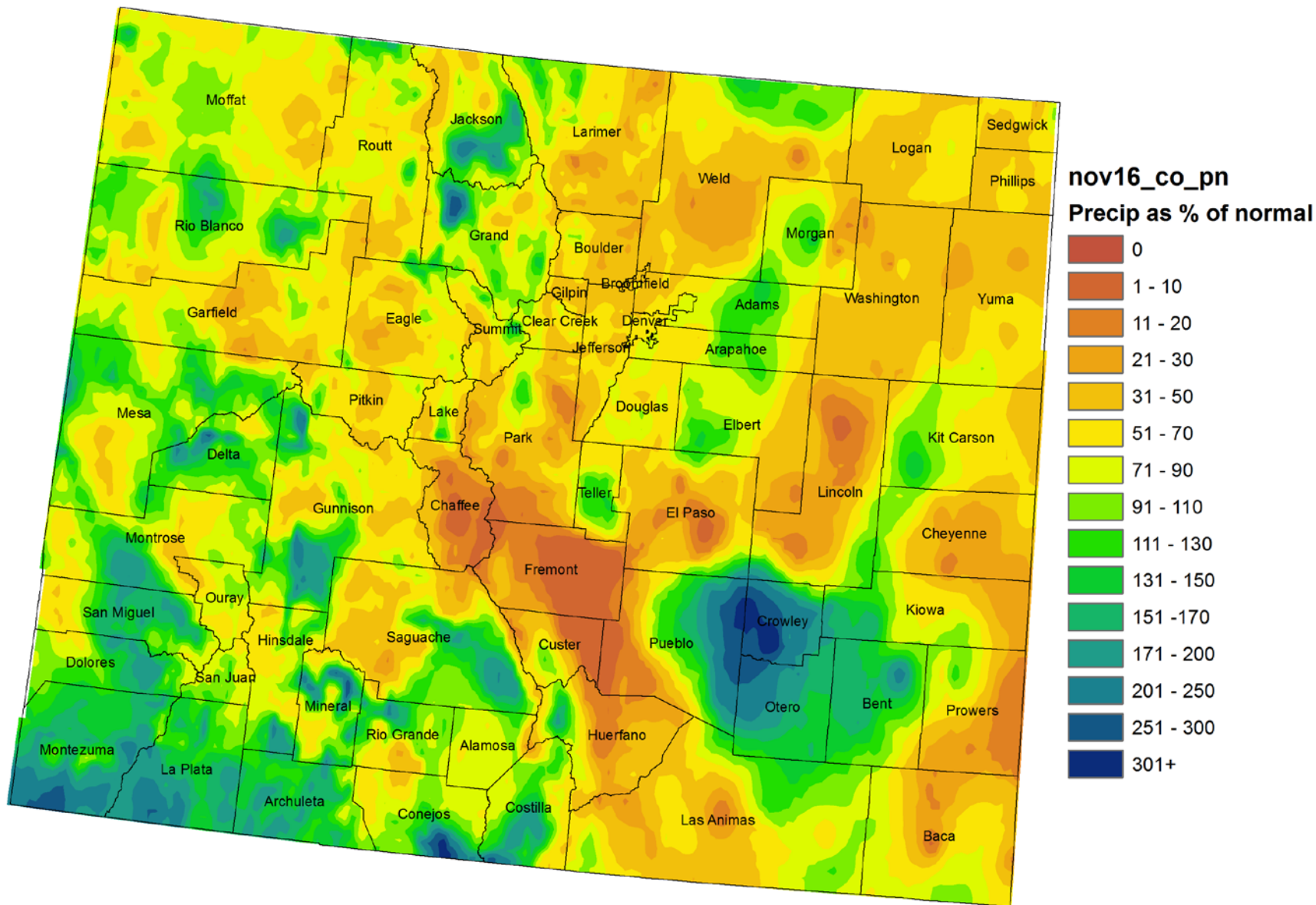


Grand Junction Daily Max/Min Temperature with Normals, WY 2017

Max Temperature Normal Max Temp Min Temperature Normal Min Temp



Colorado November 2016 Precipitation as a Percentage of Normal



Nov 2016 Statewide Precipitation

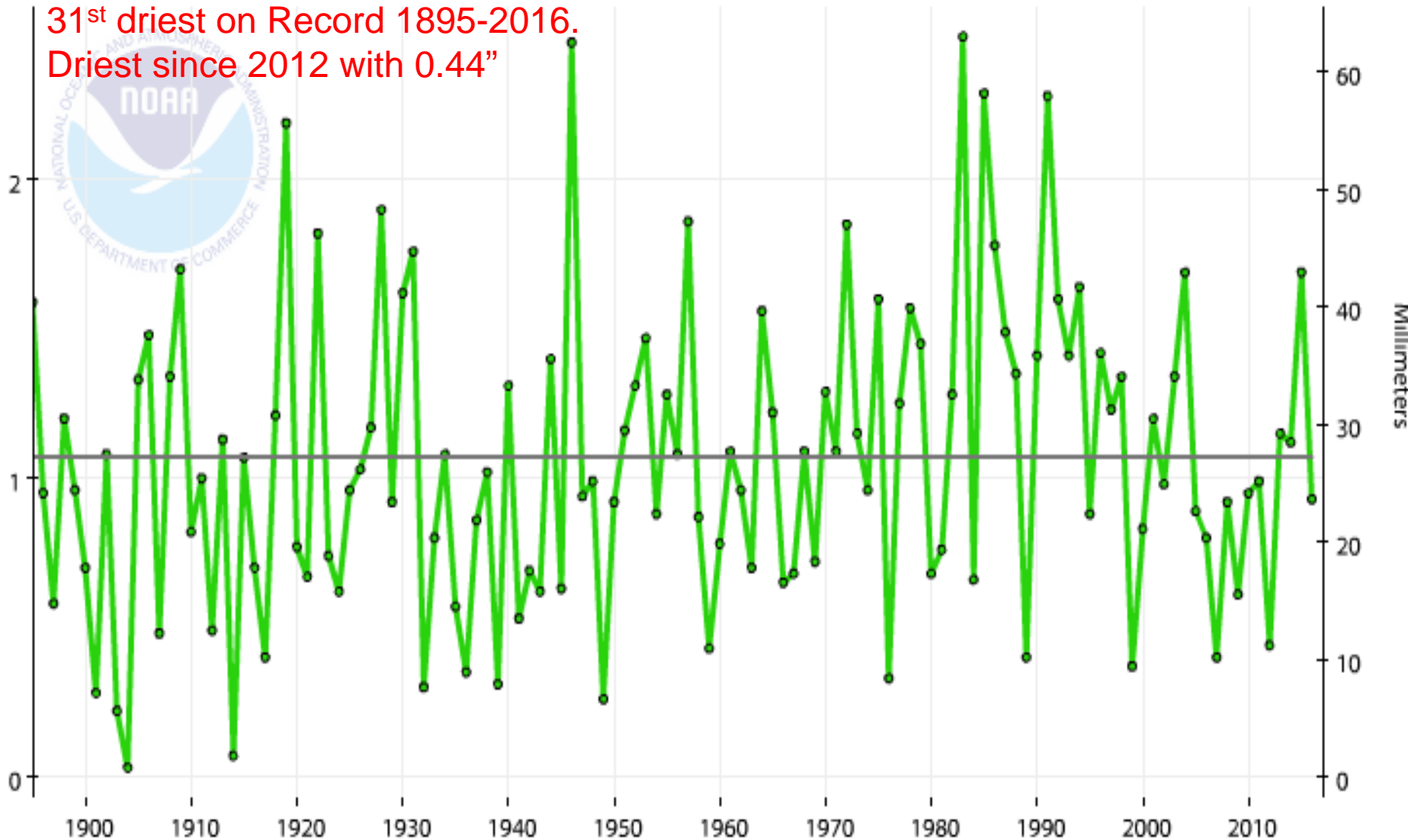
Colorado, Precipitation, November

— 1901-2000 Mean: 1.07" —●— Precip

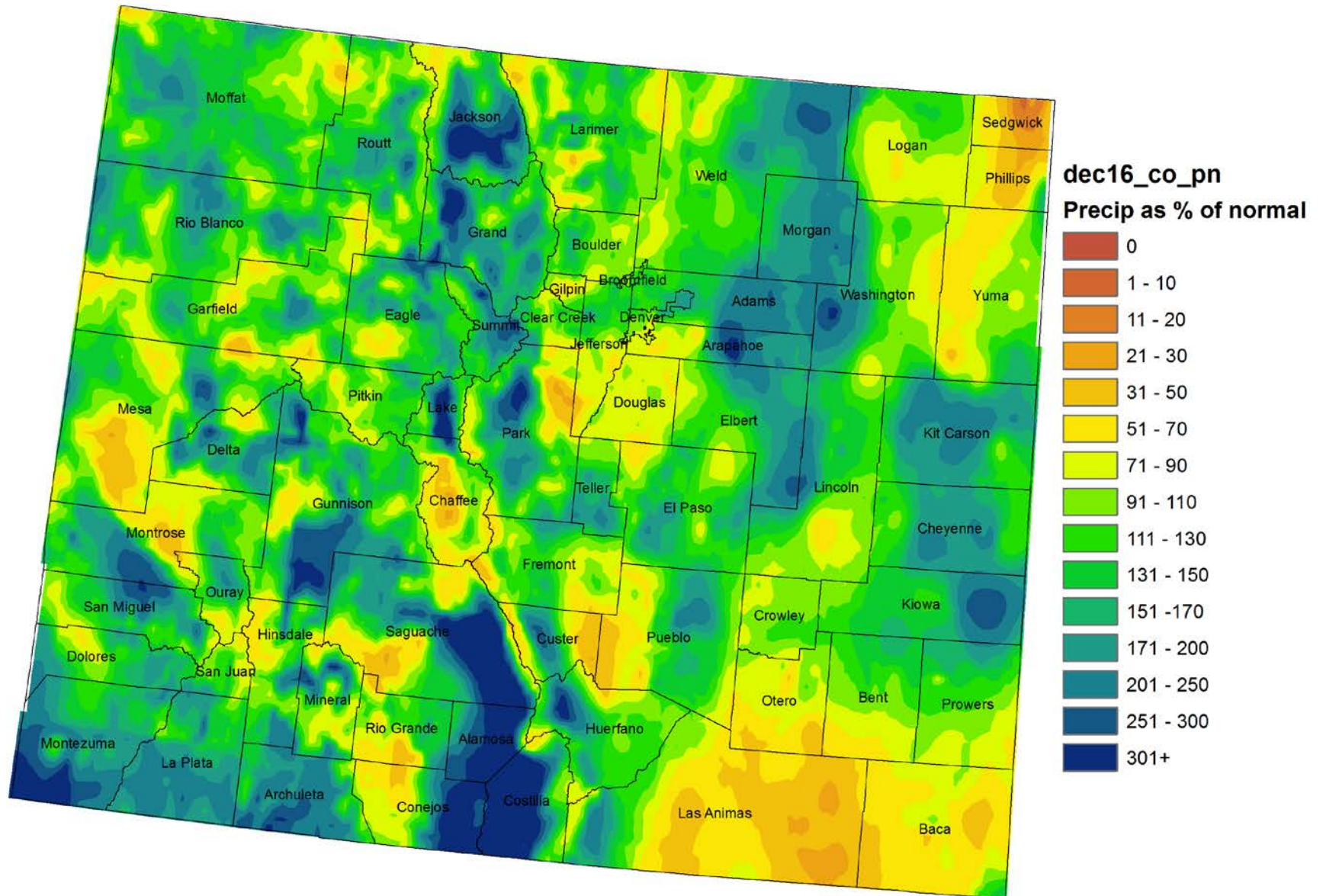
0.93" (-0.14")

31st driest on Record 1895-2016.

Driest since 2012 with 0.44"



Colorado December 2016 Precipitation as a Percentage of Normal



Dec 2016 Statewide Precipitation

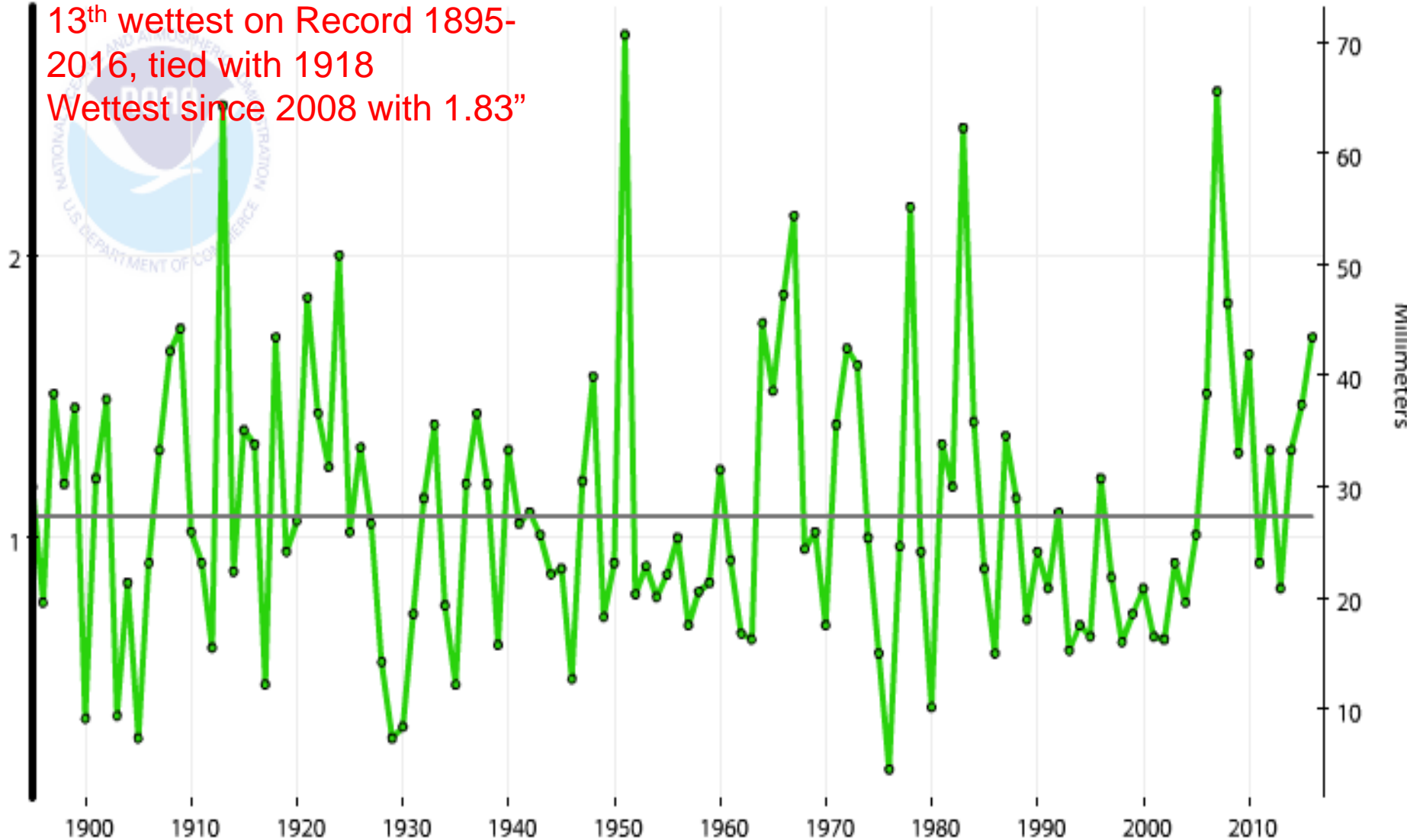
Colorado, Precipitation, December

— 1901-2000 Mean: 1.08" —●— Precip

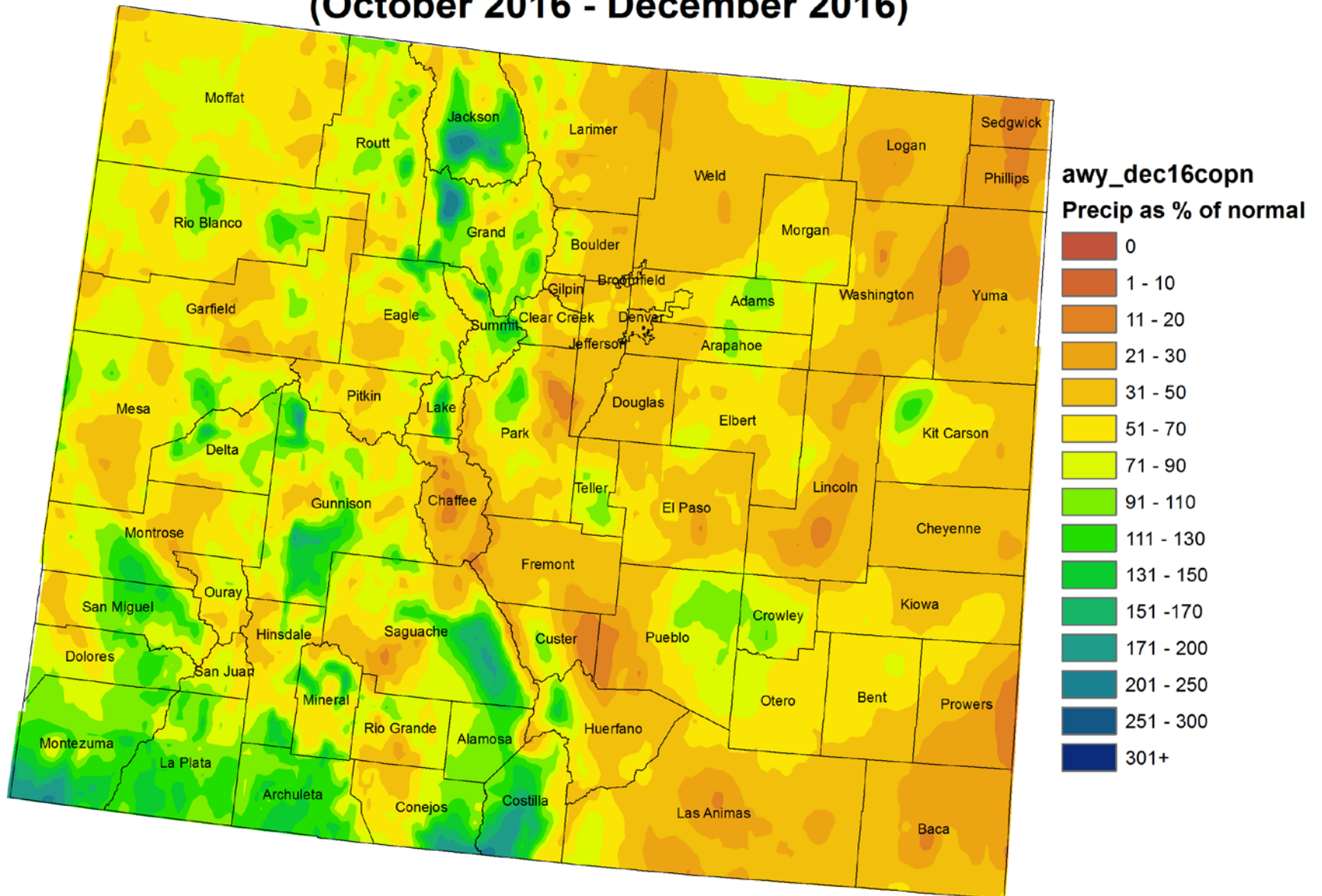
1.71" (+0.63")

13th wettest on Record 1895-2016, tied with 1918

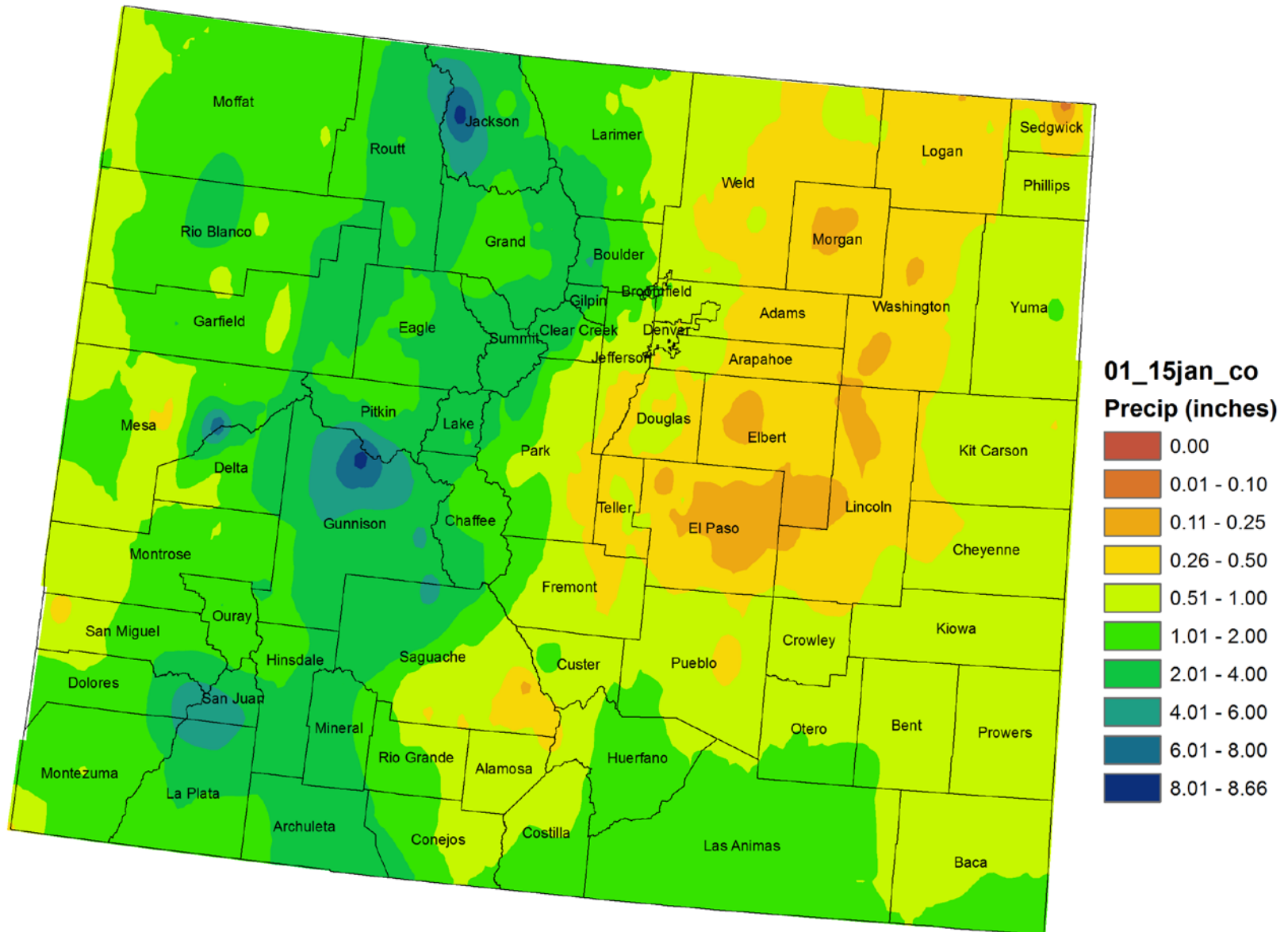
Wettest since 2008 with 1.83"



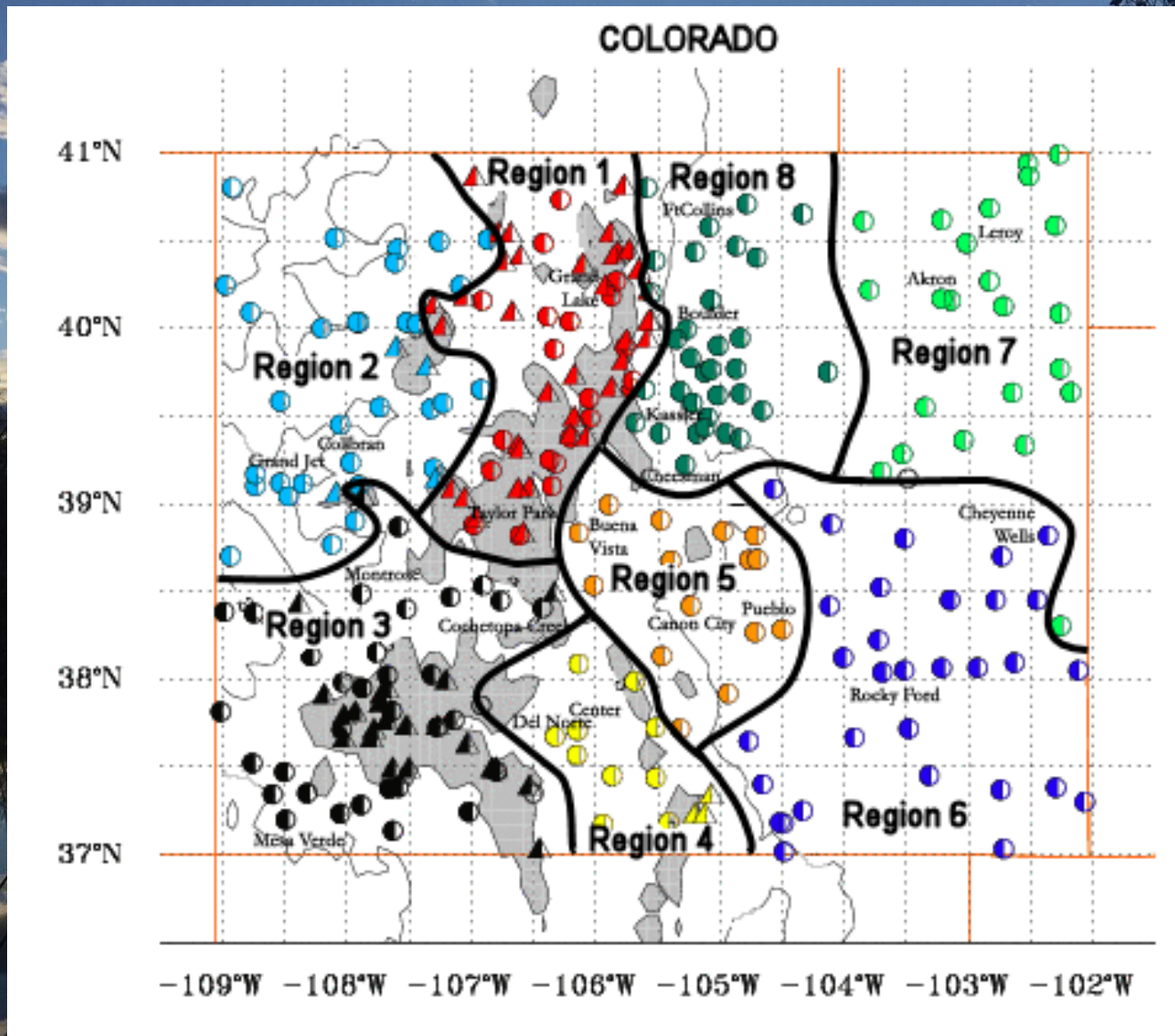
Colorado Water Year 2017 Precipitation as a Percentage of Normal (October 2016 - December 2016)



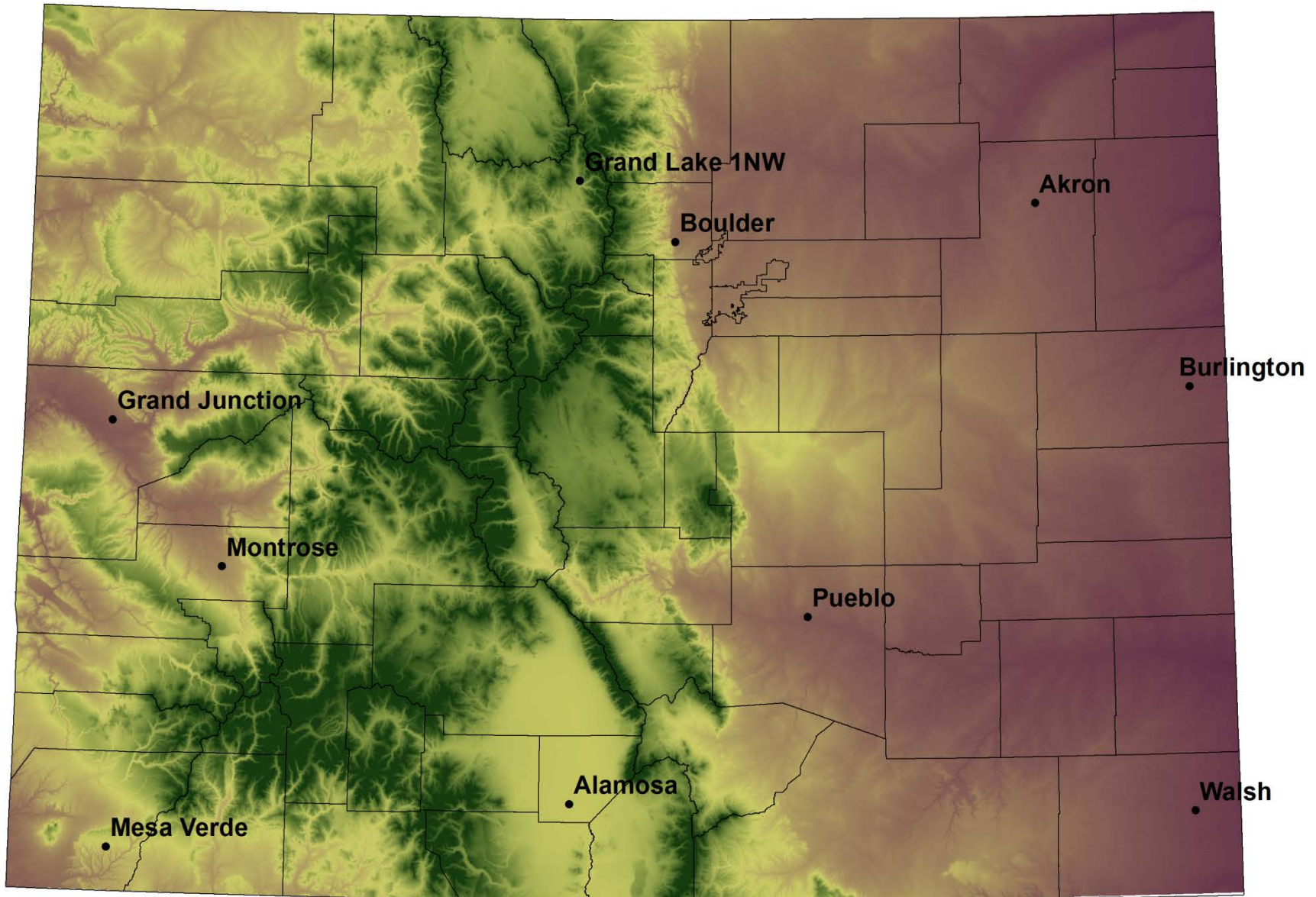
Colorado Month to Date Precipitation 1 - 15 January 2017



Climate divisions defined by Dr. Klaus Wolter of NOAA's Climate Diagnostic Center in Boulder, CO

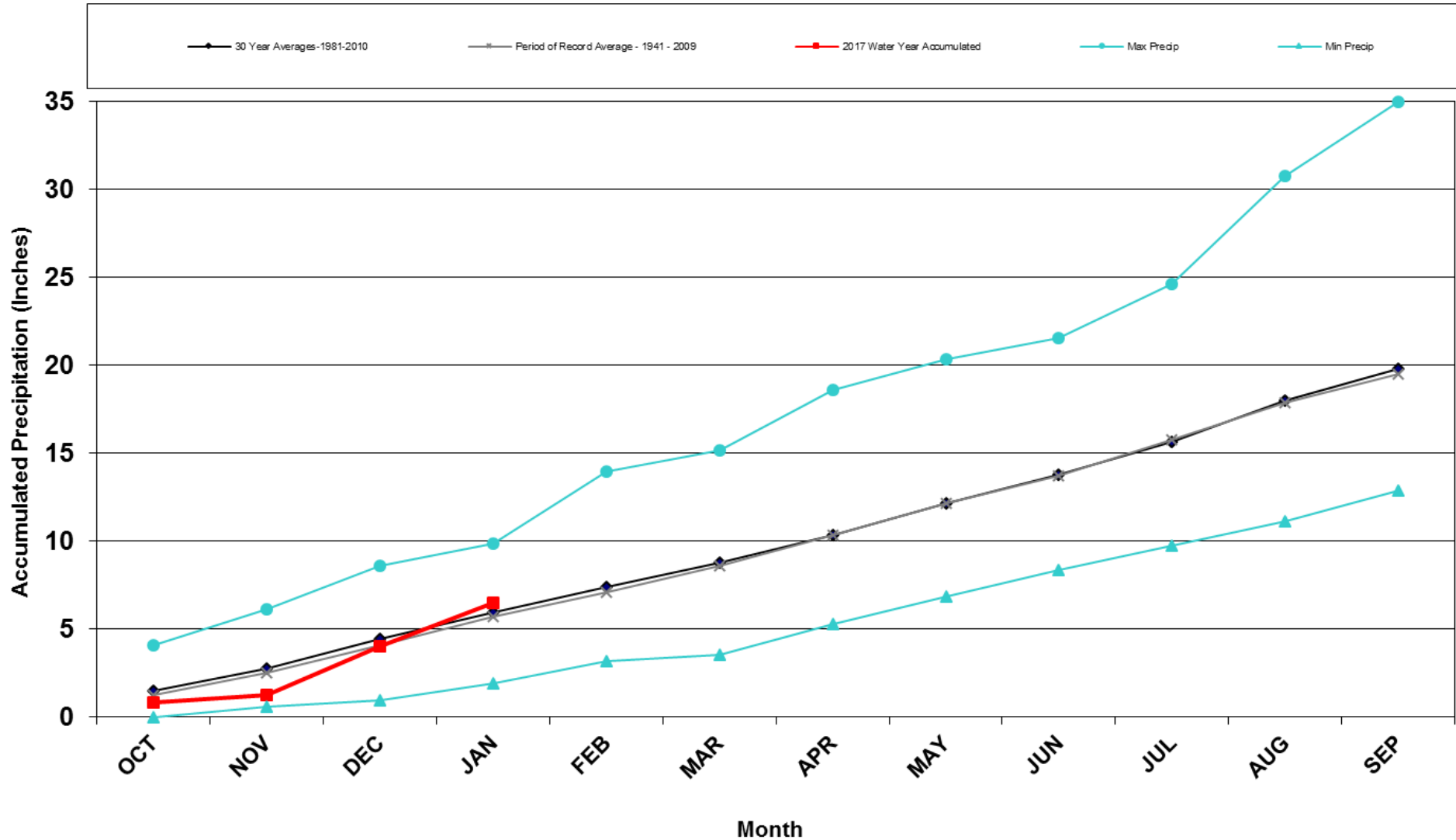


NWS Cooperative Stations for WATF



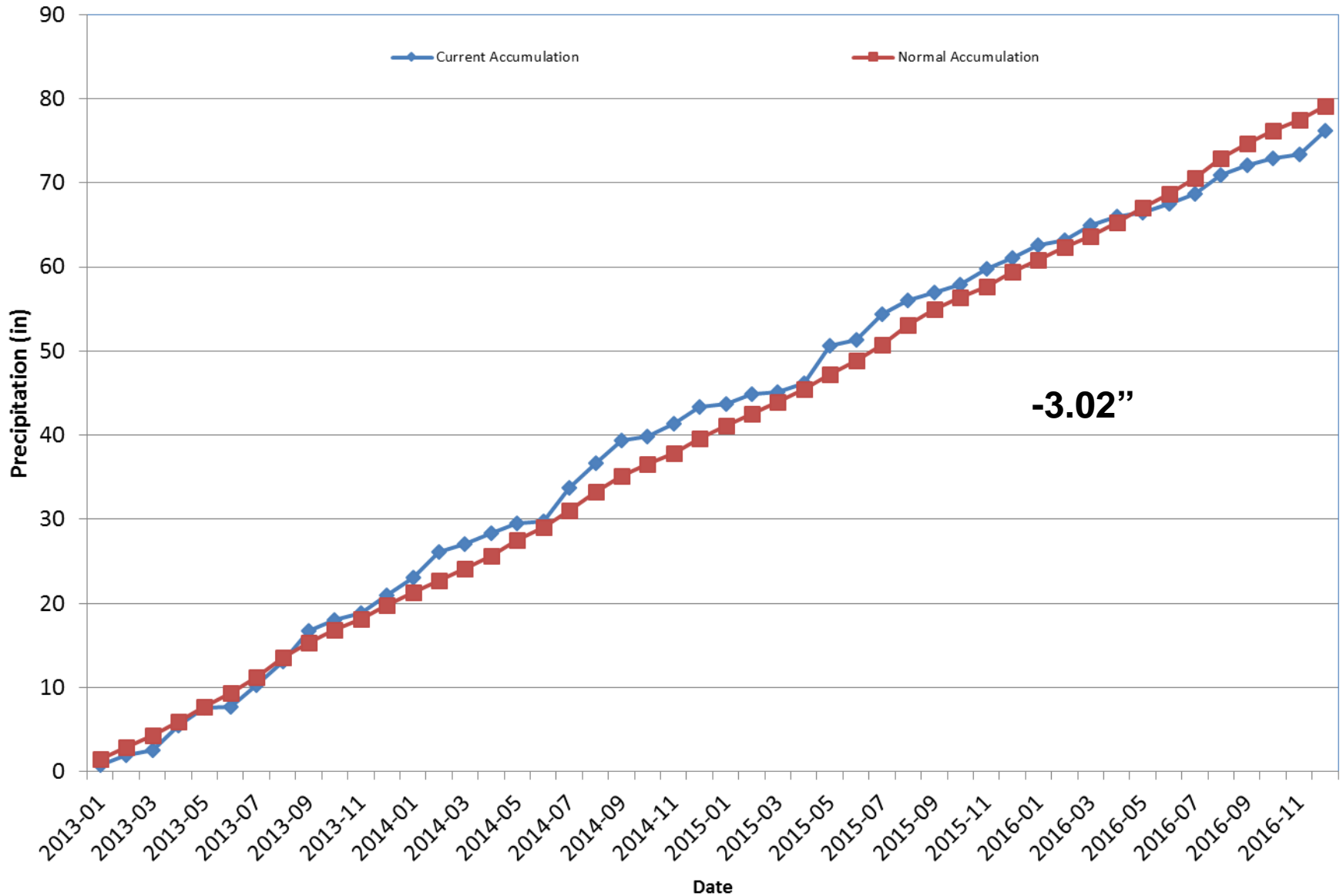
Division 1 – Grand Lake 1NW

Grand Lake 1 NW 2017 Water Year



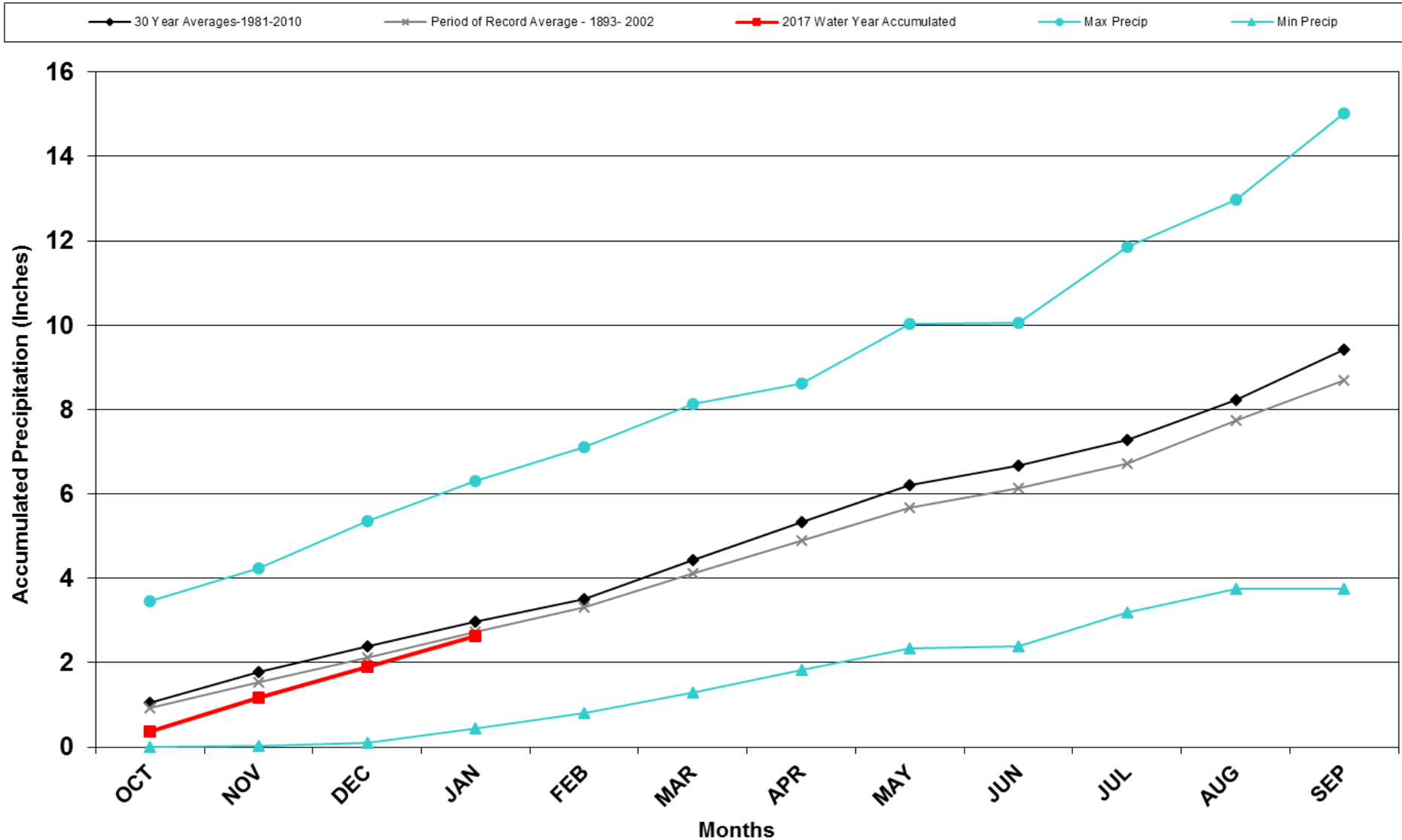
Division 1 – Grand Lake 1NW

Grand Lake 1NW Precipitation Accumulation



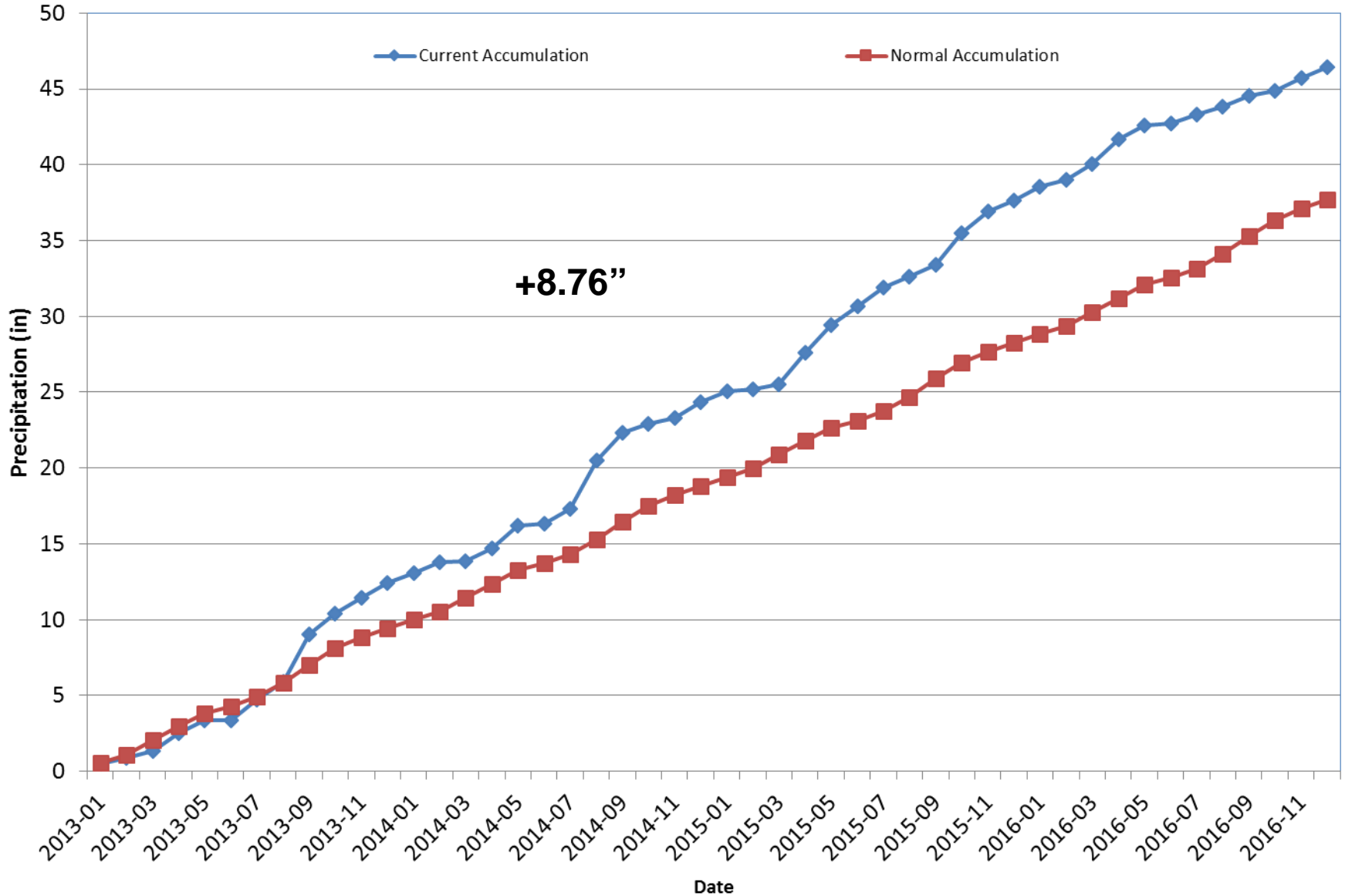
Division 2 – Grand Junction

Grand Junction WSFO 2017 Water Year



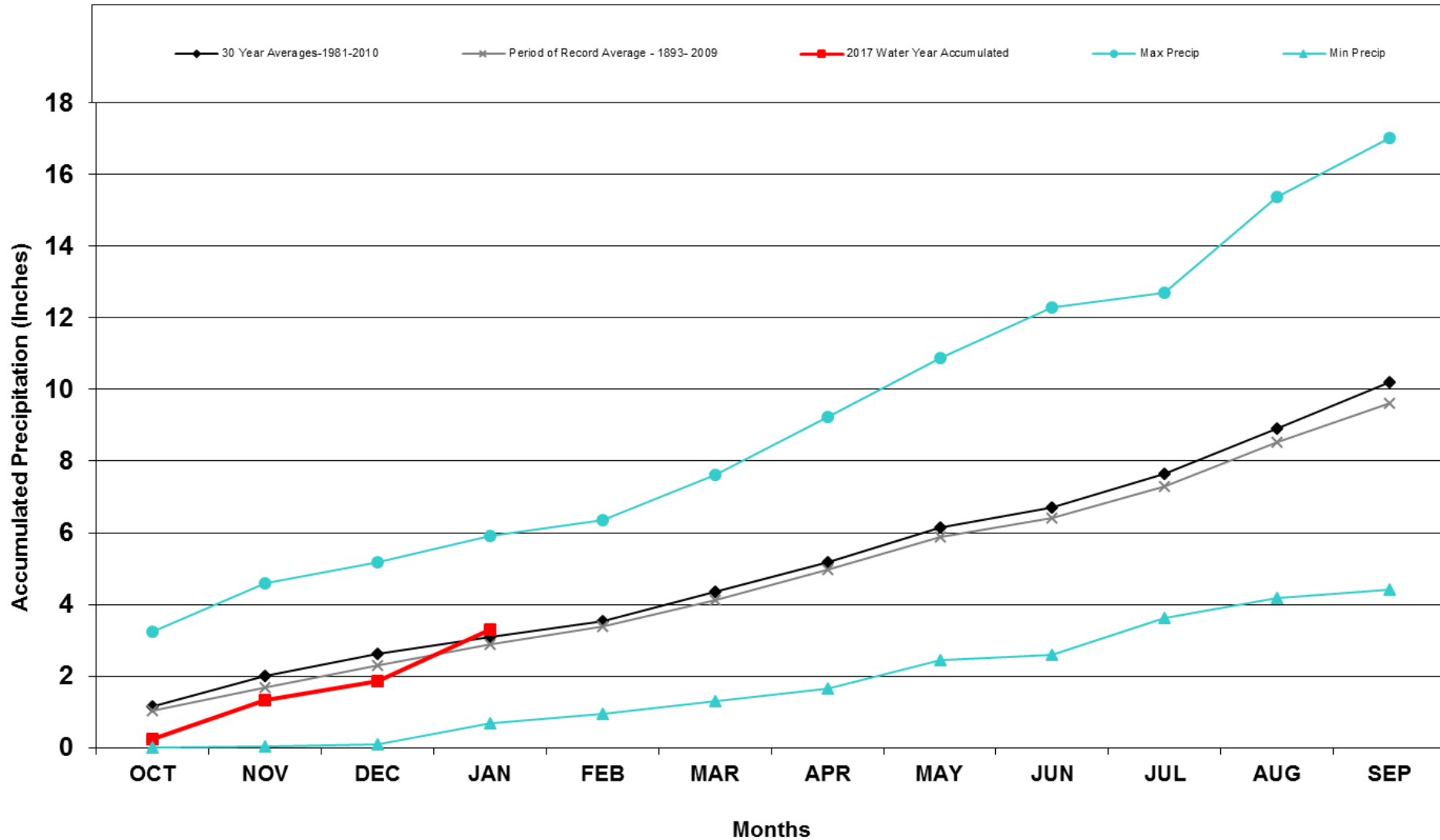
Division 2 – Grand Junction

Grand Junction Precipitation Accumulation



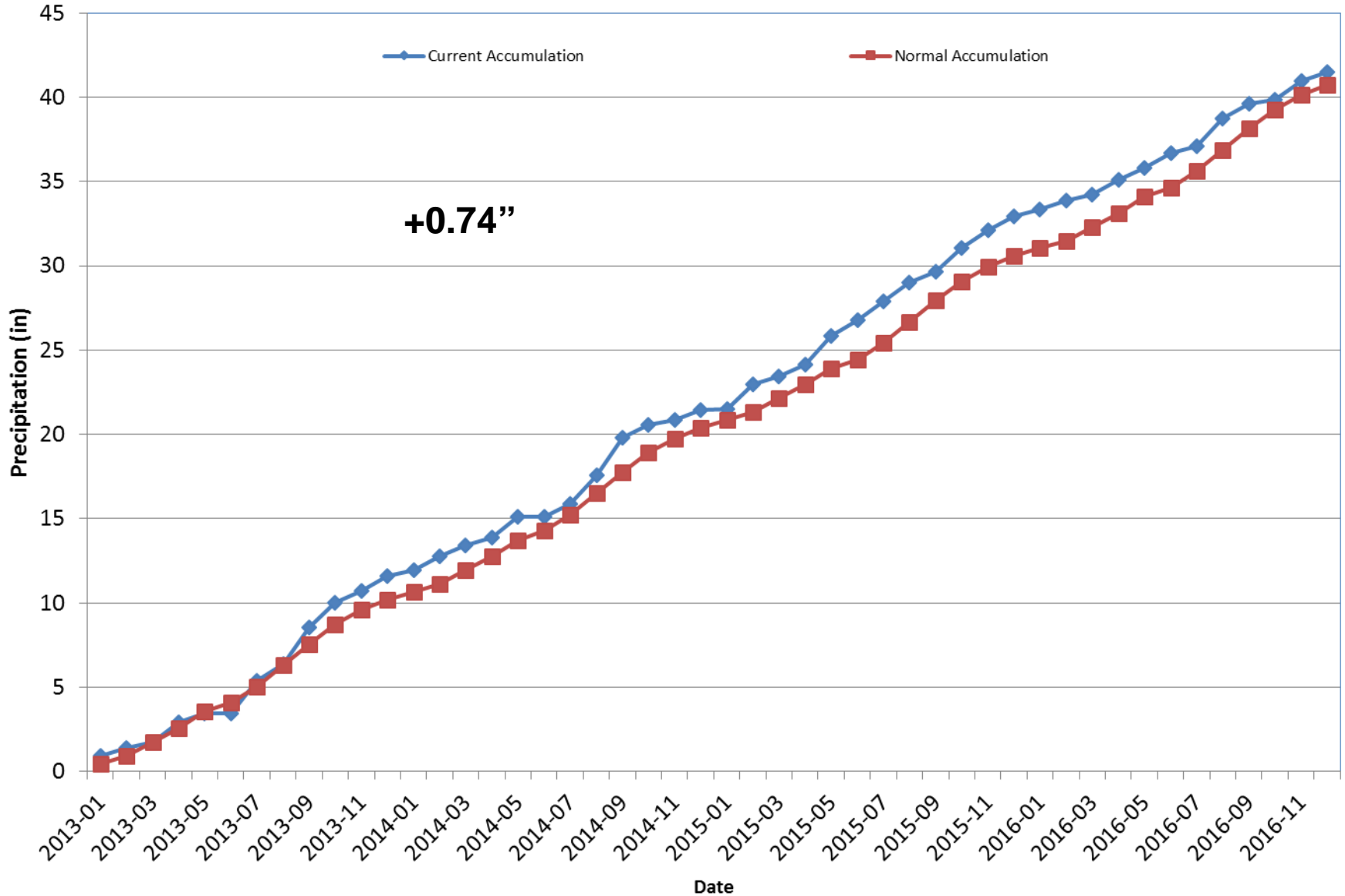
Division 3 – Montrose

Montrose #2 2017 Water Year



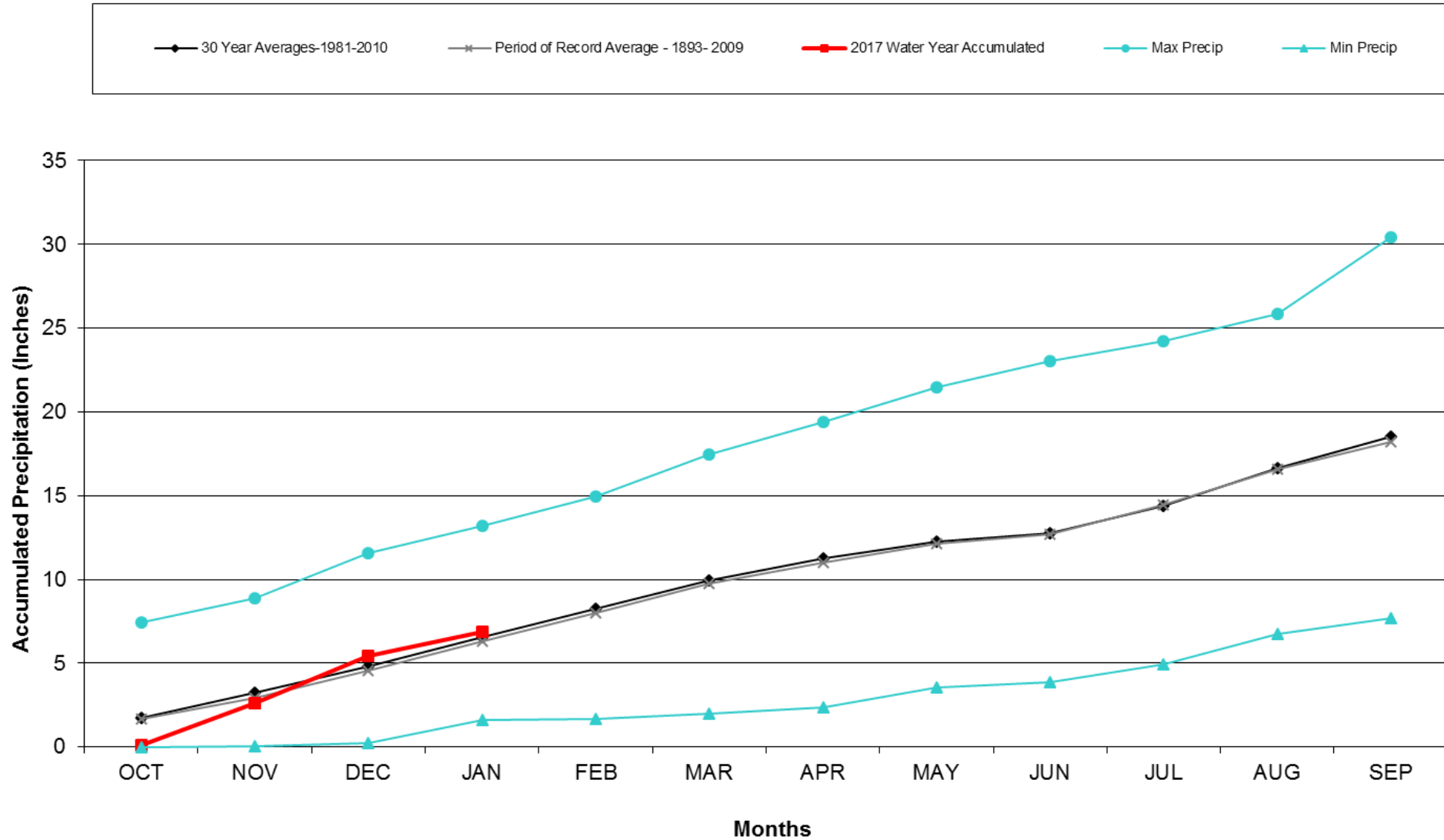
Division 3 – Montrose

Montrose #2 Precipitation Accumulation



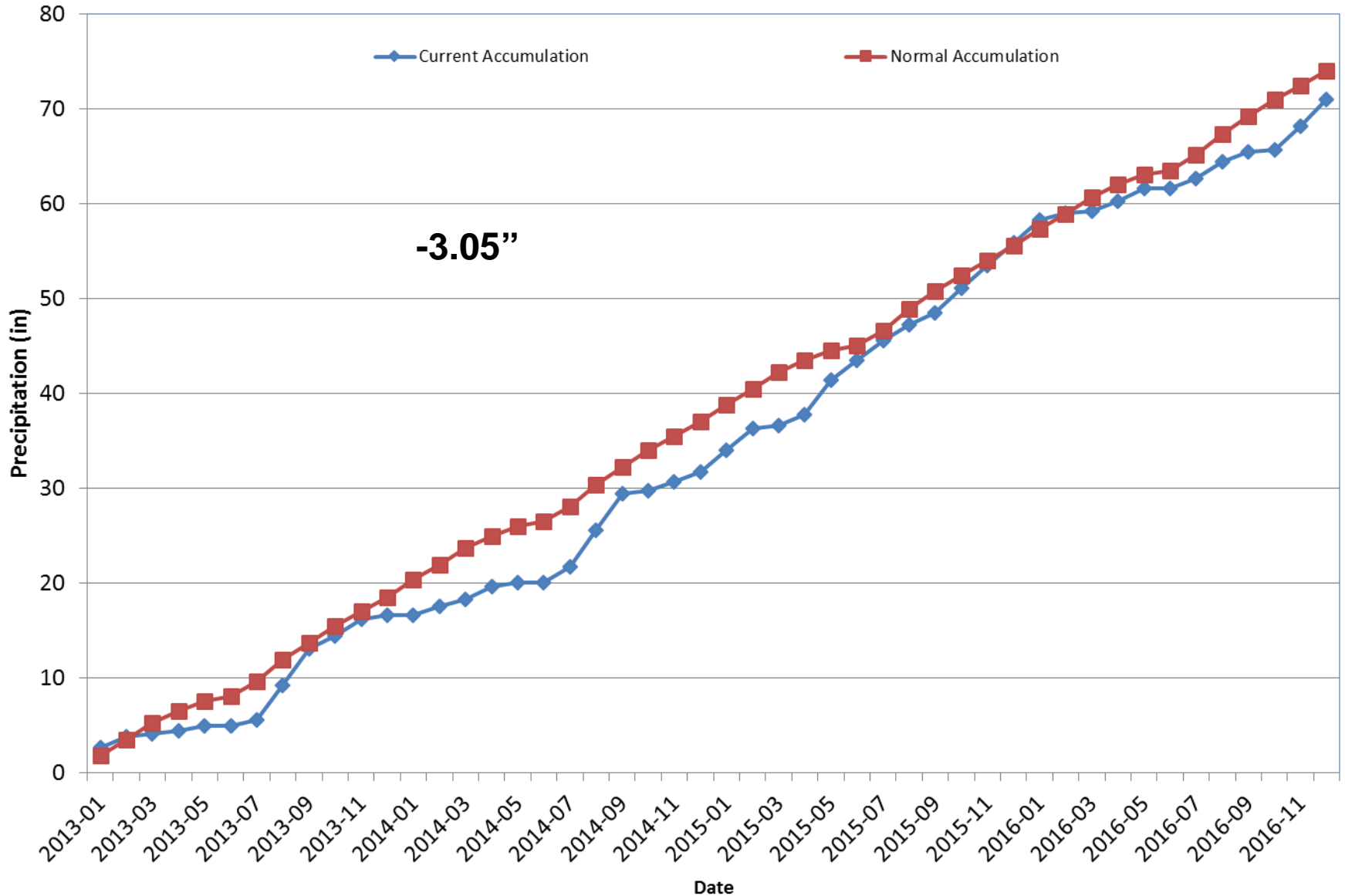
Division 3 – Mesa Verde NP

Mesa Verde NP 2017 Water Year



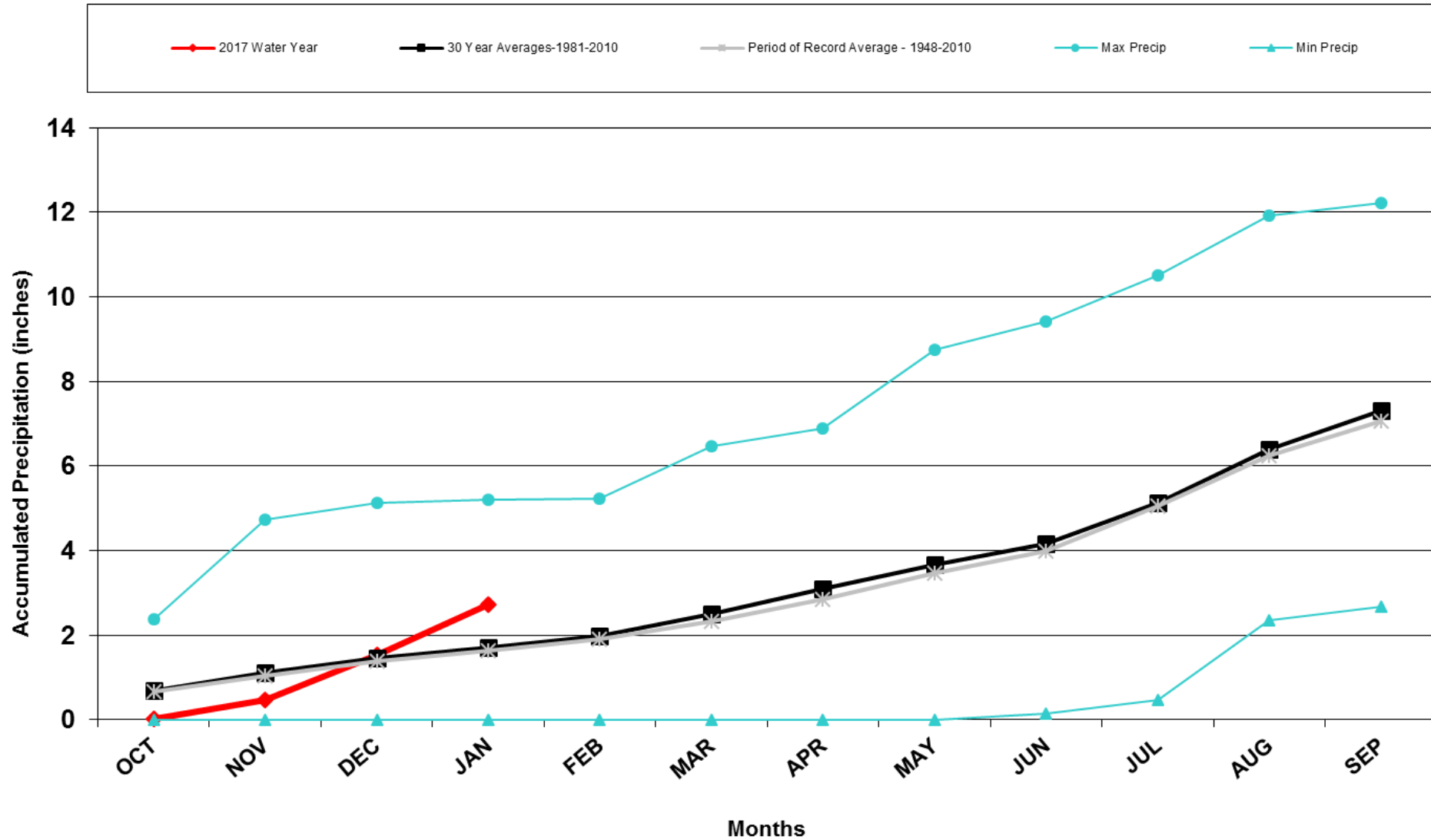
Division 3 – Mesa Verde NP

Mesa Verde NP Precipitation Accumulation



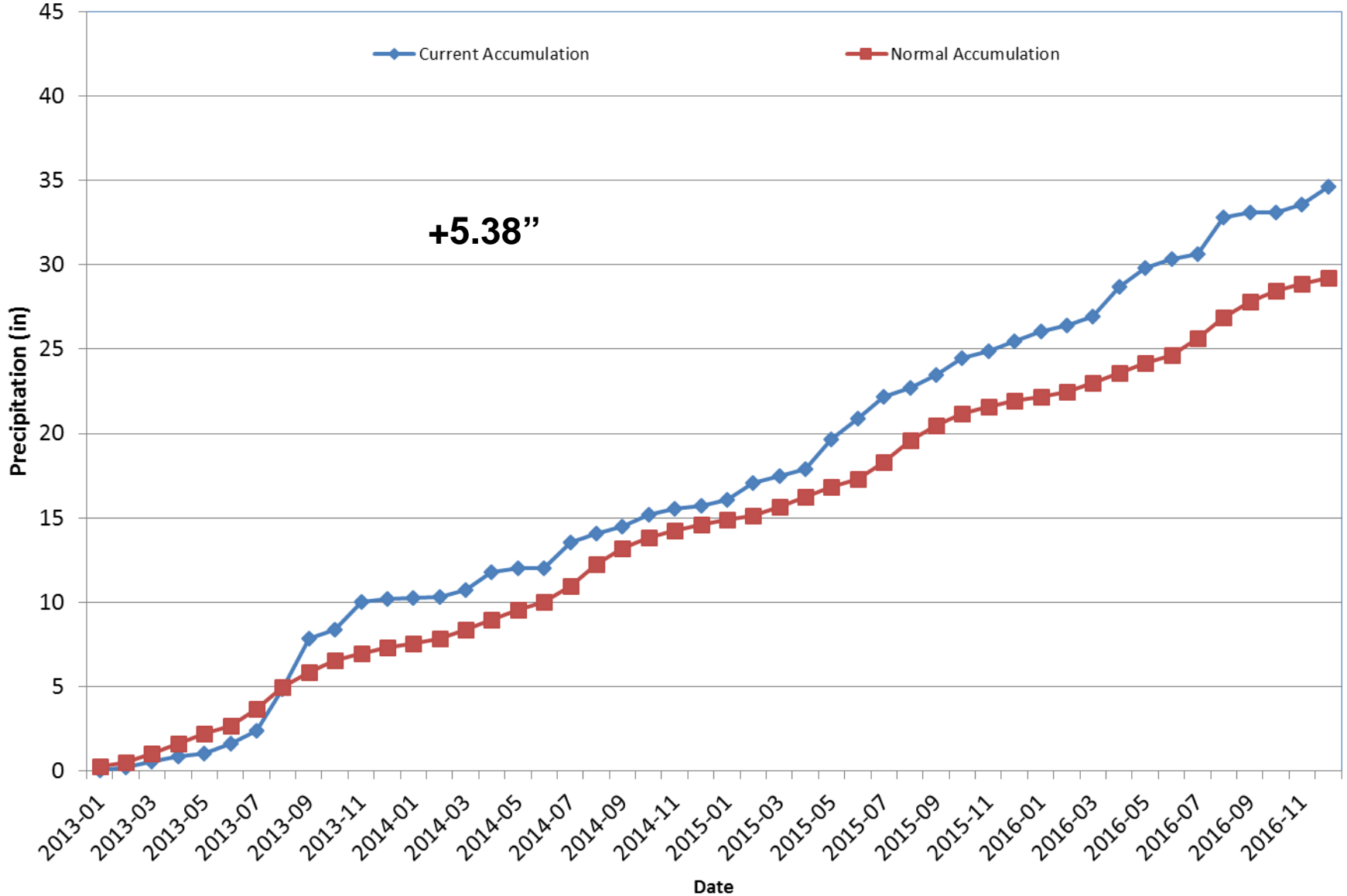
Division 4 – Alamosa

Alamosa WSO 2017 Water Year



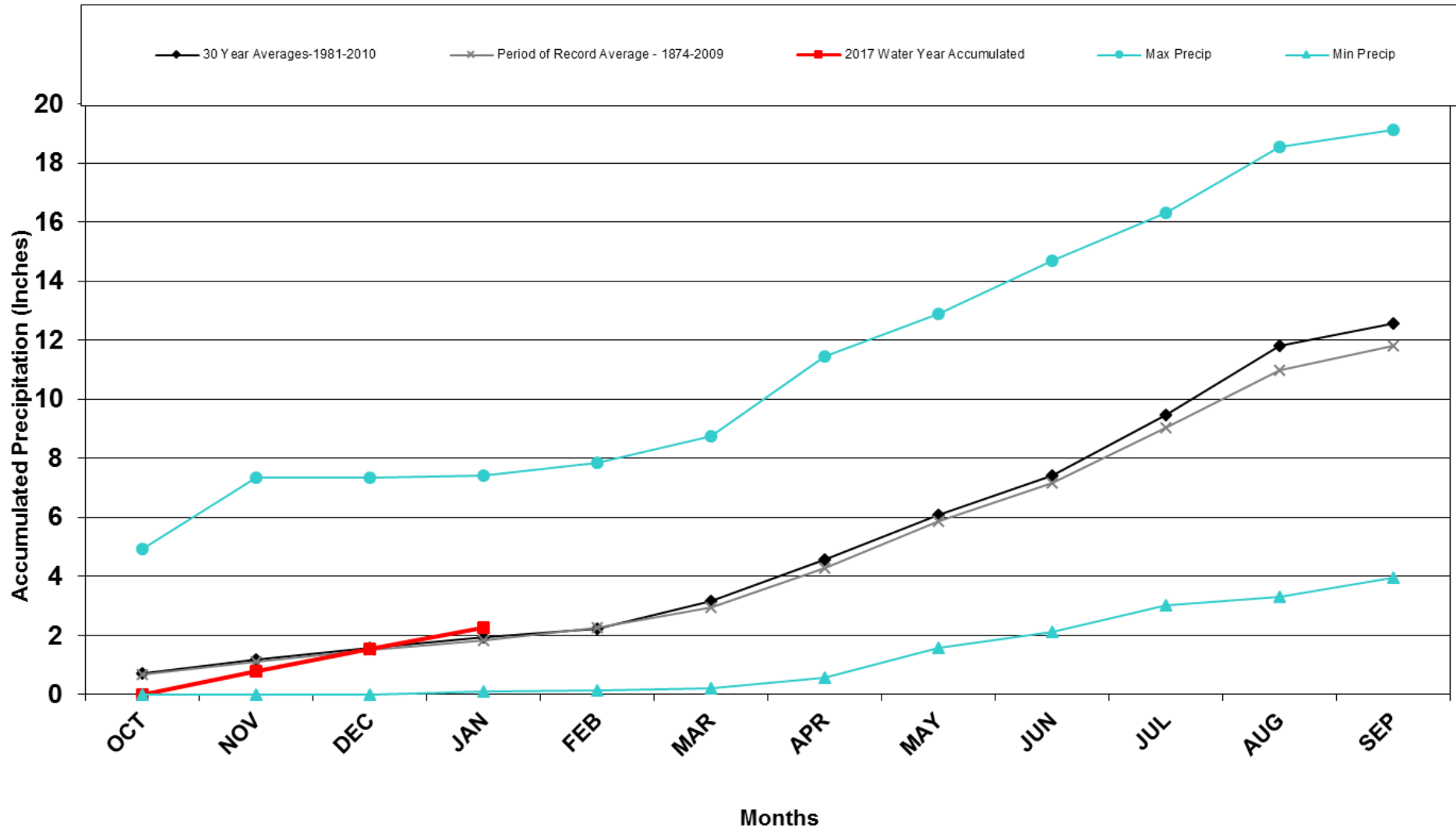
Division 4 – Alamosa

Alamosa WSO Precipitation Accumulation



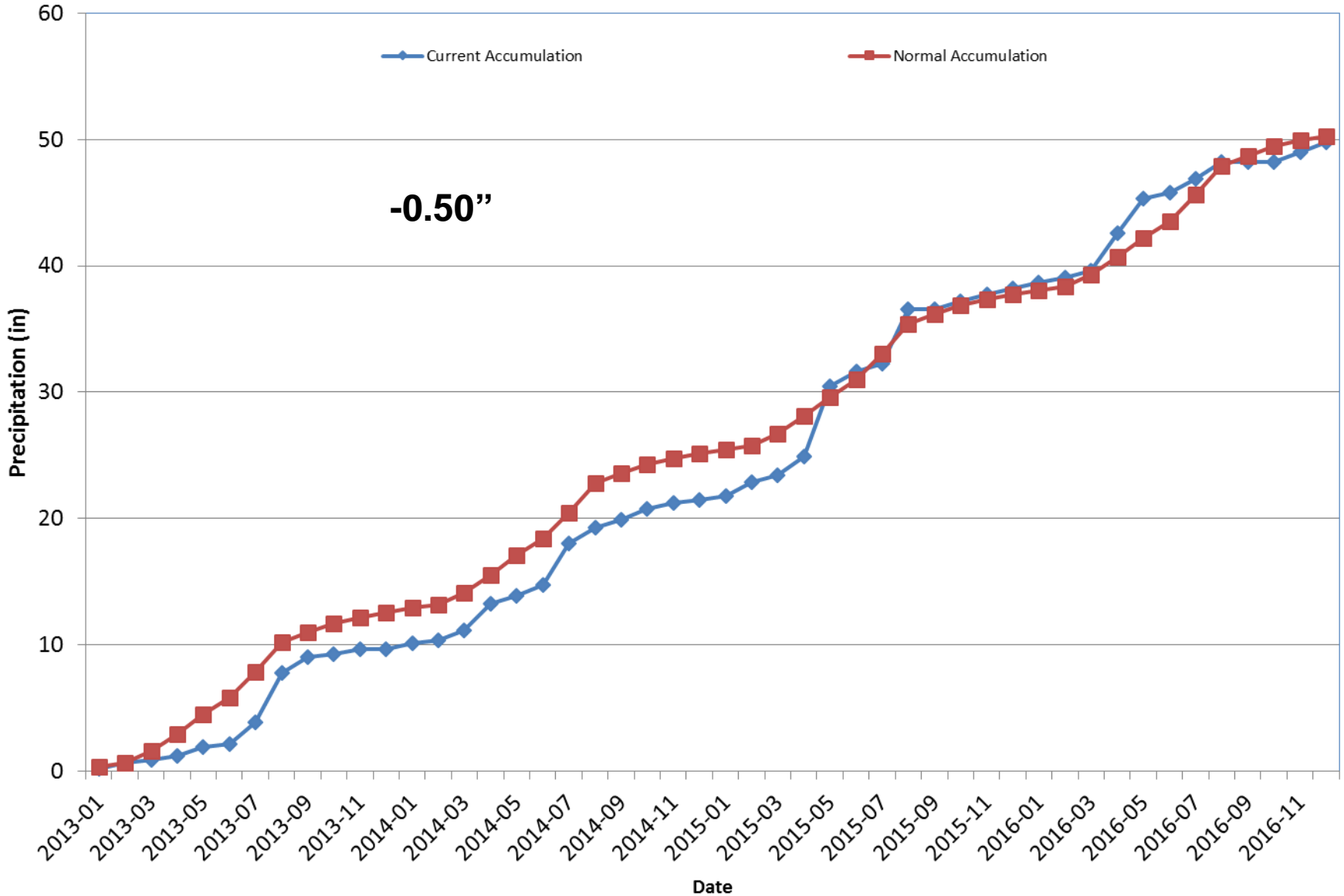
Division 5 – Pueblo

Pueblo WSO 2017 Water Year



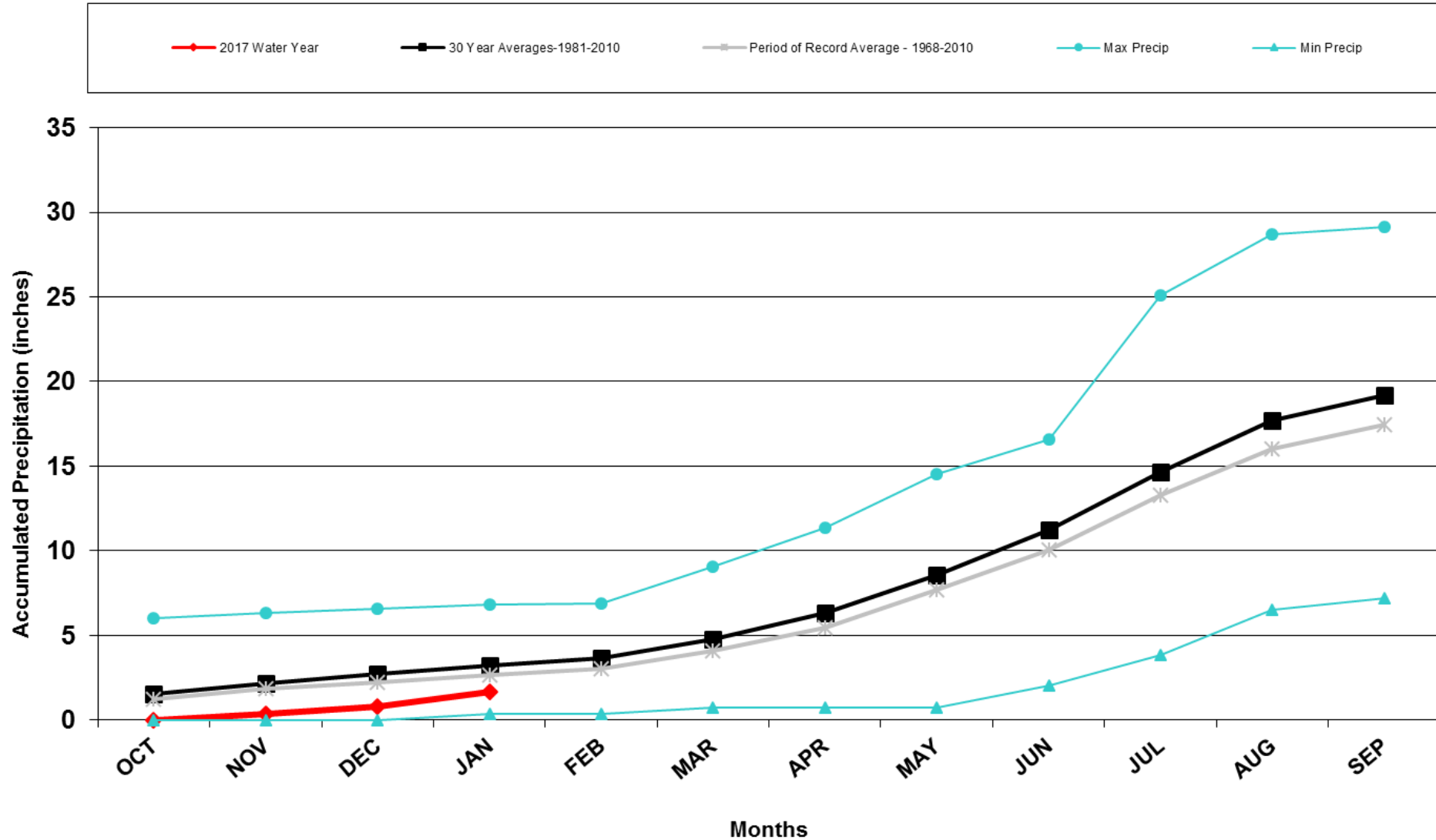
Division 5 – Pueblo

Pueblo Memorial AP Precipitation Accumulation



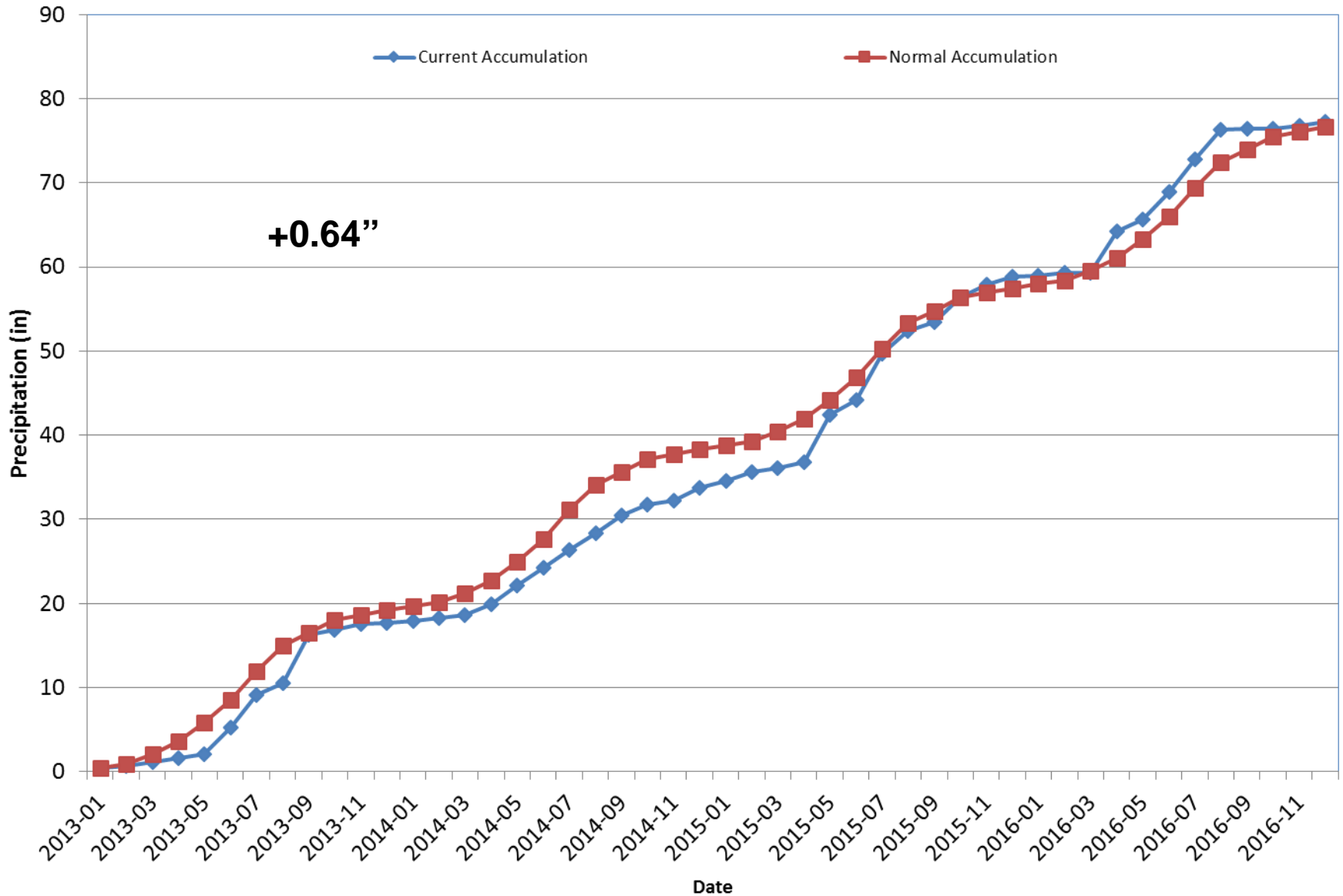
Division 6 - Walsh

Walsh 2017 Water Year



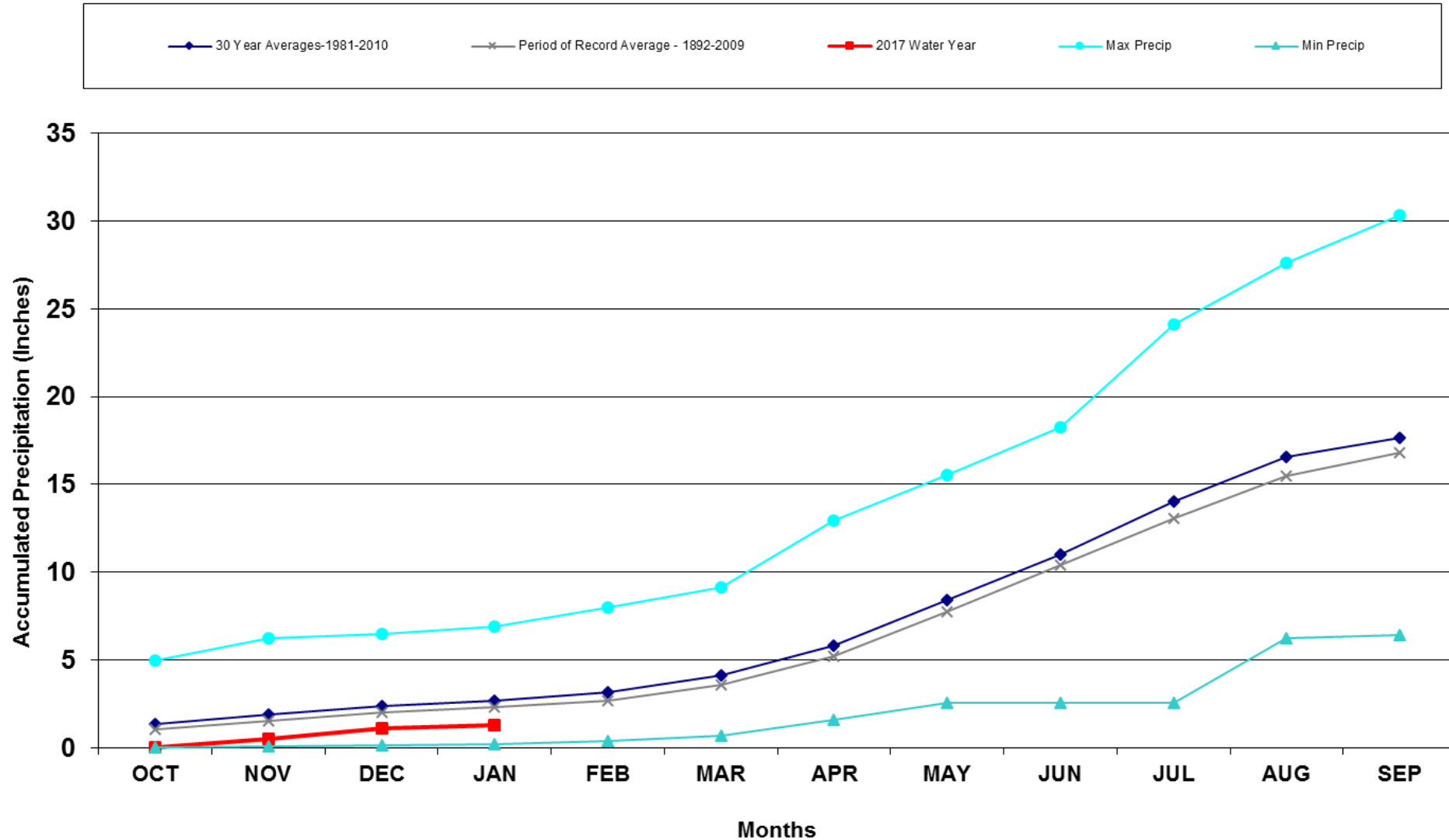
Division 6 - Walsh

Walsh 1W Precipitation Accumulation



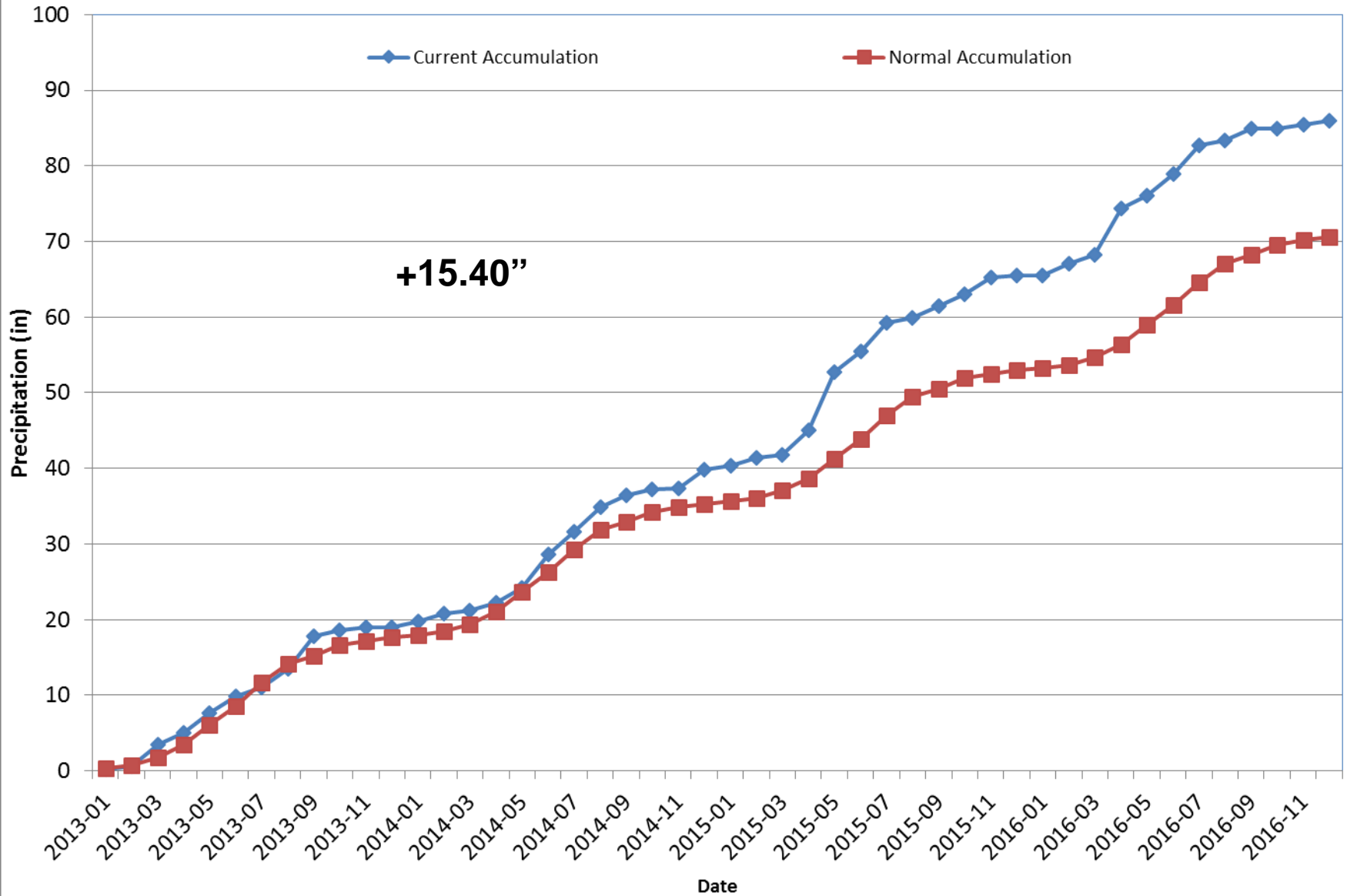
Division 6 - Burlington

Burlington 2017 Water Year



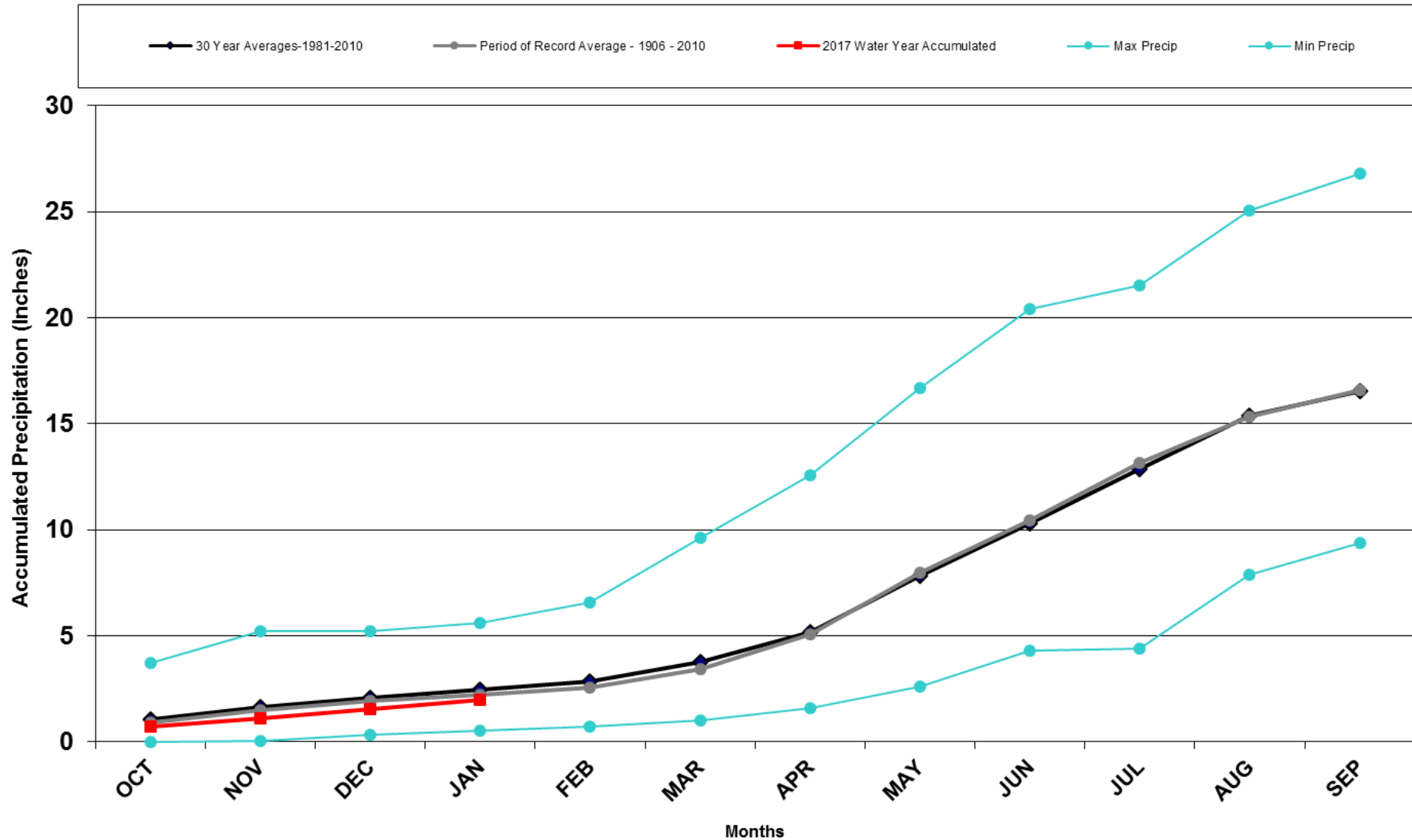
Division 6 - Burlington

Burlington, CO Precipitation Accumulation



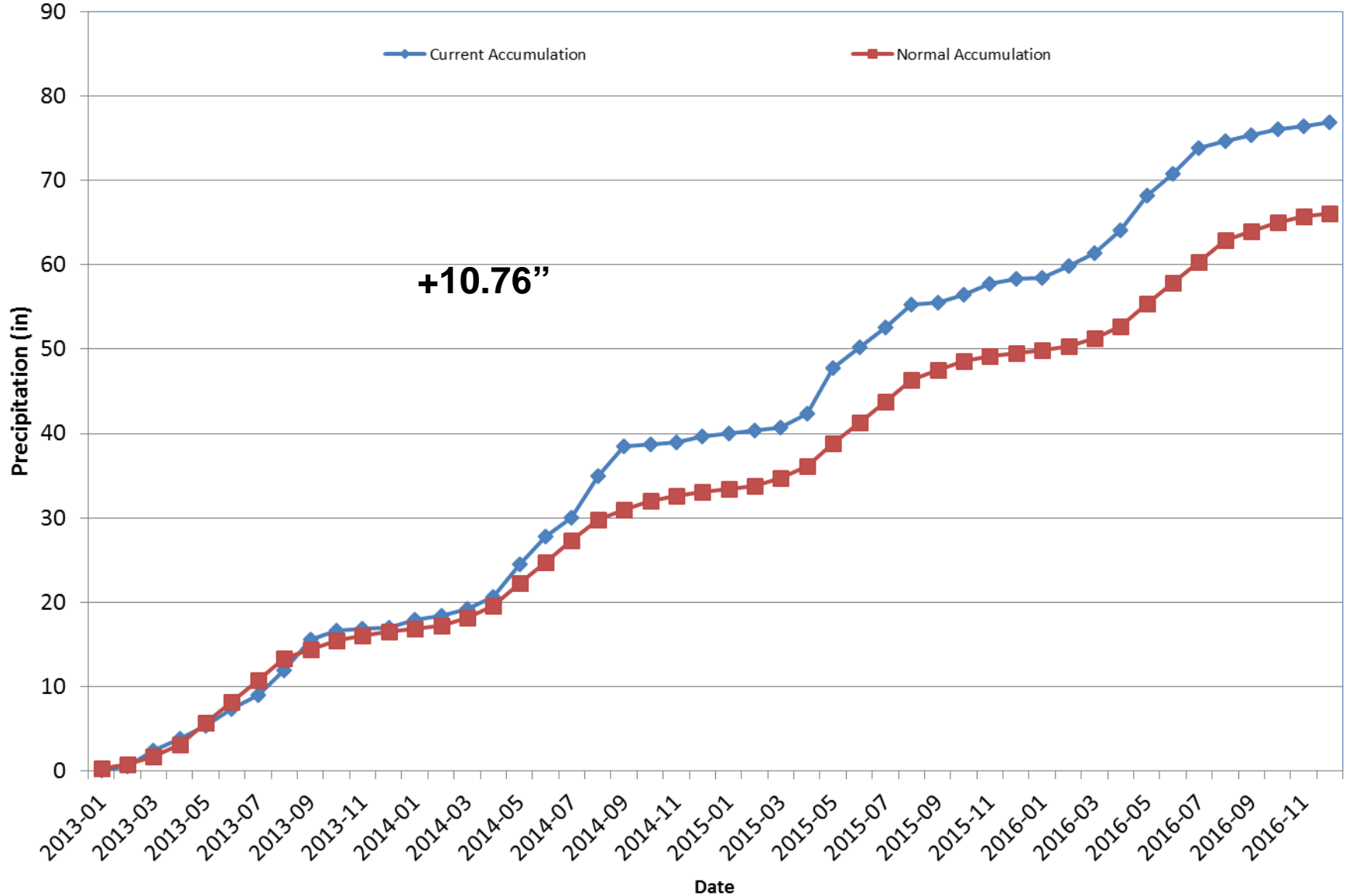
Division 7 – Akron

Akron 4E 2016 Water Year



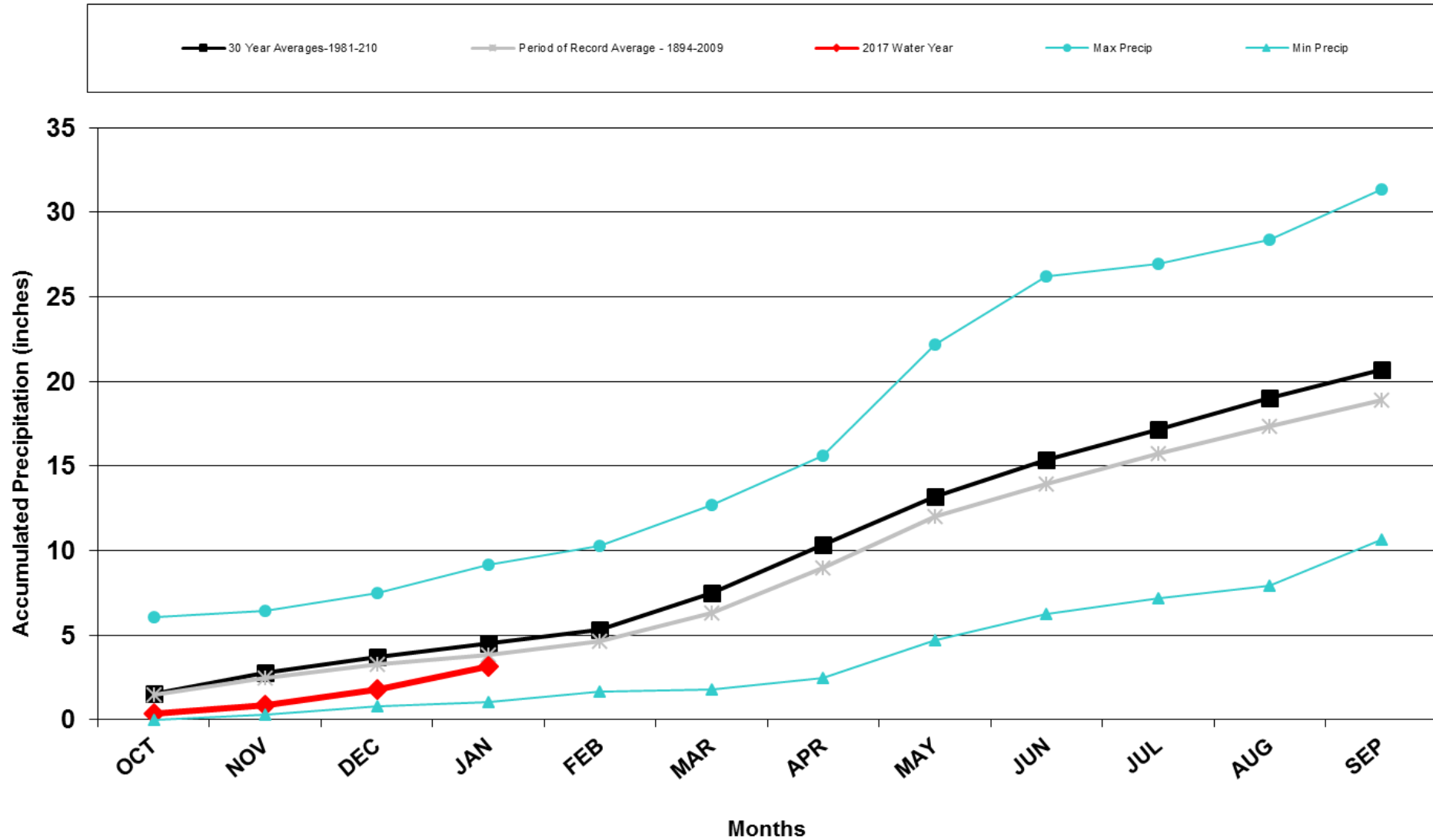
Division 7 – Akron

Akron 4E Precipitation Accumulation



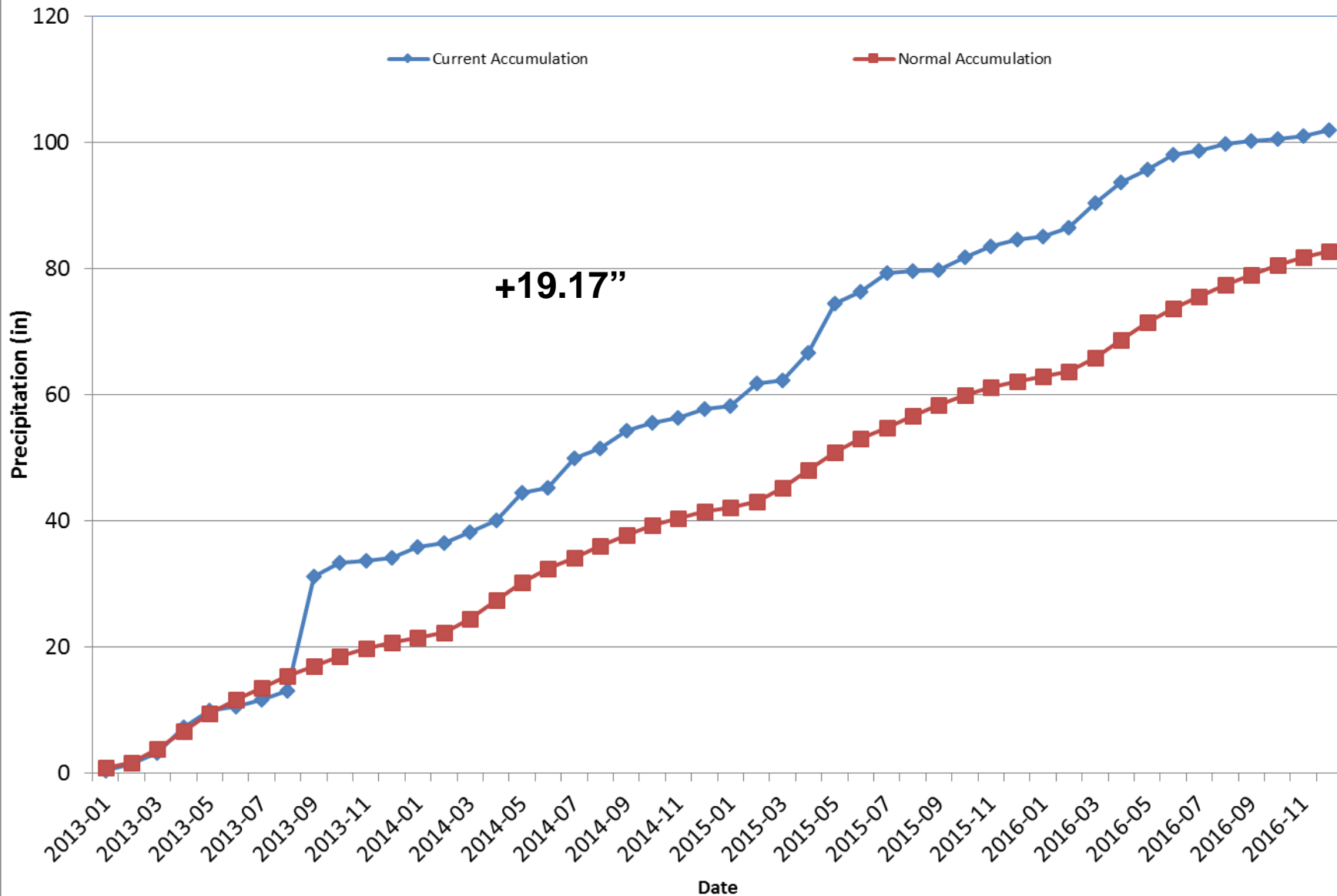
Division 8 - Boulder

Boulder 2017 Water Year



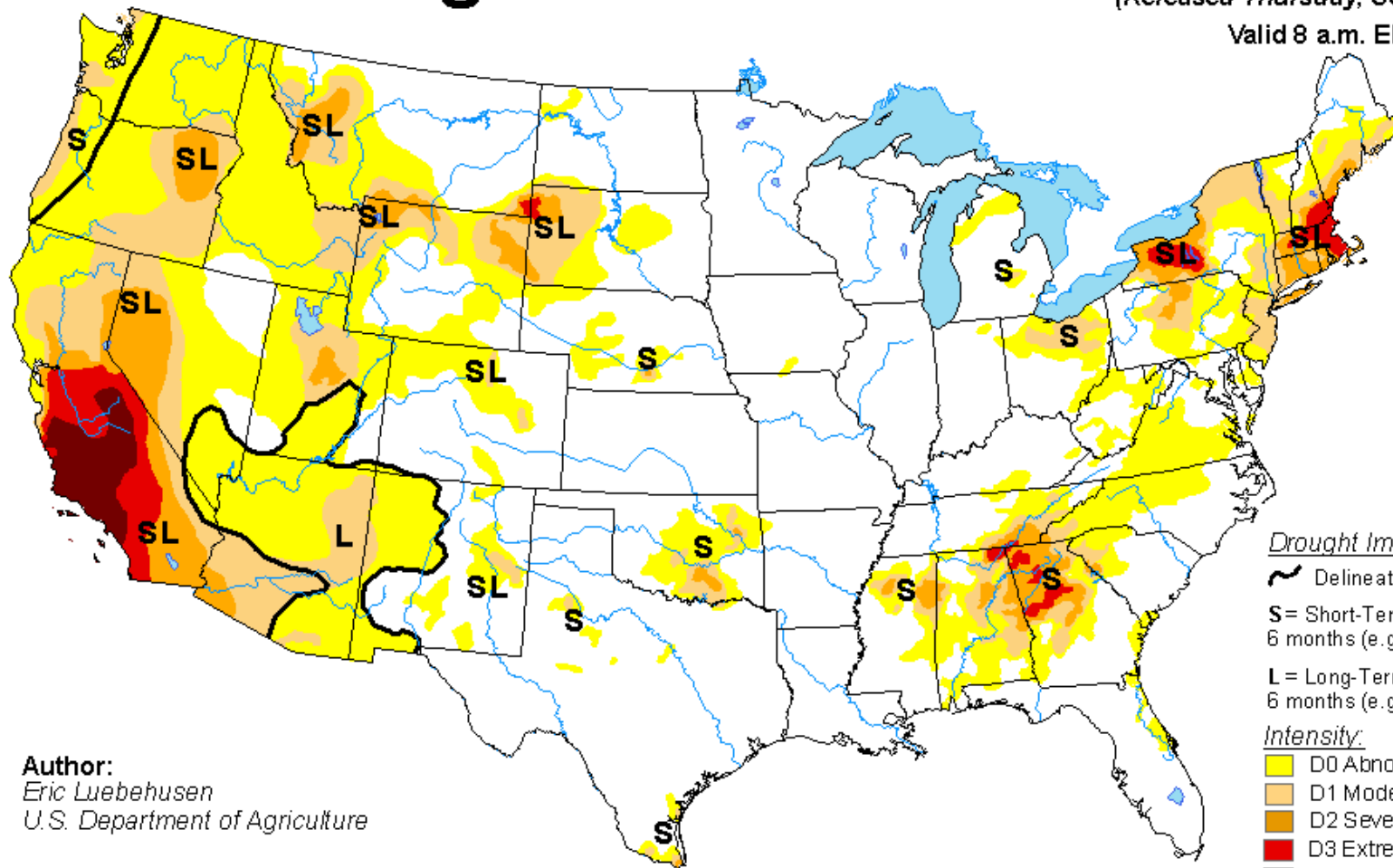
Division 8 - Boulder

Boulder Precipitation Accumulation




U.S. Drought Monitor

September 13, 2016
(Released Thursday, Sep. 15, 2016)
Valid 8 a.m. EDT








Author:
Eric Luebehusen
U.S. Department of Agriculture

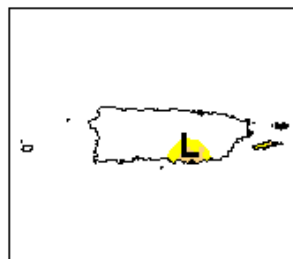
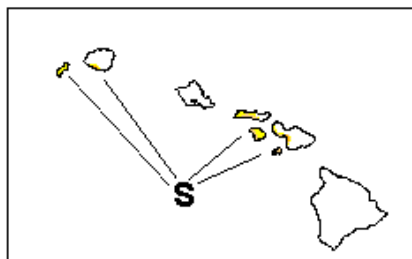
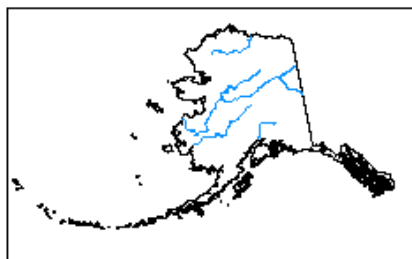
Drought Impact Types:

-  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

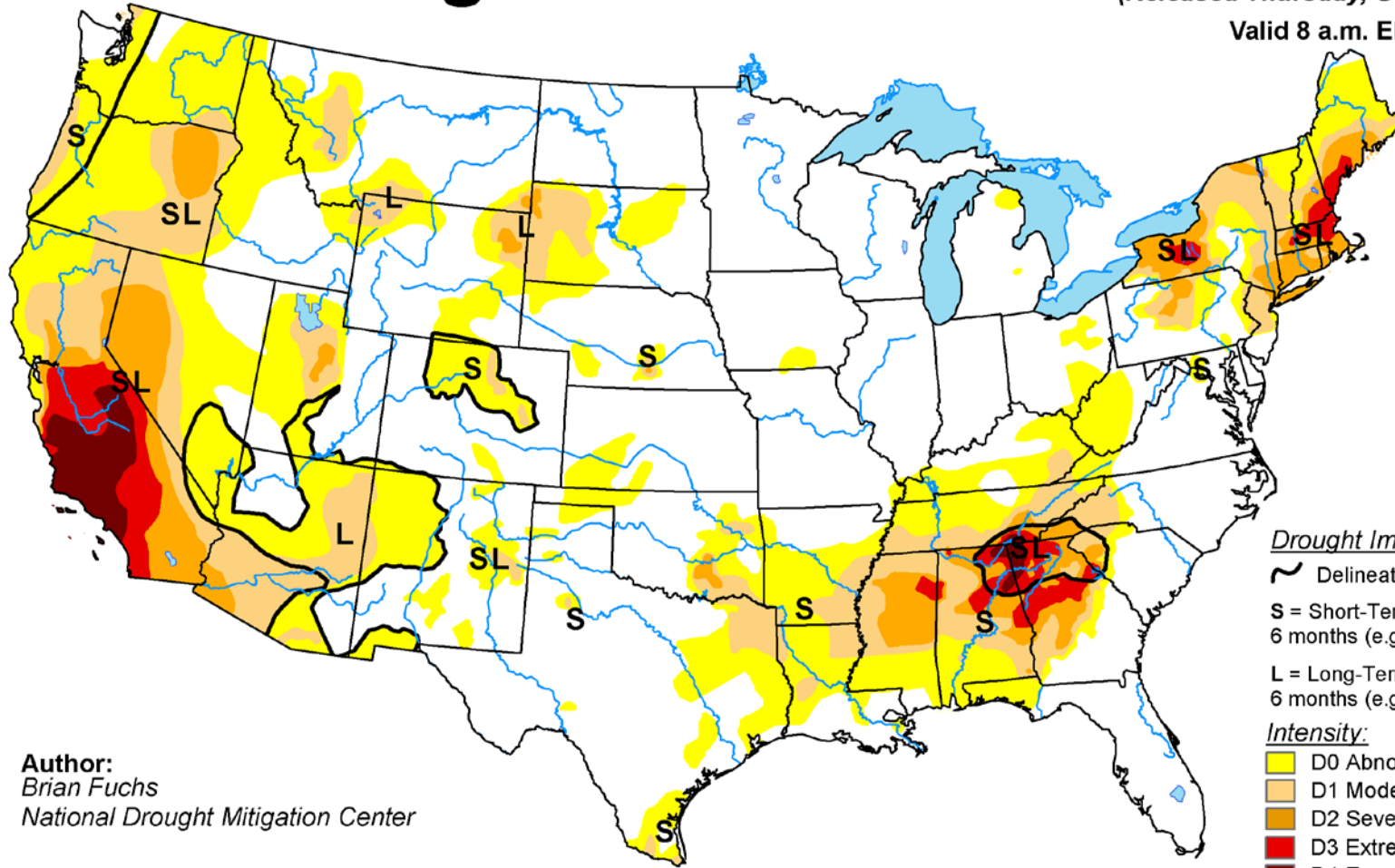
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.



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

U.S. Drought Monitor

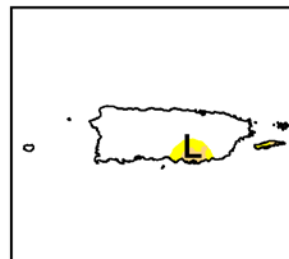
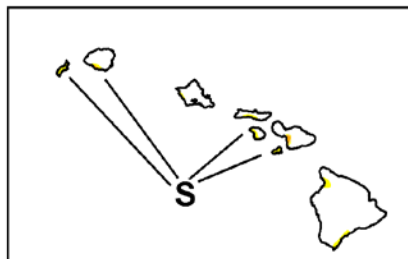
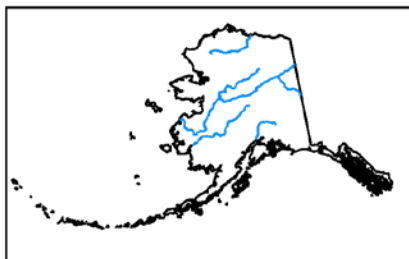
October 11, 2016
 (Released Thursday, Oct. 13, 2016)
 Valid 8 a.m. EDT



Author:
 Brian Fuchs
 National Drought Mitigation Center

- Drought Impact Types:
- ~ Delineates dominant impacts
 - S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
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- Intensity:
- Yellow: D0 Abnormally Dry
 - Light Orange: D1 Moderate Drought
 - Orange: D2 Severe Drought
 - Red: D3 Extreme Drought
 - Dark Red: D4 Exceptional Drought

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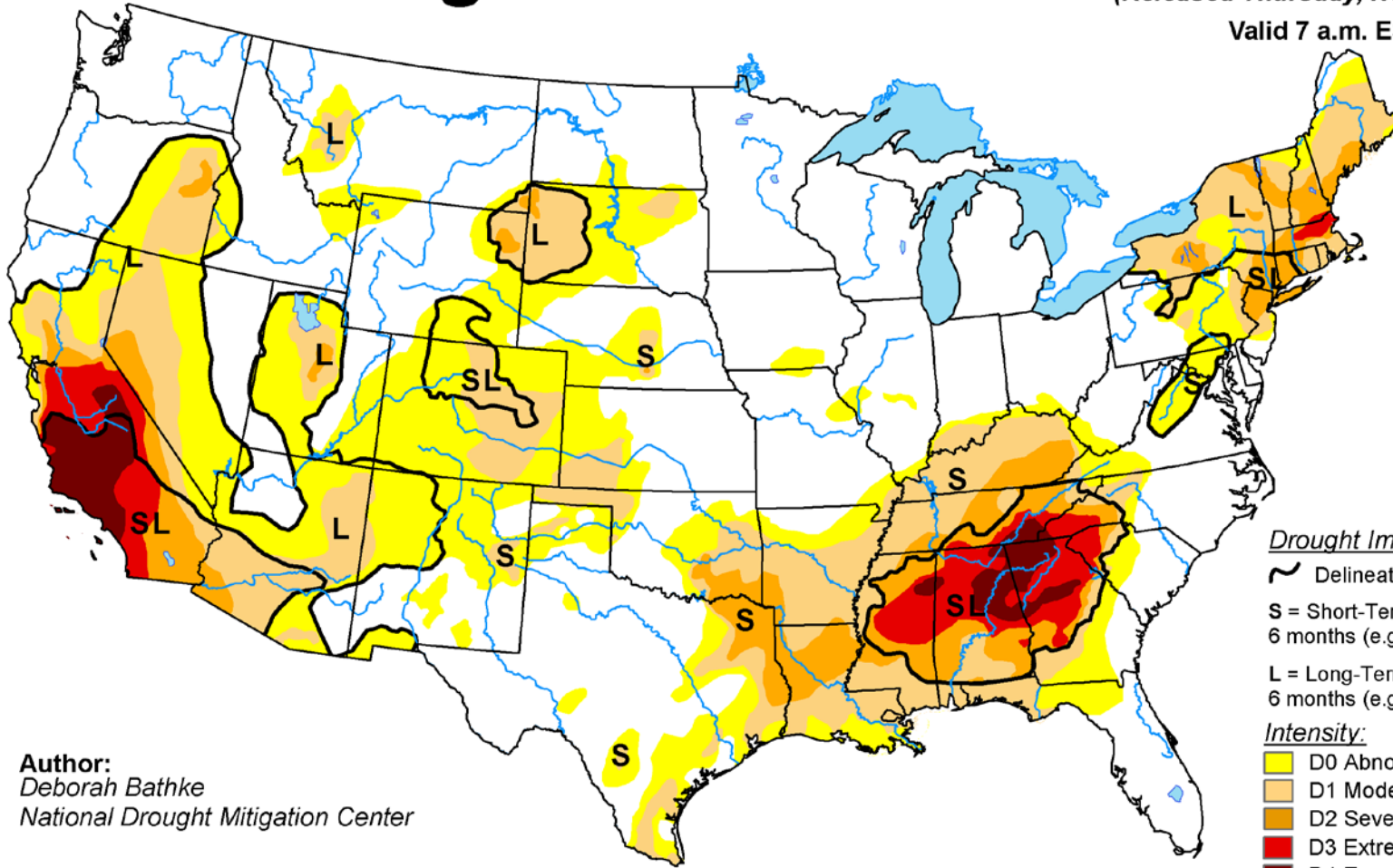


<http://droughtmonitor.unl.edu/>

U.S. Drought Monitor

November 8, 2016
(Released Thursday, Nov. 10, 2016)

Valid 7 a.m. EST



Author:
Deborah Bathke
National Drought Mitigation Center

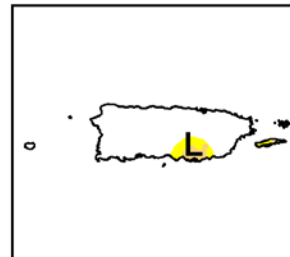
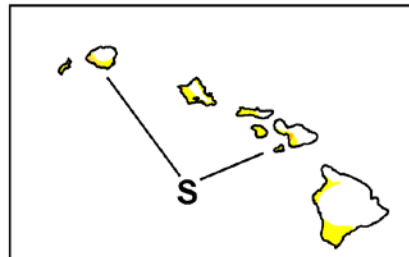
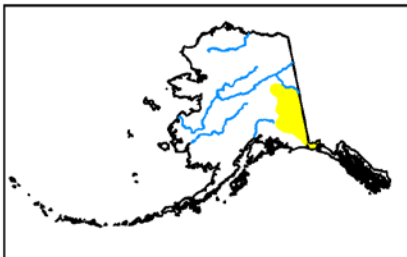
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- Medium Orange: D2 Severe Drought
- Red: D3 Extreme Drought
- Dark Red: D4 Exceptional Drought

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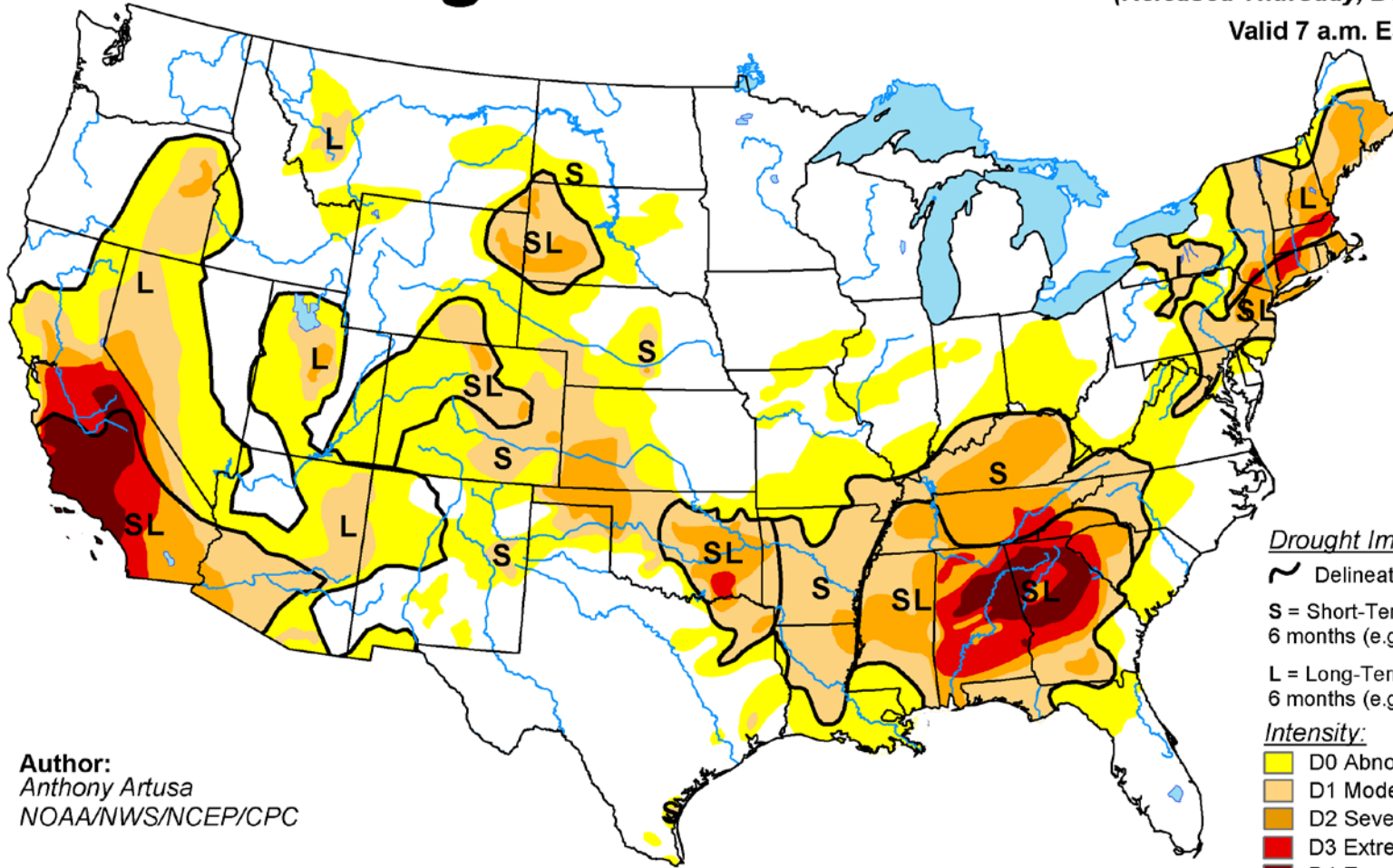


<http://droughtmonitor.unl.edu/>

U.S. Drought Monitor

December 13, 2016
(Released Thursday, Dec. 15, 2016)

Valid 7 a.m. EST



Author:
Anthony Artusa
NOAA/NWS/NCEP/CPC

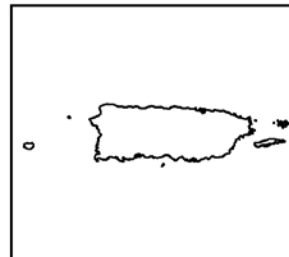
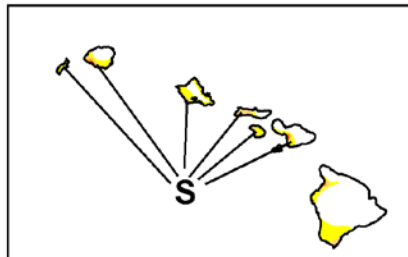
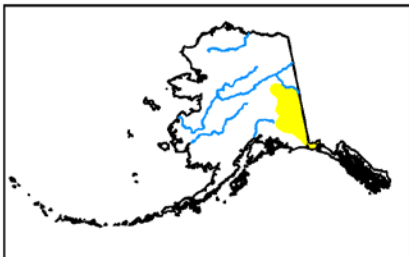
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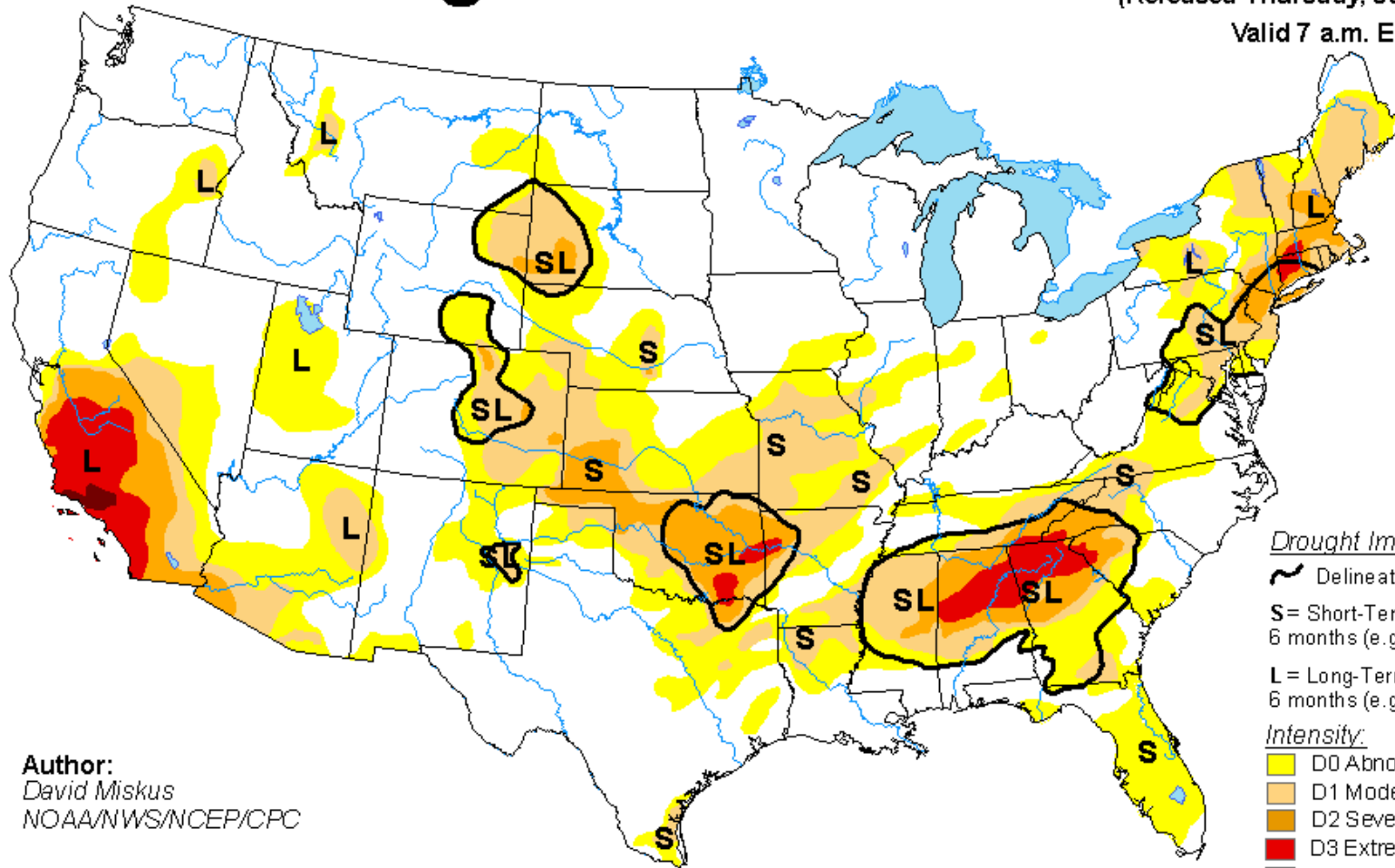
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U.S. Drought Monitor

January 10, 2017
(Released Thursday, Jan. 12, 2017)
Valid 7 a.m. EST



Author:
David Miskus
NOAA/NWS/NCEP/CPC

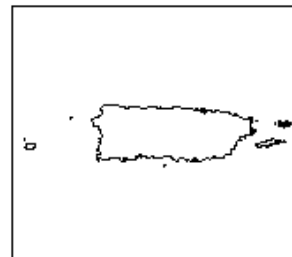
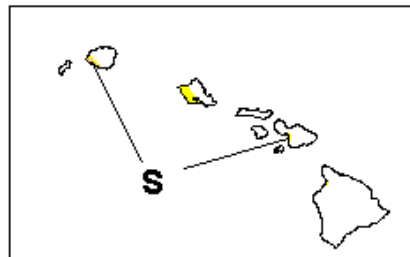
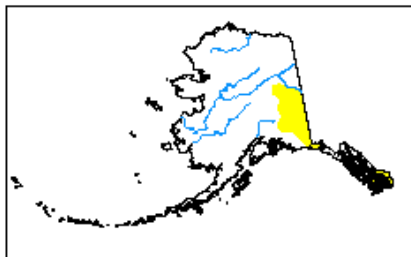
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- D4 Exceptional Drought

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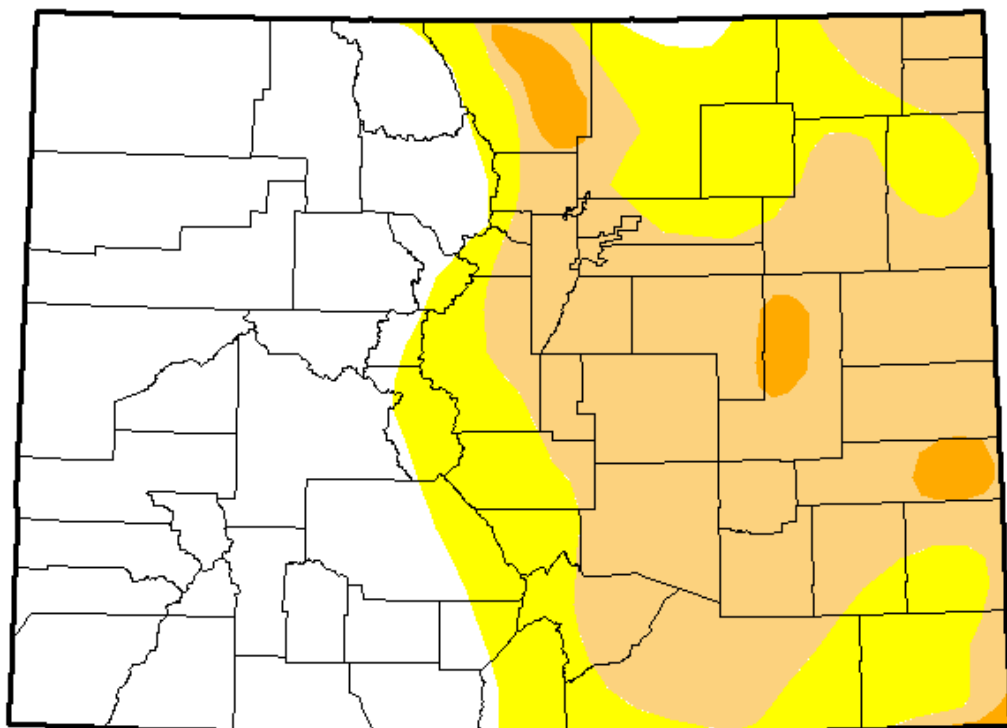


<http://droughtmonitor.unl.edu/>

U.S. Drought Monitor

Colorado

January 10, 2017
 (Released Thursday, Jan. 12, 2017)
 Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	44.17	55.83	35.34	2.28	0.00	0.00
Last Week <i>1/3/2017</i>	31.88	68.12	37.21	2.88	0.00	0.00
3 Months Ago <i>10/11/2016</i>	75.77	24.23	2.45	0.00	0.00	0.00
Start of Calendar Year <i>1/3/2017</i>	31.88	68.12	37.21	2.88	0.00	0.00
Start of Water Year <i>9/27/2016</i>	70.49	29.51	2.45	0.00	0.00	0.00
One Year Ago <i>1/12/2016</i>	89.98	10.02	0.00	0.00	0.00	0.00

Intensity:

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

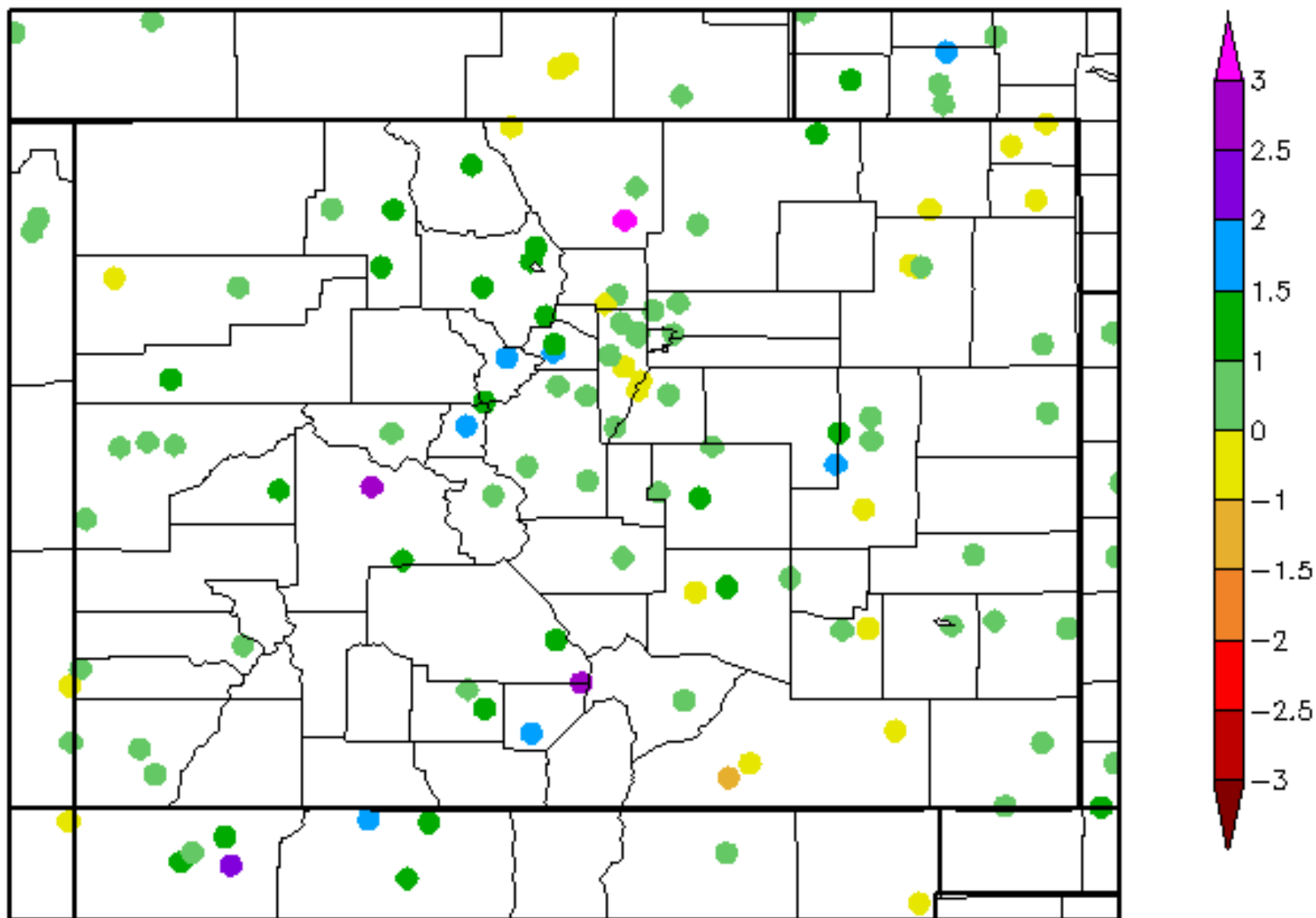
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Author:
 David Miskus
 NOAA/NWS/NCEP/CPC



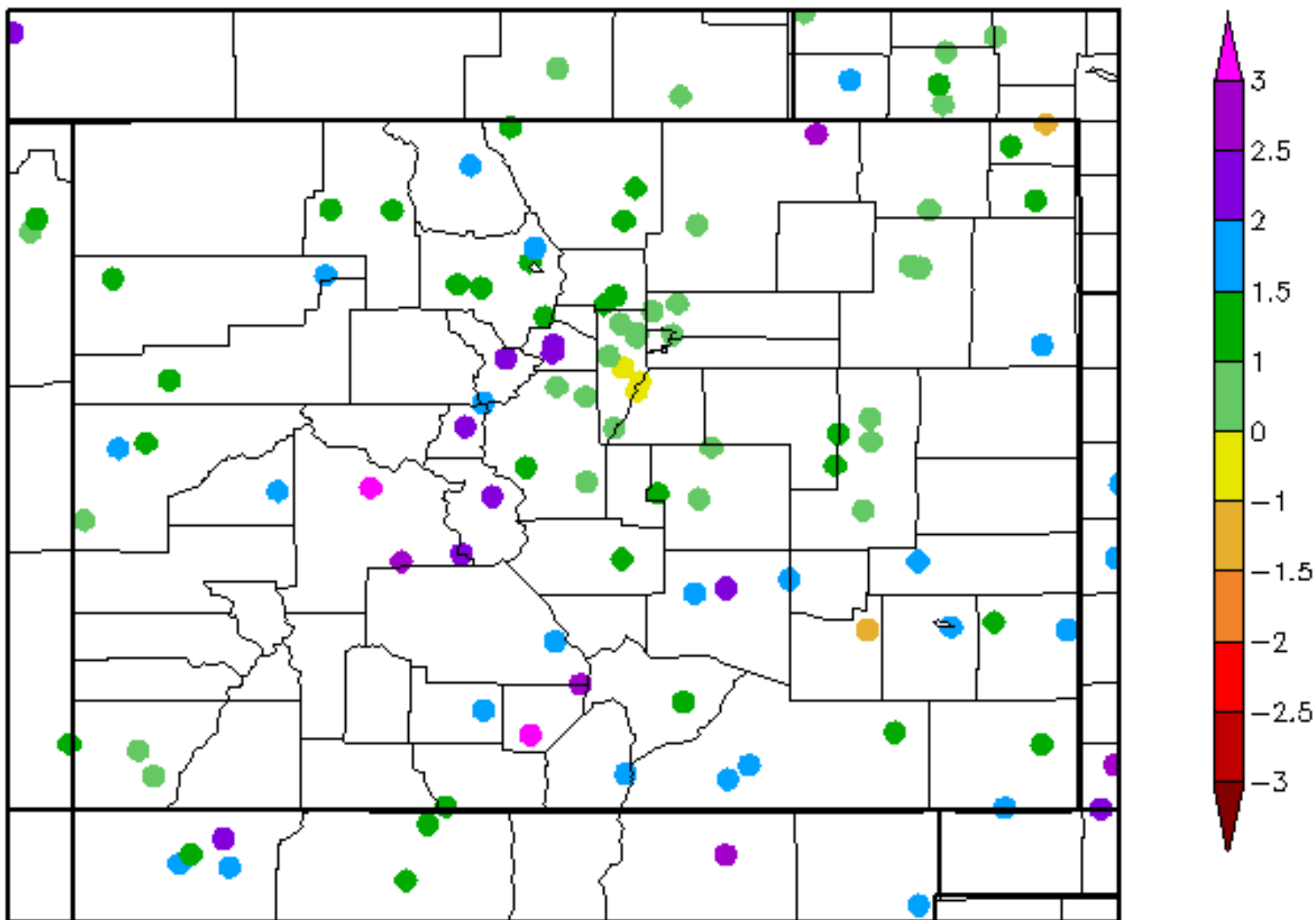
Monthly SPI

12/1/2016 - 12/31/2016



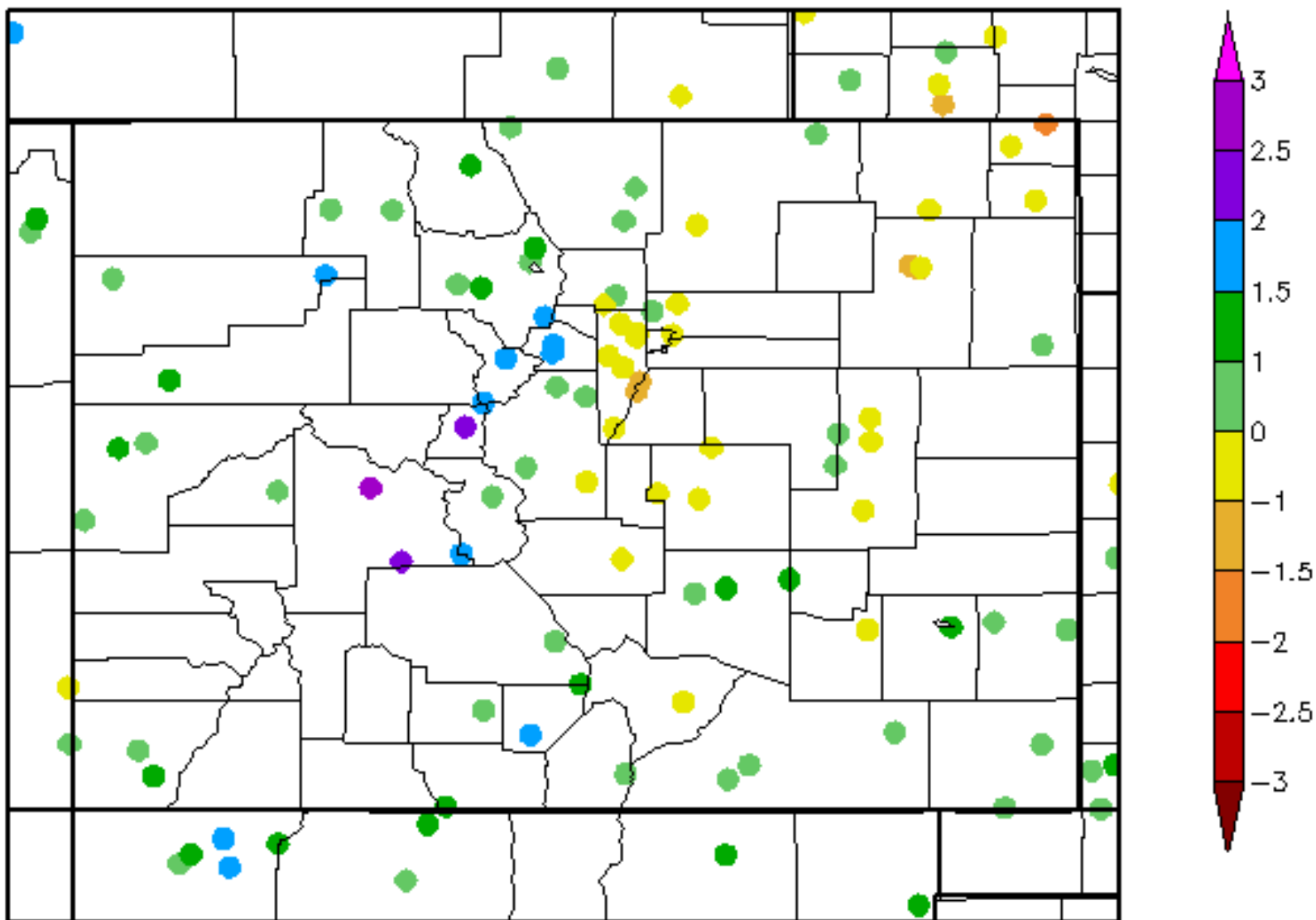
30 Day SPI

12/19/2016 - 1/17/2017



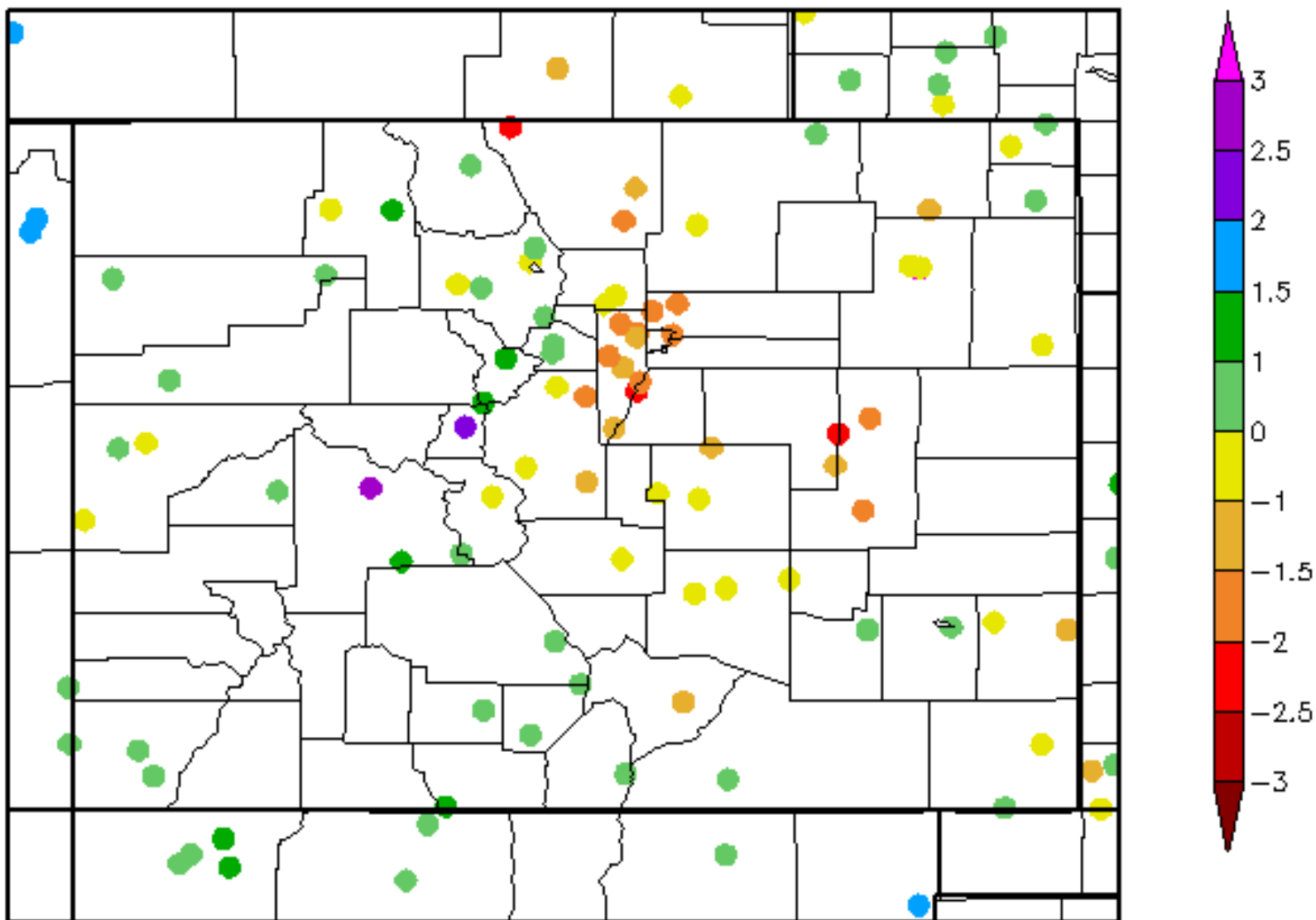
90 Day SPI

10/20/2016 - 1/17/2017

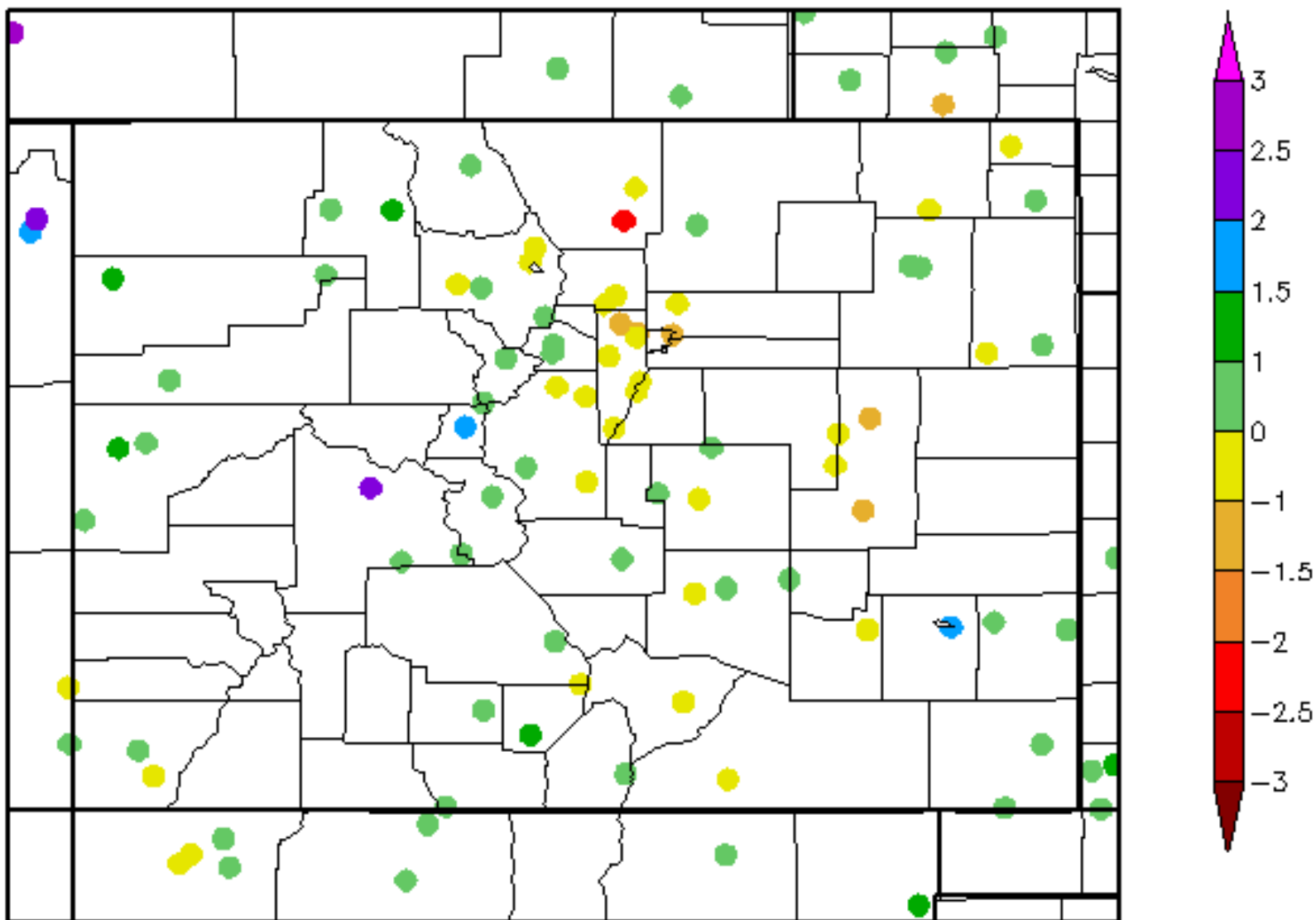


6 Month SPI

7/18/2016 - 1/17/2017

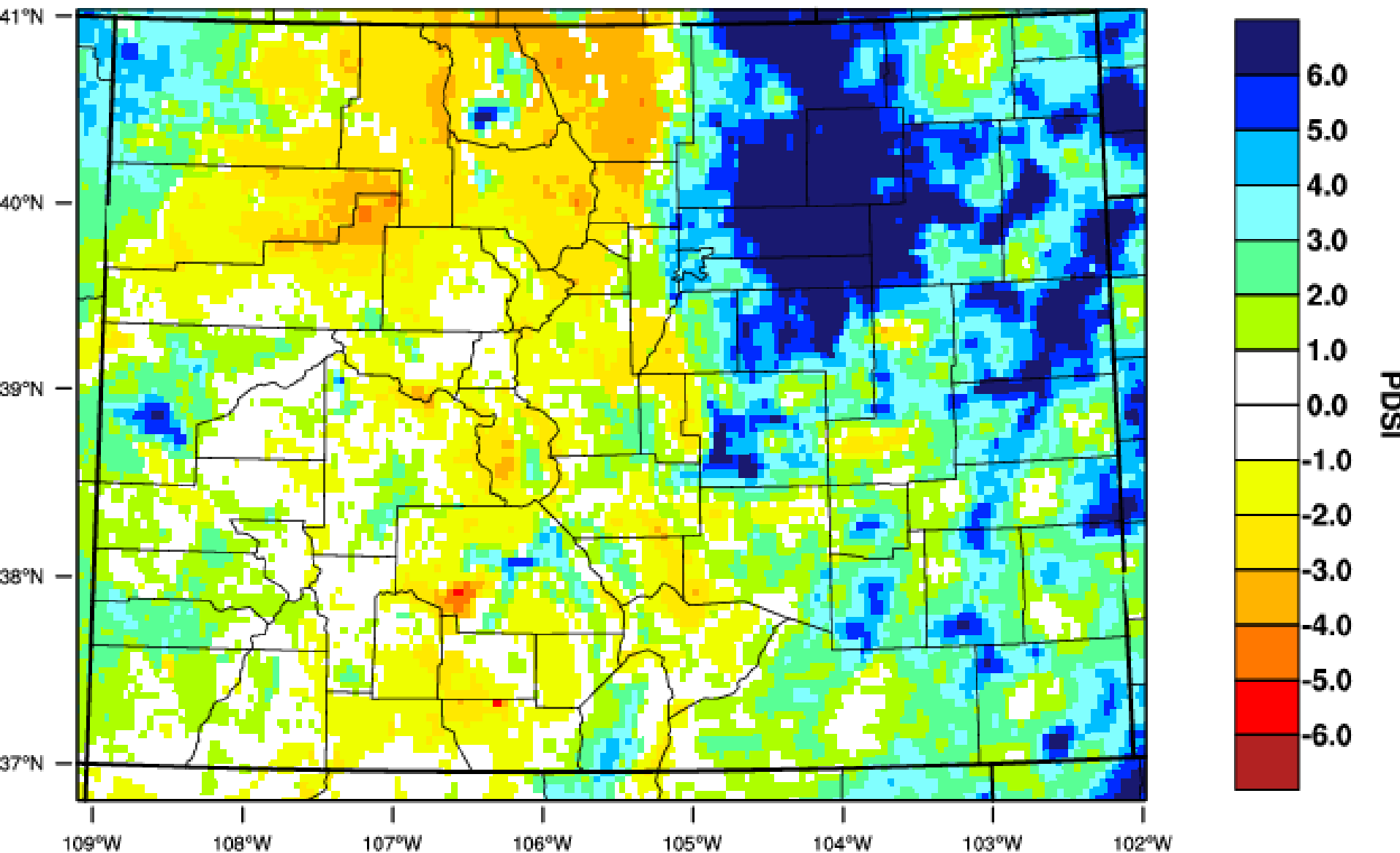


12 Month SPI 1/18/2016 - 1/17/2017



Colorado - PDSI

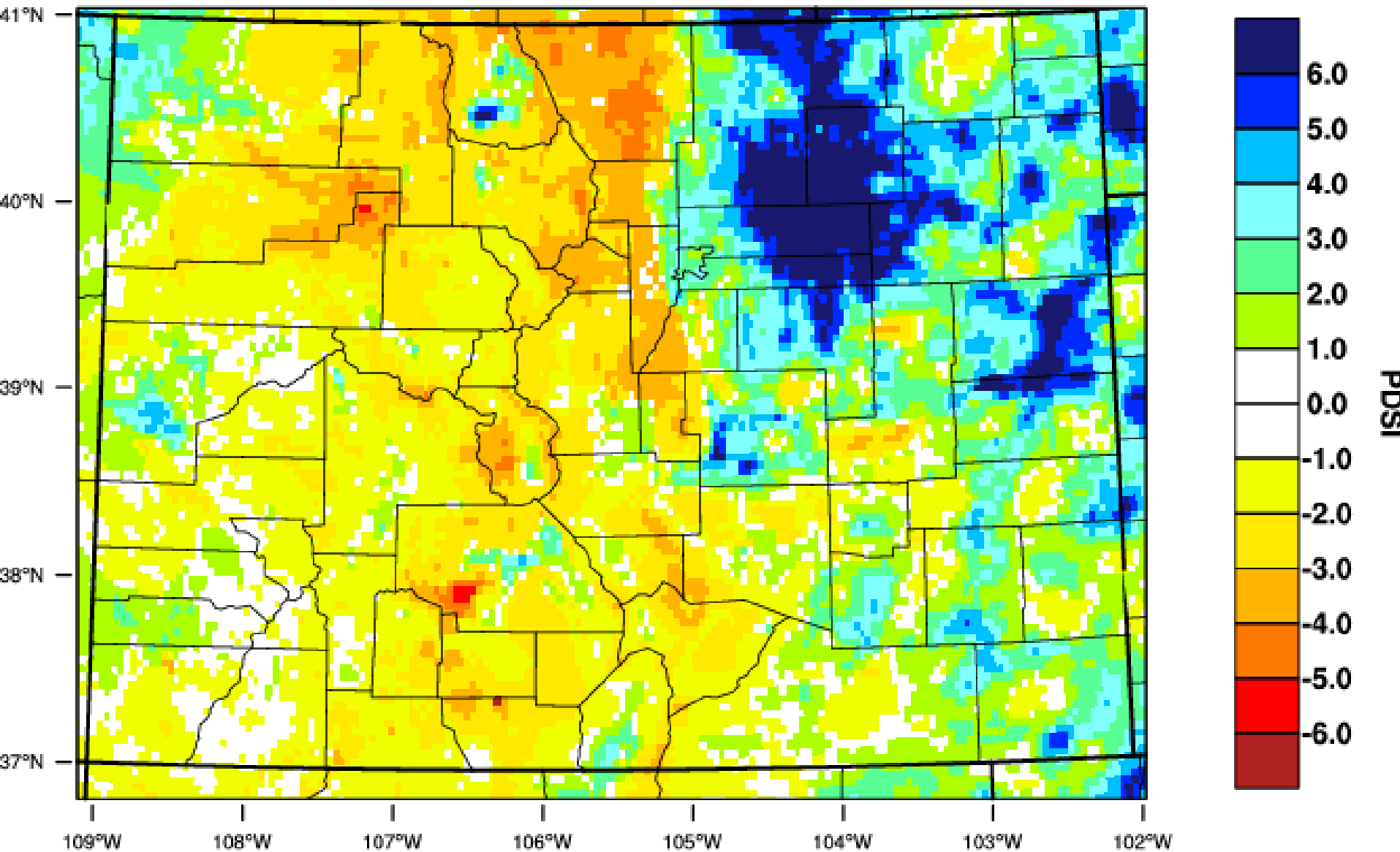
September 2016



WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 16 OCT 2016

Colorado - PDSI

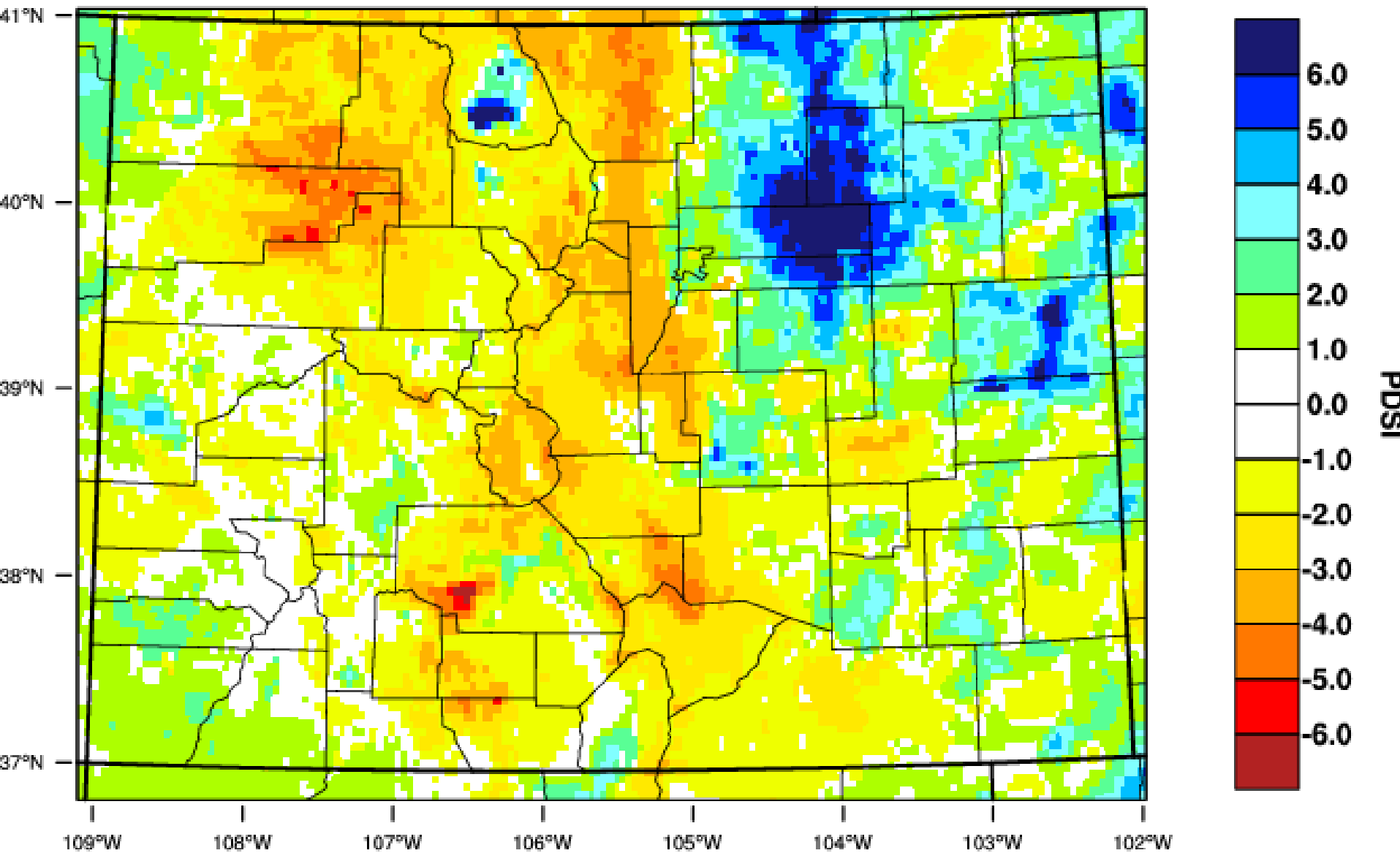
October 2016



WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 11 NOV 2016

Colorado - PDSI

December 2016

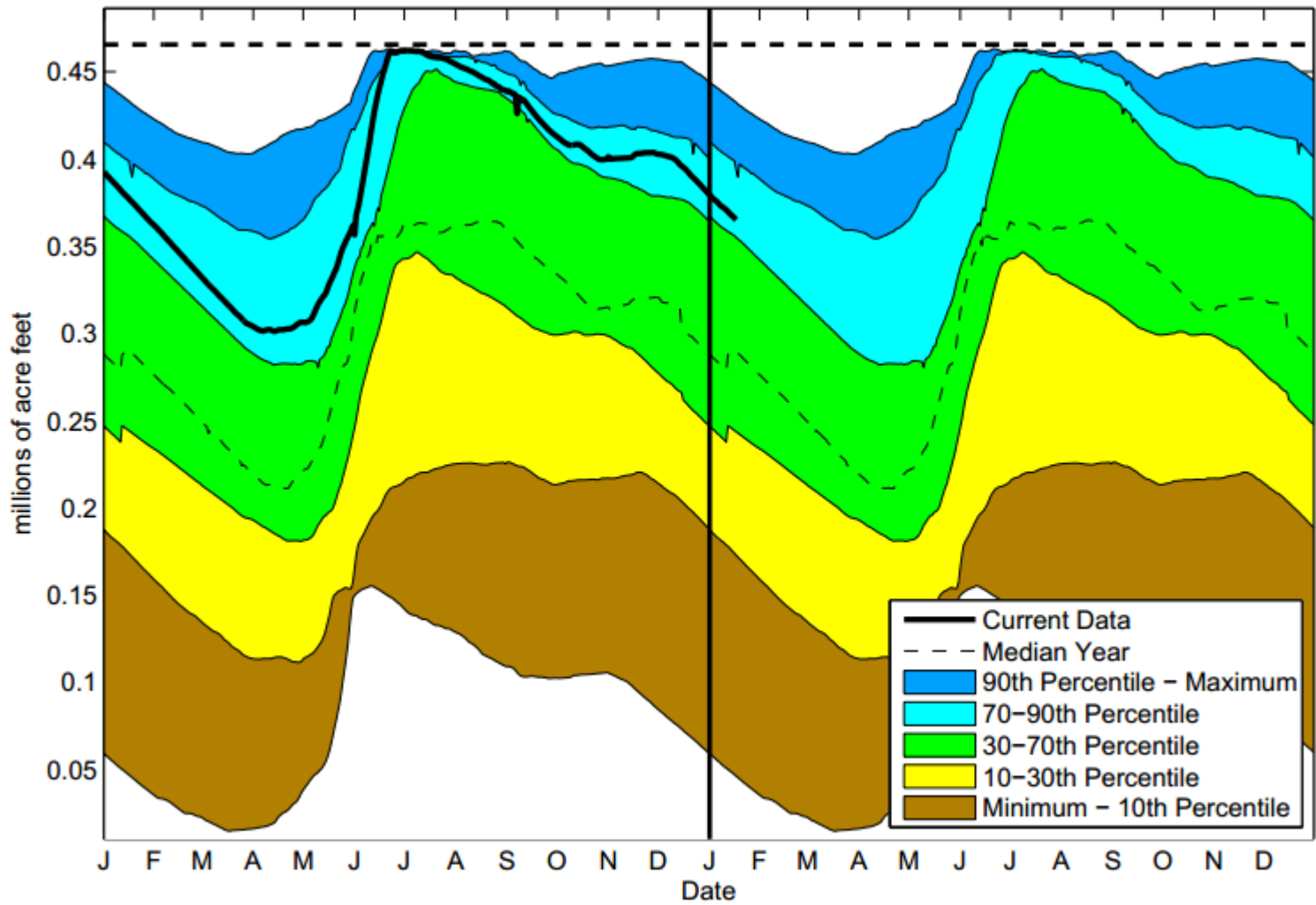


WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 7 JAN 2017

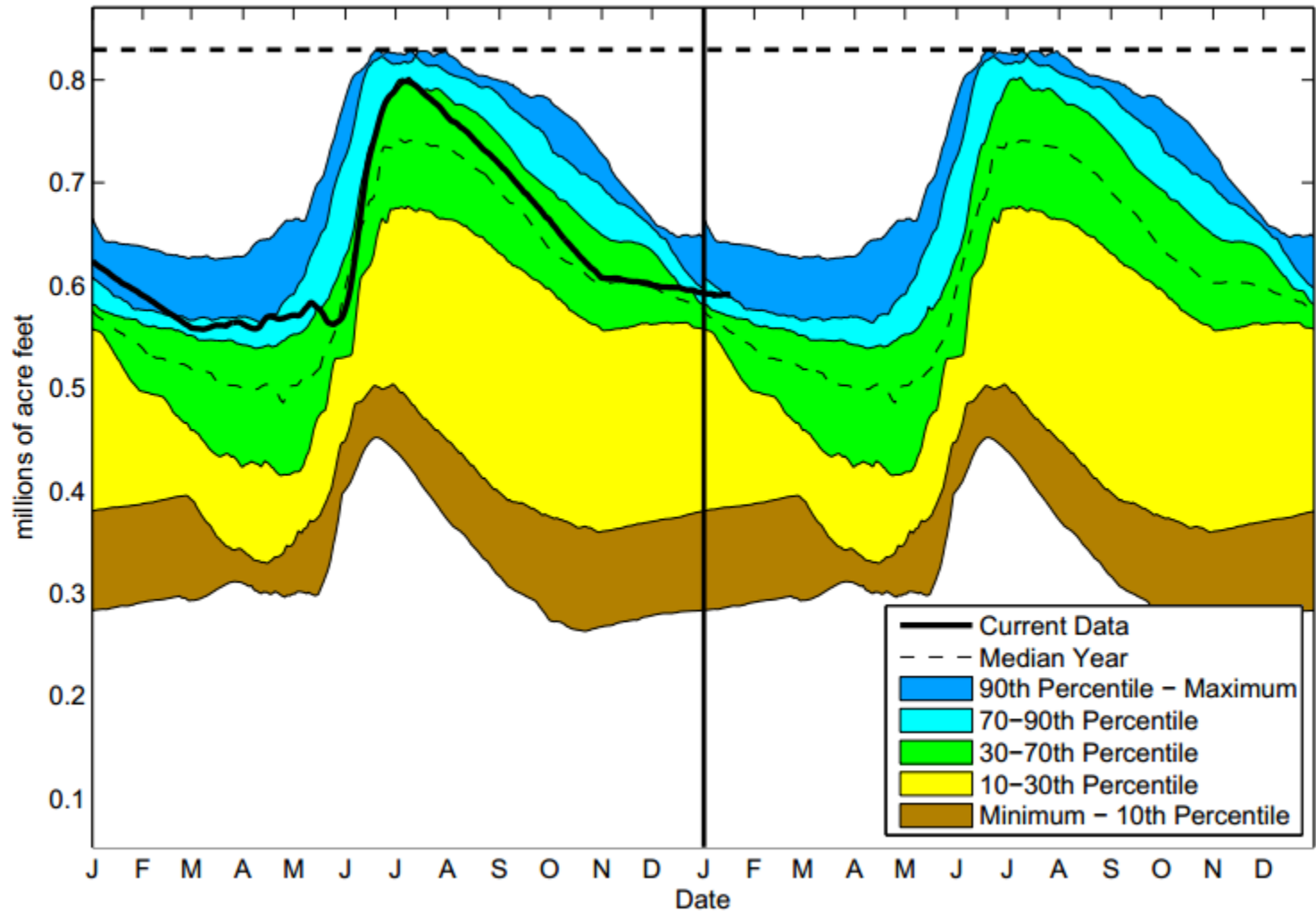
Reservoir and Soils Update



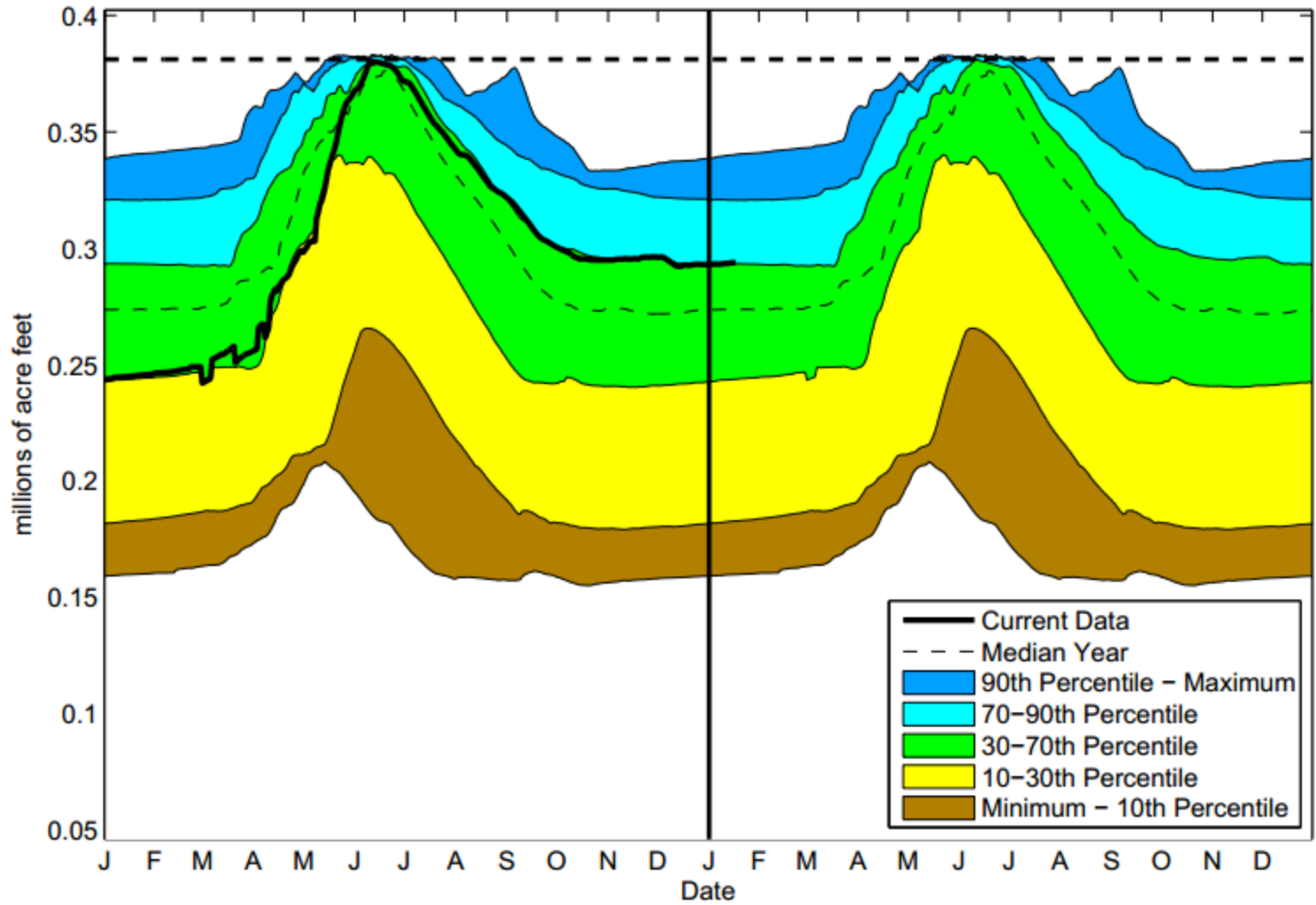
Lake Granby Reservoir Level 01/17/2017
127 Percent of 2000-2015 Average



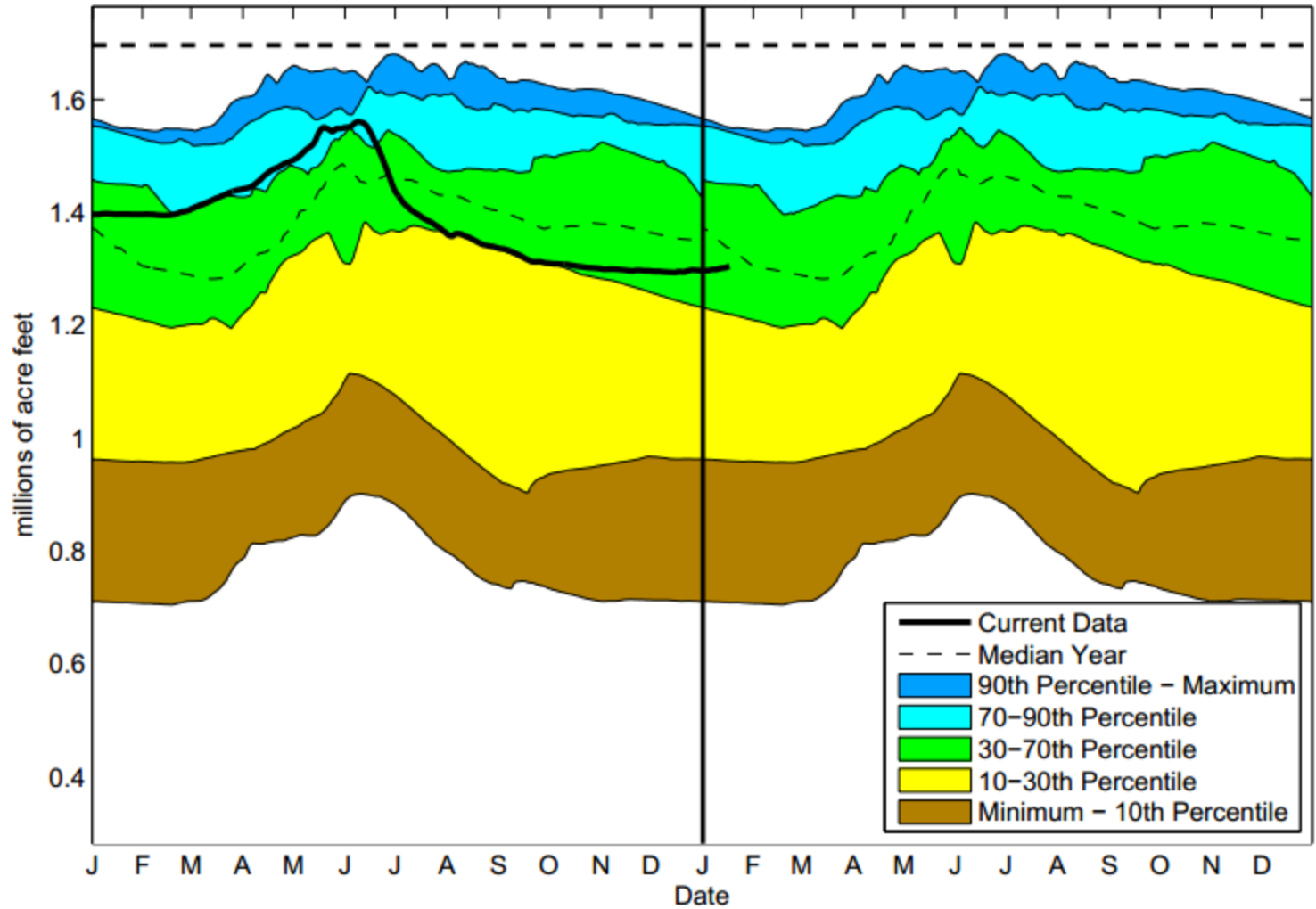
Blue Mesa Reservoir Level 01/17/2017
112 Percent of 1985-2015 Average



McPhee Reservoir Level 01/17/2017
112 Percent of 1985-2015 Average



Navajo Reservoir Level 01/17/2017
101 Percent of 1985-2015 Average





Raw Water Supply Daily Report

Day: Friday

Date: 1/13/2017

Reservoir Operations:

	Inflow (cfs)	Outflow (cfs)	Elevation (feet)	Storage (ac-ft)	Change (ac-ft)	Full Elev. (feet)	Capacity (ac-ft)
South Platte System:							
Antero	6	6	8,939.13	14,289	0	8,942	19,881
Eleven Mile	41	75	8,597.53	99,589	-69	8,597	97,779
Cheesman	102	62	6,830.17	69,209	80	6,842	79,064
Strontia Springs	226	173	5,997.76	7,439	46	6,002	7,863
Chatfield	59	0	5,431.05	25,756	96	5,432	27,076
Marston	147	169	5,525.41	11,346	-28	5,538	19,256
Soda Lakes	---	---	---	1,028	0		1,680
Platte Canyon	0	---	5,529.20	698	-1	5,533	910
South Complex	1	1	---	2,910	-1		3,561
Harriman	---	---	5,621.71	692	0	5,623	762
Moffat System:							
Gross	18	8	7,238.62	26,333	21	7,282	41,811
Ralston	2	1	6,019.41	6,811	-88	6,046	10,776
Upper Long Lake	0	0	6,075.42	854	0	6,088	1,519
Lower Long Lake	0	0	5,895.75	16	0	5,908	268
Western Slope:							
Dillon	89	98	9,008.27	230,439	-175	9,017	257,304
Williams Fork	48	75	7,796.30	75,292	-53	7,811	96,822
Meadow Creek	1	1	9,942.57	18	0	9,995	5,370
Total System:				572,720	-172		671,702
Non-system							
Wolford Mountain	19	24	7,478.37	51,030	-10	7,489	65,985
Green Mountain	185	300	7,899.39	70,054	-230	7,950	153,639
Spinney Mountain	20	60	---	31,358	N/A		53,651

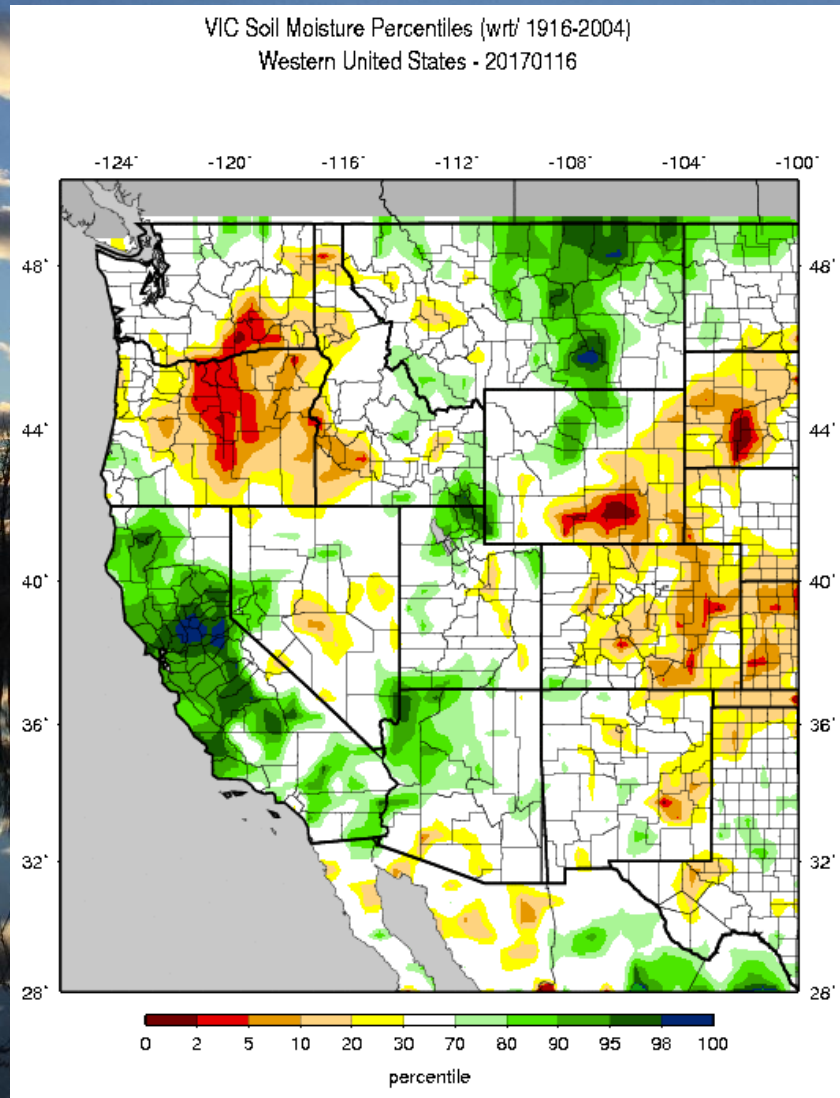
Raw Water Distribution:

(all flows in cubic feet per second, cfs)

South Platte System:

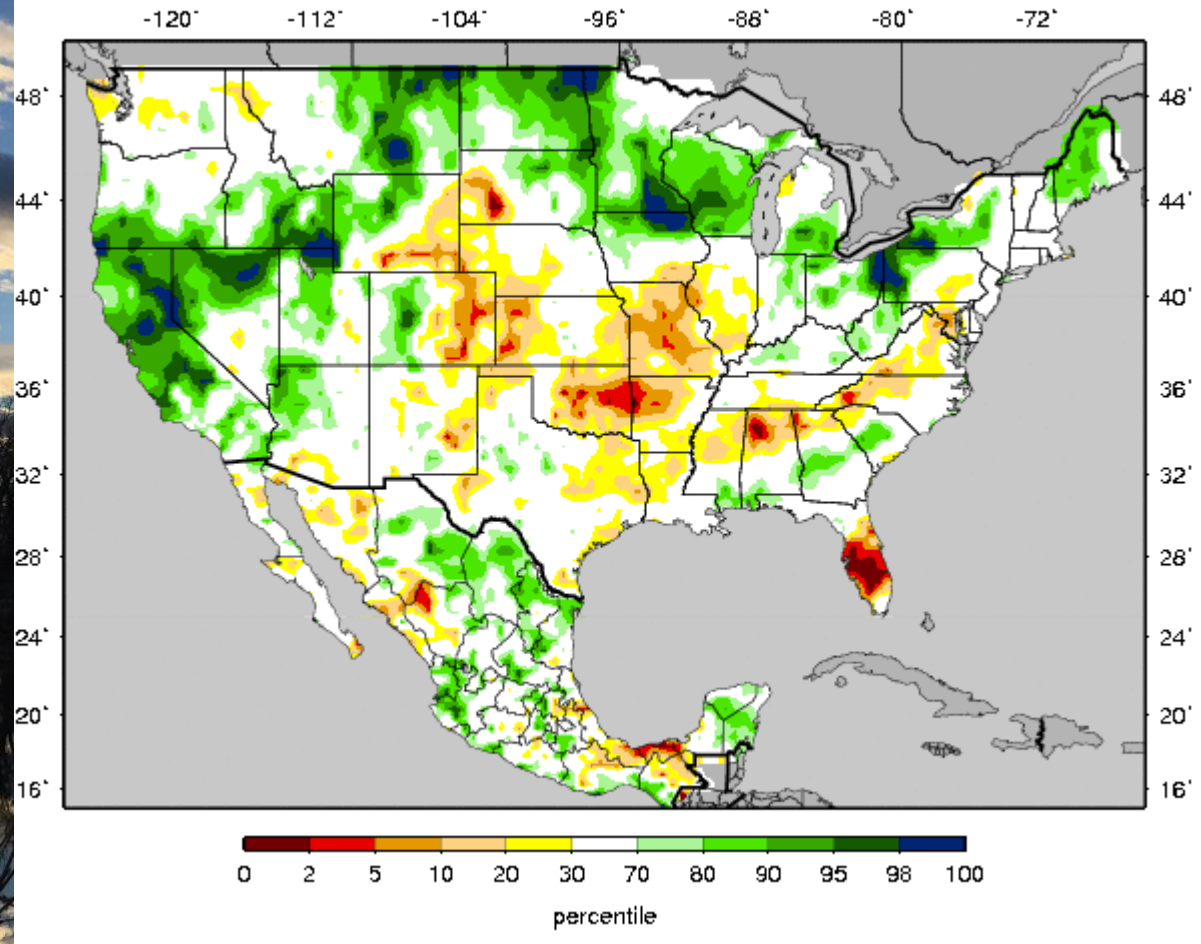
Roberts Tunnel	79
Conduit 26 to Foothills TP	0
Conduit 20 to Marston Lake	147
From Diversion Dam	133
From Last Chance Pump	14
From Chatfield Pumps	0
Conduit 15 to Marston Lake	0
High Line Canal Total Flow	0
City Ditch at Washington Park	0
Harriman Ditch Total Flow	0
Metro Sewer Effluent Exchange	0
Bi-City Effluent Exchange	0
South Complex Exchange	0
Recycling Plant	10
Moffat System:	
Moffat Tunnel	10
Jones Pass Tunnel	1
South Boulder Canal	0
Long Lake Feeder Ditch	0
Ralston to Moffat TP	33
Ralston/Clear Creek Canal	0

Soil Moisture Update

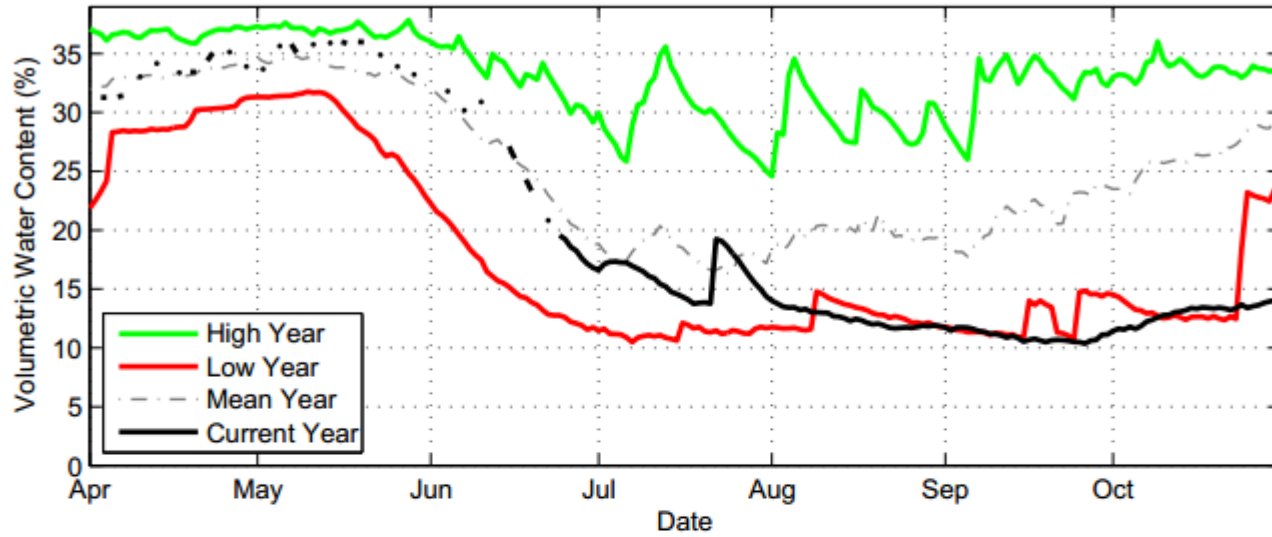


VIC Total Moisture Storage Percentiles (wrt/ 1916-2004)

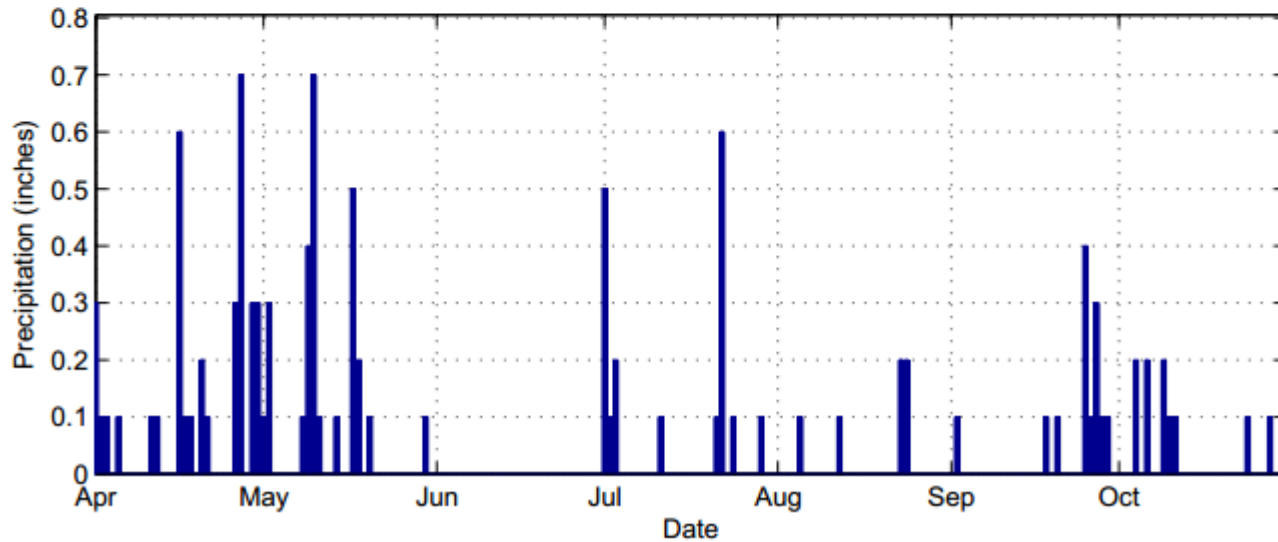
20170116



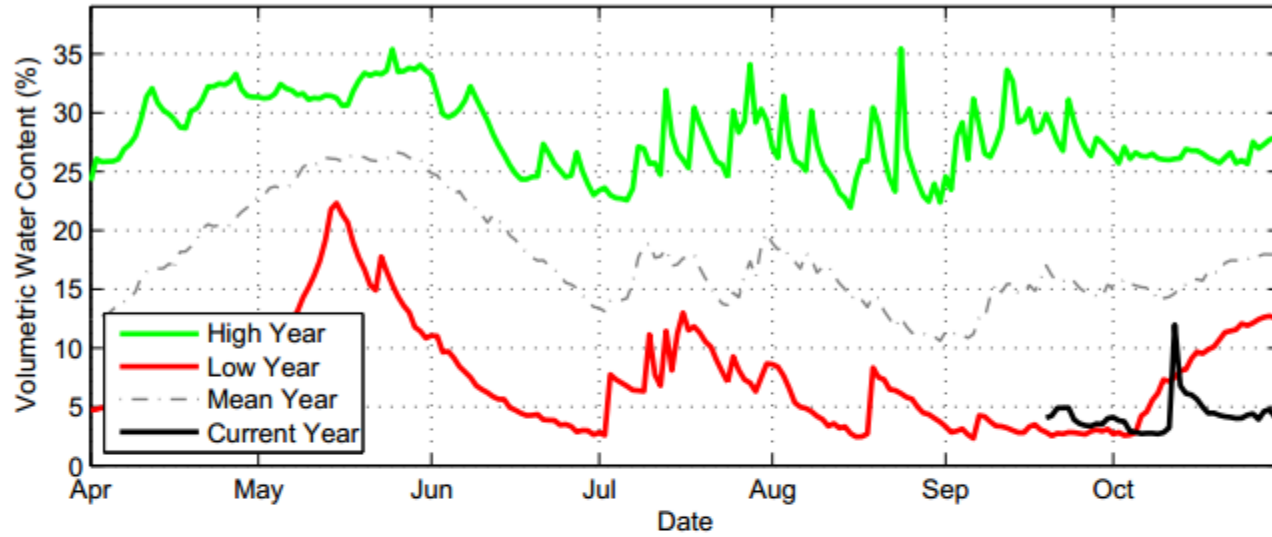
Root Zone Soil Moisture at Burro Mountain, CO
(Data from 2003–Present Elevation = 9400 ft)



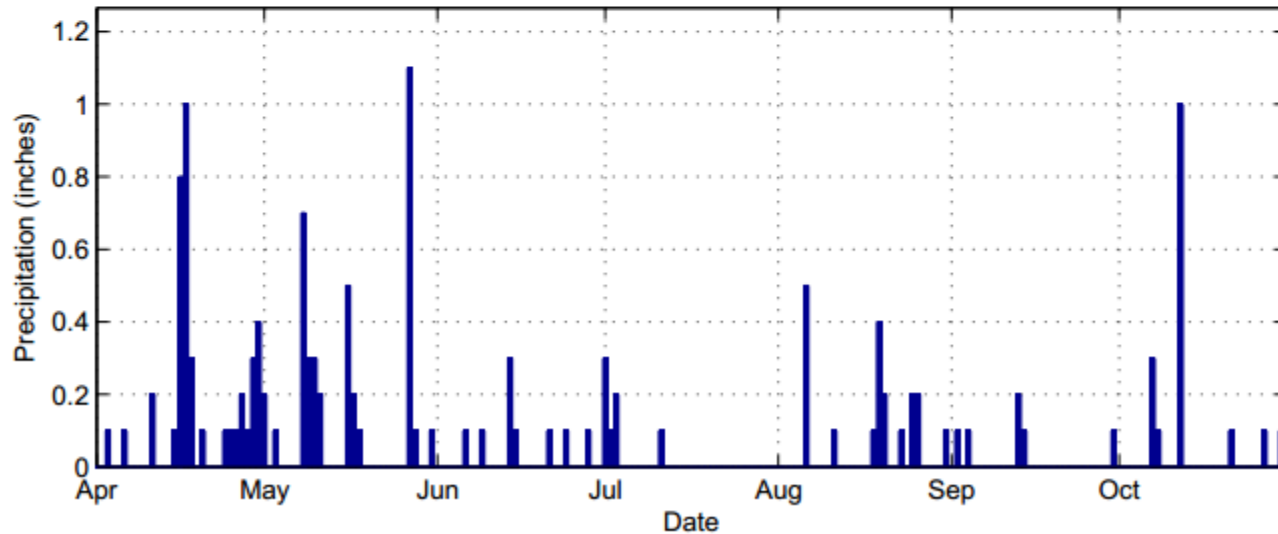
Daily Precipitation at Burro Mountain, CO



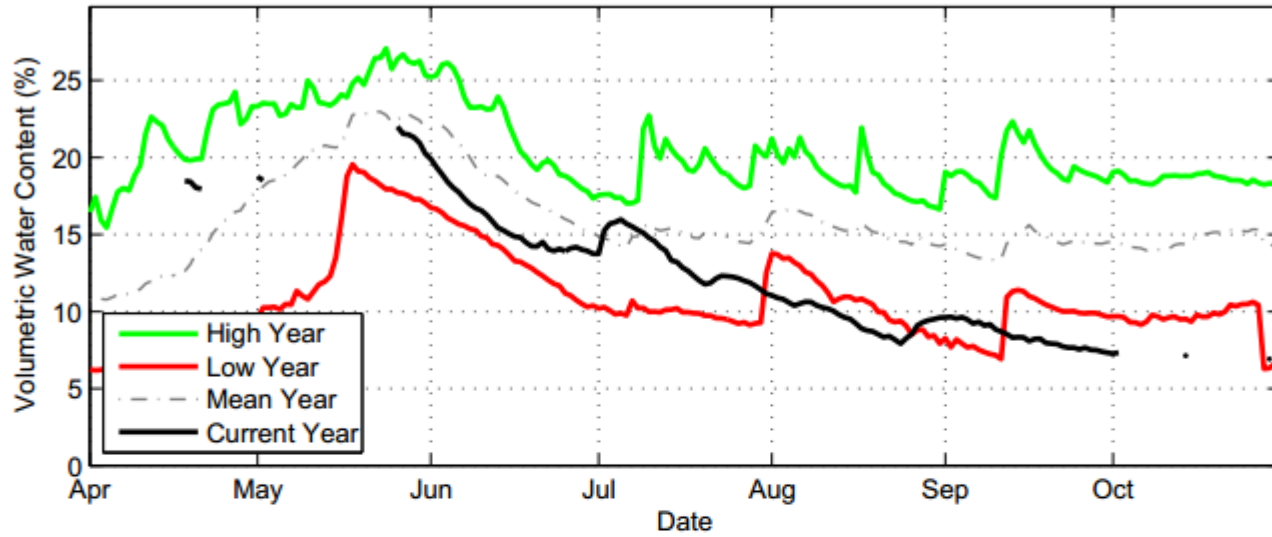
Root Zone Soil Moisture at Wild Basin, CO
(Data from 2006–Present Elevation = 9518 ft)



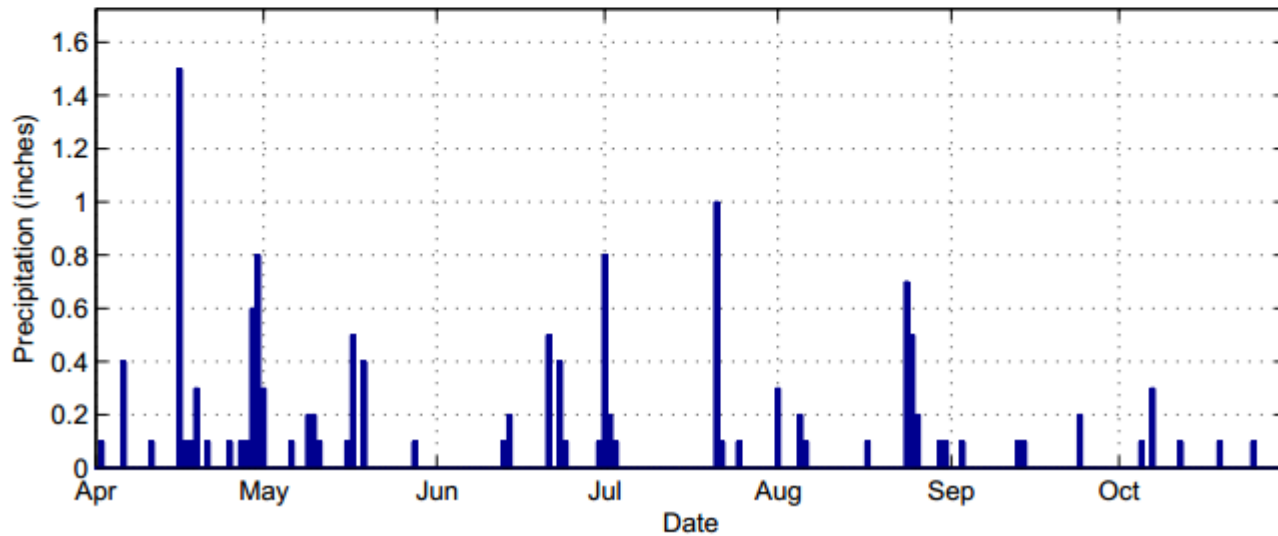
Daily Precipitation at Wild Basin, CO



Root Zone Soil Moisture at Michigan Creek, CO
(Data from 2006–Present Elevation = 10600 ft)



Daily Precipitation at Michigan Creek, CO



Colorado Climate Center

Data and Power Point Presentations available for downloading

<http://ccc.atmos.colostate.edu/droughtpresentations.php>



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