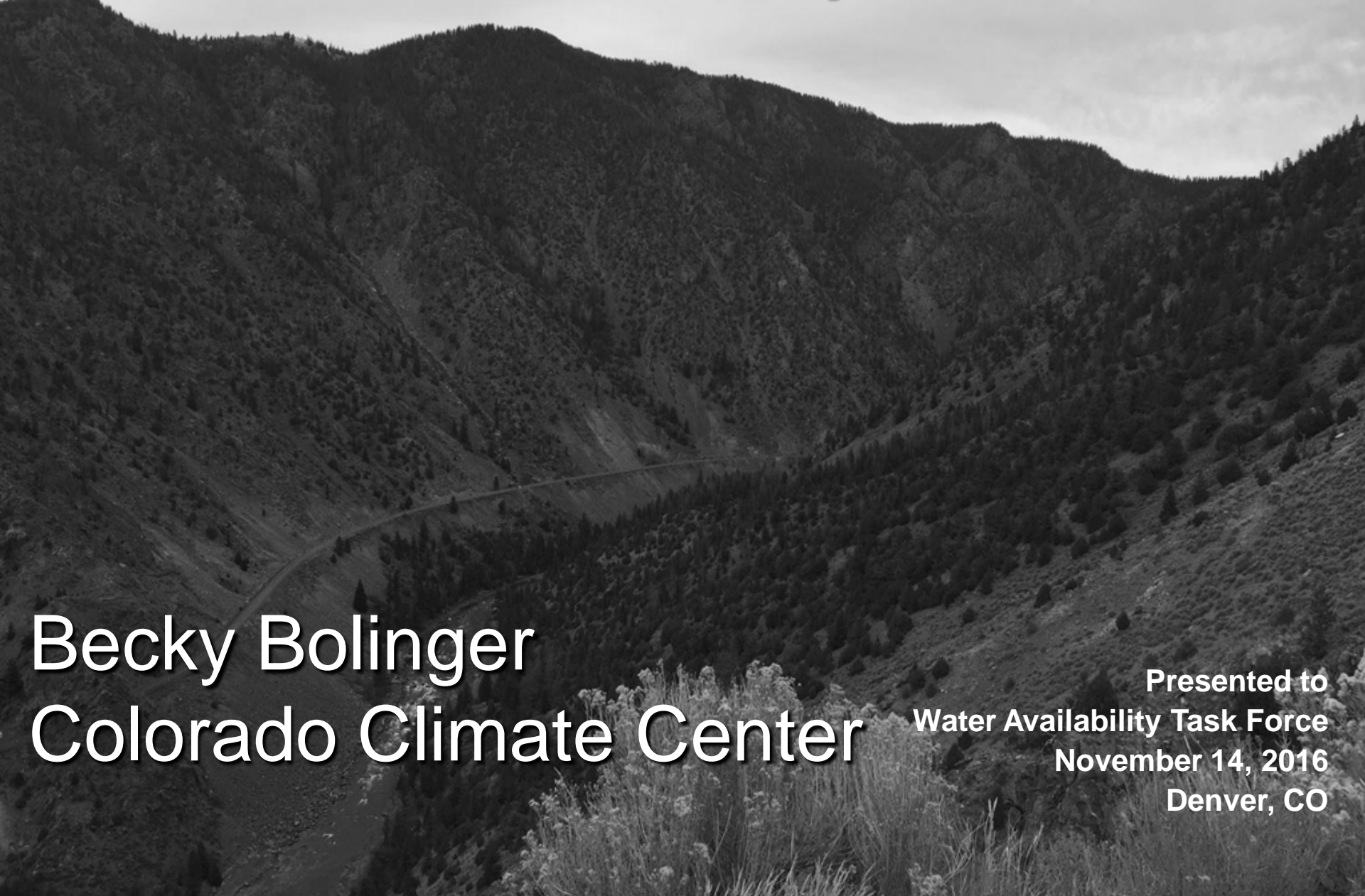




Climate Update

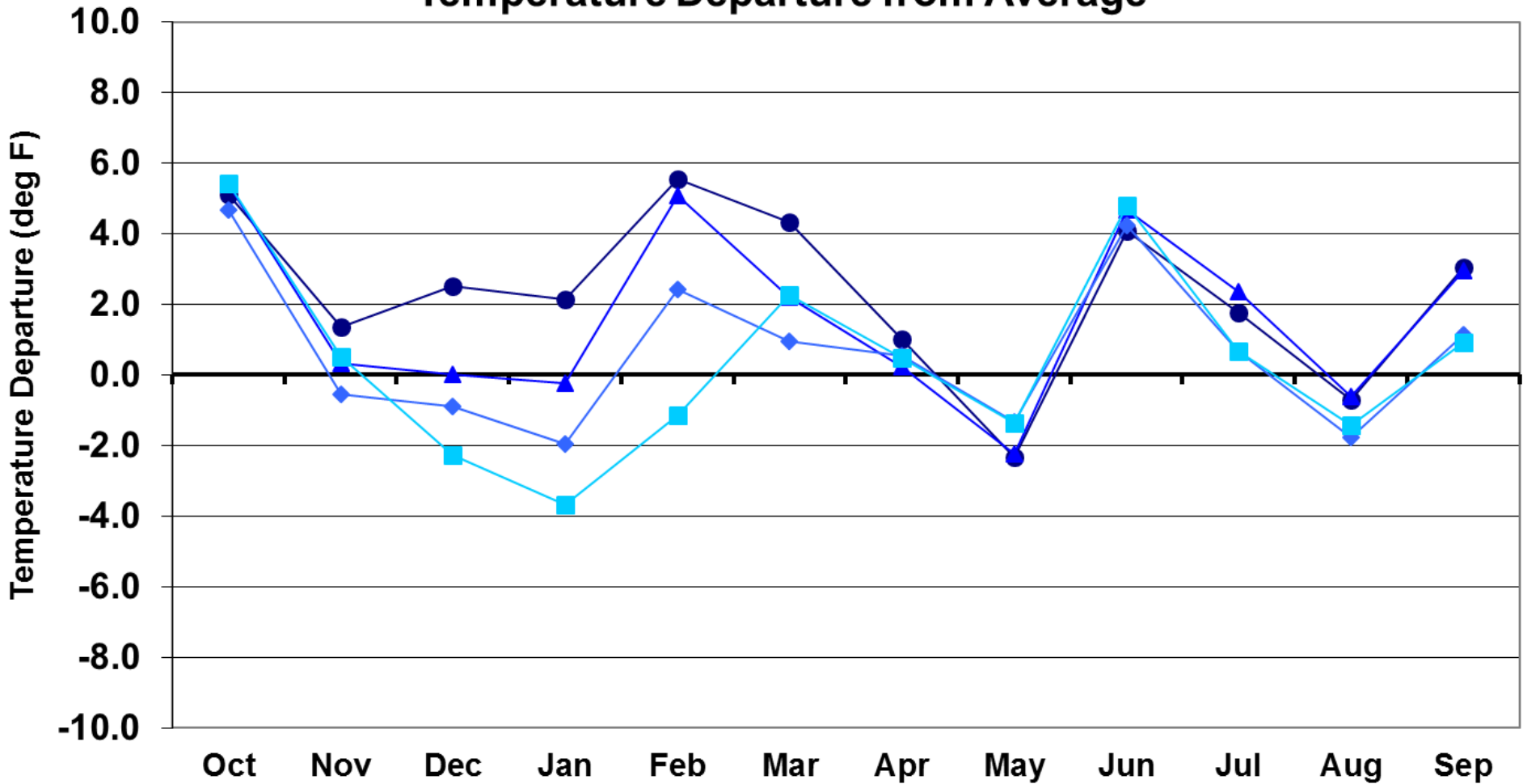


Becky Bolinger
Colorado Climate Center

Presented to
Water Availability Task Force
November 14, 2016
Denver, CO

Water Year 2016 Temperature Departures

Water Year 2016
Temperature Departure from Average



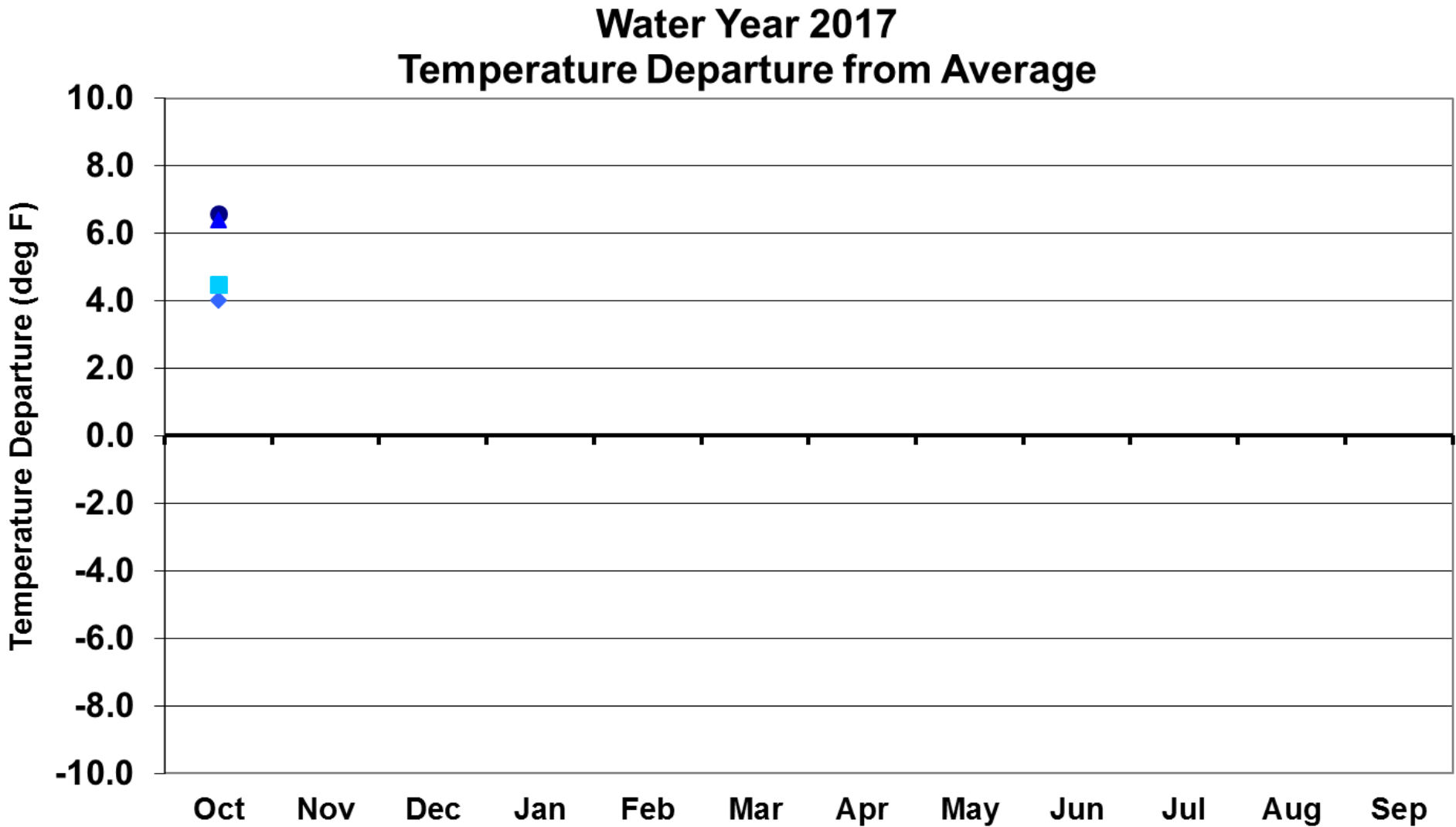
● Eastern Plains

▲ Foothills

◆ Mountains

■ Western Valleys

Water Year 2017 Temperature Departures



● Eastern Plains

▲ Foothills

◆ Mountains

■ Western Valleys

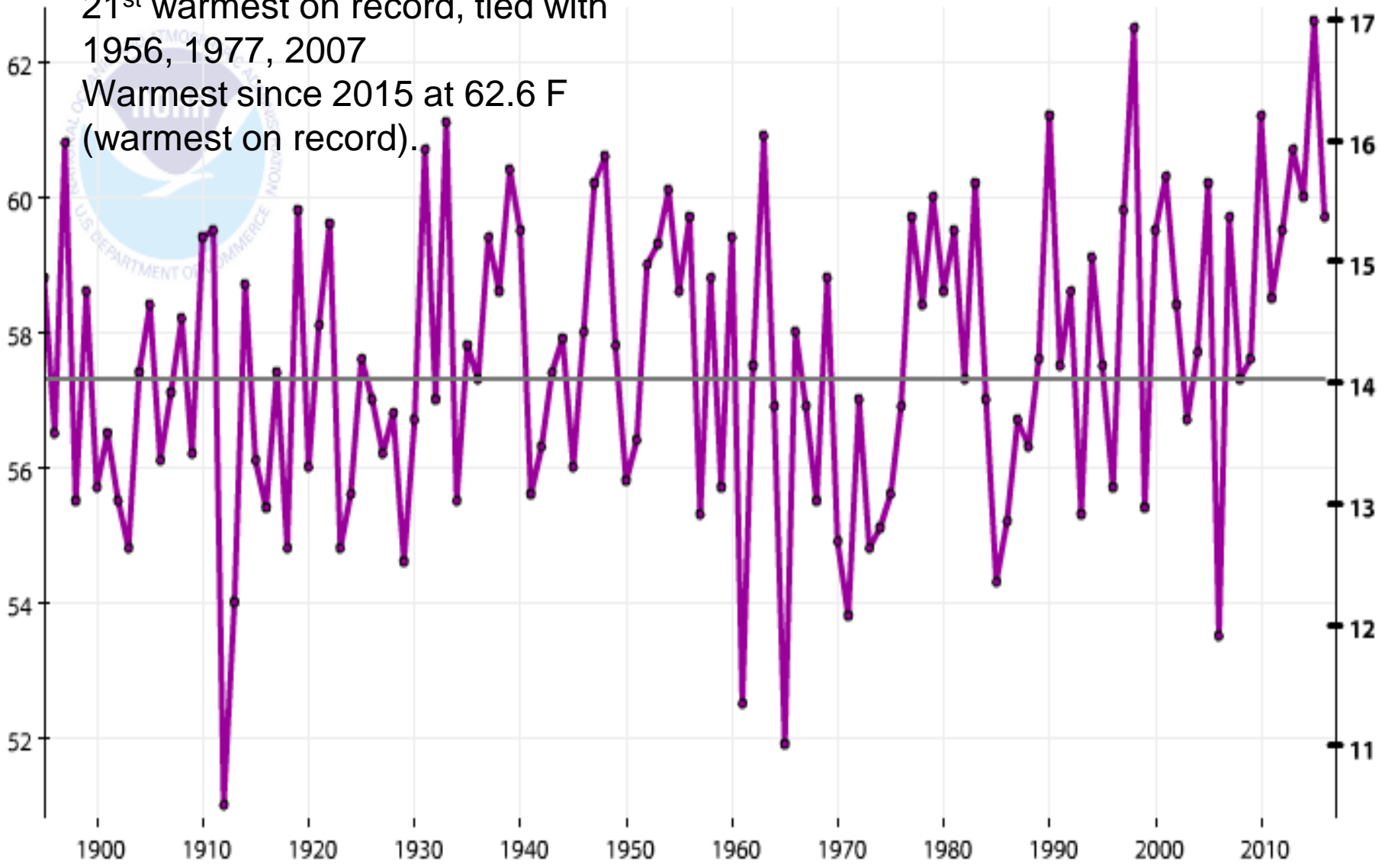
Sep 2016 Average Temperature History for Colorado (NCEI)

Colorado, Average Temperature, September

59.7 F (+2.4)
21st warmest on record, tied with
1956, 1977, 2007
Warmest since 2015 at 62.6 F
(warmest on record).

— 1901-2000
Mean: 57.3°F

—●— Avg Temperature



Water Year Average Temperature History for Colorado (NCEI)

Colorado, Average Temperature, October-September

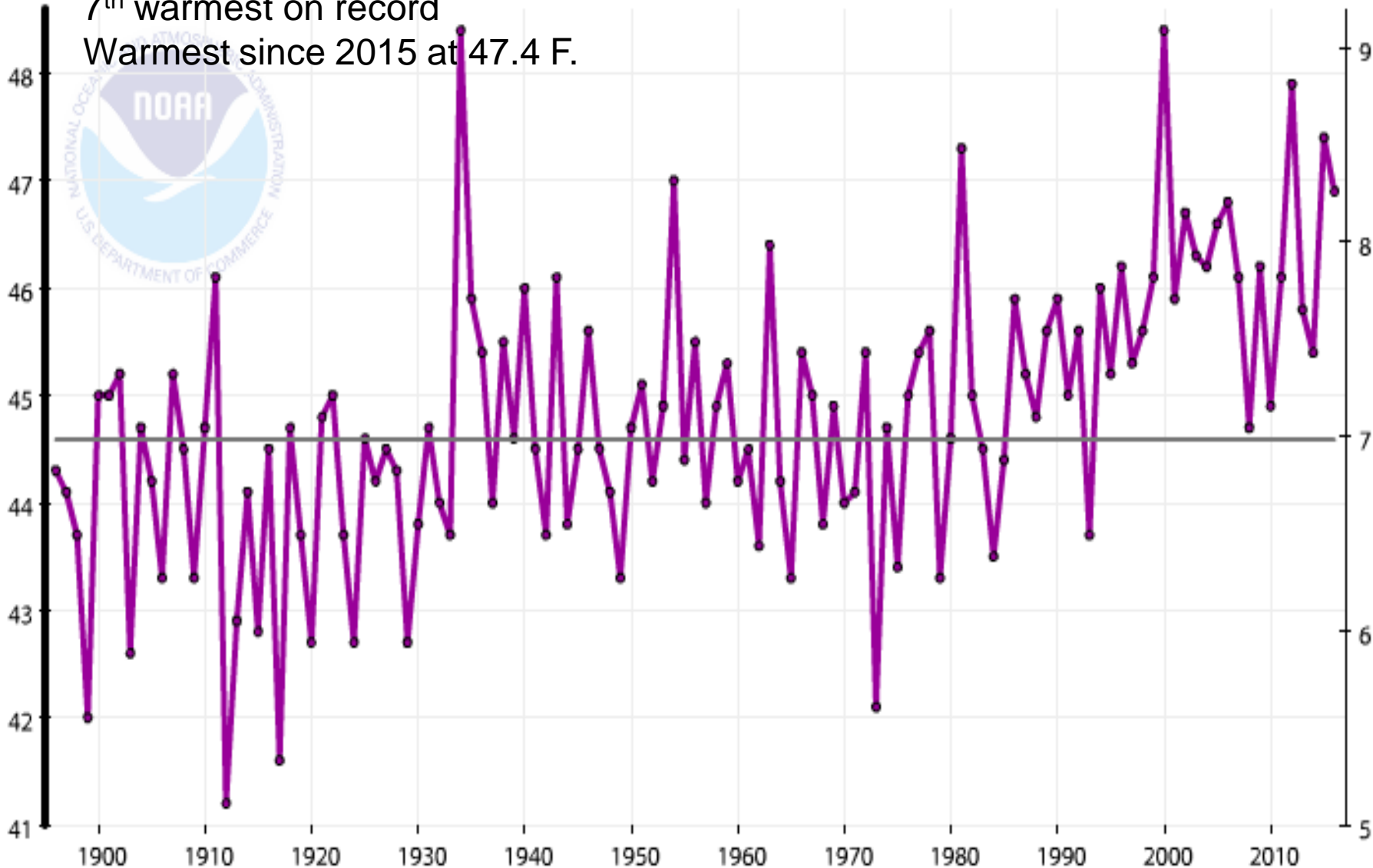
46.9 F (+2.3)

7th warmest on record

Warmest since 2015 at 47.4 F.

— 1901-2000
Mean: 44.6°F

—●— Avg Temperature



Oct 2016 Average Temperature History for Colorado (NCEI)

Colorado, Average Temperature, October

51.8 F (+5.3)

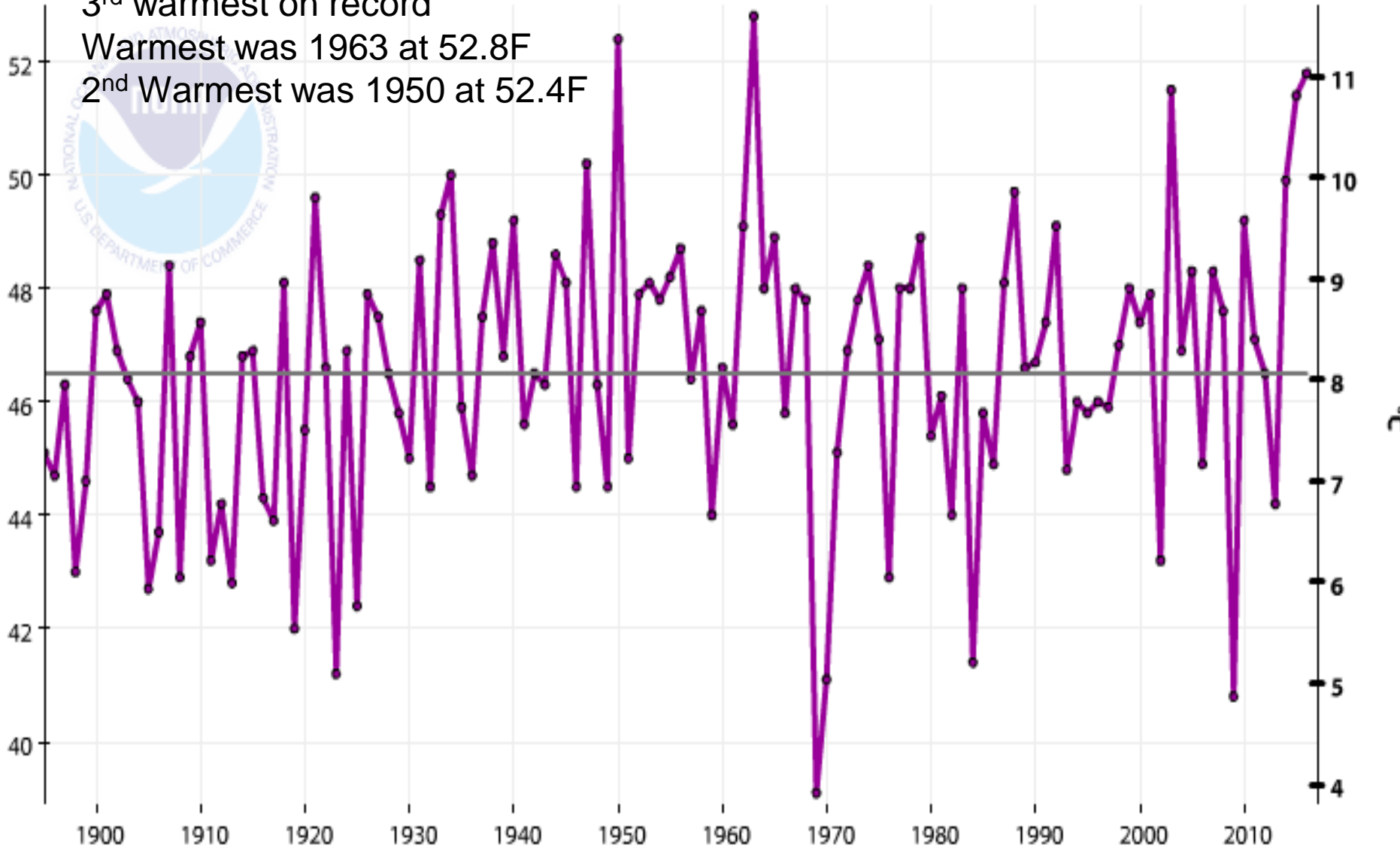
3rd warmest on record

Warmest was 1963 at 52.8F

2nd Warmest was 1950 at 52.4F

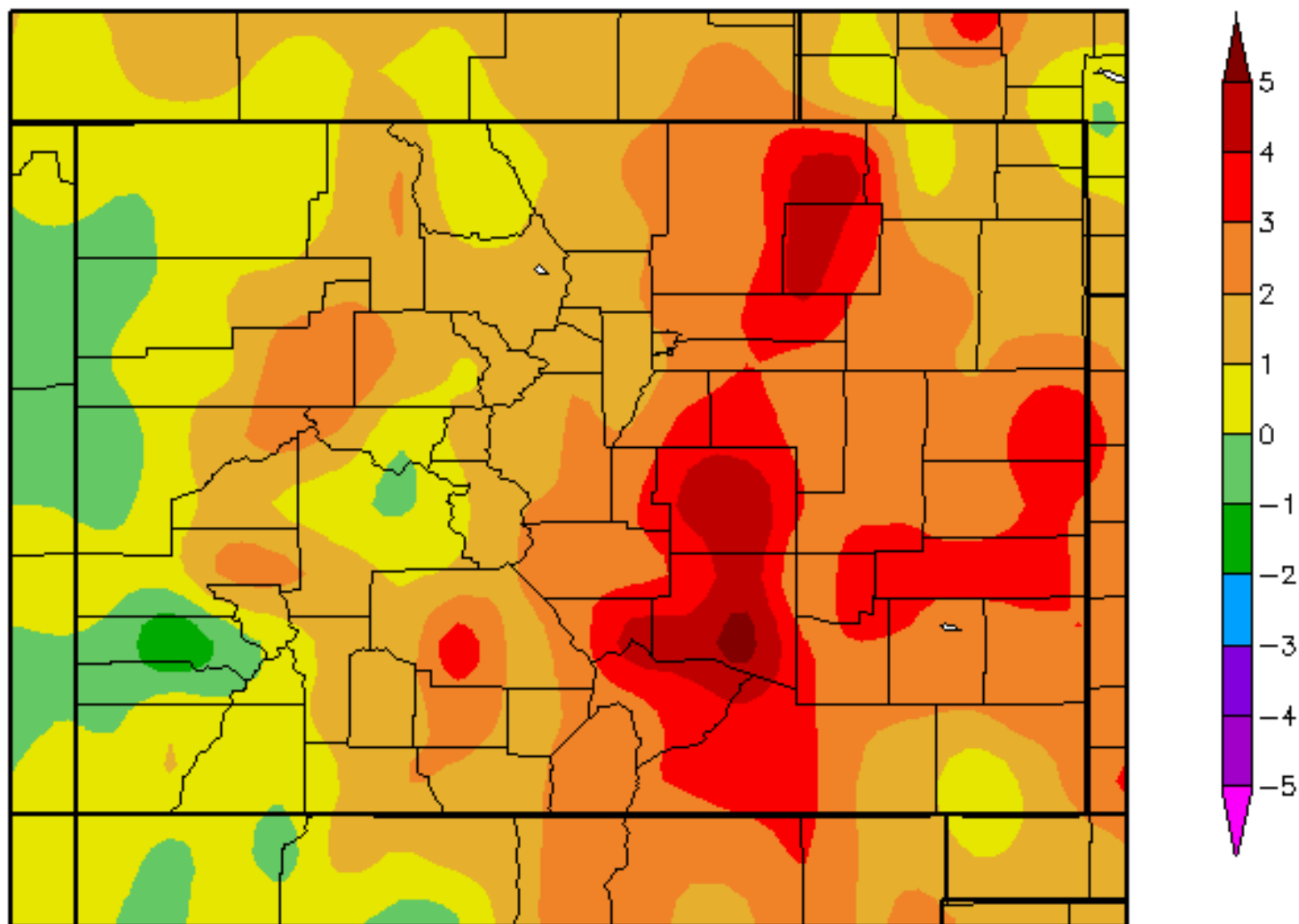
— 1901-2000
Mean: 46.5°F

● Avg Temperature



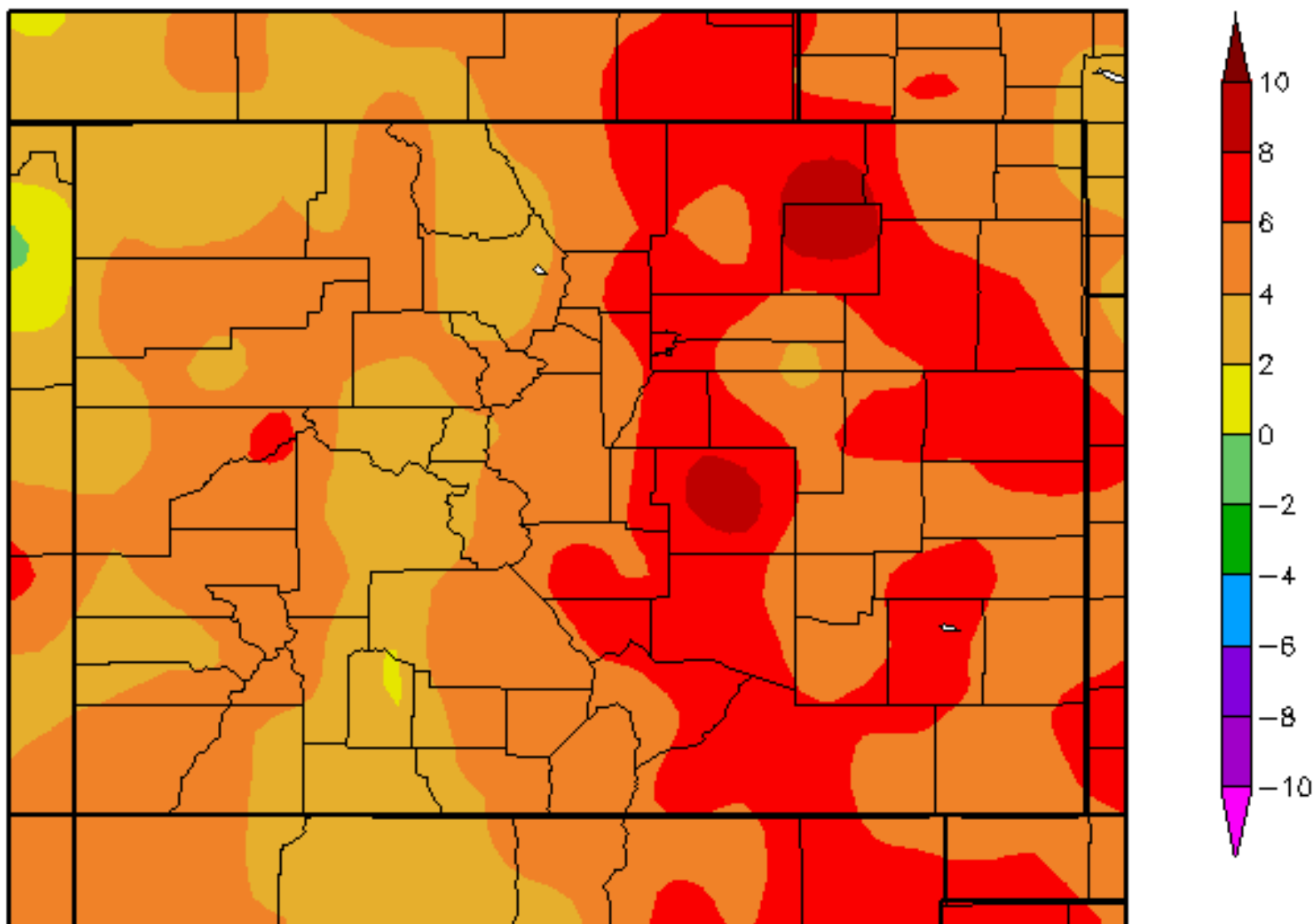
Departure from Normal Temperature (F)

9/1/2016 - 9/30/2016



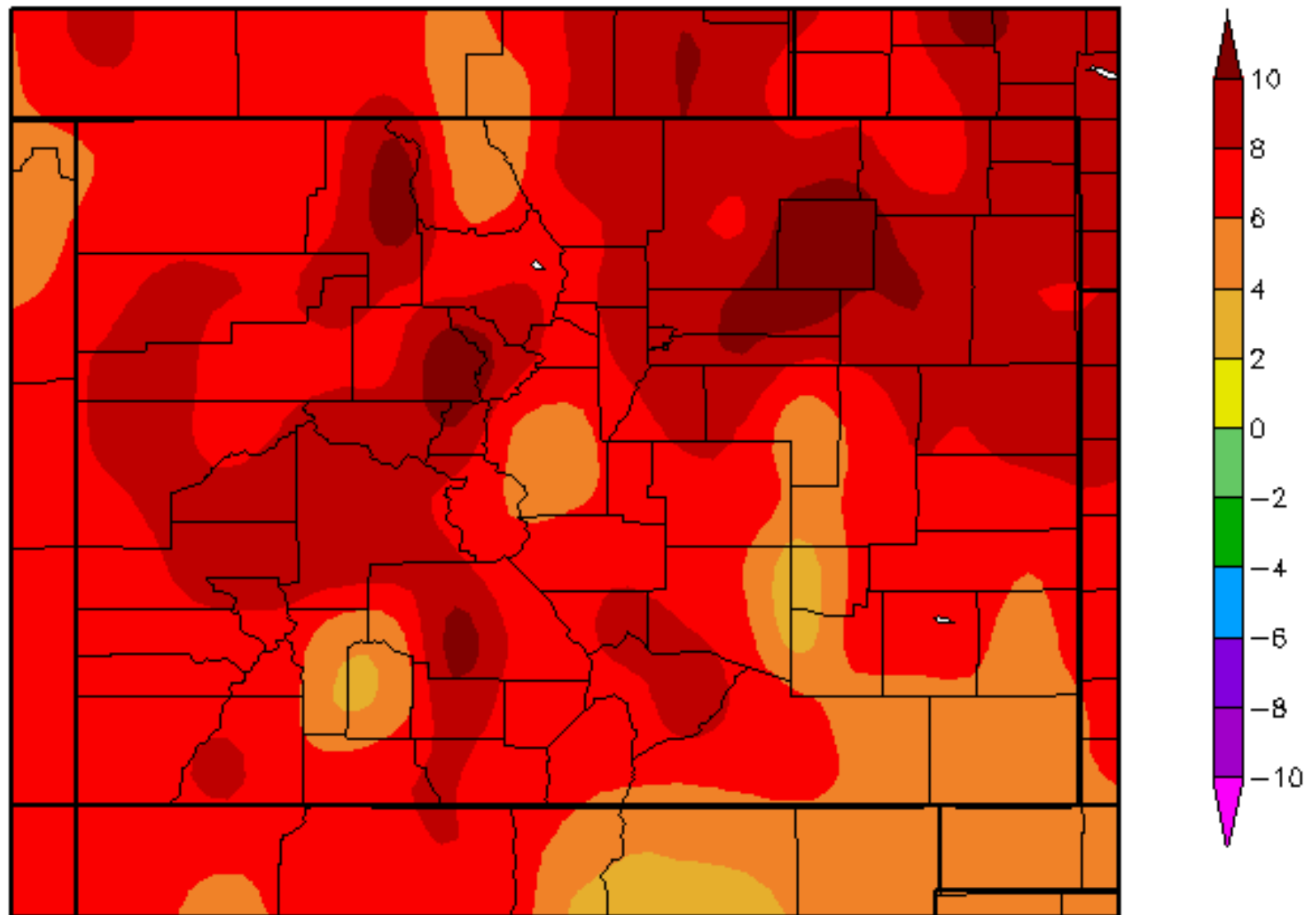
Departure from Normal Temperature (F)

10/1/2016 – 10/31/2016



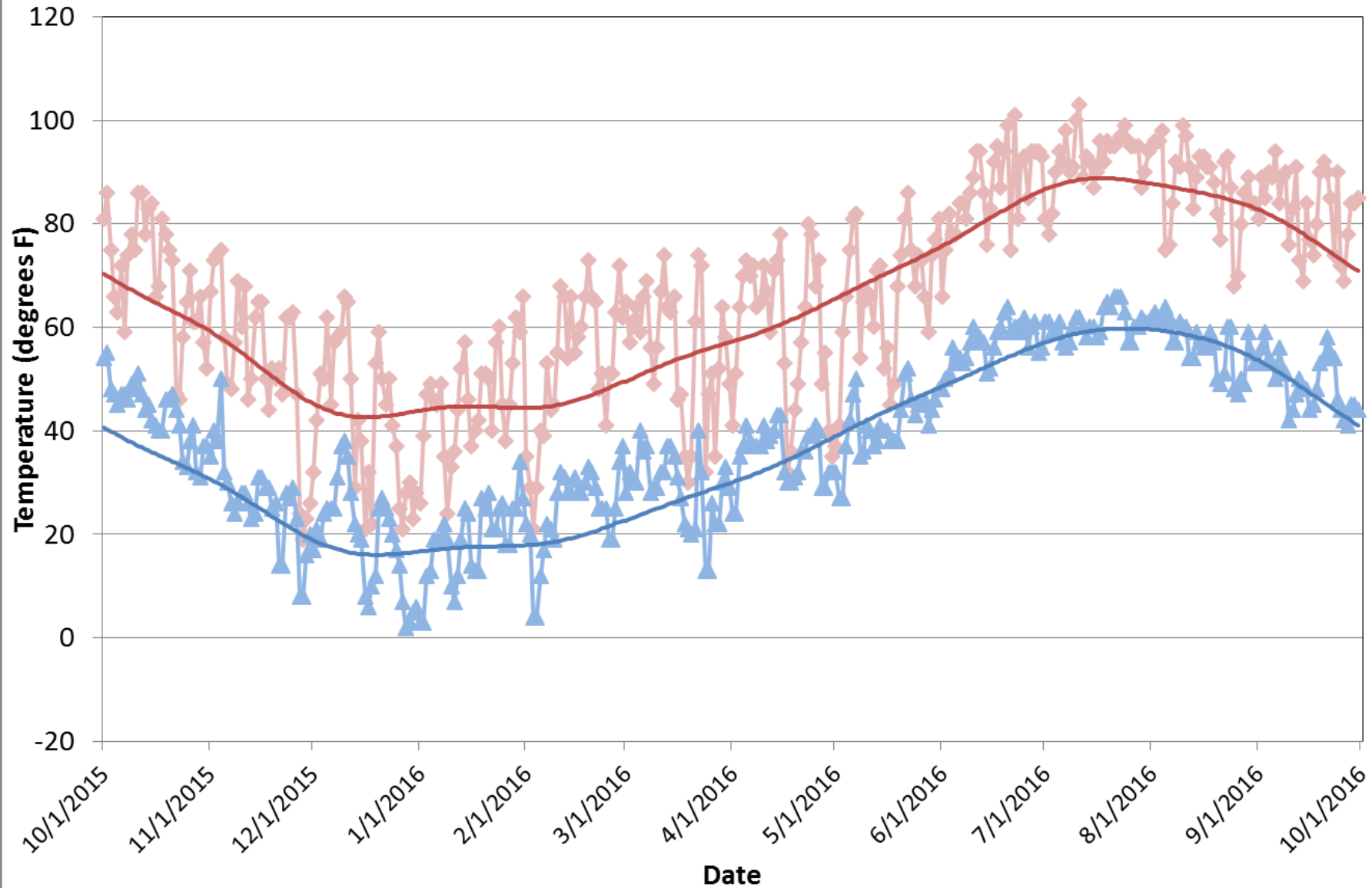
Departure from Normal Temperature (F)

11/1/2016 - 11/14/2016



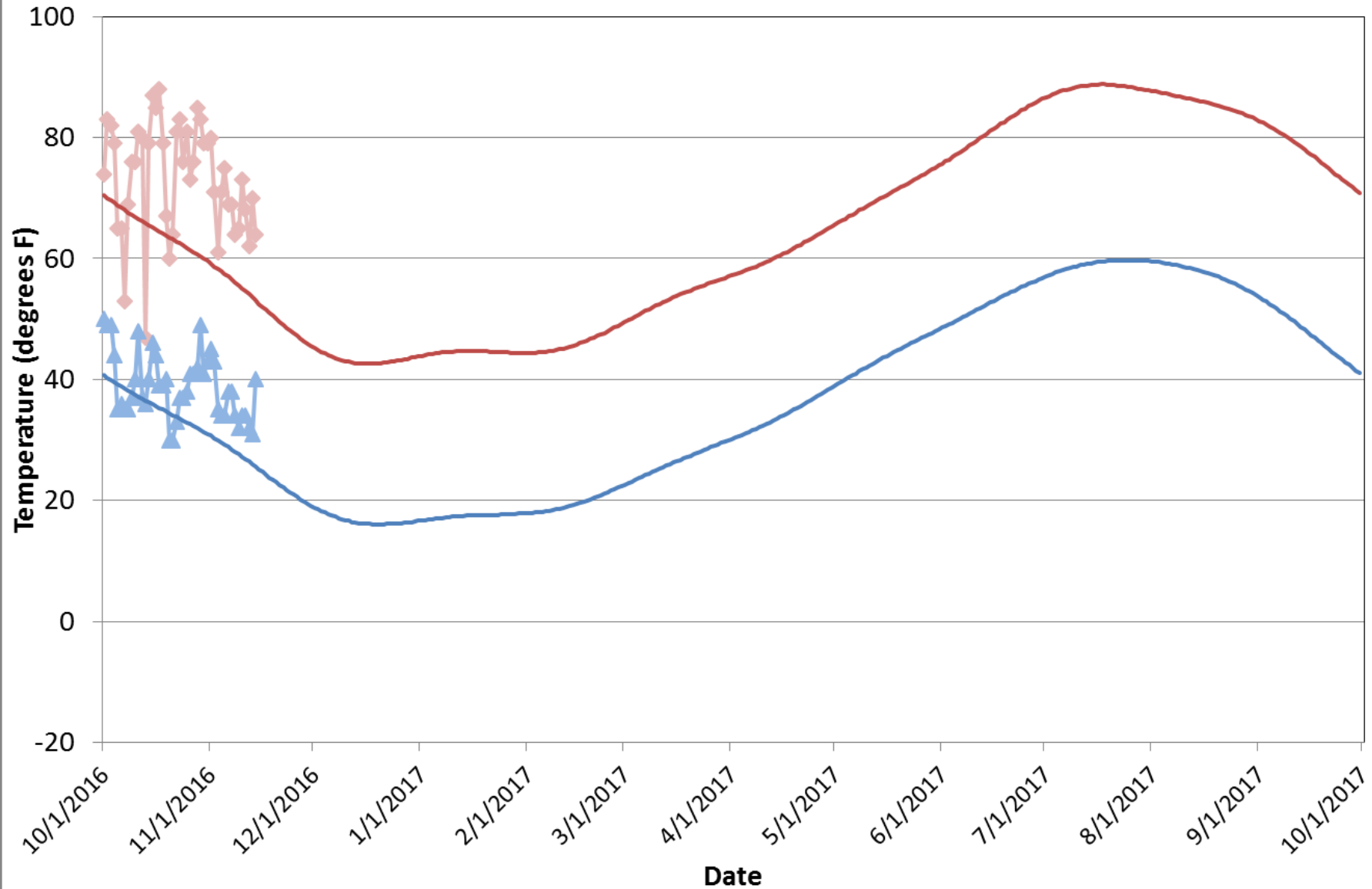
Denver-Stapleton Daily Max/Min Temperatures with Normals, Water Year 2016

◆ Max Temperature — Normal Max Temp ▲ Min Temperature — Normal Min Temp



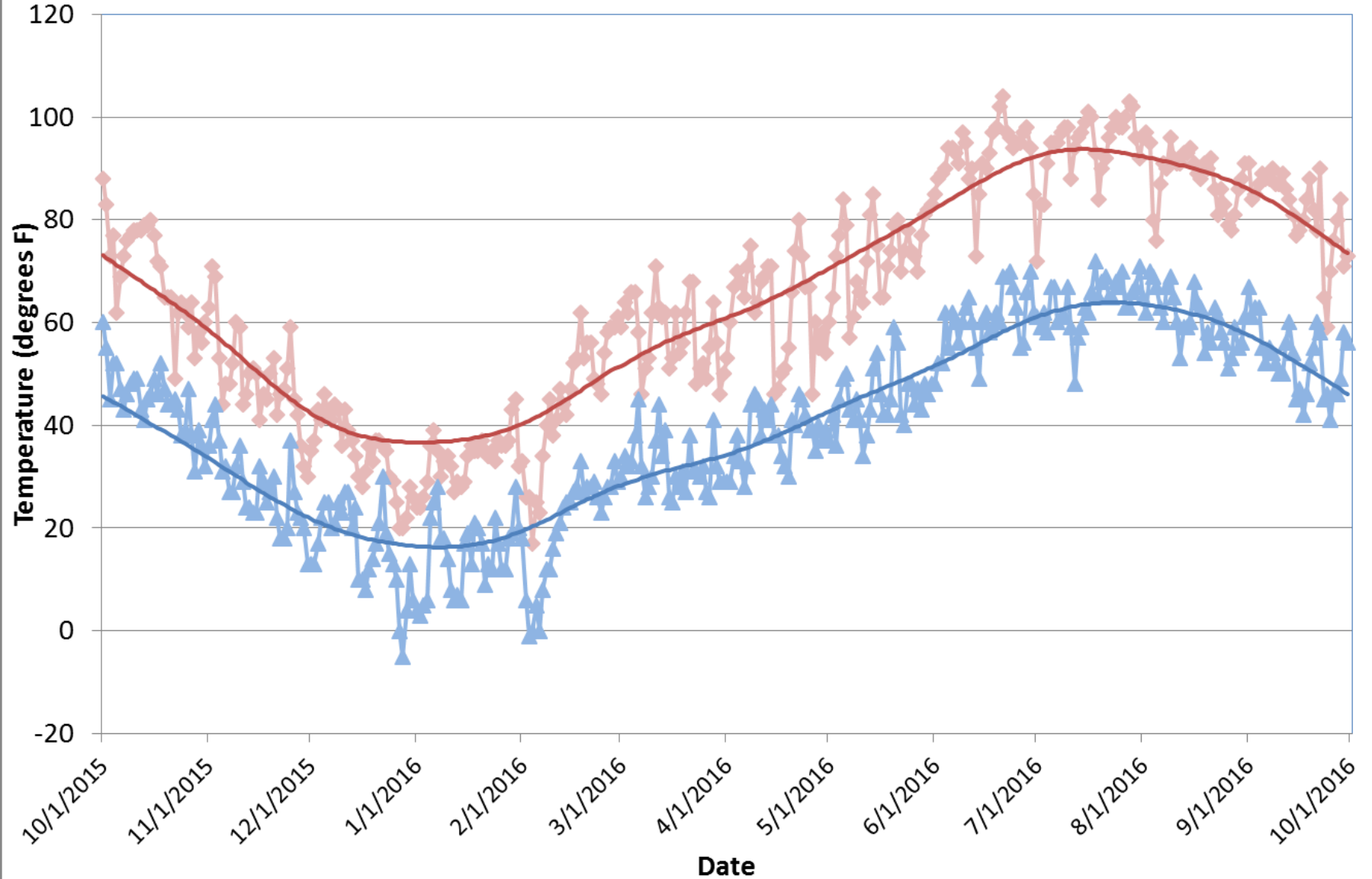
Denver-Stapleton Daily Max/Min Temperatures with Normals, Water Year 2017

Max Temperature Normal Max Temp Min Temperature Normal Min Temp



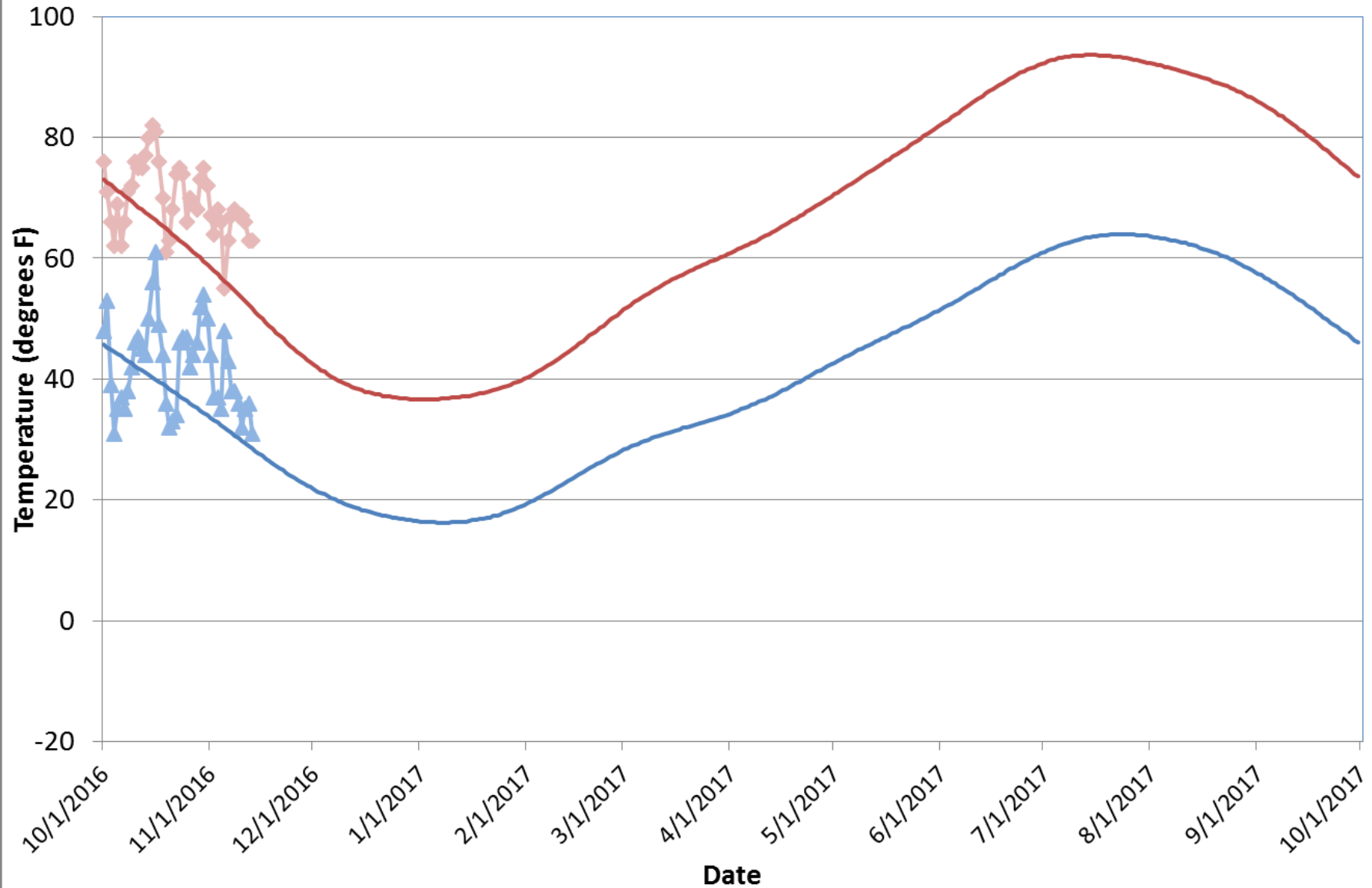
Grand Junction Daily Max/Min Temperature with Normals, WY 2016

Max Temperature Normal Max Temp Min Temperature Normal Min Temp

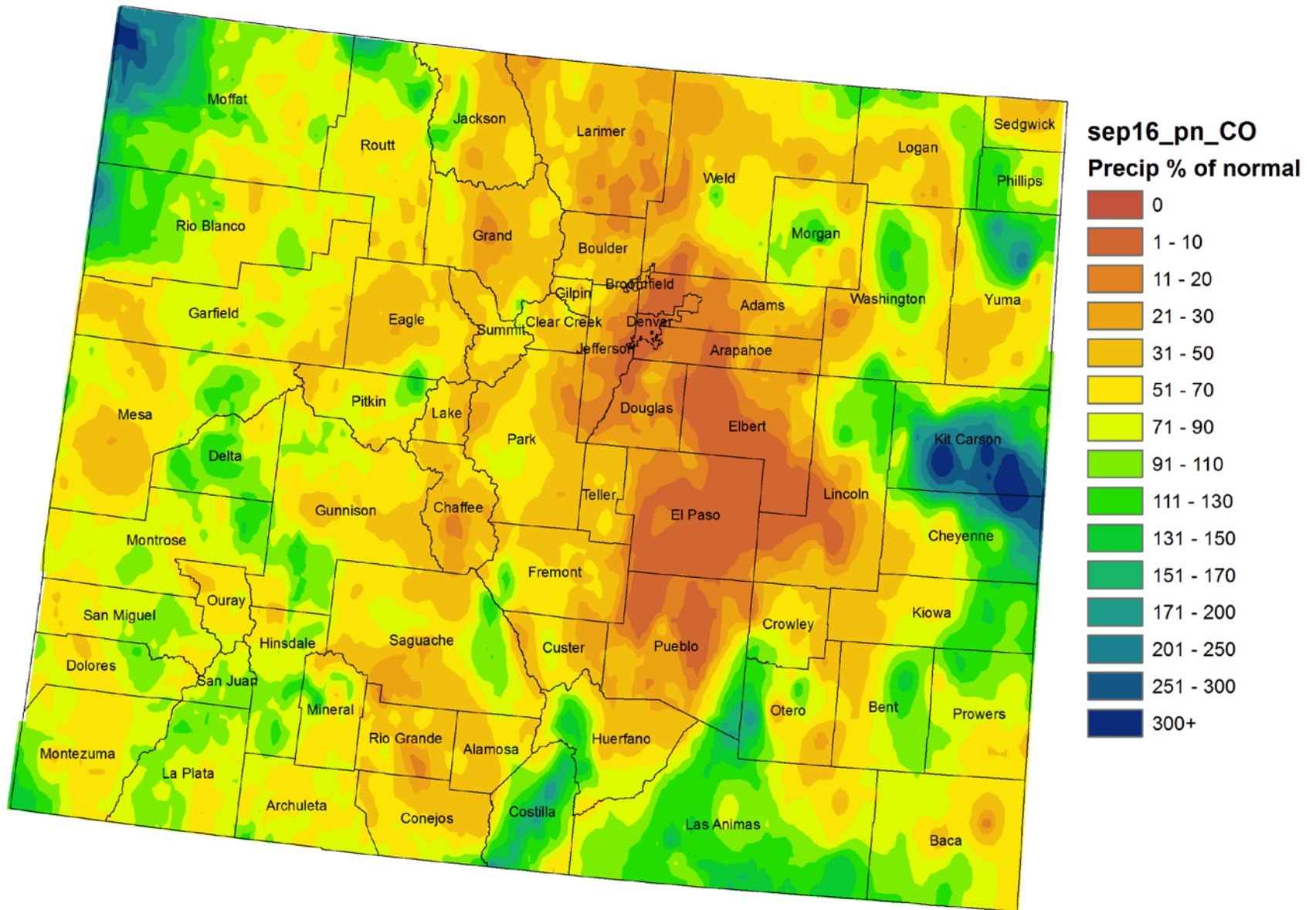


Grand Junction Daily Max/Min Temperature with Normals, WY 2017

Max Temperature Normal Max Temp Min Temperature Normal Min Temp



Colorado September 2016 Precipitation as a Percentage of Normal



Sep 2016 Statewide Precipitation

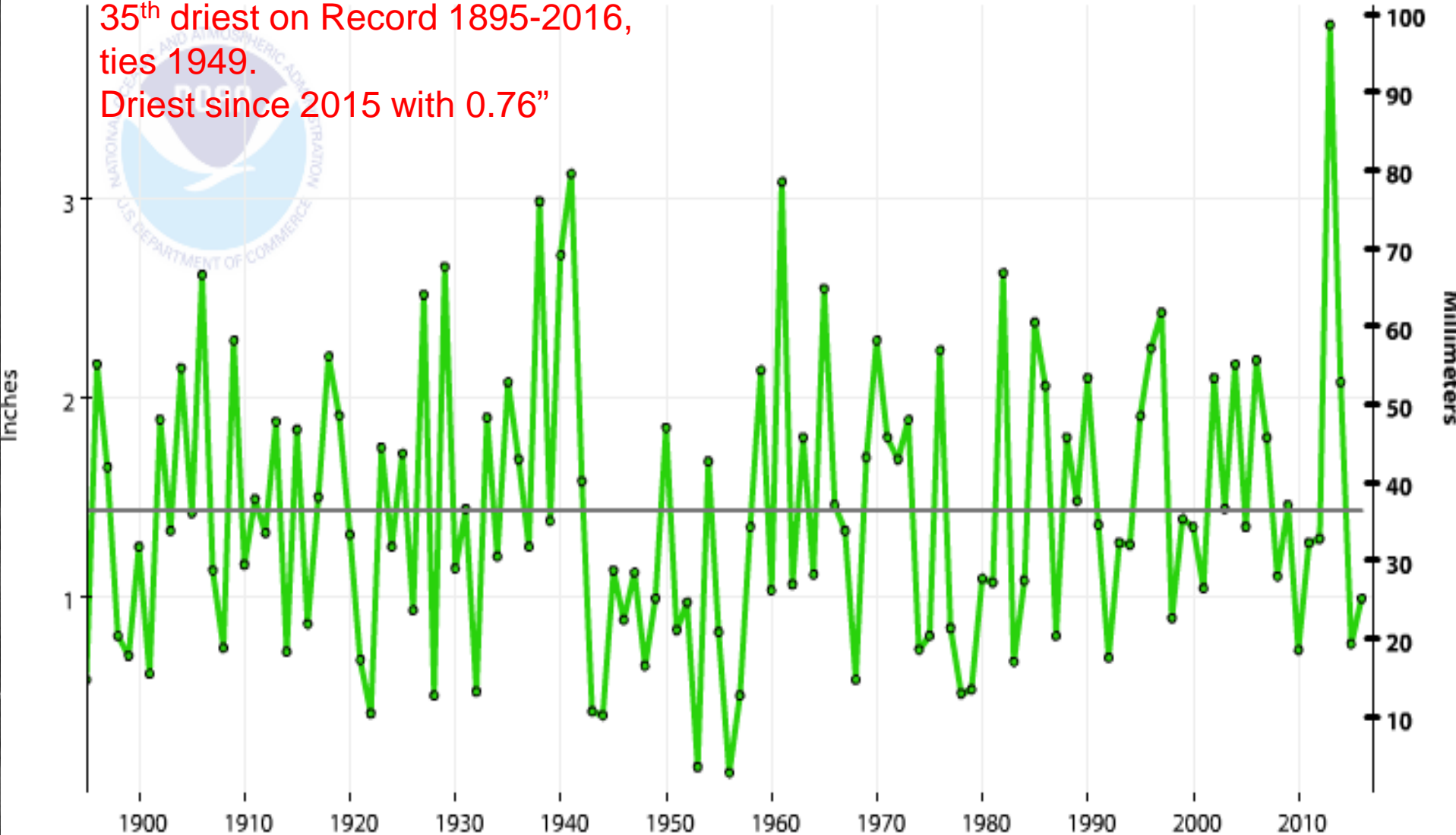
Colorado, Precipitation, September

0.99" (-0.44")

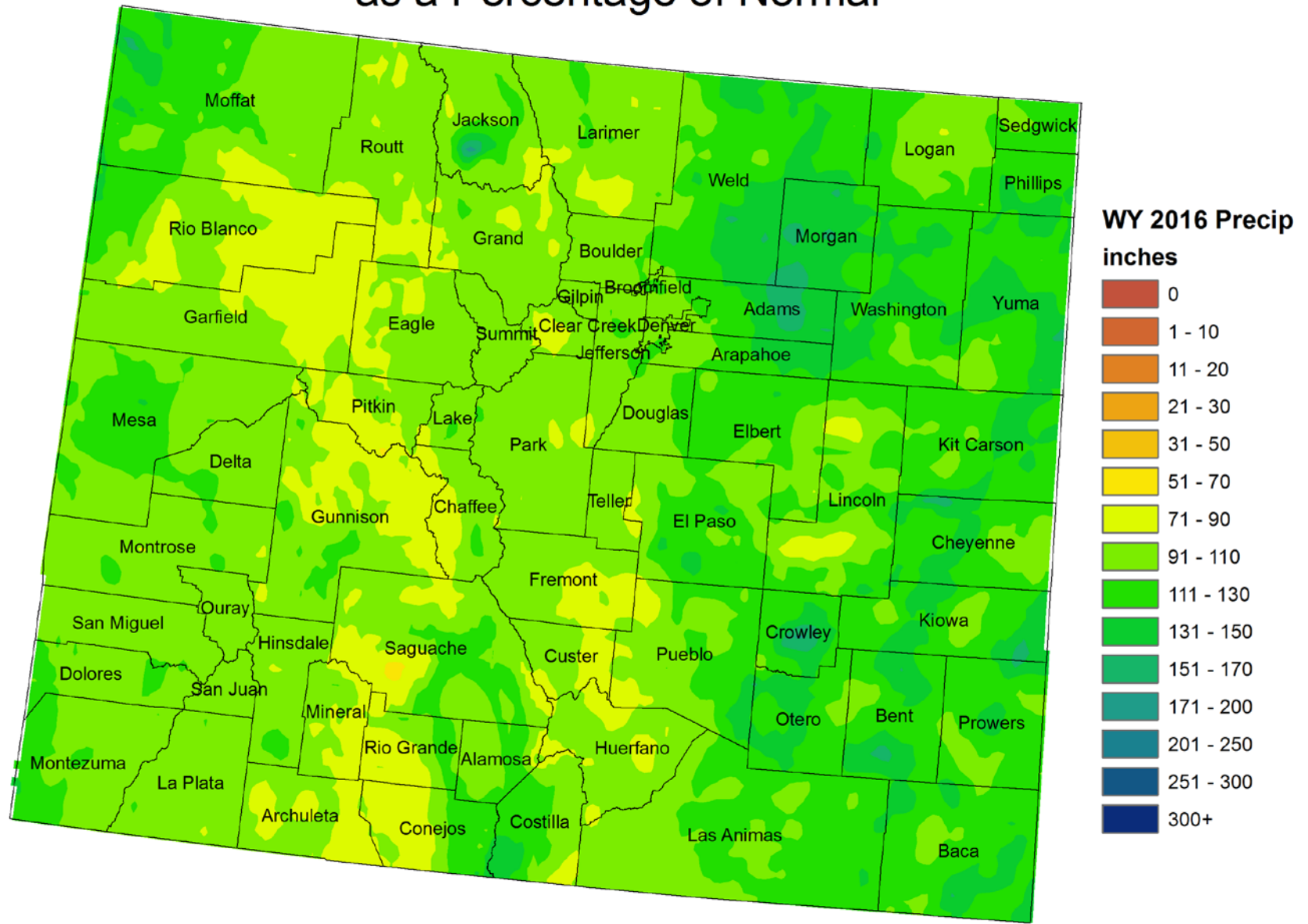
35th driest on Record 1895-2016,
ties 1949.

Driest since 2015 with 0.76"

— 1901-2000 Mean: 1.43" ●— Precip



Colorado Water Year 2016 Precipitation as a Percentage of Normal



Water Year Statewide Precipitation

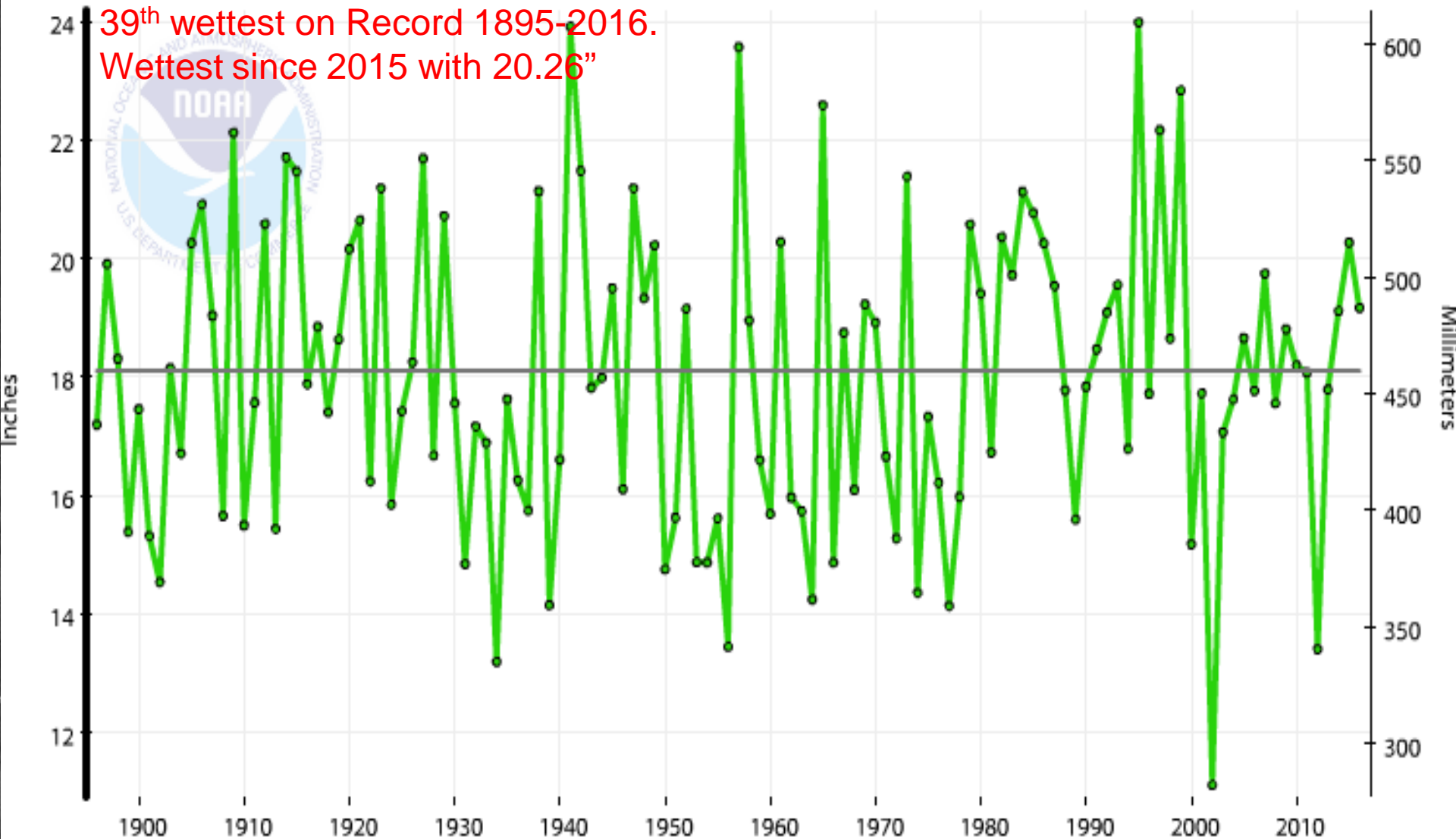
Colorado, Precipitation, October-September

— 1901-2000 Mean: 18.10" ●— Precip

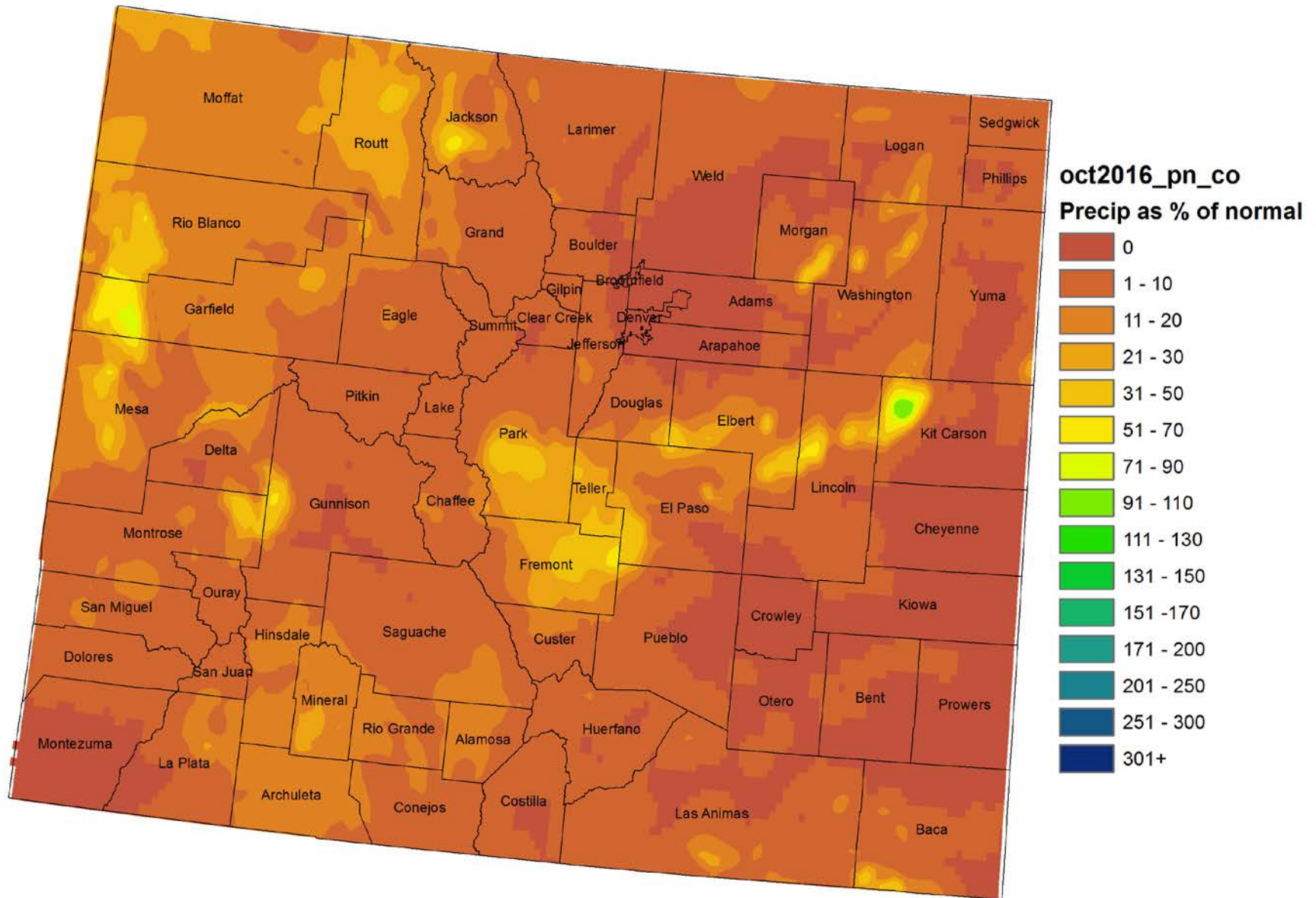
19.16" (+1.06")

39th wettest on Record 1895-2016.

Wettest since 2015 with 20.26"



Colorado October 2016 Precipitation as a Percentage of Normal



Oct 2016 Statewide Precipitation

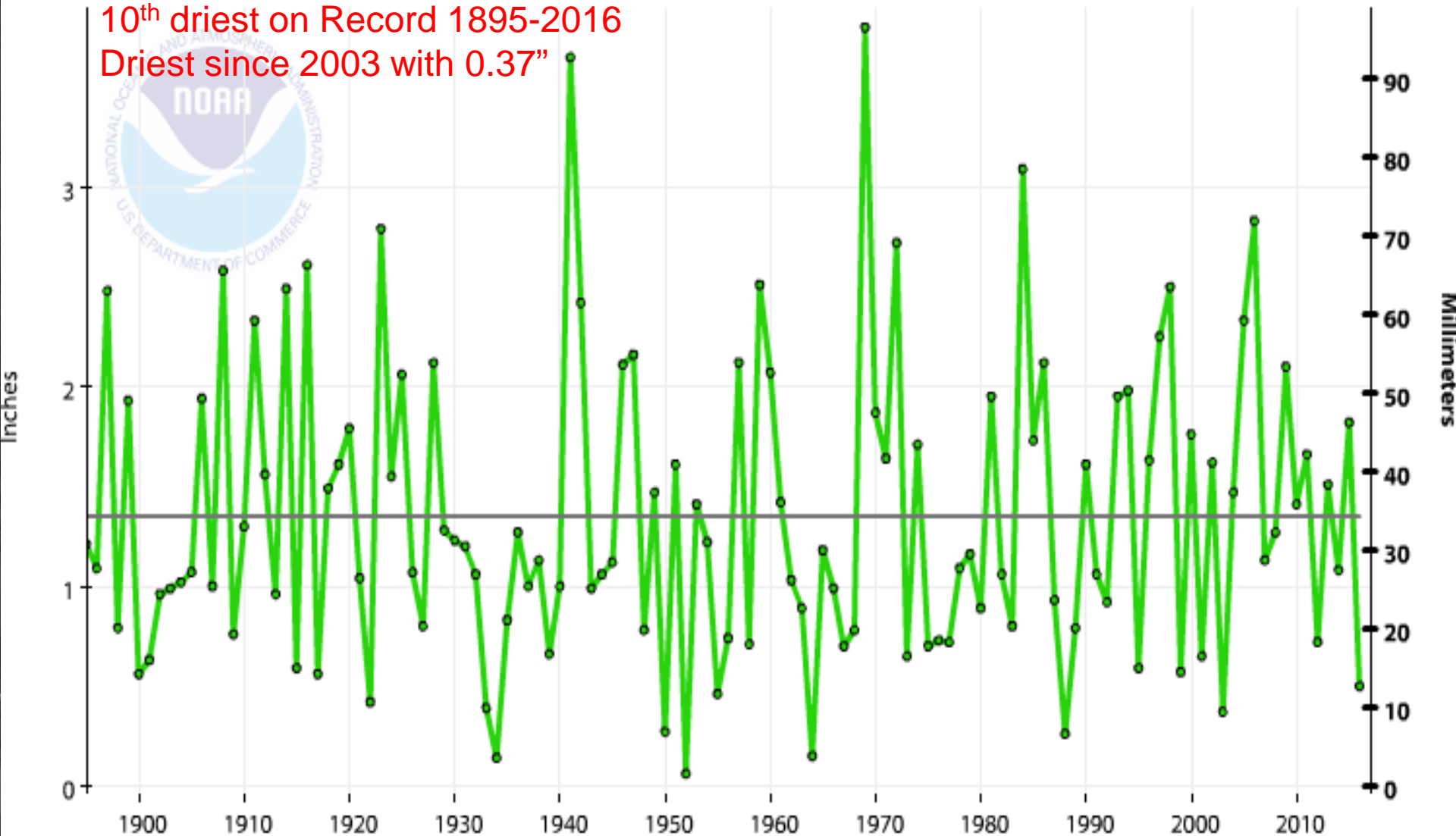
Colorado, Precipitation, October

0.50" (-0.85")

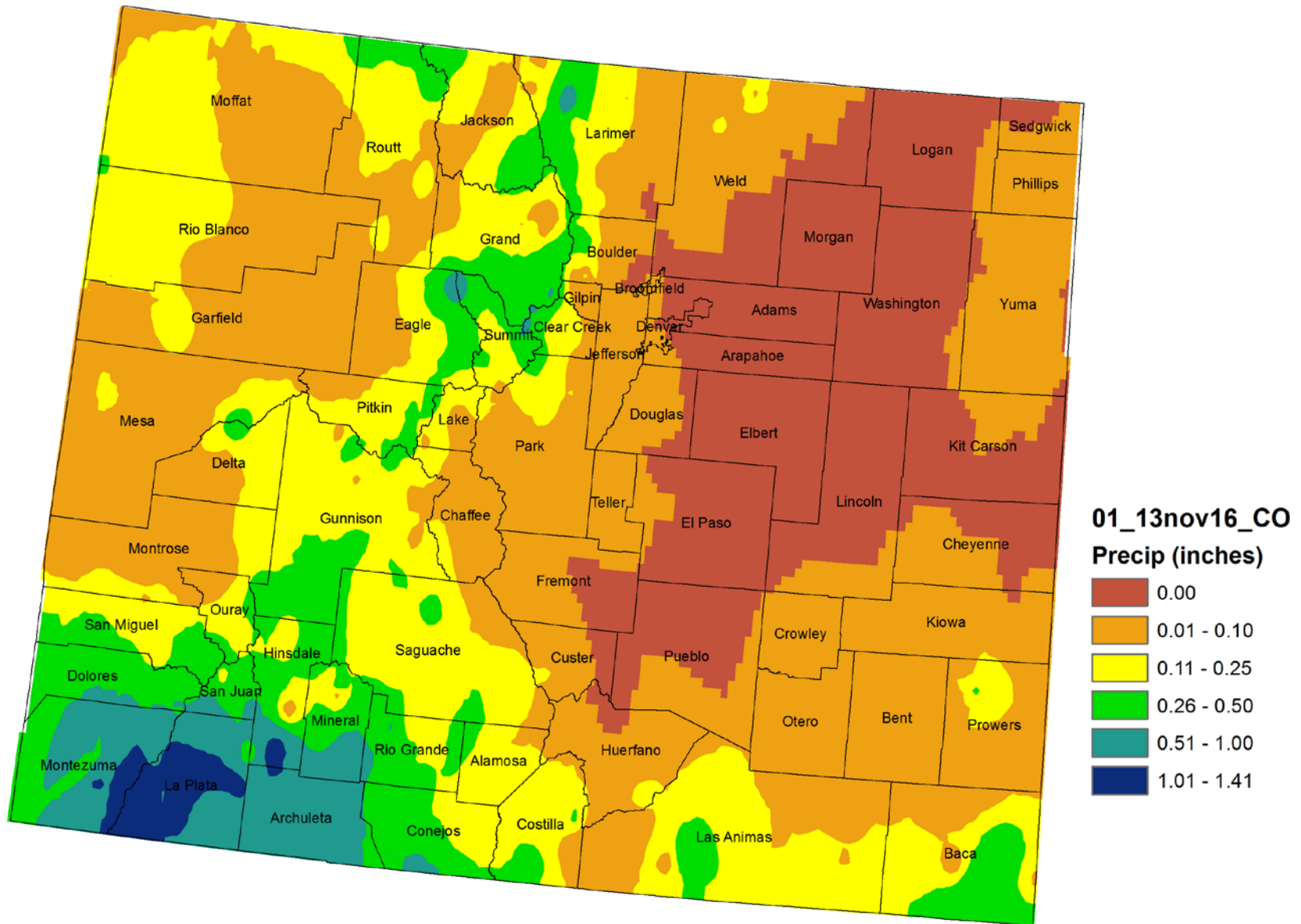
10th driest on Record 1895-2016

Driest since 2003 with 0.37"

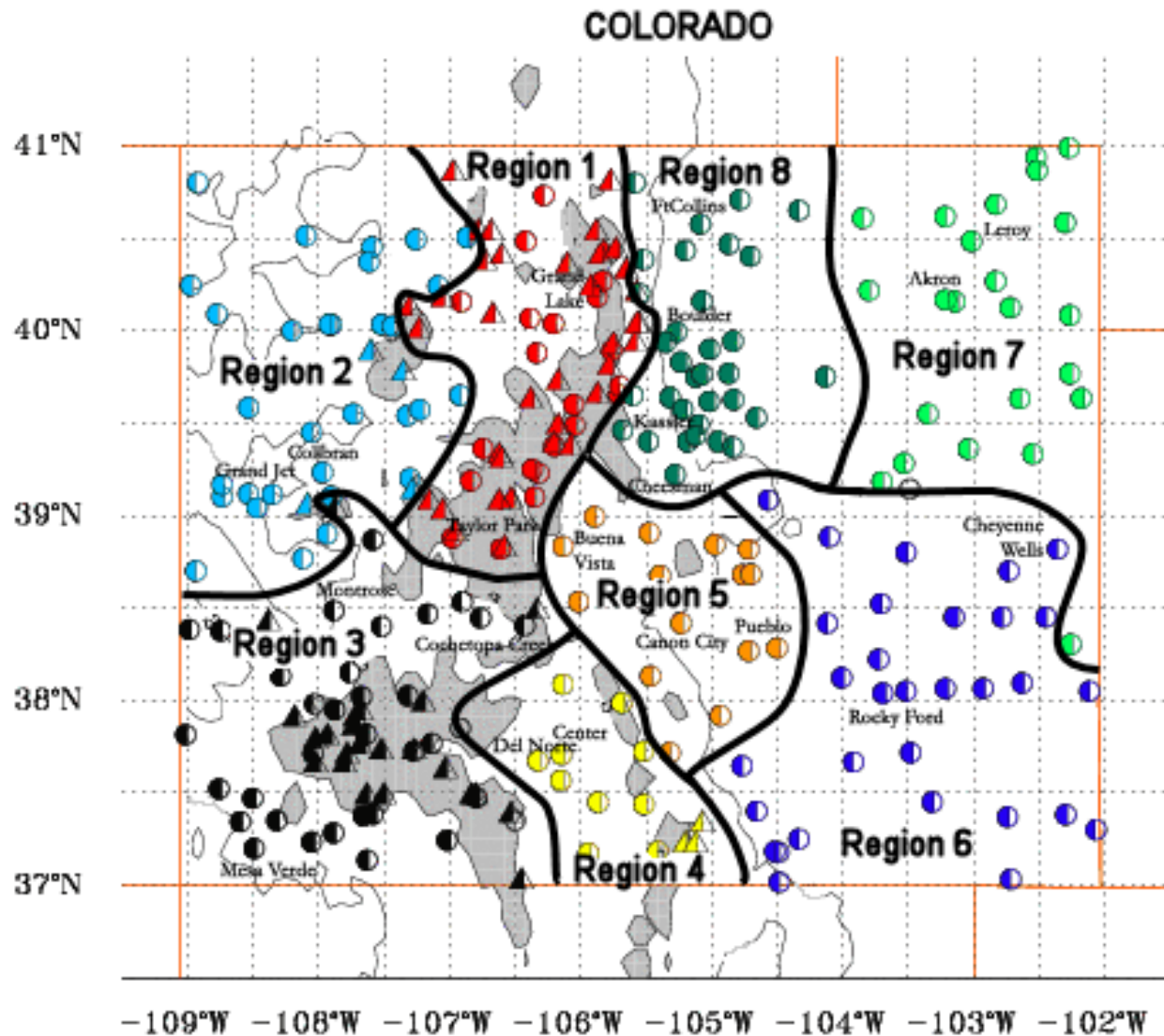
— 1901-2000 Mean: 1.35" —●— Precip



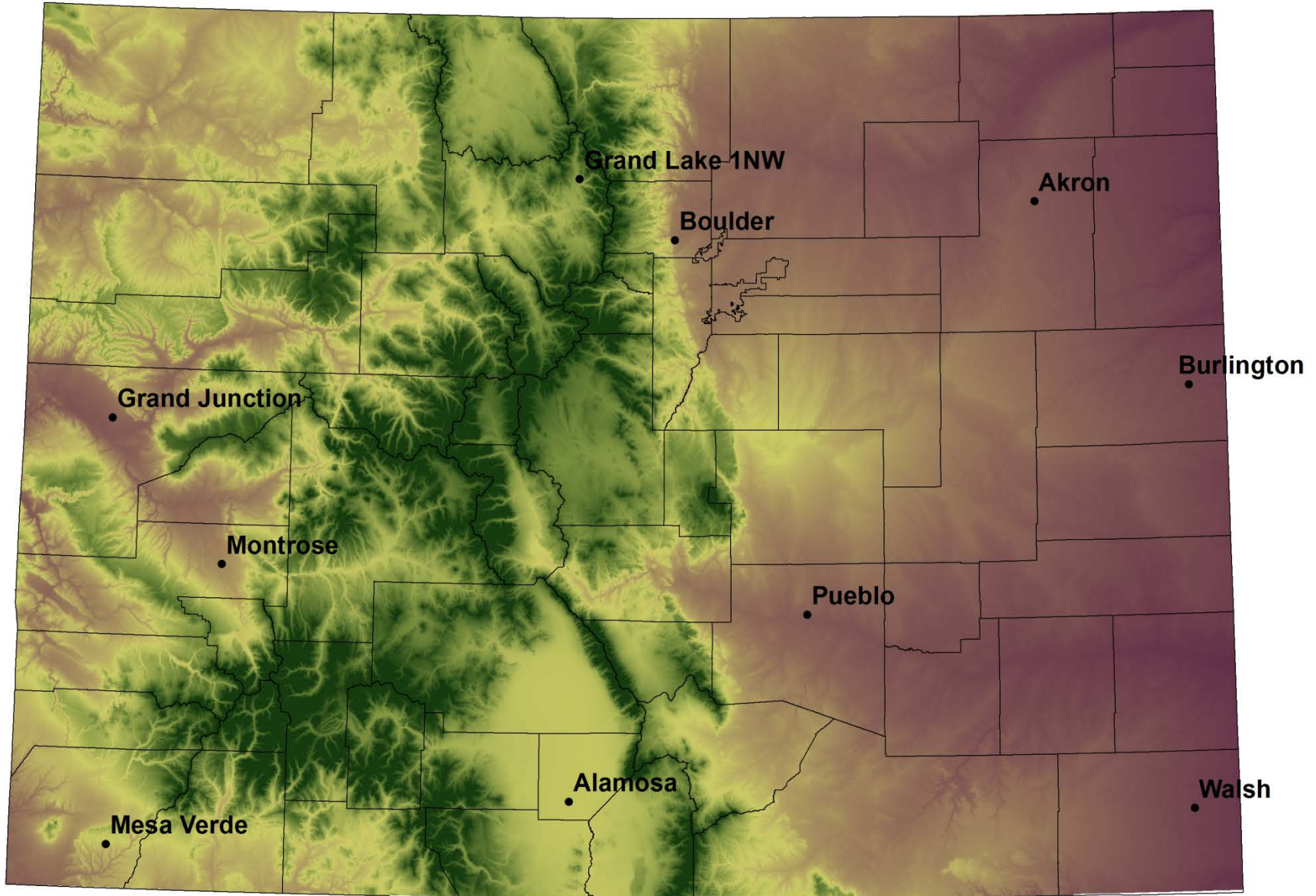
Colorado Month to Date Precipitation 1 - 13 November 2016



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

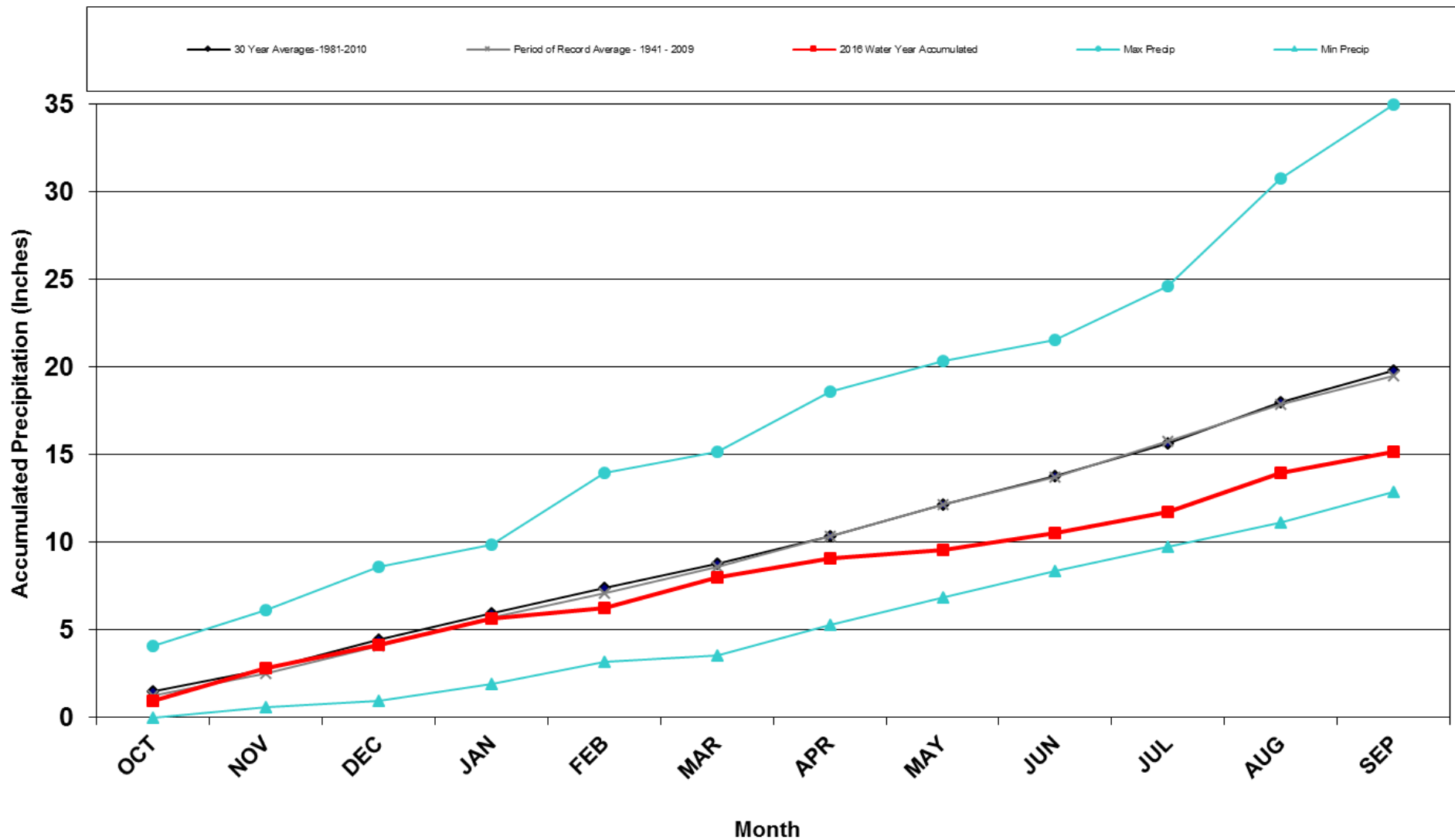


NWS Cooperative Stations for WATF



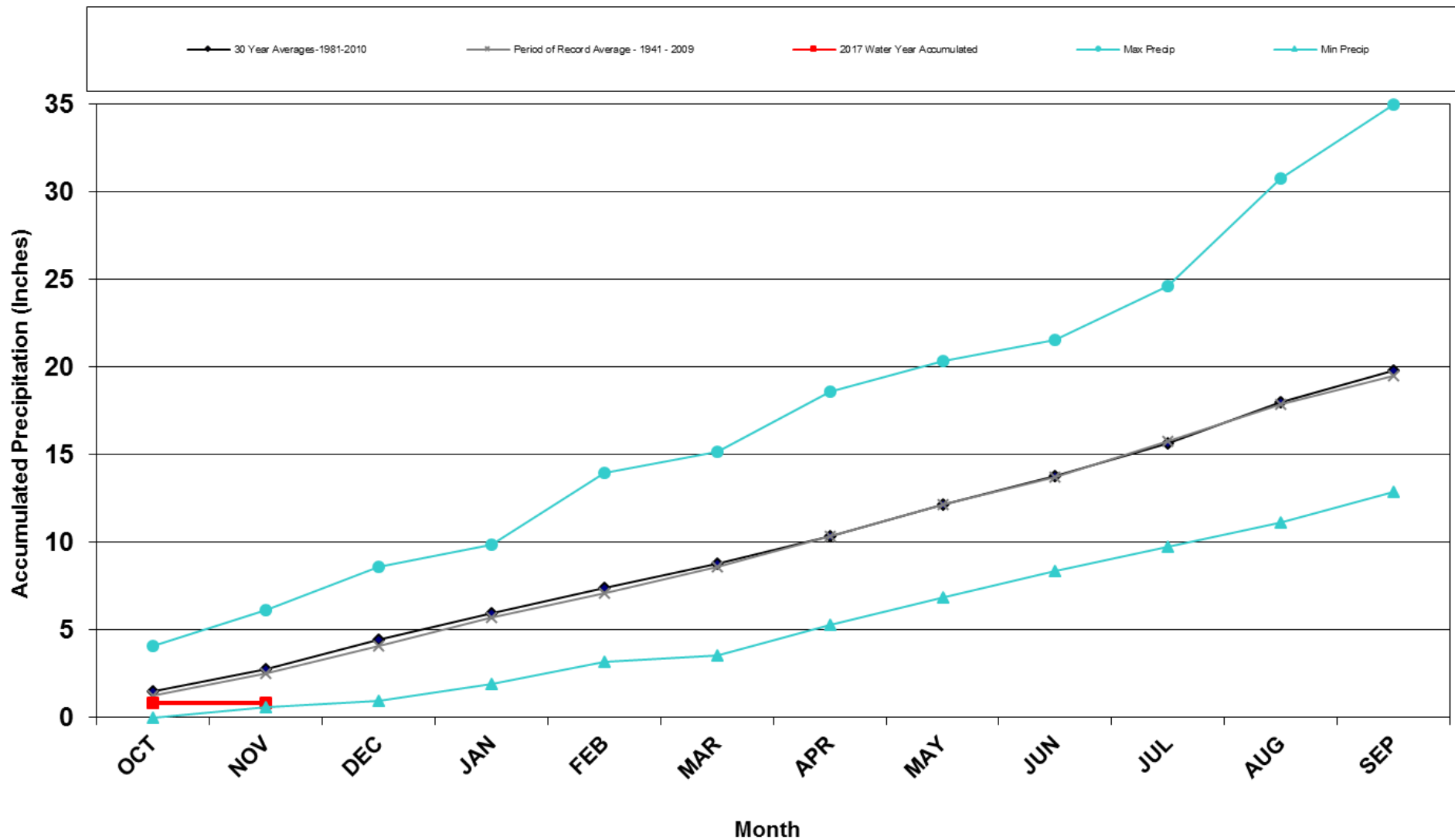
Division 1 – Grand Lake 1NW

Grand Lake 1 NW 2016 Water Year



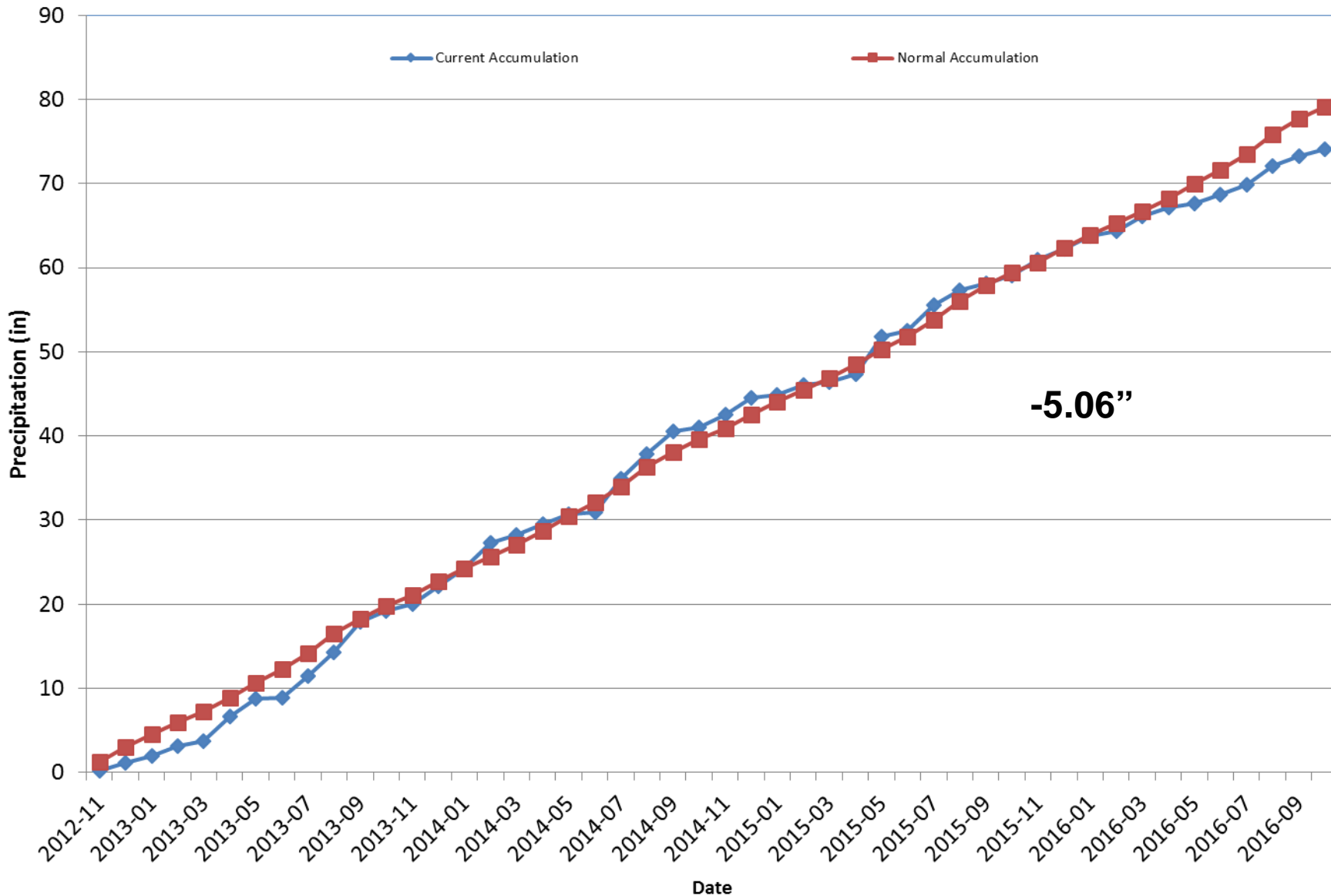
Division 1 – Grand Lake 1NW

Grand Lake 1 NW 2017 Water Year



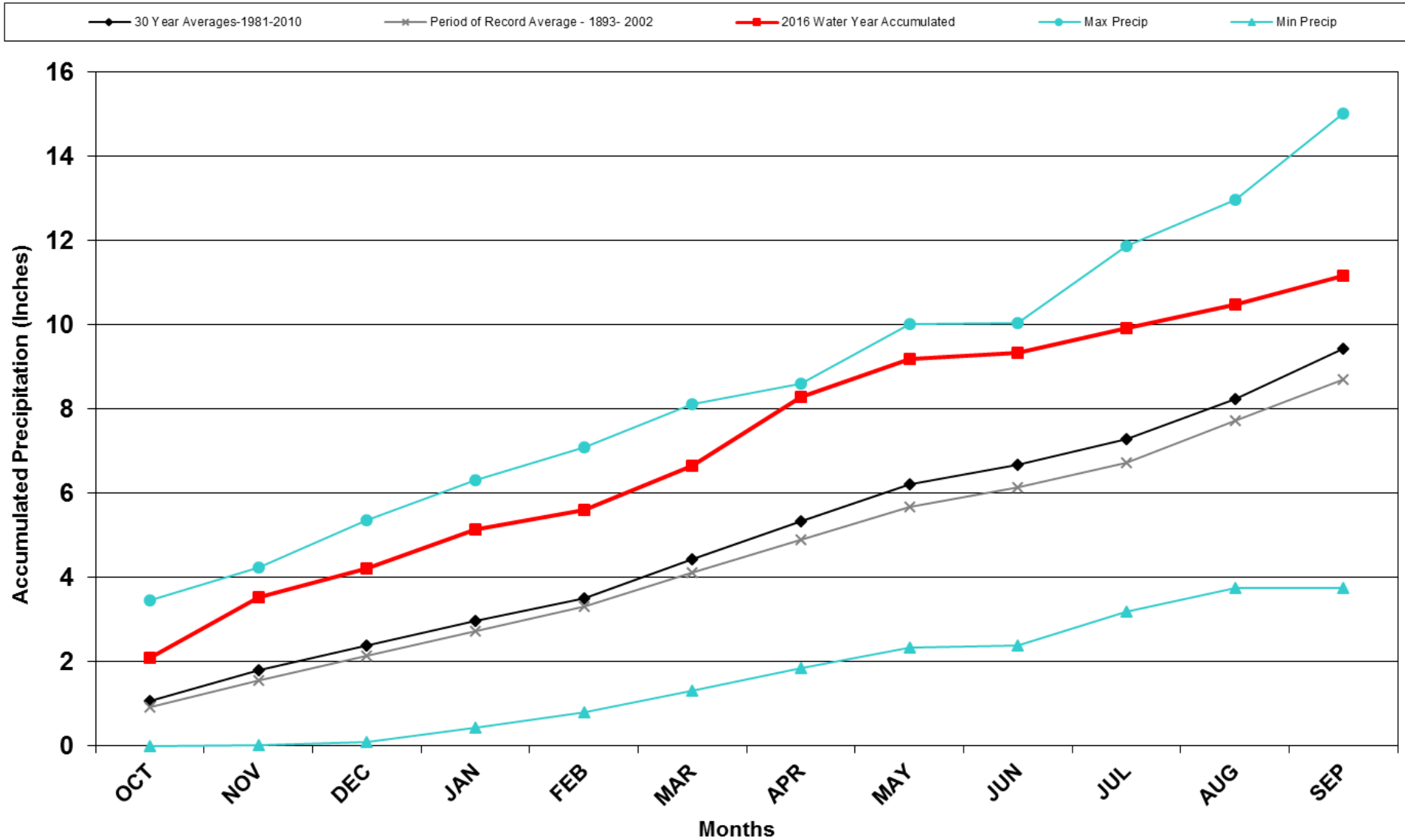
Division 1 – Grand Lake 1NW

Grand Lake 1NW Precipitation Accumulation



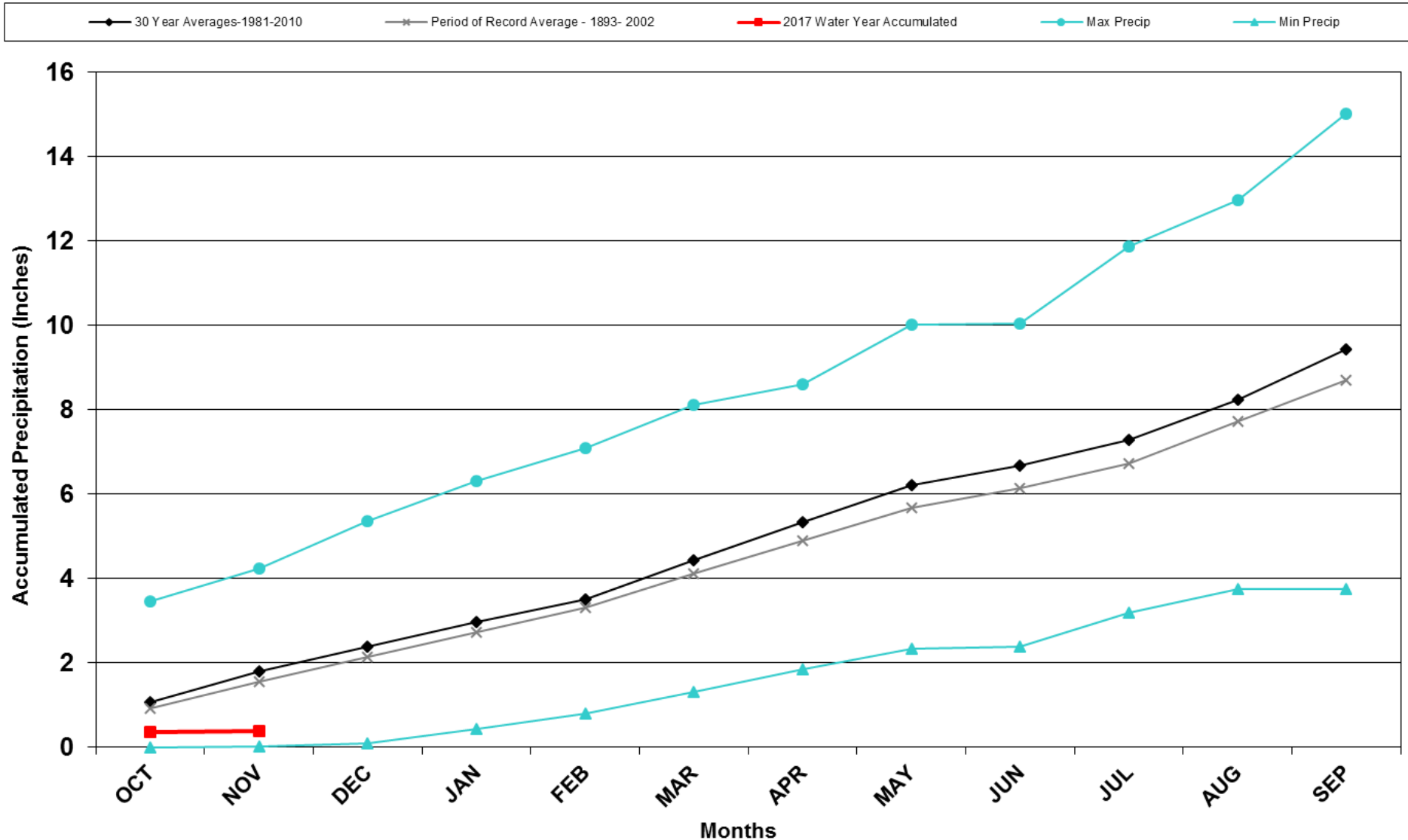
Division 2 – Grand Junction

Grand Junction WSFO 2016 Water Year



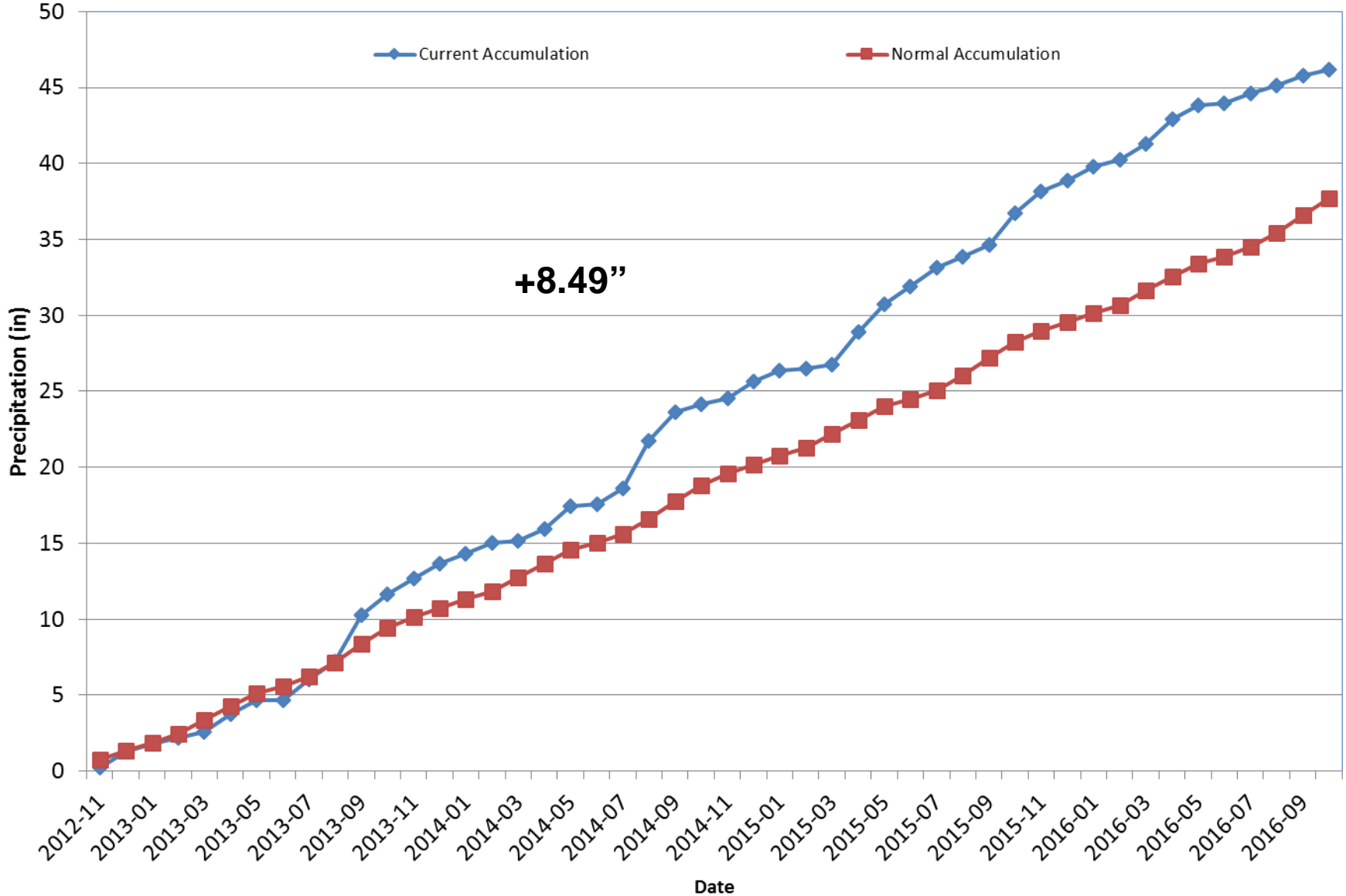
Division 2 – Grand Junction

Grand Junction WSFO 2017 Water Year



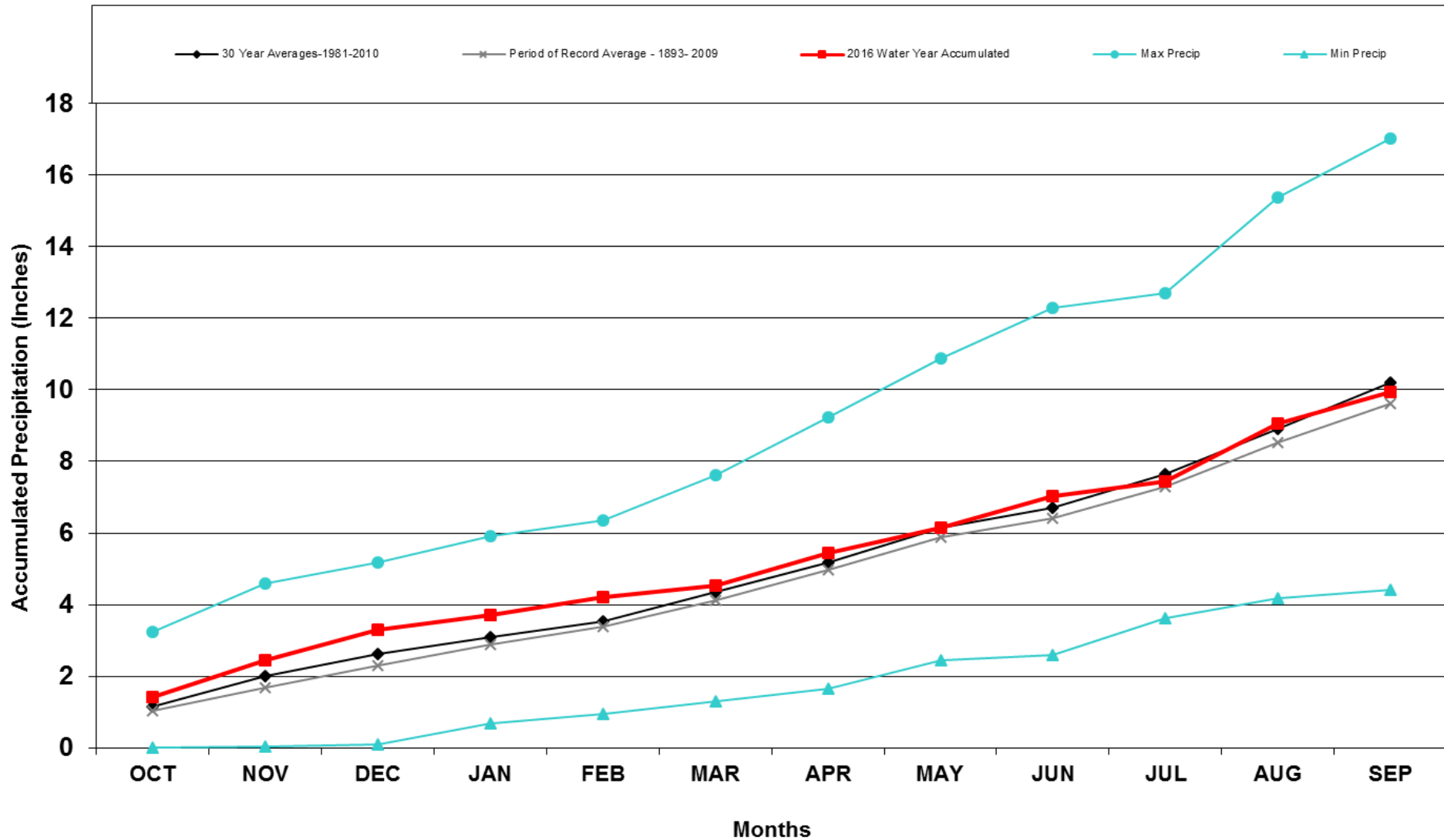
Division 2 – Grand Junction

Grand Junction Precipitation Accumulation



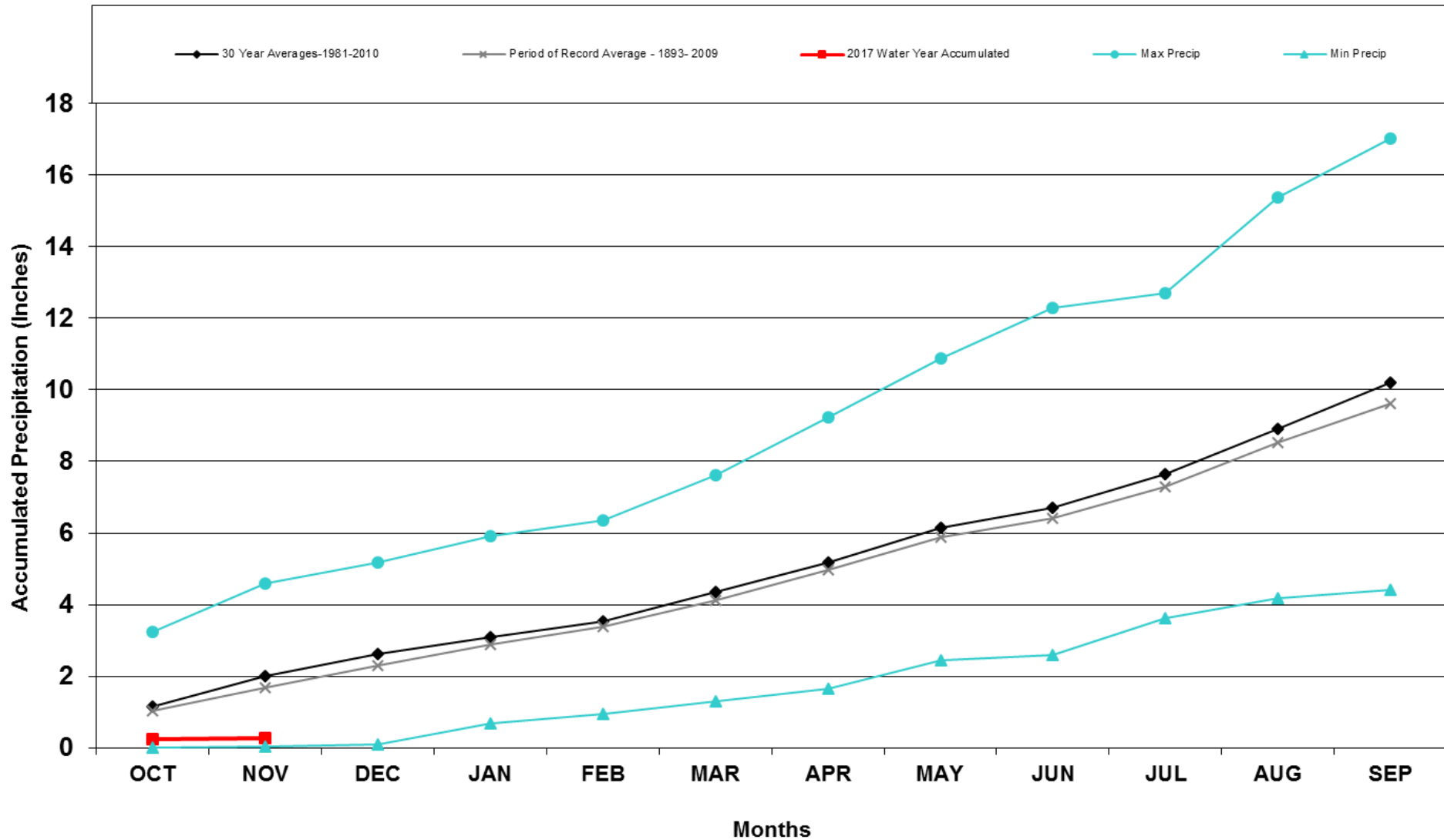
Division 3 – Montrose

Montrose #2 2016 Water Year



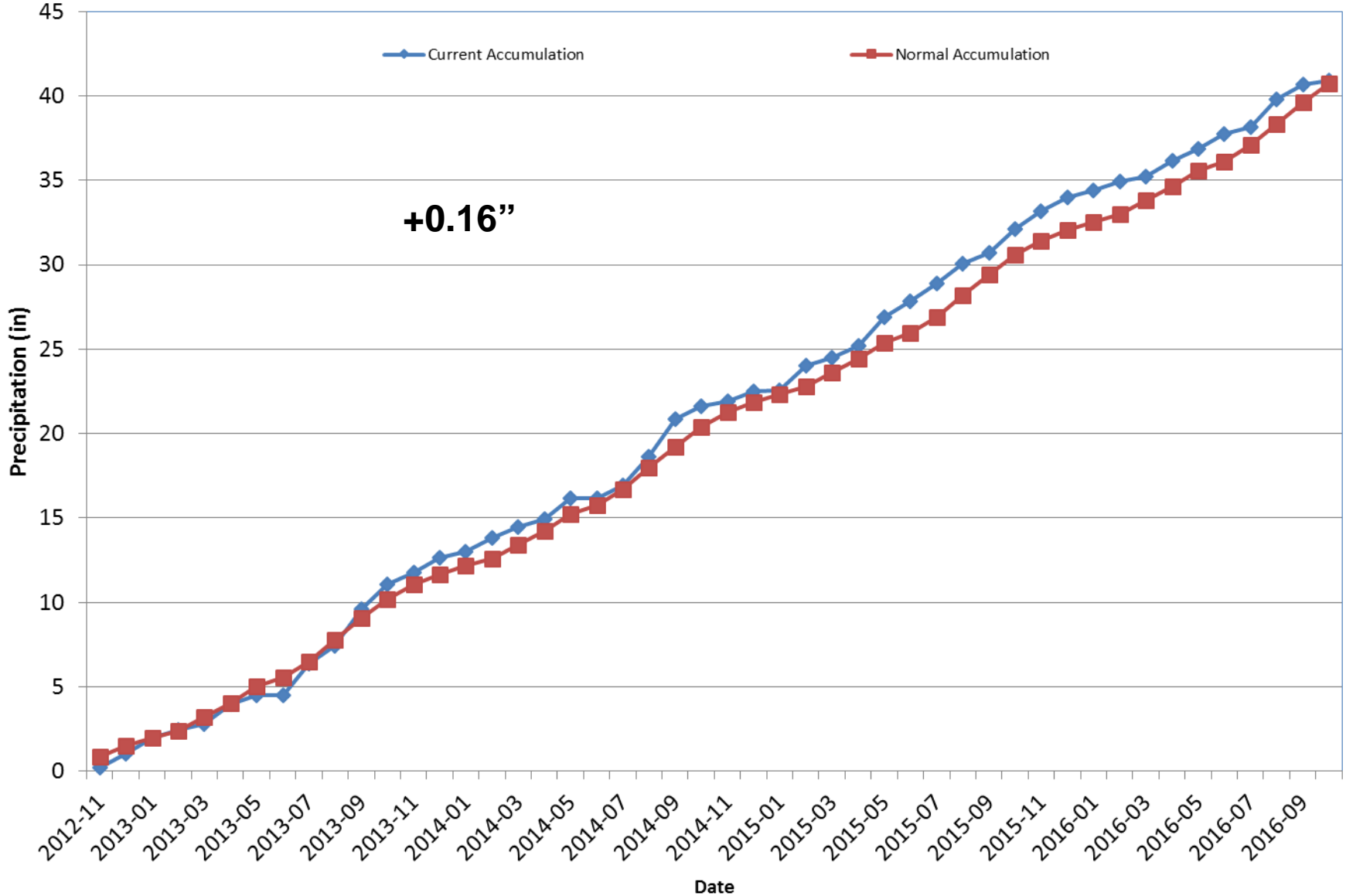
Division 3 – Montrose

Montrose #2 2017 Water Year



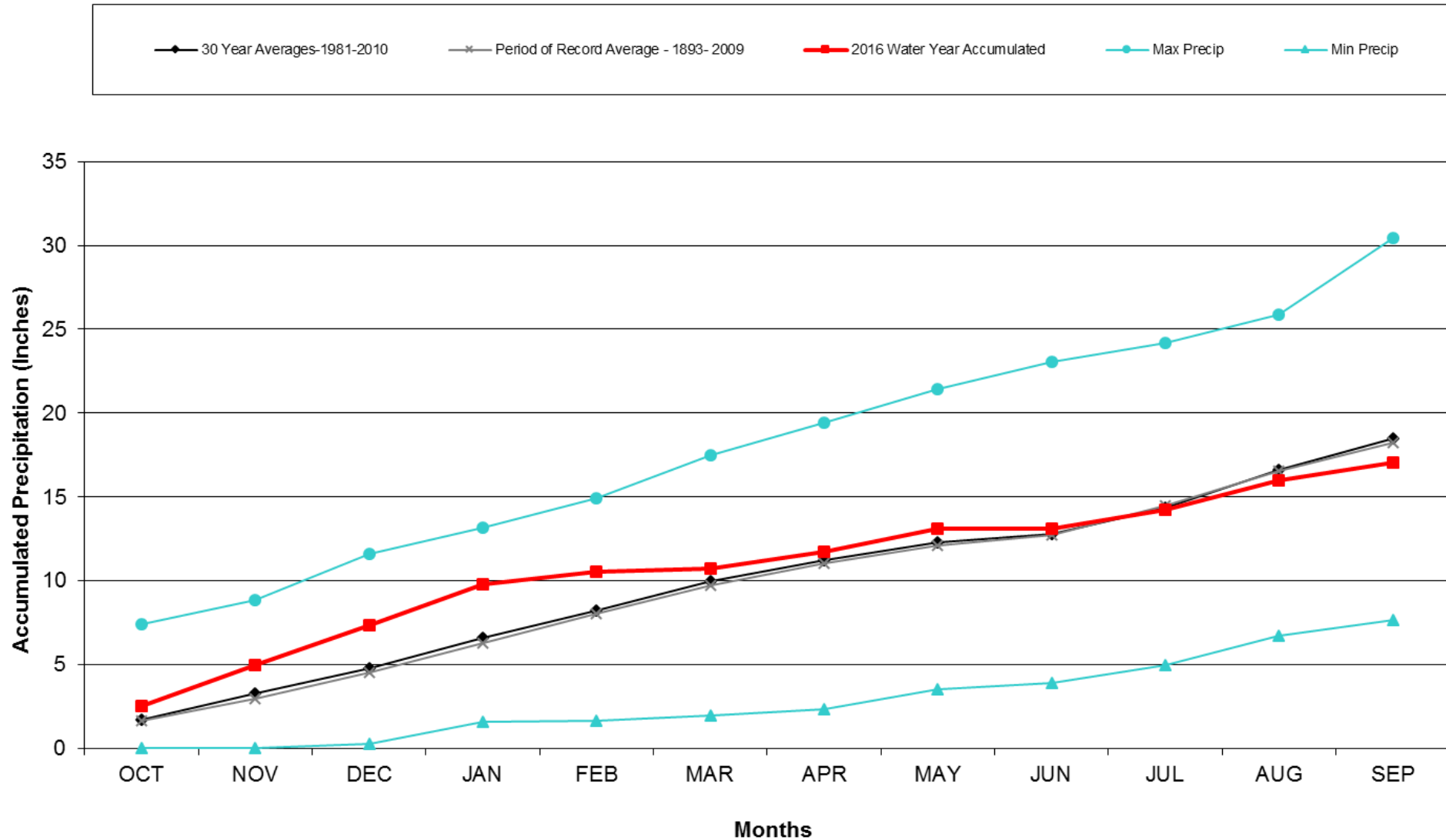
Division 3 – Montrose

Montrose #2 Precipitation Accumulation



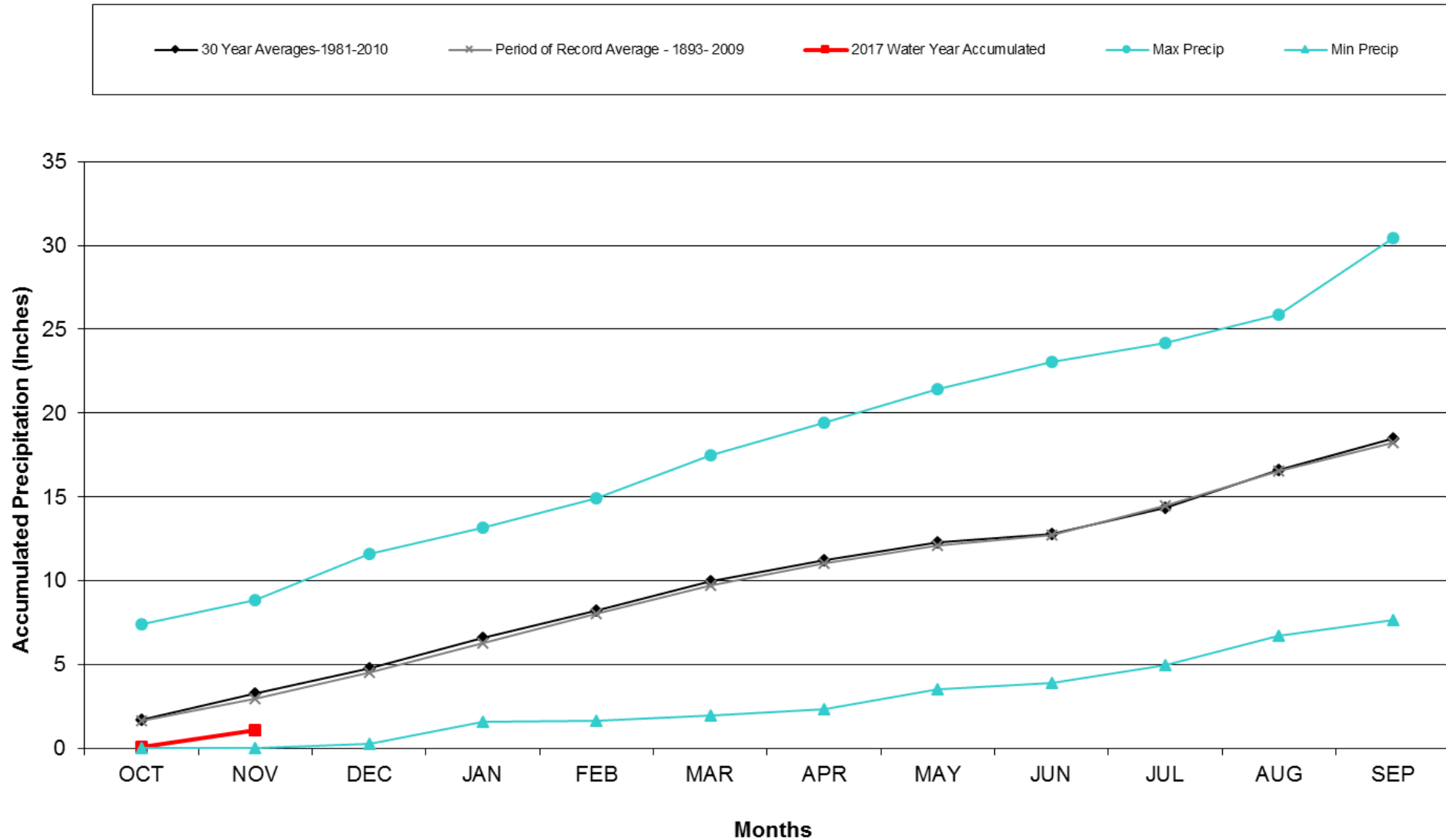
Division 3 – Mesa Verde NP

Mesa Verde NP 2016 Water Year



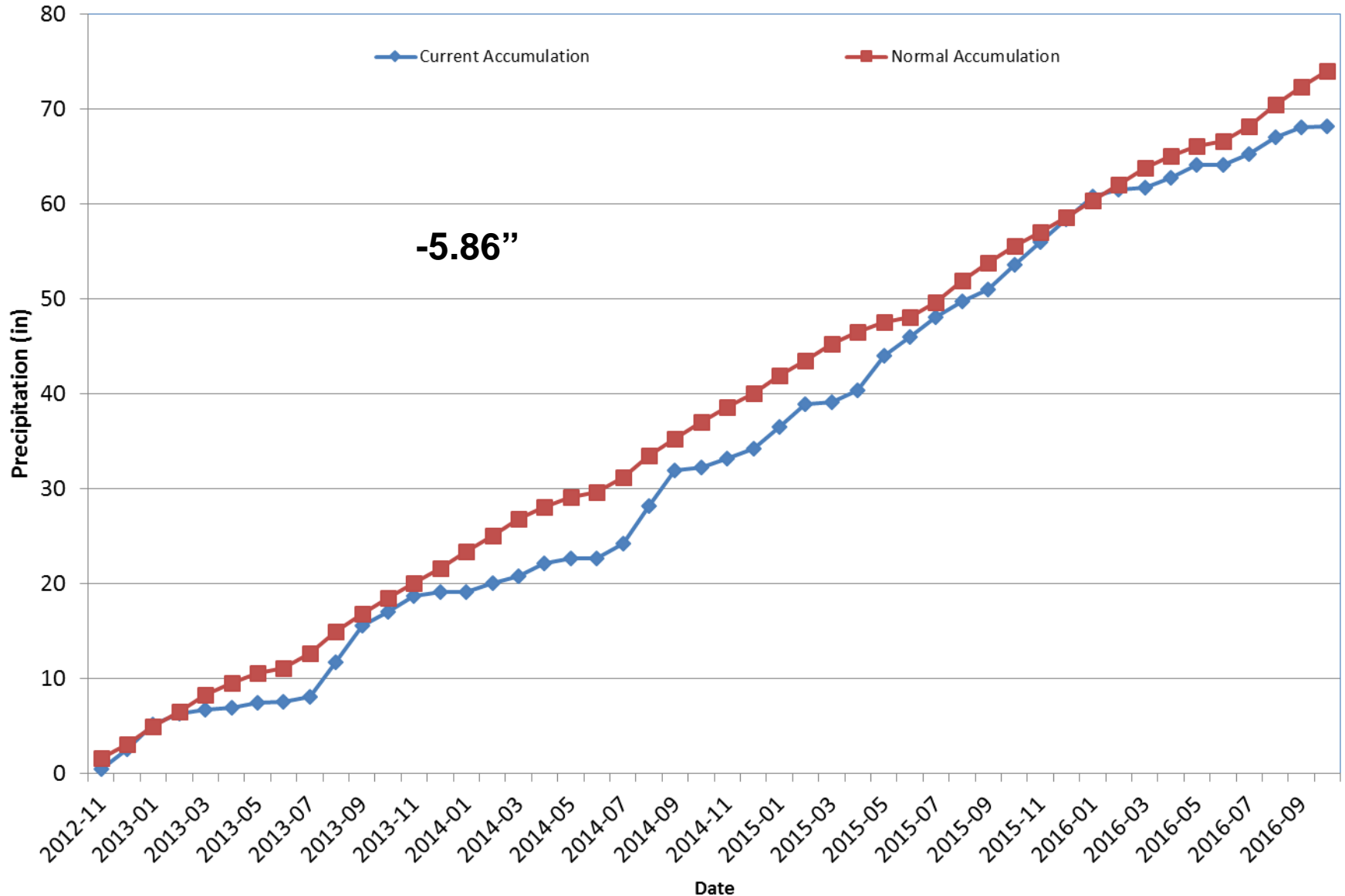
Division 3 – Mesa Verde NP

Mesa Verde NP 2017 Water Year



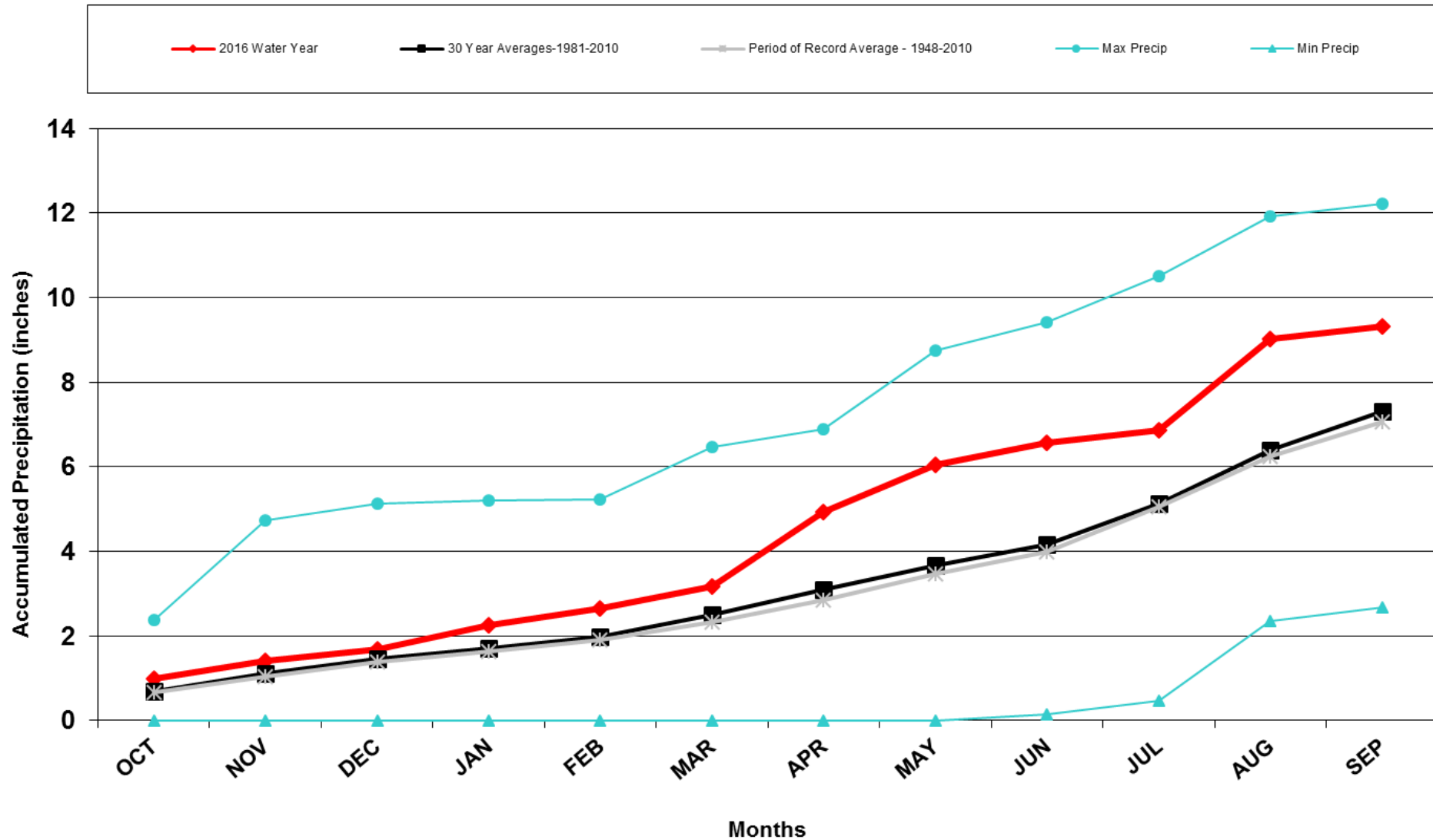
Division 3 – Mesa Verde NP

Mesa Verde NP Precipitation Accumulation



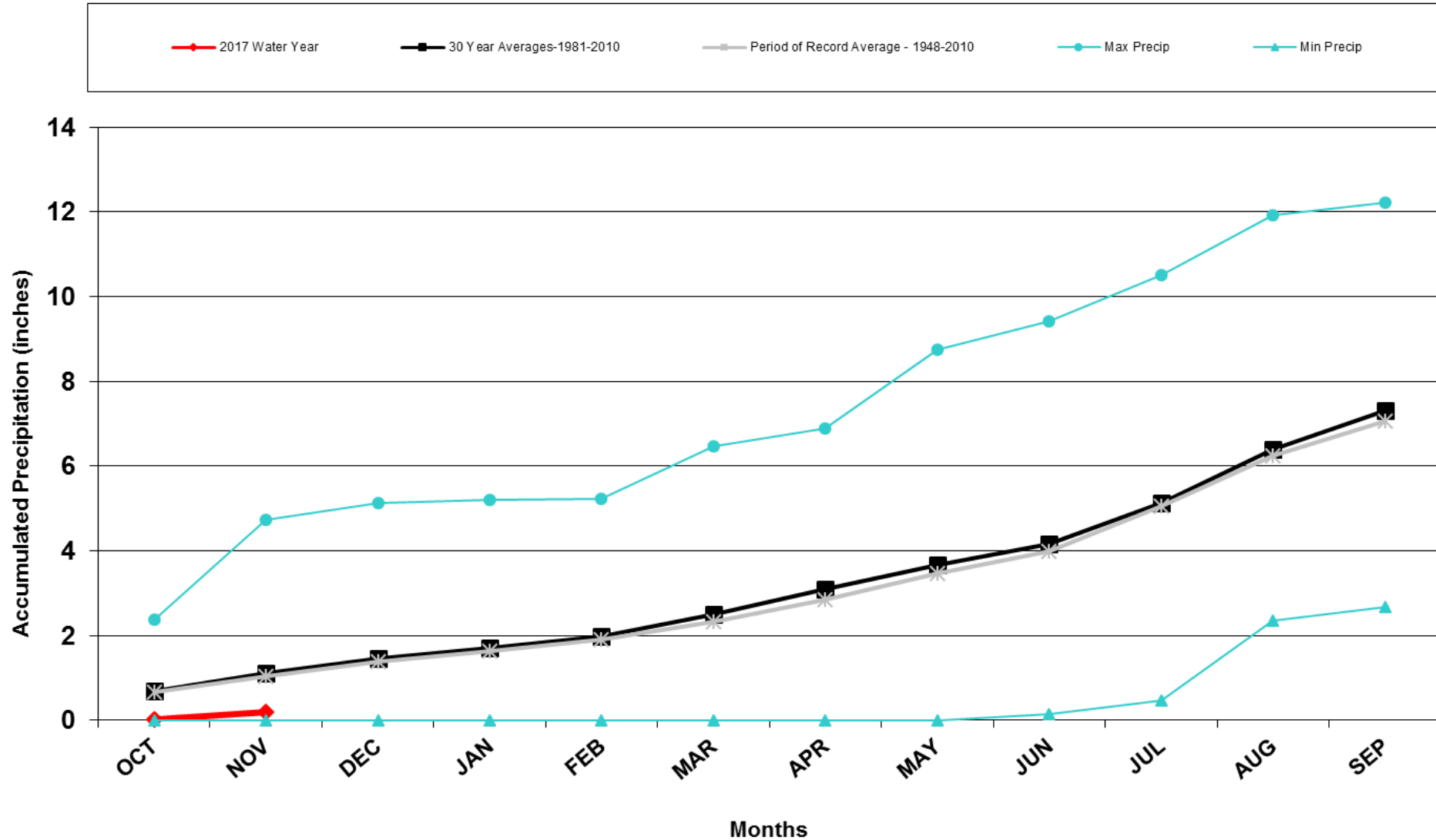
Division 4 – Alamosa

Alamosa WSO 2016 Water Year



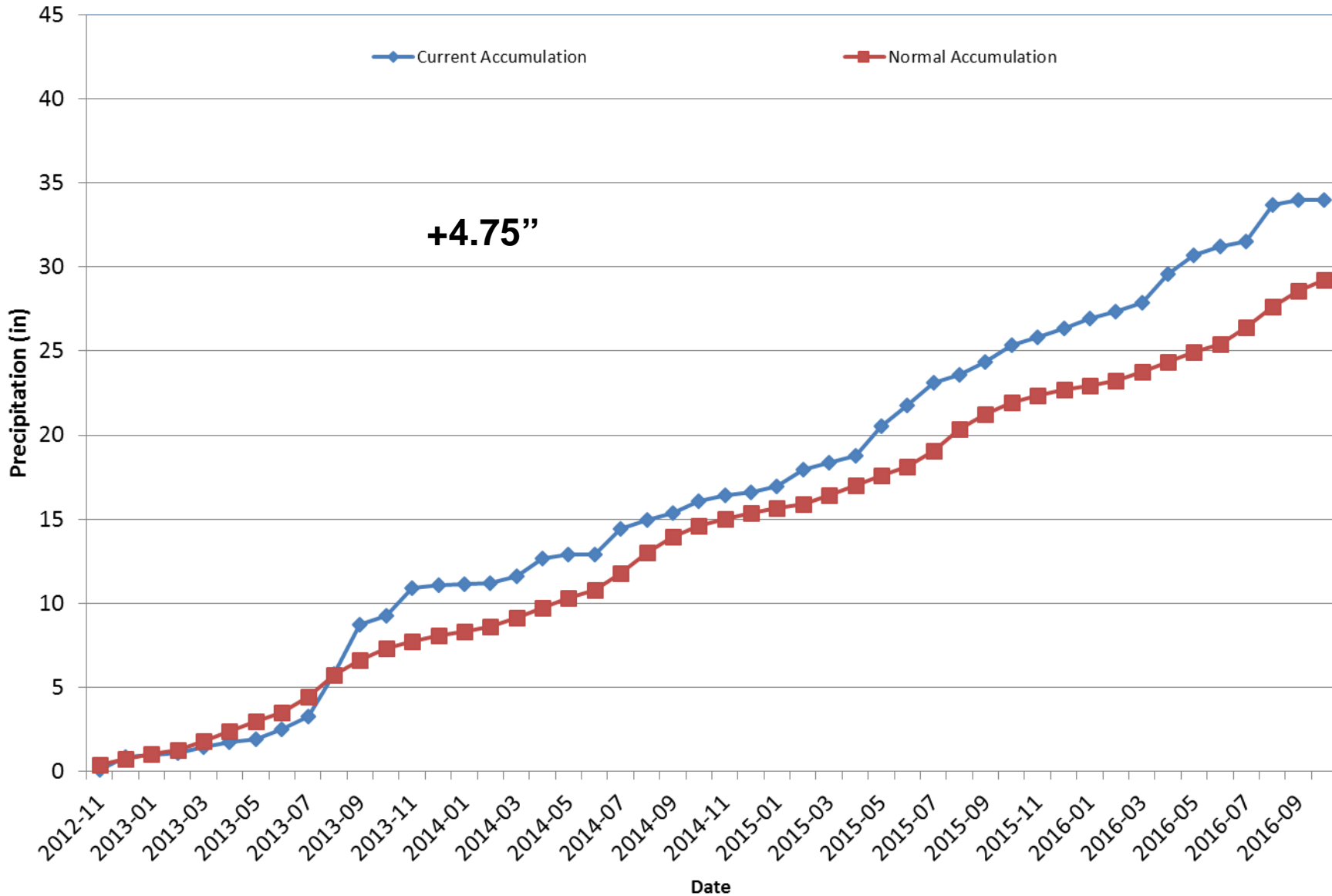
Division 4 – Alamosa

Alamosa WSO 2017 Water Year



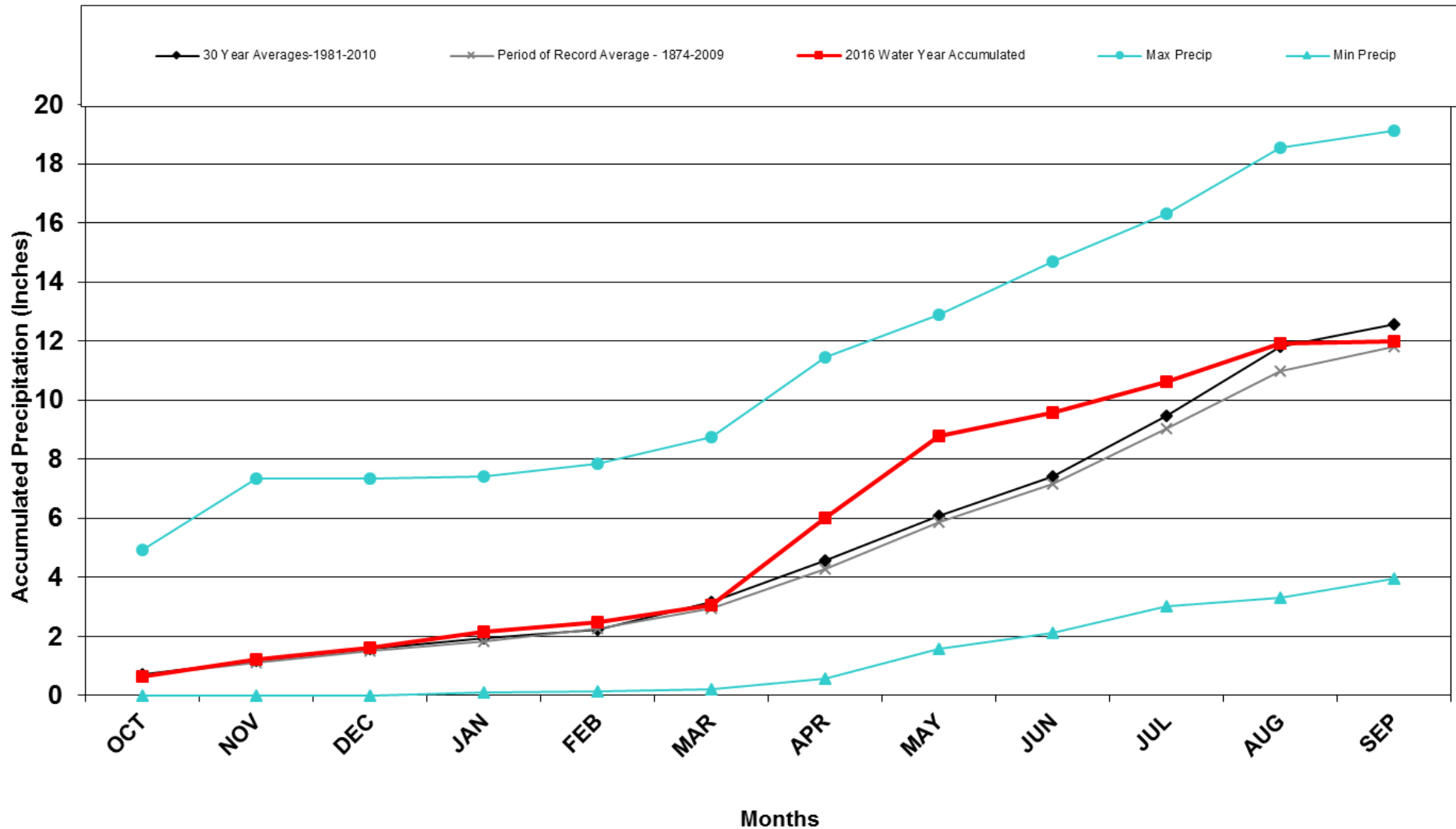
Division 4 – Alamosa

Alamosa WSO Precipitation Accumulation



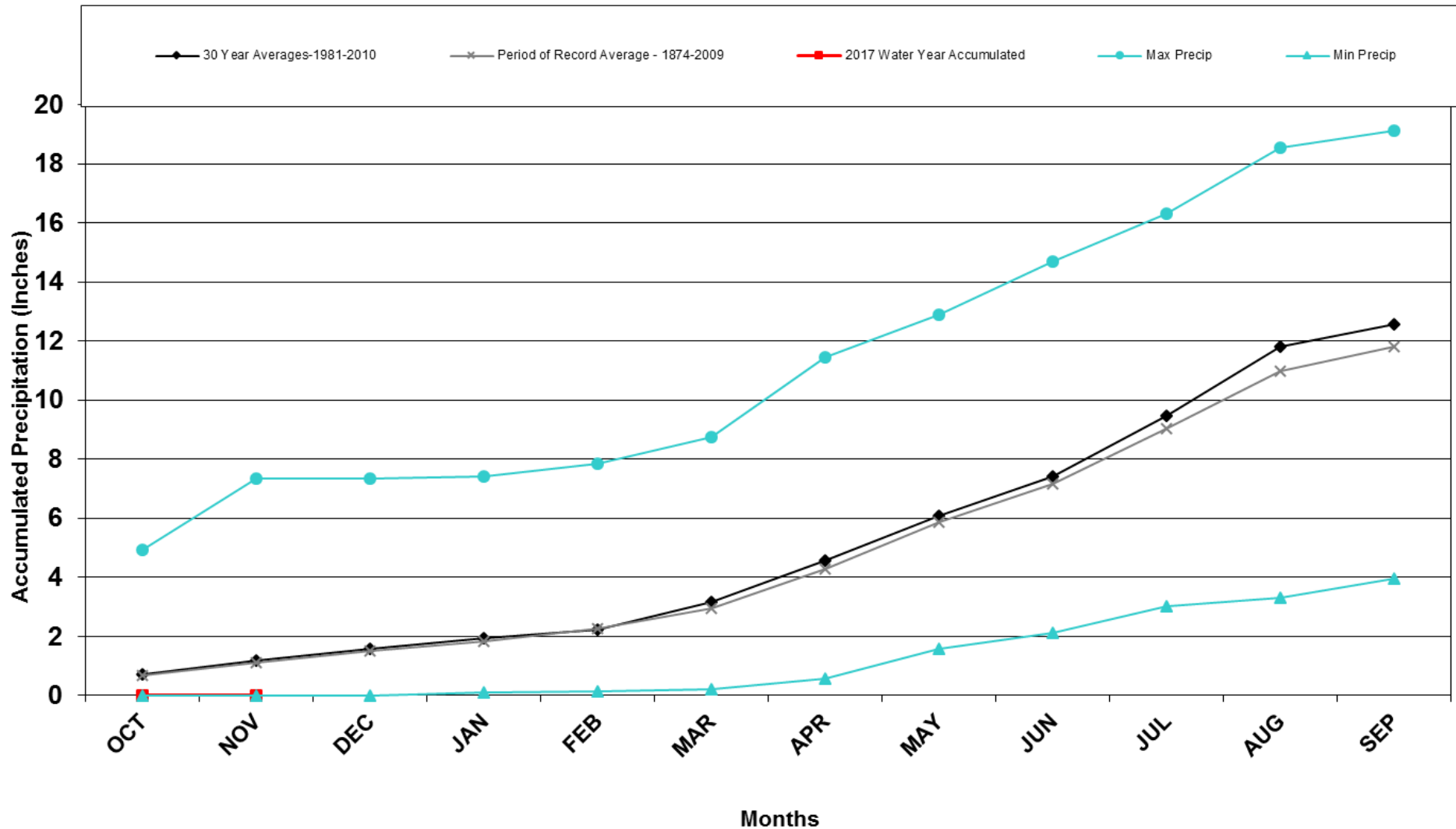
Division 5 – Pueblo

Pueblo WSO 2016 Water Year



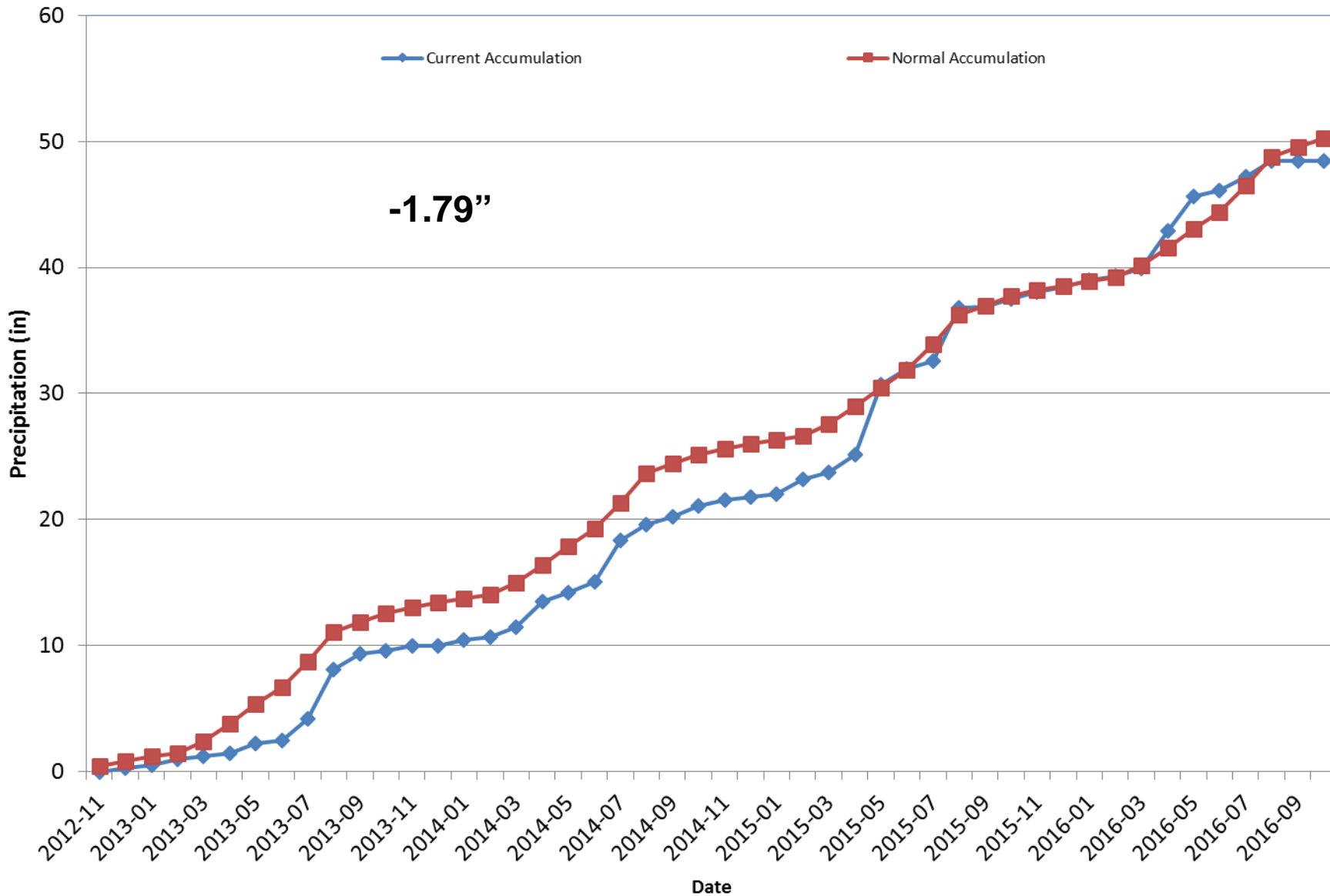
Division 5 – Pueblo

Pueblo WSO 2017 Water Year



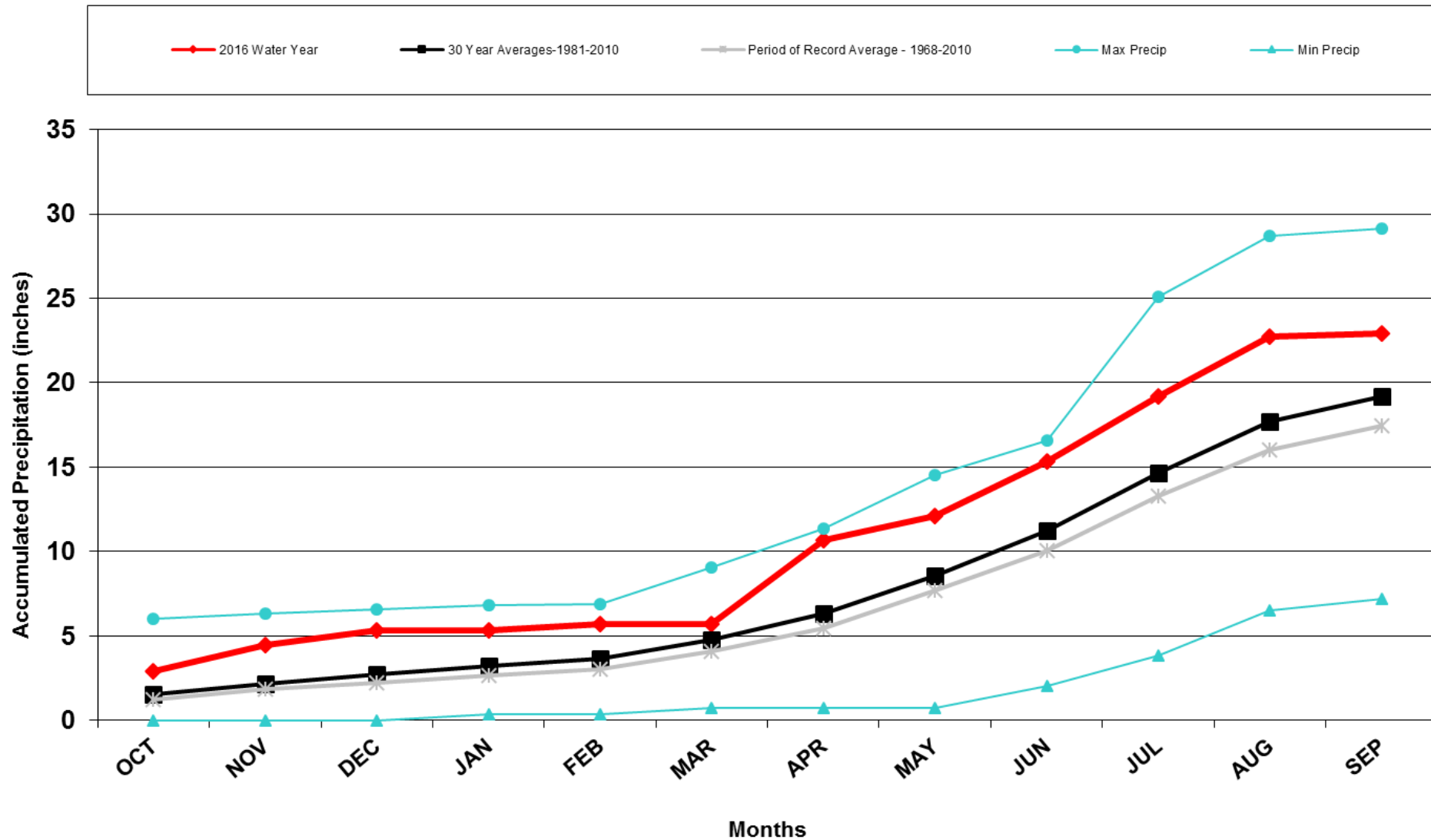
Division 5 – Pueblo

Pueblo Memorial AP Precipitation Accumulation



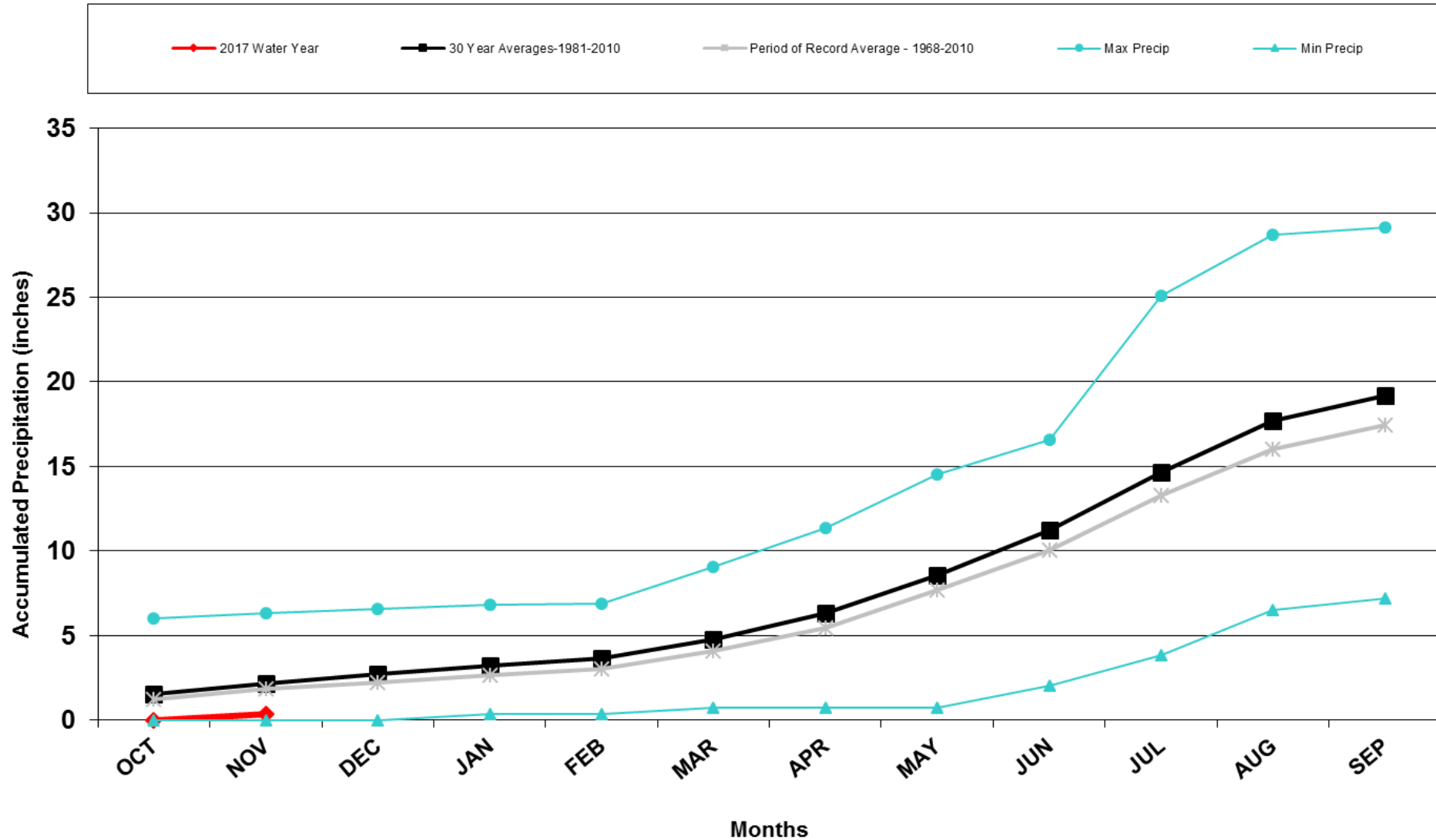
Division 6 - Walsh

Walsh 2016 Water Year



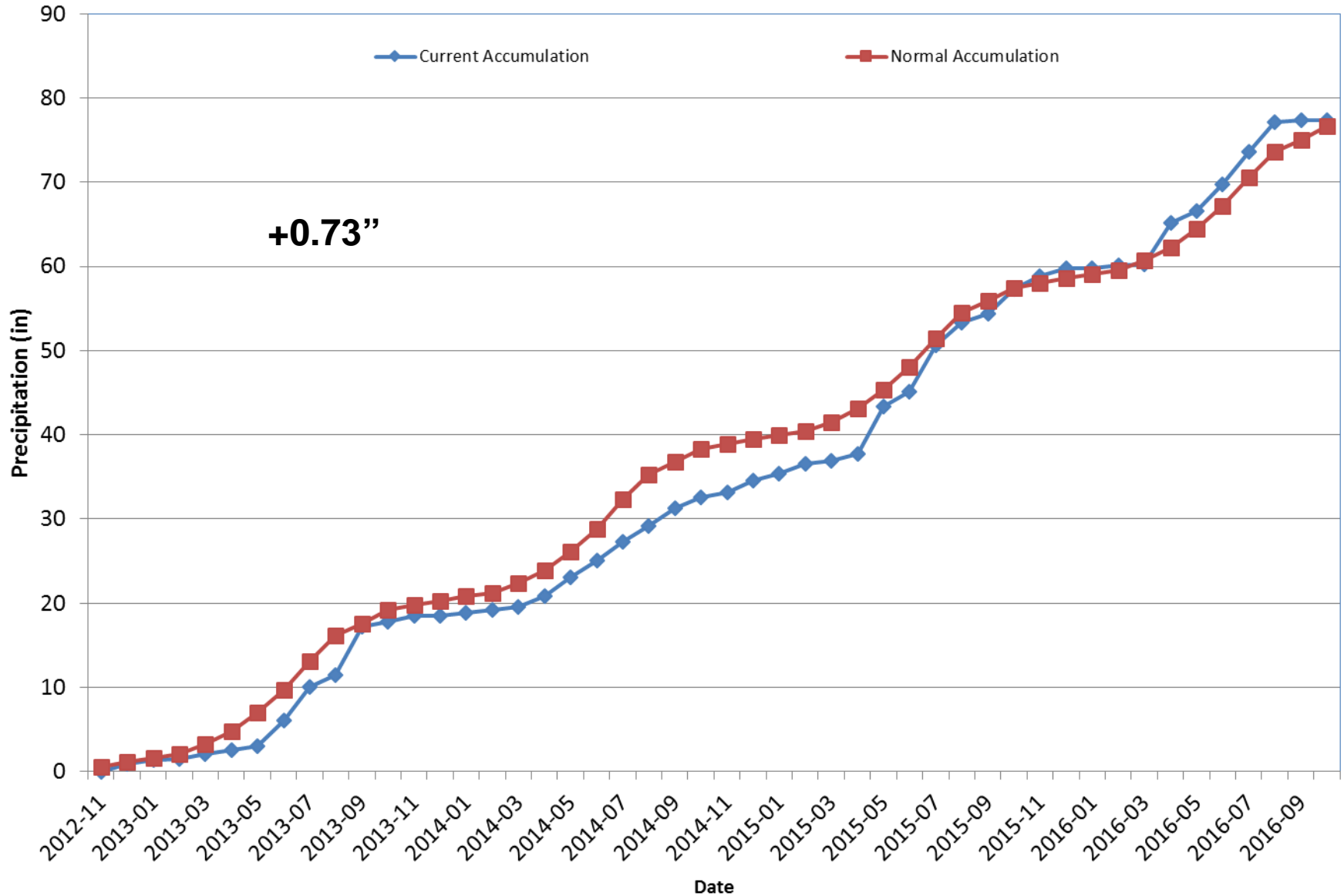
Division 6 - Walsh

Walsh 2017 Water Year



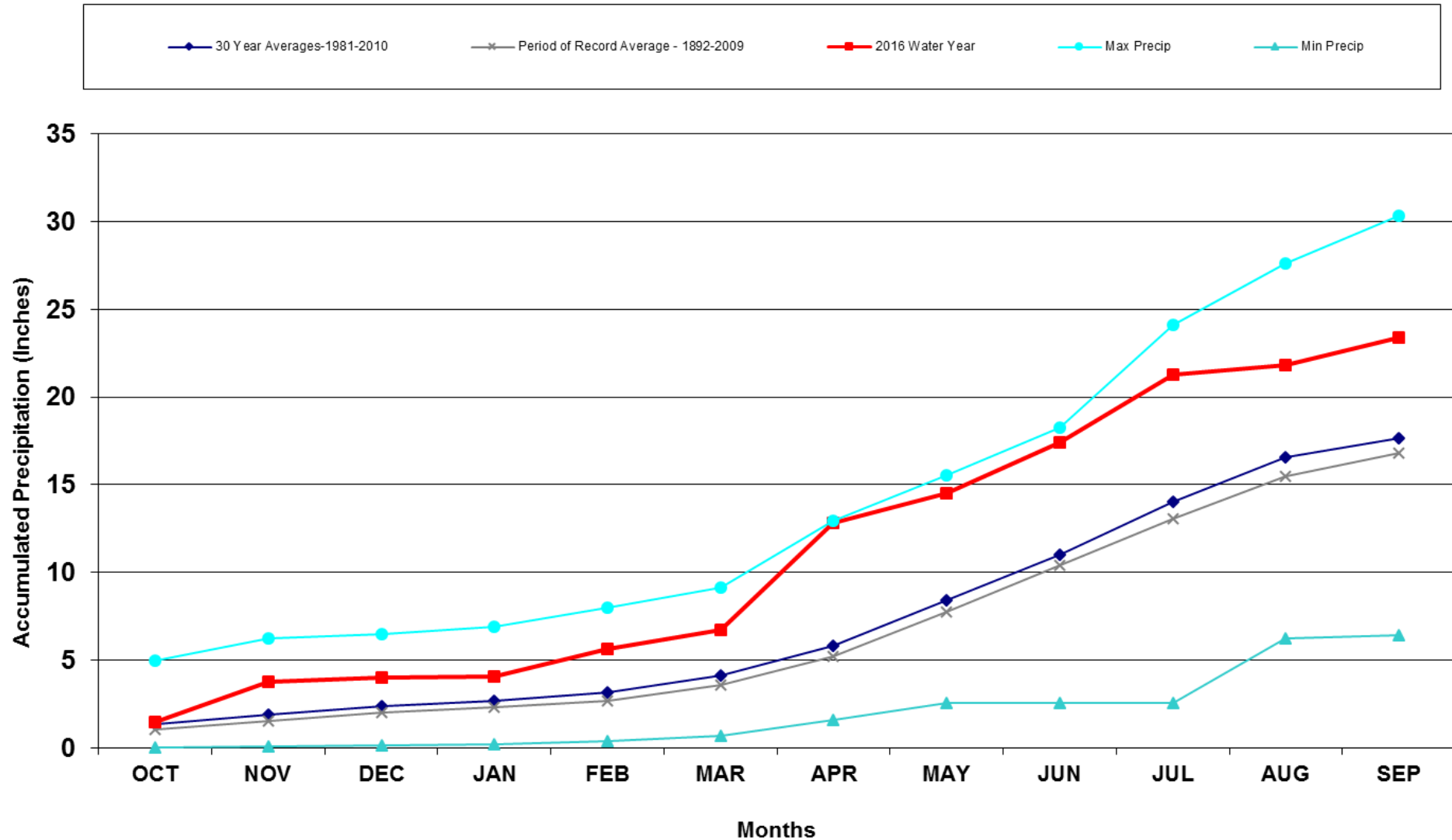
Division 6 - Walsh

Walsh 1W Precipitation Accumulation



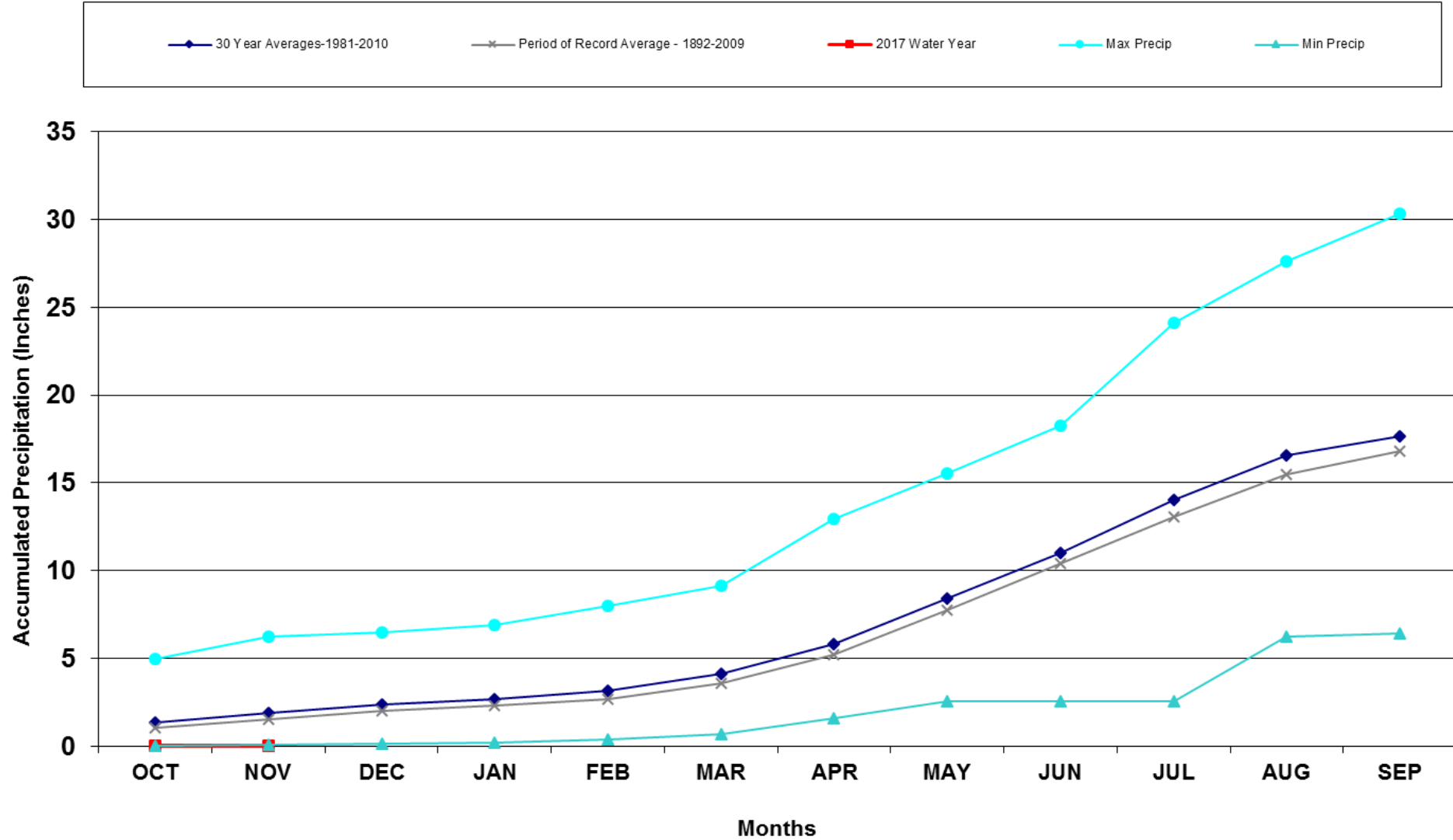
Division 6 - Burlington

Burlington 2016 Water Year



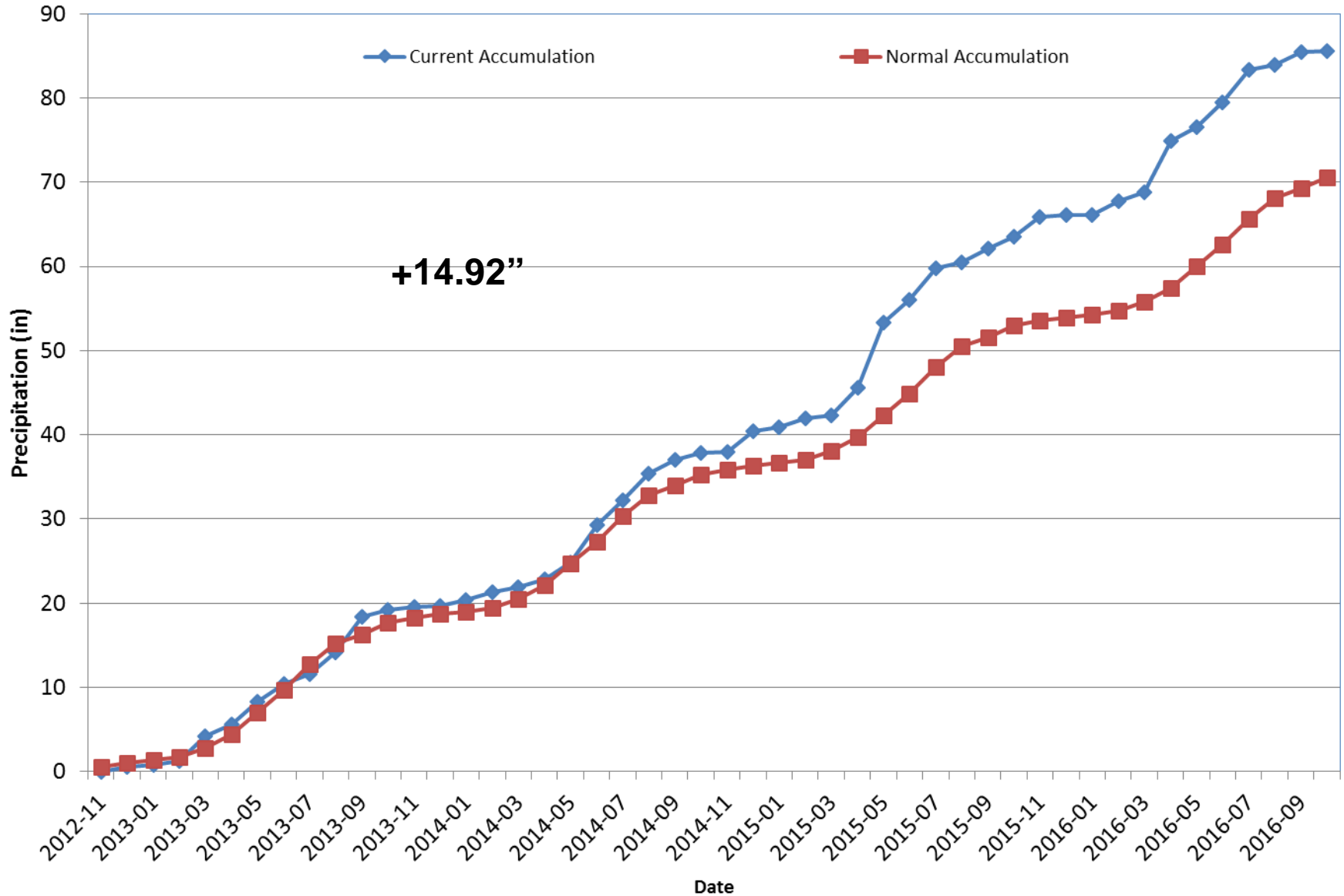
Division 6 - Burlington

Burlington 2017 Water Year



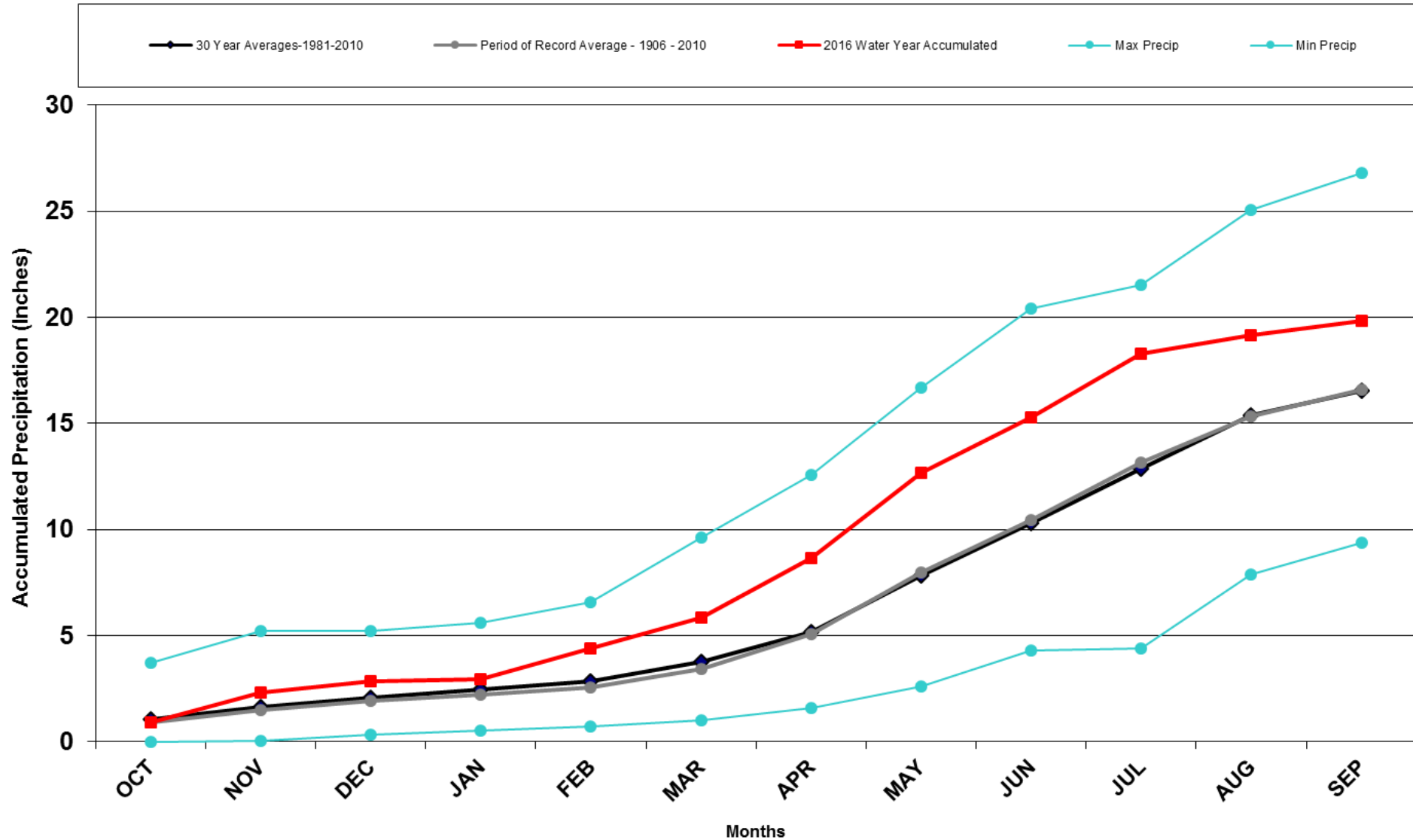
Division 6 - Burlington

Burlington, CO Precipitation Accumulation



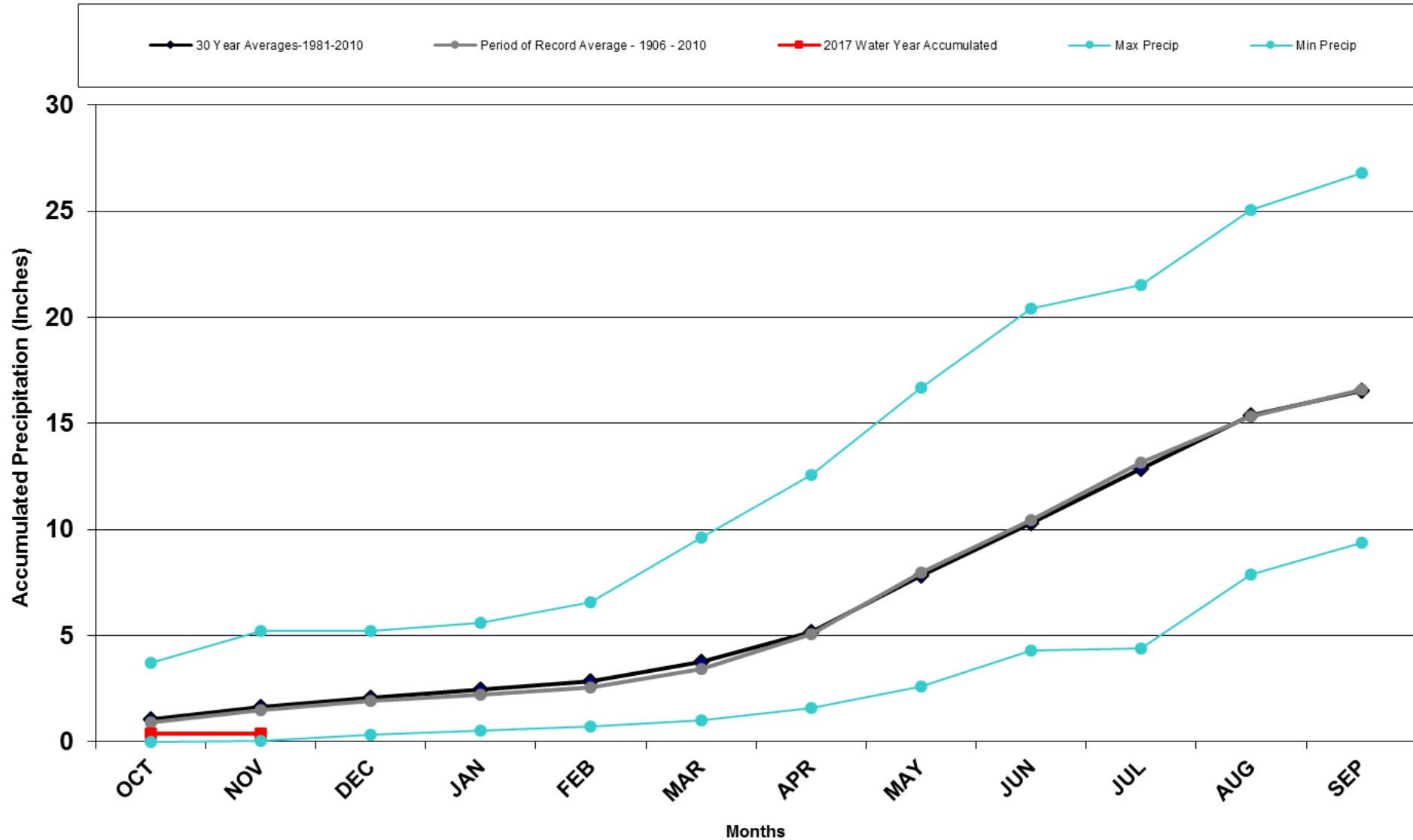
Division 7 – Akron

Akron 4E 2016 Water Year



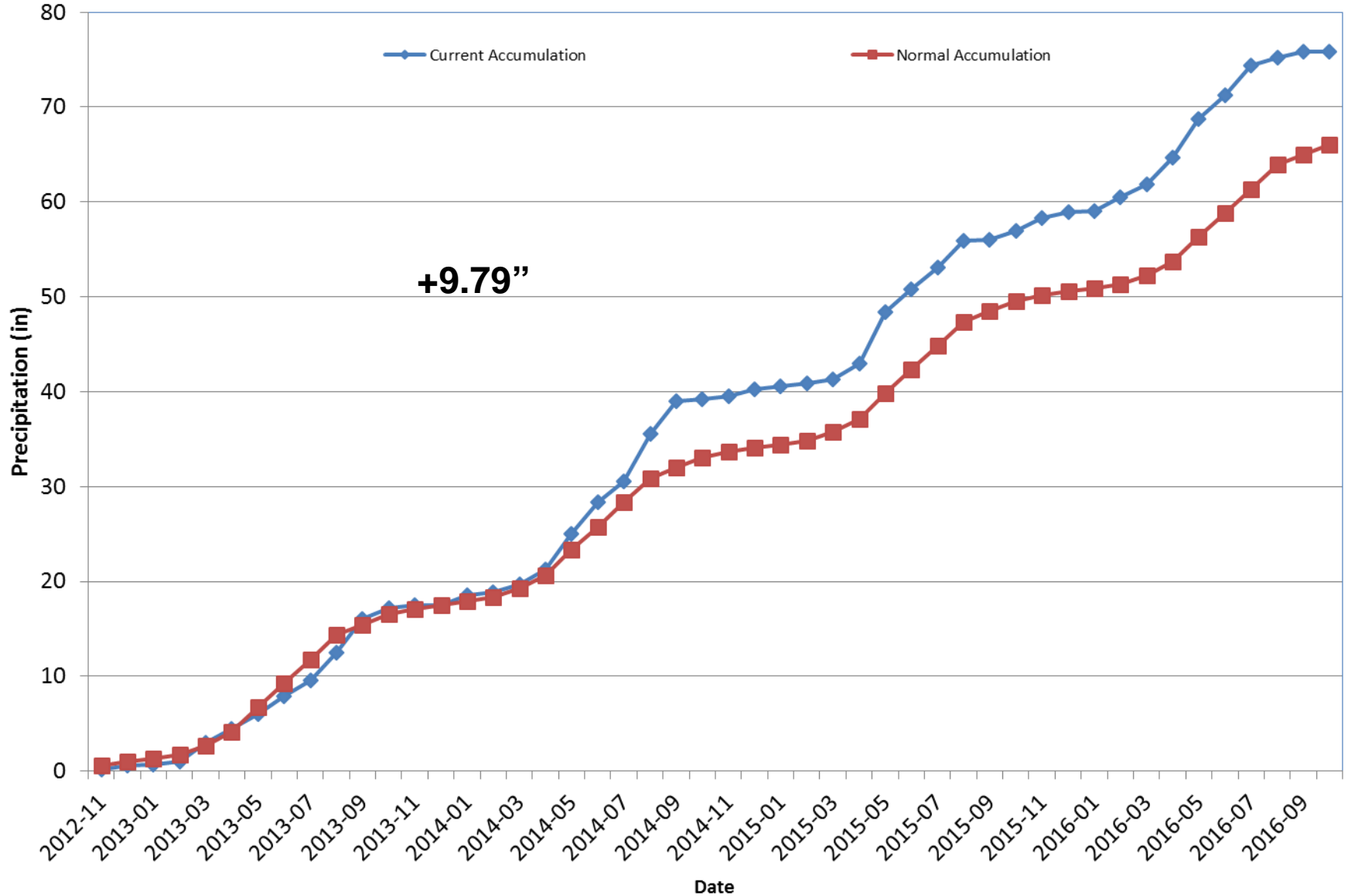
Division 7 – Akron

Akron 4E 2016 Water Year



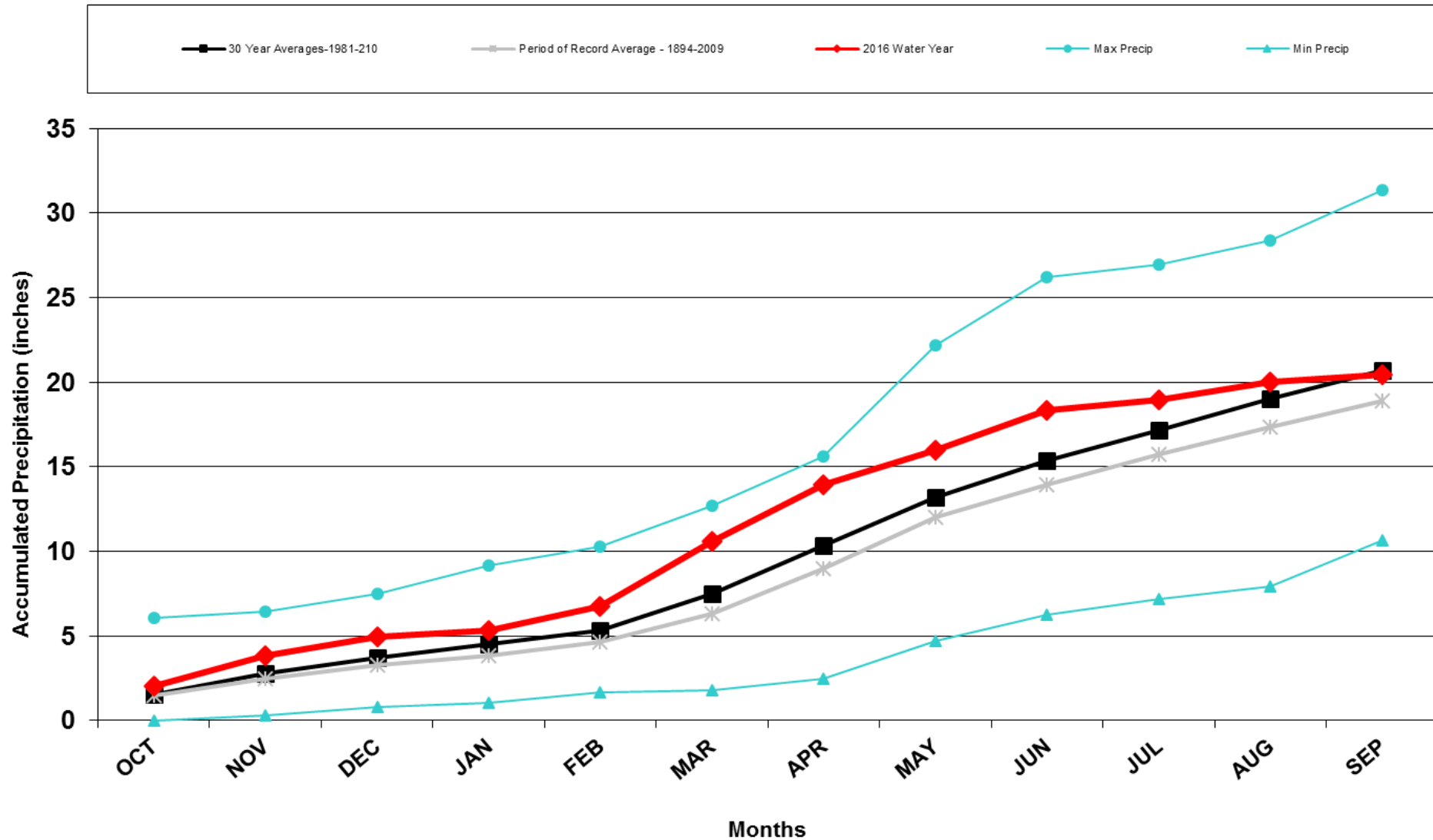
Division 7 – Akron

Akron 4E Precipitation Accumulation



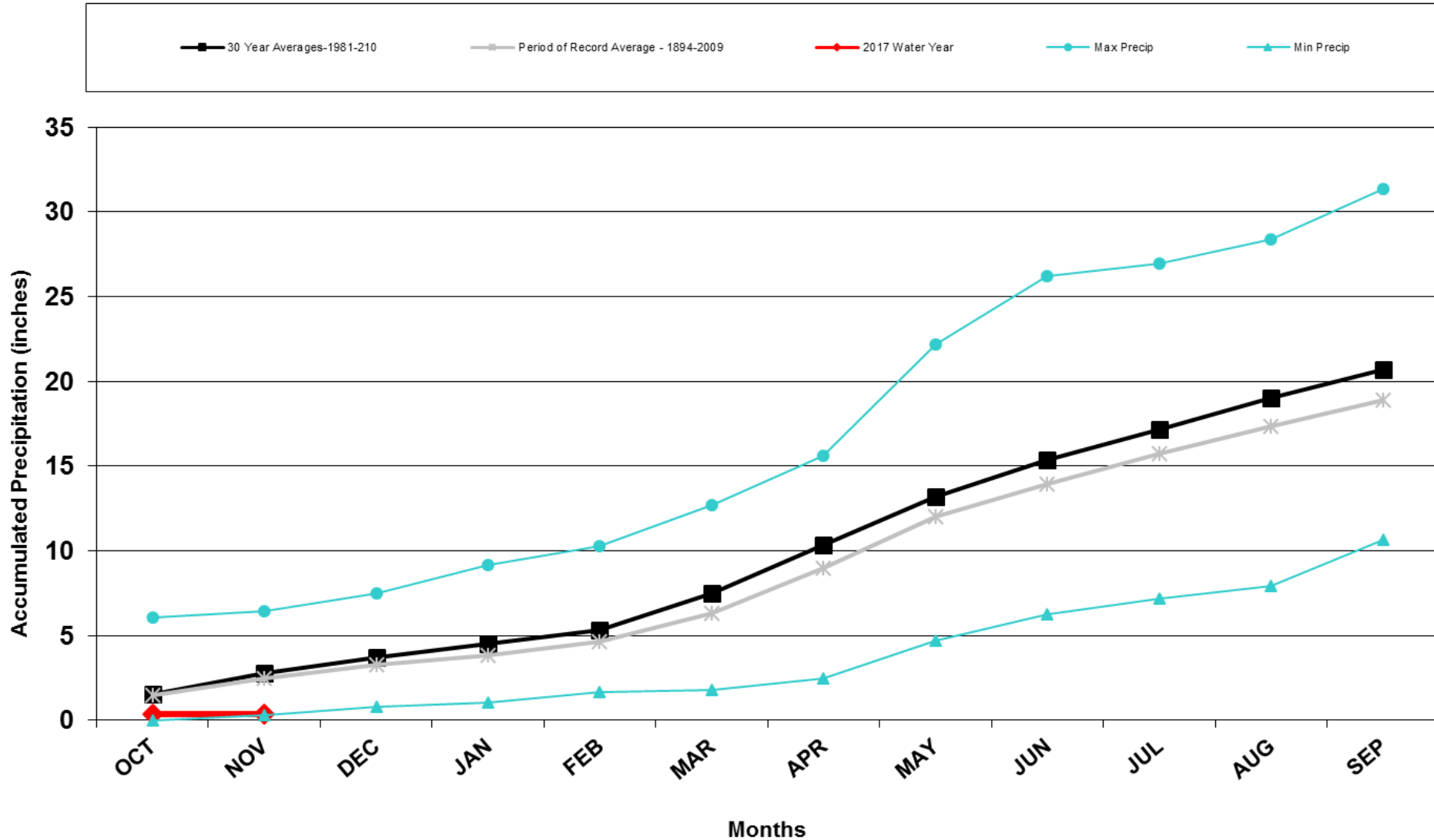
Division 8 - Boulder

Boulder 2016 Water Year



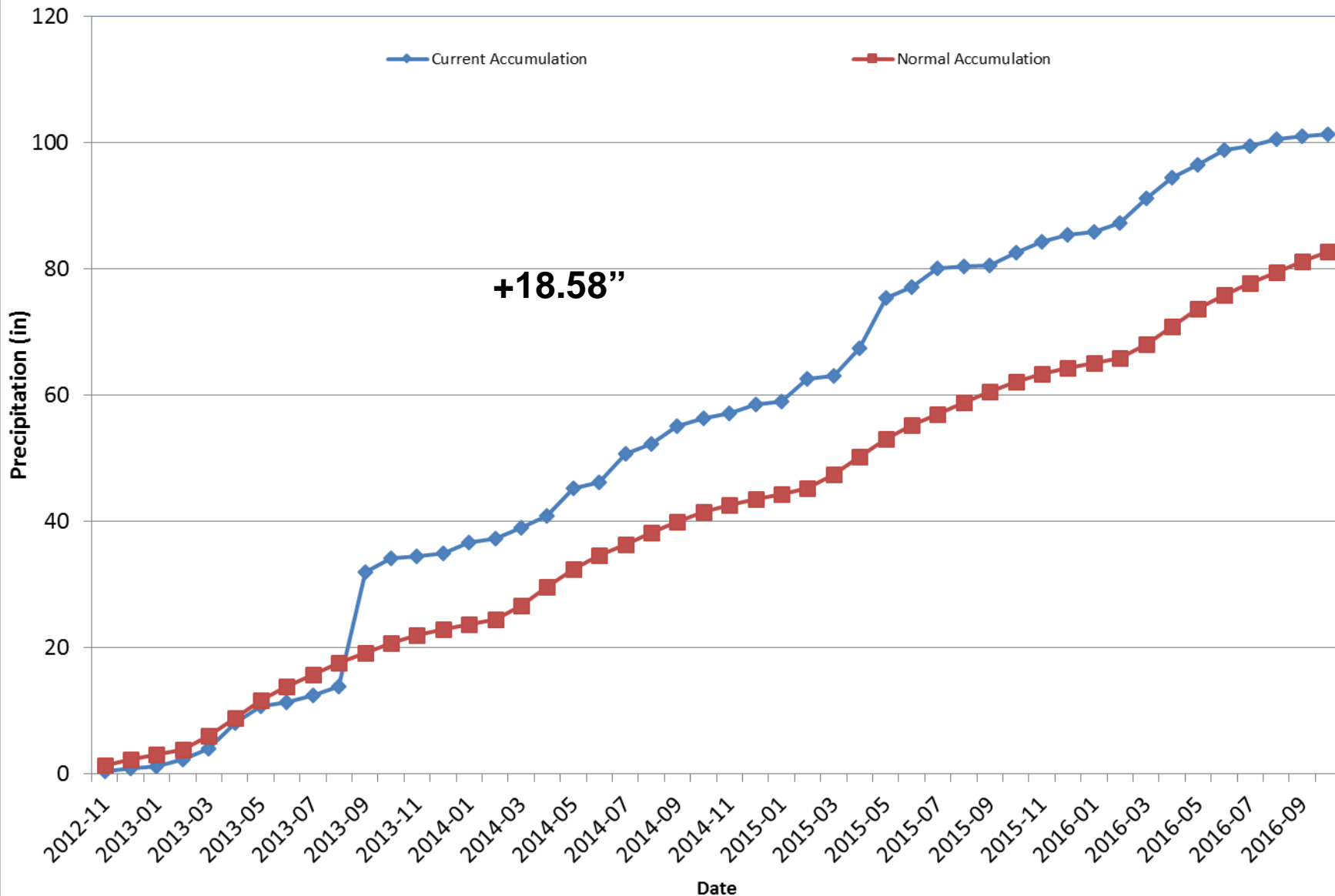
Division 8 - Boulder

Boulder 2017 Water Year

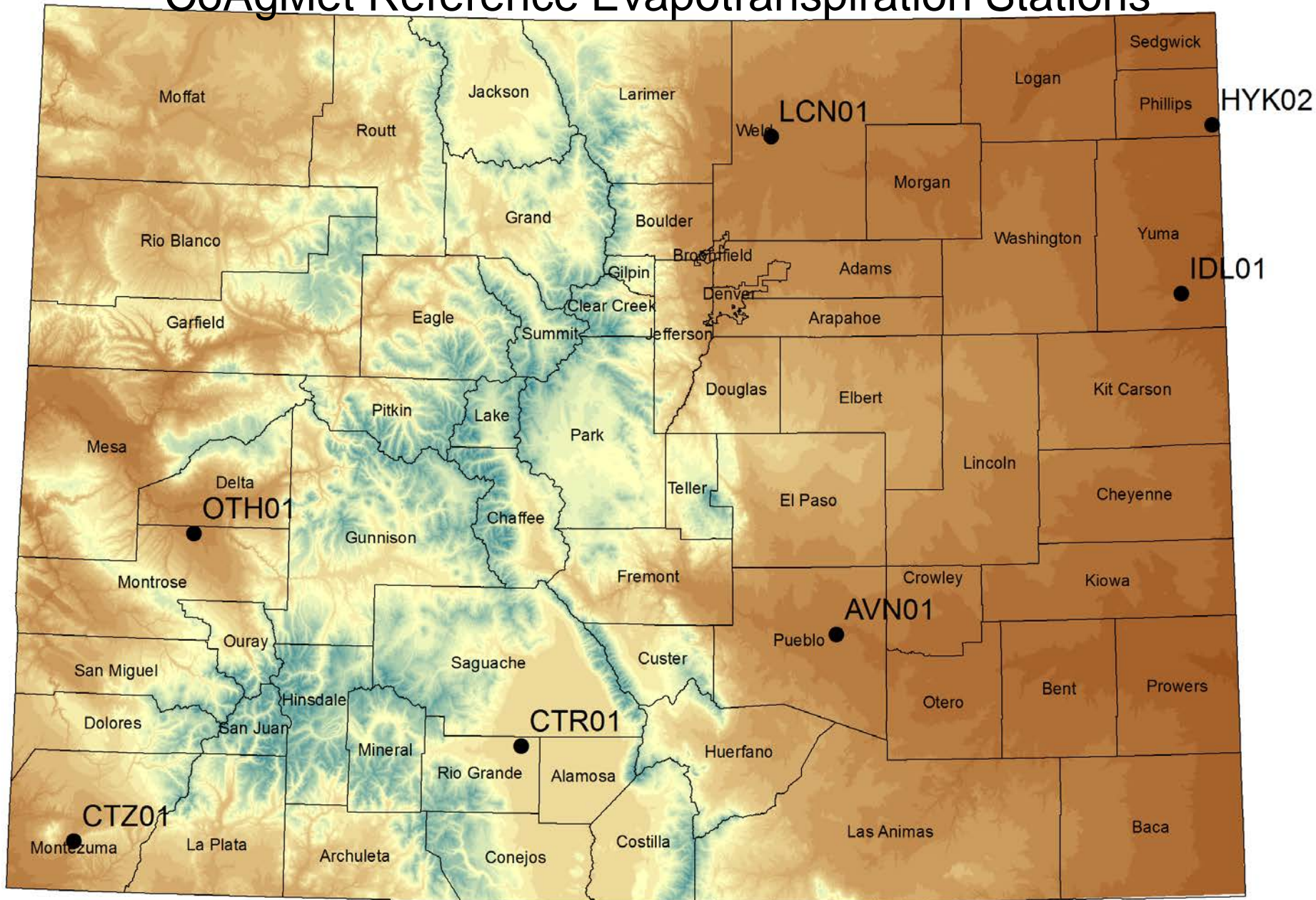


Division 8 - Boulder

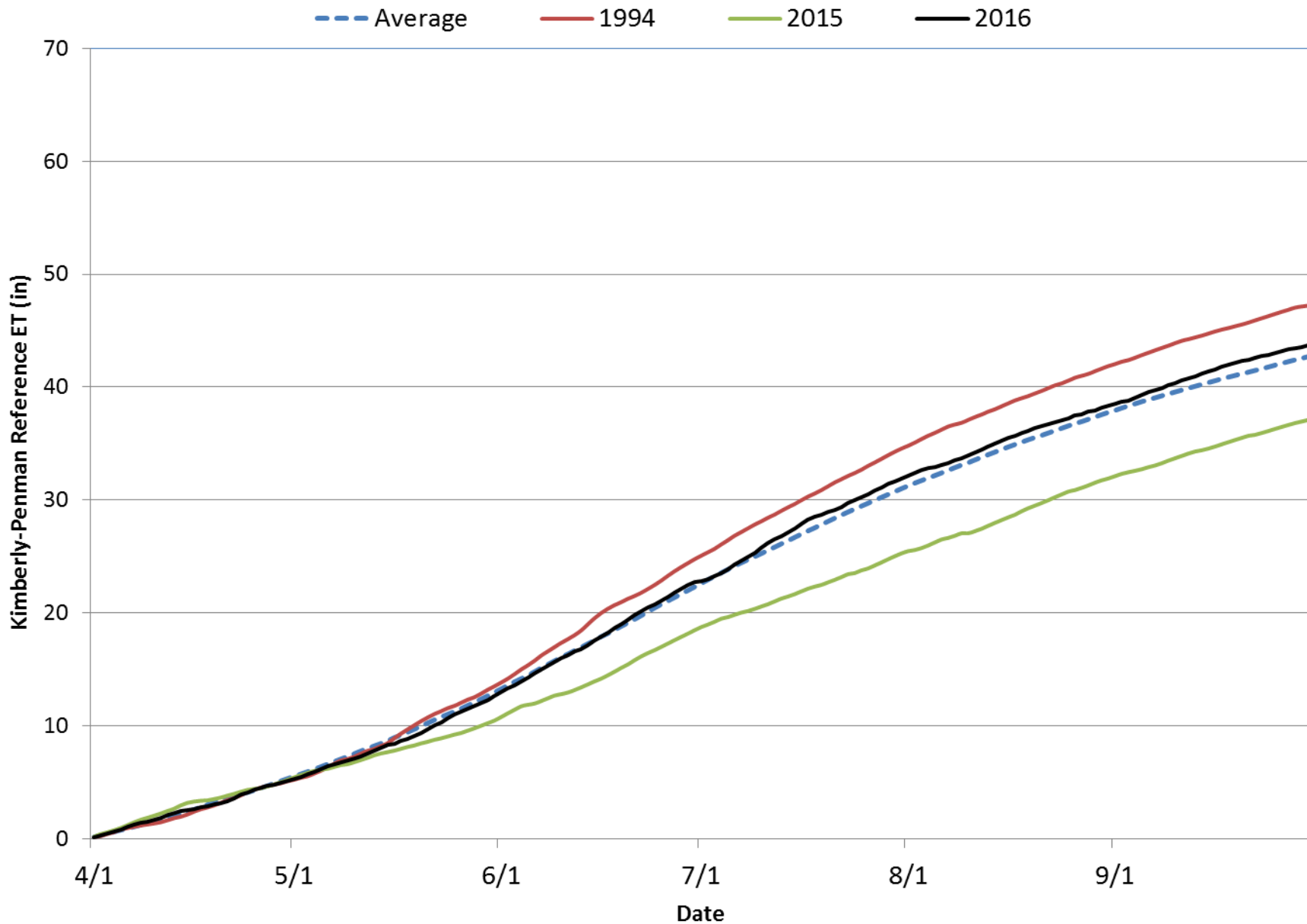
Boulder Precipitation Accumulation



CoAgMet Reference Evapotranspiration Stations

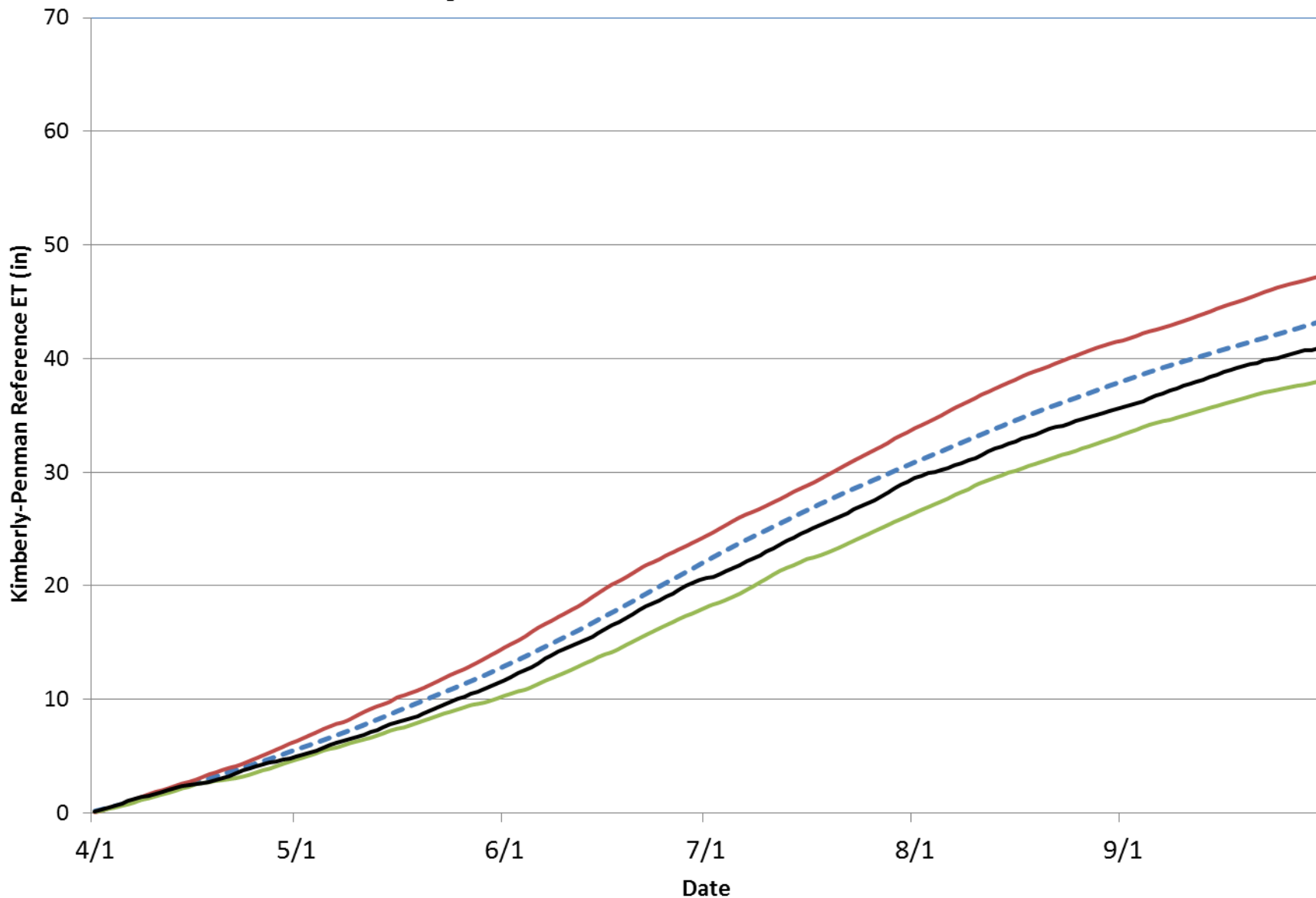


Olathe Kimberly-Penman Reference ET (1993 - 2016)



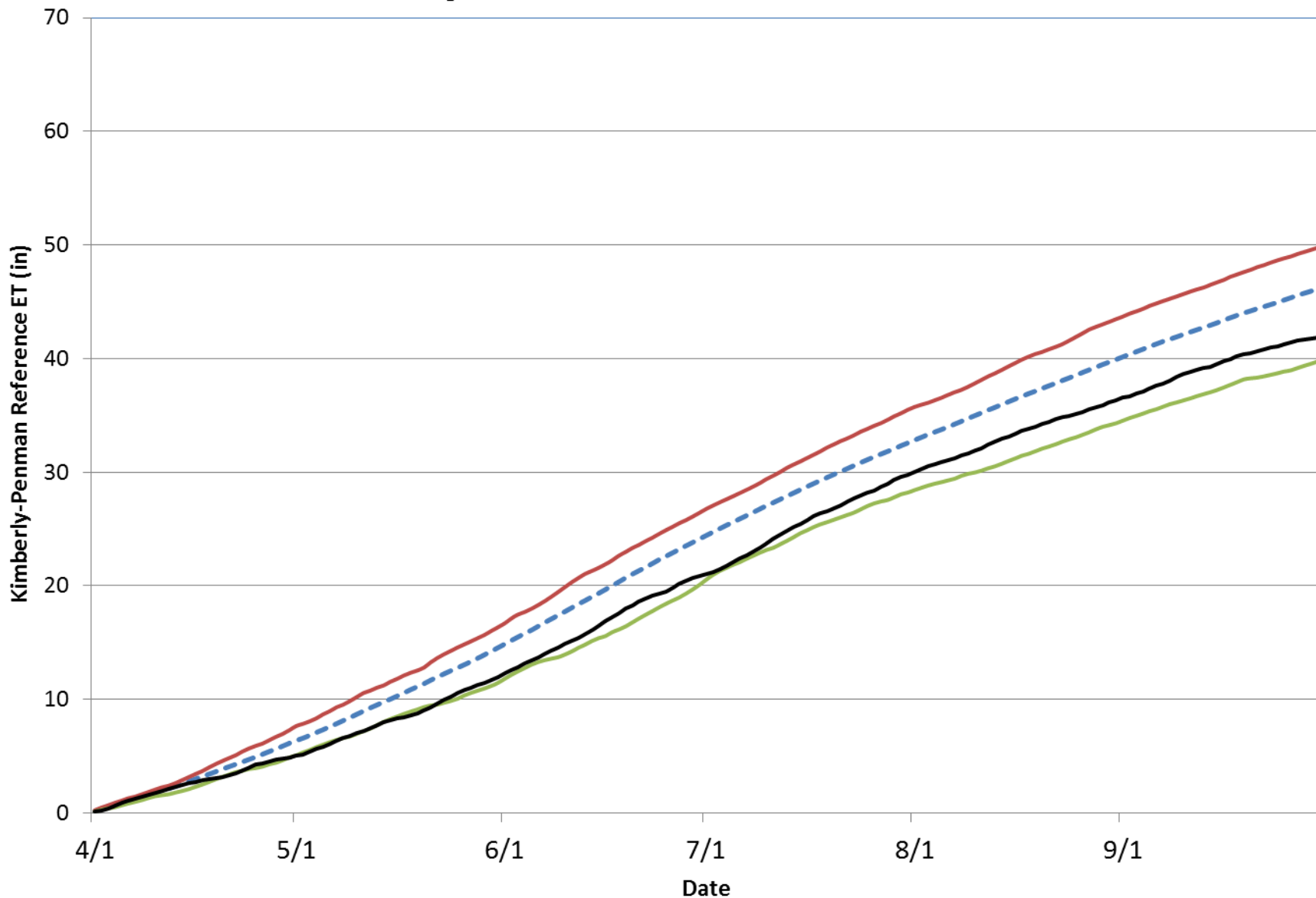
Cortez Kimberly-Penman Reference ET (1992 - 2016)

--- Average — 2000 — 1995 — 2016

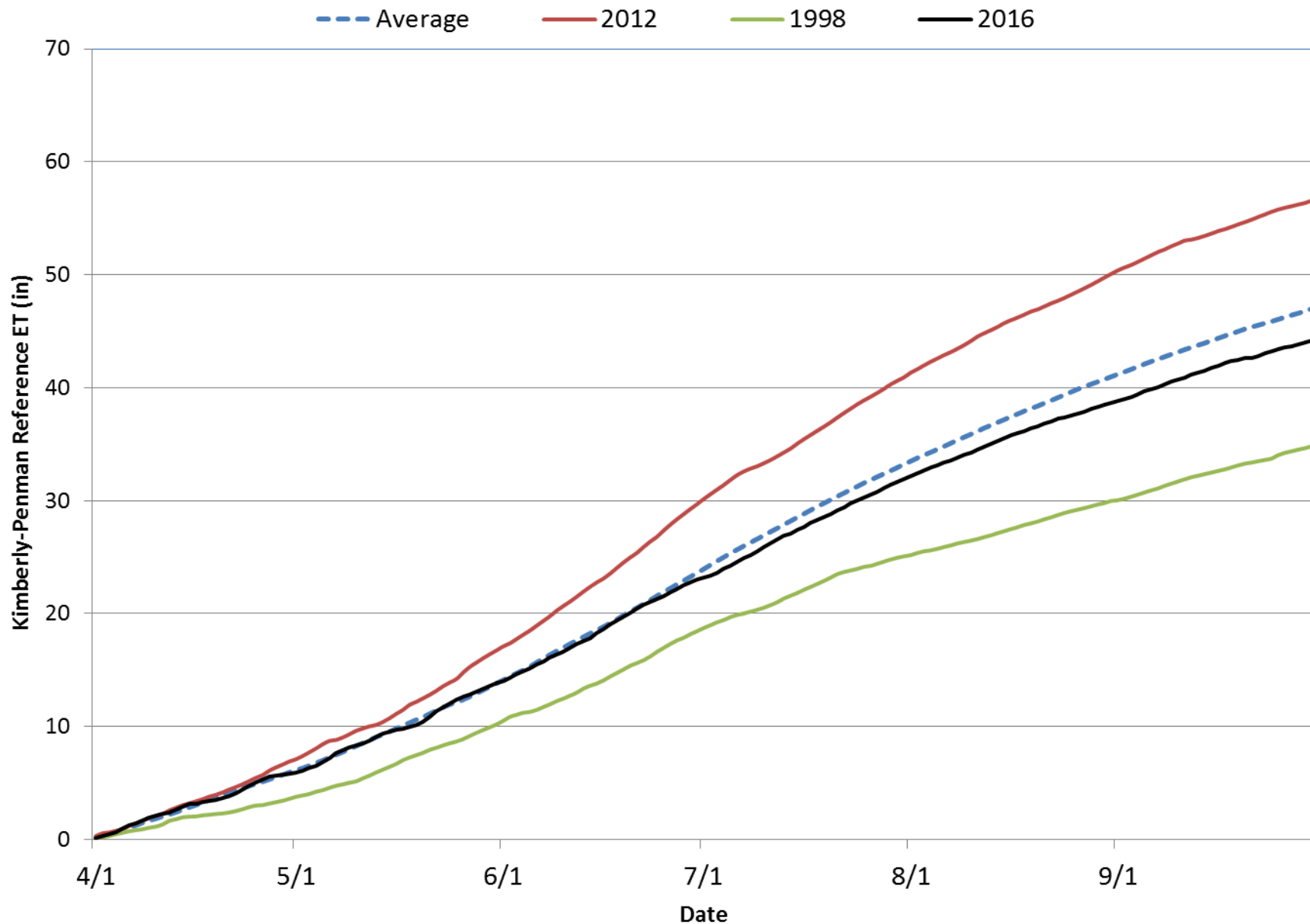


Center Kimberly-Penman Reference ET (1994 - 2016)

--- Average — 2002 — 1997 — 2016

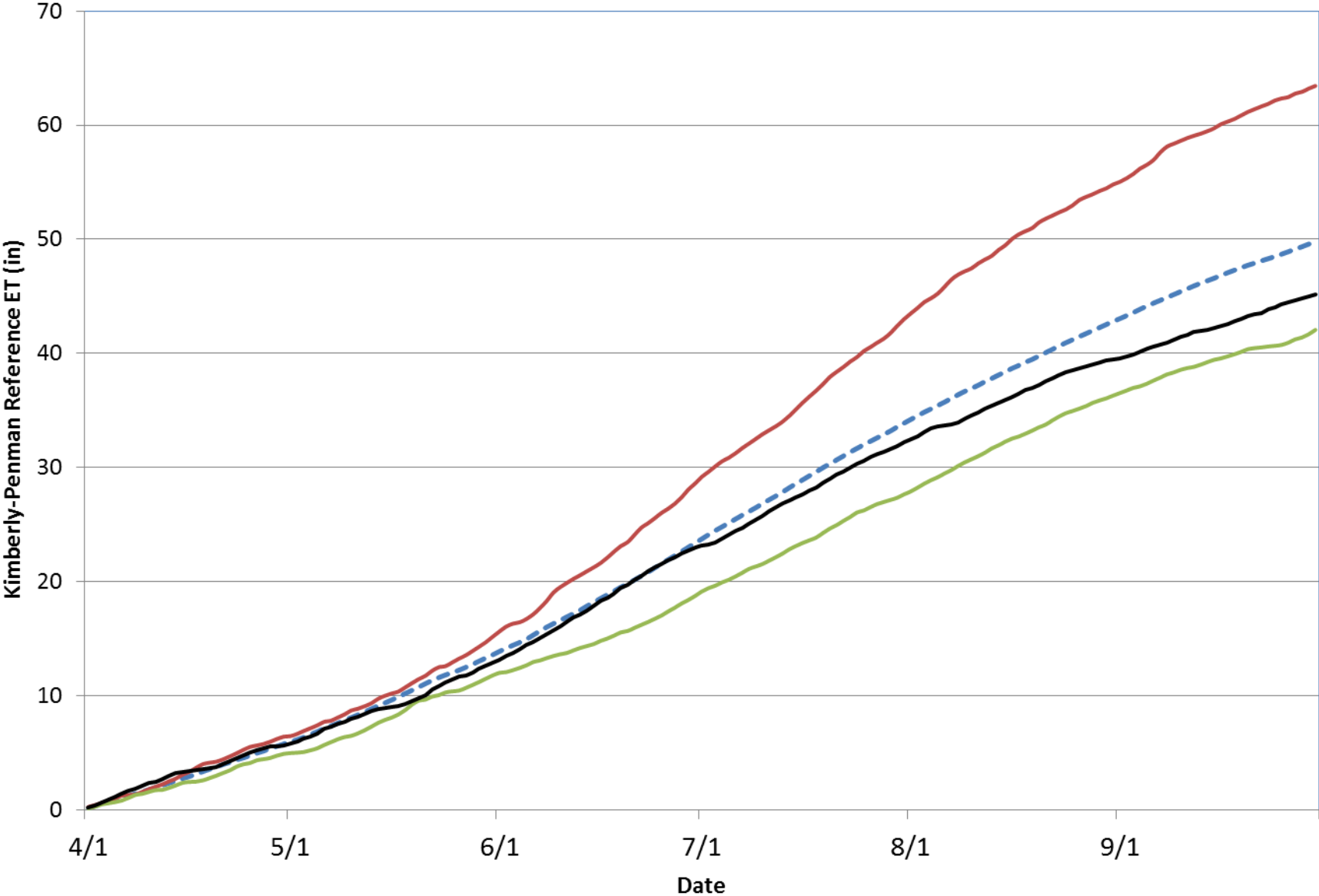


Avondale Kimberly-Penman Reference ET (1993 - 2016)

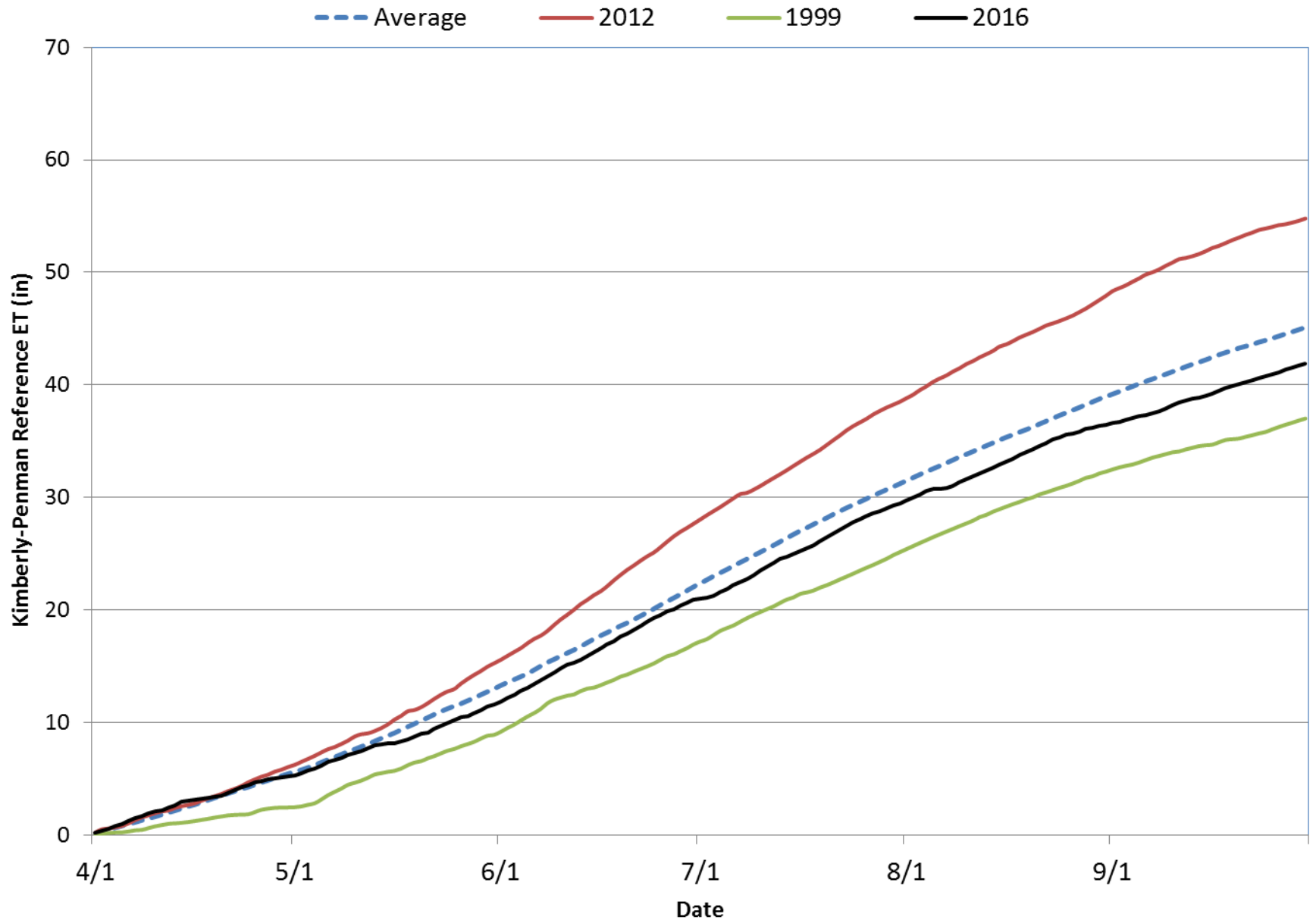


Idalia Kimberly-Penman Reference ET (1992 - 2016)

--- Average — 2002 — 2009 — 2016

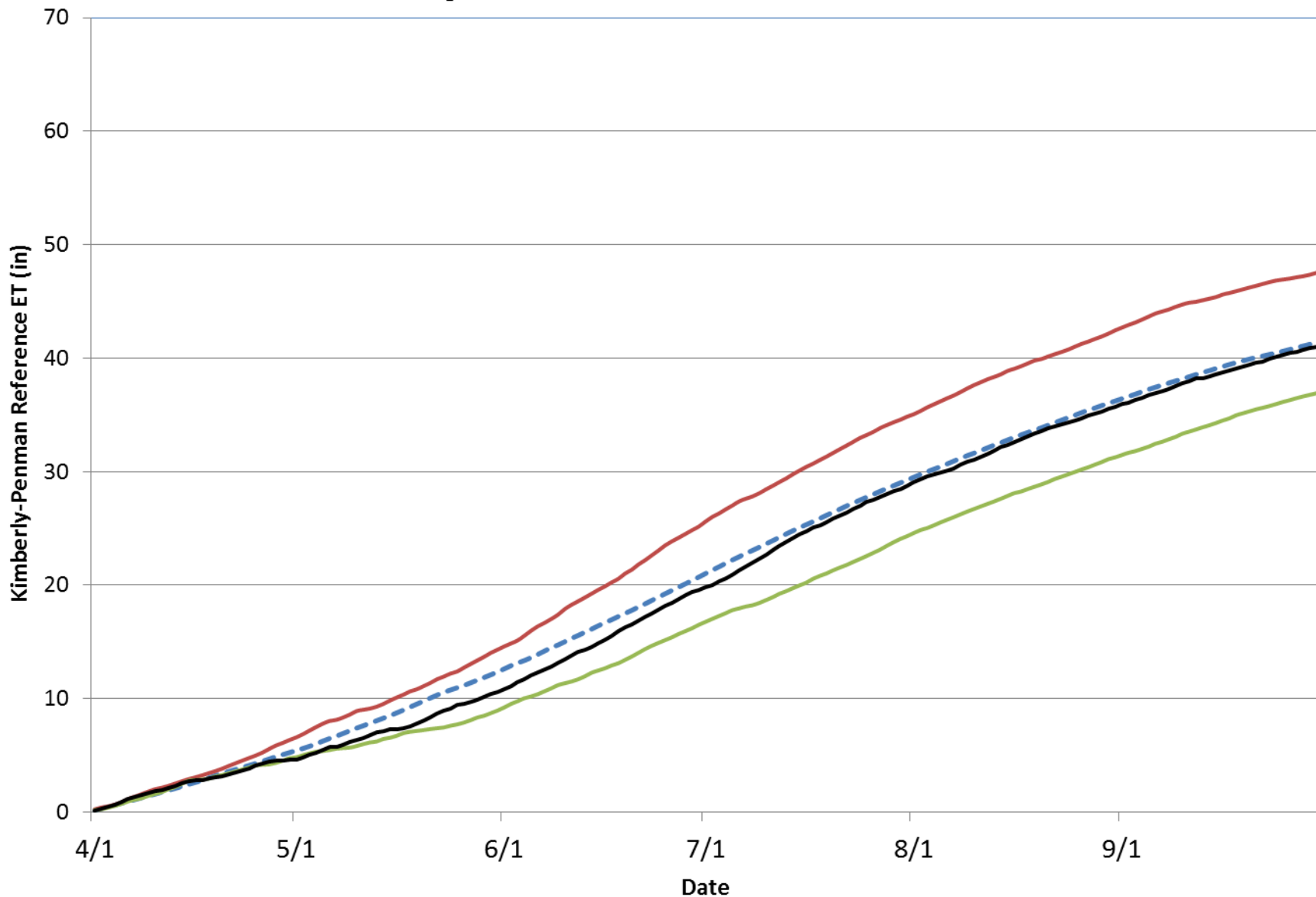


Holyoke Kimberly-Penman Reference ET (1992 - 2016)



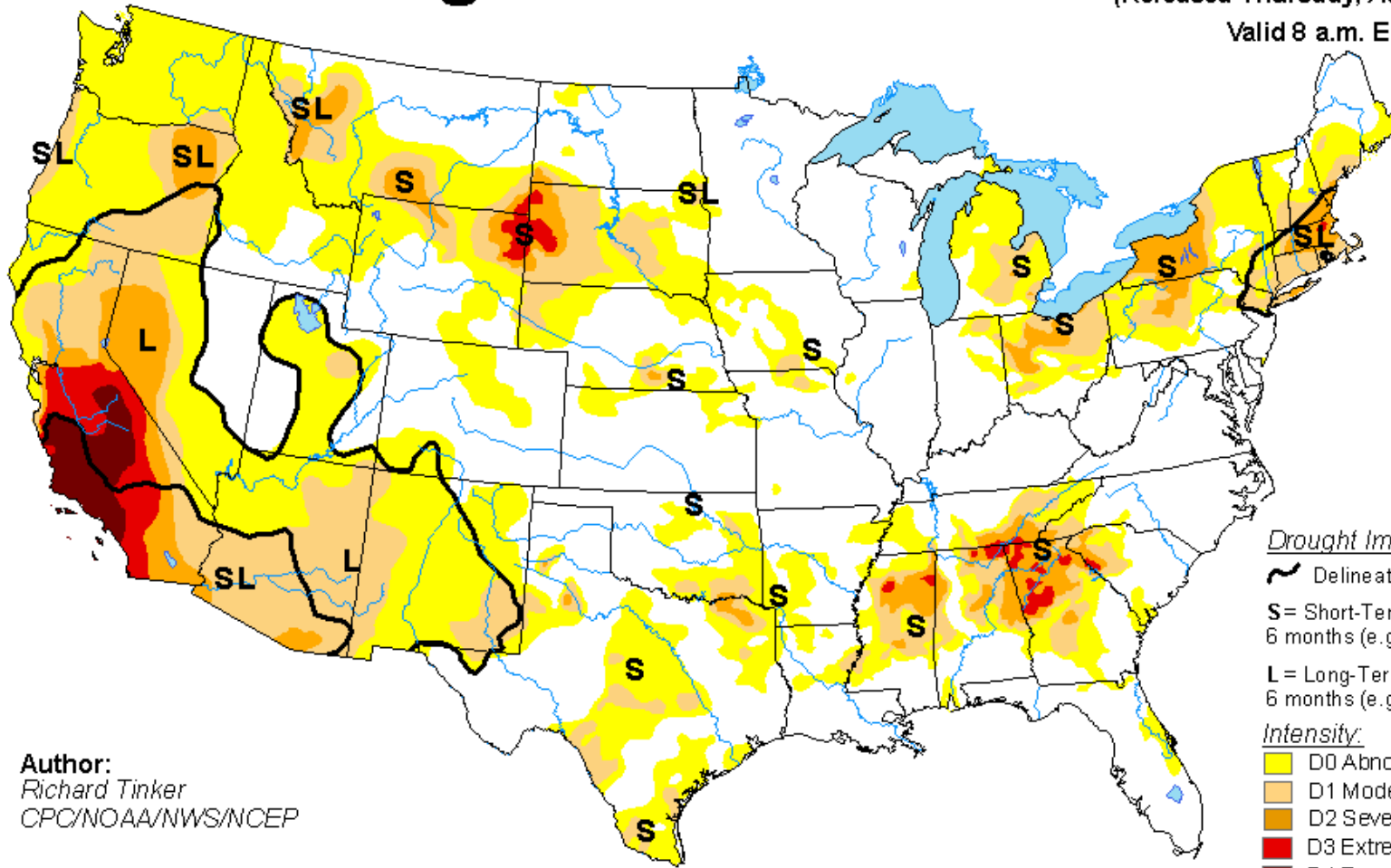
Lucerne Kimberly-Penman Reference ET (1992 - 2016)

--- Average — 2012 — 2015 — 2016



U.S. Drought Monitor

August 9, 2016
 (Released Thursday, Aug. 11, 2016)
 Valid 8 a.m. EDT



Author:
 Richard Tinker
 CPC/NOAA/NWS/NCEP

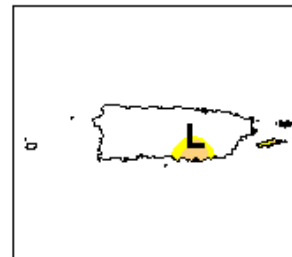
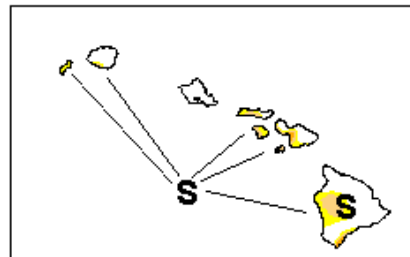
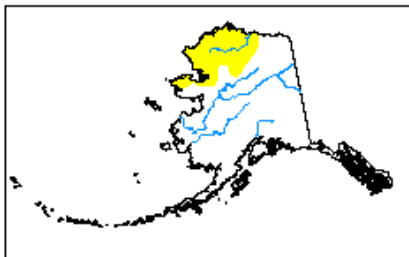
Drought Impact Types:

- 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.

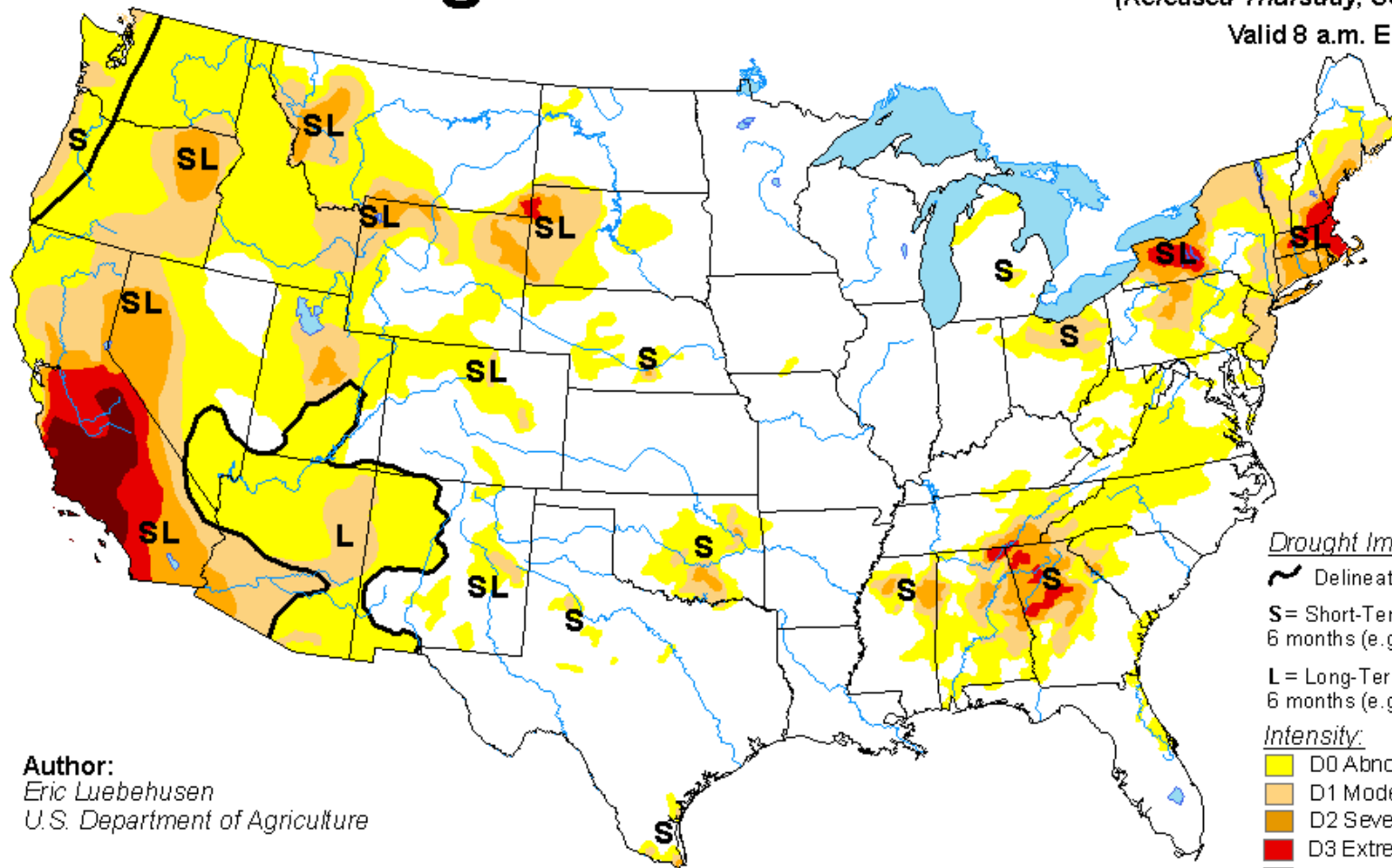


<http://droughtmonitor.unl.edu/>

U.S. Drought Monitor

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

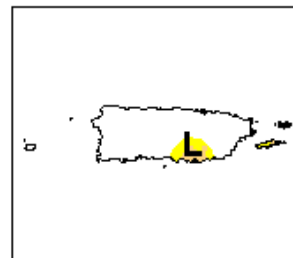
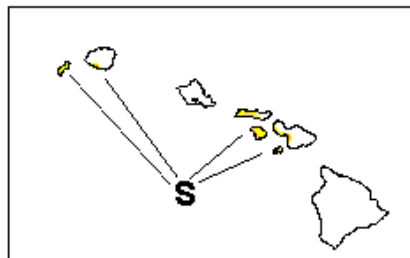
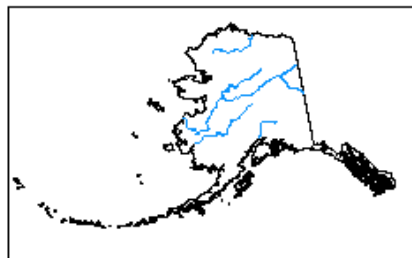
D1 Moderate Drought

D2 Severe Drought

D3 Extreme Drought

D4 Exceptional Drought

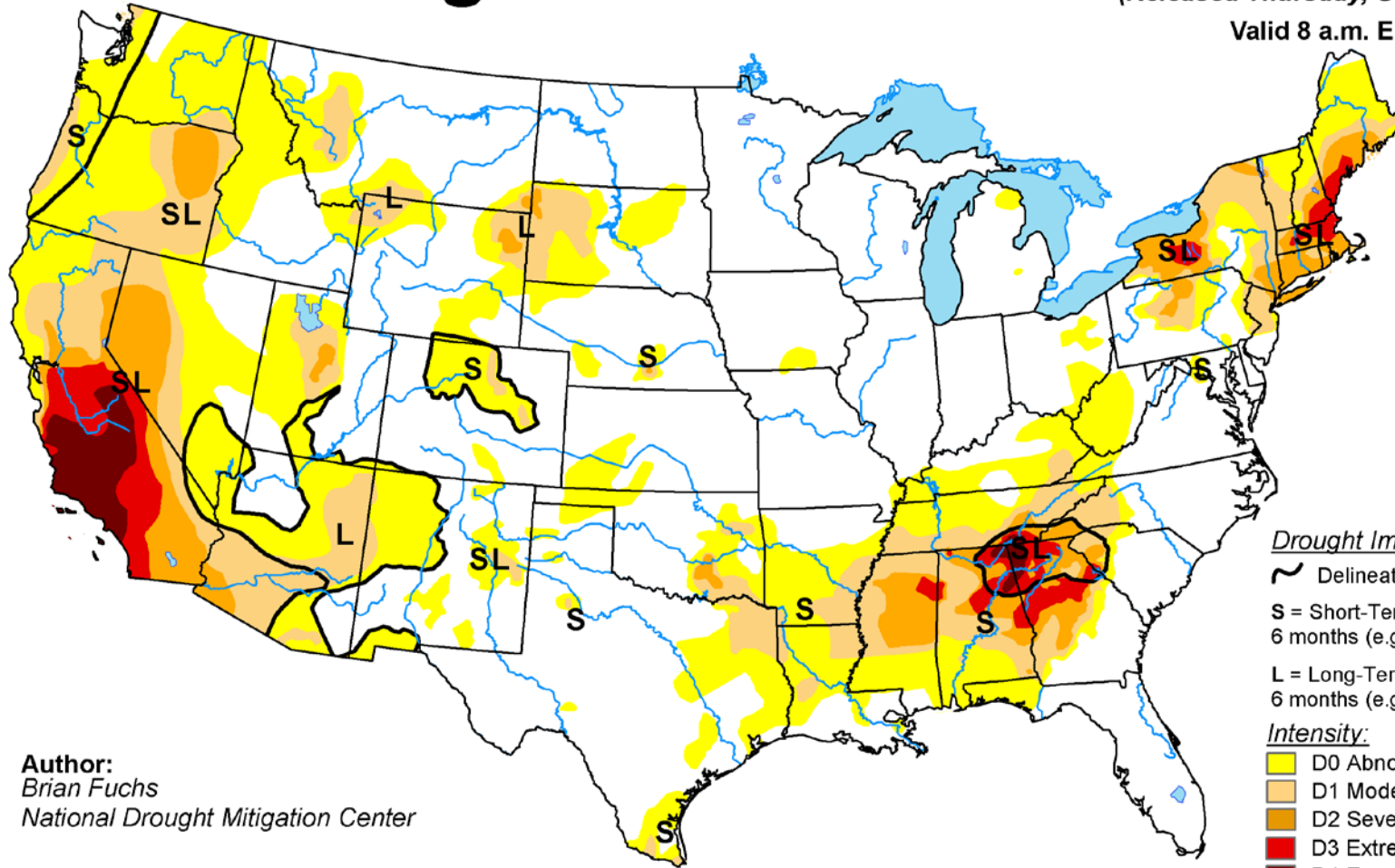
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.



<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

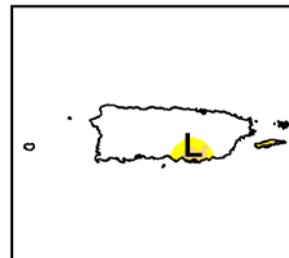
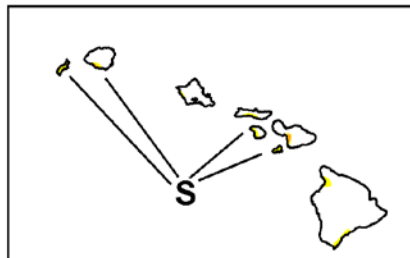
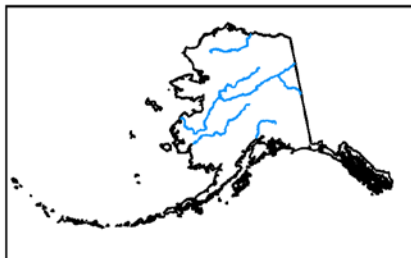
Drought Impact Types:

- ~ Delineates dominant impacts
- S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

- Yellow: D0 Abnormally Dry
- Light Orange: D1 Moderate Drought
- Dark Orange: D2 Severe Drought
- Red: D3 Extreme Drought
- Dark Red: D4 Exceptional Drought

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

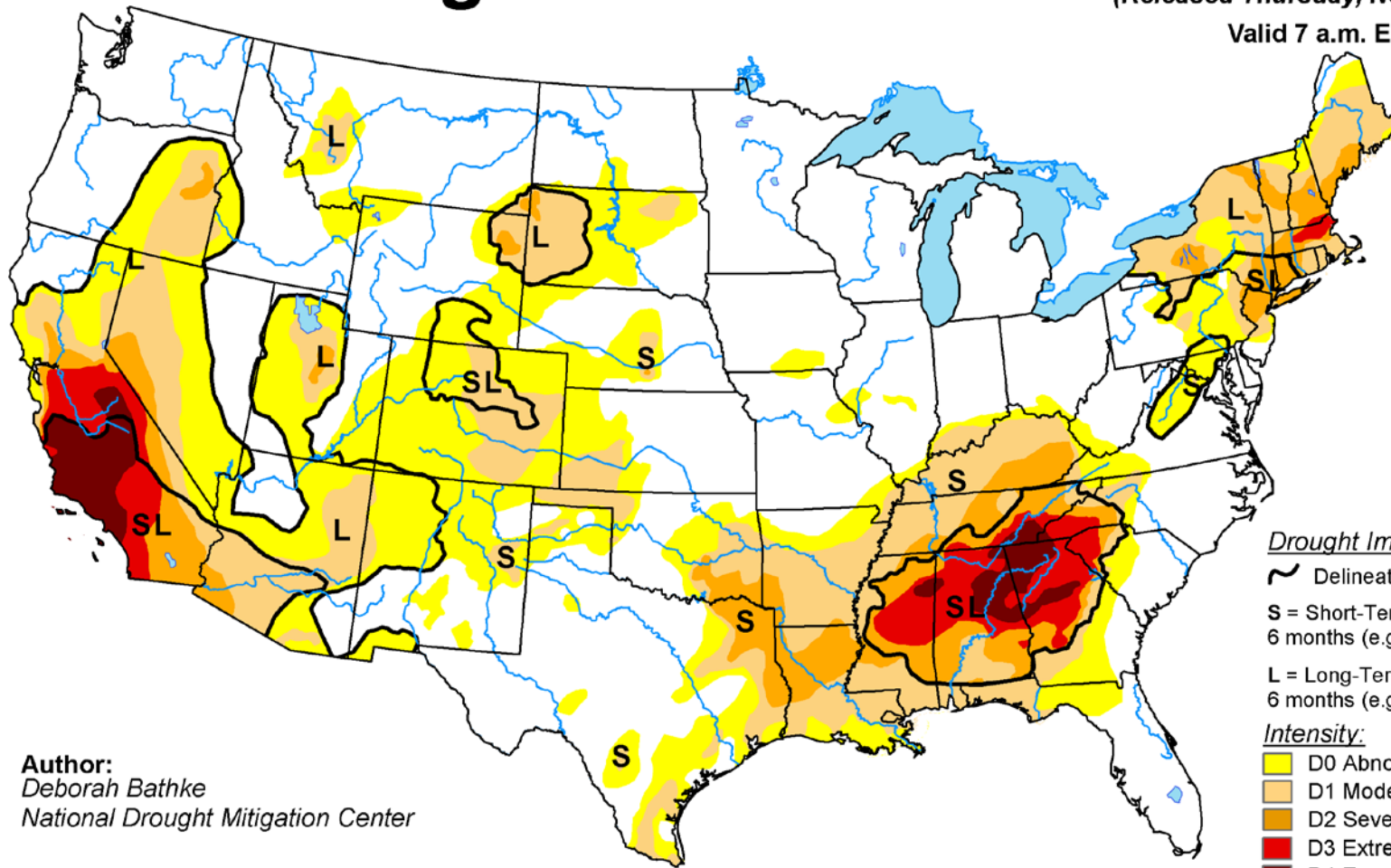


<http://droughtmonitor.unl.edu/>

U.S. Drought Monitor

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

Valid 7 a.m. EST



Drought Impact Types:

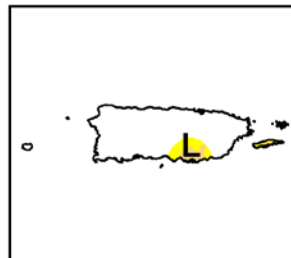
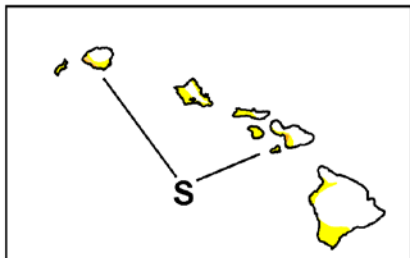
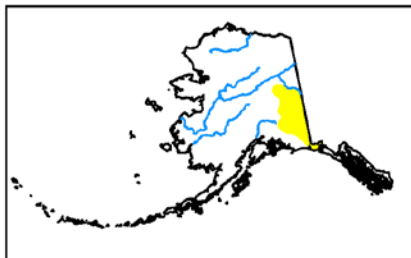
- Delineates dominant impacts
- S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

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

Author:
Deborah Bathke
National Drought Mitigation Center

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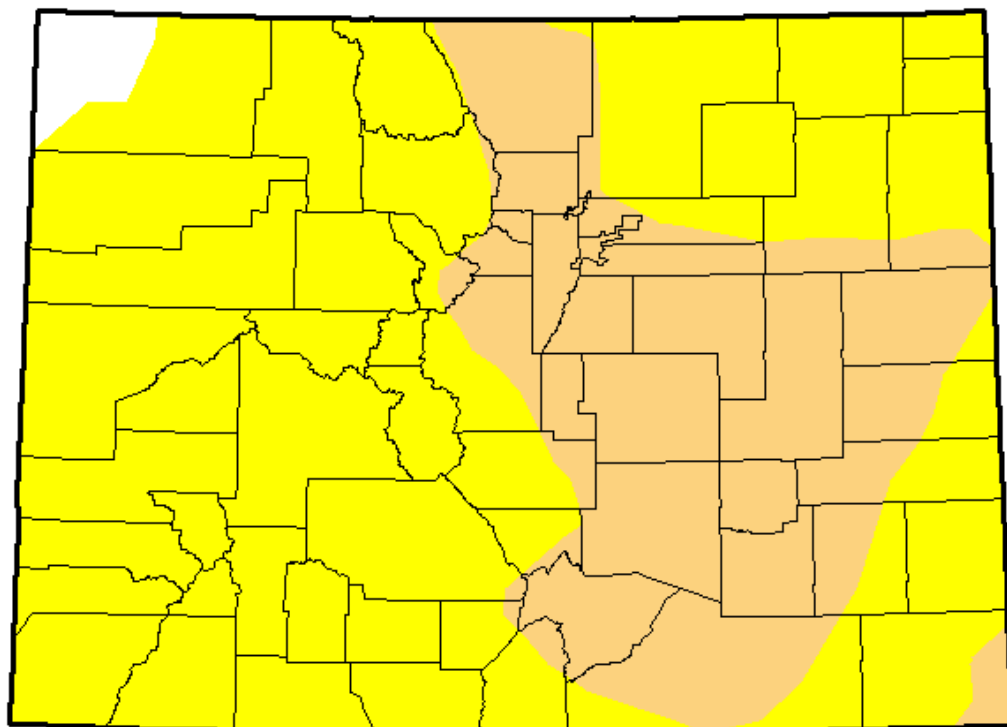


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Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	1.60	98.40	30.84	0.00	0.00	0.00
Last Week <i>11/1/2016</i>	8.90	91.10	24.31	0.00	0.00	0.00
3 Months Ago <i>8/9/2016</i>	73.34	26.66	0.38	0.00	0.00	0.00
Start of Calendar Year <i>12/29/2015</i>	90.02	9.98	0.00	0.00	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>11/10/2015</i>	79.91	20.09	0.00	0.00	0.00	0.00

Intensity:



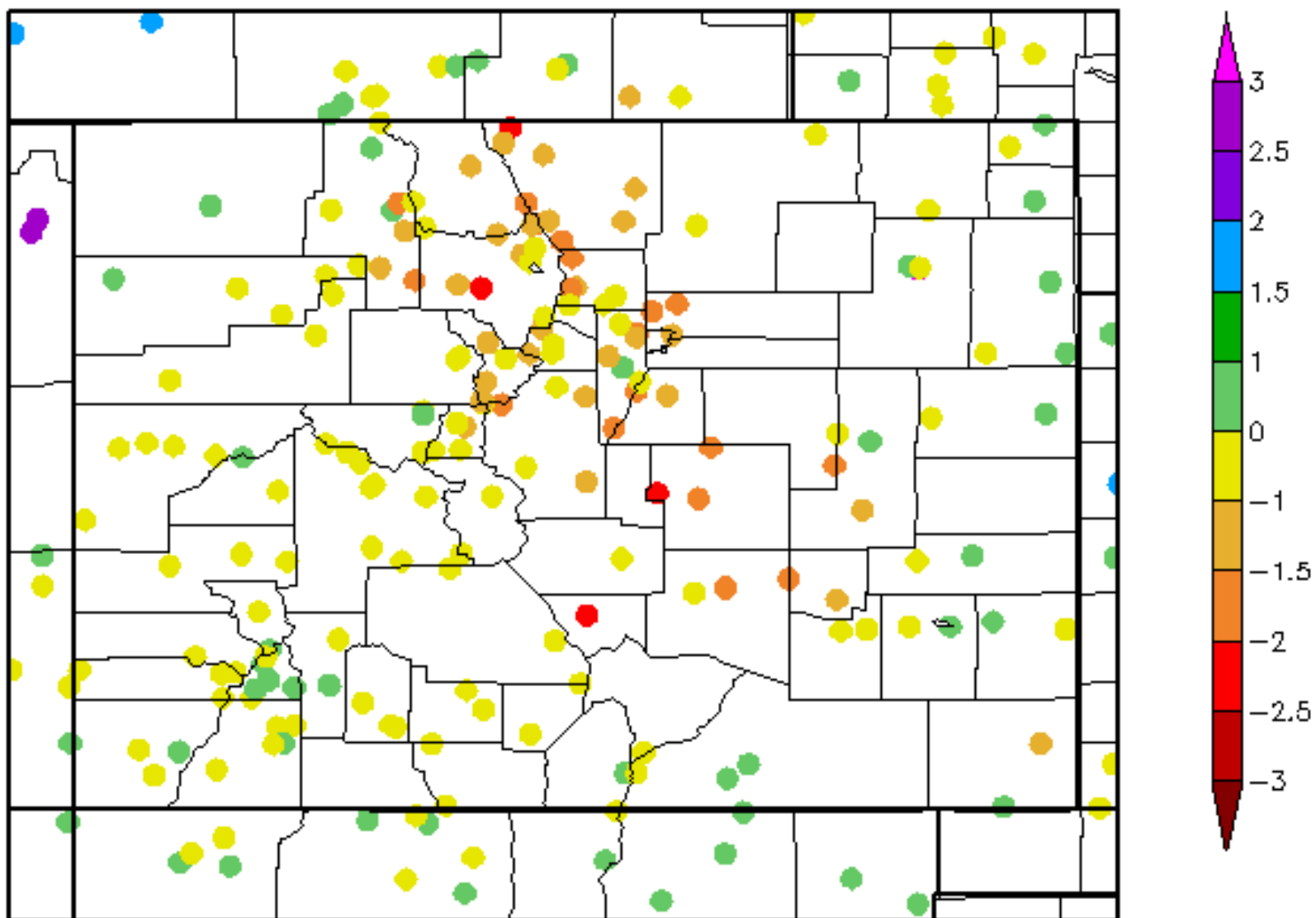
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 Deborah Bathke
 National Drought Mitigation Center



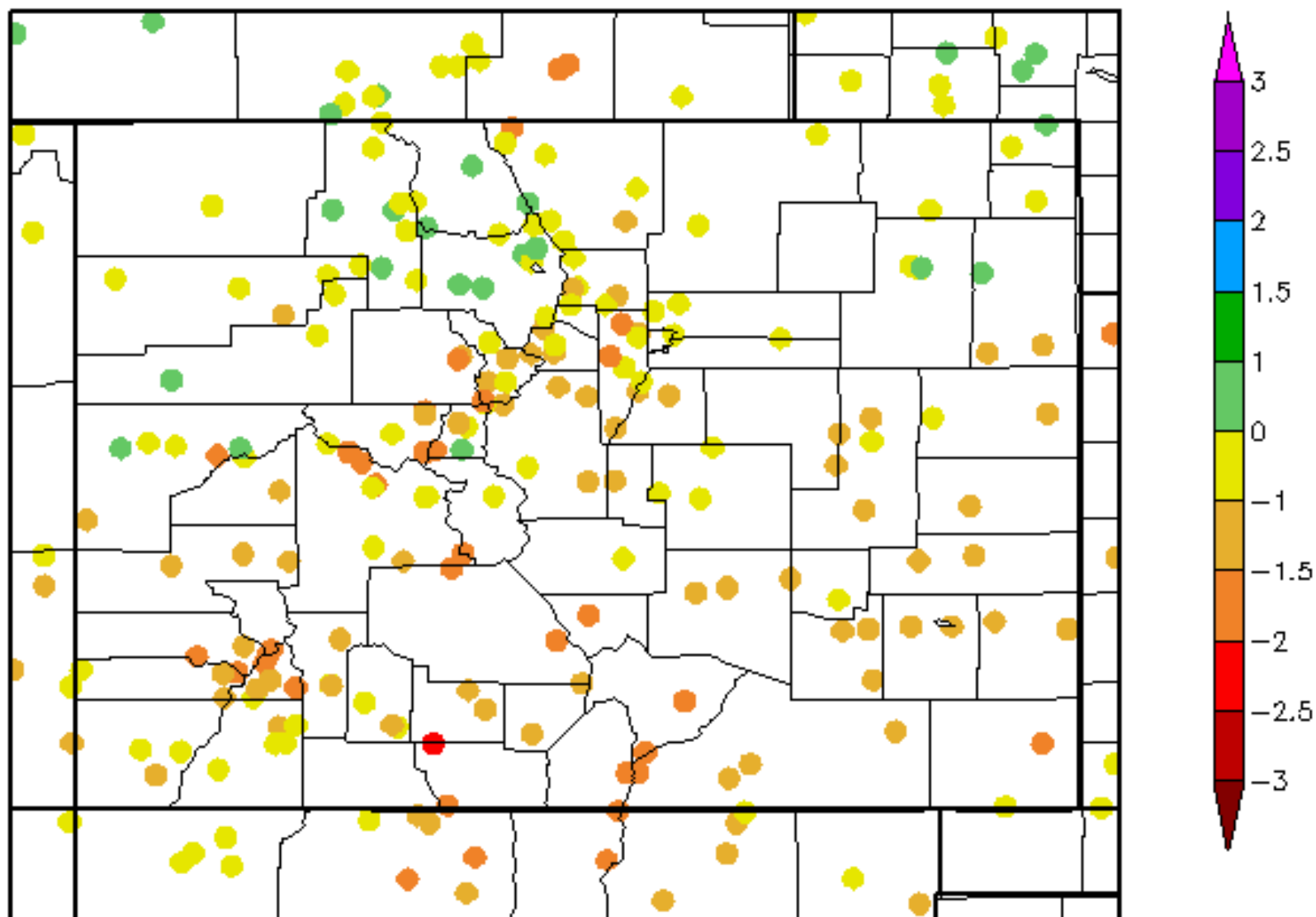
Monthly SPI

9/1/2016 - 9/30/2016



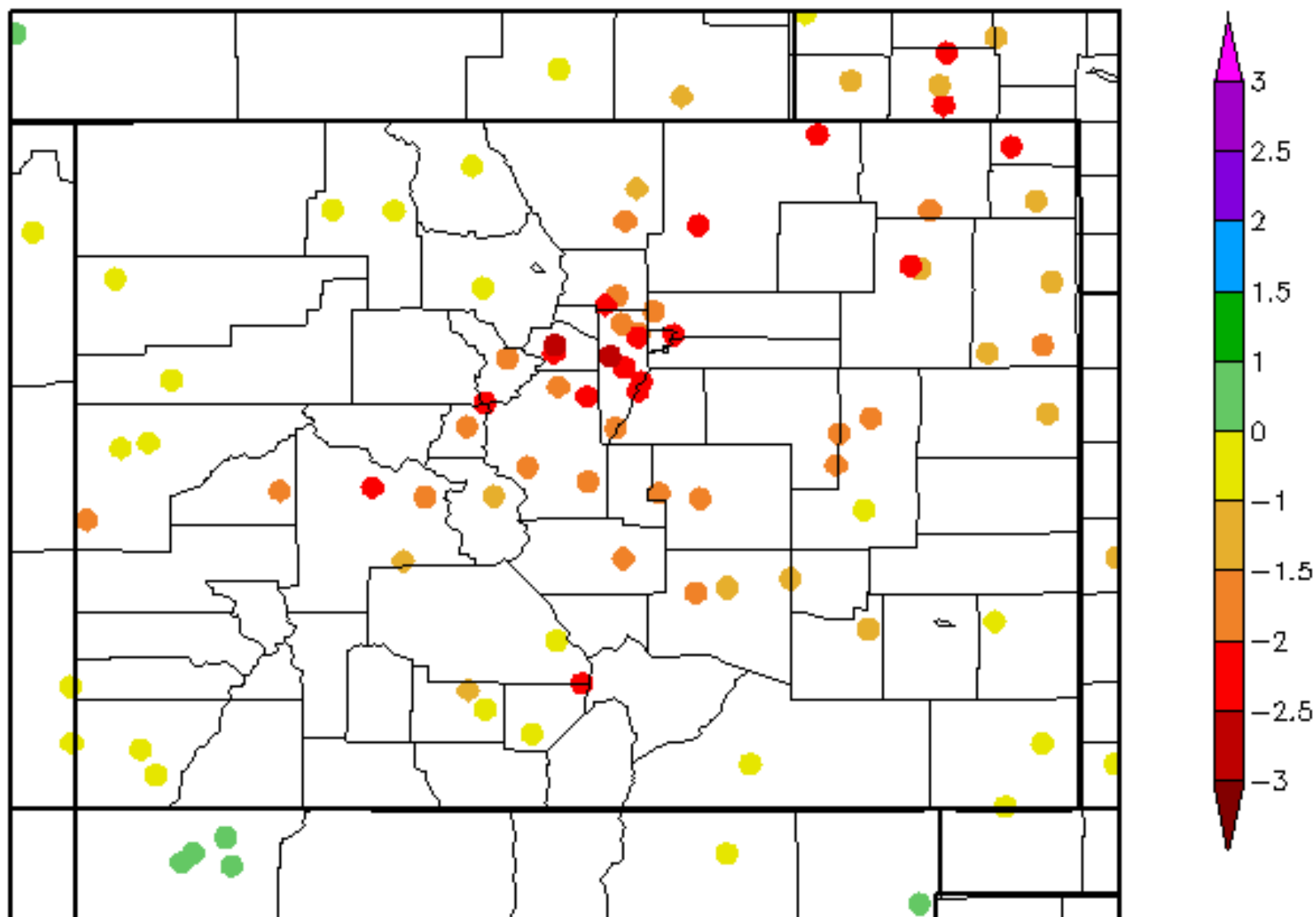
Monthly SPI

10/1/2016 - 10/31/2016



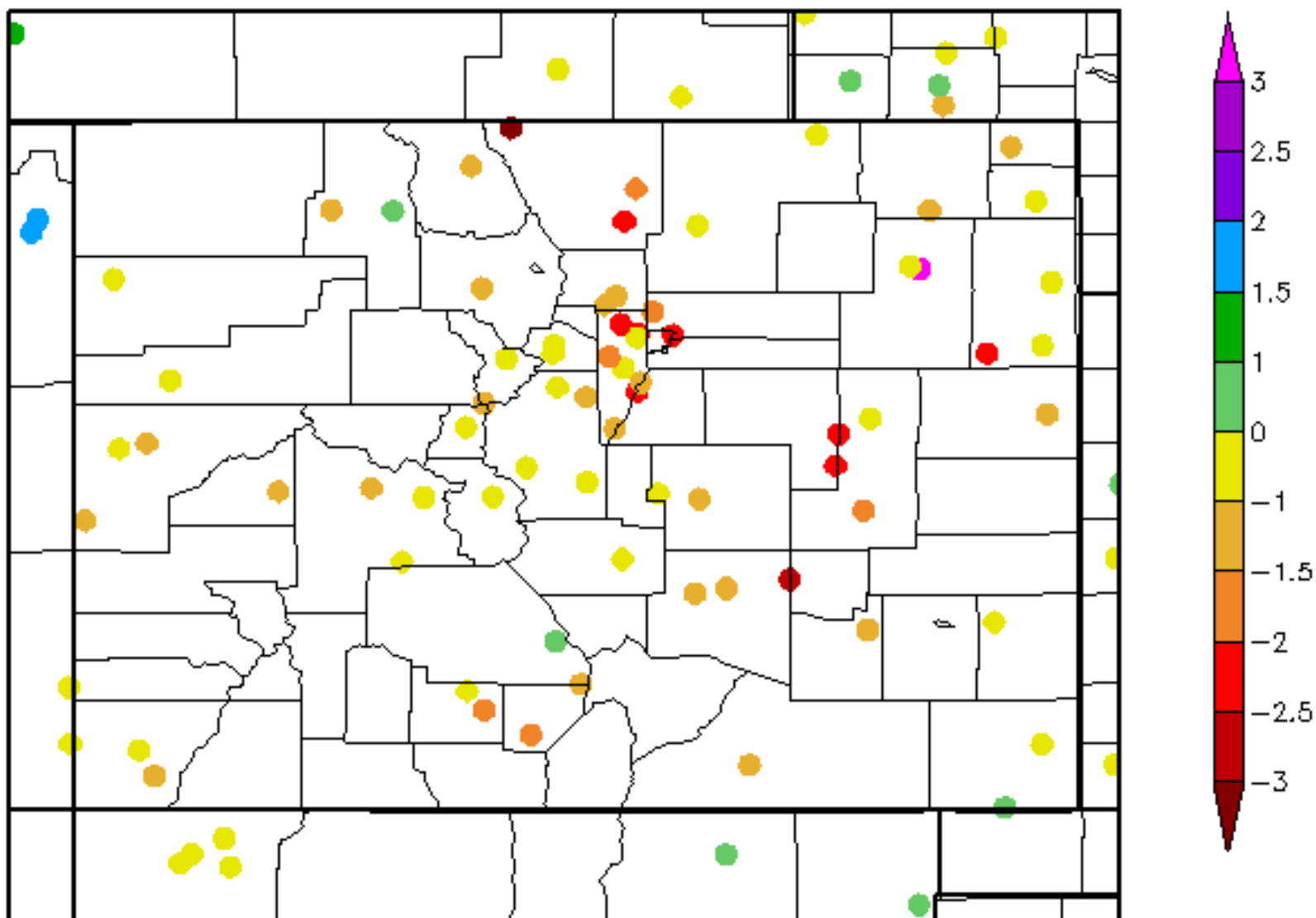
30 Day SPI

10/15/2016 - 11/13/2016



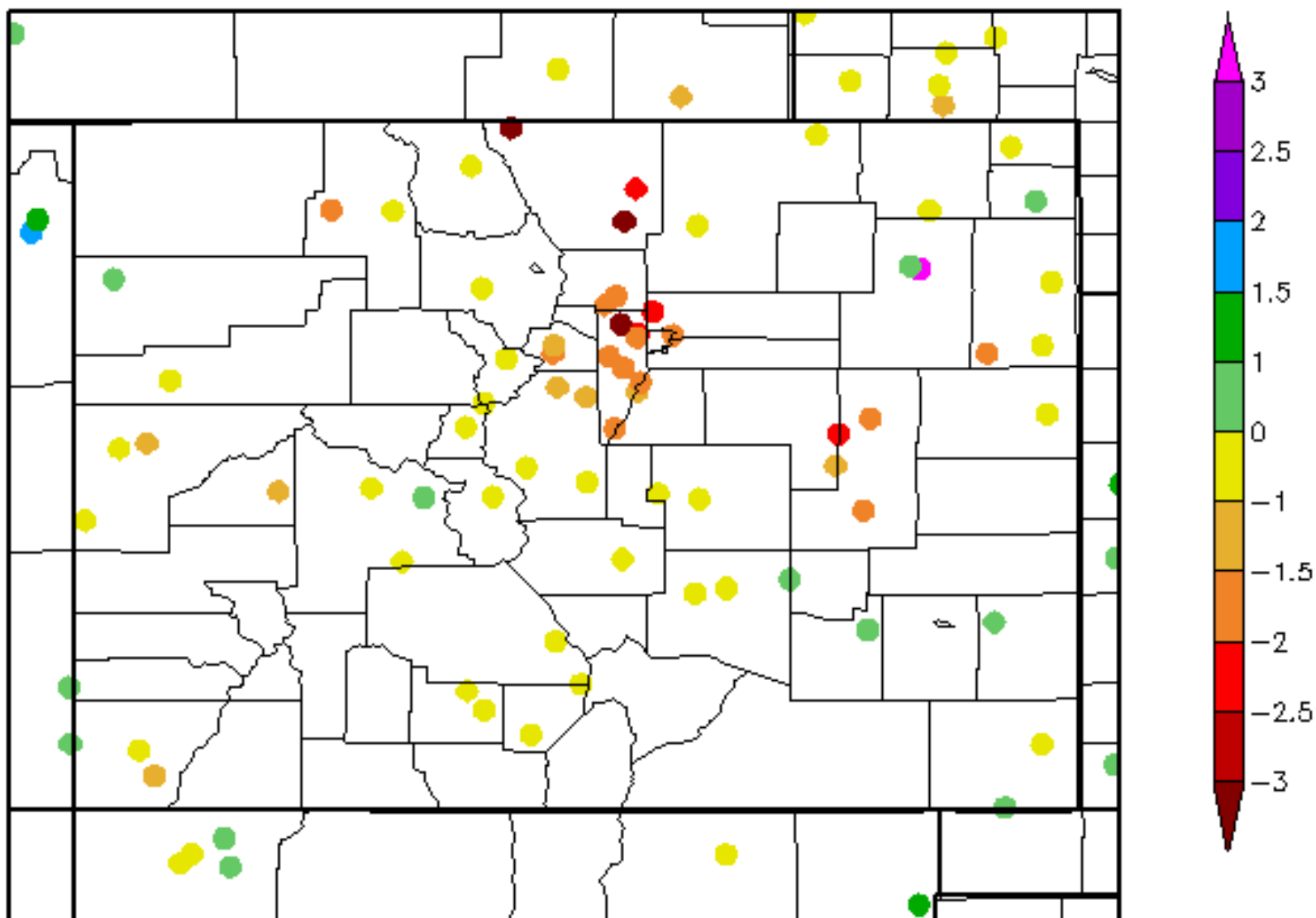
90 Day SPI

8/16/2016 - 11/13/2016



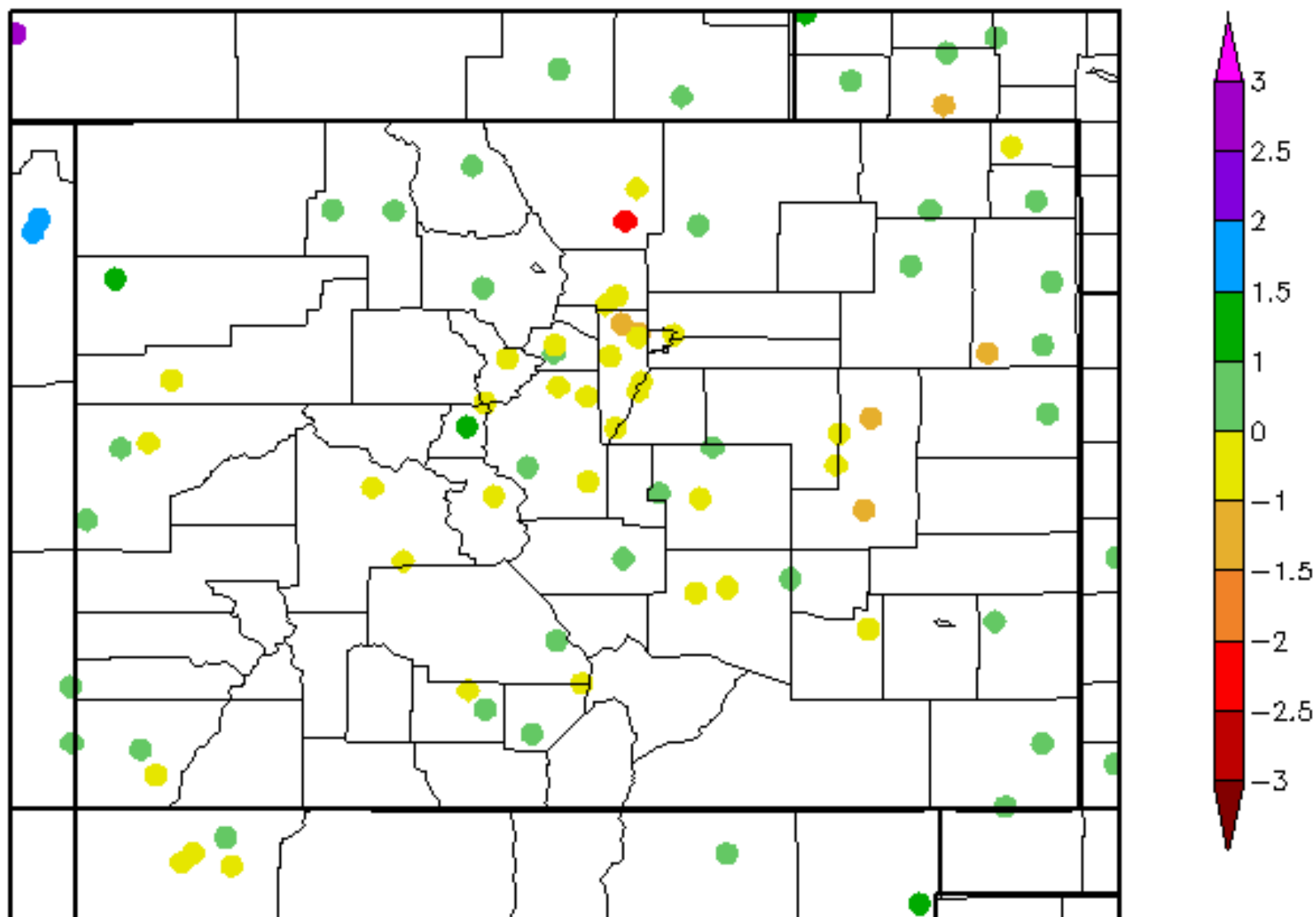
6 Month SPI

5/14/2016 - 11/13/2016



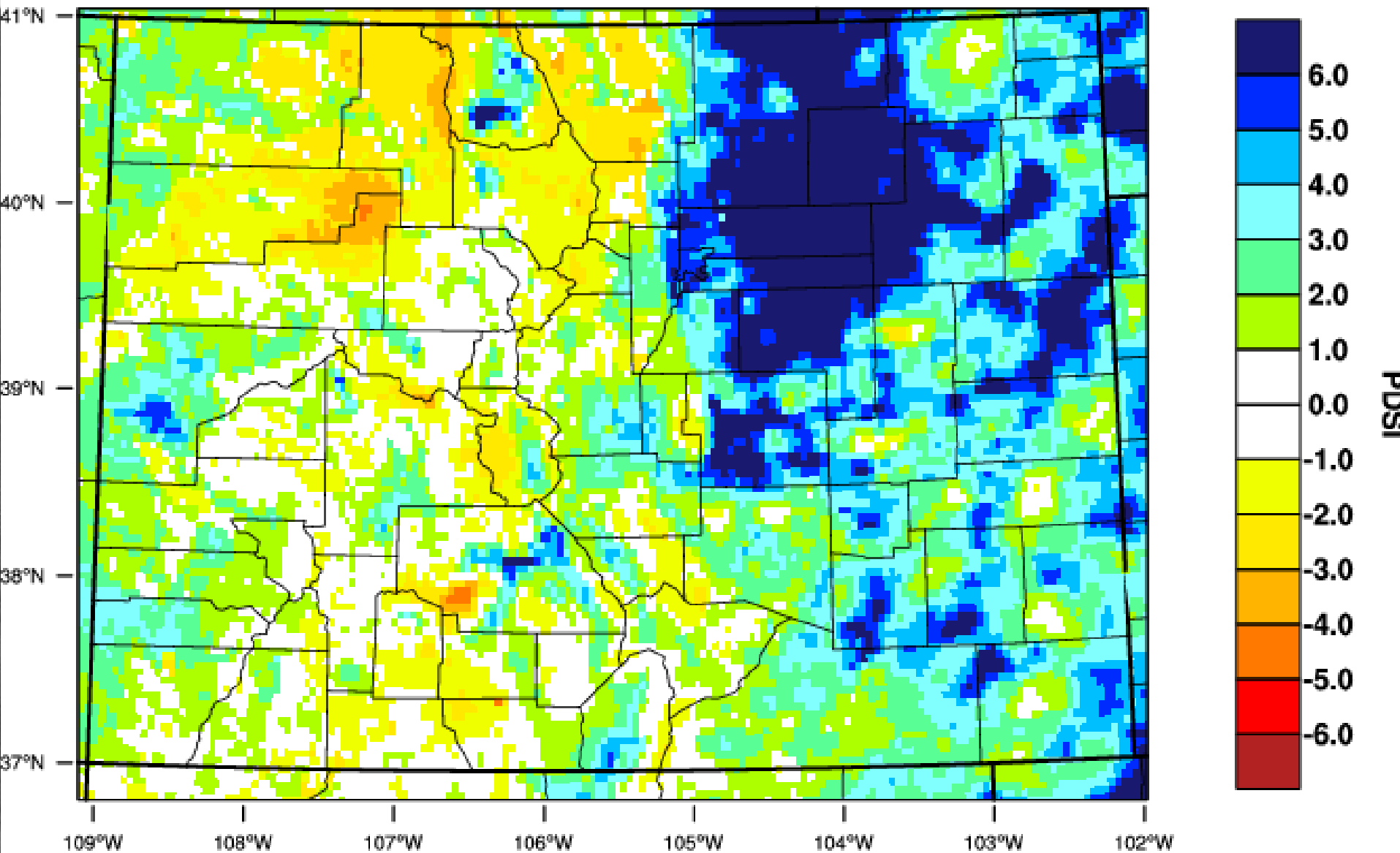
12 Month SPI

11/14/2015 - 11/13/2016



Colorado - PDSI

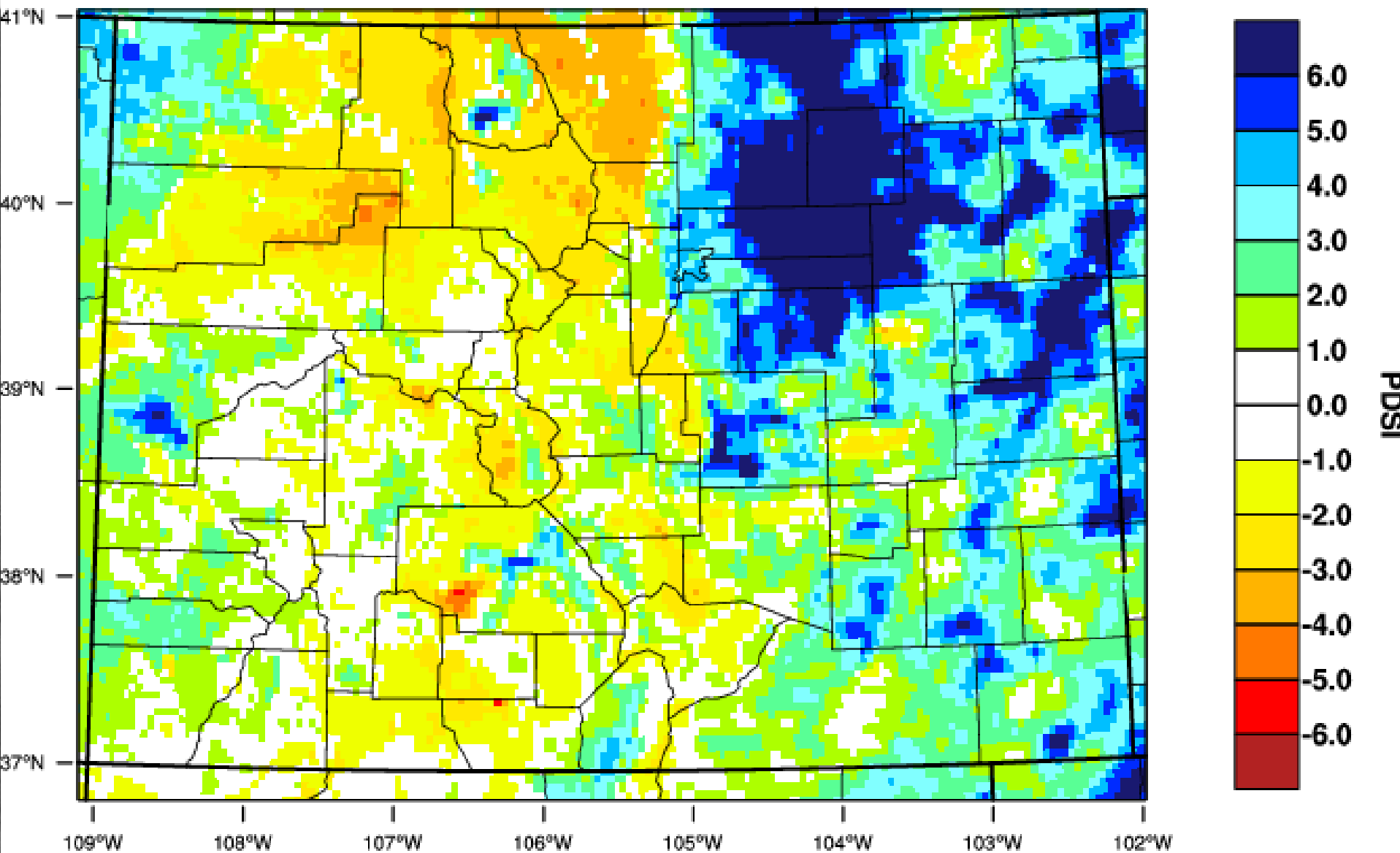
August 2016



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

Colorado - PDSI

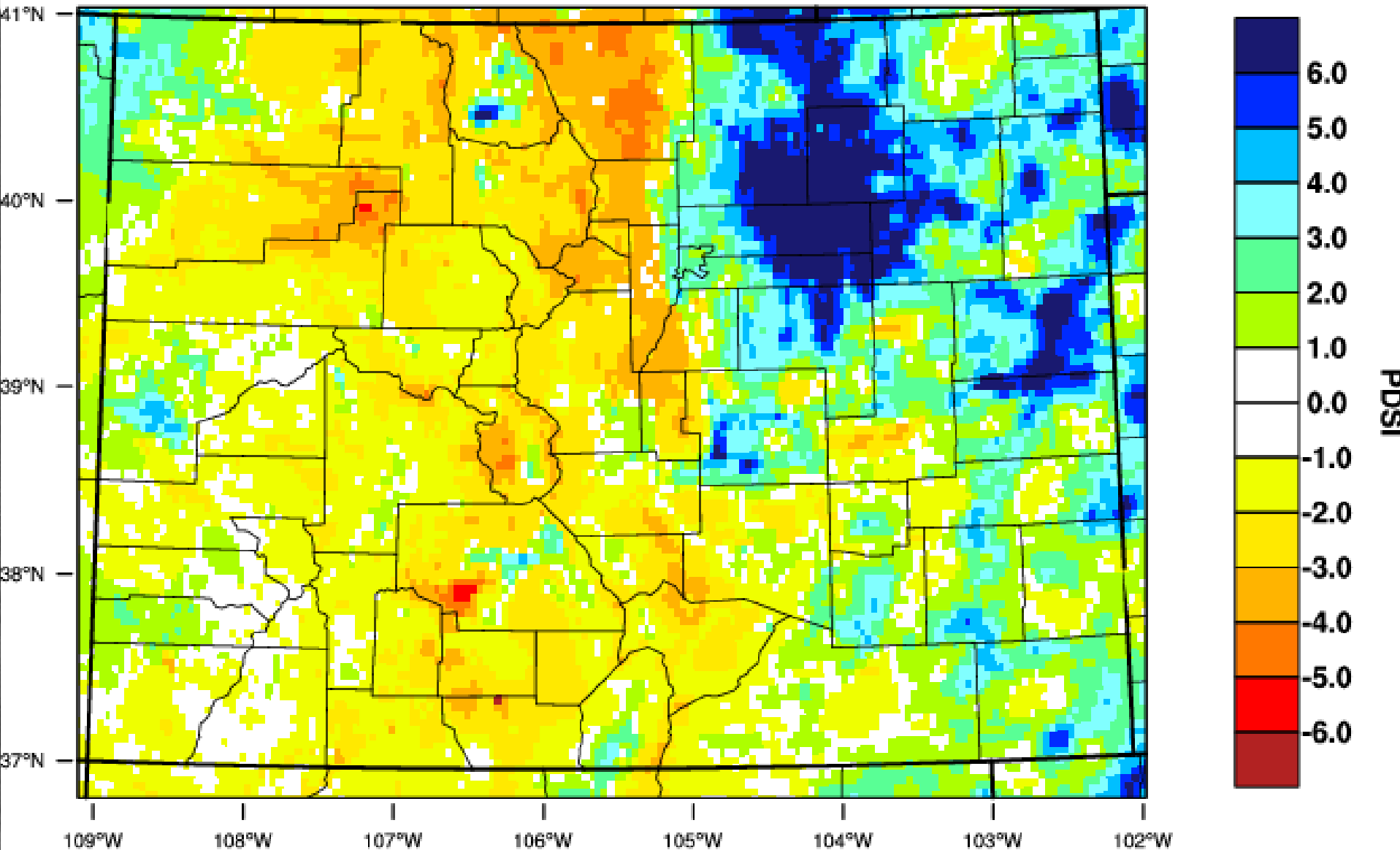
September 2016



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 Climate Center

Data and Presentations available for download at:

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

Thank you!



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