



Climate Update

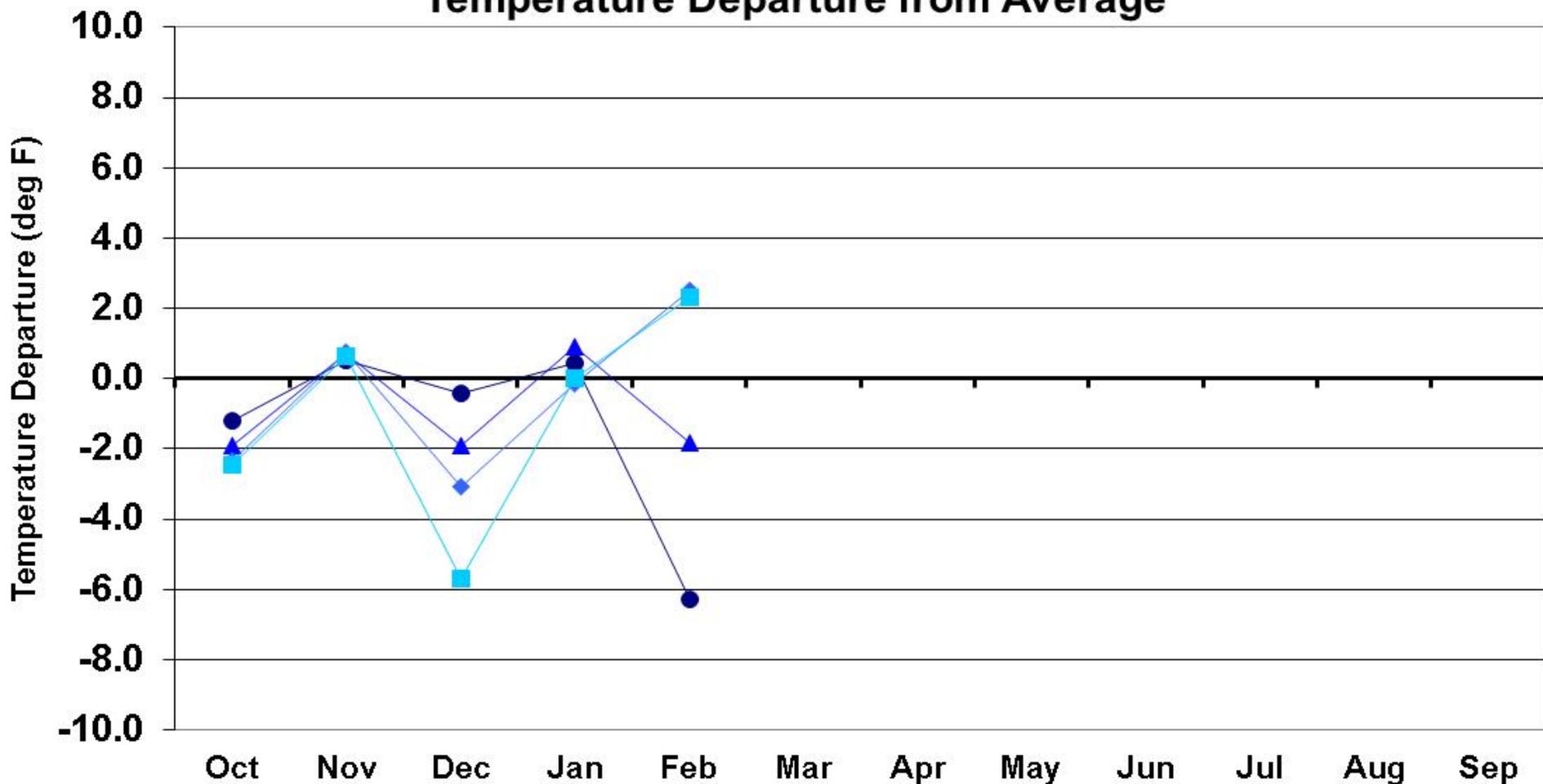
**Nolan Doesken and Wendy Ryan
Colorado Climate Center**

Colorado State University

Presented to -
Joint Meeting of the Colorado Water
Availability and Flood Task Forces
20 March 2014
Denver, CO

Water Year 2014 Temperature Departures

Water Year 2014
Temperature Departure from Average



● Eastern Plains

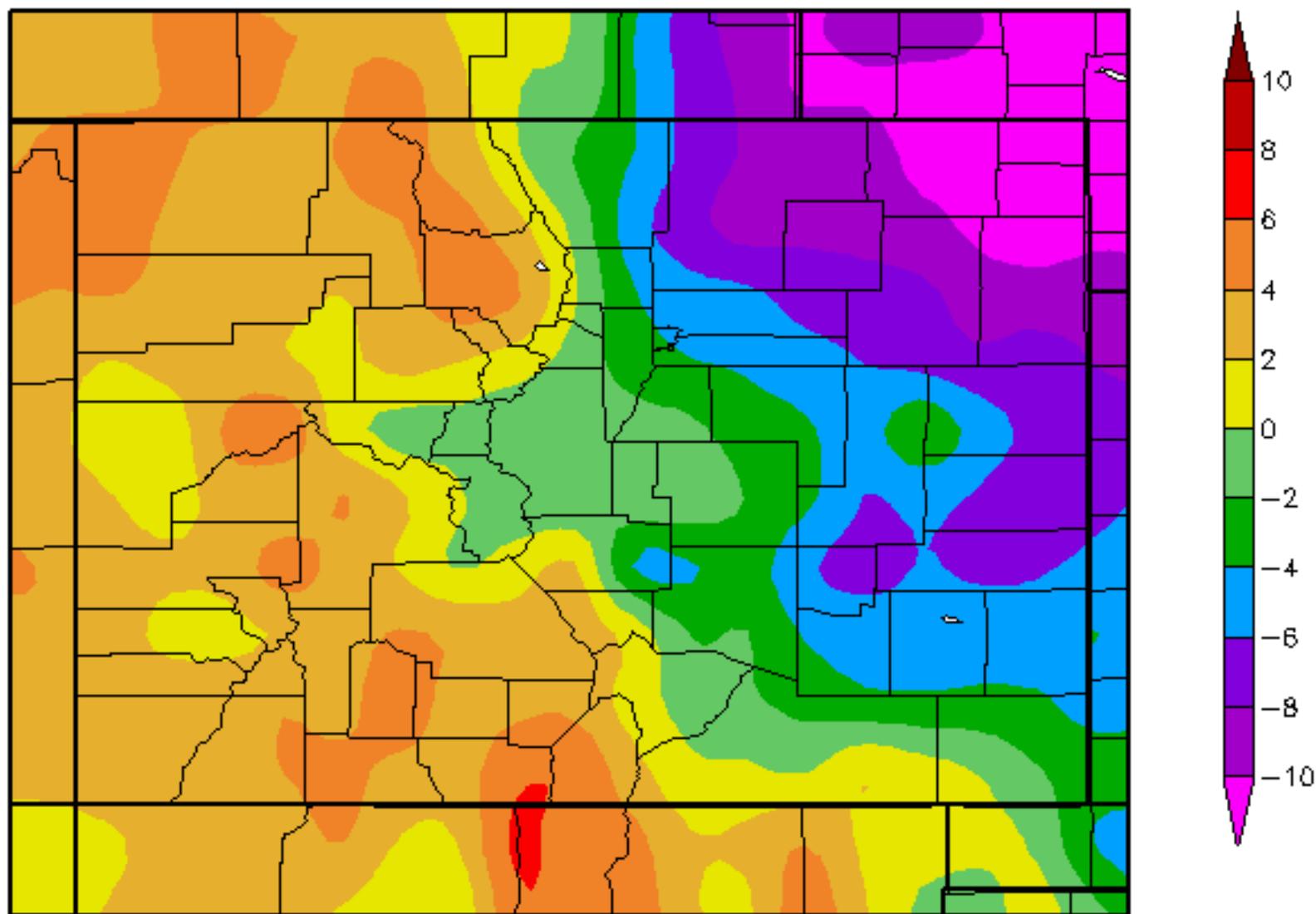
▲ Foothills

◆ Mountains

■ Western Valleys

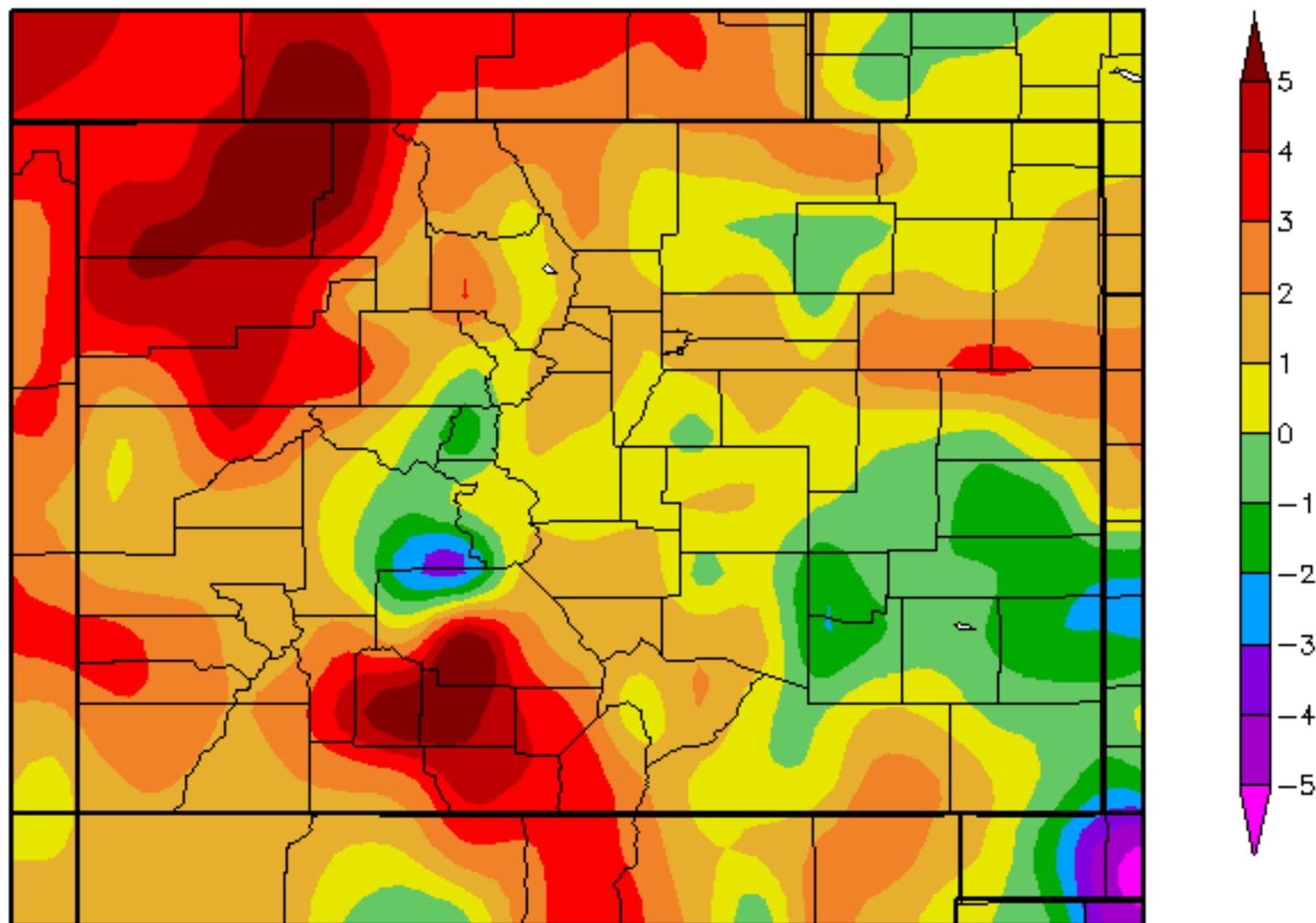
Departure from Normal Temperature (F)

2/1/2014 - 2/28/2014

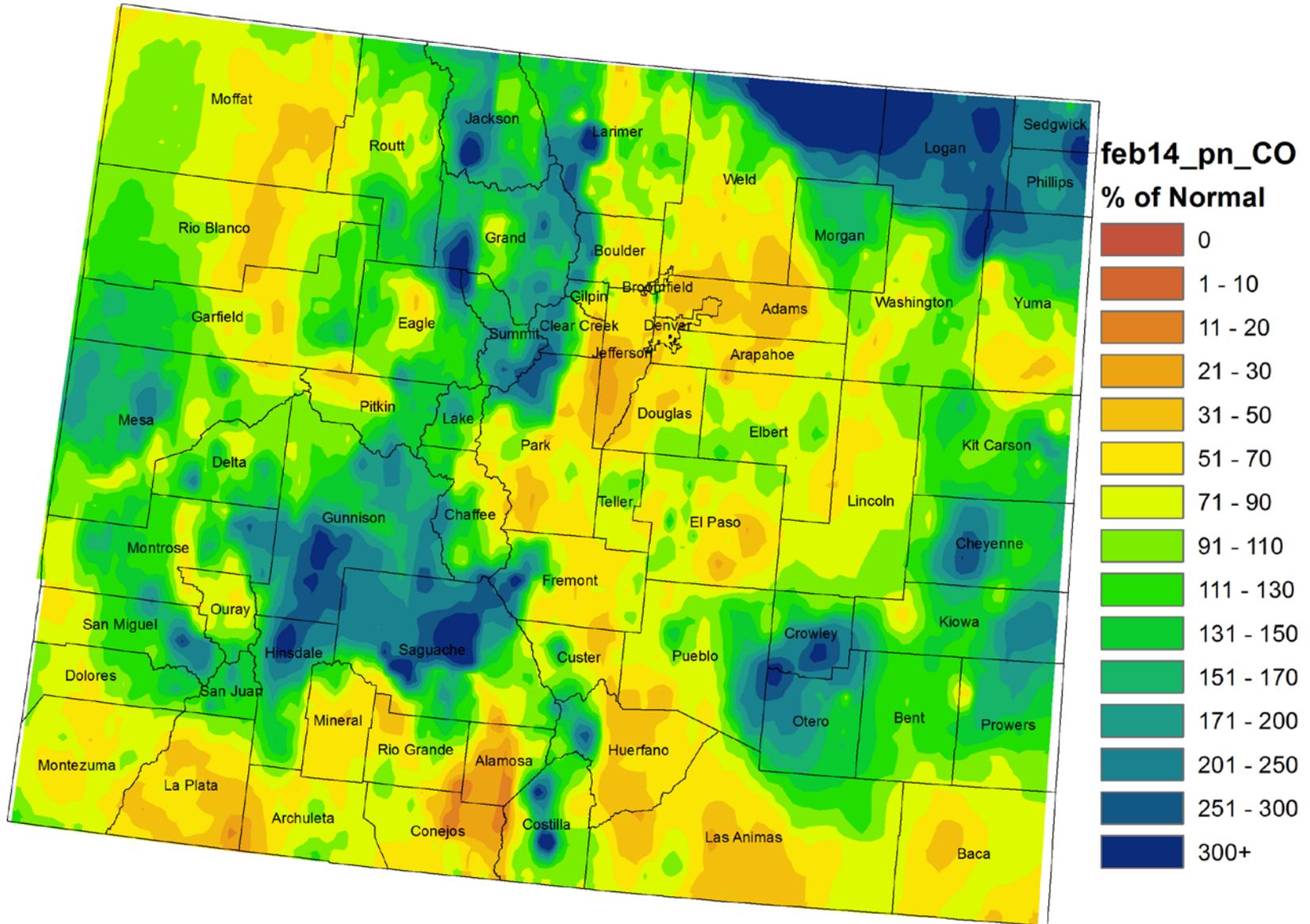


Departure from Normal Temperature (F)

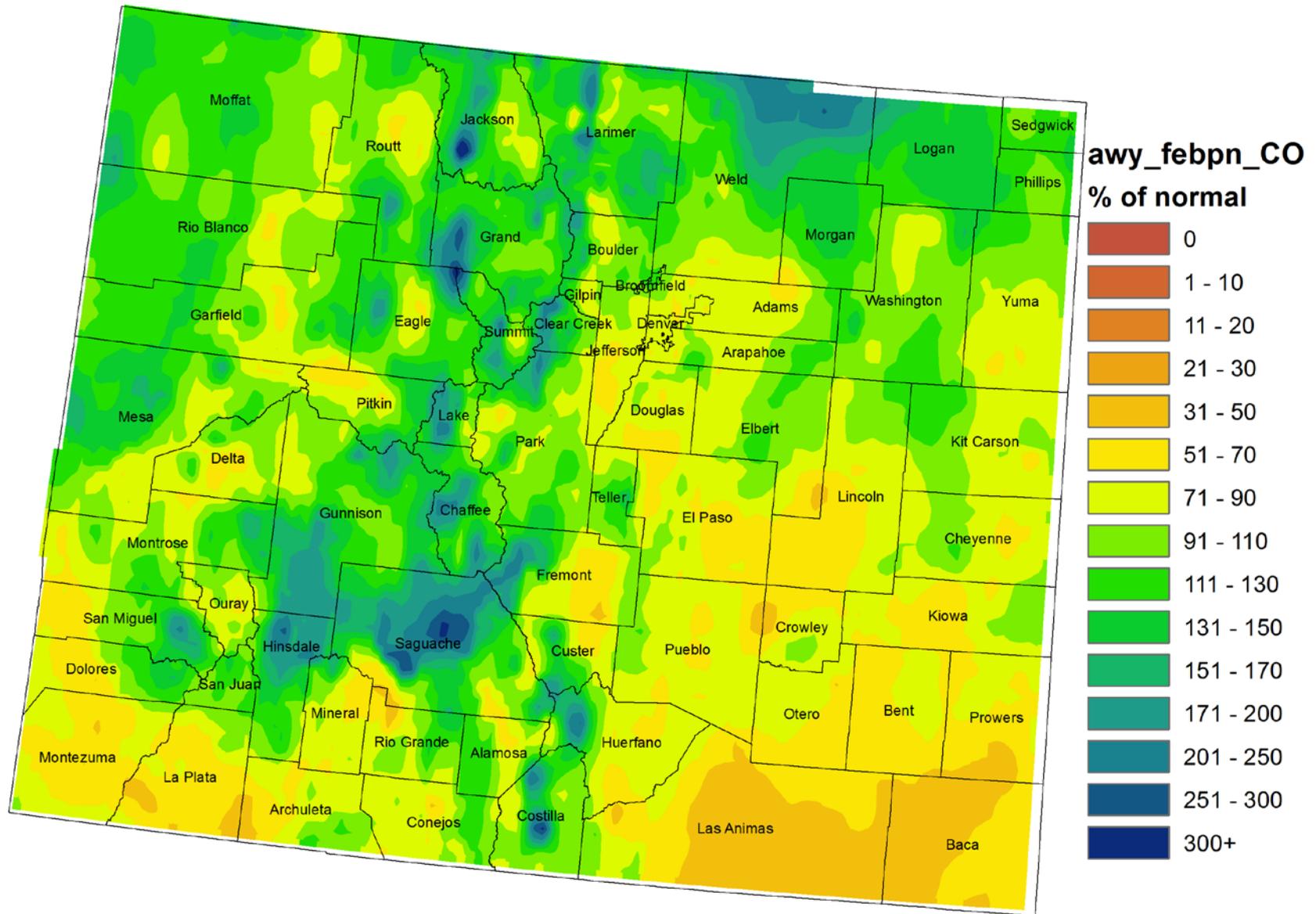
3/1/2014 - 3/18/2014



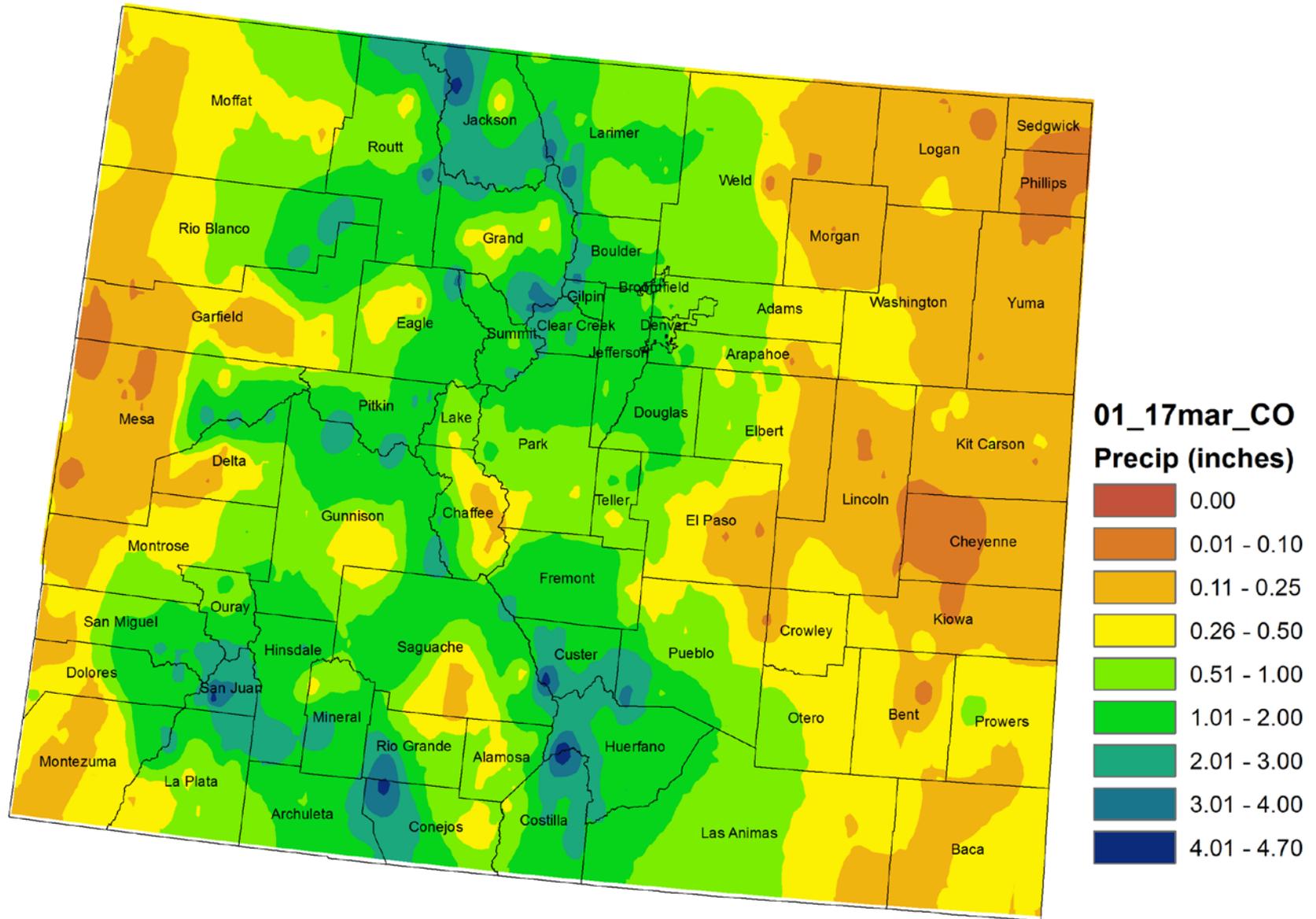
Colorado February 2014 Precipitation as Percentage of Normal



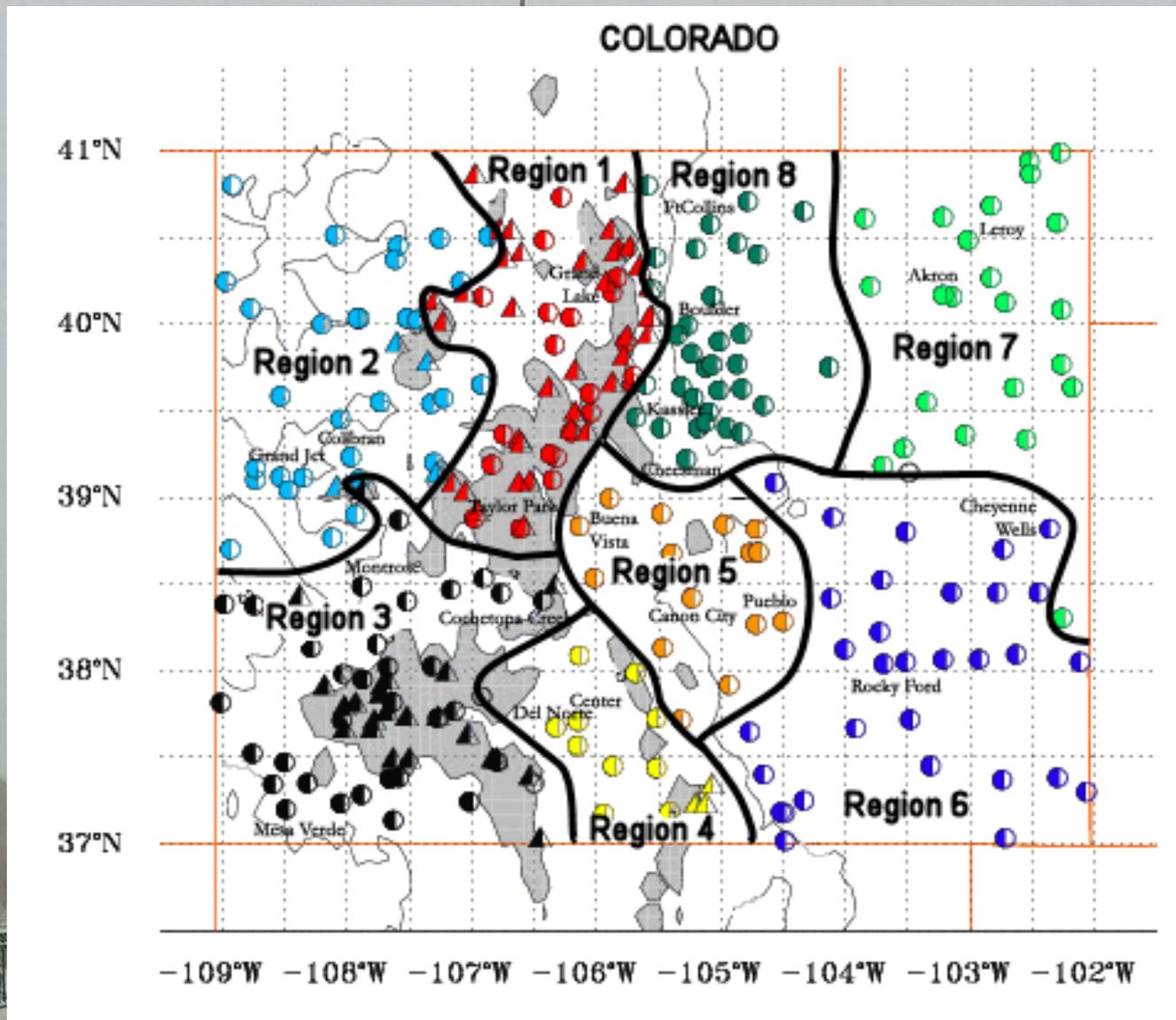
Colorado Water Year Precipitation as Percentage of Normal October 2013 - February 2014



Colorado Month to Date Precipitation 1 - 17 March 2014

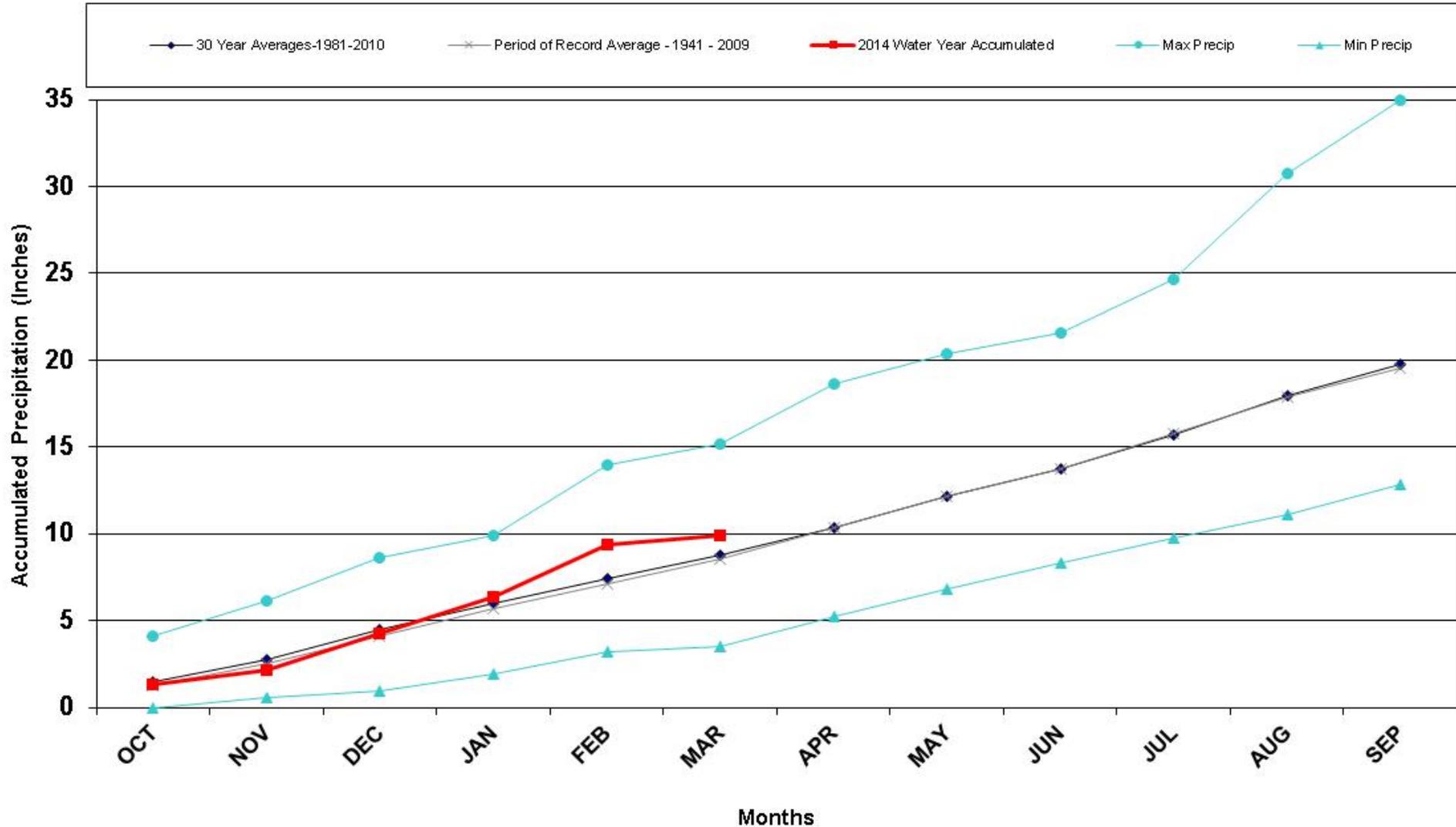


Climate divisions defined by Dr. Klaus Wolter of NOAA's Climate Diagnostic Center in Boulder, CO



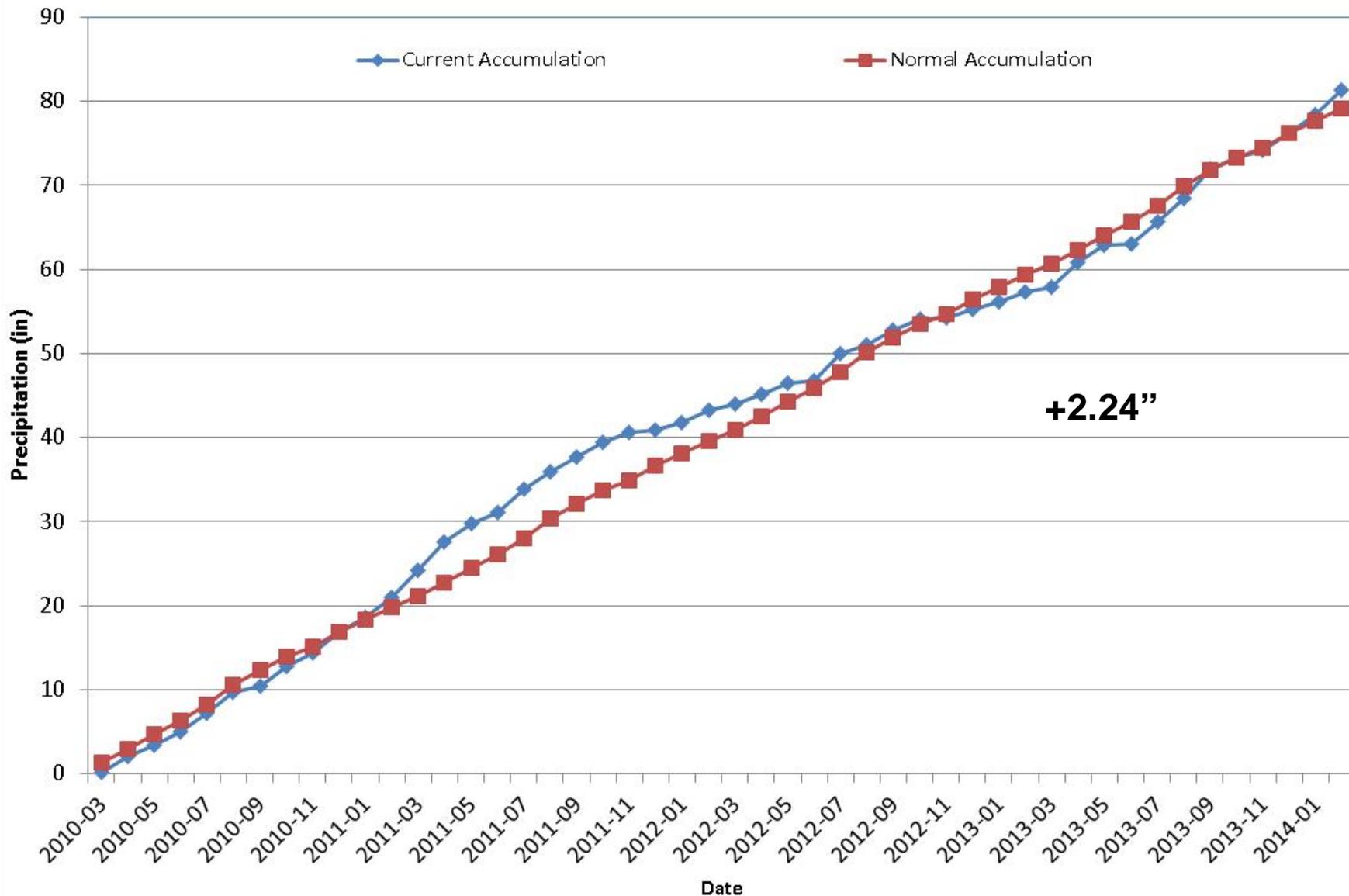
Division 1 – Grand Lake 1NW

Grand Lake 1 NW 2014 Water Year



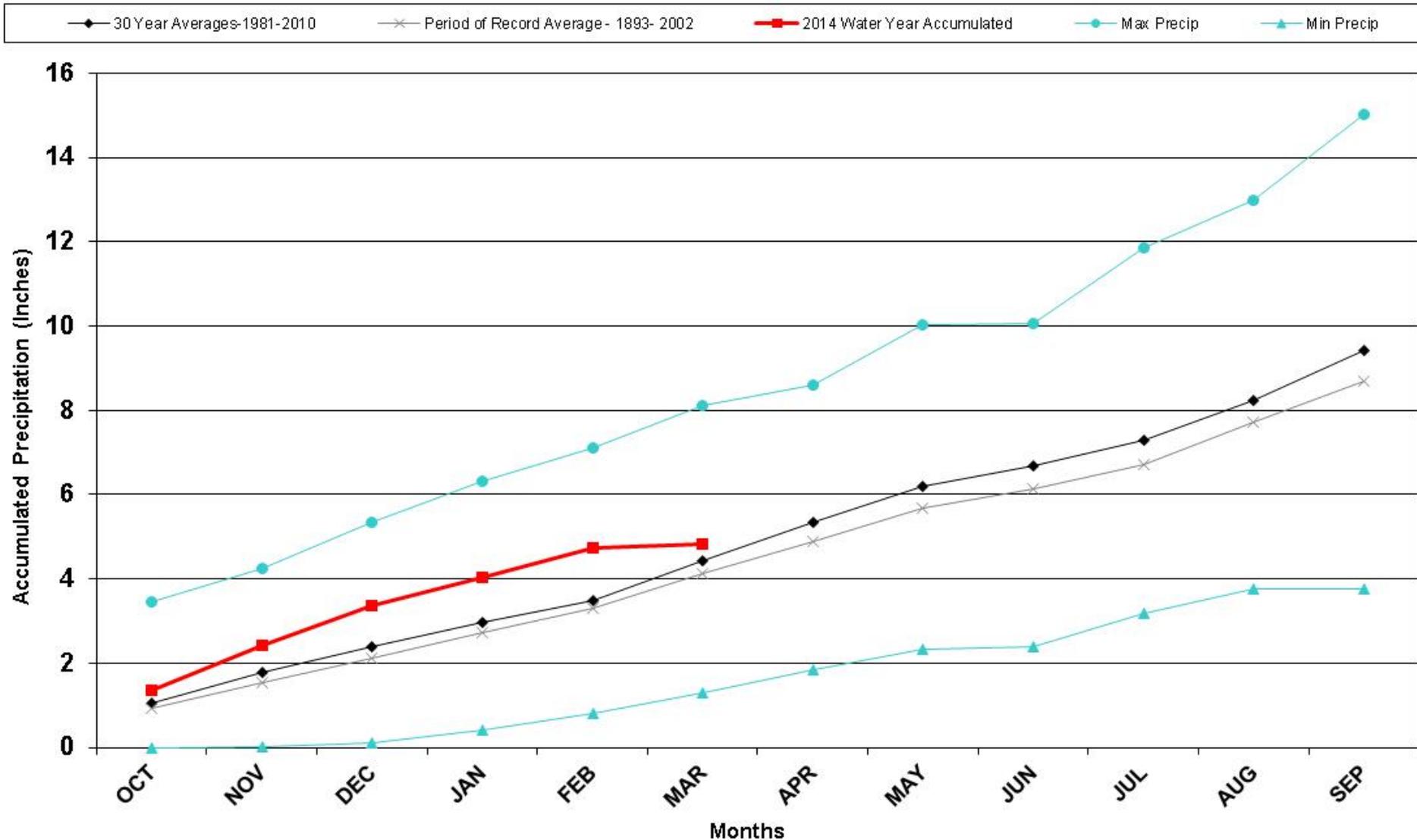
Division 1 – Grand Lake 1NW

Grand Lake 1NW Precipitation Accumulation



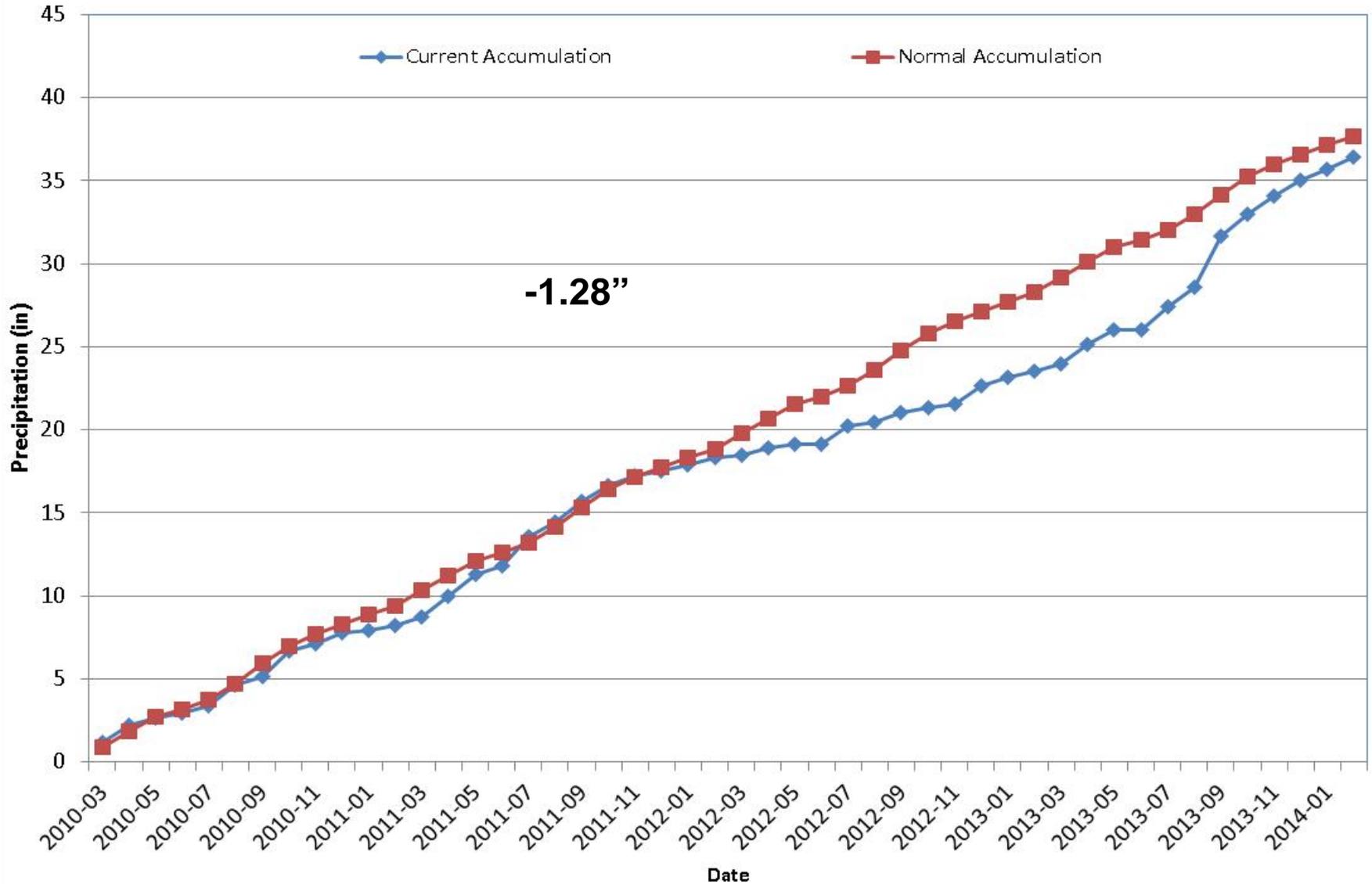
Division 2 – Grand Junction

Grand Junction WSFO 2014 Water Year



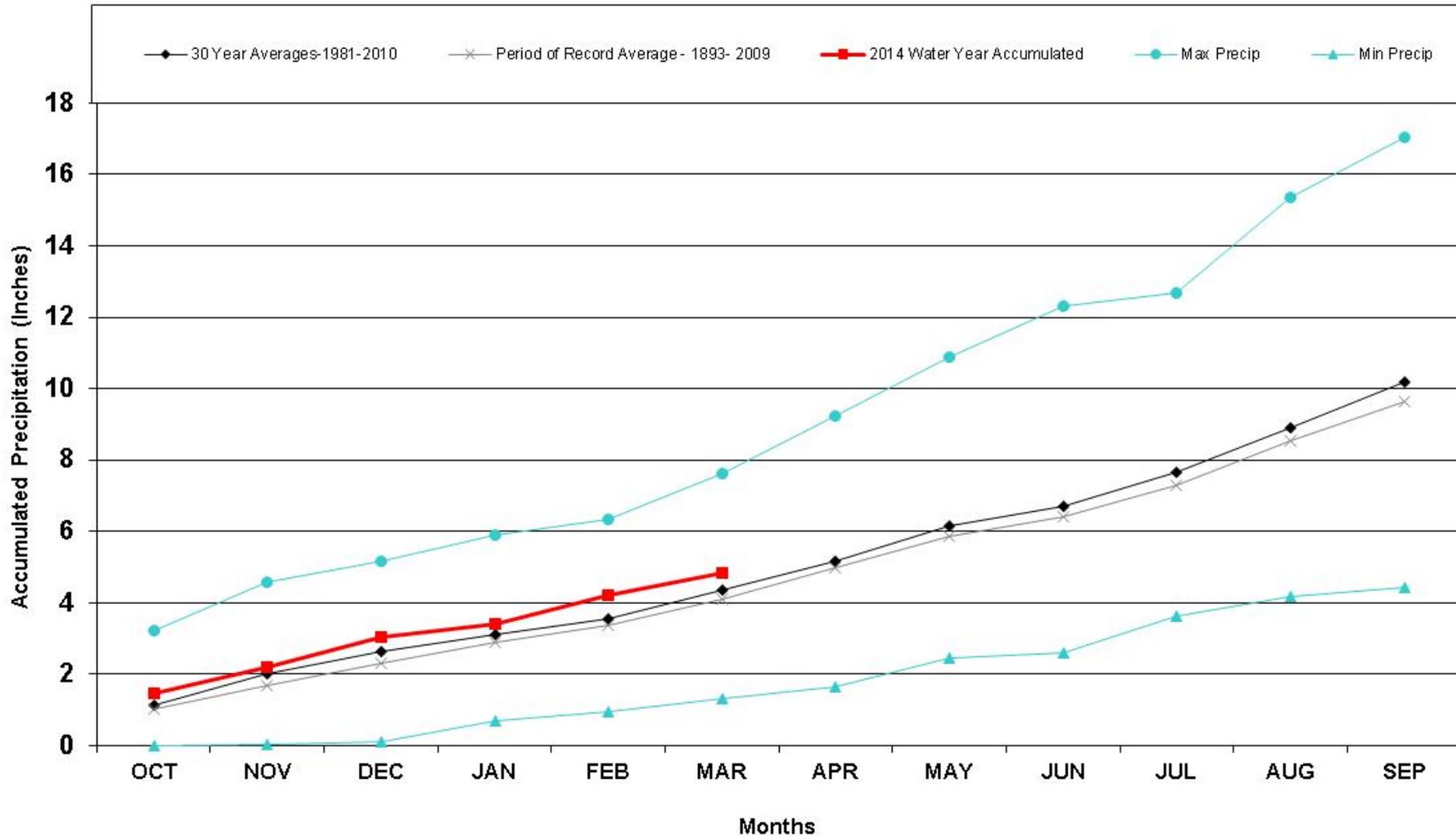
Division 2 – Grand Junction

Grand Junction Precipitation Accumulation



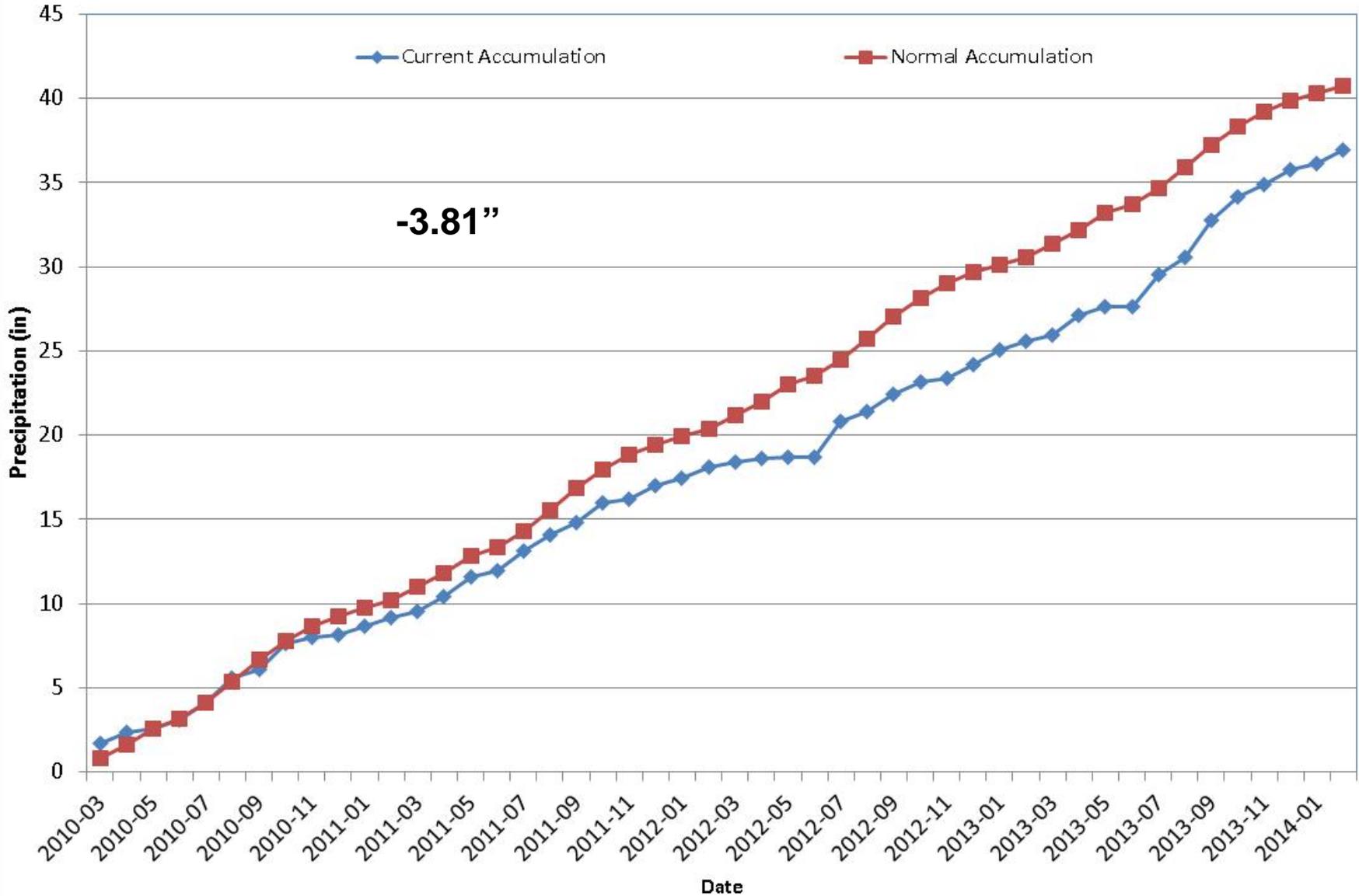
Division 3 – Montrose

Montrose #2 2014 Water Year



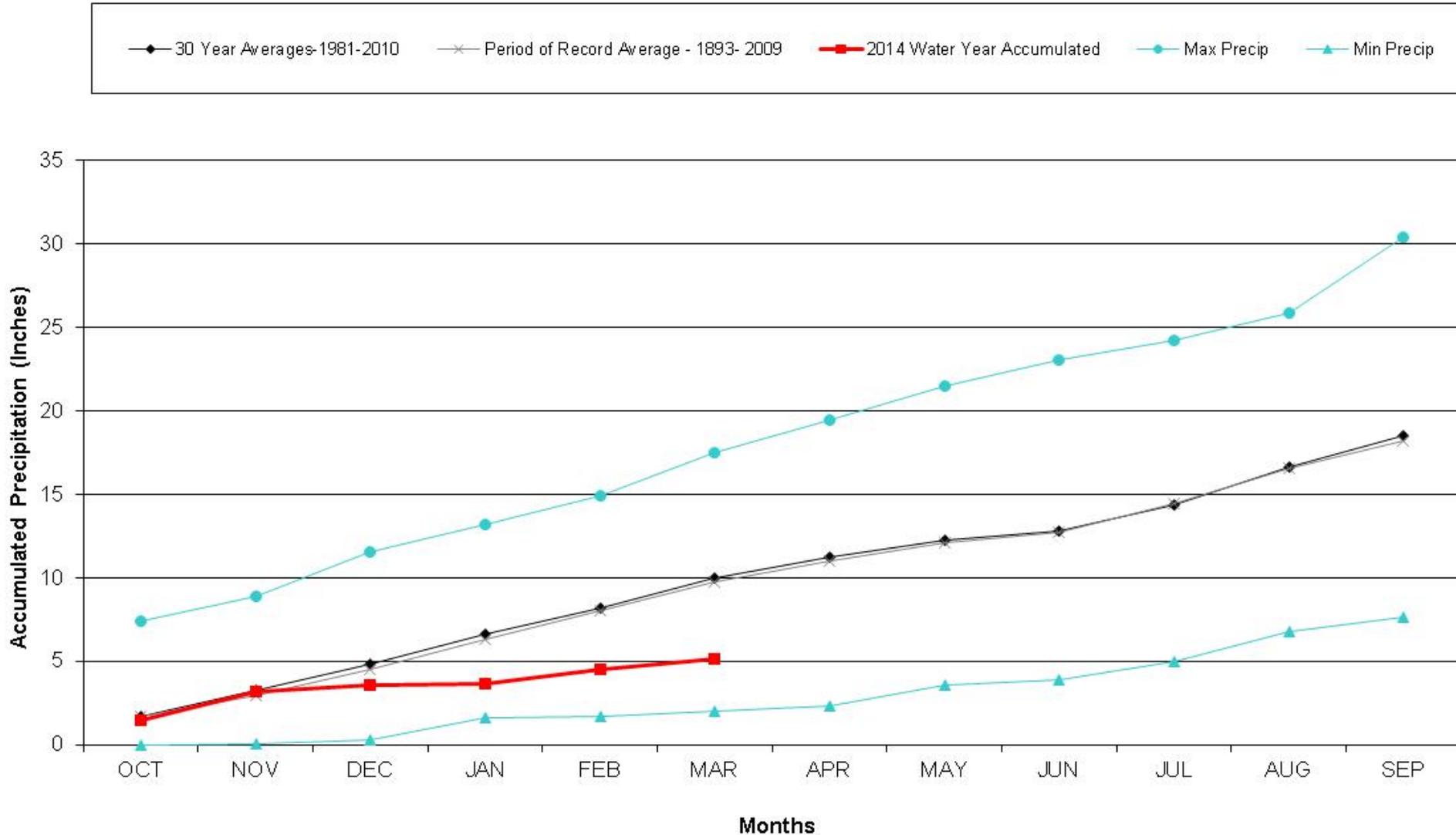
Division 3 – Montrose

Montrose #2 Precipitation Accumulation



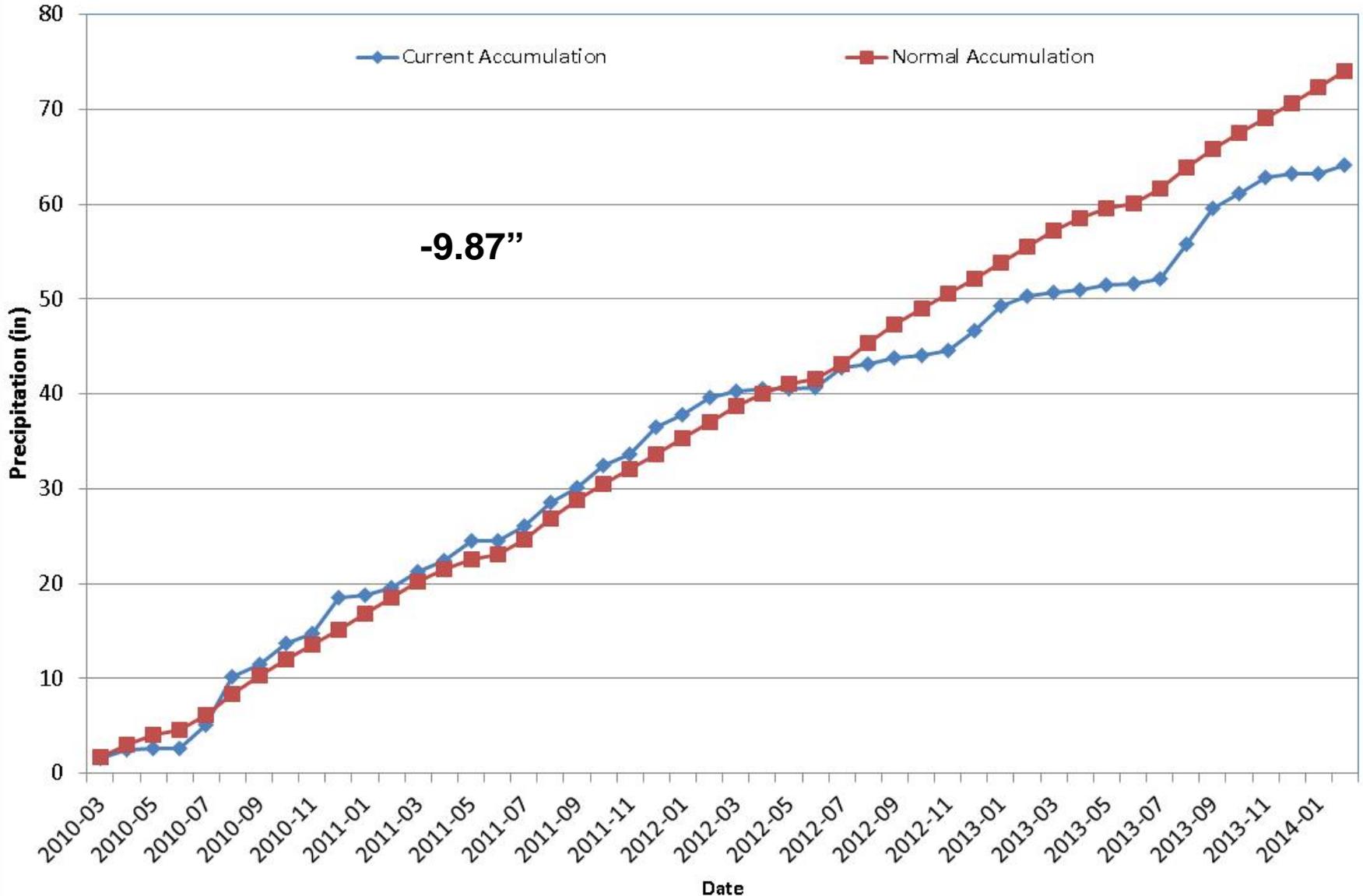
Division 3 – Mesa Verde NP

Mesa Verde NP 2014 Water Year



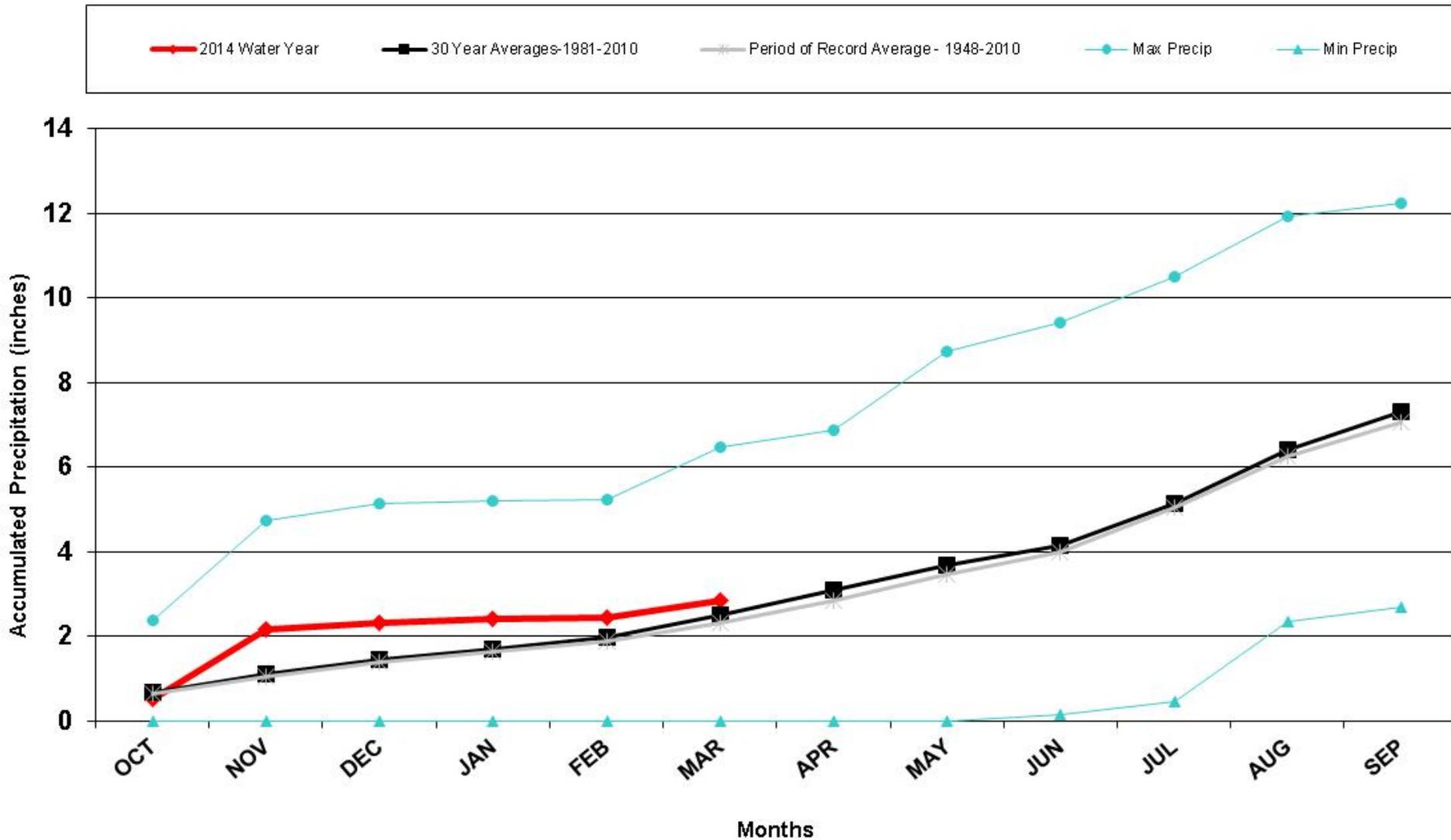
Division 3 – Mesa Verde NP

Mesa Verde NP Precipitation Accumulation



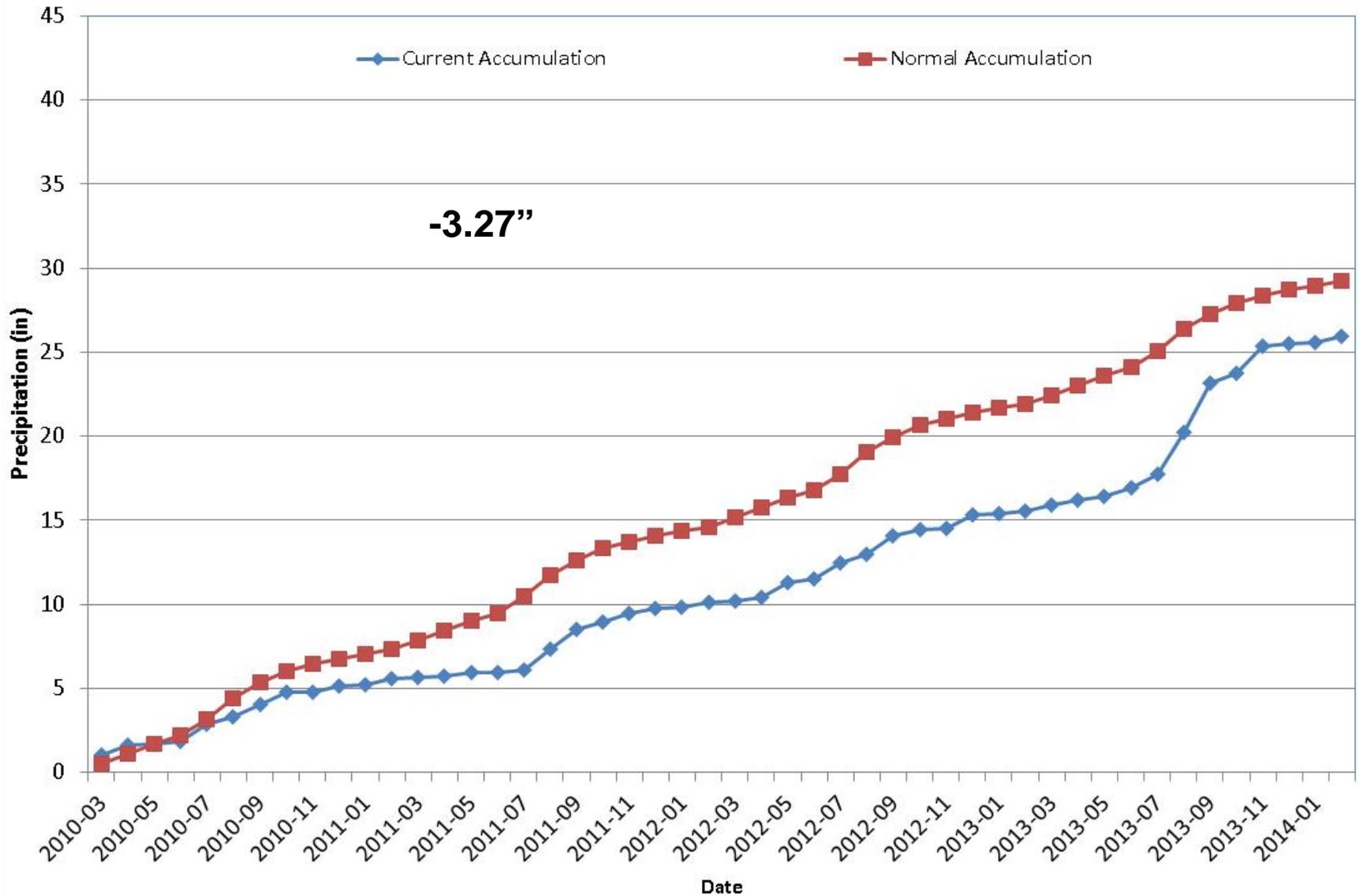
Division 4 – Alamosa

Alamosa WSO 2014 Water Year



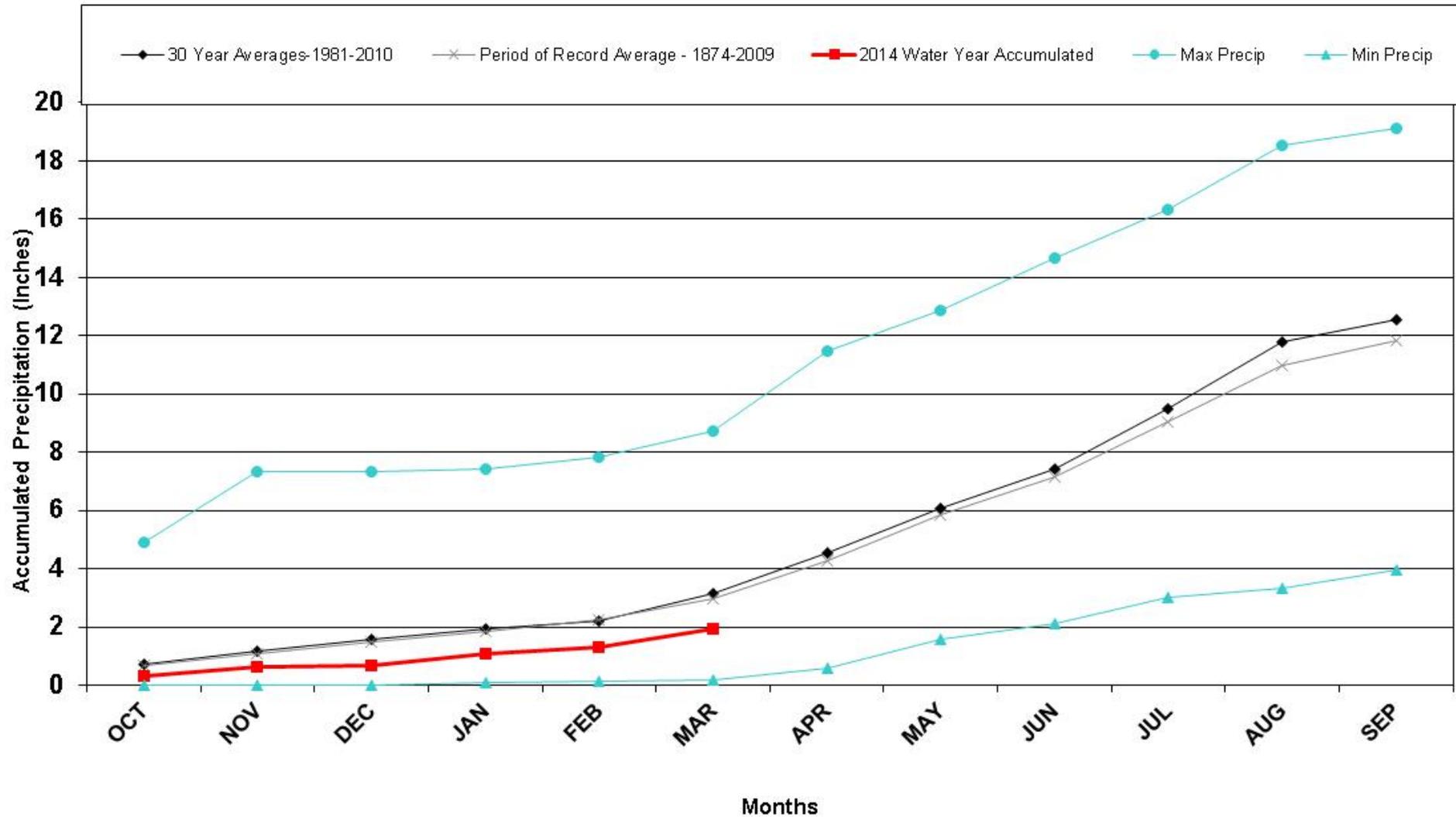
Division 4 – Alamosa

Alamosa WSO Precipitation Accumulation



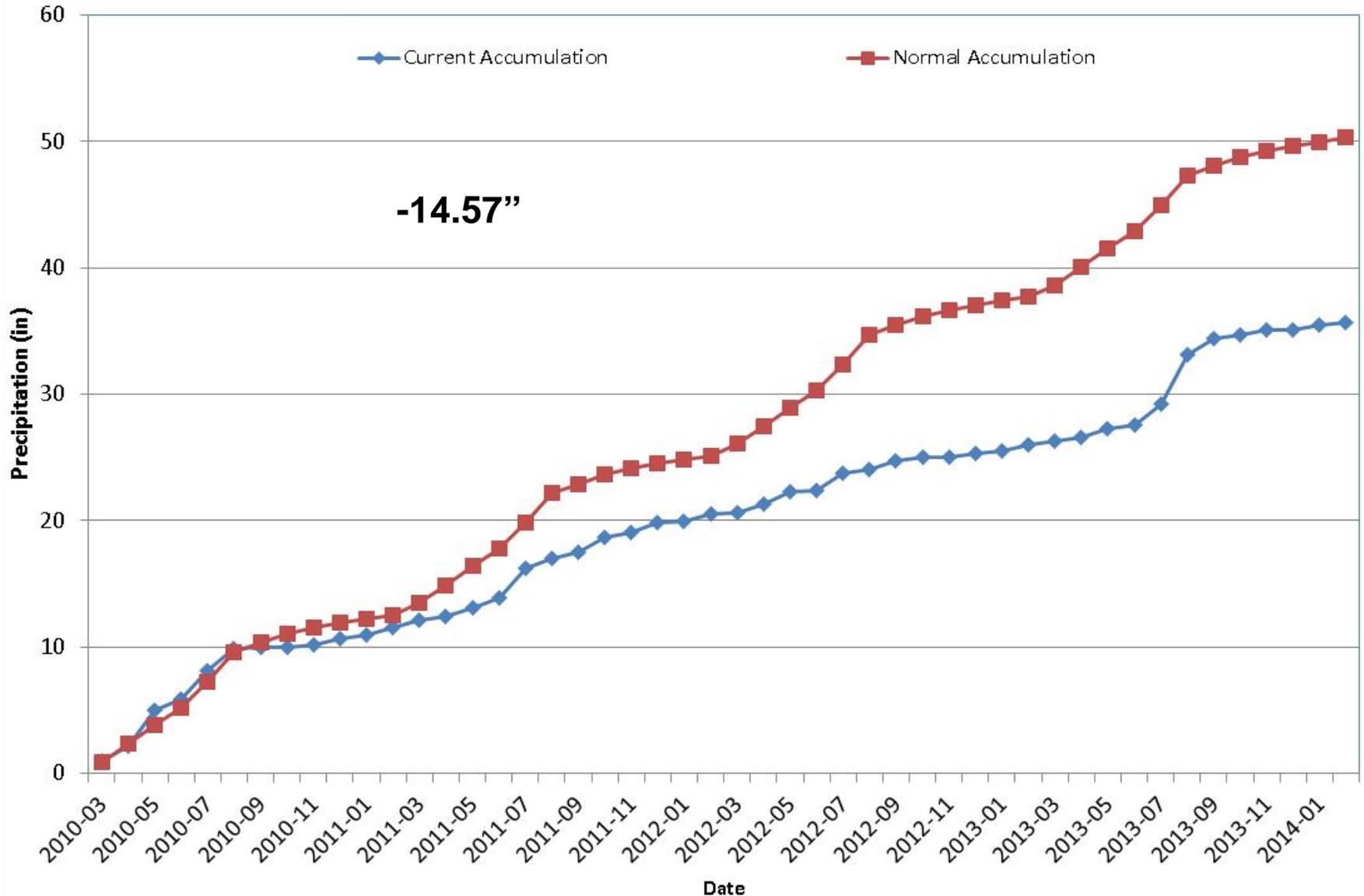
Division 5 – Pueblo

Pueblo WSO 2014 Water Year



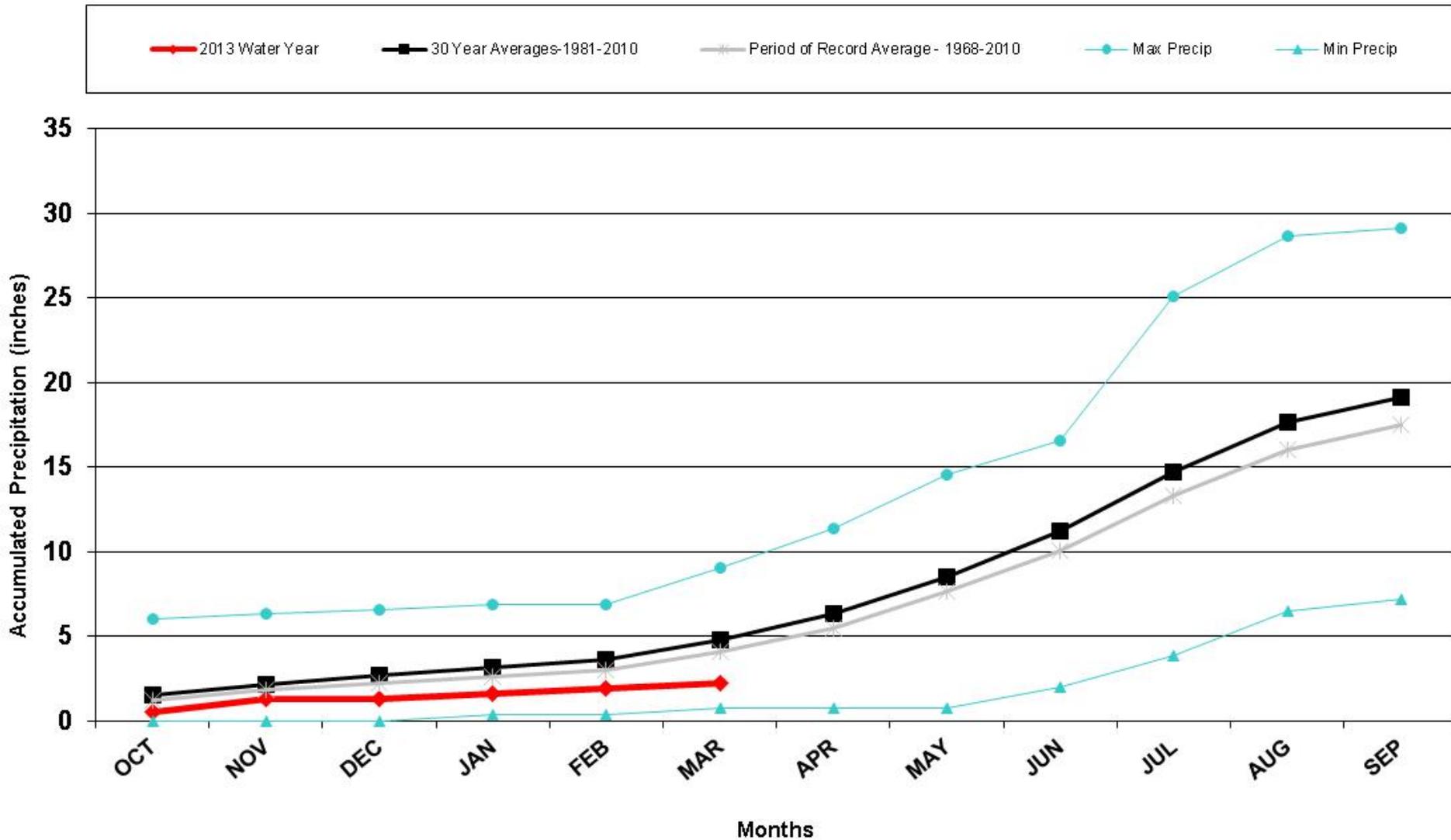
Division 5 – Pueblo

Pueblo Memorial AP Precipitation Accumulation



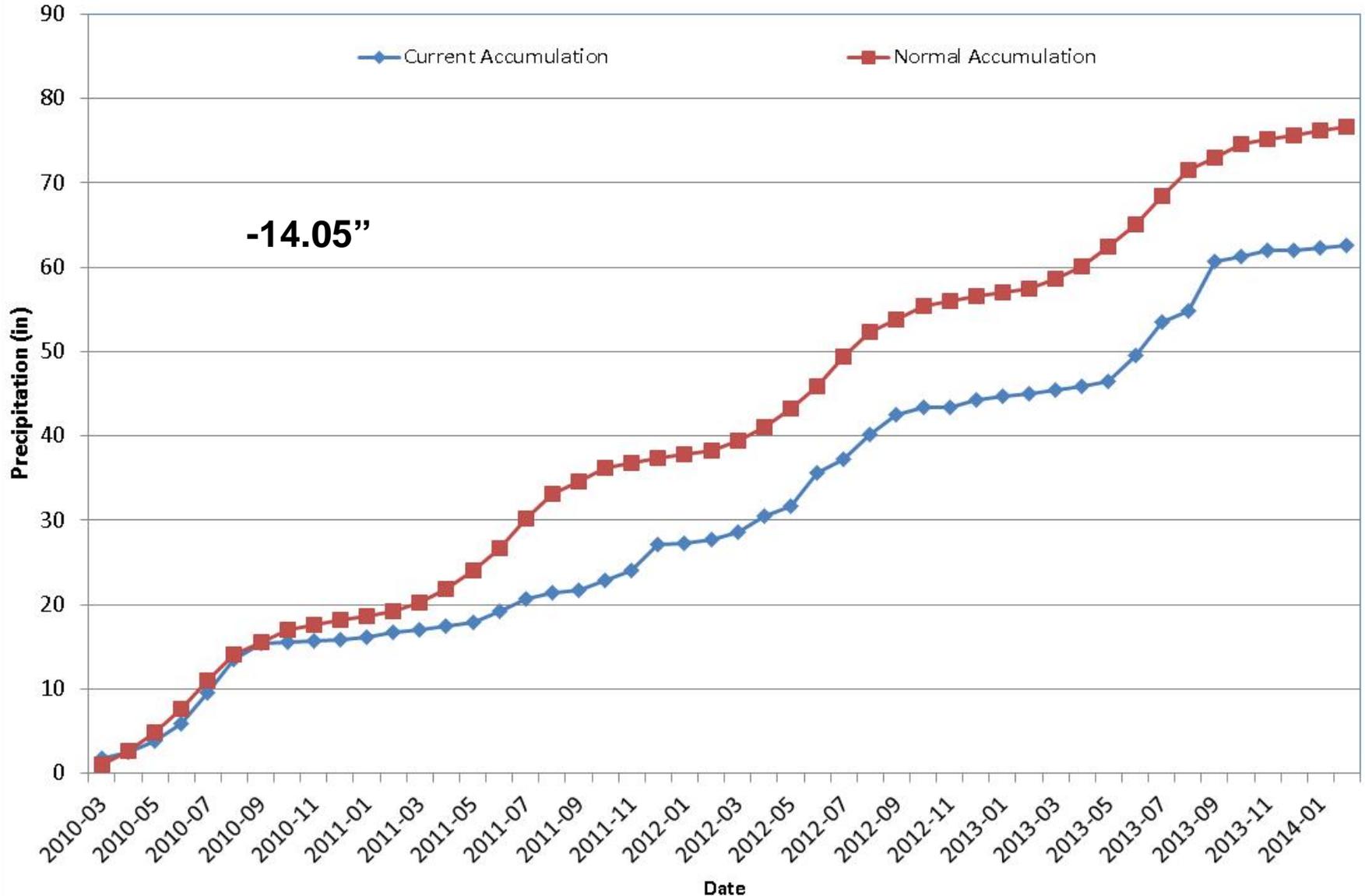
Division 6 - Walsh

Walsh 2014 Water Year



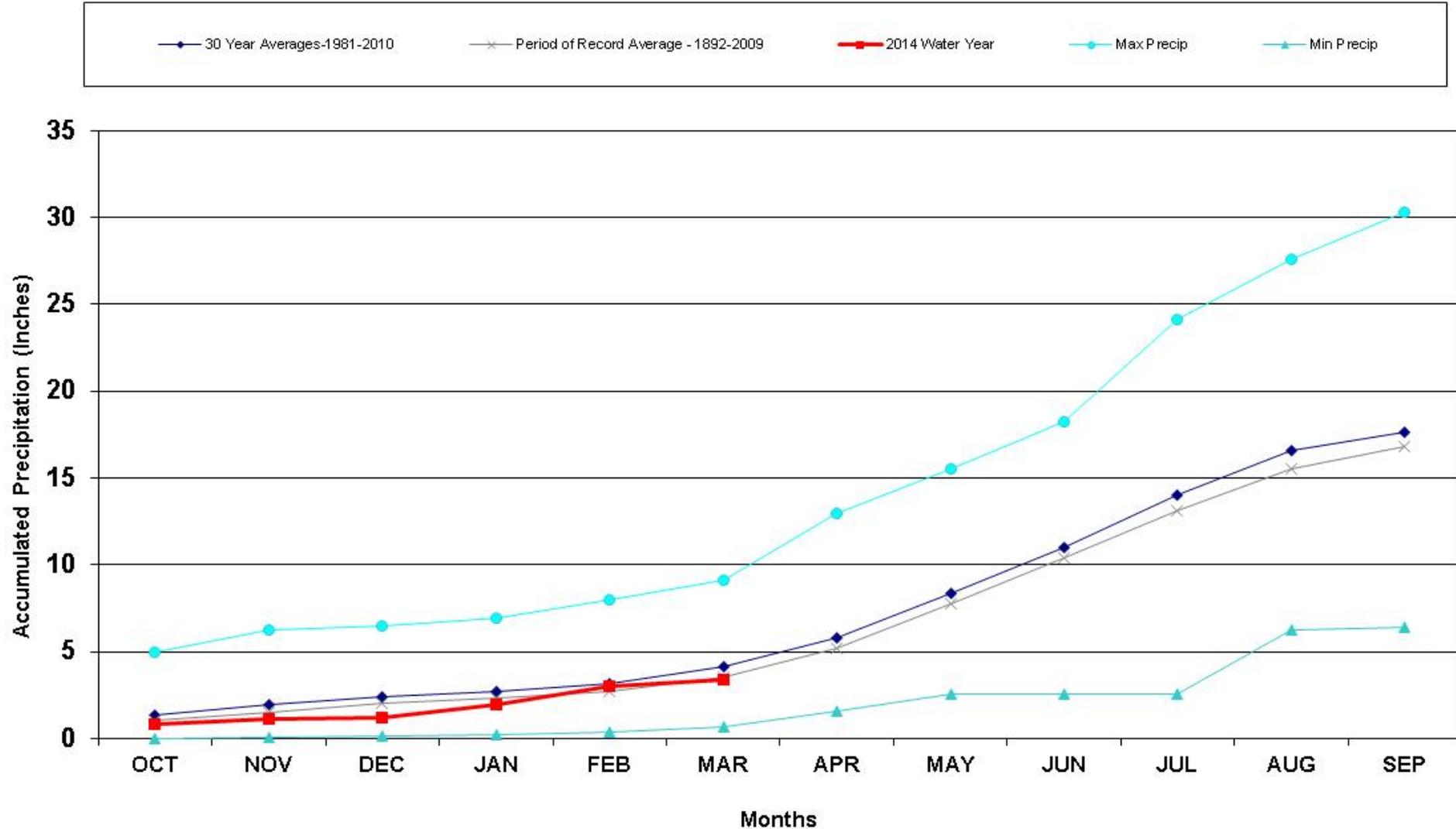
Division 6 - Walsh

Walsh 1W Precipitation Accumulation



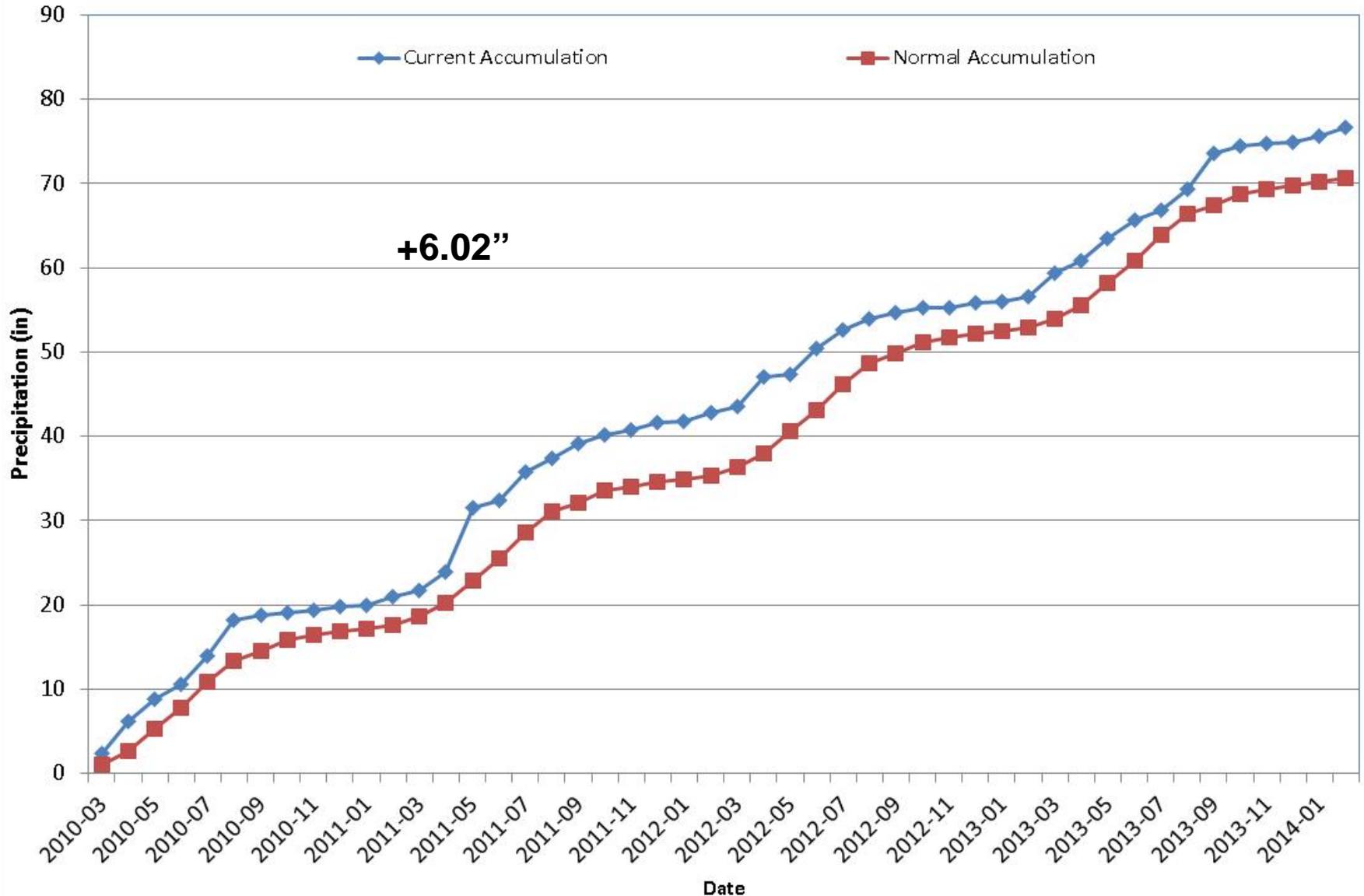
Division 6 - Burlington

Burlington 2014 Water Year



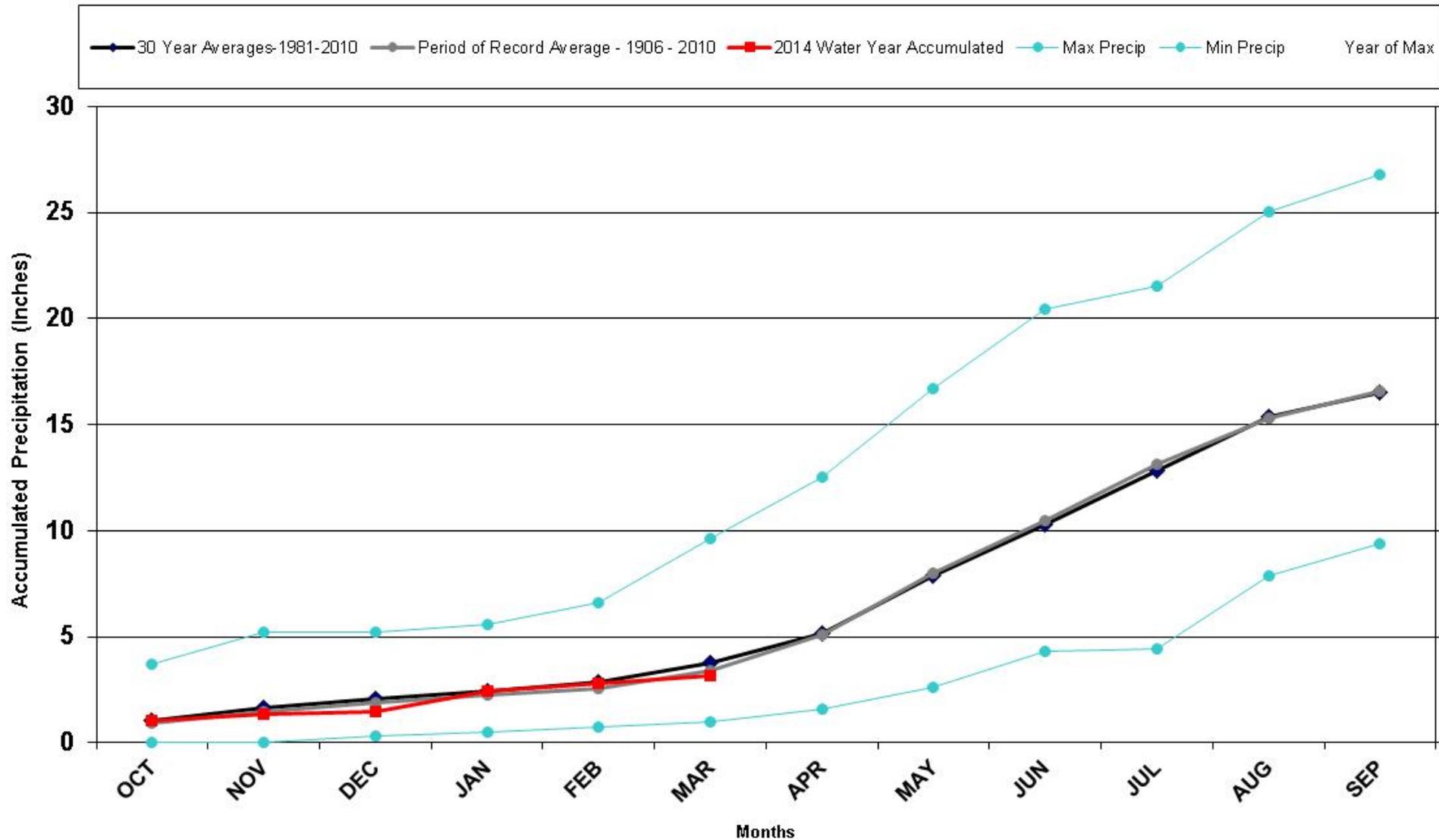
Division 6 - Burlington

Burlington, CO Precipitation Accumulation



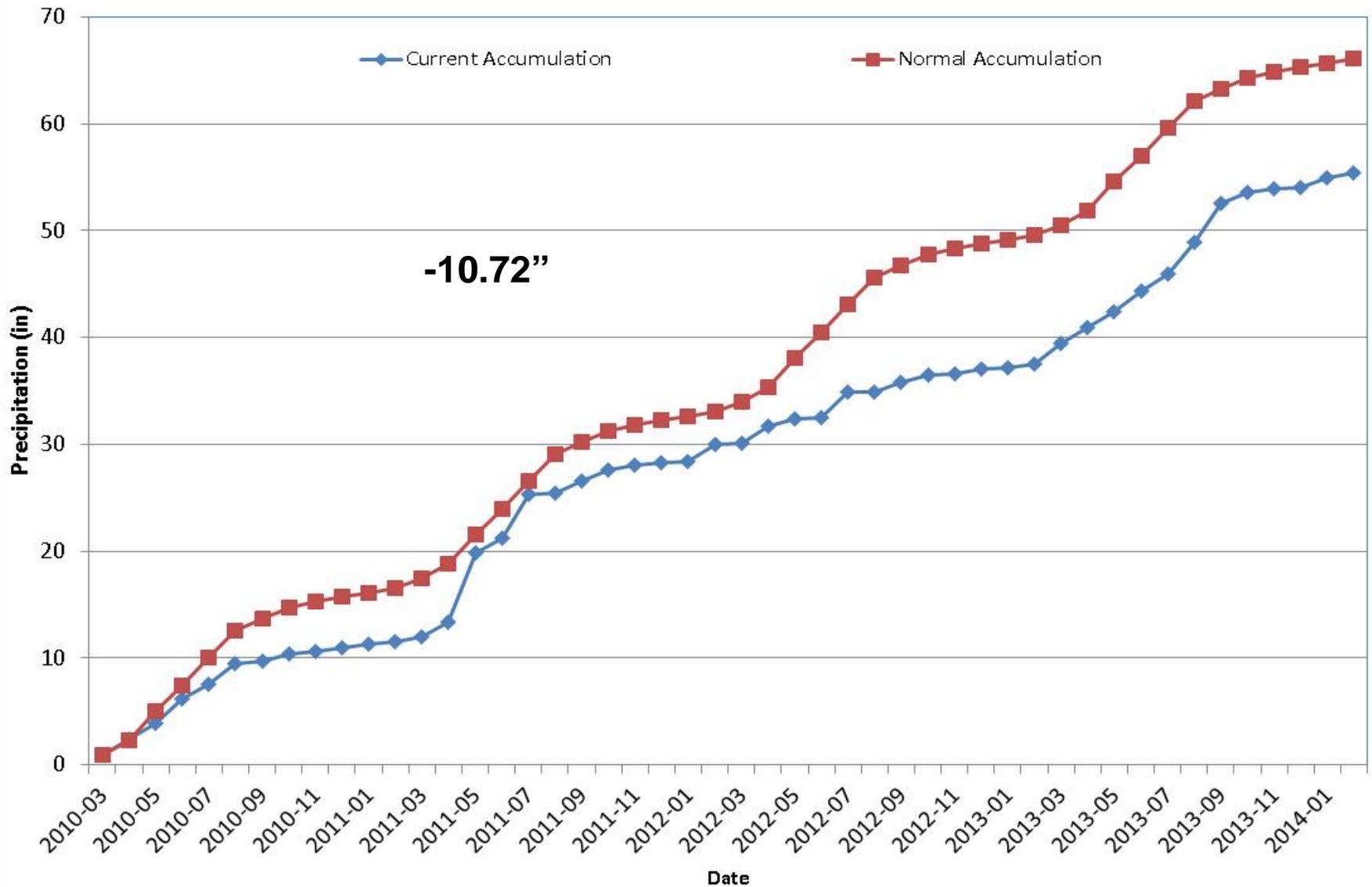
Division 7 – Akron

Akron 4E 2014 Water Year



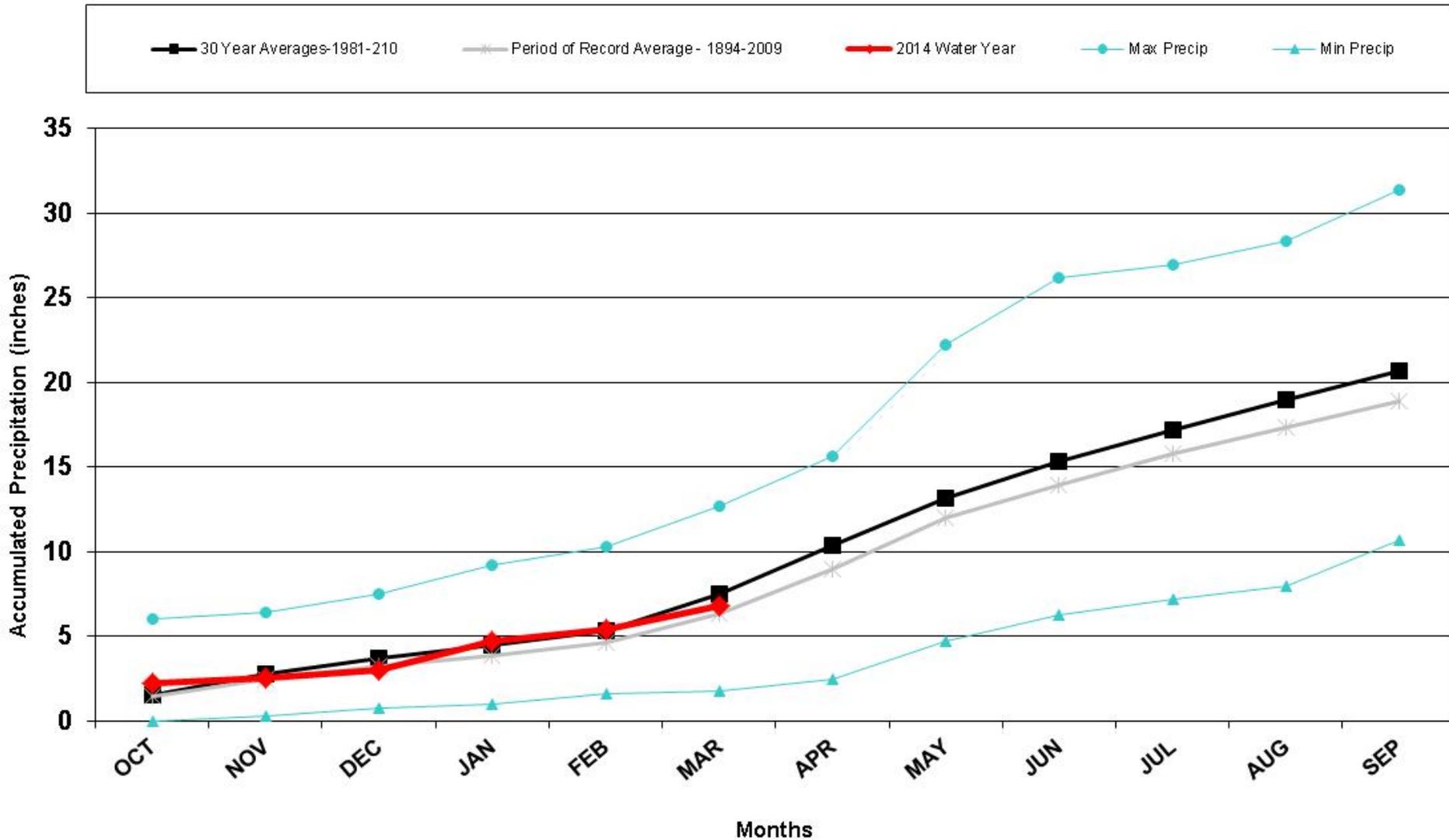
Division 7 – Akron

Akron 4E Precipitation Accumulation



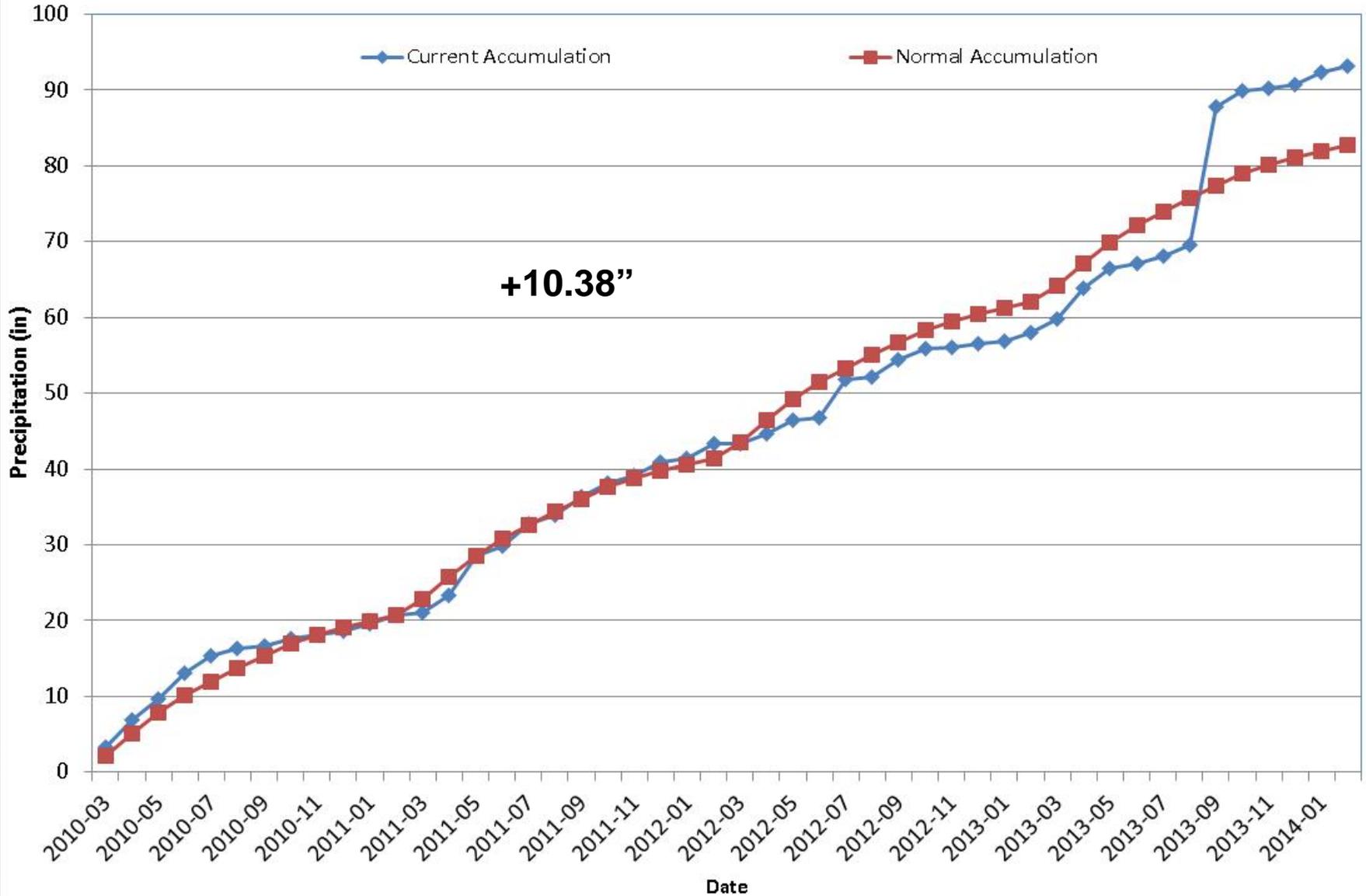
Division 8 - Boulder

Boulder 2014 Water Year



Division 8 - Boulder

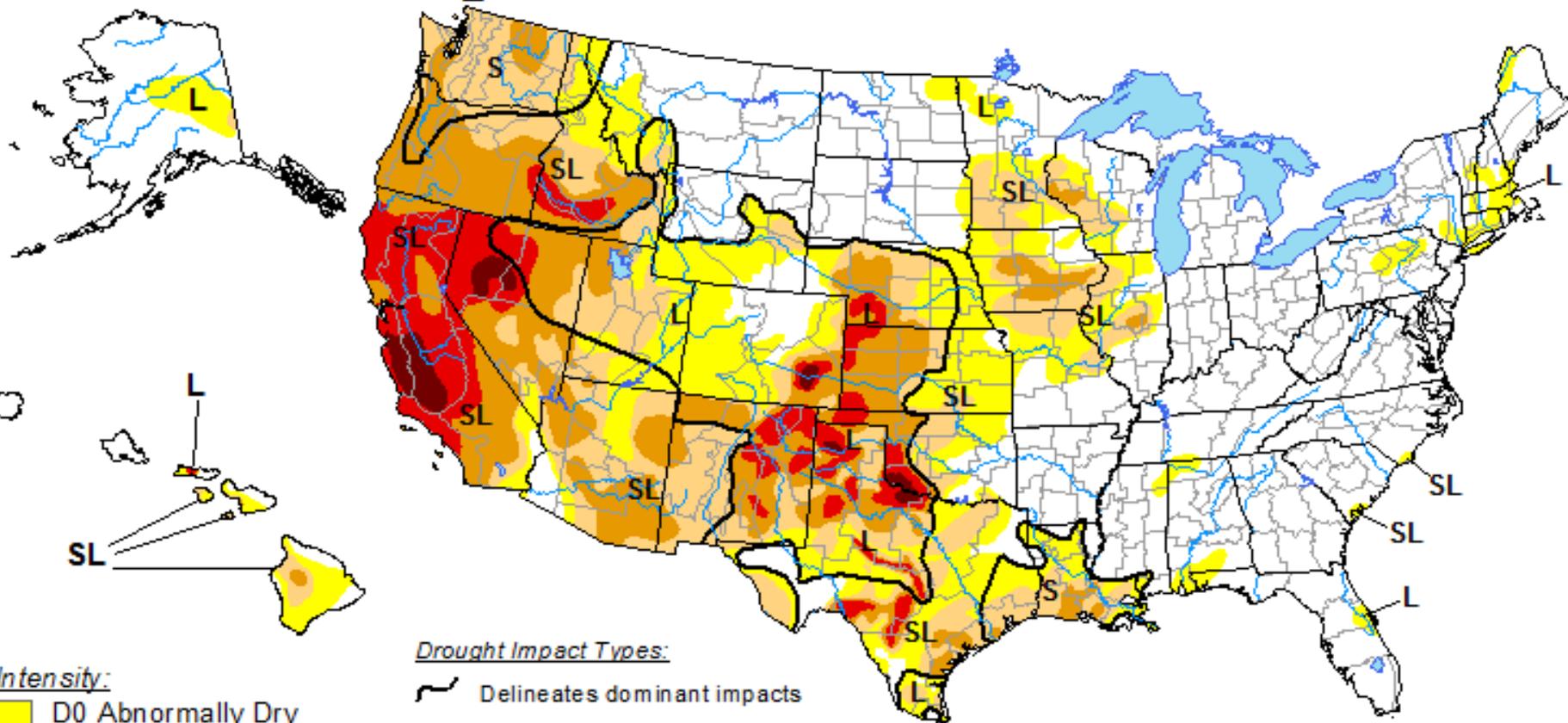
Boulder Precipitation Accumulation



U.S. Drought Monitor

February 11, 2014

Valid 7 a.m. EST



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/>



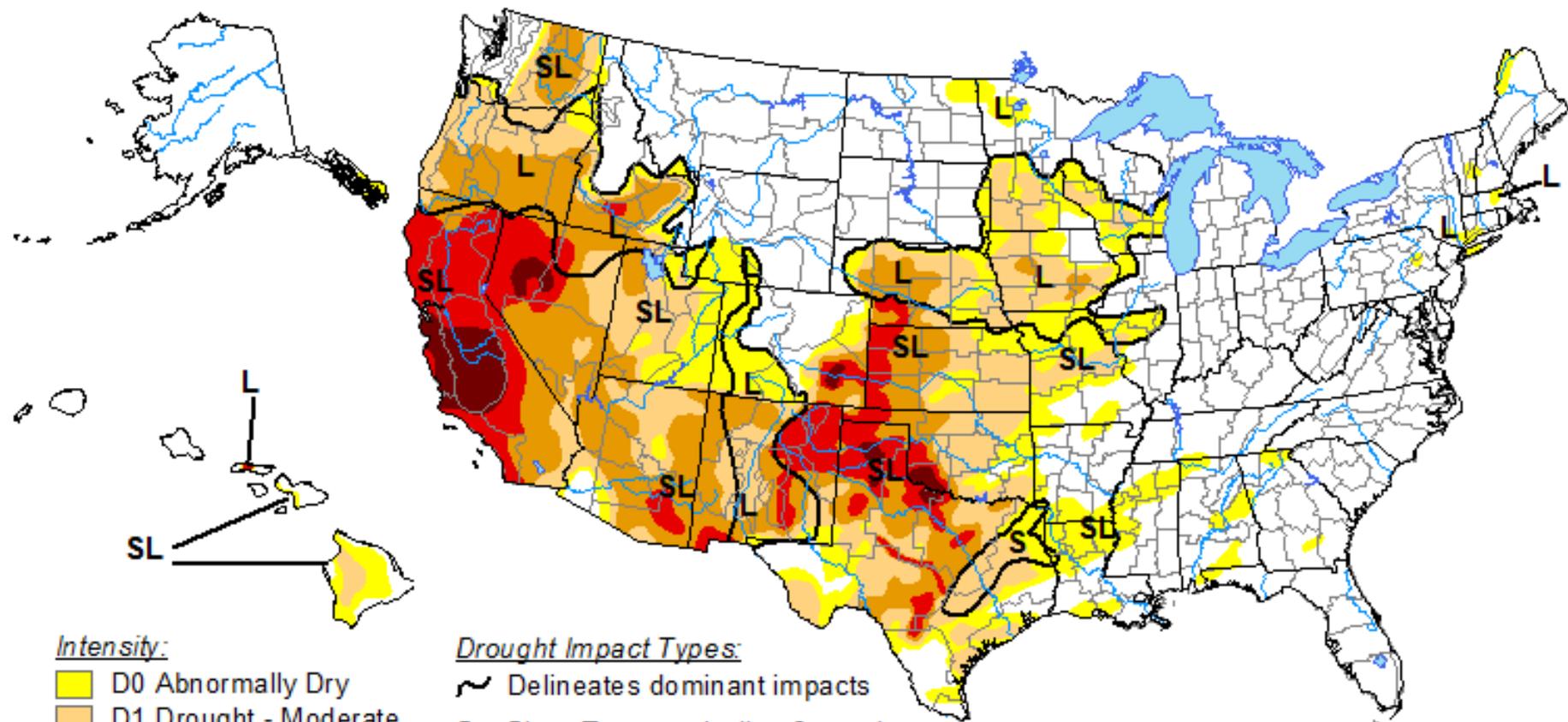
Released Thursday, February 13, 2014

Author: David Miskus, NOAA/NWS/NCEP/CPC

U.S. Drought Monitor

March 18, 2014

Valid 8 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)
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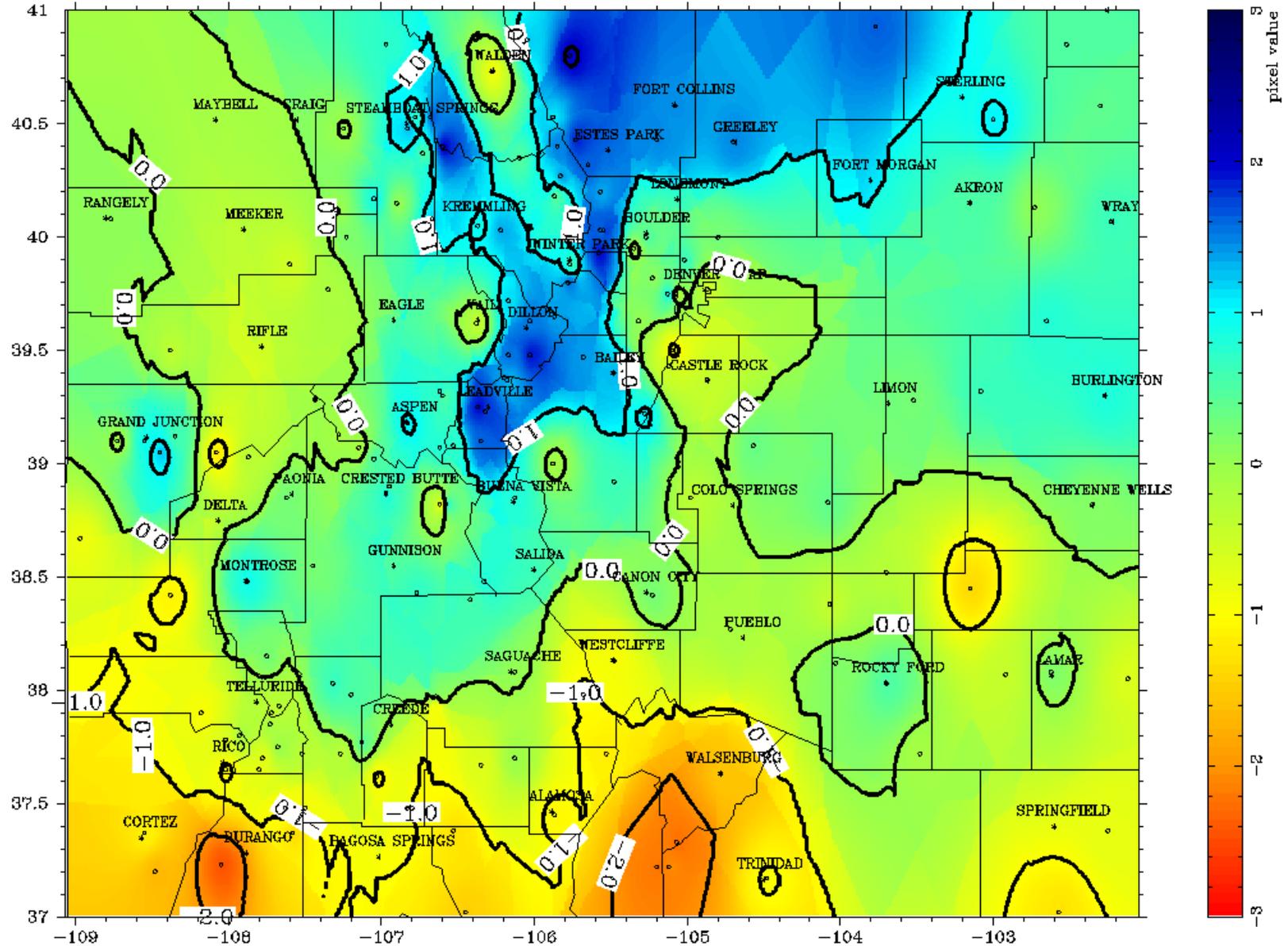
Released Thursday, March 20, 2014

Author: Eric Luebehusen, U.S. Department of Agriculture

Colorado

2/2014 3 mon. SPI

JULESBUURG



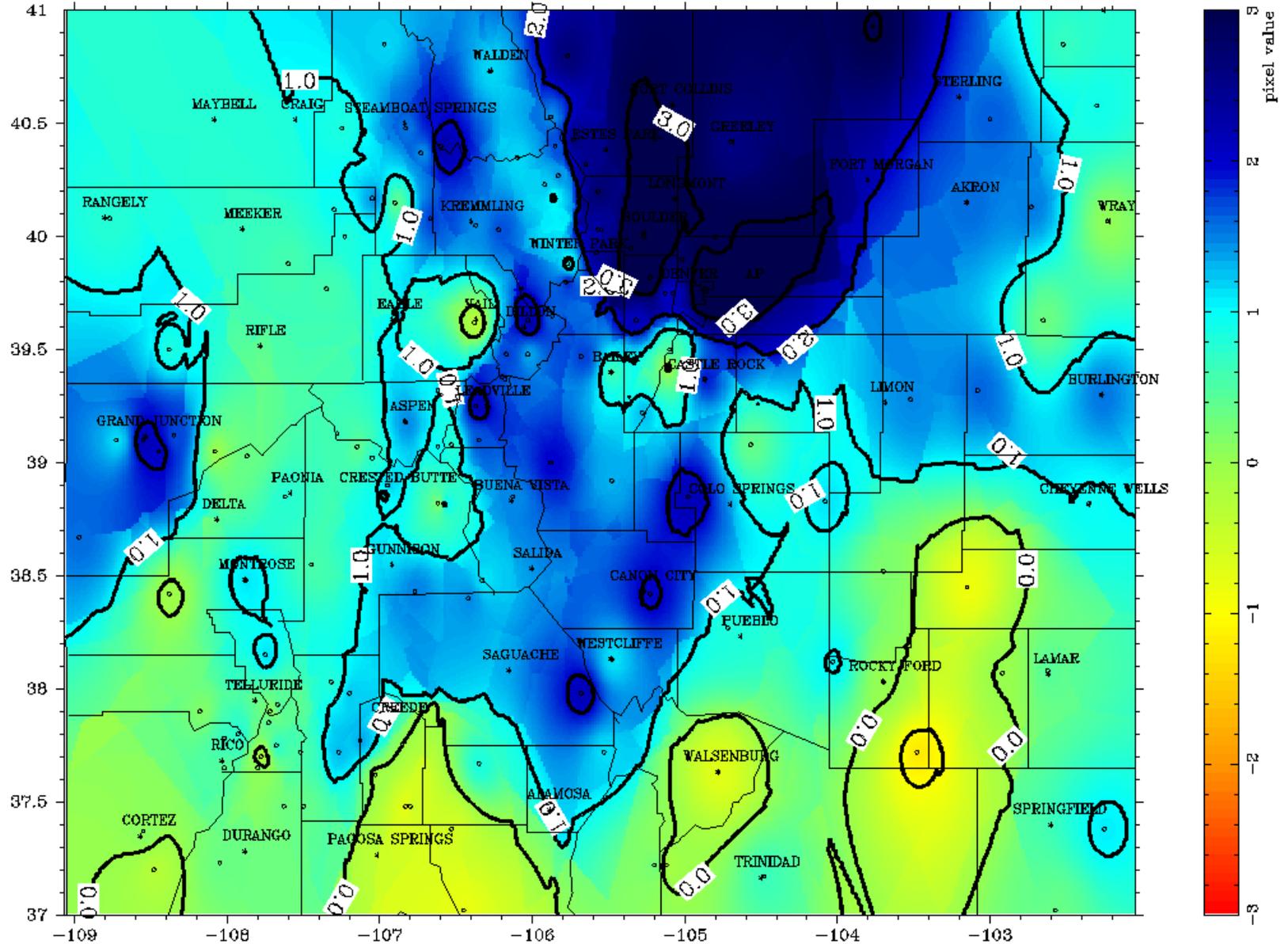
100 % < 2.0	11 % < -1.0
89 % < 1.0	1 % < -2.0
47 % < 0.0	0 % < -3.0

Produced by:
Colorado Climate Center
Fort Collins, CO

Colorado

2/2014 6 mon. SPI

JULESBURG



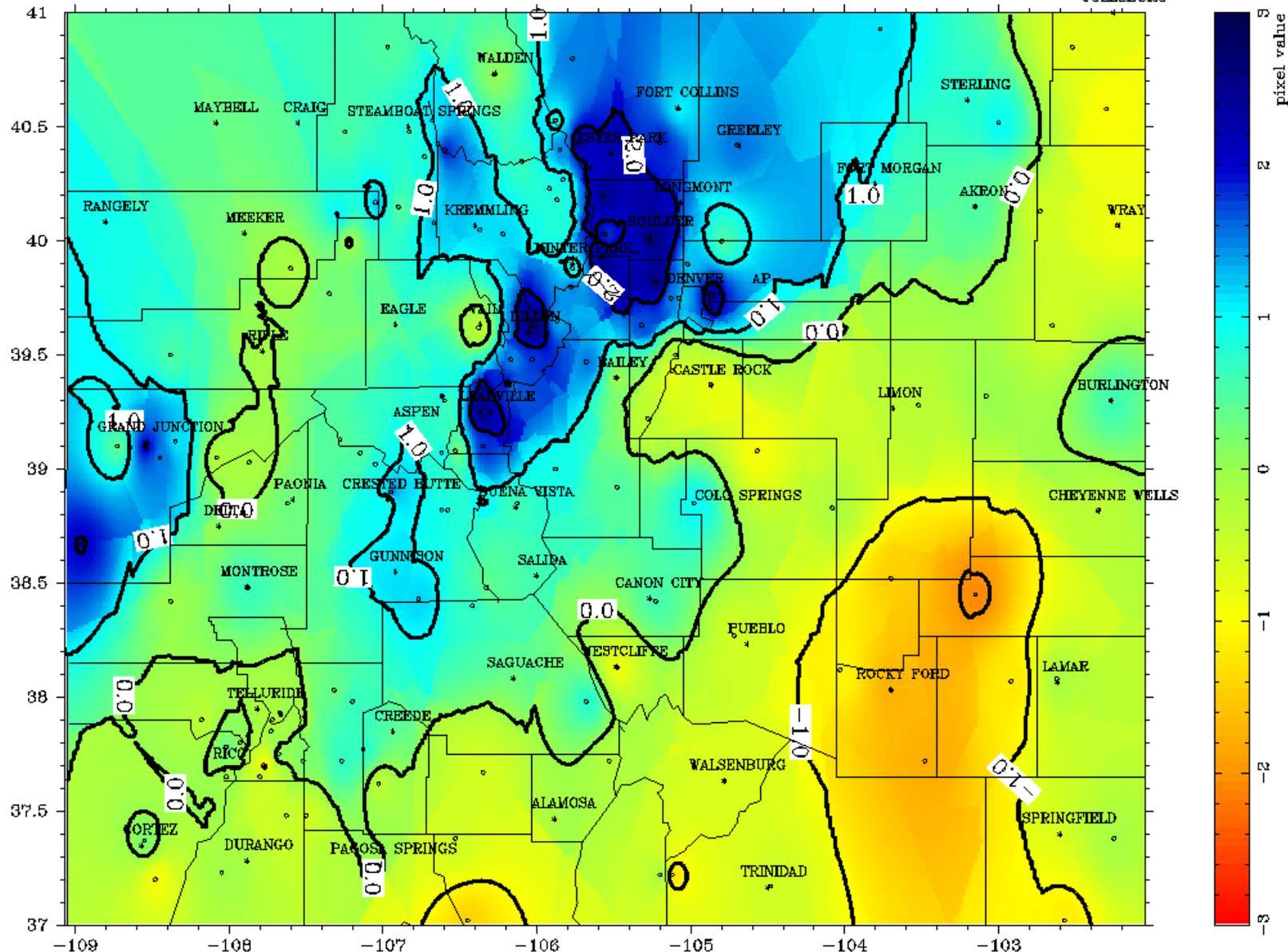
89 % < 2.0 0 % < -1.0
55 % < 1.0 0 % < -2.0
10 % < 0.0 0 % < -3.0

Produced by:
Colorado Climate Center
Fort Collins, CO

Colorado

2/2014 12 mon. SPI

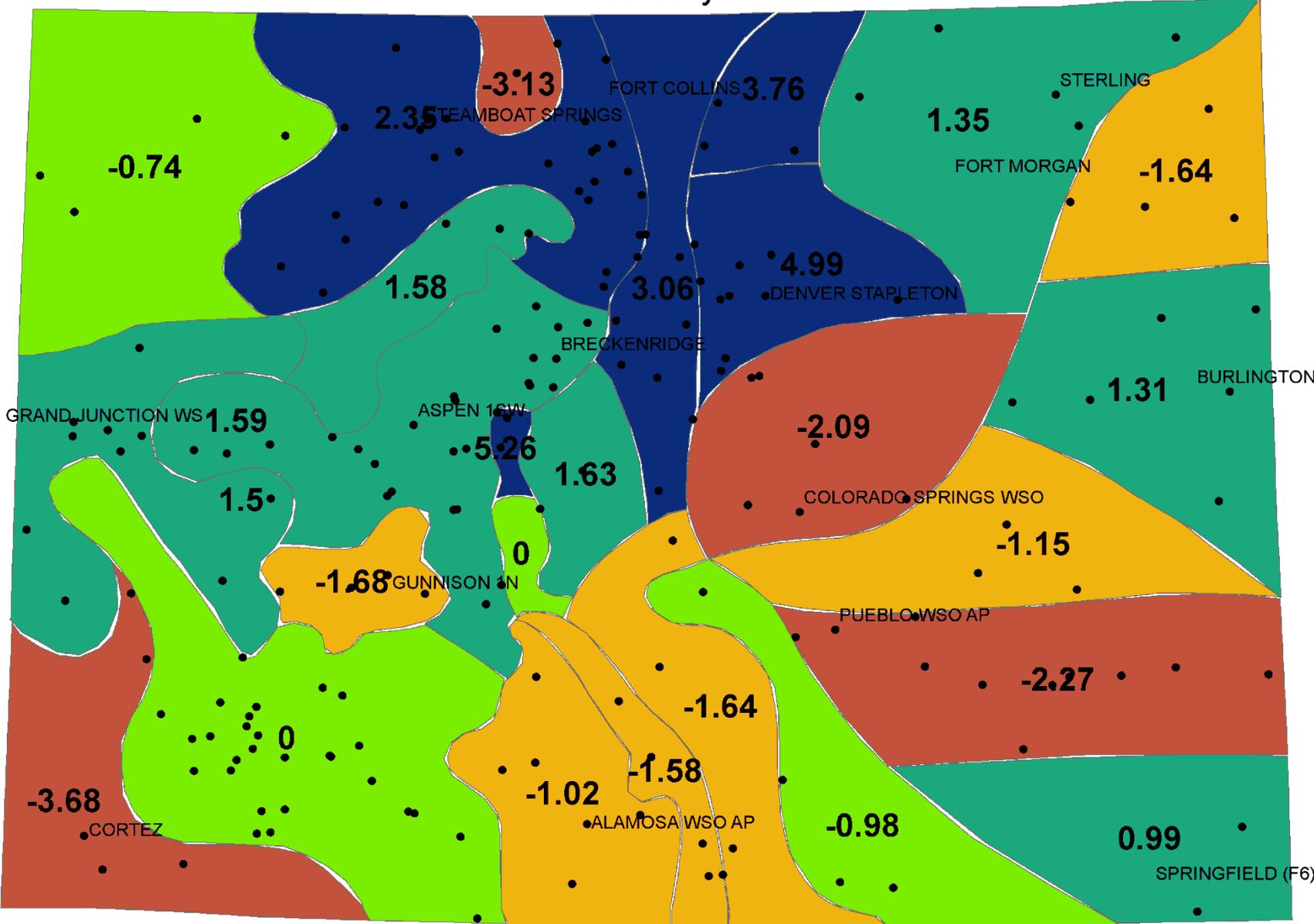
JULESBURG



98 % < 2.0 9 % < -1.0
83 % < 1.0 0 % < -2.0
46 % < 0.0 0 % < -3.0

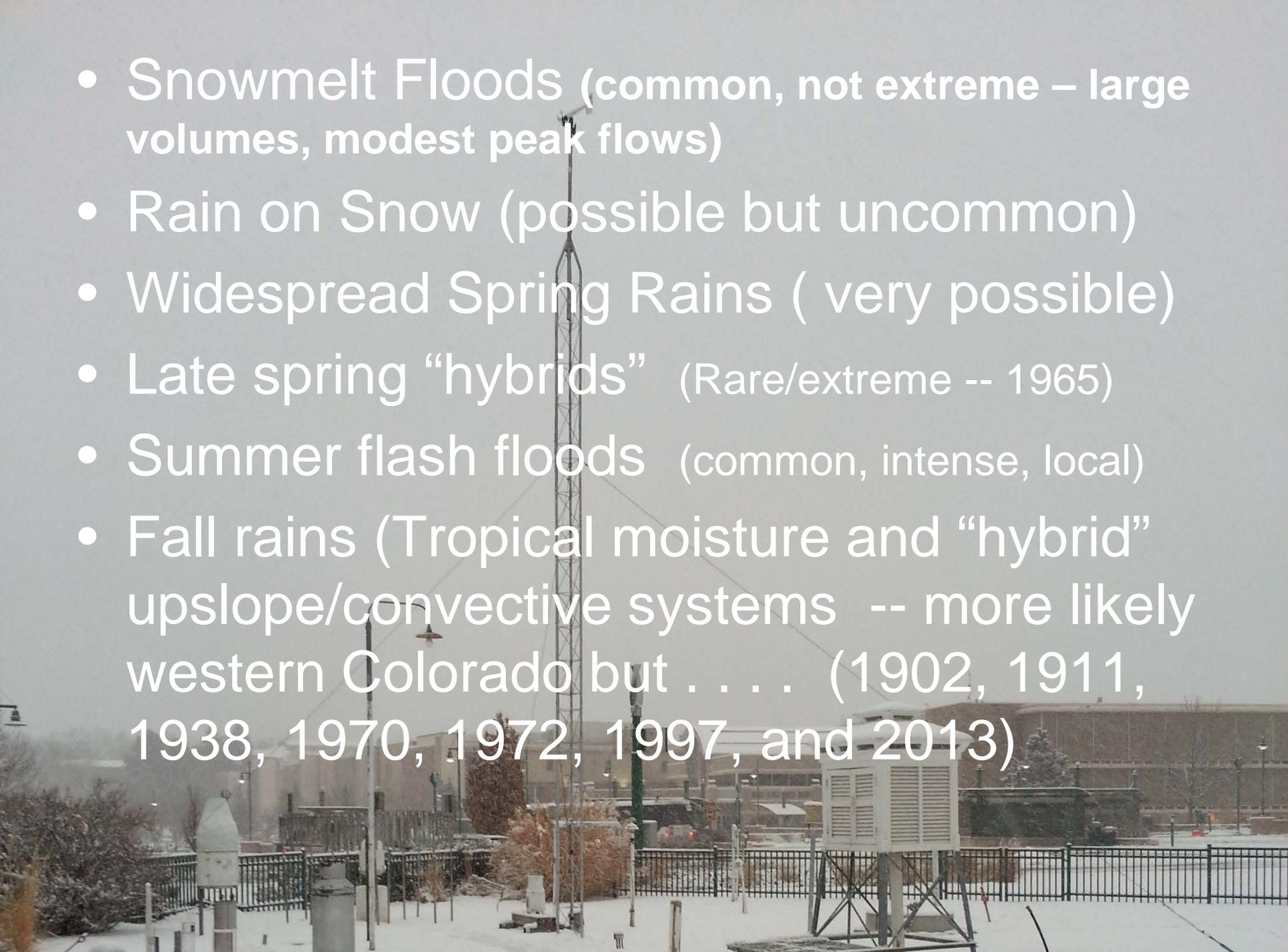
Produced by:
Colorado Climate Center
Fort Collins, CO

Modified Palmer Drought Severity Index for Colorado February 2014



Next, let's talk about flood risk. Colorado floods come in several flavors



- 
- Snowmelt Floods (common, not extreme – large volumes, modest peak flows)
 - Rain on Snow (possible but uncommon)
 - Widespread Spring Rains (very possible)
 - Late spring “hybrids” (Rare/extreme -- 1965)
 - Summer flash floods (common, intense, local)
 - Fall rains (Tropical moisture and “hybrid” upslope/convective systems -- more likely western Colorado but (1902, 1911, 1938, 1970, 1972, 1997, and 2013))

**For peak flows from snowmelt,
it's sunshine and consecutive
hot days that matter most**



Flood History of Colorado

(selected)

Historic Floods of Colorado

Year	Location
May, 1864	Colorado Front Range
May, 1876	Denver and vicinity
July, 1885	Front Range
May, 1894	Boulder and vicinity
Sept, 1902	north central Colorado
May, 1904	Larimer County
Oct, 1911	SW Colorado
June, 1921	Pueblo and Fremont Countys
May, 1935	Republican River and elsewhere in E. Colorado
September, 1938	Front Range
May, 1955	SE Colorado
June, 1965	South Platte/Arkansas basins
May, 1969	Boulder/Morrison
Sept, 1970	SW Clorado
July, 1976	Big Thompson
July, 1981	Las Animas County, CO
July, 1997	Fort Collins
April, 1999	Eastern Colorado
September, 2013	Front Range





**It's only March 20.
We've got 3 full months of spring
flood potential to come**

Many possibilities lie ahead of us

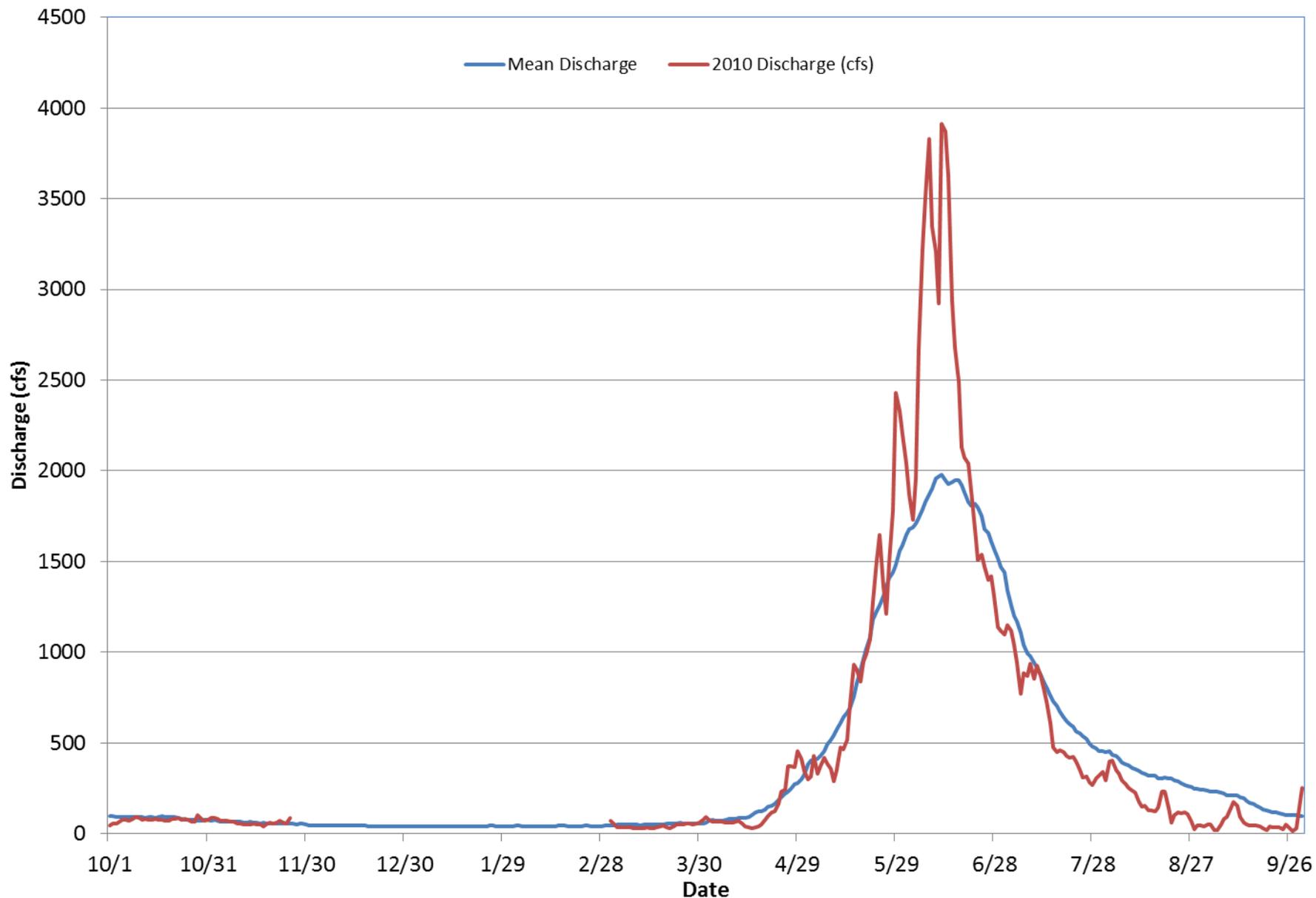
We're close to this season, too



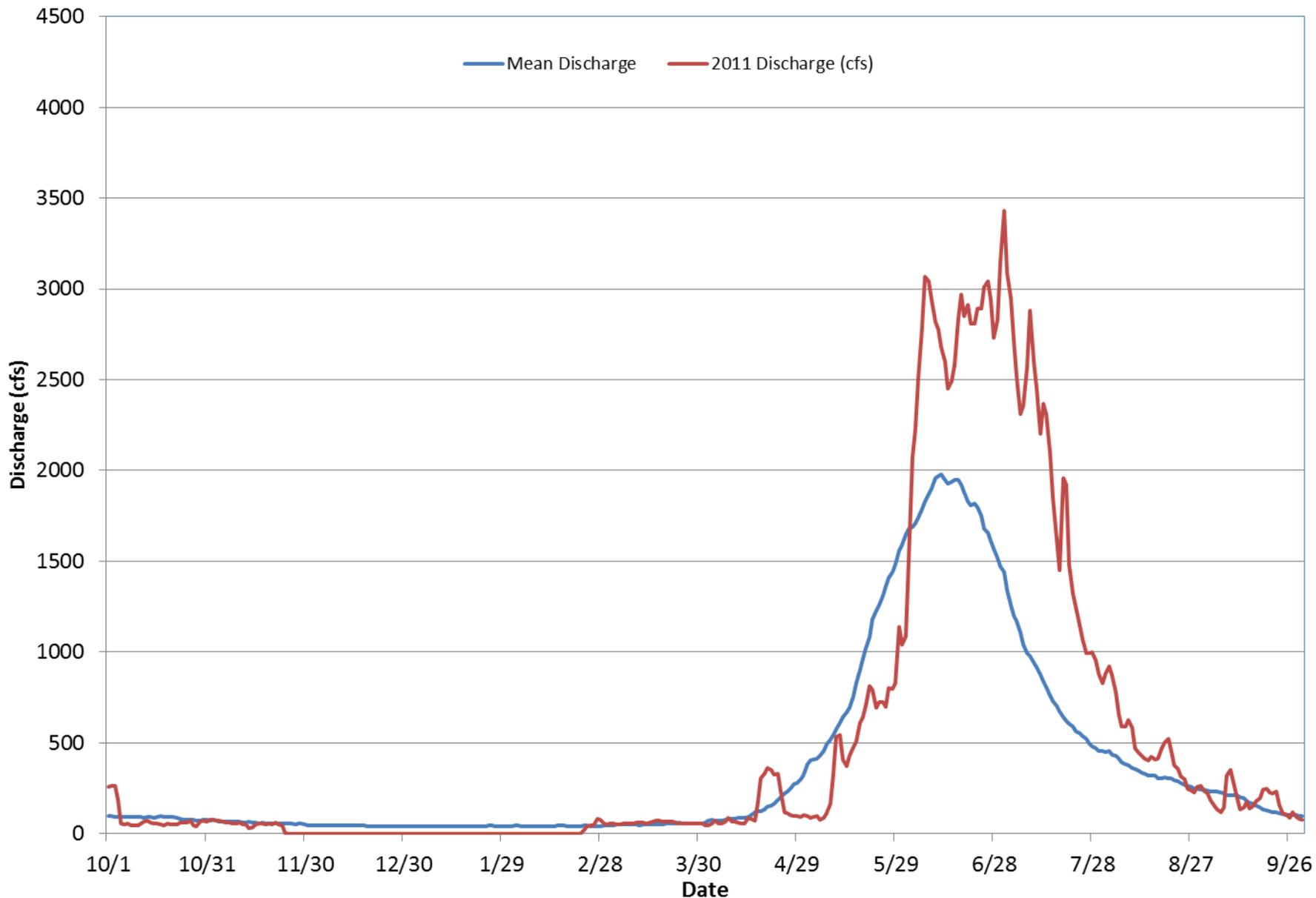
Poudre River at the Canyon Mouth Mean Discharge (cfs)



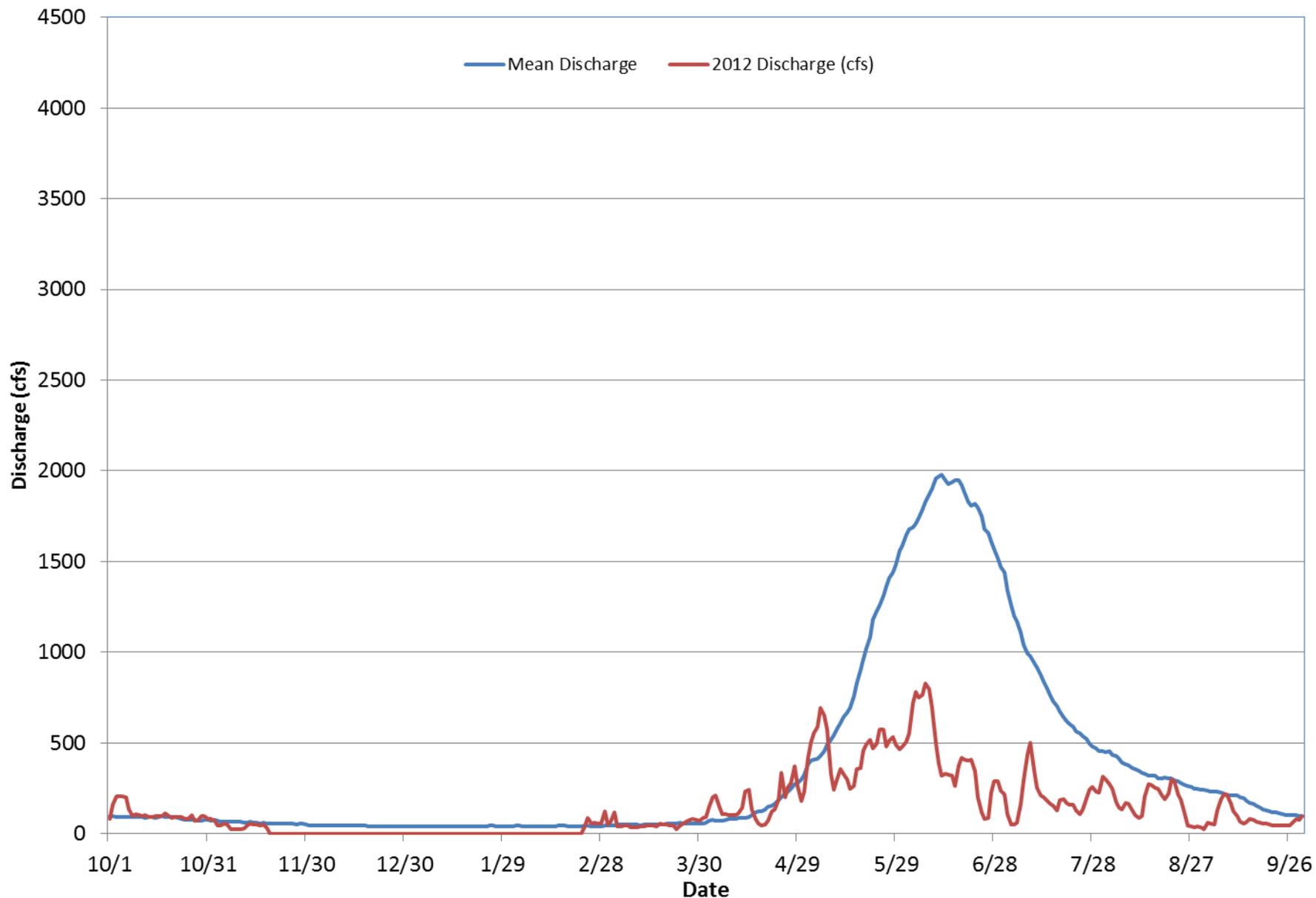
Poudre River at the Canyon Mouth Mean and WY 2010 Discharge (cfs)



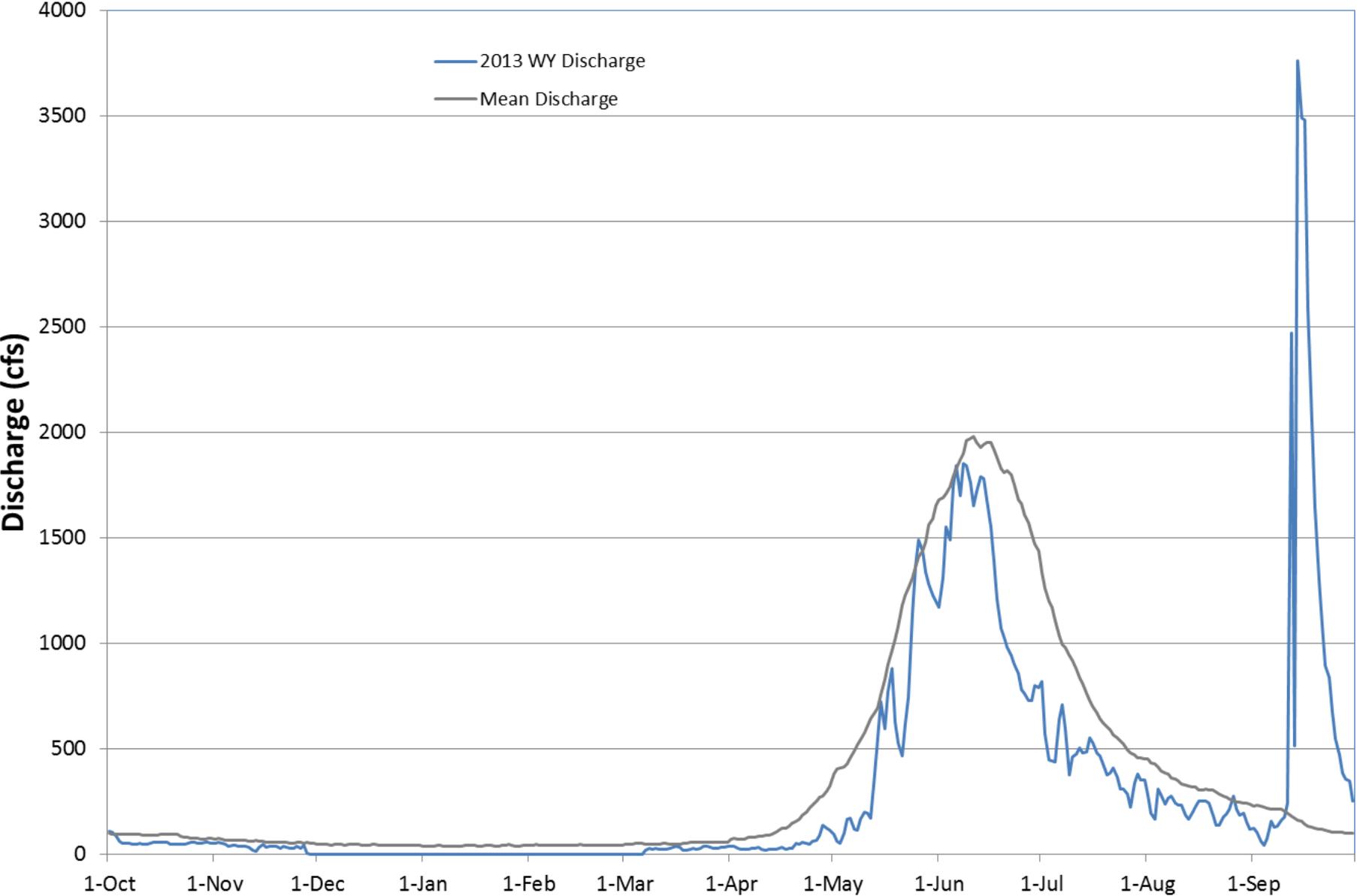
Poudre River at the Canyon Mouth Mean and WY 2011 Discharge (cfs)

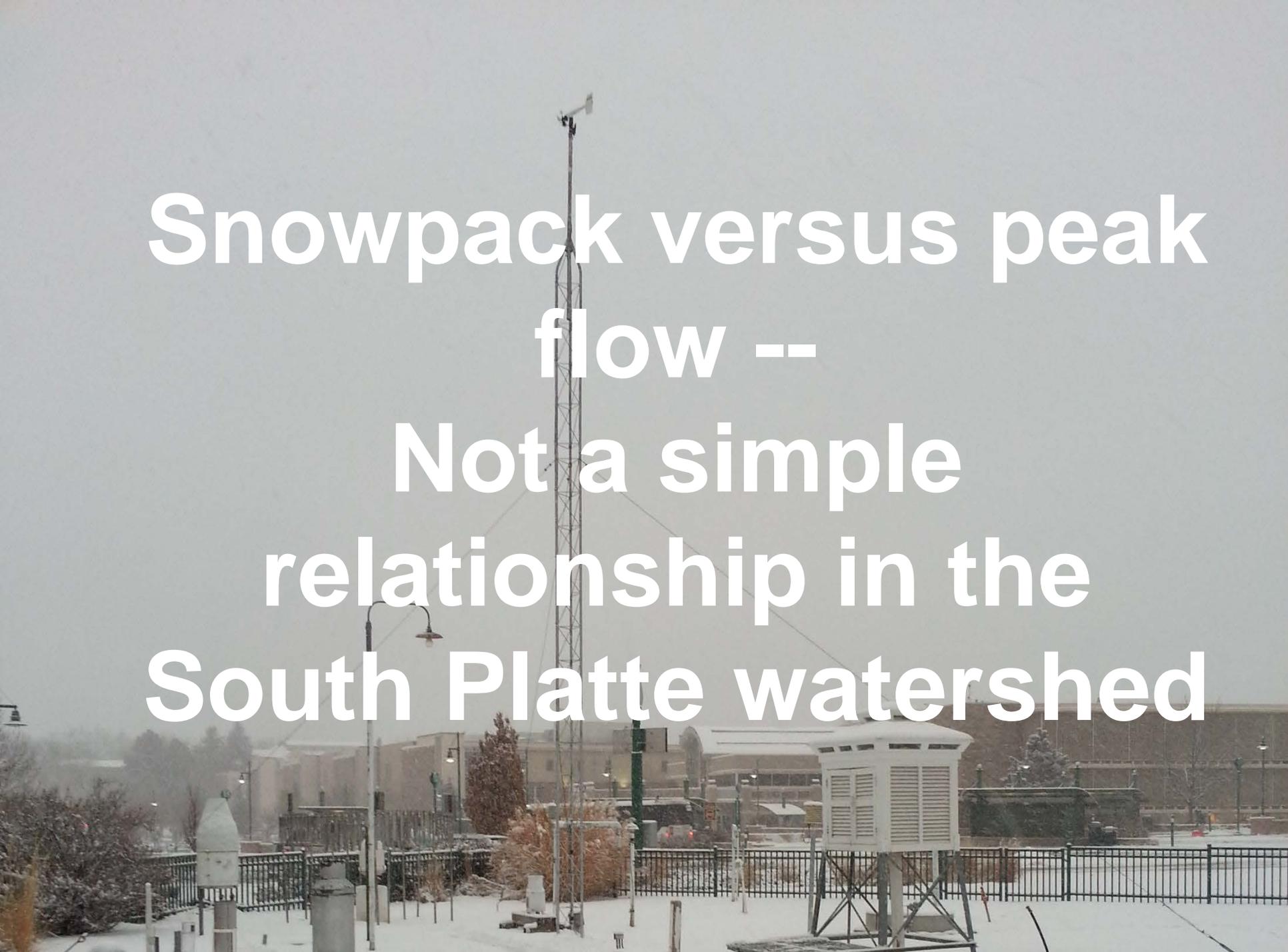


Poudre River at the Canyon Mouth Mean and WY 2012 Discharge (cfs)



Cache La Poudre at Canyon Mouth Near Fort Collins

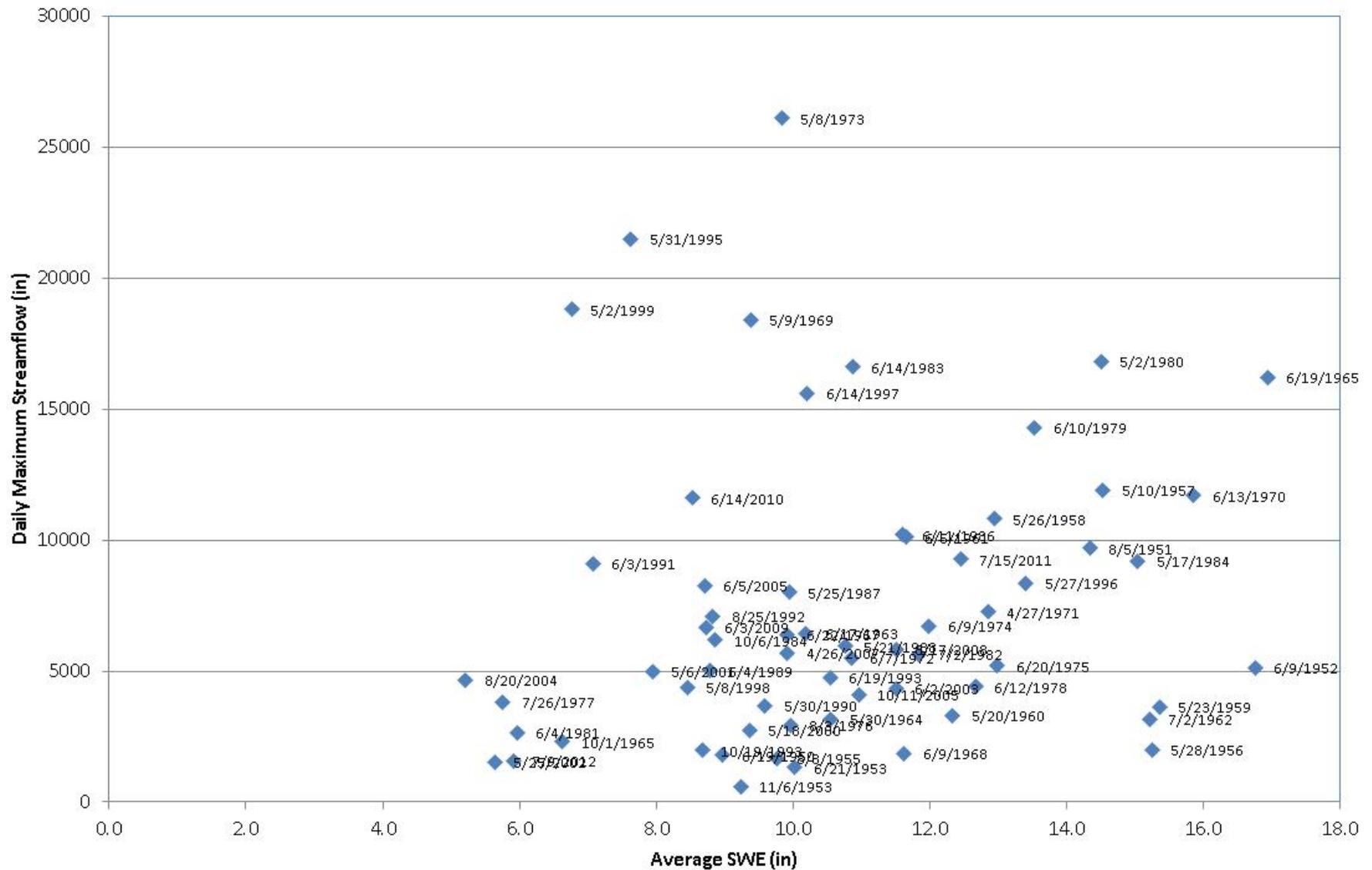




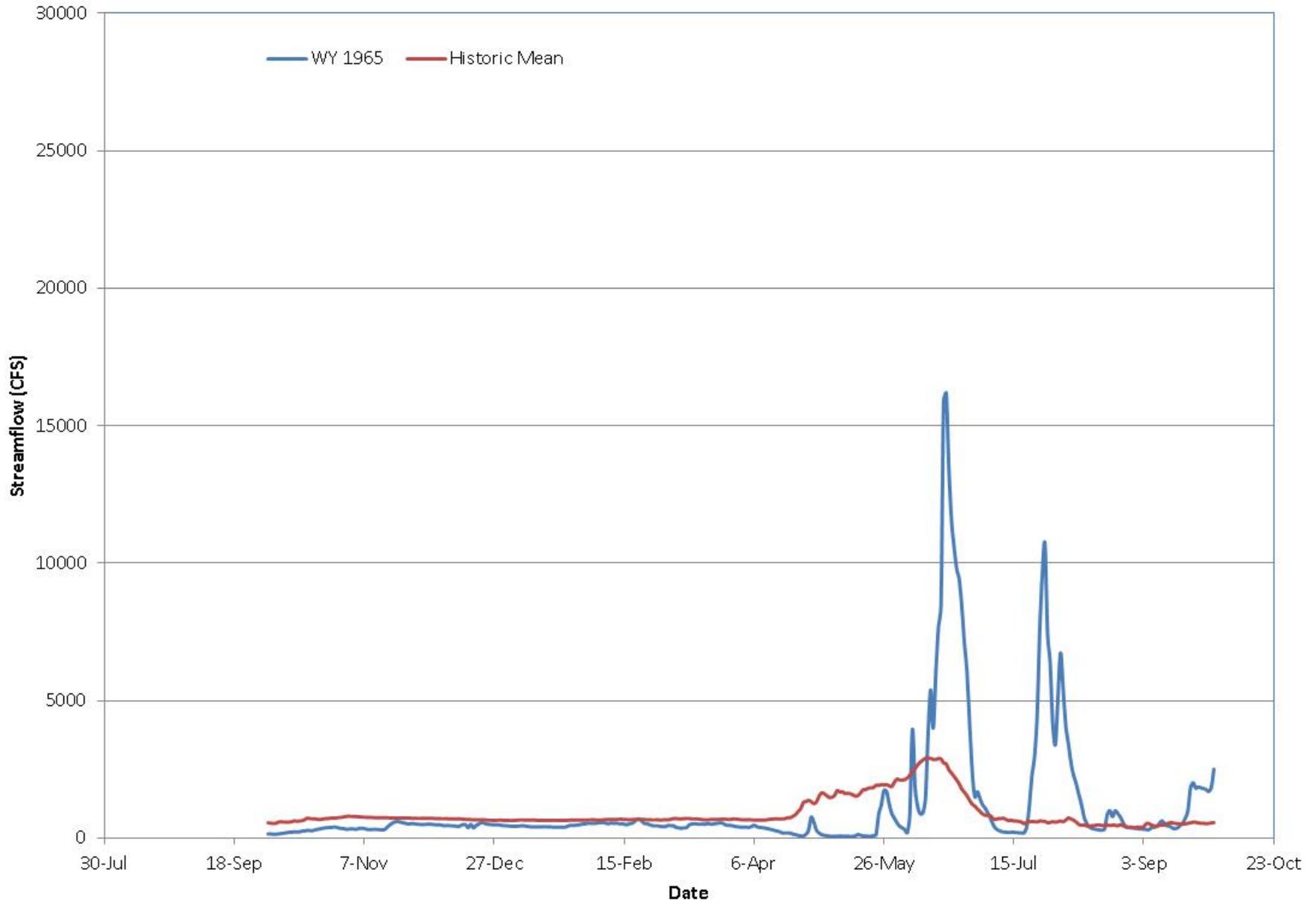
**Snowpack versus peak
flow --**

**Not a simple
relationship in the
South Platte watershed**

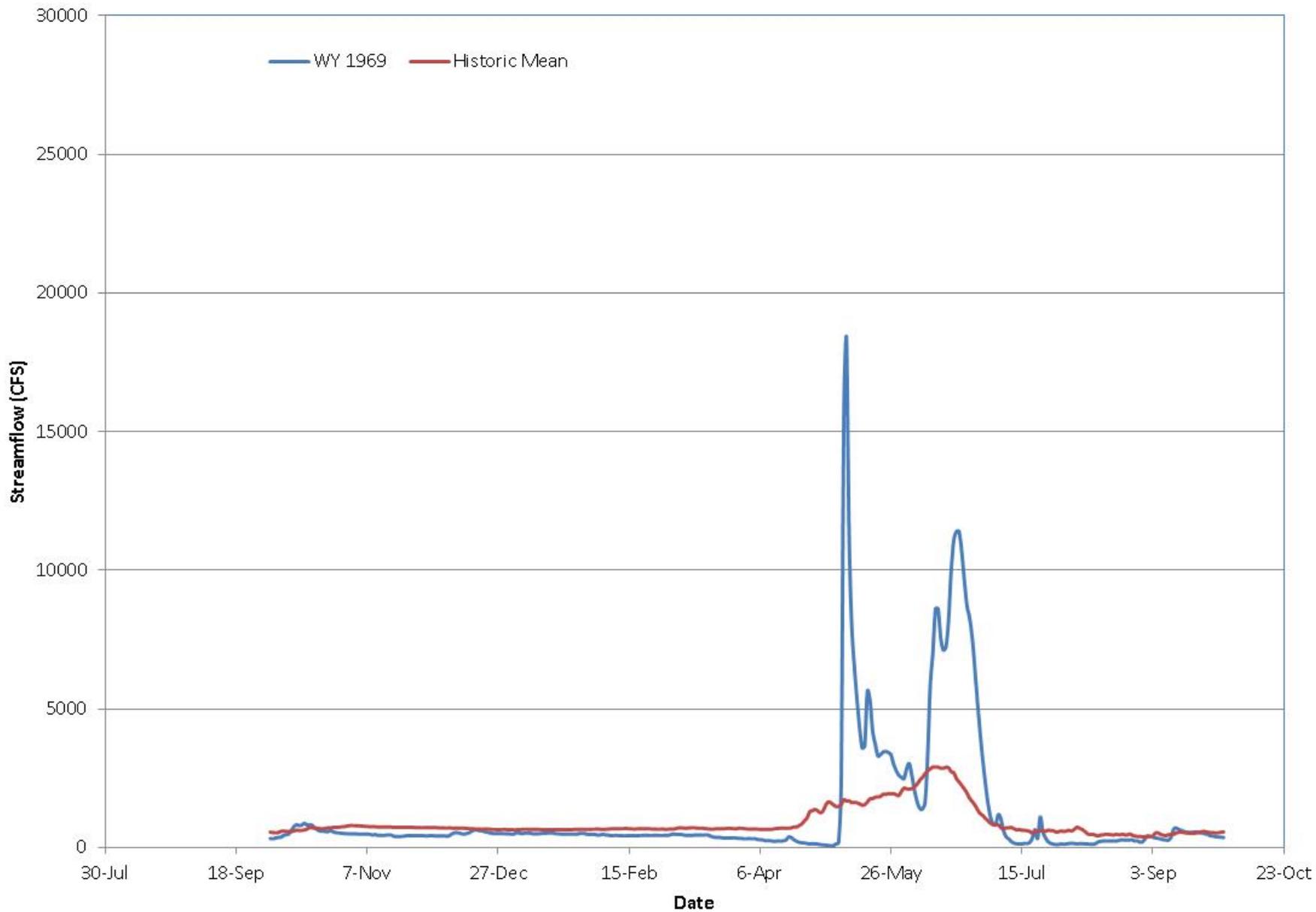
South Platte Basin Average Apr 1 SWE vs. Max Daily Streamflow (cfs) at Kersey 1950-2012



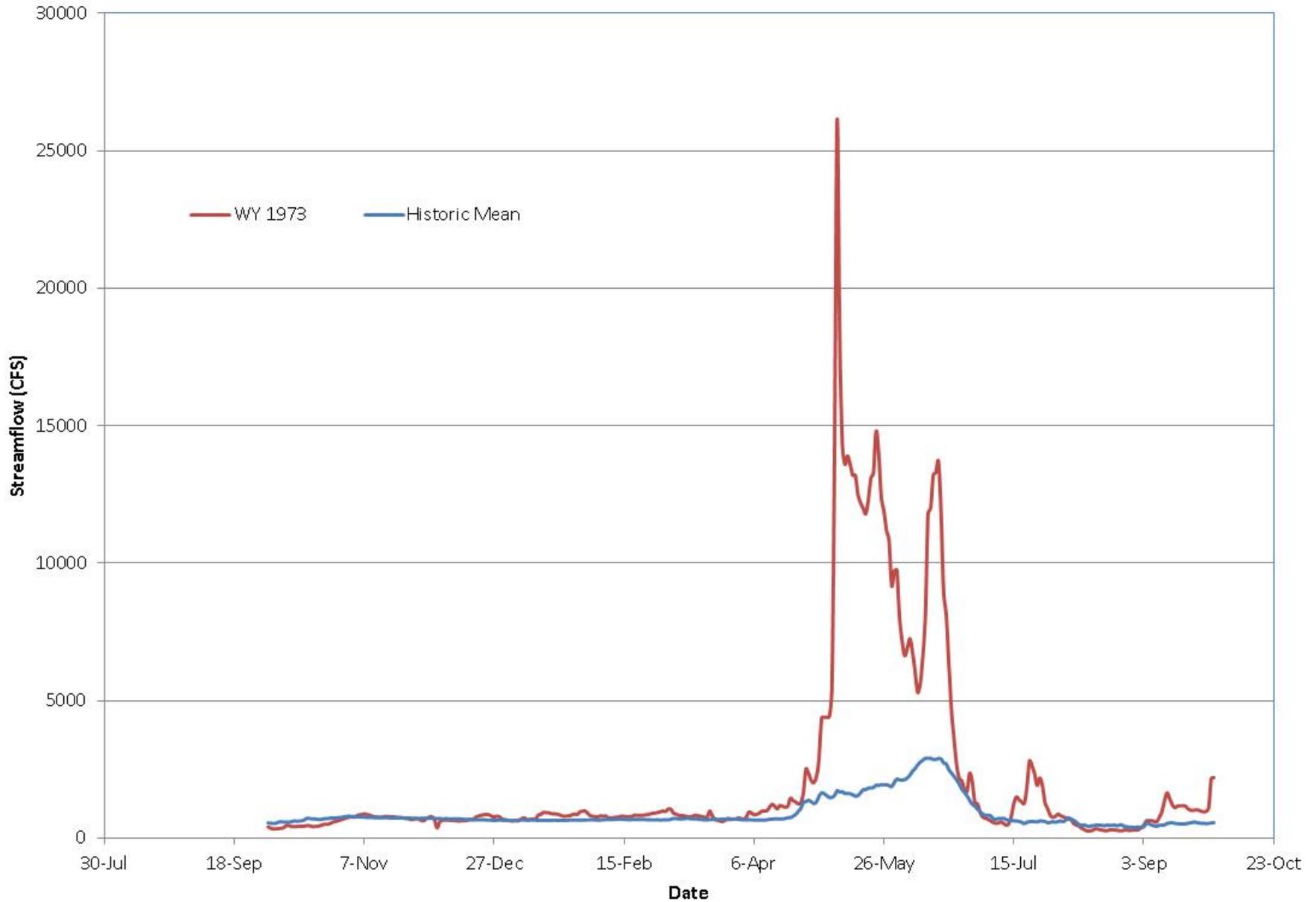
WY 1965 South Platte at Kersey



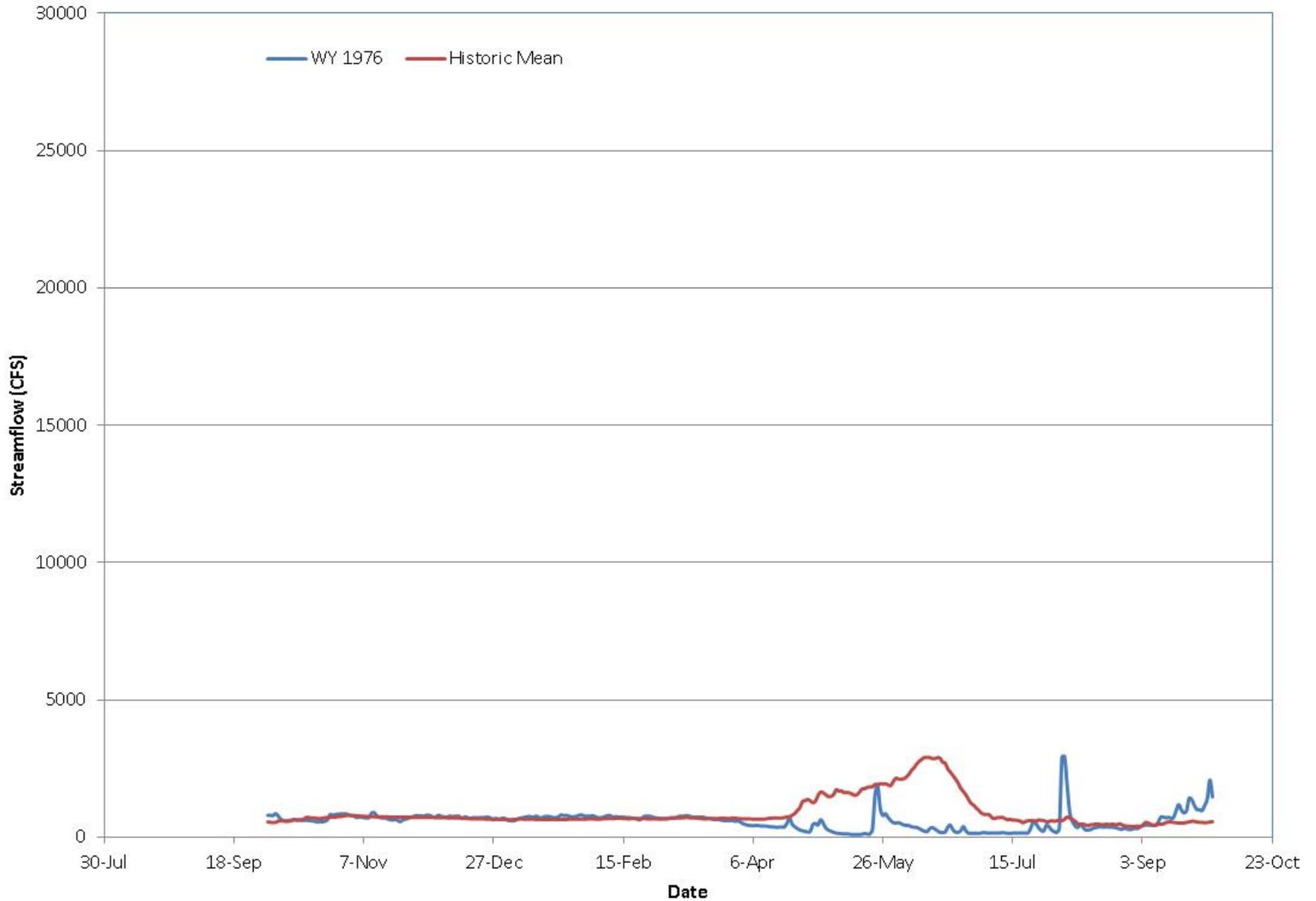
WY 1969 South Platte at Kersey



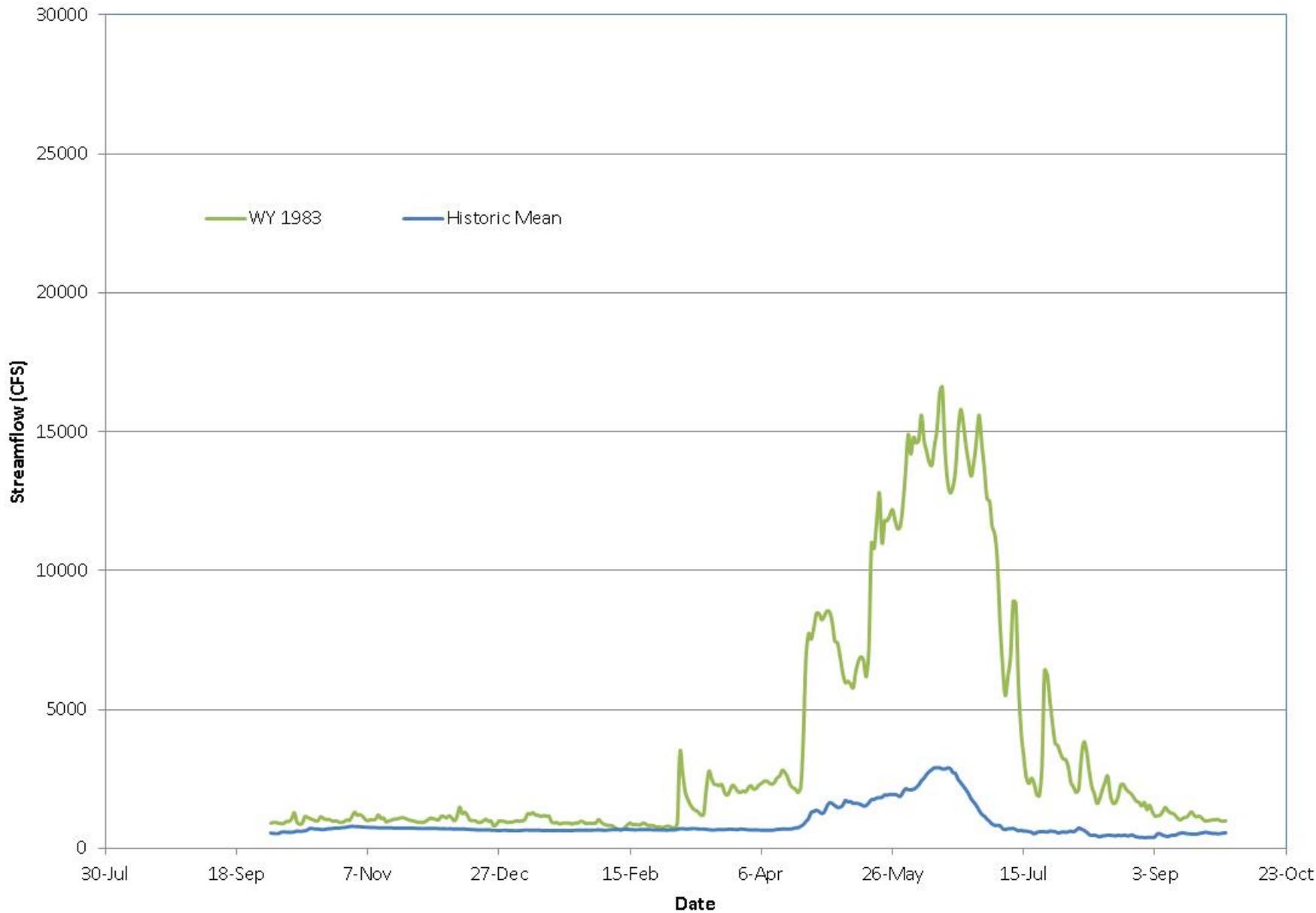
WY 1973 South Platte at Kersey



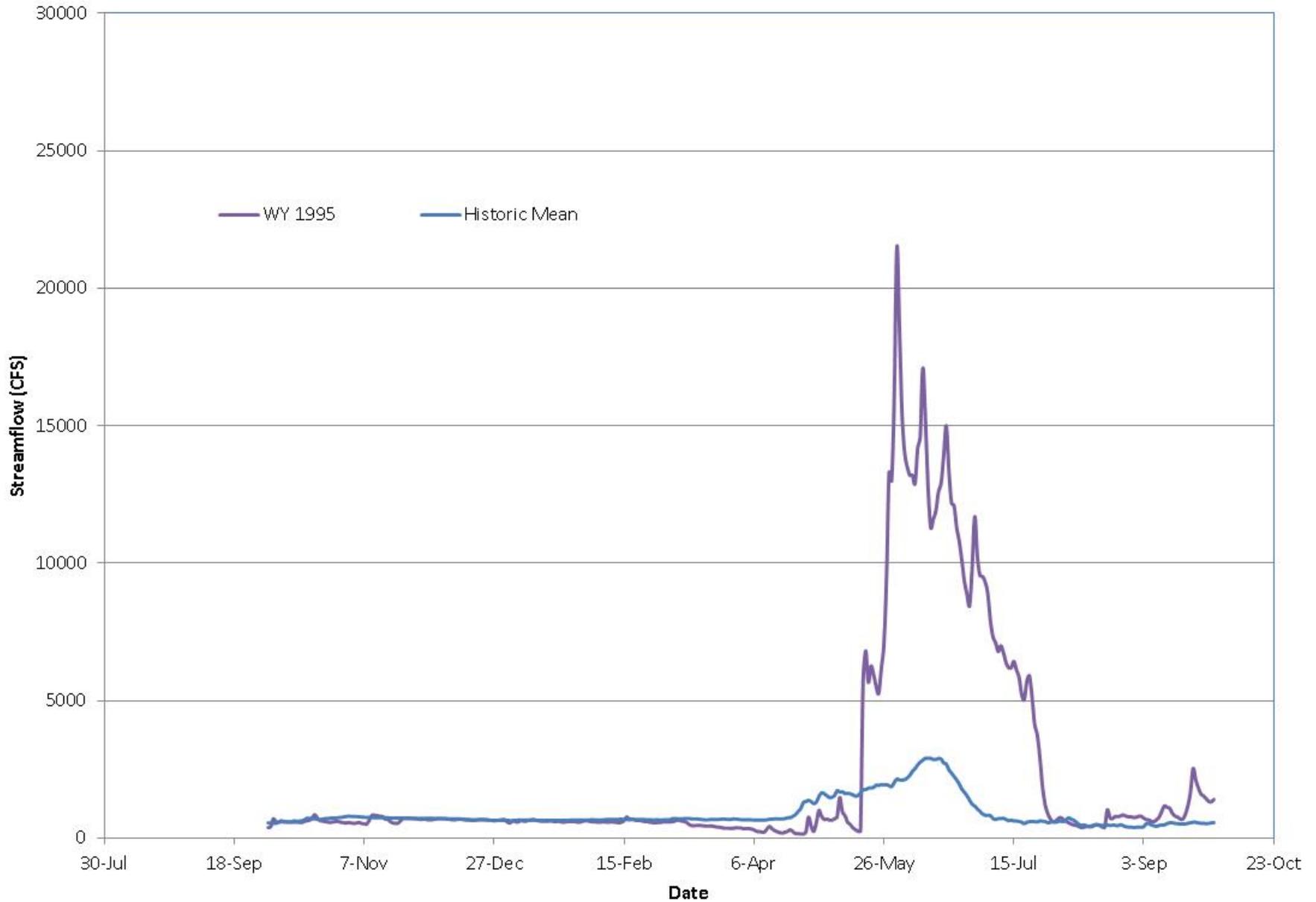
WY 1976 South Platte at Kersey



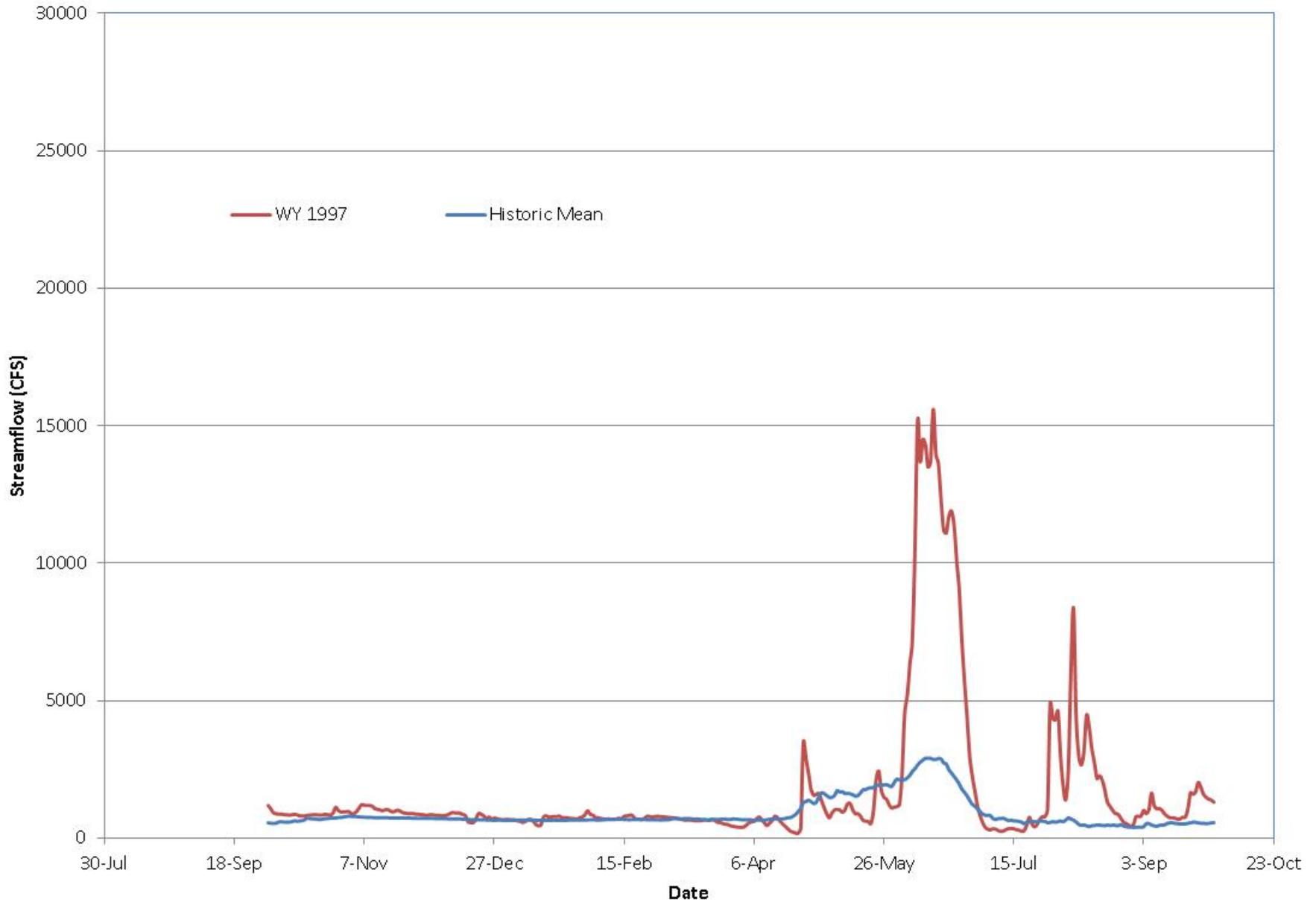
WY 1983 South Platte at Kersey



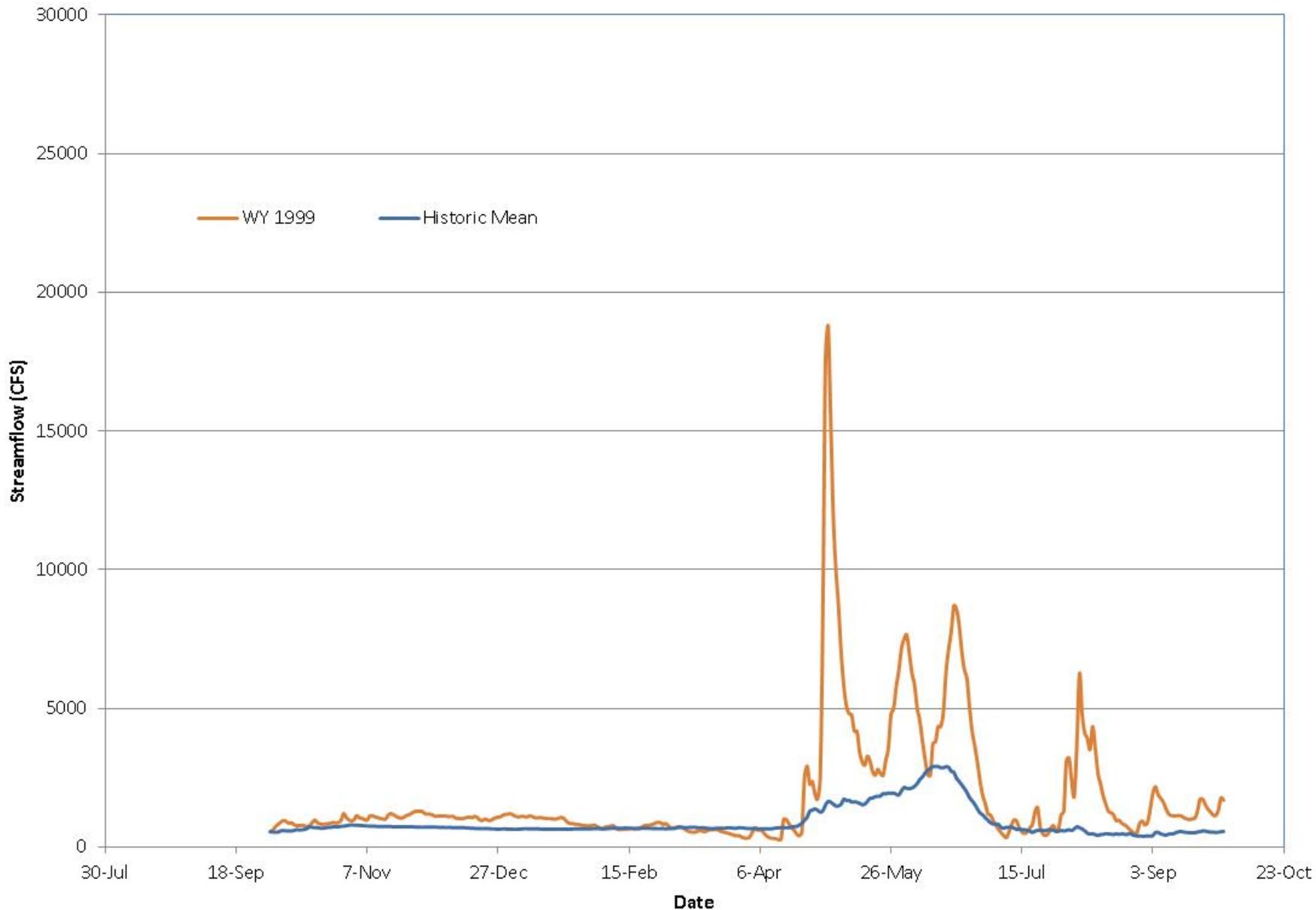
WY 1995 South Platte at Kersey



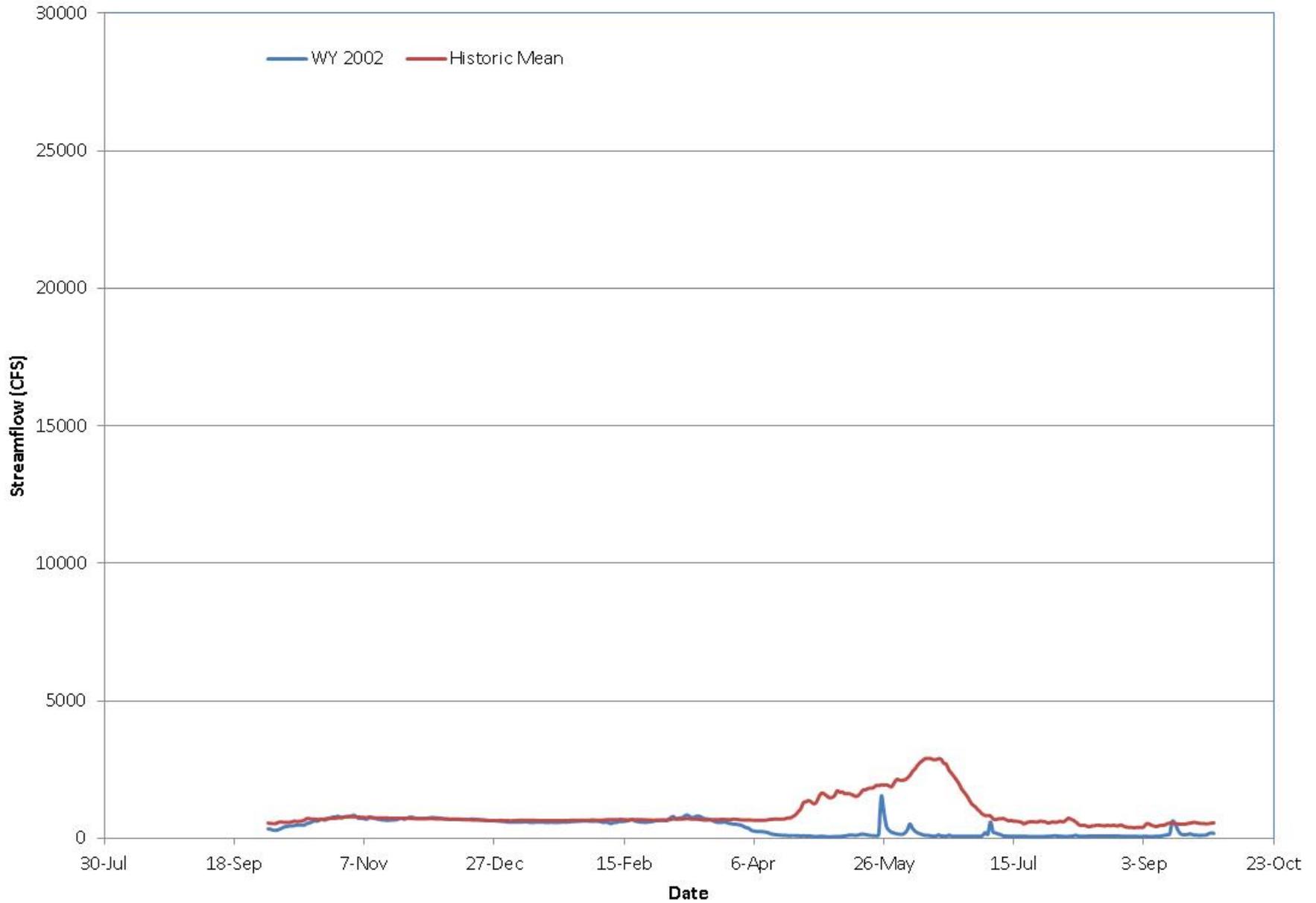
WY 1997 South Platte at Kersey



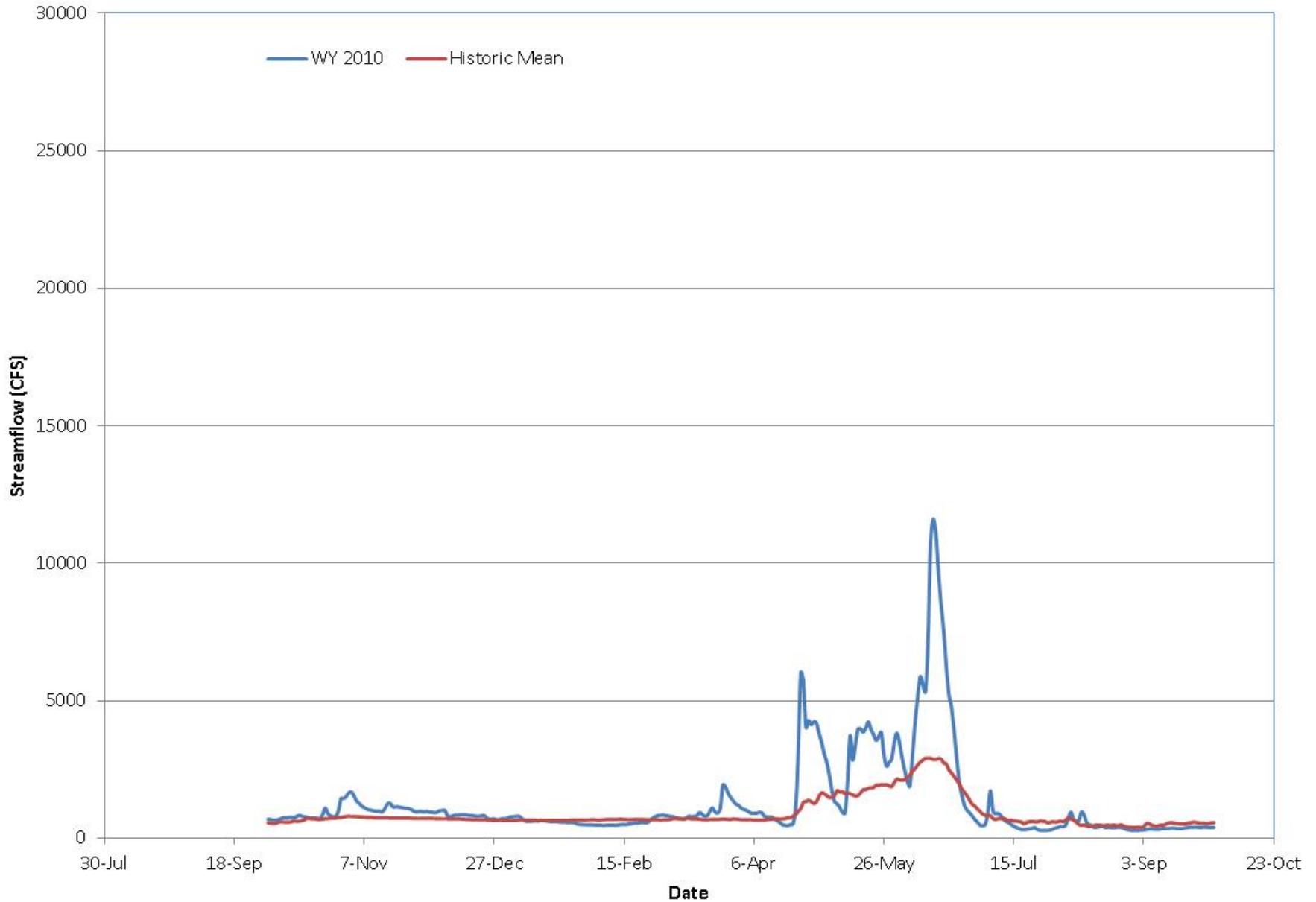
WY 1999 South Platte at Kersey



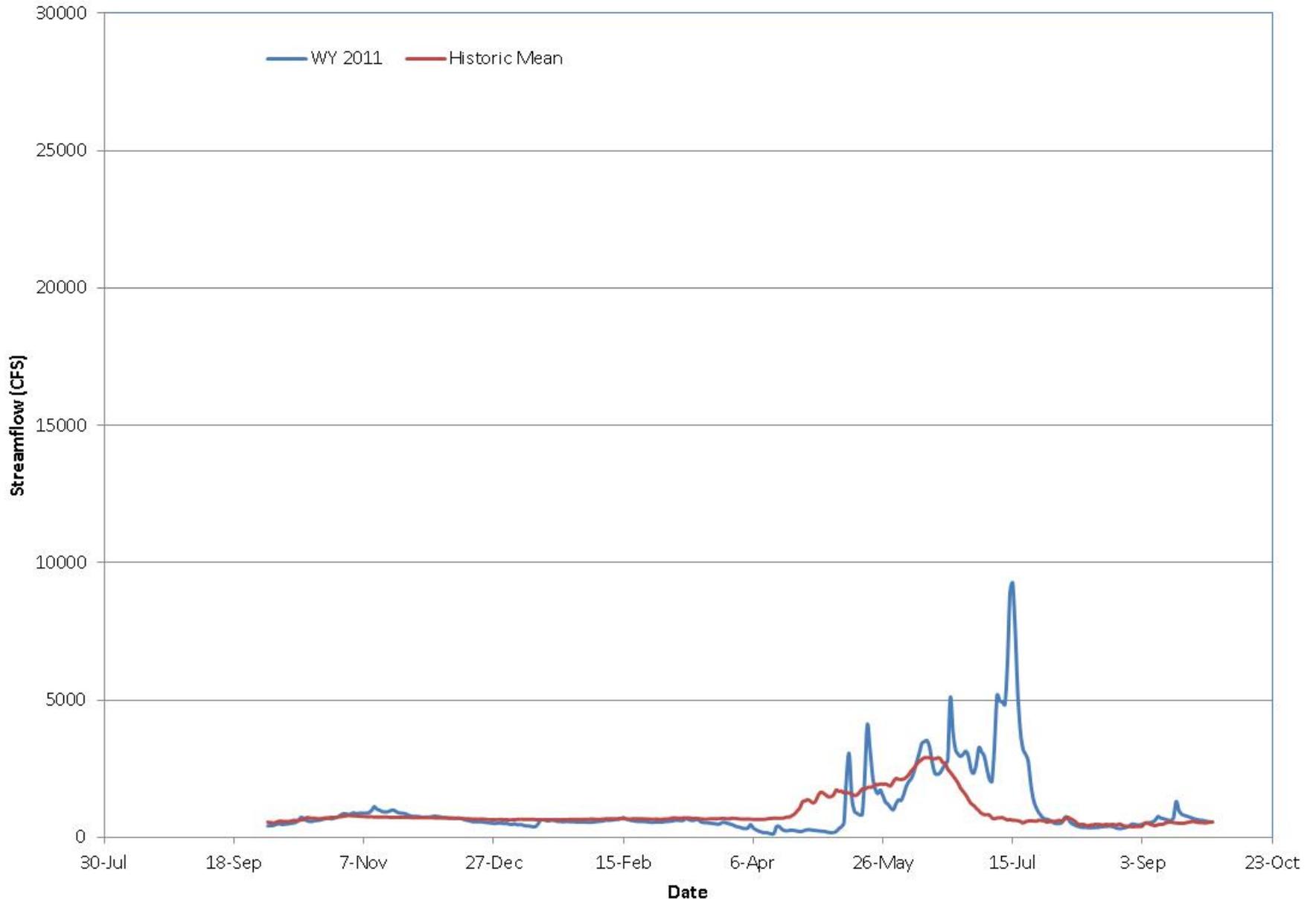
WY 2002 South Platte at Kersey



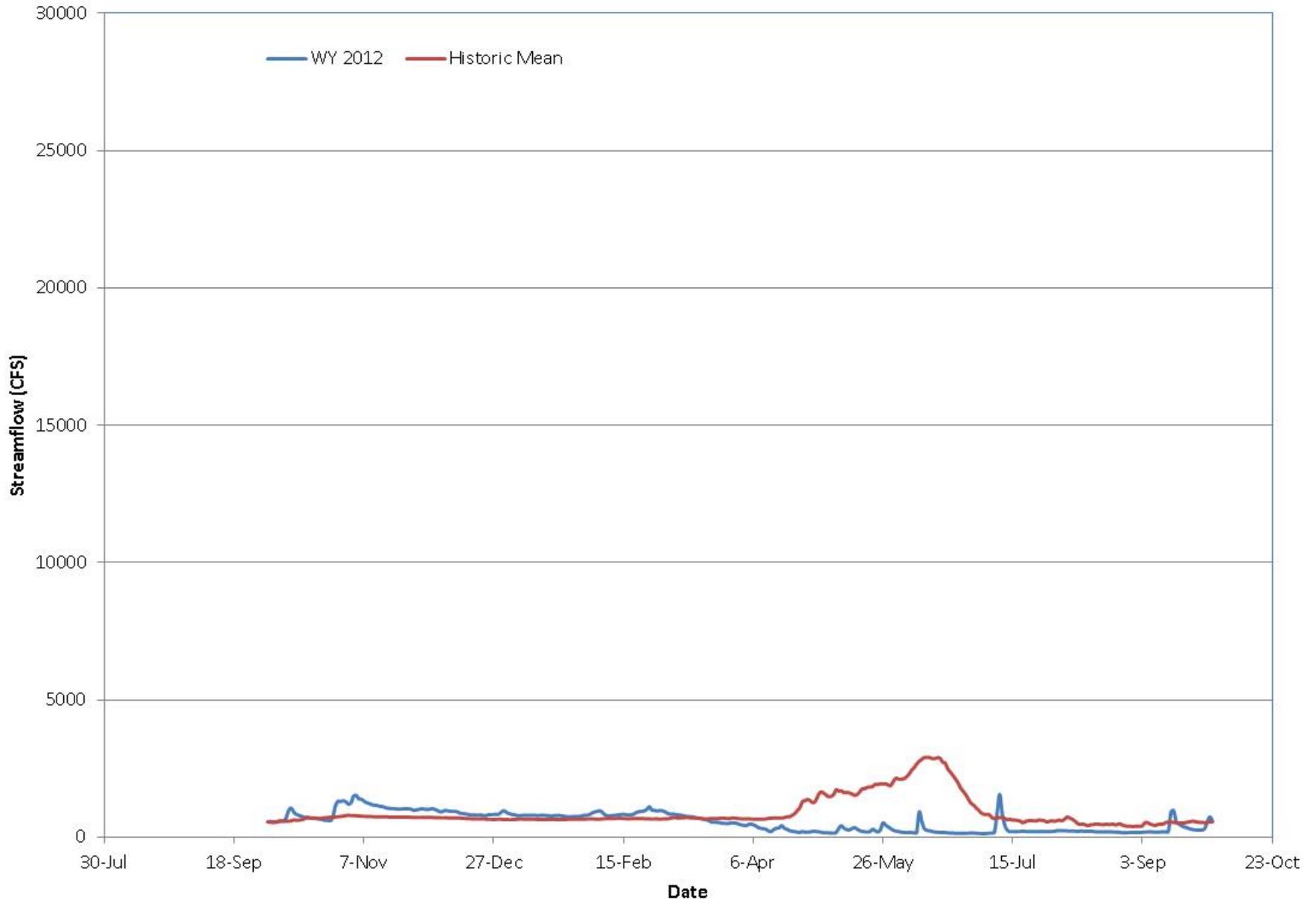
WY 2010 South Platte at Kersey



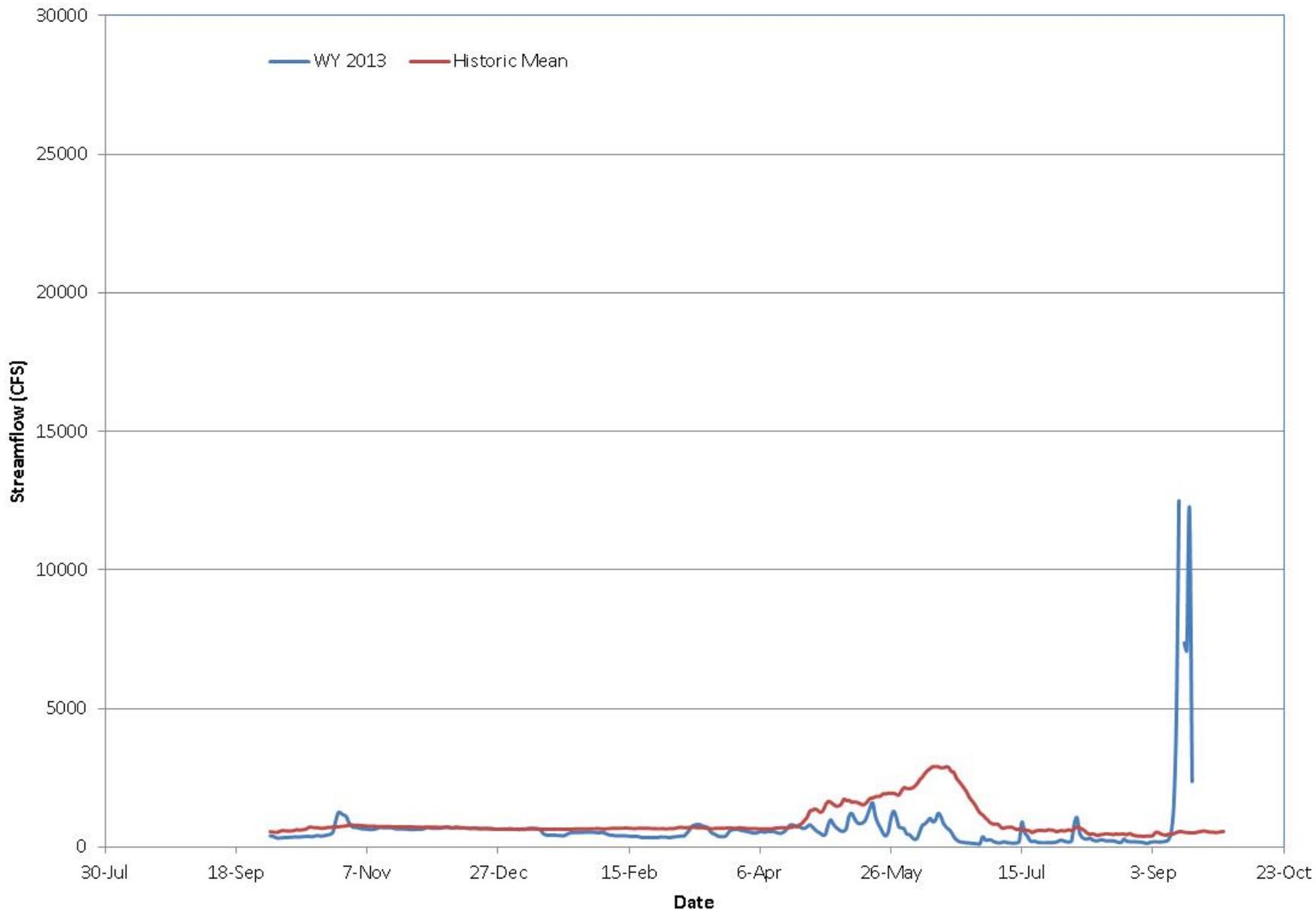
WY 2011 South Platte at Kersey



WY 2012 South Platte at Kersey



WY 2013- Provisional Data South Platte at Kersey



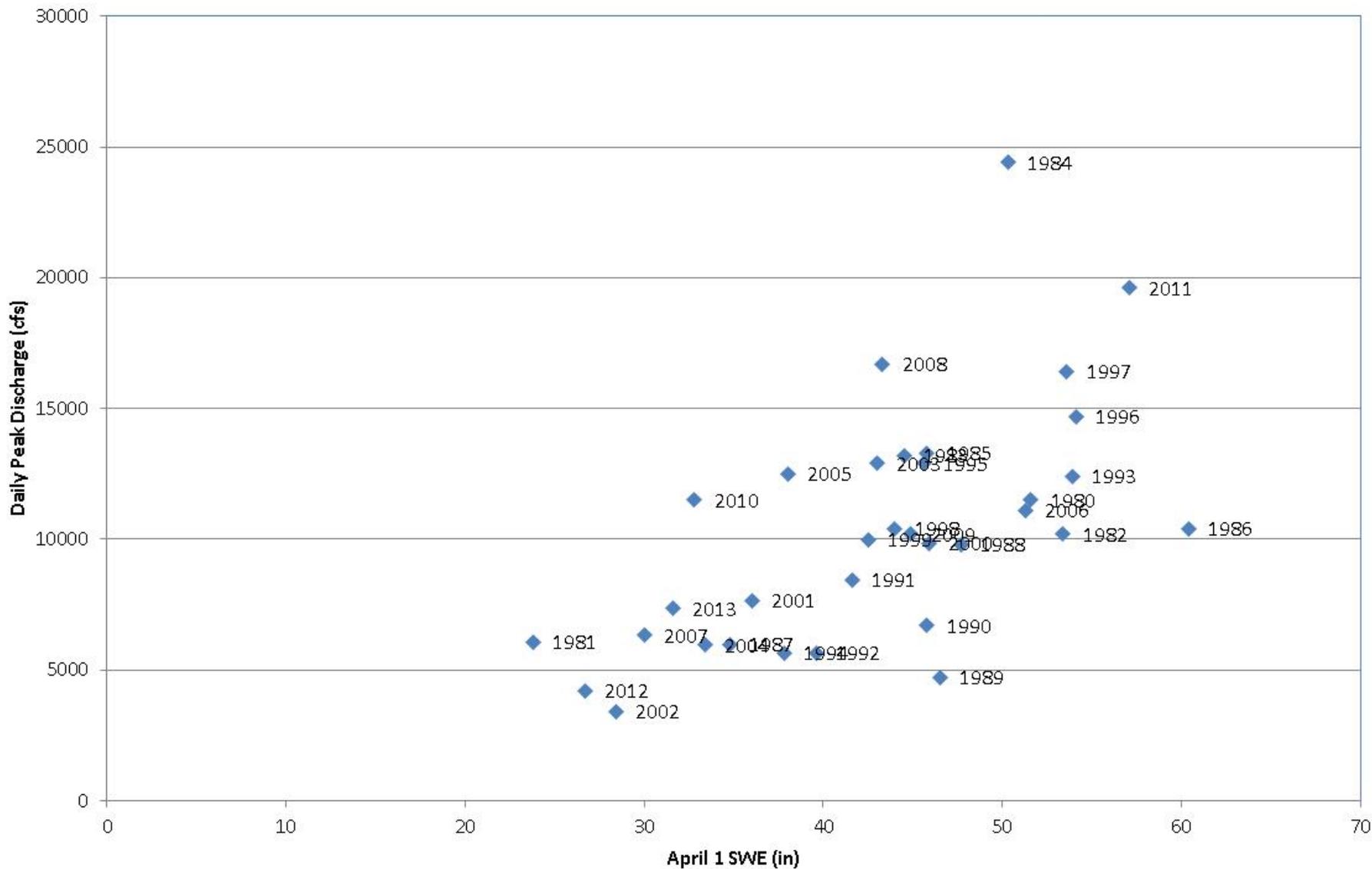
**So please plan
accordingly**



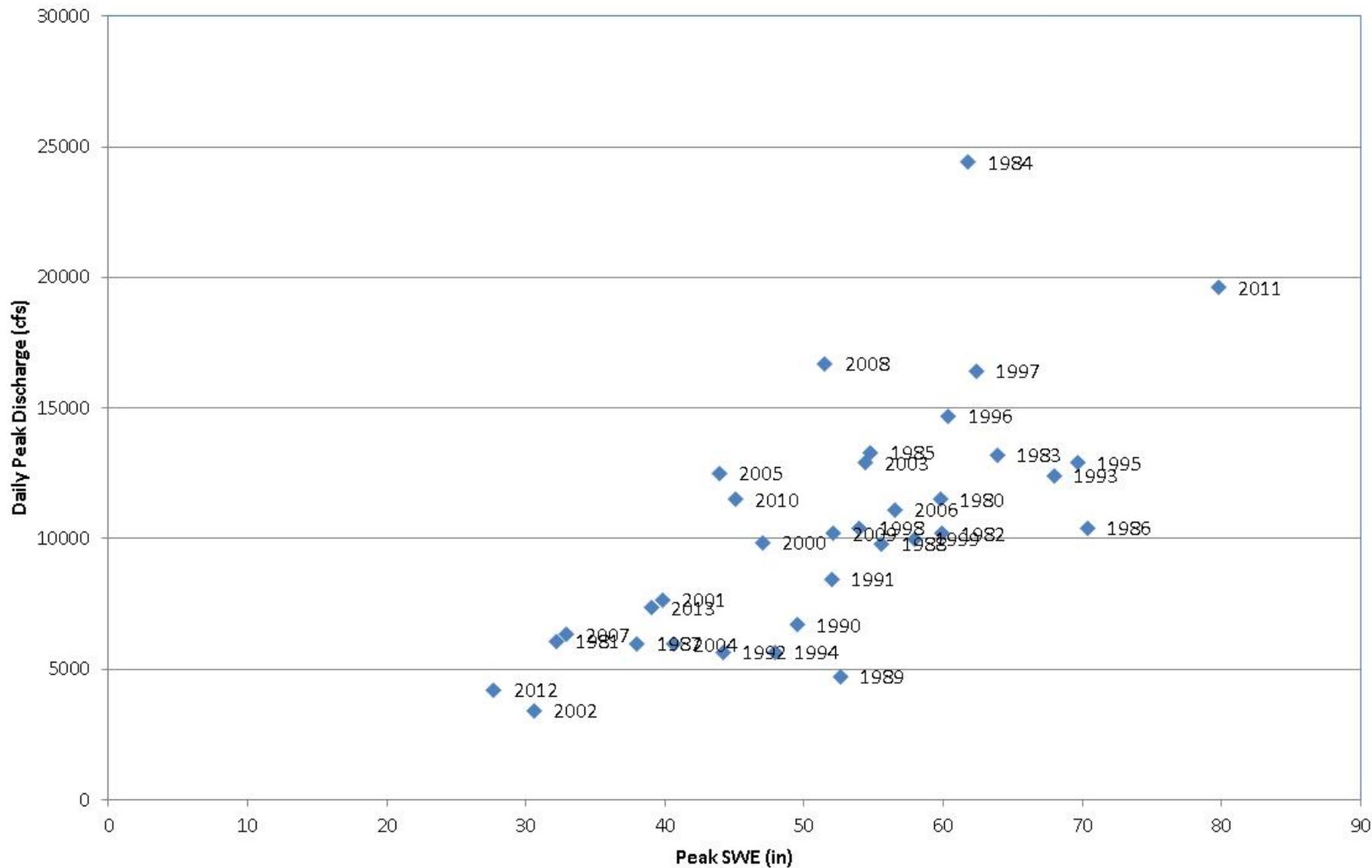
A snowy outdoor scene, likely a weather station or observation point. In the center, a tall, slender metal tower stands against a grey, overcast sky. To the right, a white, boxy weather station with a domed top is mounted on a metal frame. The ground is covered in snow, and a black metal fence runs across the foreground. In the background, there are buildings and trees, some with snow on their branches. A street lamp is visible on the left side of the frame.

Relationship much better for tributaries to the Colorado River

Tower SnoTel April 1 SWE (in) vs. Yampa at Maybell Daily Peak Discharge (cfs) 1980-2013



Tower SnoTel Peak SWE (in) vs. Yampa at Maybell Daily Peak Discharge (cfs) 1980-2013



Don't forget your CoCoRaHS

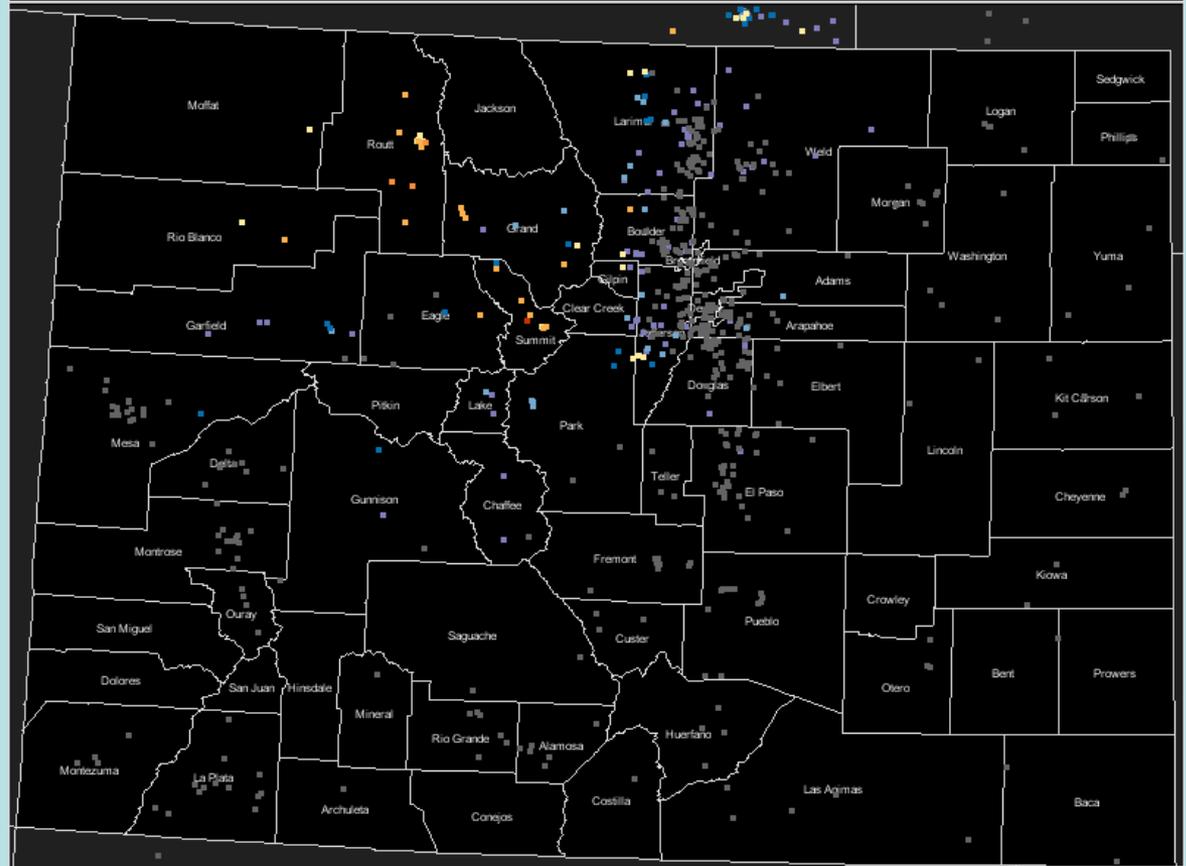
Local
Volunteer
Data --
really helps!!



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

Colorado 3/18/2014

0.0 Trace 0.01 - 0.02 0.03 - 0.04 0.05 - 0.09 0.10 - 0.22 0.23 - 0.33 0.34 - 0.36



Colorado Climate Center

Data and Power Point Presentations available for downloading

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



COLORADO
CLIMATE
CENTER

Colorado
State
University
Knowledge to Go Places