Historical View of Colorado's Climate From Instrumental Records

Nolan Doesken
Colorado Climate Center
Colorado State University

Photo by Zach Schwalbe   Looking NE from Copper Mountain   24 March 2012

First -- A short background

- In 1973 the federal government abolished the "State Climatologist" program nationwide leaving Colorado without
- Later that same year, Colorado established the Colorado Climate Center at Colorado State University with support through the Colorado Agricultural Experiment Station.

Our Mission

- The Colorado Climate Center at CSU provides valuable climate expertise to the residents of the state through its threefold program of:

  1) ***Climate Monitoring*** (data acquisition, analysis, and archiving),

  2) ***Climate Research***

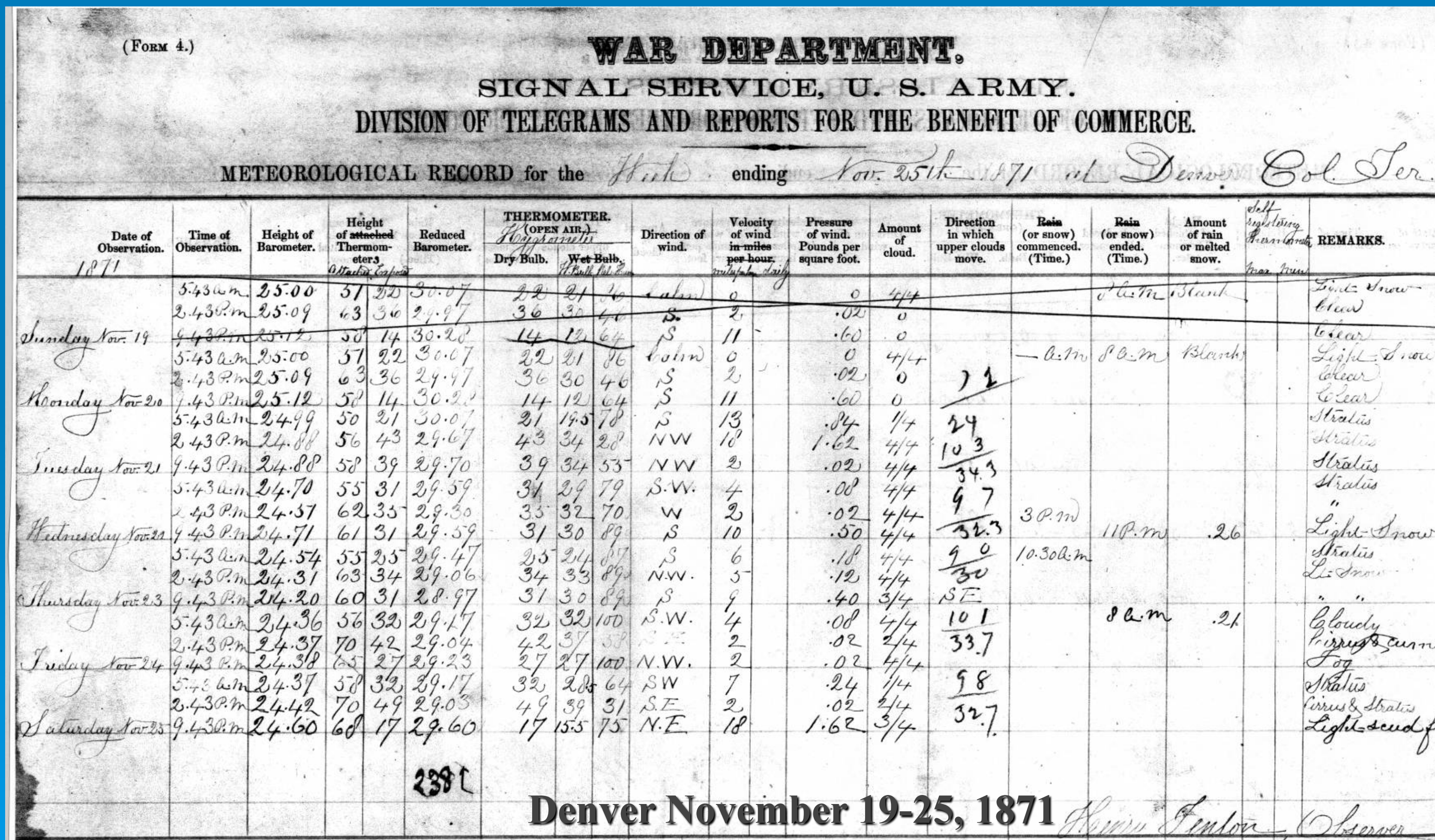
  3) ***Climate Services***.(providing data, analysis, climate expertise, education and outreach)

Monitoring our Climate

- Elements: temperature, precipitation, snow, wind, solar, evaporation, soil temperatures, humidity, clouds, etc.

Fort Collins CSU Historic Weather Station
Continuous monitoring since the 1880s

Systematic weather data collection
began in Colorado in the 1870s and 1880s



(Form 4.)

WAR DEPARTMENT.

SIGNAL SERVICE, U. S. ARMY.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE.

METEOROLOGICAL RECORD for the Week ending Nov. 25th 1871 at Denver Col. Ter.

Date of Observation. 1871	Time of Observation.	Height of Barometer.	Height of Thermometers: Attached	Exposed	Reduced Barometer.	Thermometer (open air.) Dry Bulb.	Wet Bulb.	Rel. Hum.	Direction of wind.	Velocity of wind, miles daily	Pressure of wind. Pounds per square foot.	Amount of cloud.	Direction in which upper clouds move.	Rain (or snow) commenced. (Time.)	Rain (or snow) ended. (Time.)	Amount of rain or melted snow.	Self-registering Max.	Min.	REMARKS.
	~~5.43 a.m~~	~~25.00~~	~~37~~	~~22~~	~~30.07~~	~~22~~	~~21~~	~~86~~	~~Calm~~	~~0~~	~~0~~	~~4/4~~			~~7 a.m~~	~~Blank~~			~~Light Snow~~
	~~2.43 P.m~~	~~25.09~~	~~63~~	~~36~~	~~29.97~~	~~36~~	~~30~~	~~46~~	~~S~~	~~2~~	~~.02~~	~~0~~							~~Clear~~
~~Sunday Nov. 19~~	~~9.43 P.m~~	~~25.12~~	~~58~~	~~14~~	~~30.28~~	~~14~~	~~12~~	~~64~~	~~S~~	~~11~~	~~.60~~	~~0~~							~~Clear~~
	5.43 a.m	25.00	57	22	30.07	22	21	86	Calm	0	0	4/4		— a.m	8 a.m	Blank			Light Snow
	2.43 P.m	25.09	63	36	29.97	36	30	46	S	2	.02	0							Clear
Monday Nov 20	9.43 P.m	25.12	58	14	30.28	14	12	64	S	11	.60	0	11						Clear
	5.43 a.m	24.99	50	21	30.07	21	19.5	78	S	13	.84	1/4	24						Stratus
	2.43 P.m	24.88	56	43	29.67	43	34	28	NW	18	1.62	4/4	10 3						Stratus
Tuesday Nov. 21	9.43 P.m	24.88	58	39	29.70	39	34	53	NW	2	.02	4/4	34.3						Stratus
	5.43 a.m	24.70	55	31	29.59	31	29	79	S.W.	4	.08	4/4	9 7						Stratus
	2.43 P.m	24.57	62	33	29.30	33	32	70	W	2	.02	4/4		3 P.m					"
Wednesday Nov 22	9.43 P.m	24.71	61	31	29.59	31	30	89	S	10	.50	4/4	32.3		11 P.m	.26			Light Snow
	5.43 a.m	24.54	55	25	29.47	25	24	87	S	6	.18	4/4	9 0	10.30 a.m					Stratus
	2.43 P.m	24.31	63	34	29.06	34	33	89	N.W.	5	.12	4/4	30						Lt Snow
Thursday Nov 23	9.43 P.m	24.20	60	31	28.97	31	30	89	S	9	.40	3/4	S.E.						" "
	5.43 a.m	24.36	56	32	29.17	32	32	100	S.W.	4	.08	4/4	10 1		8 a.m	.21			Cloudy
	2.43 P.m	24.37	70	42	29.04	42	37	58	S.E.	2	.02	2/4	33.7						Cirrus & cumu
Friday Nov 24	9.43 P.m	24.38	65	27	29.23	27	27	100	N.W.	2	.02	4/4							Fog
	5.43 a.m	24.37	57	32	29.17	32	28	64	SW	7	.24	1/4	9 8						Stratus
	2.43 P.m	24.42	70	49	29.03	49	39	31	S.E	2	.02	2/4							Cirrus & Stratus
Saturday Nov 25	9.43 P.m	24.60	68	17	29.60	17	15.5	75	N.E	18	1.62	3/4	32.7						Light scud fr

238 C

Henry Fenton, Observer

Denver November 19-25, 1871

Weather reports began on Pikes Peak in 1873

Reports were sent by telegraph every few hours

Stories abounded in the national media of the rigors of Colorado Climate

Colorado Weather Stations in 1890

Slower start in NW and SW Colorado

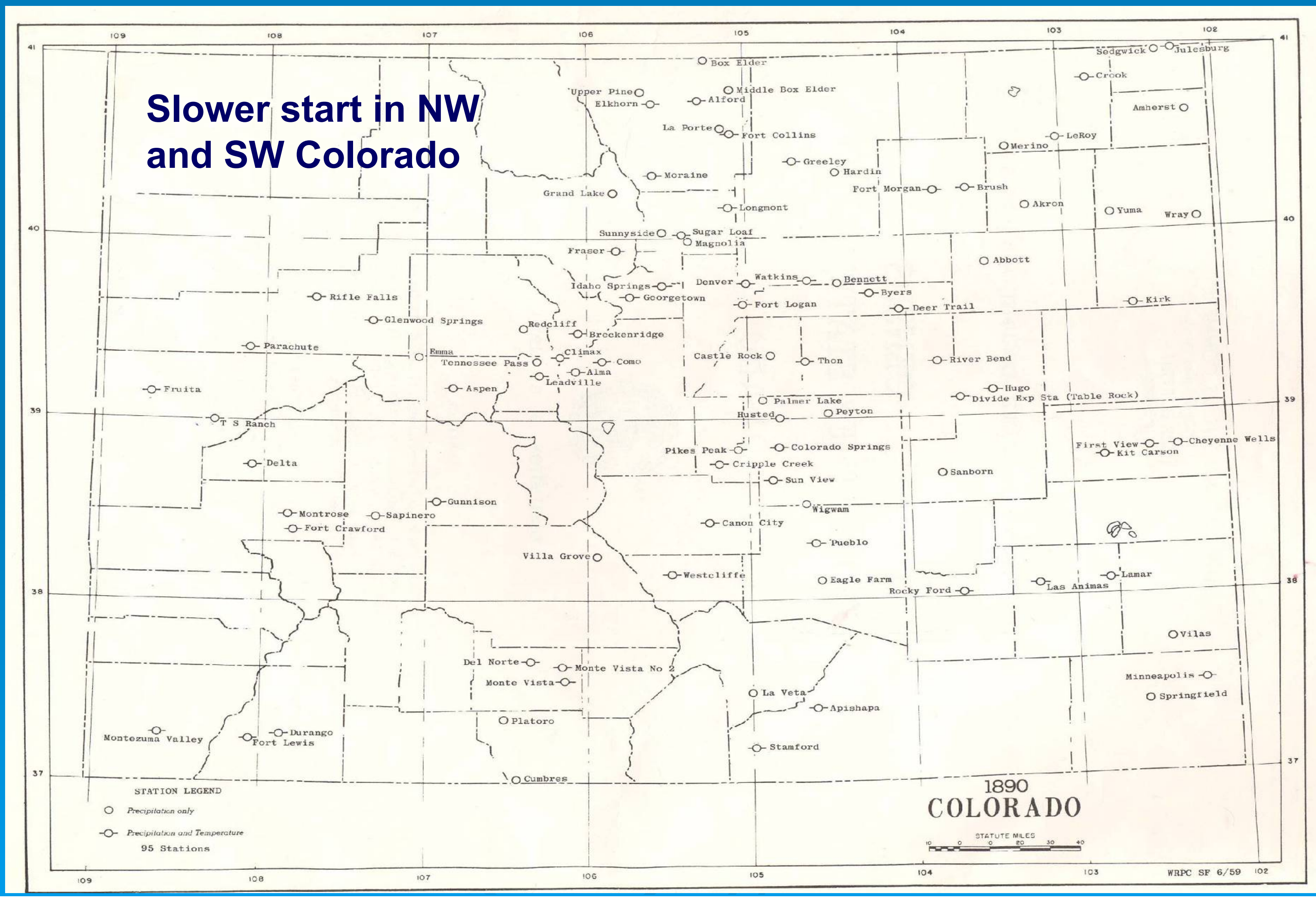


Photo by Christopher Davey

?


What have we learned from over 120 years of continuous climate monitoring?

Bulletin 245 June, 1918

The Agricultural Experiment Station

OF THE

Colorado Agricultural College

COLORADO CLIMATOLOGY

By ROBERT E. TRIMBLE

PUBLISHED BY THE EXPERIMENT STATION
FORT COLLINS, COLORADO
1918

section of the country.

Colorado being an arid state, the amount of precipitation is at all times a vital question. Liability to a marked deficiency in rainfall in any region is a matter of grave concern to those engaged in agriculture and other interests. We often hear it stated that the rainfall is changing, that the settling up of the country and the planting of trees and building of reservoirs, forming lakes and wet places throughout the country, is causing an increase in the amount of our precipitation, but long series of observations taken at different places over the world, do not bear out that claim.

YEARS OF STUDY SHOWS CLIMATE NOT CHANGING

We often hear the statement made that the climate is changing, and the popular belief that such is the case can only be explained by the generally short and defective memories of people who through exposure to a few severe storms in the past, or inconvenience, or perhaps loss from a few of them, unintentionally exaggerate the severity and frequency of their occurrence. Although large fluctuations occur in different years with some indication of periodical terms, especially in Colorado, where the range of temperature is great, there seems to be no progressive change. These fluctuations are large and often in the same direction for several successive years.

In the meteorological data for the last one hundred years, the record of some places extending still further back, there

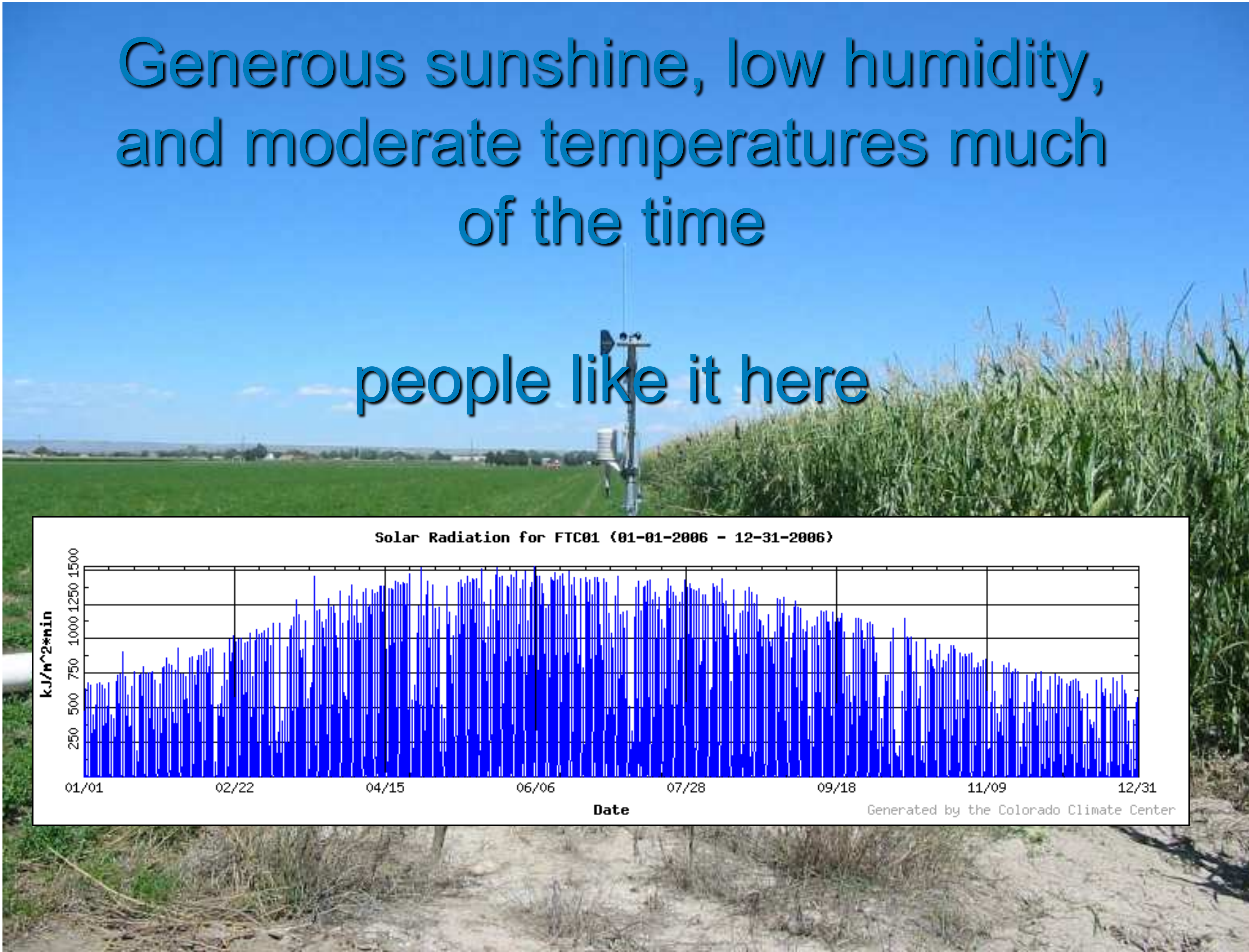
We Have a Fascinating Climate

- High elevation (highest state in the Union – by far)
- Mid-Latitude location (lively seasonal changes)
- Interior Continental Location far from atmospheric moisture sources
- Complex Mountain topography


The Result?

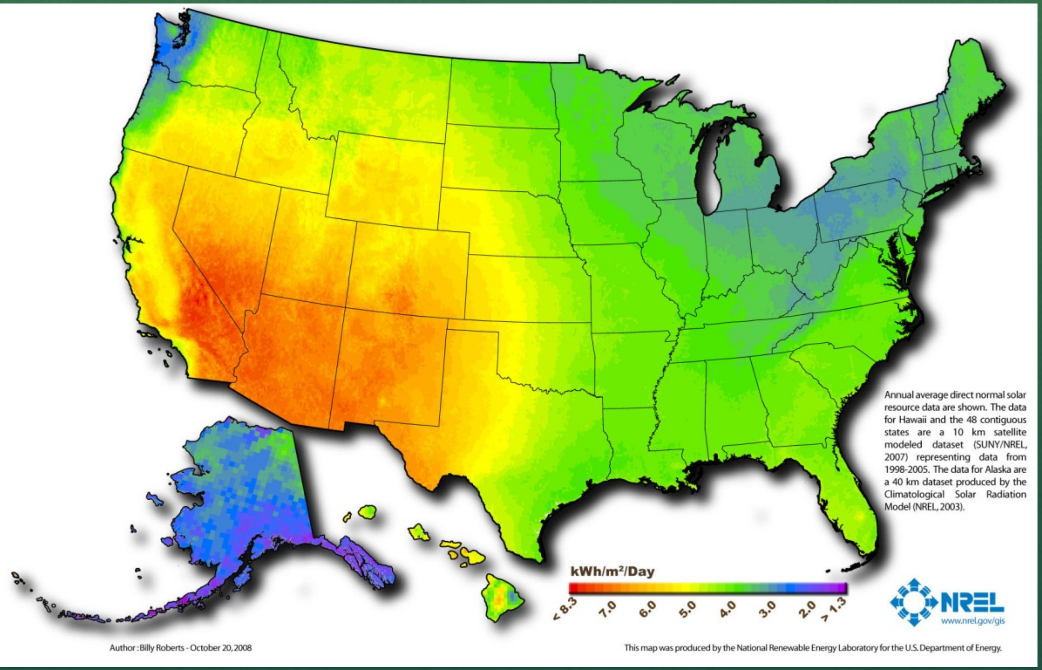
Generous sunshine, low humidity, and moderate temperatures much of the time

people like it here



Annual Average Solar Radiation

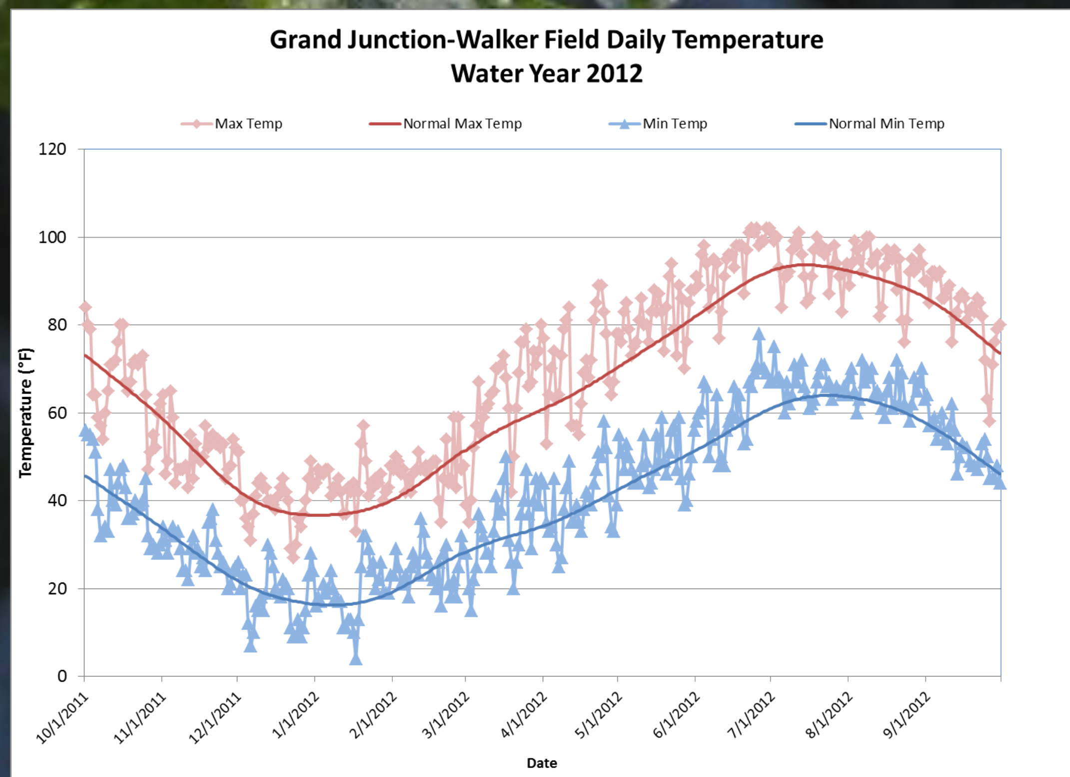
Colorado is a part of the Southwest “Sunbelt” ---- especially southern Colorado



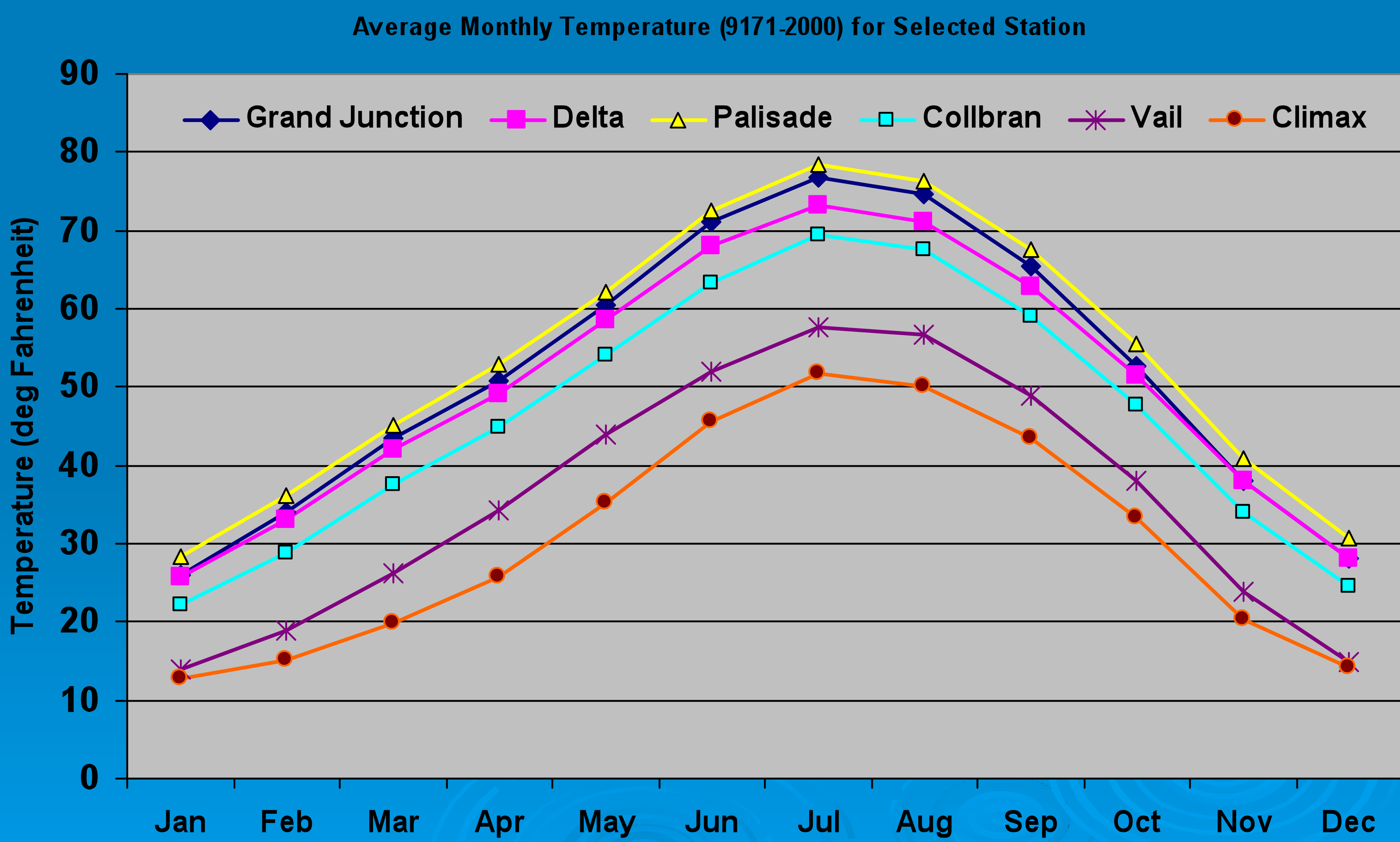
National Renewal Energy Laboratory: www.nrel.gov

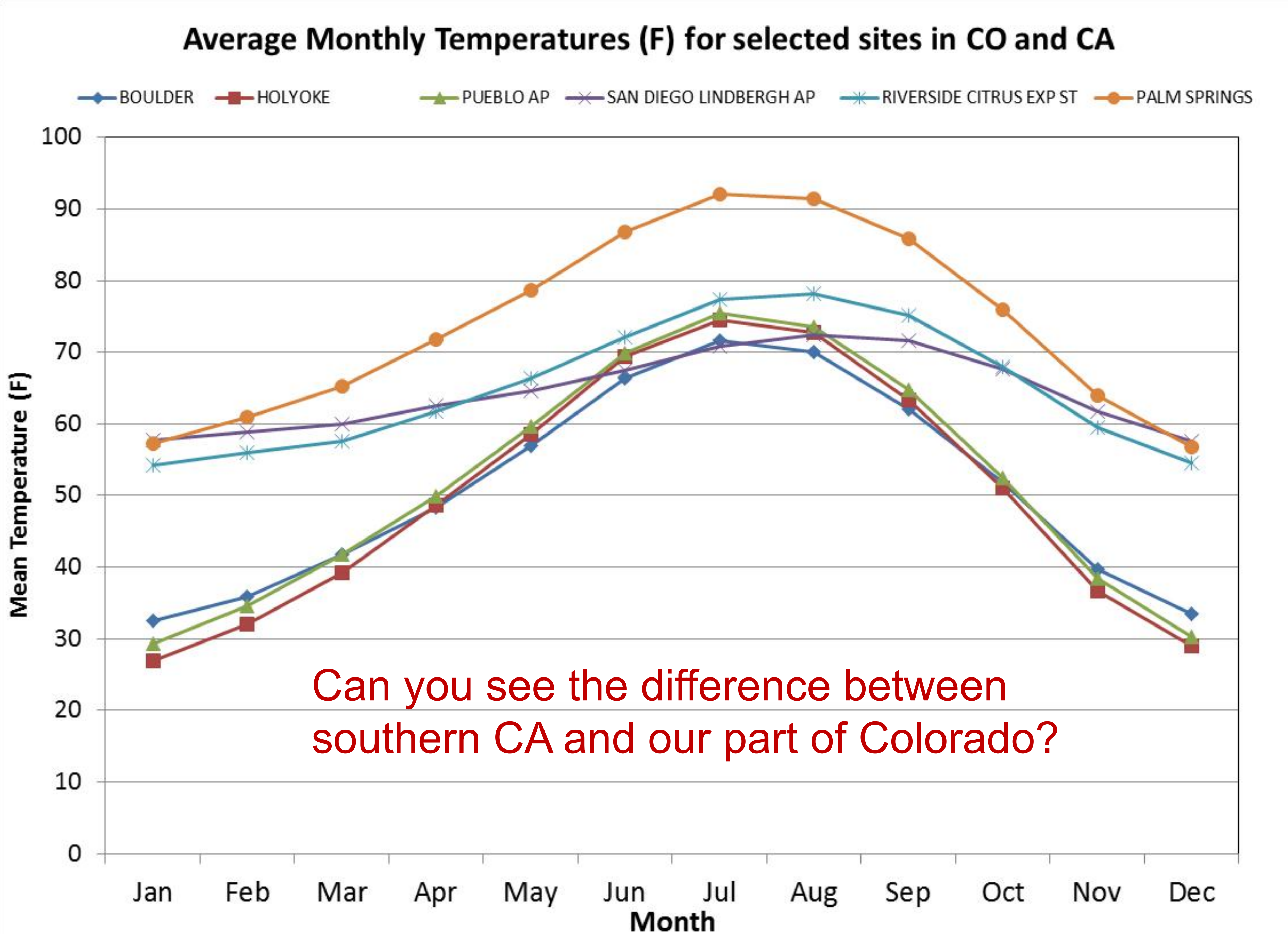
Large Seasonal Temperature Variations

Fruita, Colo.

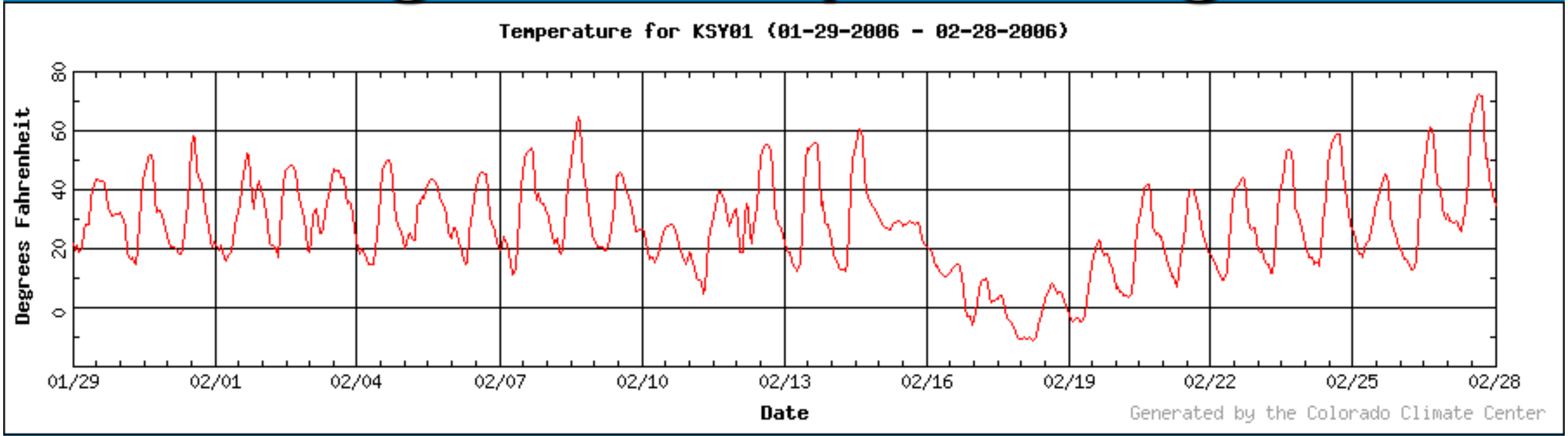


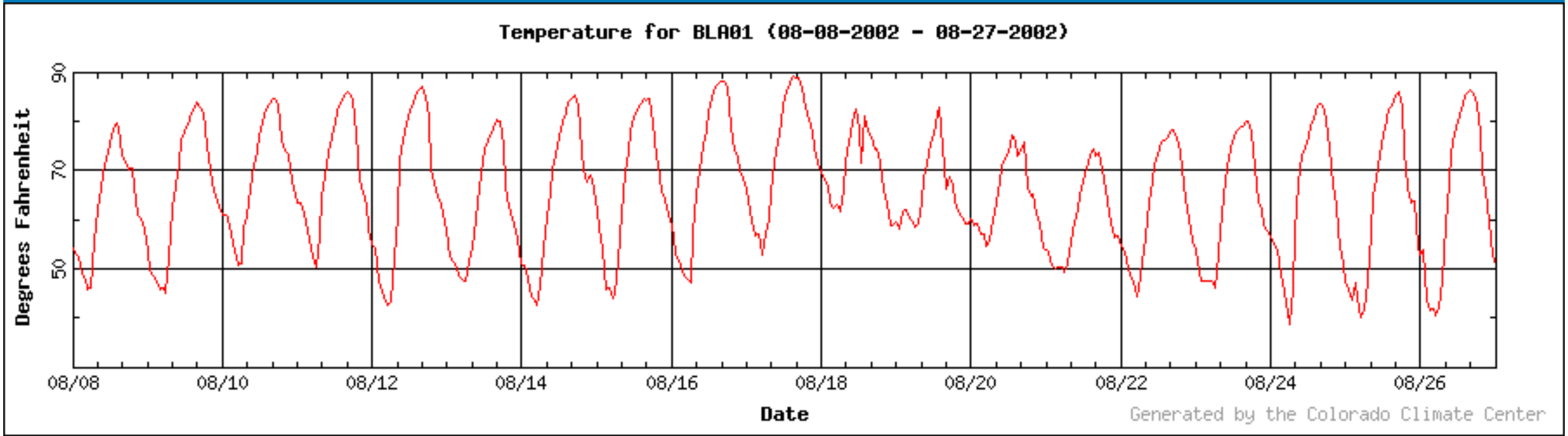
Winters are consistently colder than summers – ☺



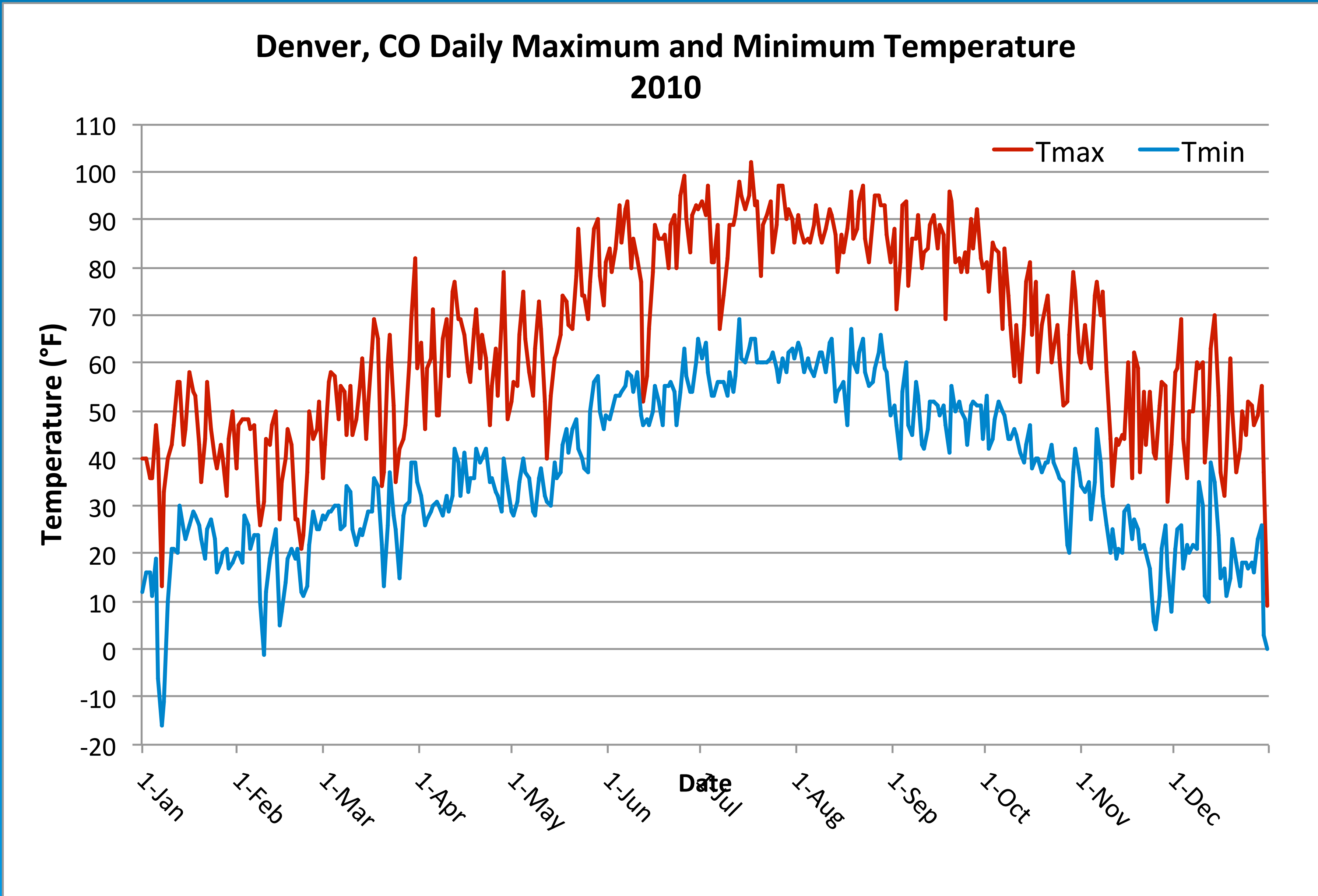

Average Monthly Temperatures (F) for selected sites in CO and CA
BOULDER
HOLYOKE
PUEBLO AP
SAN DIEGO LINDBERGH AP
RIVERSIDE CITRUS EXP ST
PALM SPRINGS
Mean Temperature (F)
100
90
80
70
60
50
40
30
20
10
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
Can you see the difference between southern CA and our part of Colorado?

Large diurnal temperature ranges and rapid changes

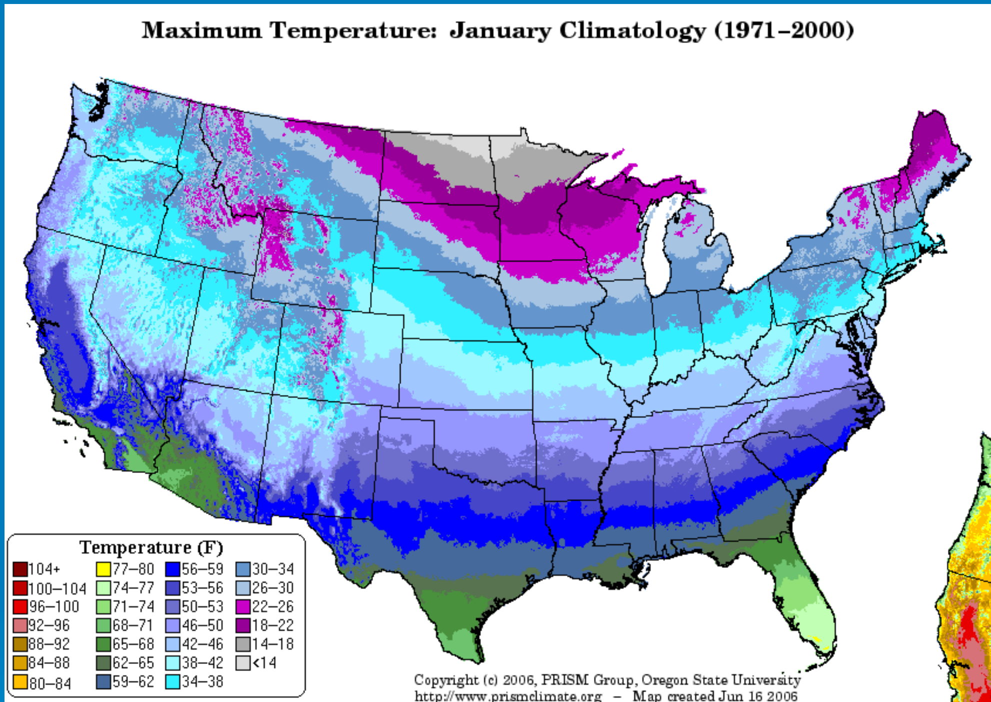


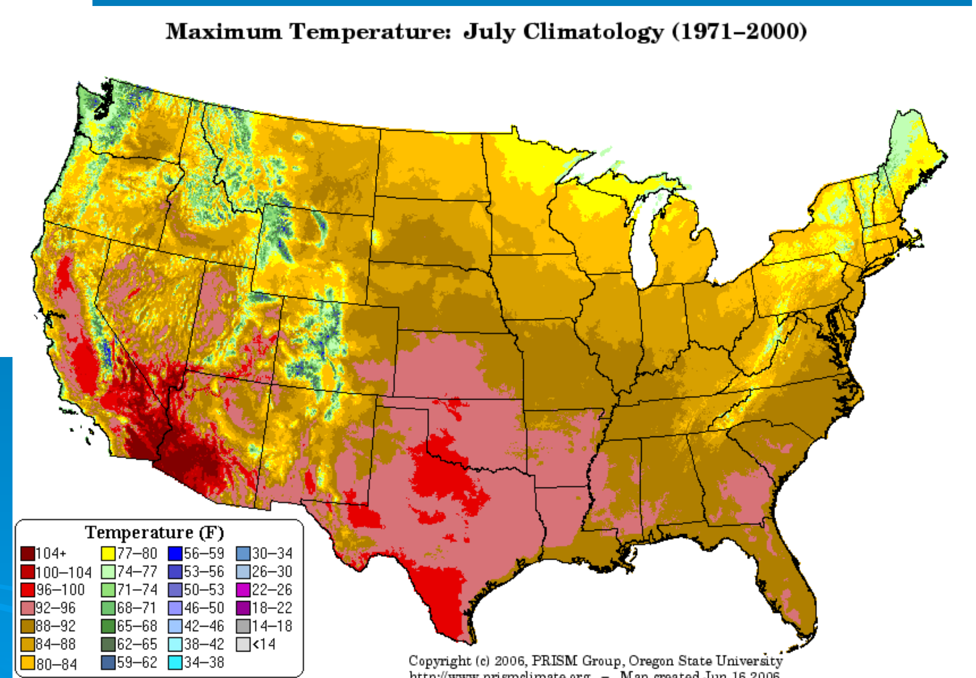


And this is how daily weather, over time, defines our climate



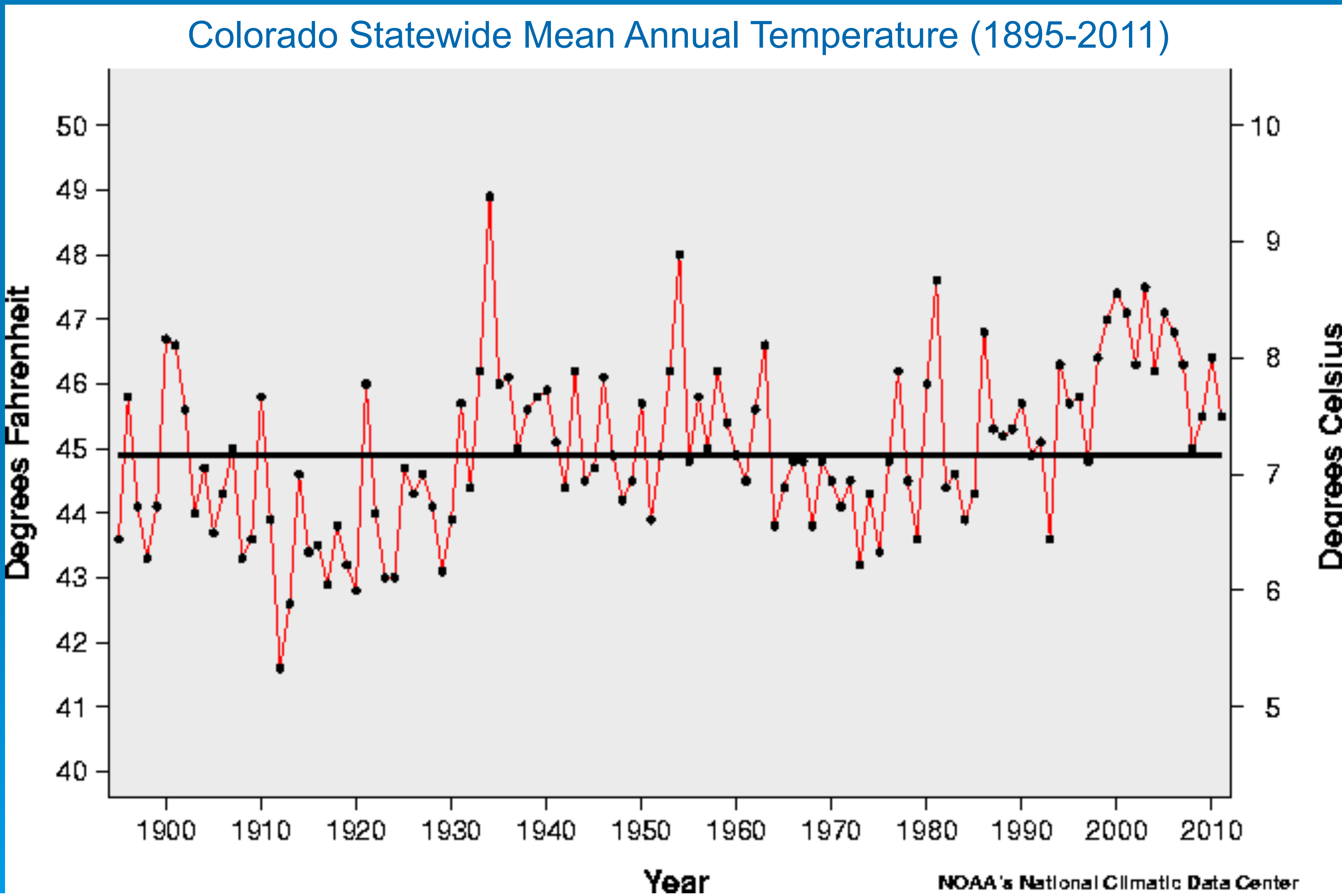
Complex local variations due to elevation and topography

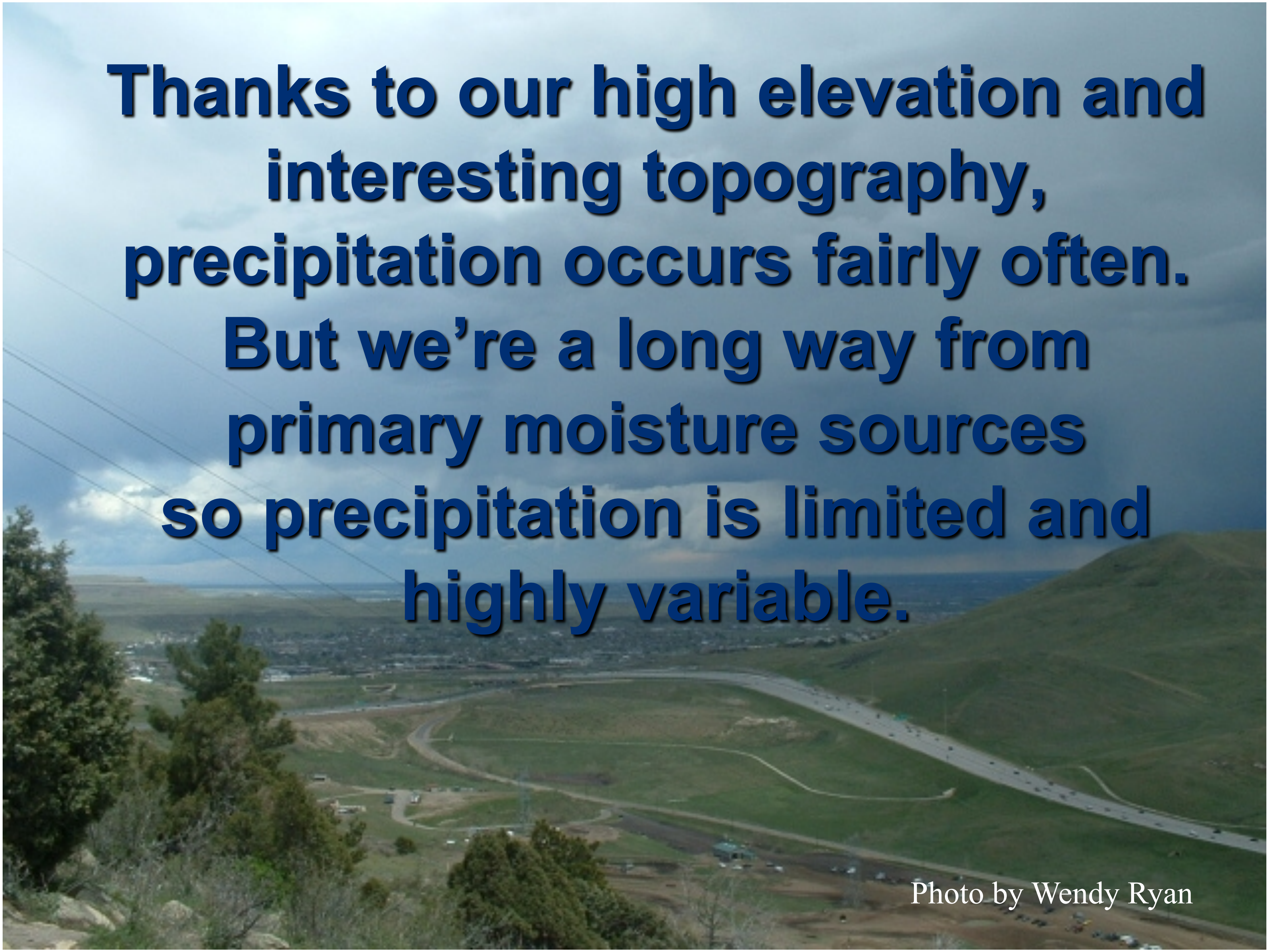




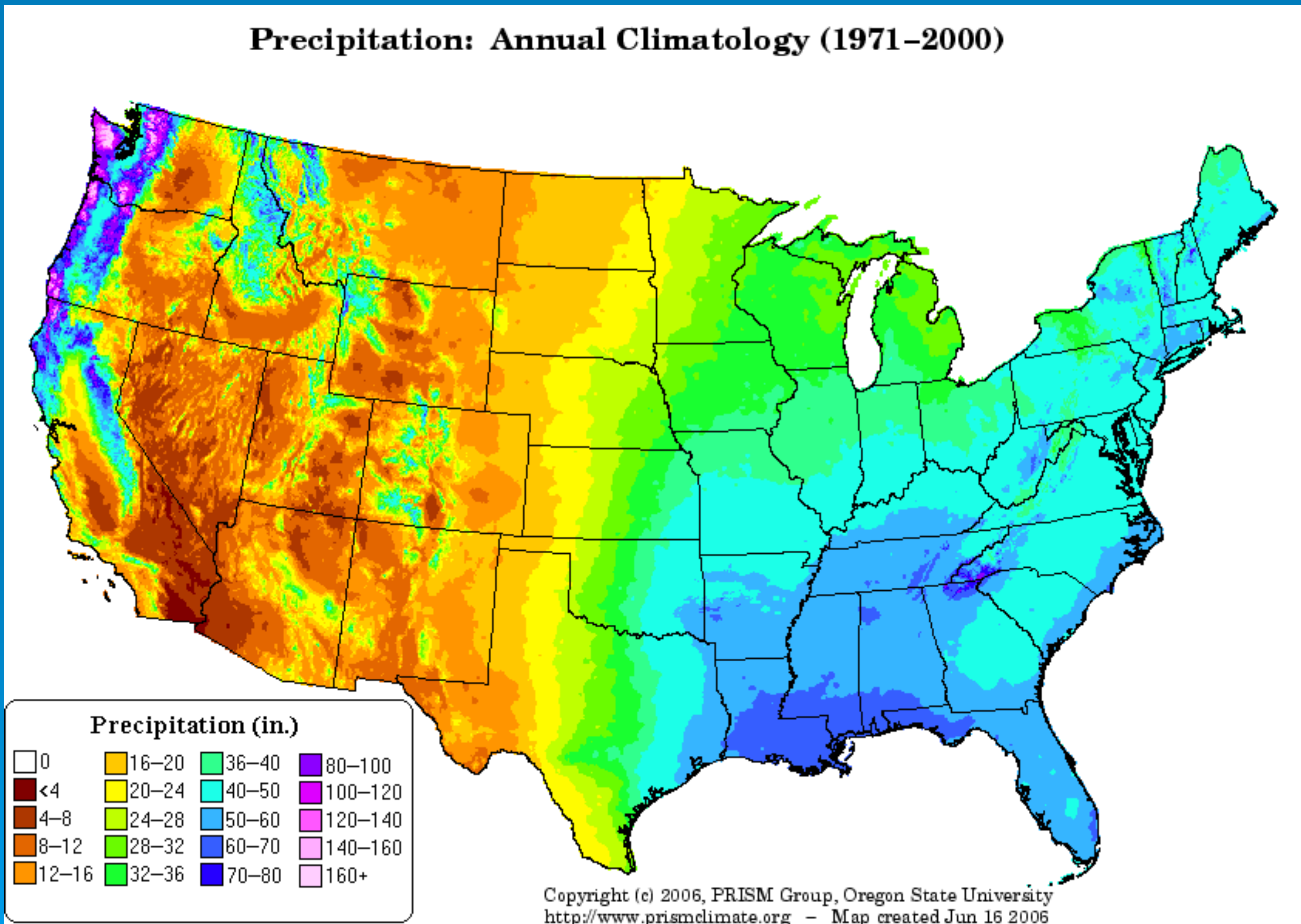
For example, variations within Rocky Mountain National Park – Totally different climate west of the Continental Divide than east even at the same elevation

Relatively Large Year to Year Variations ("Interannual Variabililty")

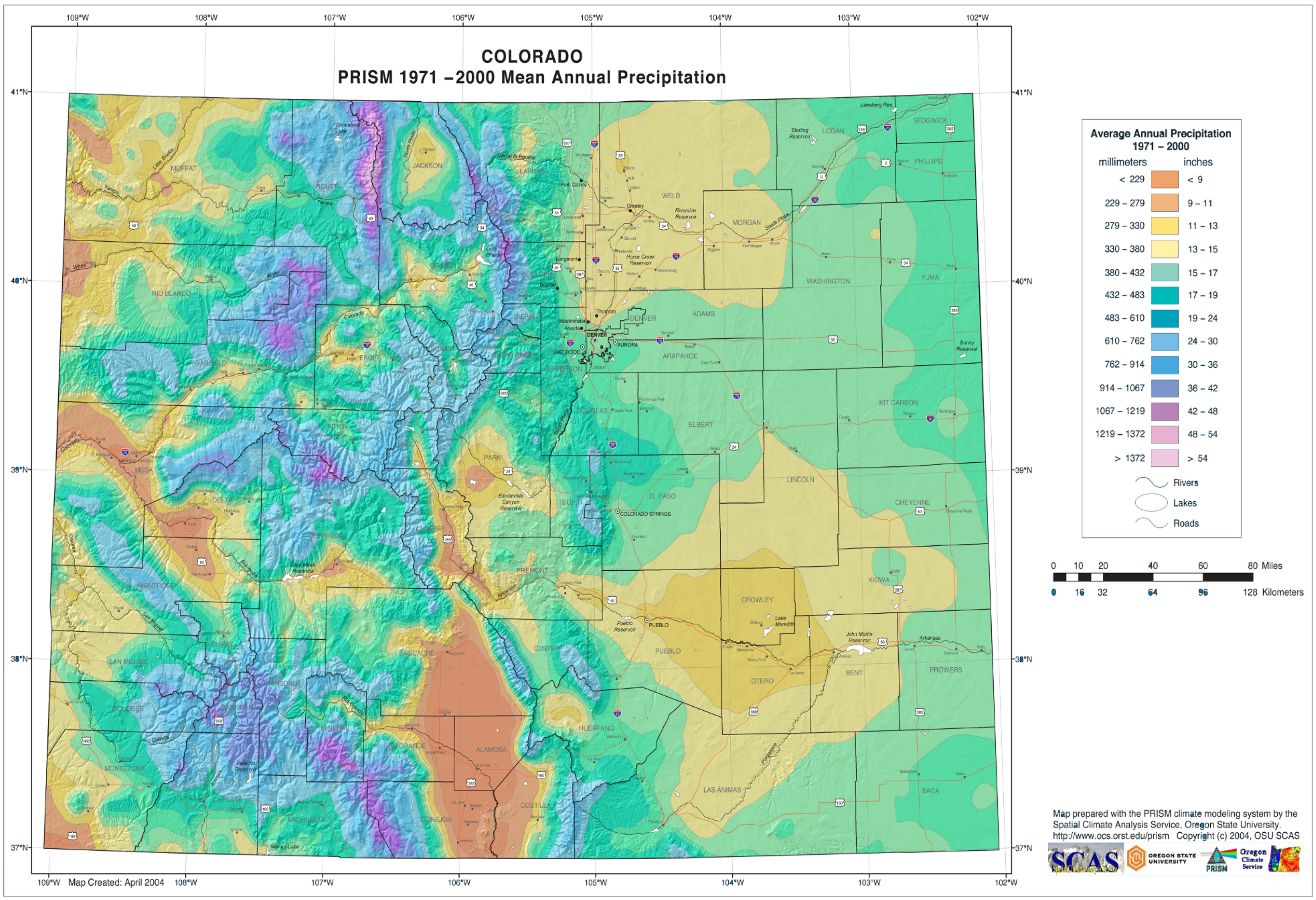



Thanks to our high elevation and interesting topography, precipitation occurs fairly often. But we're a long way from primary moisture sources so precipitation is limited and highly variable.
Photo by Wendy Ryan

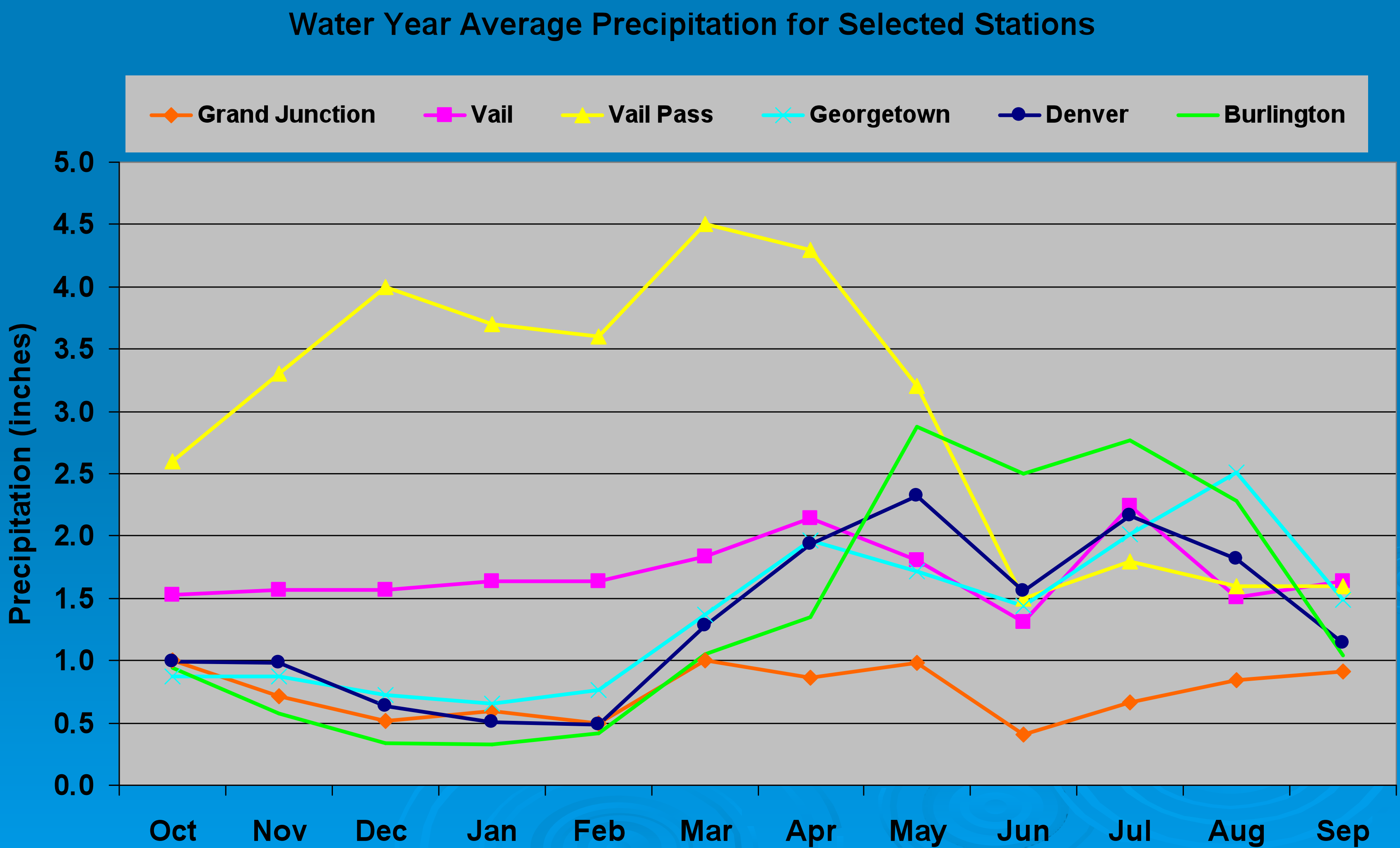
Where we fit in the national picture



Except for our mountains, we're already very dry most of the time.

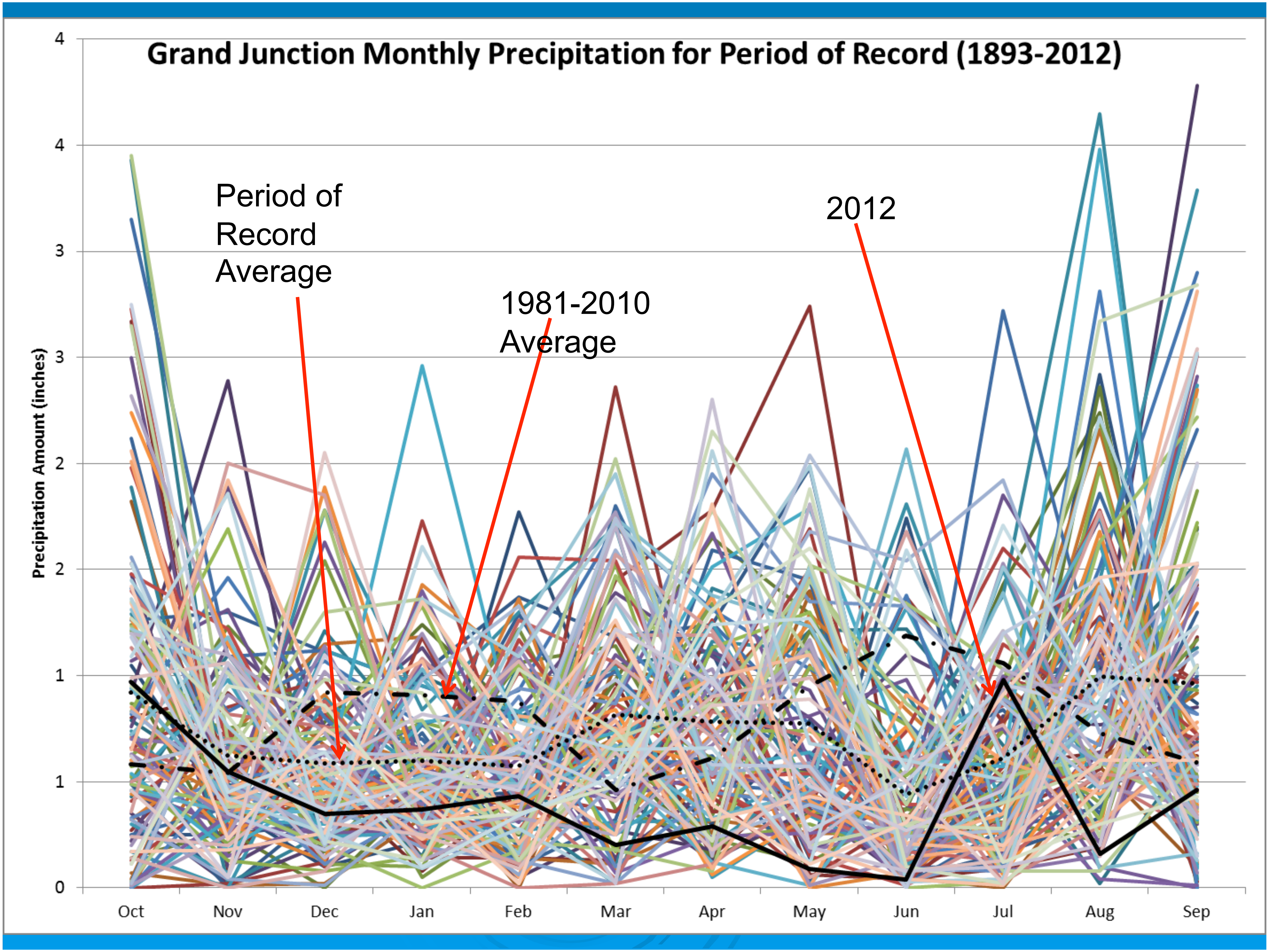


Highly seasonal precipitation patterns with considerable geographic diversity in "seasonality"

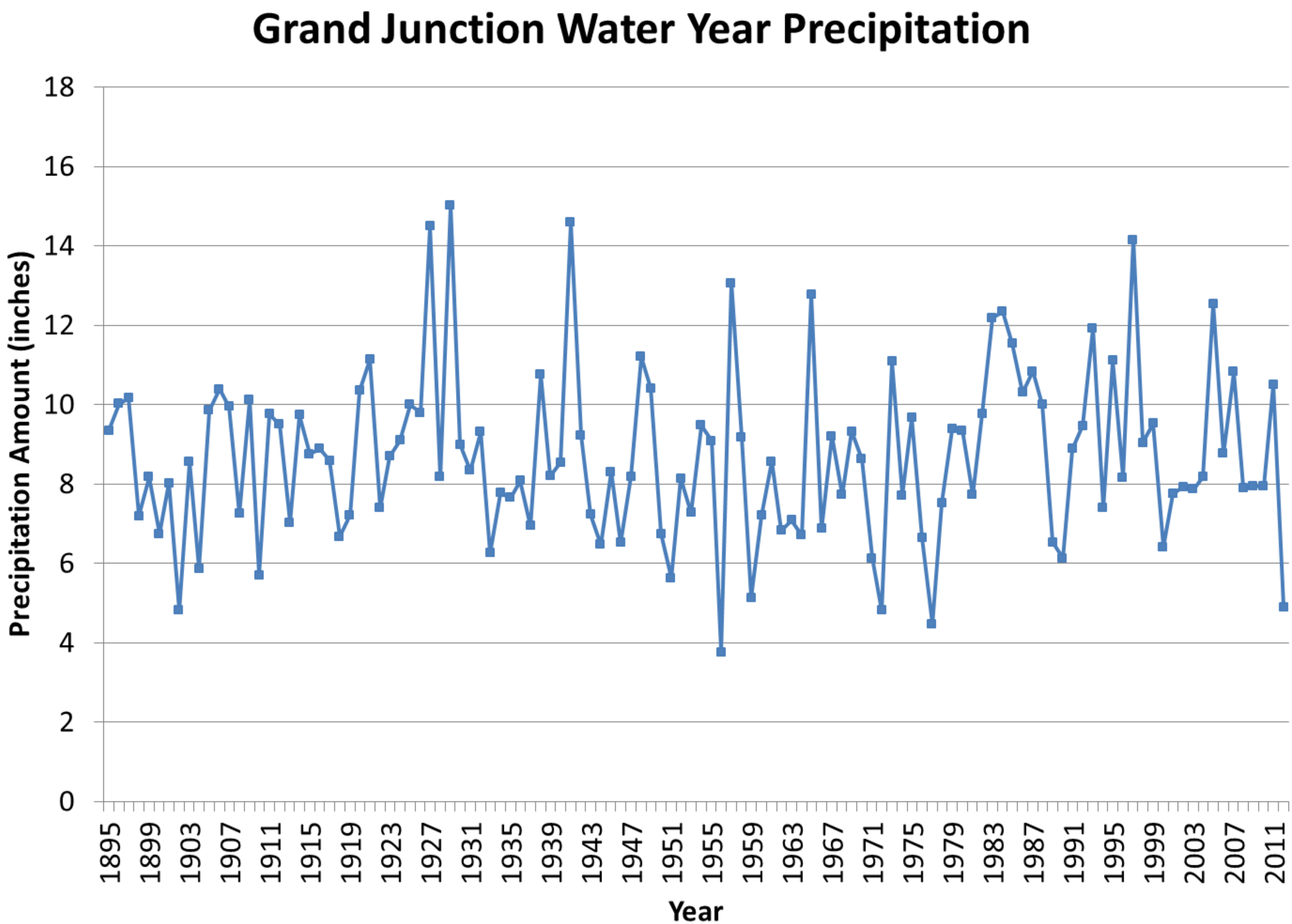


Large (actually "Huge") Year-to-Year Variations in Precipitation

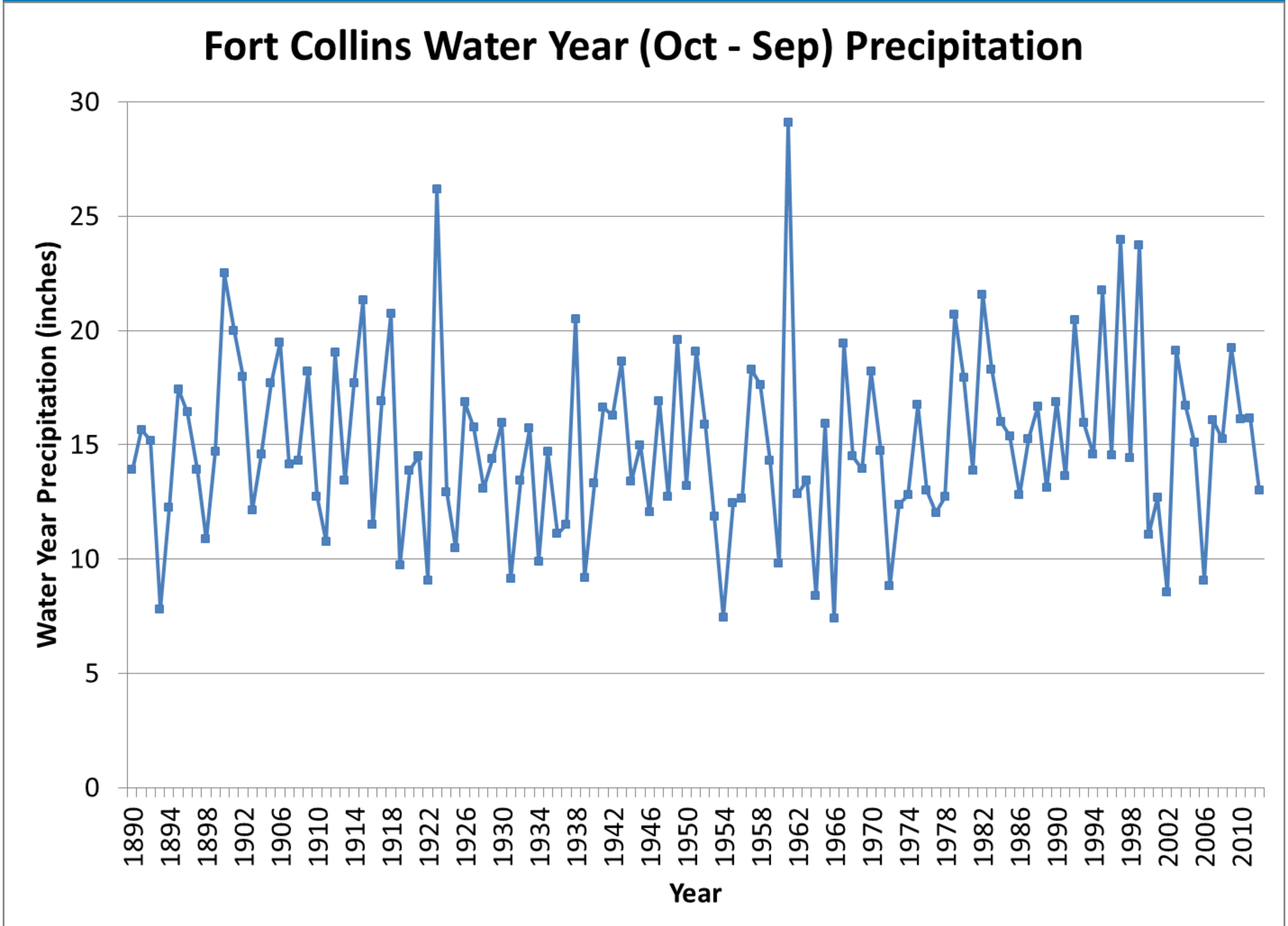
Are we ever "Average"? Probably not.

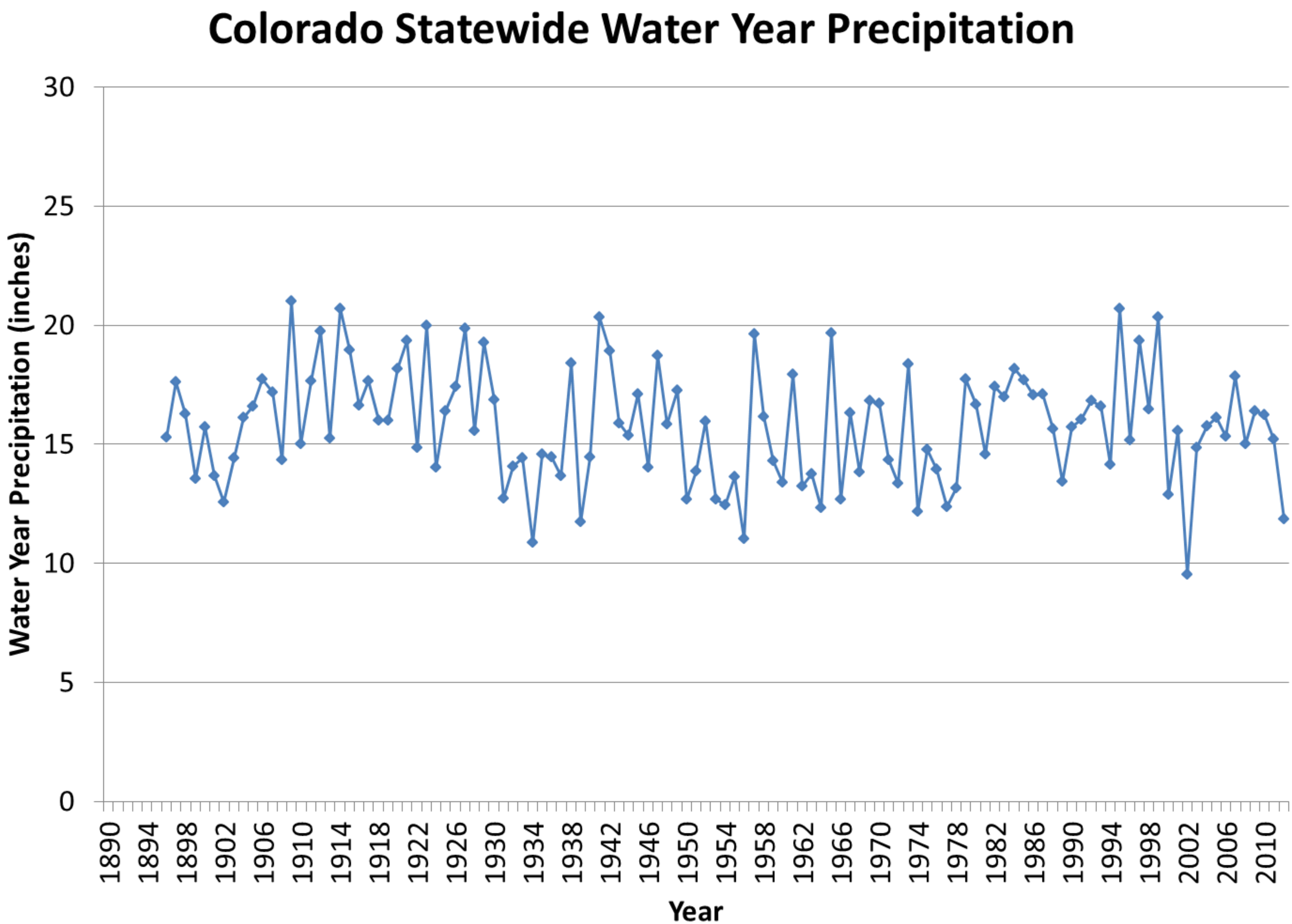


Grand Junction Monthly Precipitation for Period of Record (1893-2012)
Precipitation Amount (inches)
Period of Record Average
1981-2010 Average
2012
0
1
1
2
2
3
3
4
4
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep



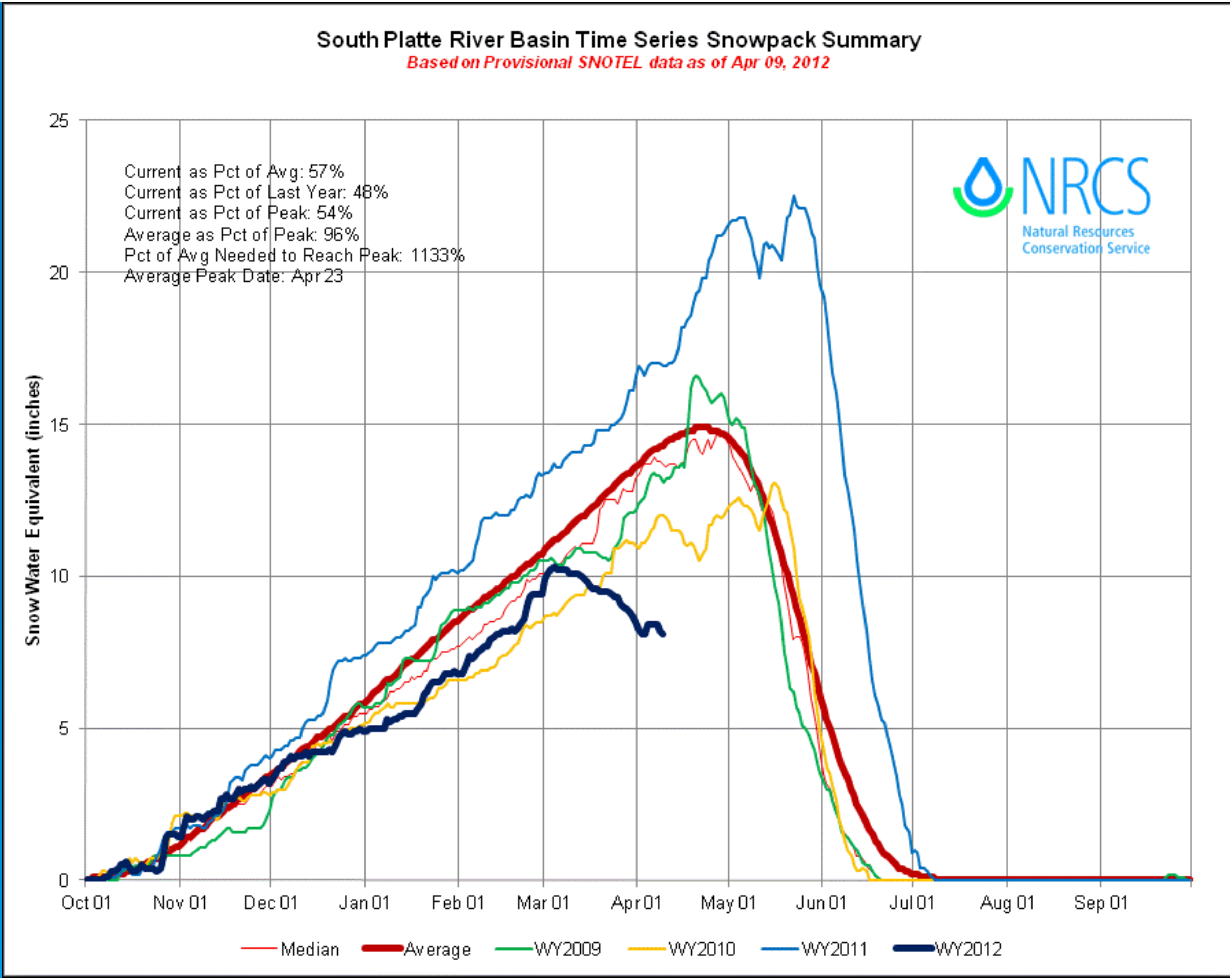
Grand Junction Water Year Precipitation
Precipitation Amount (inches)
0
2
4
6
8
10
12
14
16
18
1895
1899
1903
1907
1911
1915
1919
1923
1927
1931
1935
1939
1943
1947
1951
1955
1959
1963
1967
1971
1975
1979
1983
1987
1991
1995
1999
2003
2007
2011
Year


Fort Collins Water Year (Oct - Sep) Precipitation
Water Year Precipitation (inches)
30
25
20
15
10
5
0
1890
1894
1898
1902
1906
1910
1914
1918
1922
1926
1930
1934
1938
1942
1946
1950
1954
1958
1962
1966
1970
1974
1978
1982
1986
1990
1994
1998
2002
2006
2010
Year

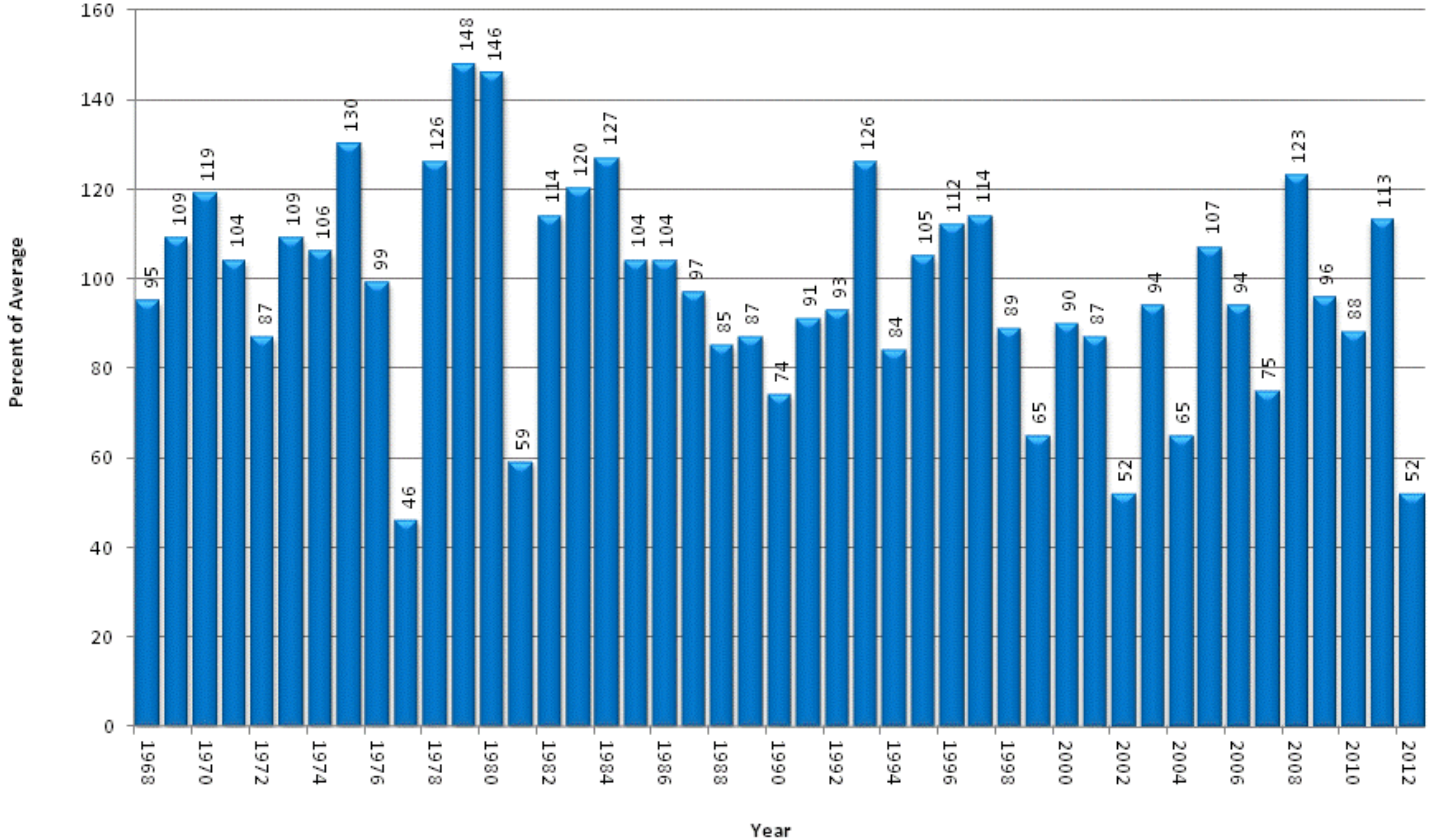


Colorado Statewide Water Year Precipitation
Water Year Precipitation (inches)
30
25
20
15
10
5
0
1890
1894
1898
1902
1906
1910
1914
1918
1922
1926
1930
1934
1938
1942
1946
1950
1954
1958
1962
1966
1970
1974
1978
1982
1986
1990
1994
1998
2002
2006
2010
Year

Snow is “Way Important” in our climate and hydrology


South Platte River Basin Time Series Snowpack Summary
Based on Provisional SNOTEL data as of Apr 09, 2012
Current as Pct of Avg: 57%
Current as Pct of Last Year: 48%
Current as Pct of Peak: 54%
Average as Pct of Peak: 96%
Pct of Avg Needed to Reach Peak: 1133%
Average Peak Date: Apr 23
NRCS
Natural Resources
Conservation Service
Snow Water Equivalent (inches)
25
20
15
10
5
0
Oct 01
Nov 01
Dec 01
Jan 01
Feb 01
Mar 01
Apr 01
May 01
Jun 01
Jul 01
Aug 01
Sep 01
Median
Average
WY2009
WY2010
WY2011
WY2012

April 1 Colorado Statewide Snowpack

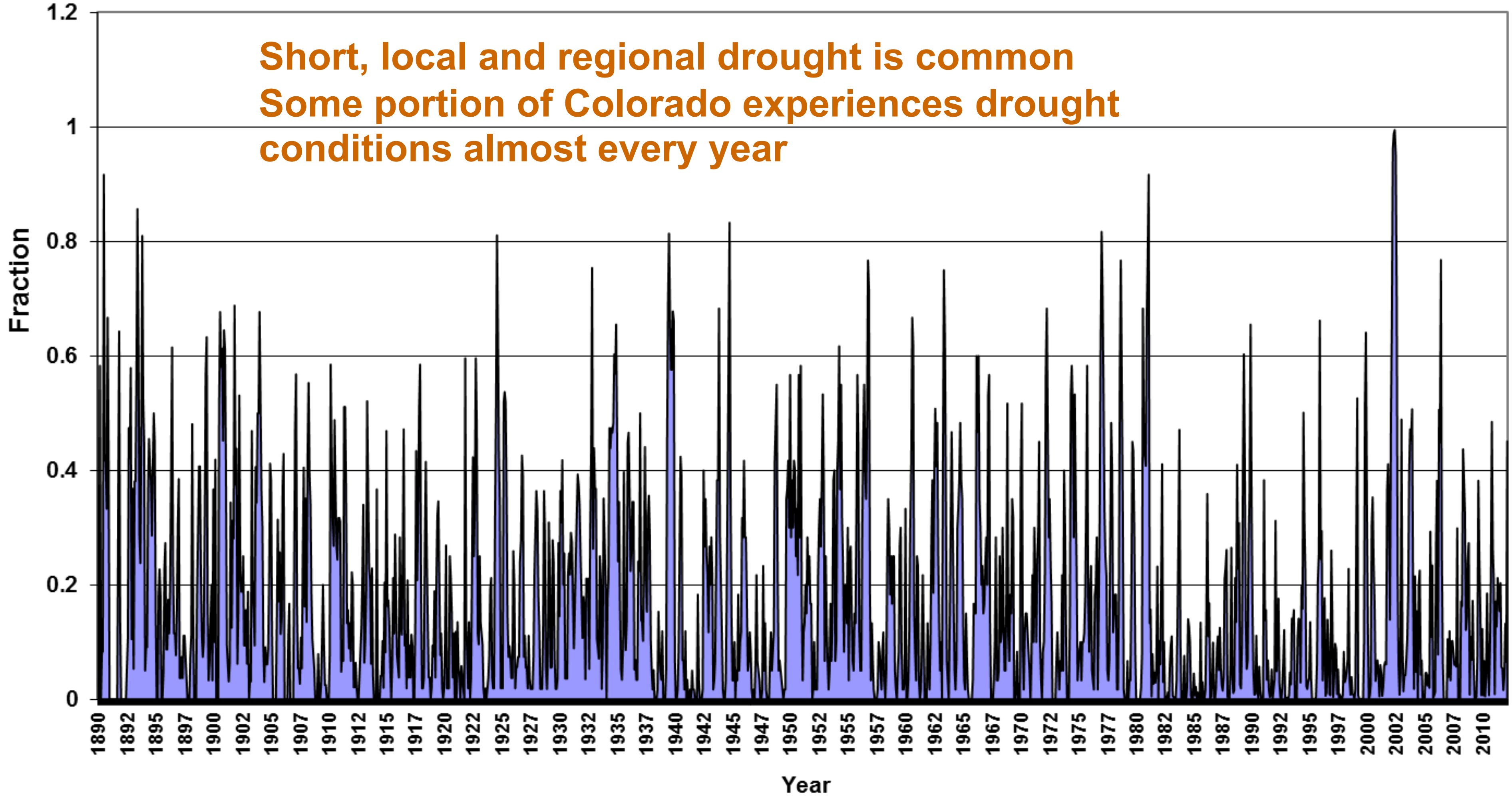



Drought is an unwelcome but
frequent visitor to Colorado

Fraction of Colorado in Drought

Based on 3 month SPI

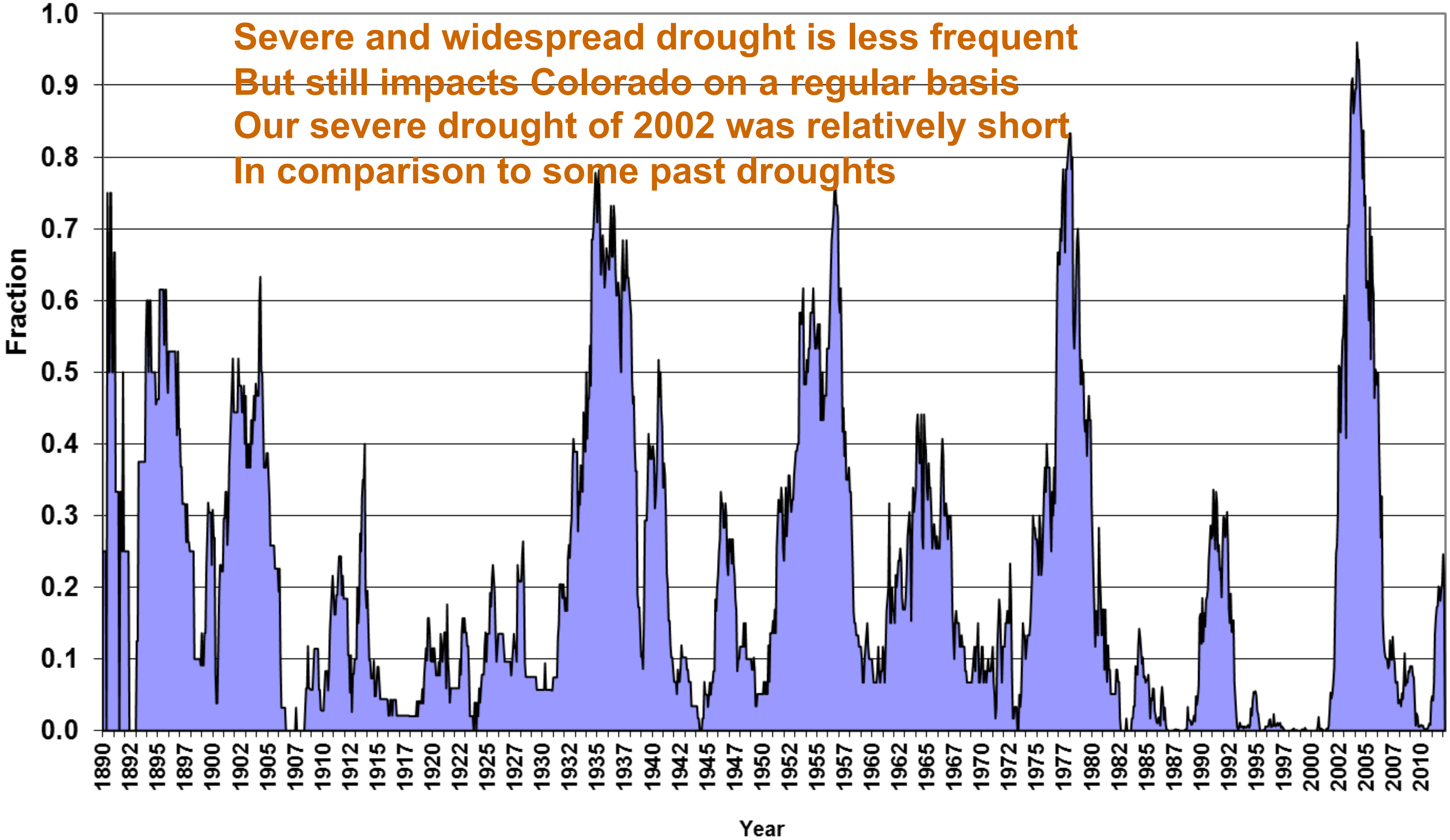
(1890 - March 2012)

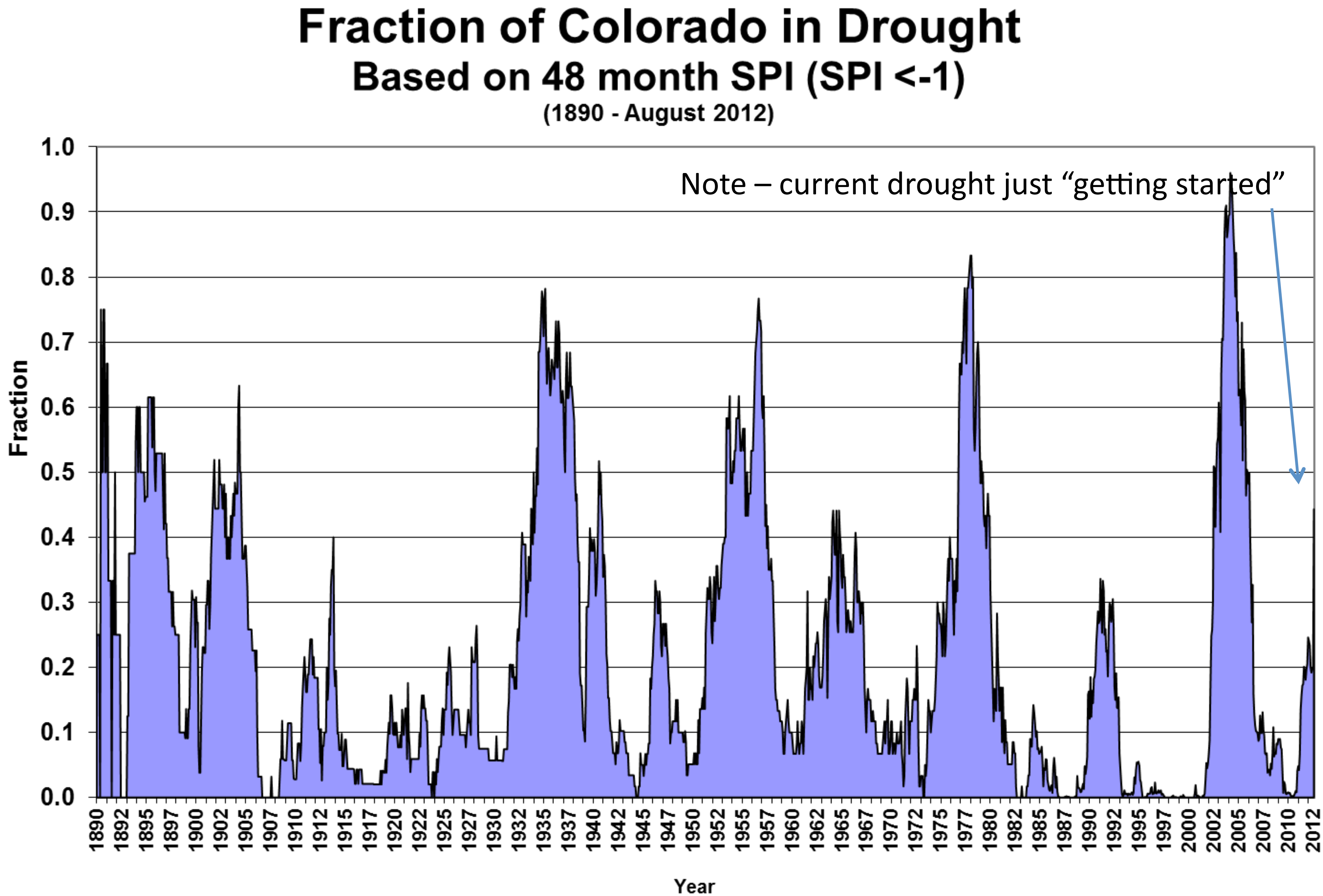


Fraction of Colorado in Drought

Based on 48 month SPI (SPI <-1)

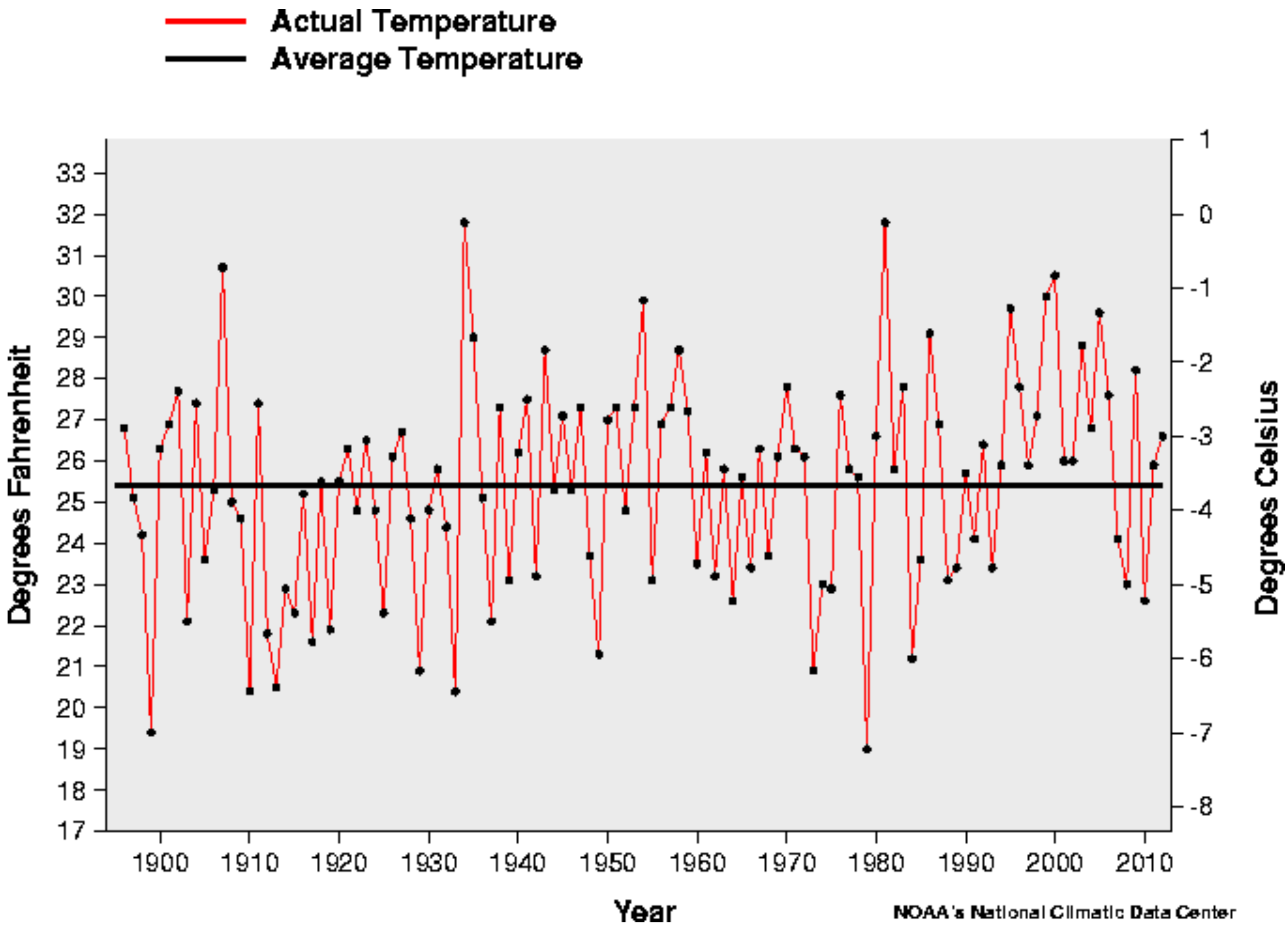
(1890 - March 2012)



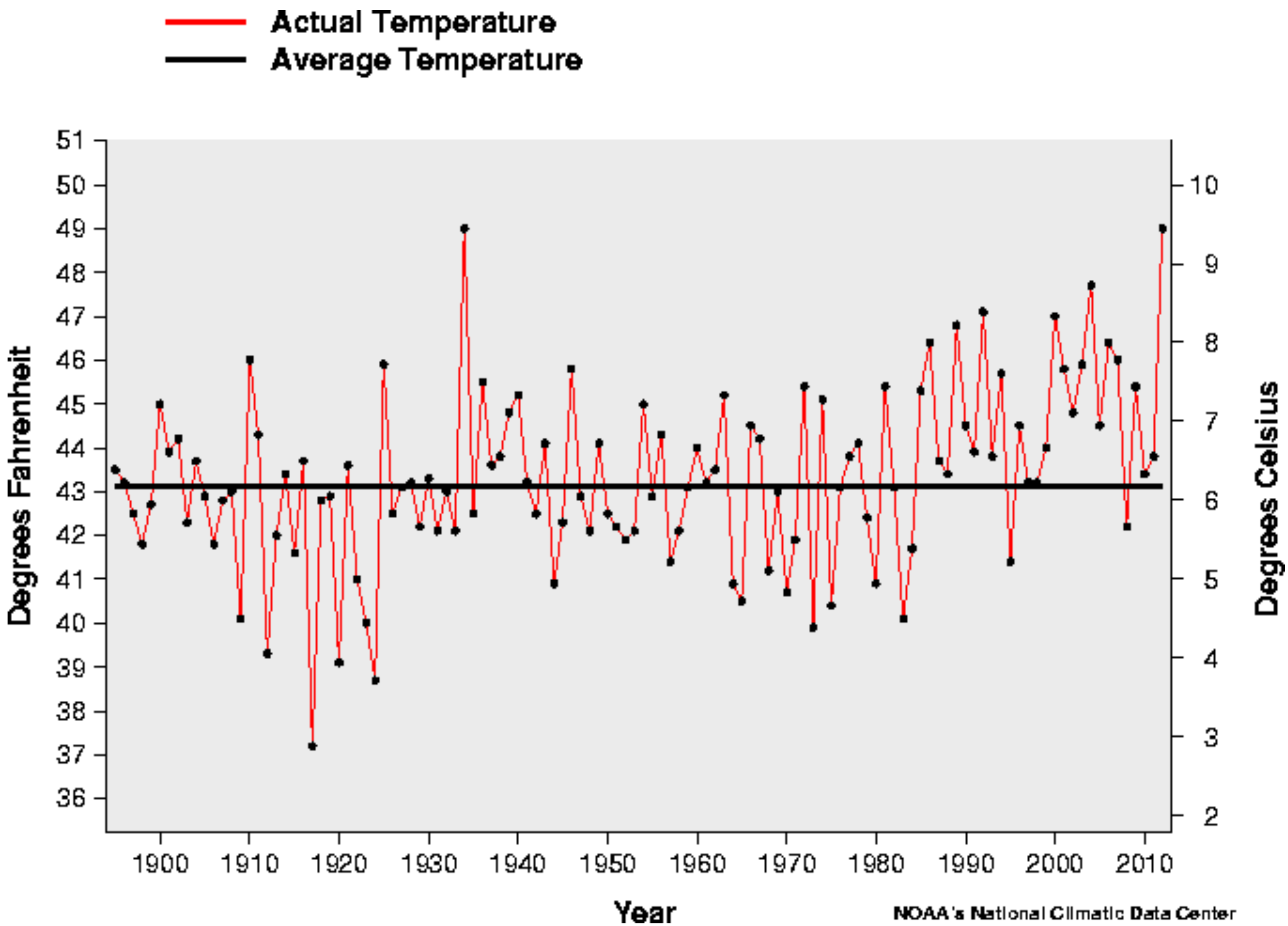

Fraction of Colorado in Drought
Based on 48 month SPI (SPI <-1)
(1890 - August 2012)
Note – current drought just “getting started”
Fraction
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1890 1892 1895 1897 1900 1902 1905 1907 1910 1912 1915 1917 1920 1922 1925 1927 1930 1932 1935 1937 1940 1942 1945 1947 1950 1952 1955 1957 1960 1962 1965 1967 1970 1972 1975 1977 1980 1982 1985 1987 1990 1992 1995 1997 2000 2002 2005 2007 2010 2012
Year


Recent upward trends in temperatures, especially in spring and summer, are only making matters worse.

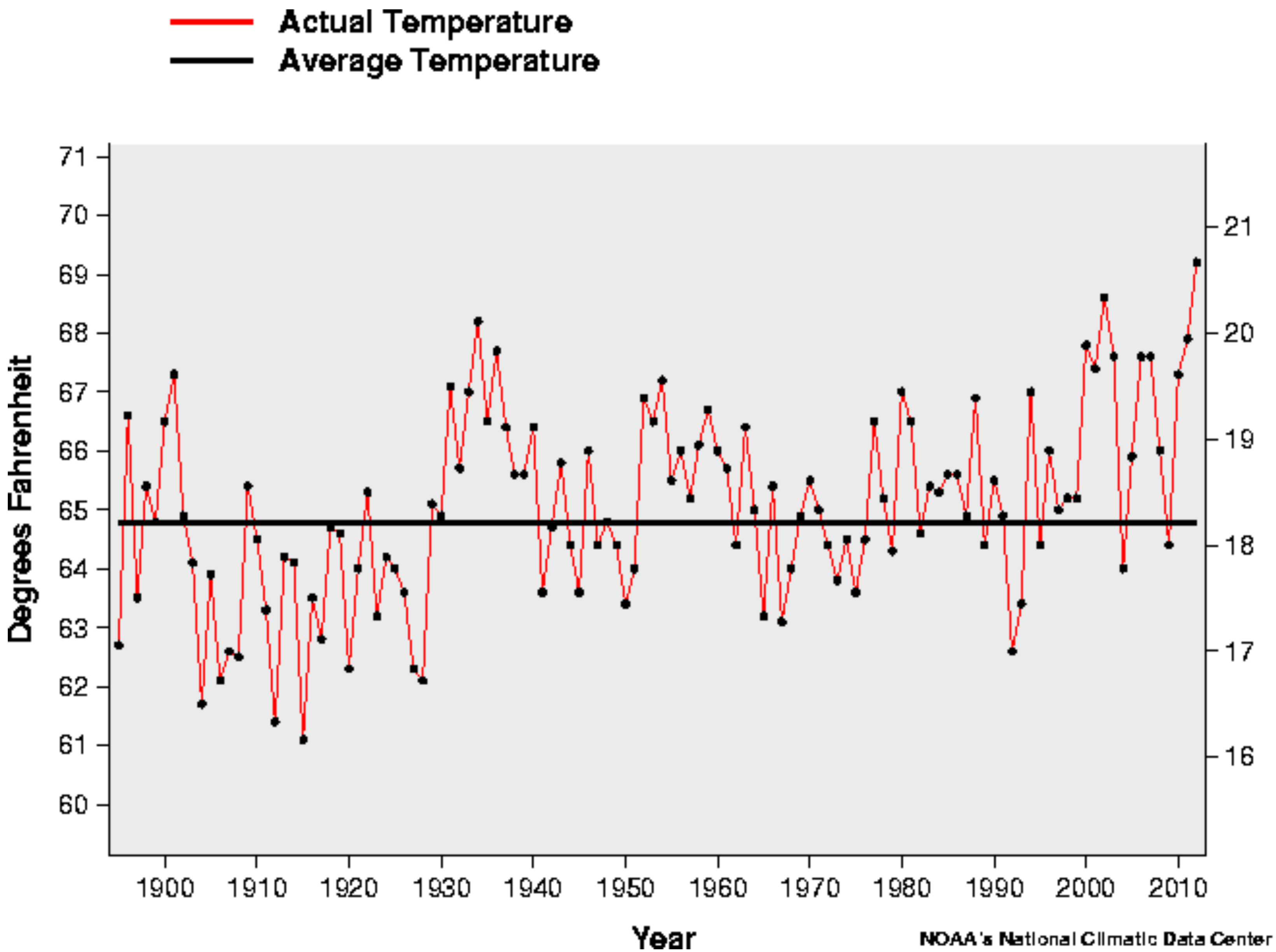
Colorado Statewide Mean Winter Temperature (Dec – Feb)



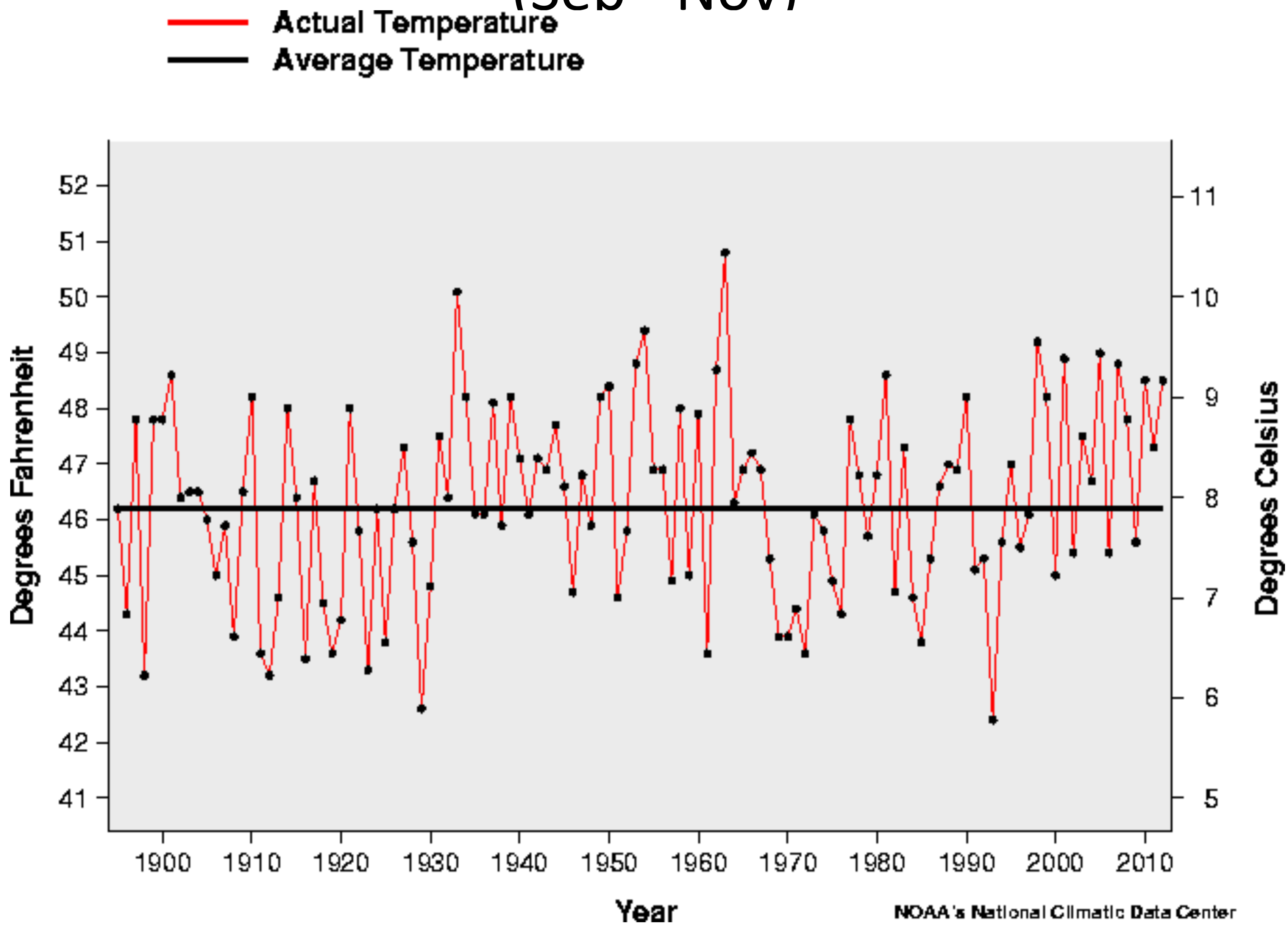
Colorado Statewide Mean Spring Temperature (Mar - May)



Colorado Statewide Mean Summer Temperature (Jun - Aug)



Colorado Statewide Mean Autumn Temperature (Sep - Nov)

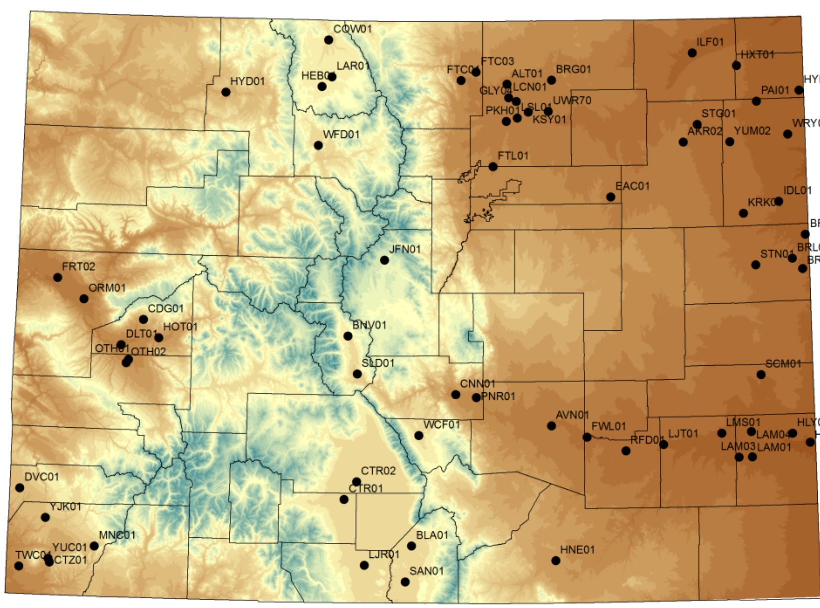


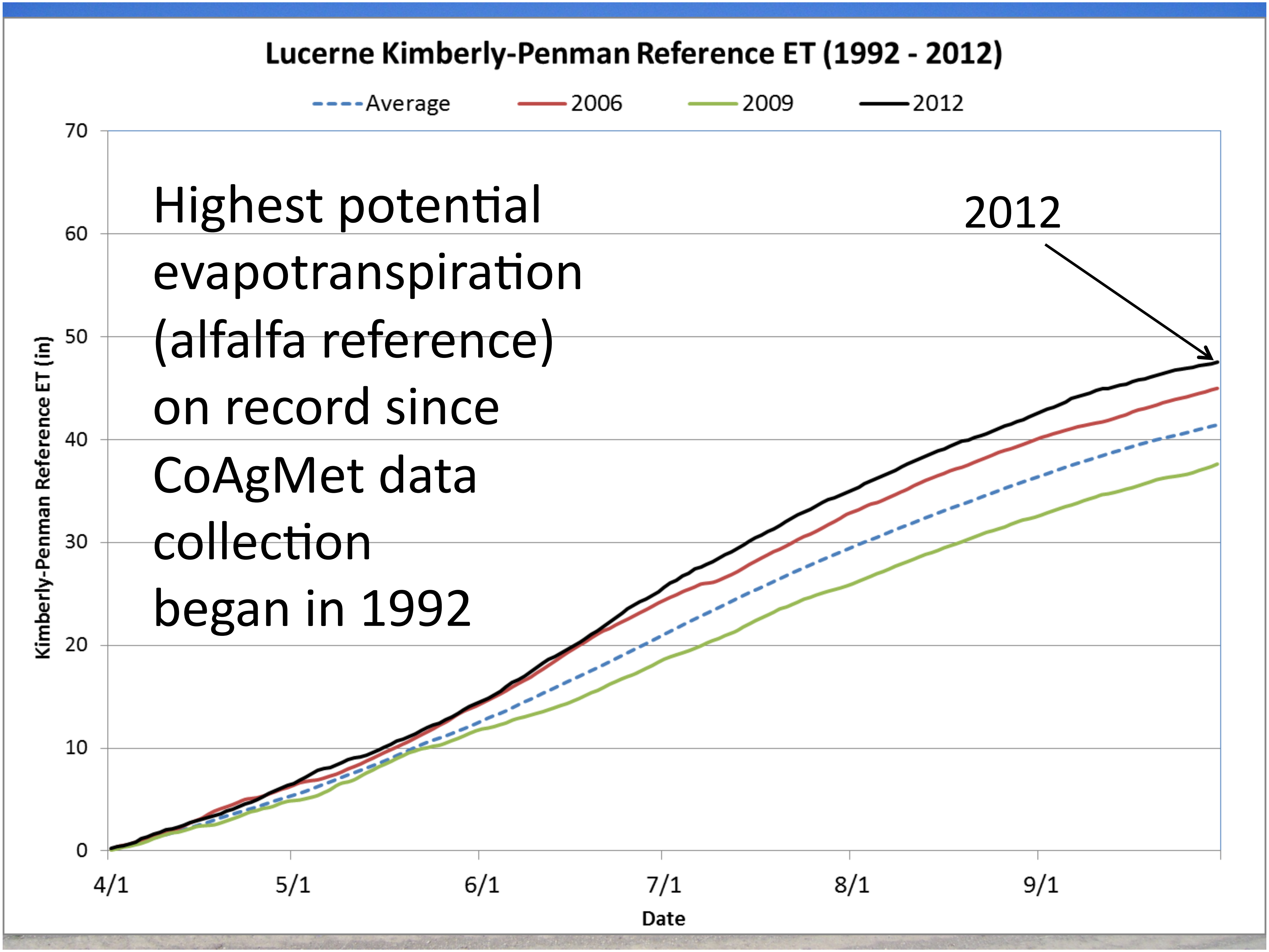

This year (2012) the result was
record reference (potential)
evapotranspiration rates

Based on 20 years of data from CoAgMet – our agricultural weather monitoring network --

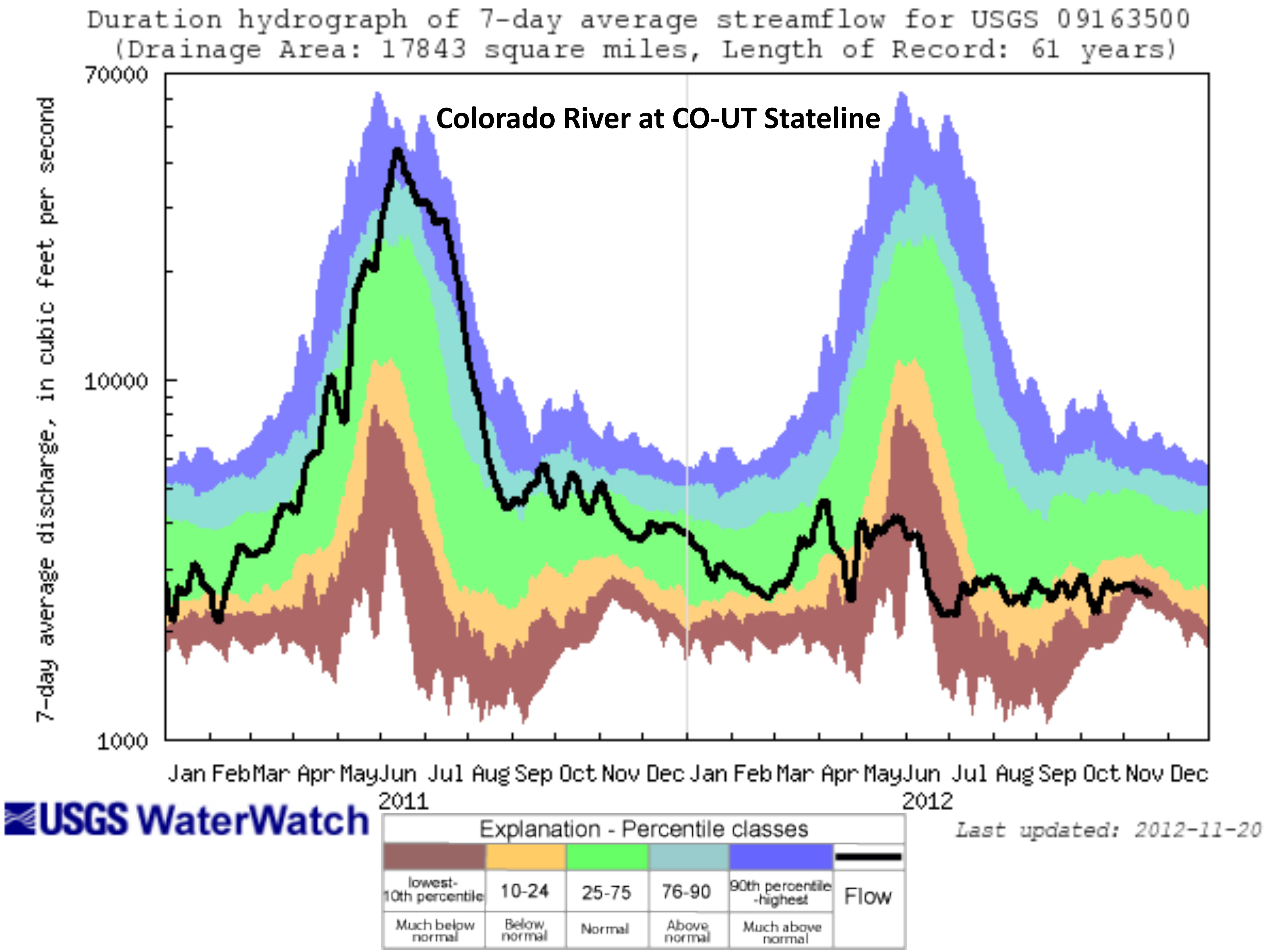
2012 was an extreme year for evapotranspiration

Current CoAgMet Station Locations - July 2012

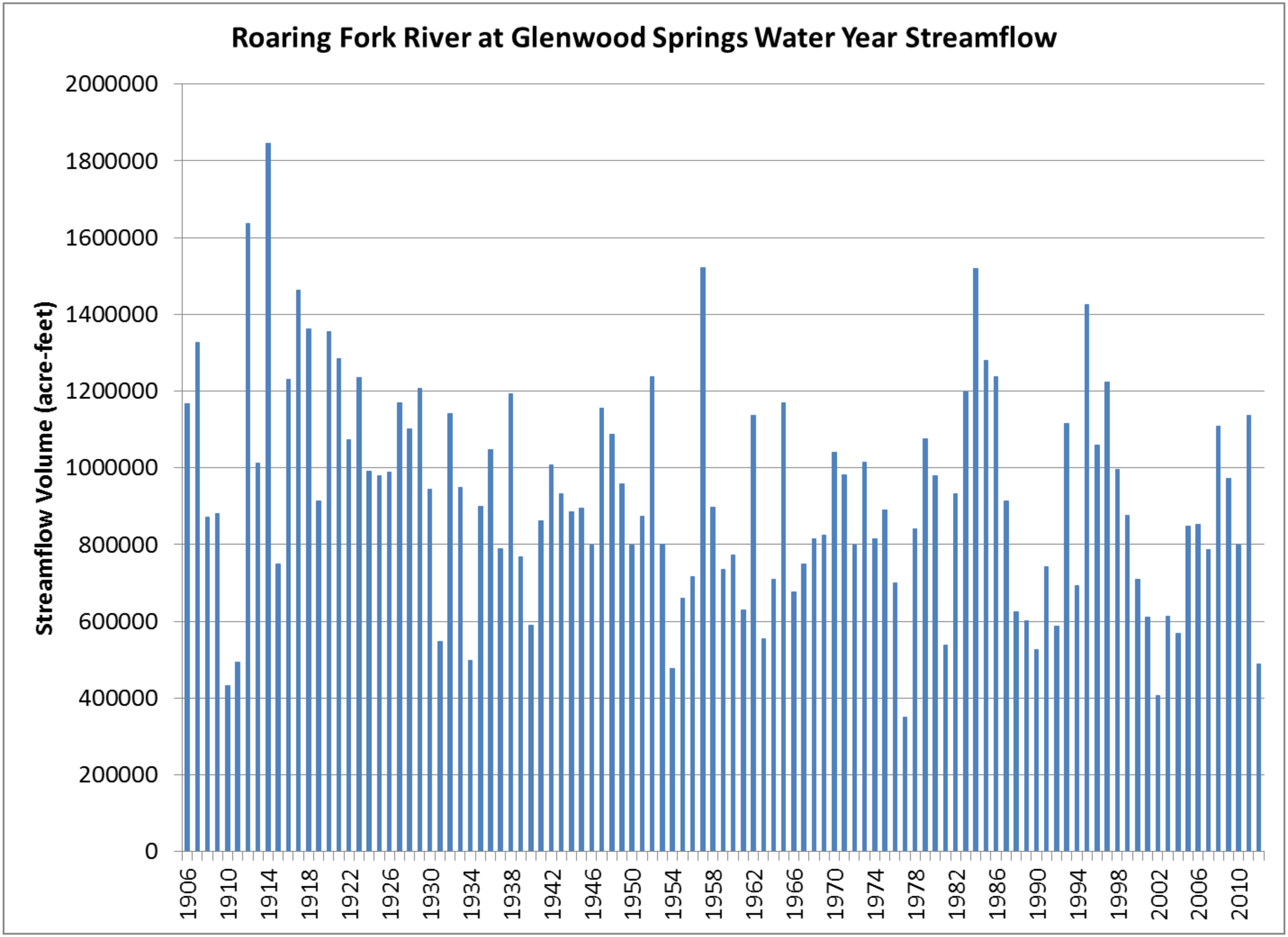


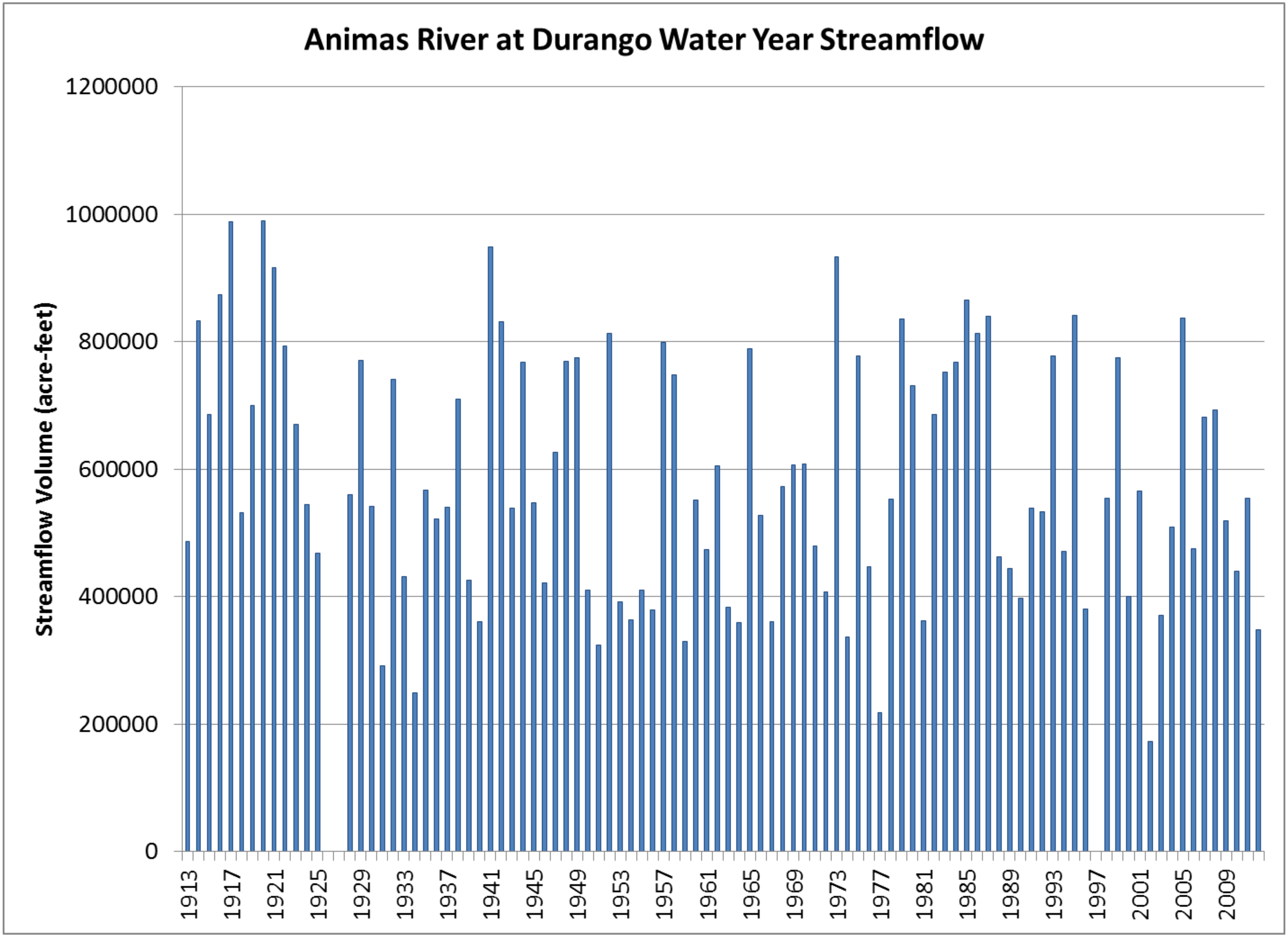

Lucerne Kimberly-Penman Reference ET (1992 - 2012)
Average
2006
2009
2012
Highest potential evapotranspiration (alfalfa reference) on record since CoAgMet data collection began in 1992
2012
Kimberly-Penman Reference ET (in)
70
60
50
40
30
20
10
0
4/1
5/1
6/1
7/1
8/1
9/1
Date

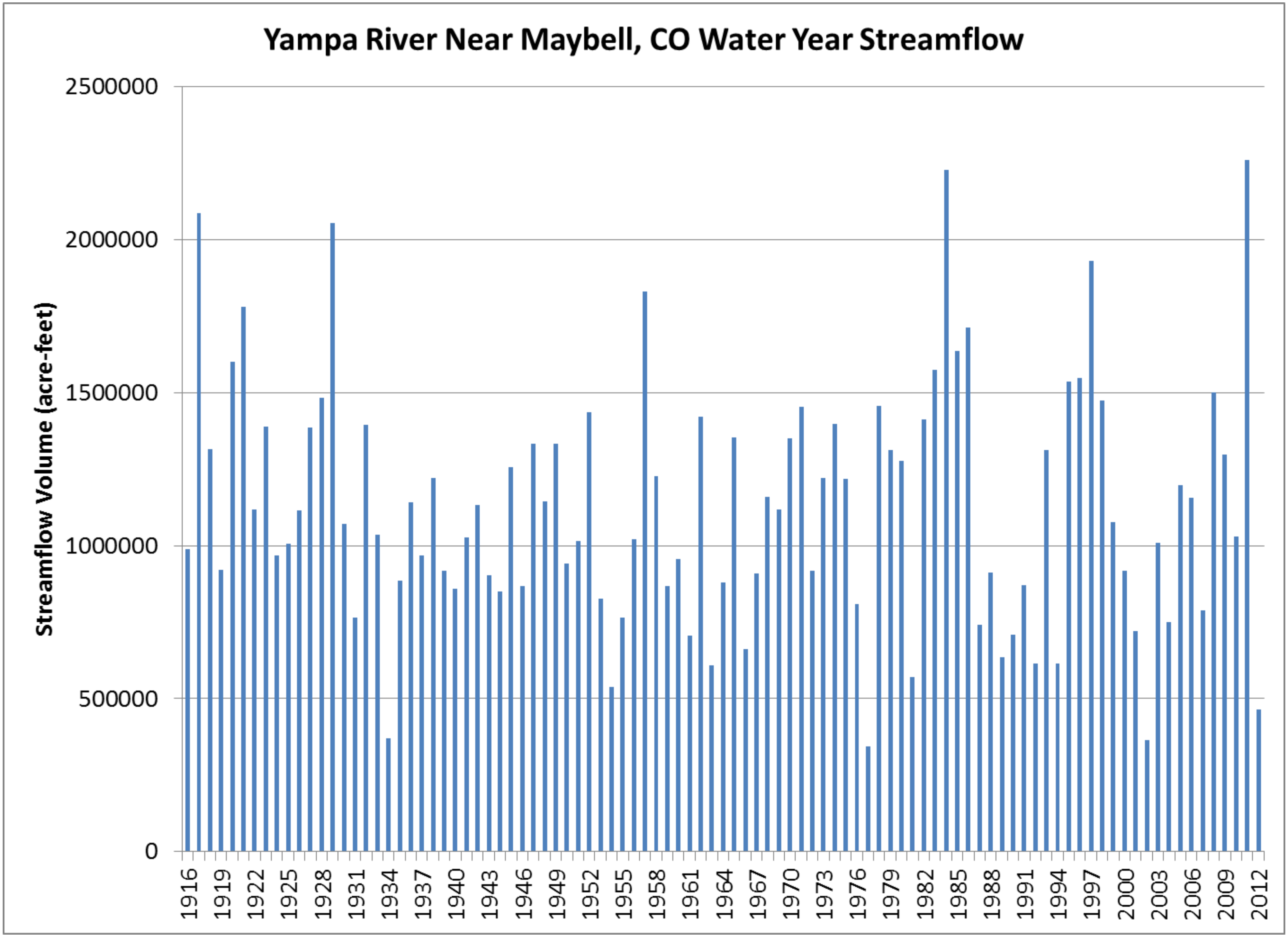
The great "integrator" of the water budget – ***stream flow***



Duration hydrograph of 7-day average streamflow for USGS 09163500
(Drainage Area: 17843 square miles, Length of Record: 61 years)
Colorado River at CO-UT Stateline
7-day average discharge, in cubic feet per second
70000
10000
1000
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
2011
2012
USGS WaterWatch
Explanation - Percentile classes
lowest-10th percentile
10-24
25-75
76-90
90th percentile -highest
Flow
Much below normal
Below normal
Normal
Above normal
Much above normal
Last updated: 2012-11-20

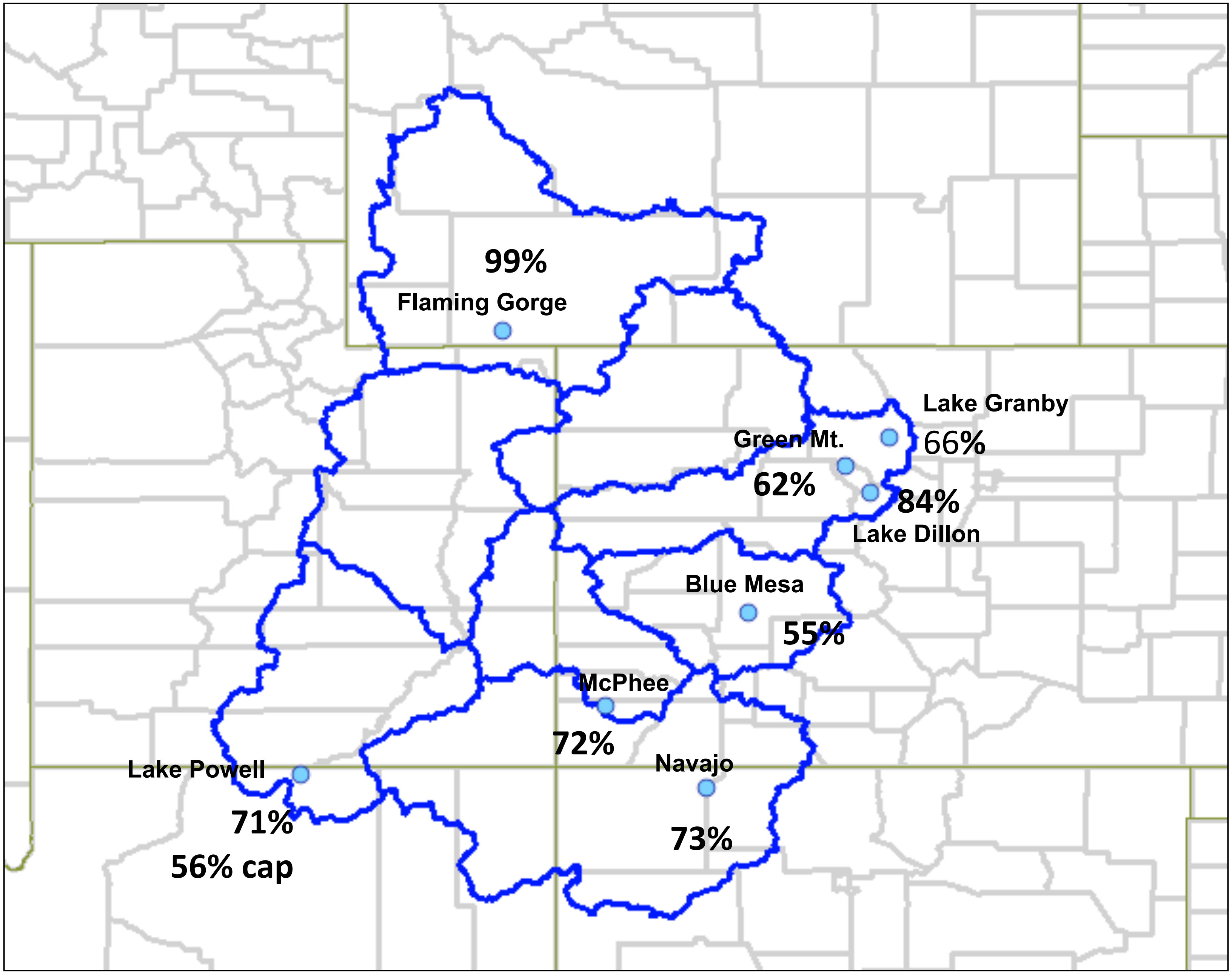

Roaring Fork River at Glenwood Springs Water Year Streamflow
Streamflow Volume (acre-feet)
2000000
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
1906
1910
1914
1918
1922
1926
1930
1934
1938
1942
1946
1950
1954
1958
1962
1966
1970
1974
1978
1982
1986
1990
1994
1998
2002
2006
2010


Animas River at Durango Water Year Streamflow
Streamflow Volume (acre-feet)
1200000
1000000
800000
600000
400000
200000
0
1913
1917
1921
1925
1929
1933
1937
1941
1945
1949
1953
1957
1961
1965
1969
1973
1977
1981
1985
1989
1993
1997
2001
2005
2009

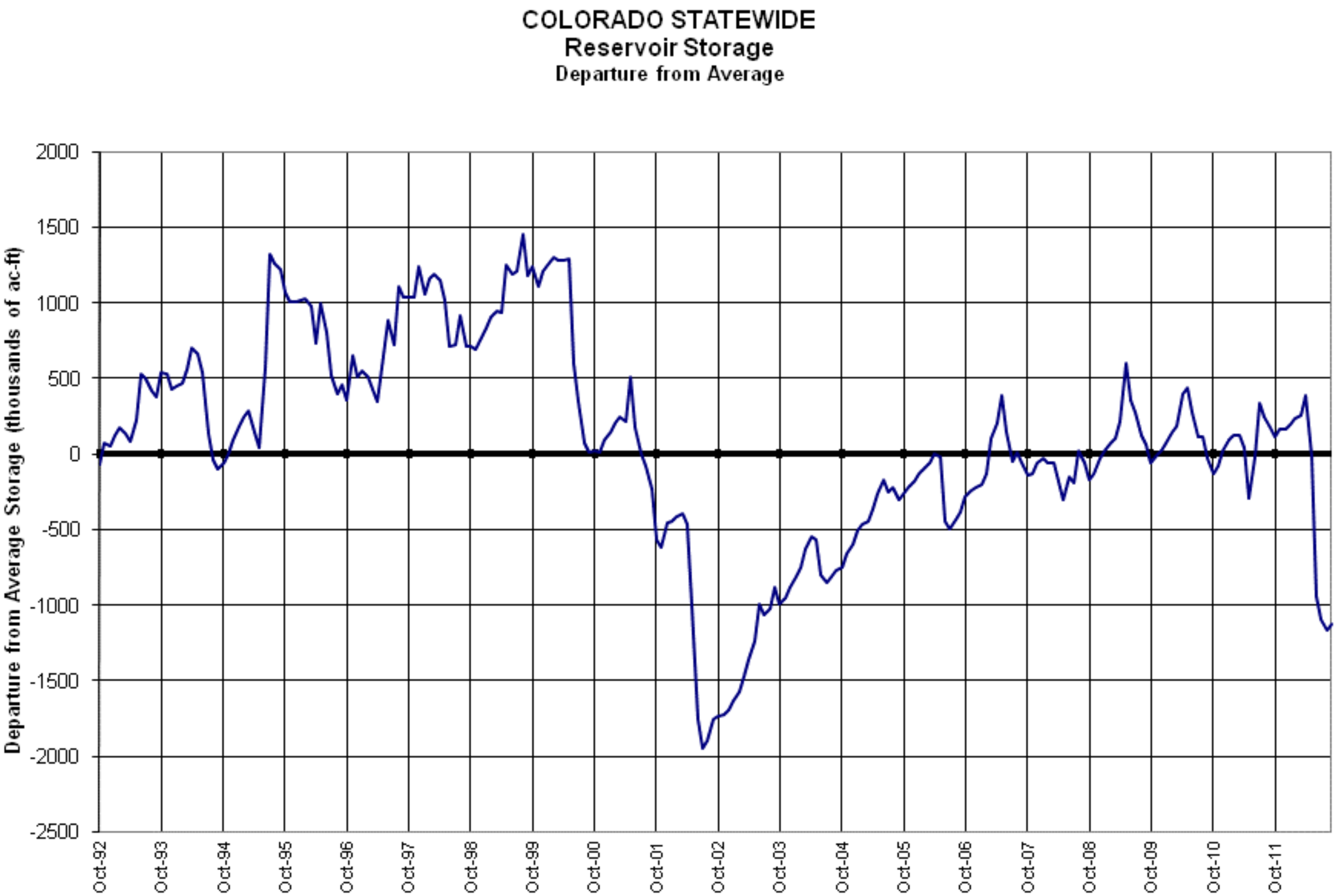

Yampa River Near Maybell, CO Water Year Streamflow
Streamflow Volume (acre-feet)
2500000
2000000
1500000
1000000
500000
0
1916
1919
1922
1925
1928
1931
1934
1937
1940
1943
1946
1949
1952
1955
1958
1961
1964
1967
1970
1973
1976
1979
1982
1985
1988
1991
1994
1997
2000
2003
2006
2009
2012

Reservoirs – our drought insurance

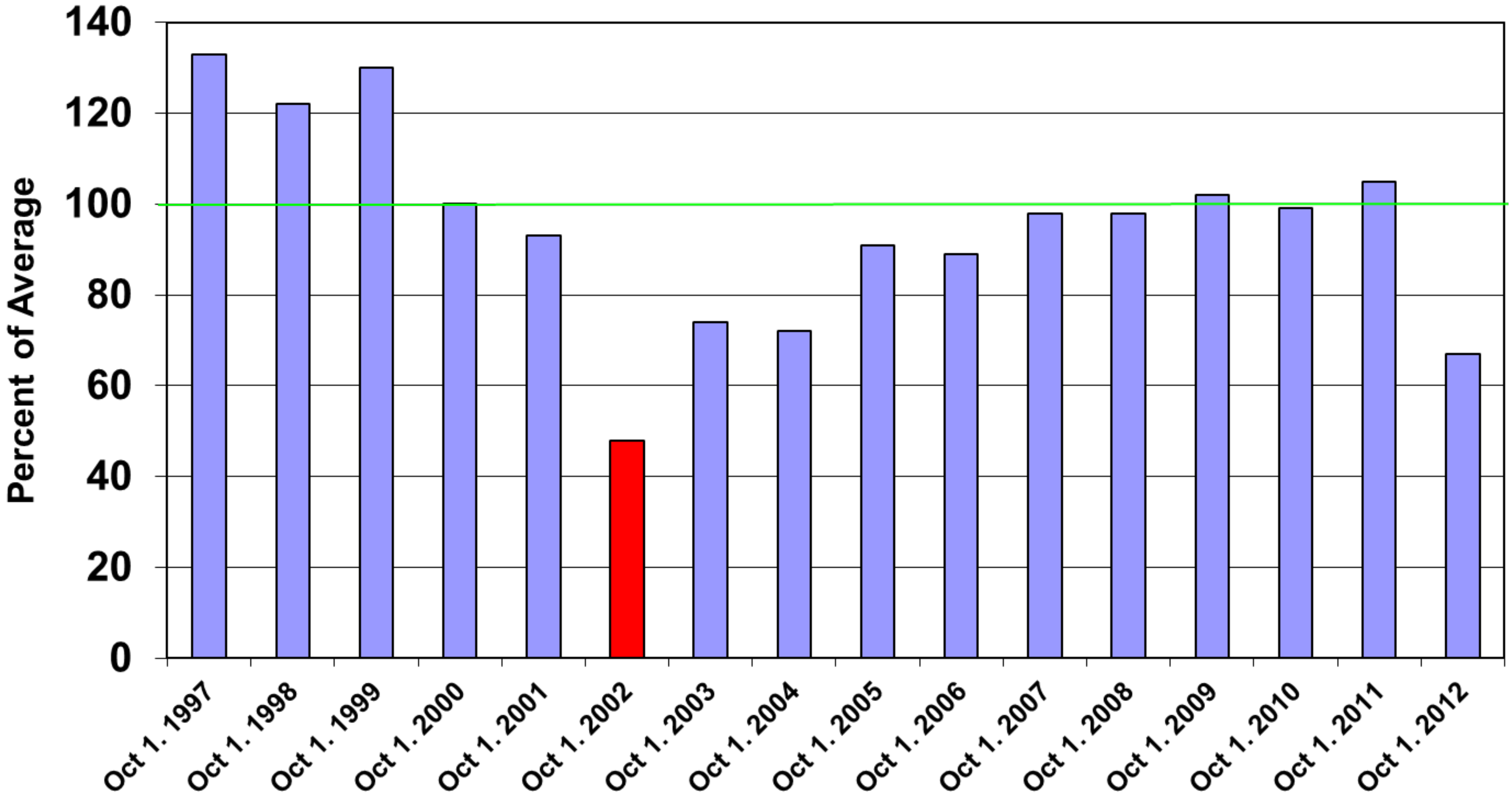
November 2012 Average Reservoir Storage Volume



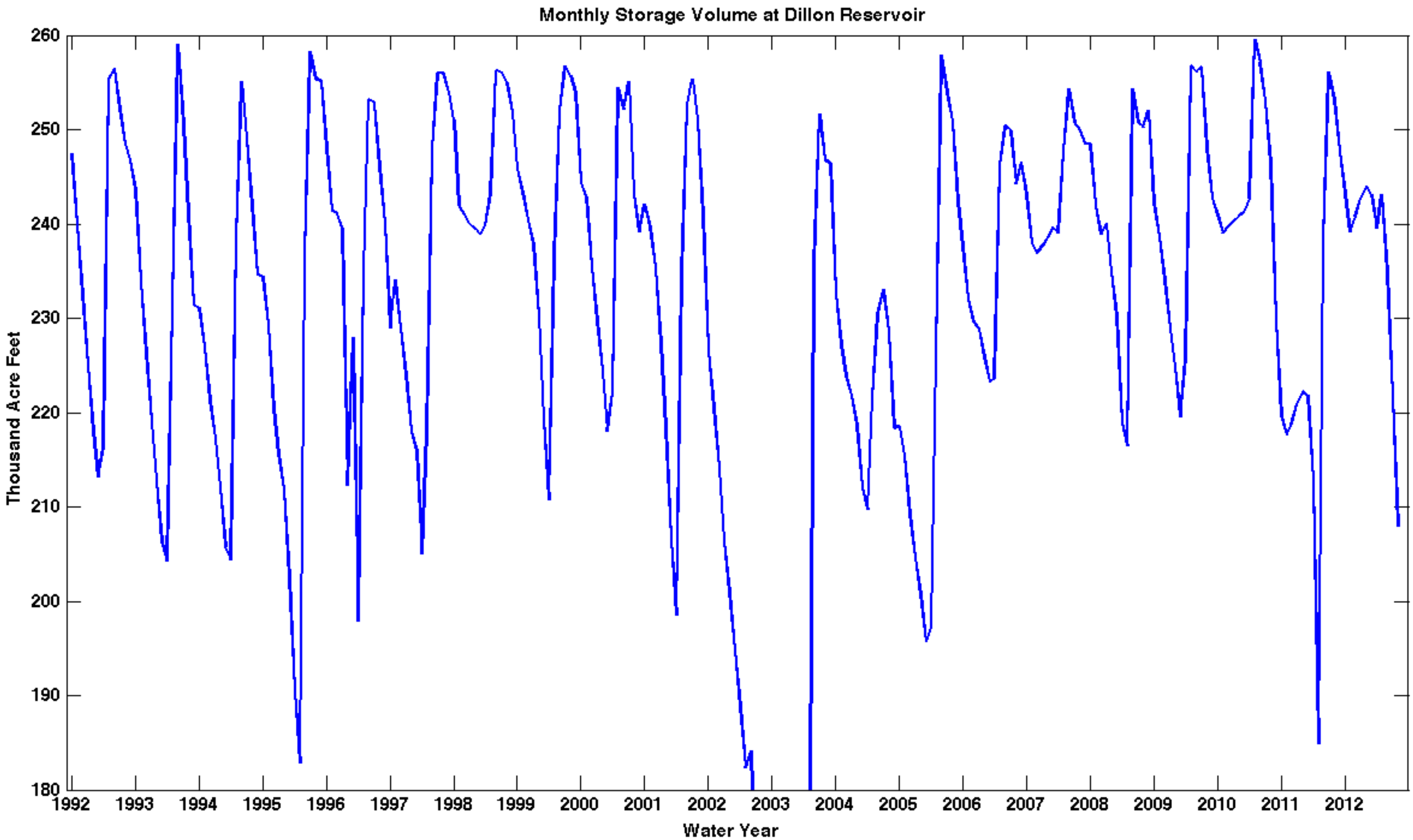
Imagine 2012 without reservoirs



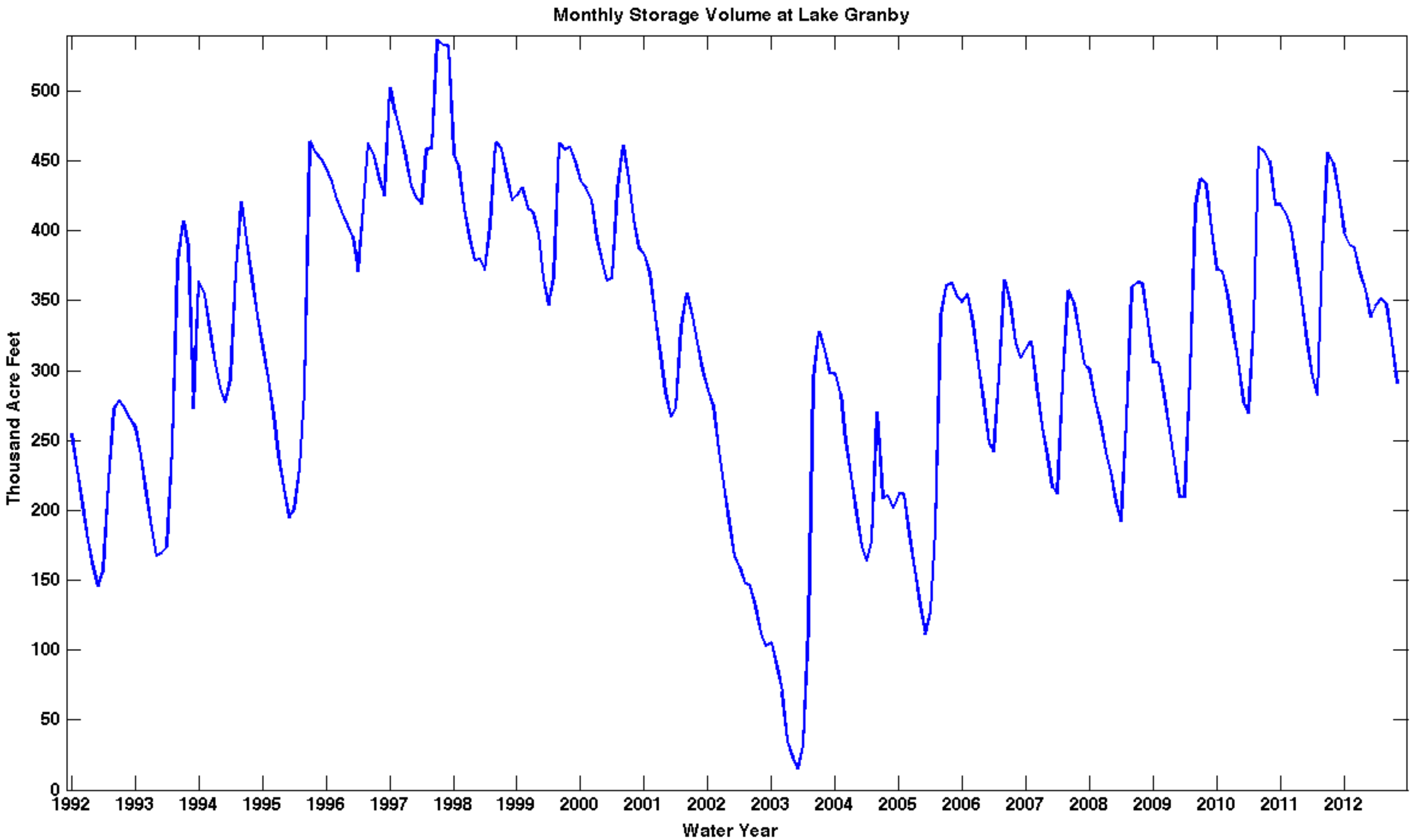
Colorado Statewide Reservoir Levels on October 1st for Years 1997- 2012



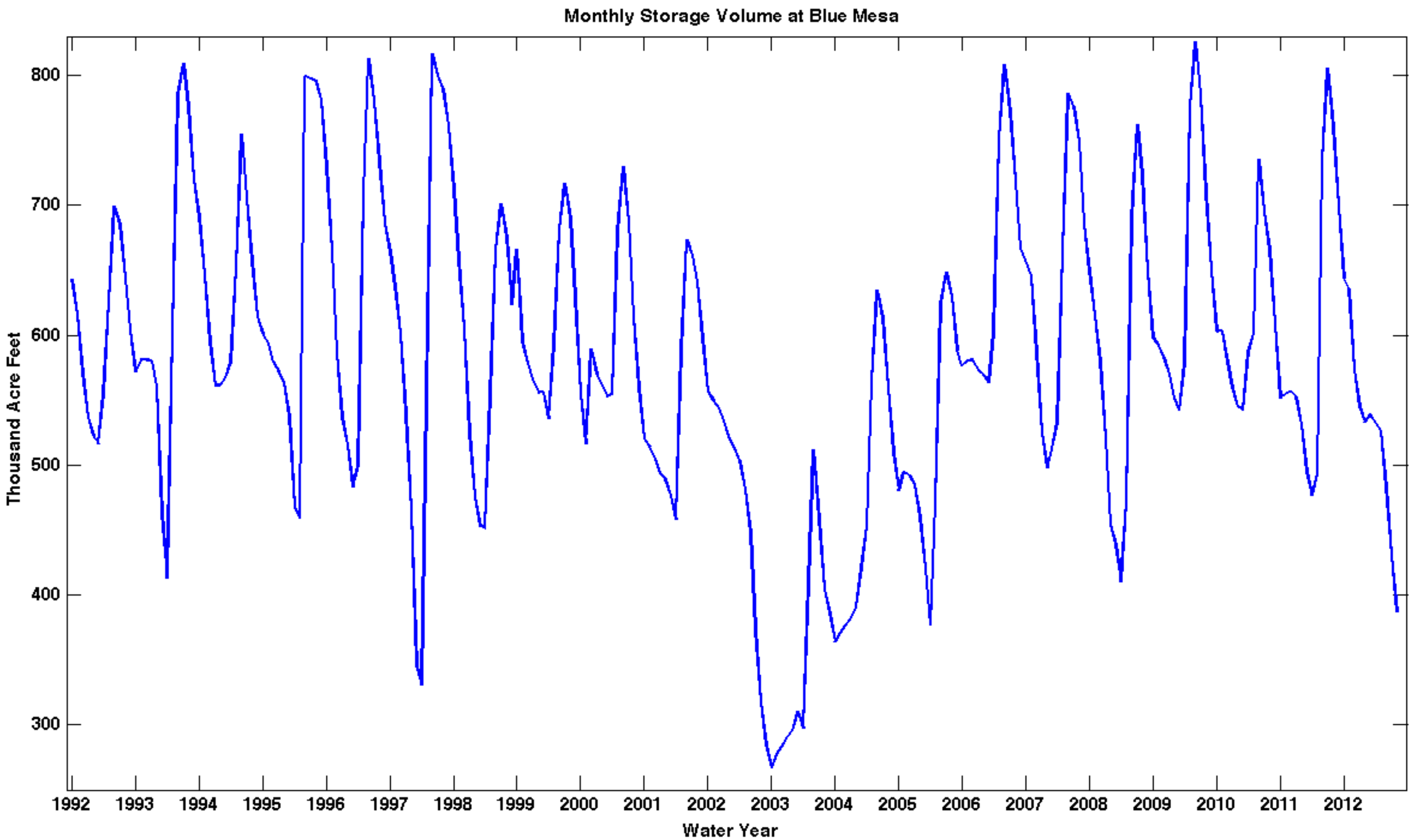
Dillon Storage Time Series



Granby Storage Time Series

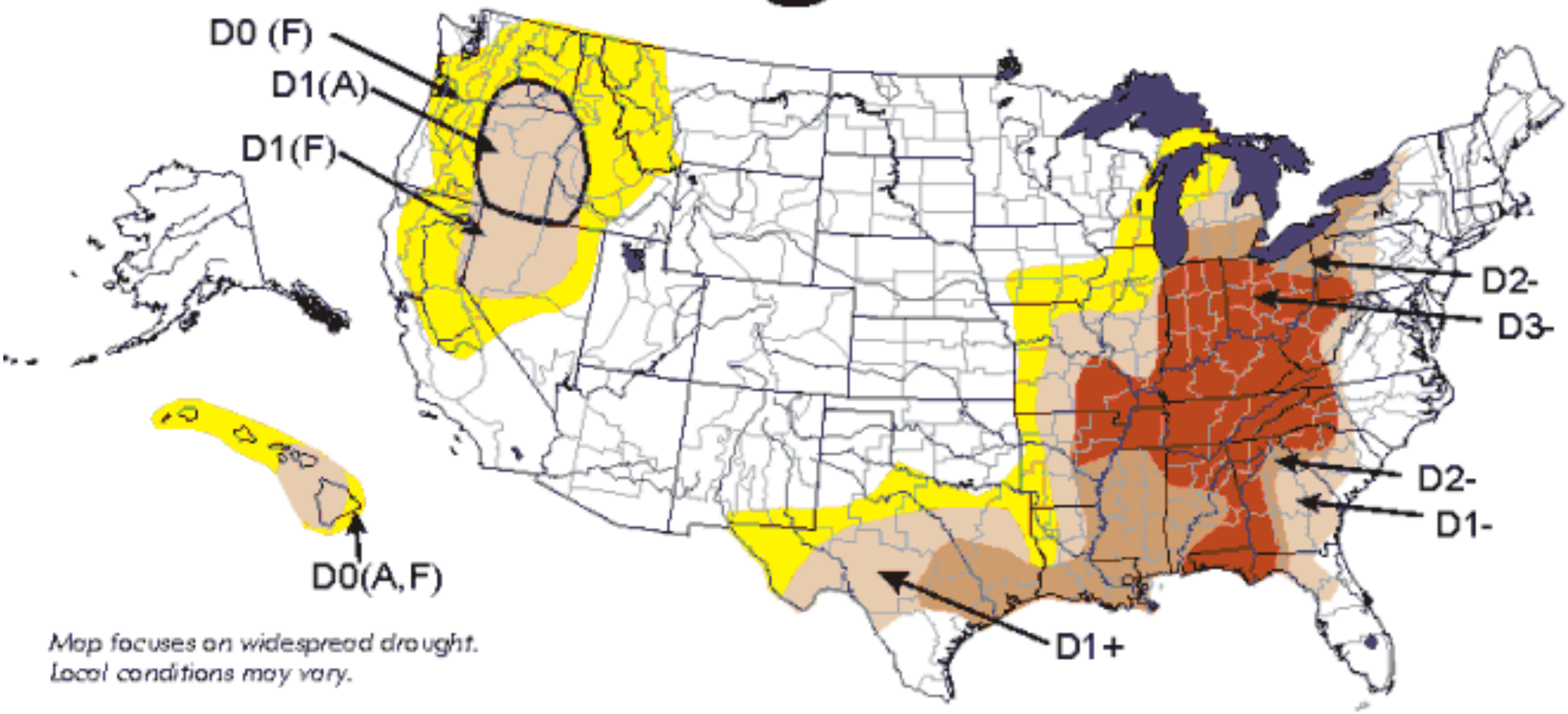


Blue Mesa Storage Volume



September 28, 1999

U.S. Drought Monitor



Map focuses on widespread drought.
Local conditions may vary.

- D0 Watch
- D1 Drought
- D2 Drought–Severe
- D3 Drought–Extreme
- D4 Drought–Exceptional
- Delineates Overlapping Areas

Drought type: used only when impacts differ

A = Agriculture
W = Water
F = Forest fire danger

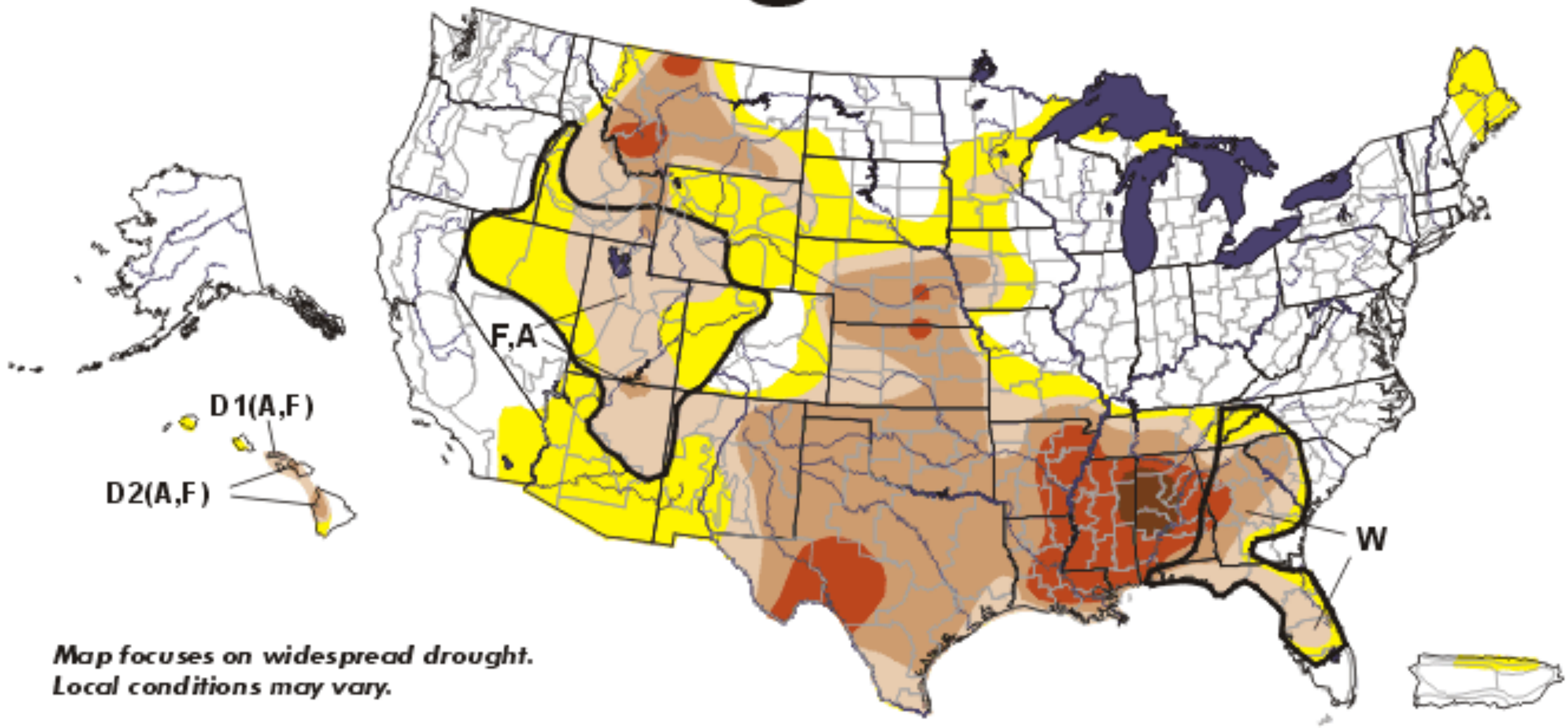
Plus (+) = Forecast to intensify next two weeks
Minus (-) = Forecast to diminish next two weeks
No sign = No change in drought classification forecast

USDA — National Drought Mitigation Center — U.S. Department of Commerce — NOAA

• ***Released Thursday, Sep 30, 1999*** •

October 3, 2000 Valid 8 a.m. EDT

U.S. Drought Monitor



Map focuses on widespread drought.
Local conditions may vary.

- D0 Abnormally Dry
- D1 Drought–First Stage
- D2 Drought–Severe
- D3 Drought–Extreme
- D4 Drought–Exceptional
- Delineates Overlapping Areas

Drought type: used only when impacts differ

A = Agriculture
W = Water
F = Wildfire danger

USDA · National Drought Mitigation Center · NOAA

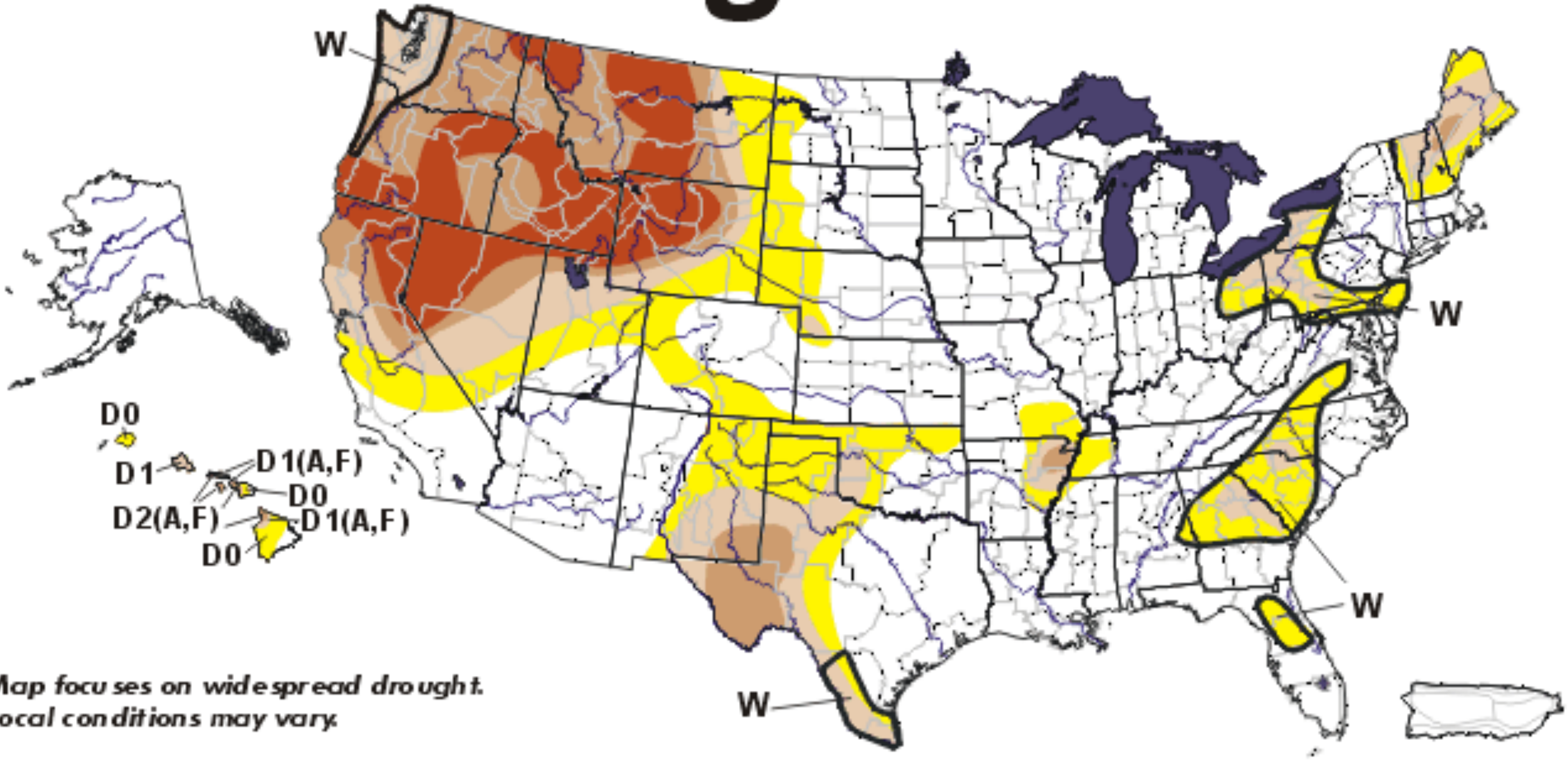
See accompanying text summary for forecast statements

http://enso.unl.edu/monitor/monitor.html

• ***Released Thursday, Oct. 5, 2000*** •

October 2, 2001 Valid 8 a.m. EDT

U.S. Drought Monitor



Map focuses on widespread drought.
Local conditions may vary.

- D0 Abnormally Dry
- D1 Drought–Moderate
- D2 Drought–Severe
- D3 Drought–Extreme
- D4 Drought–Exceptional
- Delineates Overlapping Areas

Drought Impact Types:
A = Agriculture
W = Water (Hydrological)
F = Fire danger (Wildfires)
(No type = All 3 impacts)

See accompanying text summary for forecast statements
http://enso.unl.edu/monitor/monitor.html

USDA
National Drought Mitigation Center

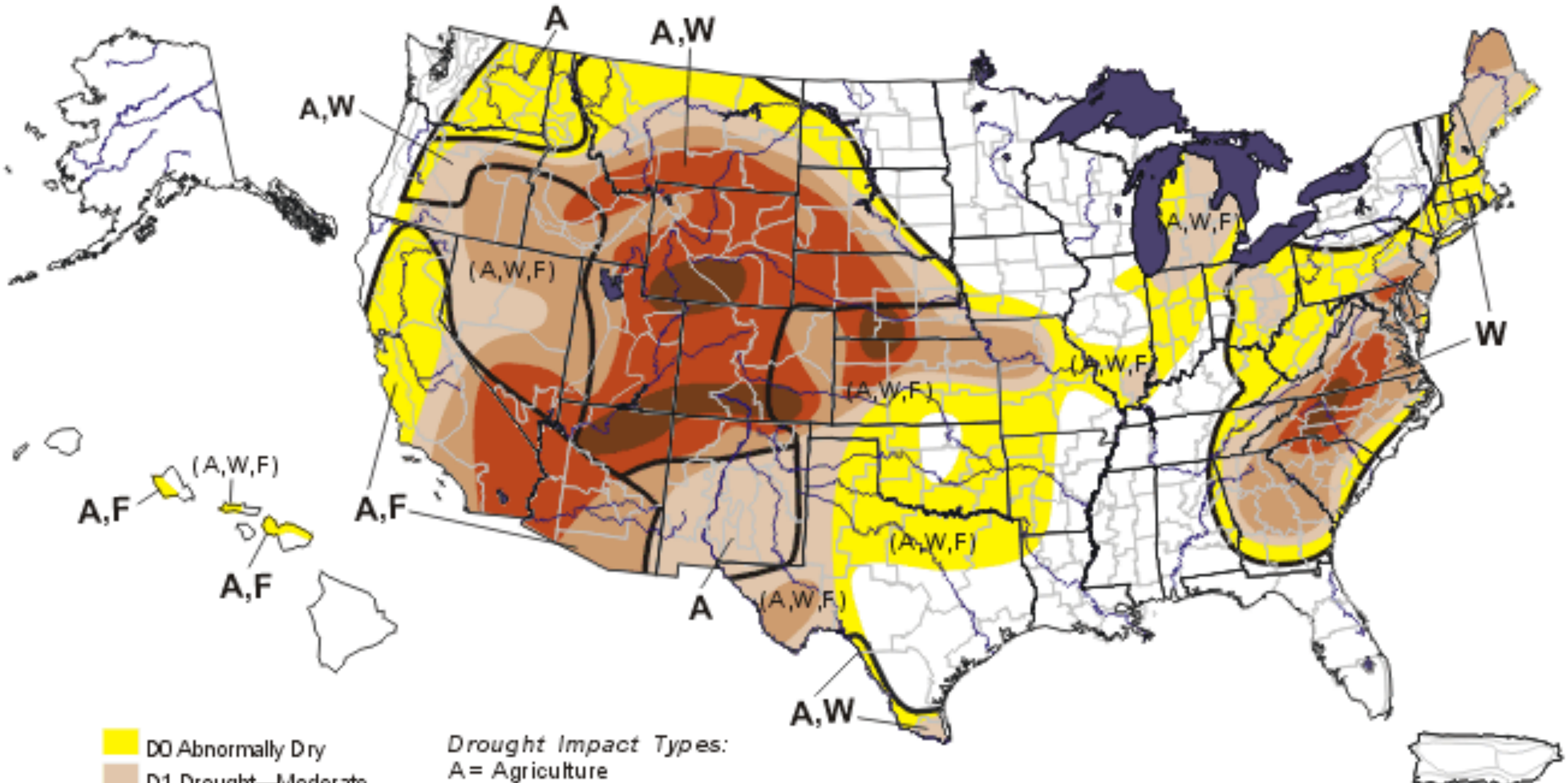
• ***Released Thursday, October 4, 2001*** •

Author: *Douglas Le Comte, NOAA/CPC*

U.S. Drought Monitor

October 1, 2002

Valid 8 a.m. EDT



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

Drought Impact Types:
A = Agriculture
W = Water (Hydrological)
F = Fire danger (Wildfires)
Delineates dominant impacts
(No type = All 3 impacts)

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

http://drought.unl.edu/dm

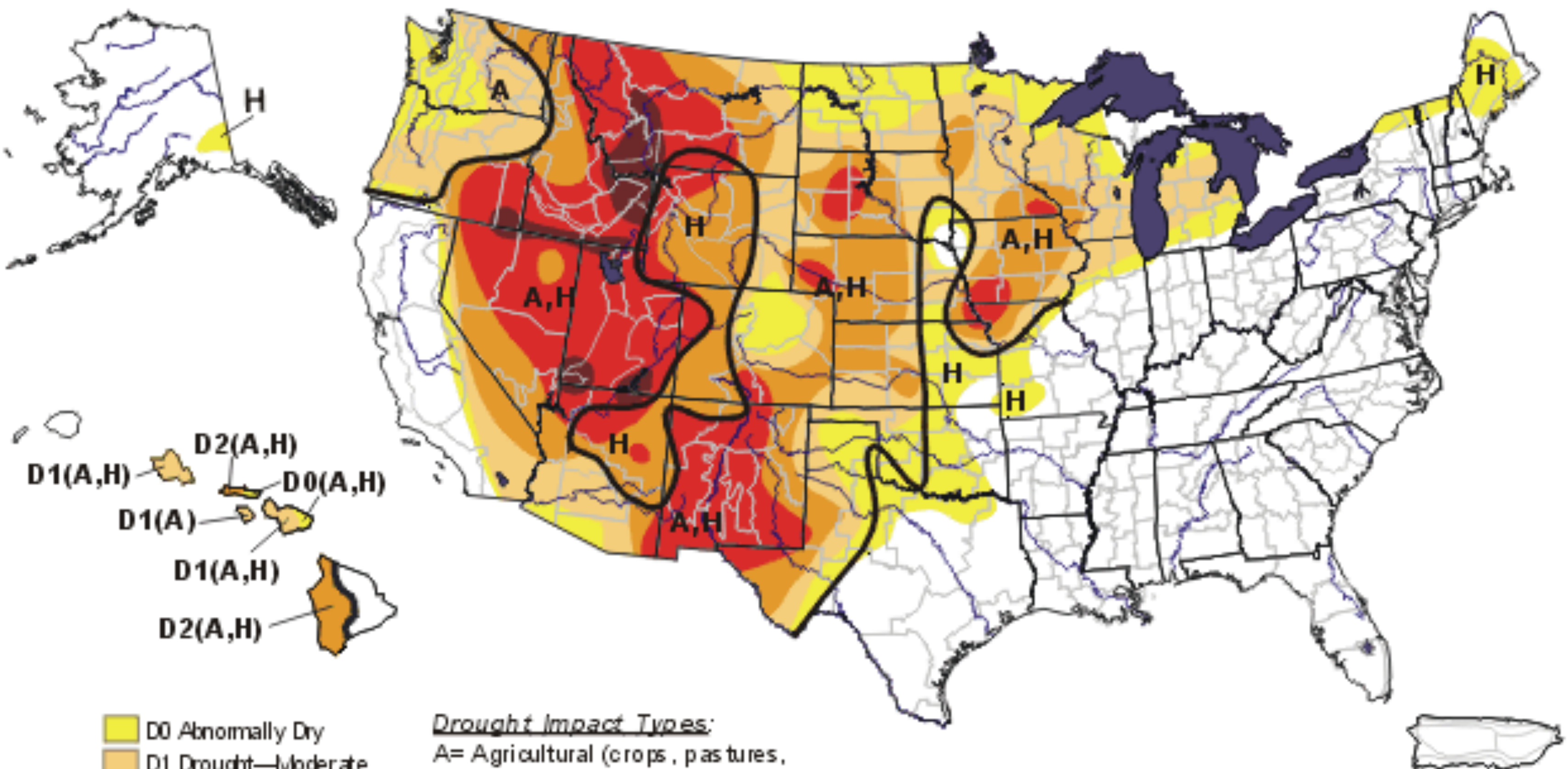
USDA
National Drought Mitigation Center
NOAA

Released Thursday, October 3, 2002

Author: *Rich Tinker, CPC/NCEP/NWS/NOAA*

U.S. Drought Monitor

September 30, 2003
Valid 8 a.m. EDT



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

Drought Impact Types:
A= Agricultural (crops, pastures, grasslands)
H= Hydrological (water)
No type = both impacts
Delineates dominant impacts

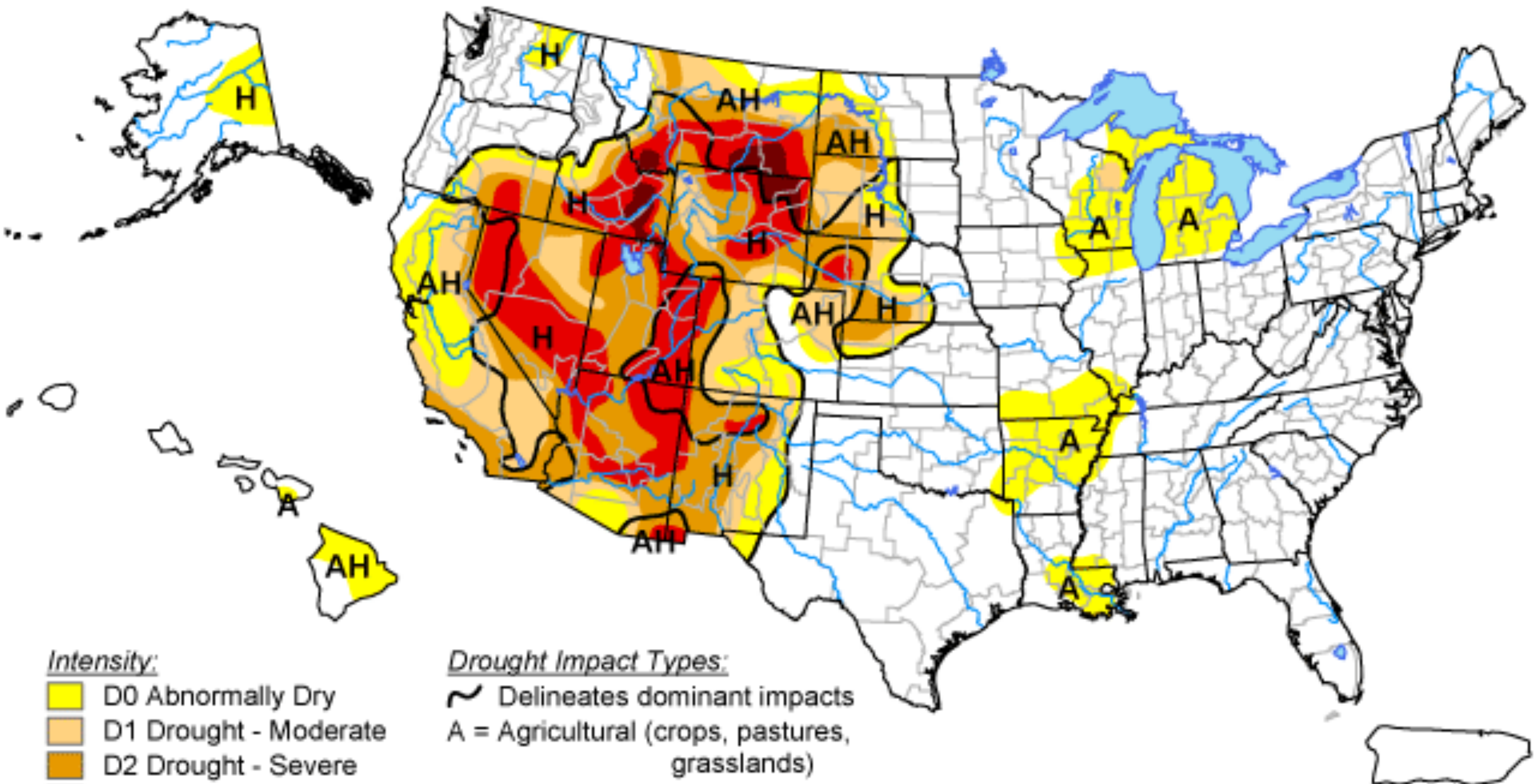
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://drought.unl.edu/dm

Released Thursday, October 2, 2003
Author: *Candace Tankersley/Scott Stephens, NOAA/NCDC*

U.S. Drought Monitor

September 28, 2004
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
A = Agricultural (crops, pastures, grasslands)
H = Hydrological (water)
(No type = Both impacts)

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

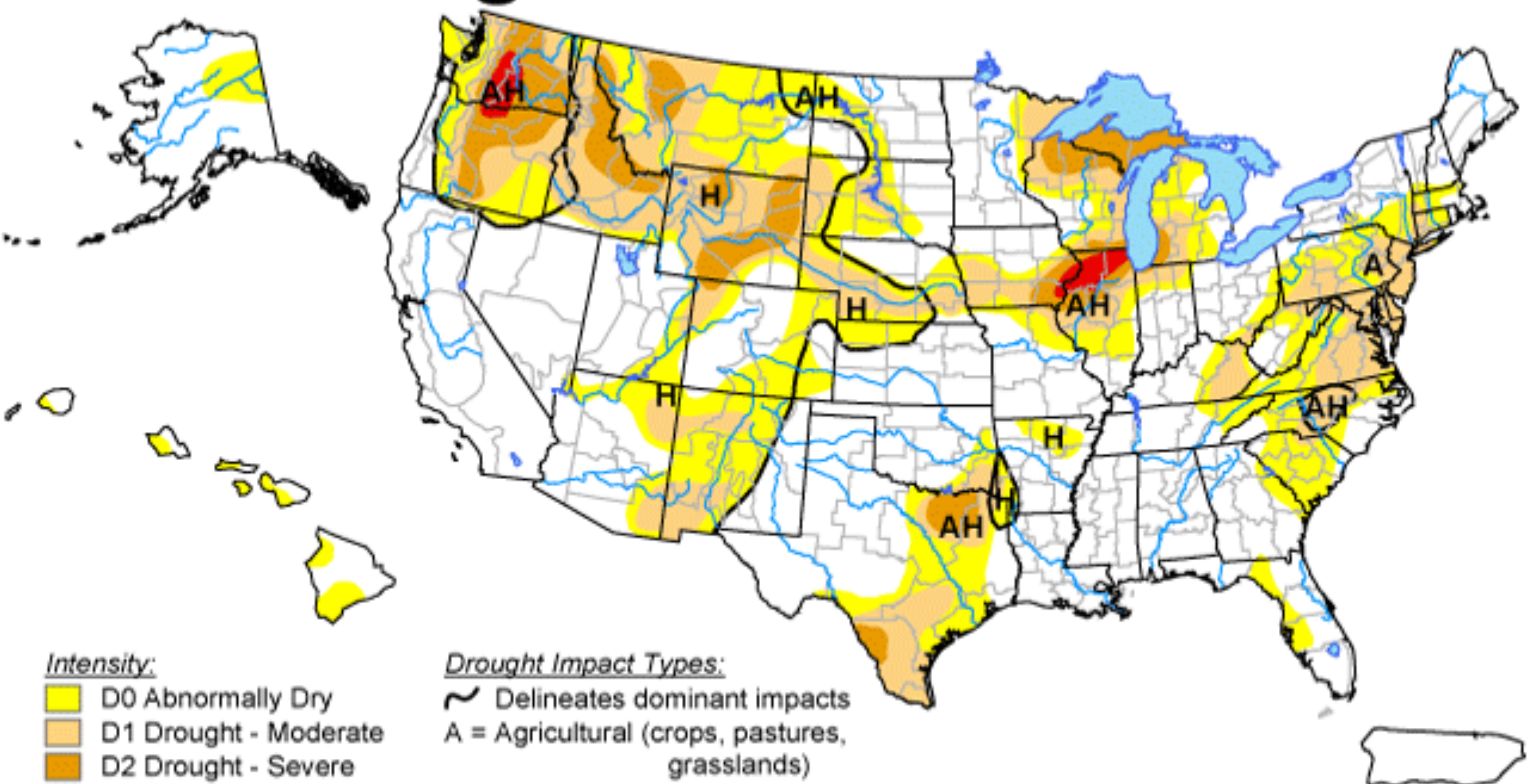
http://drought.unl.edu/dm

USDA
National Drought Mitigation Center

Released Thursday, September 30, 2004
Author: Brad Rippey, U.S. Department of Agriculture

U.S. Drought Monitor

September 27, 2005
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
A = Agricultural (crops, pastures, grasslands)
H = Hydrological (water)
(No type = Both impacts)

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

http://drought.unl.edu/dm

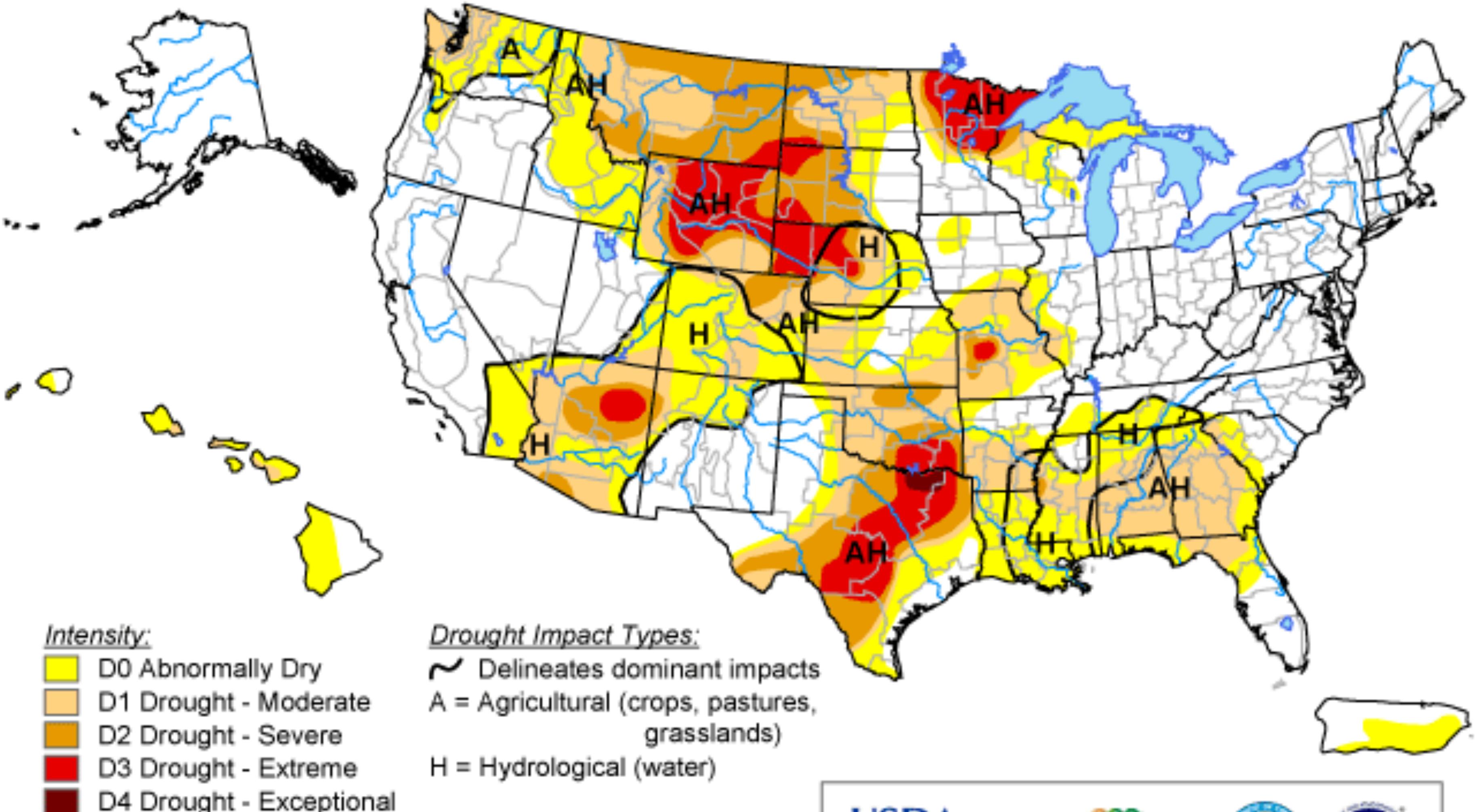
USDA National Drought Mitigation Center

Released Thursday, September 29, 2005

Author: Douglas Le Comte, CPC/NOAA

U.S. Drought Monitor

October 3, 2006
Valid 8 a.m. EDT



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

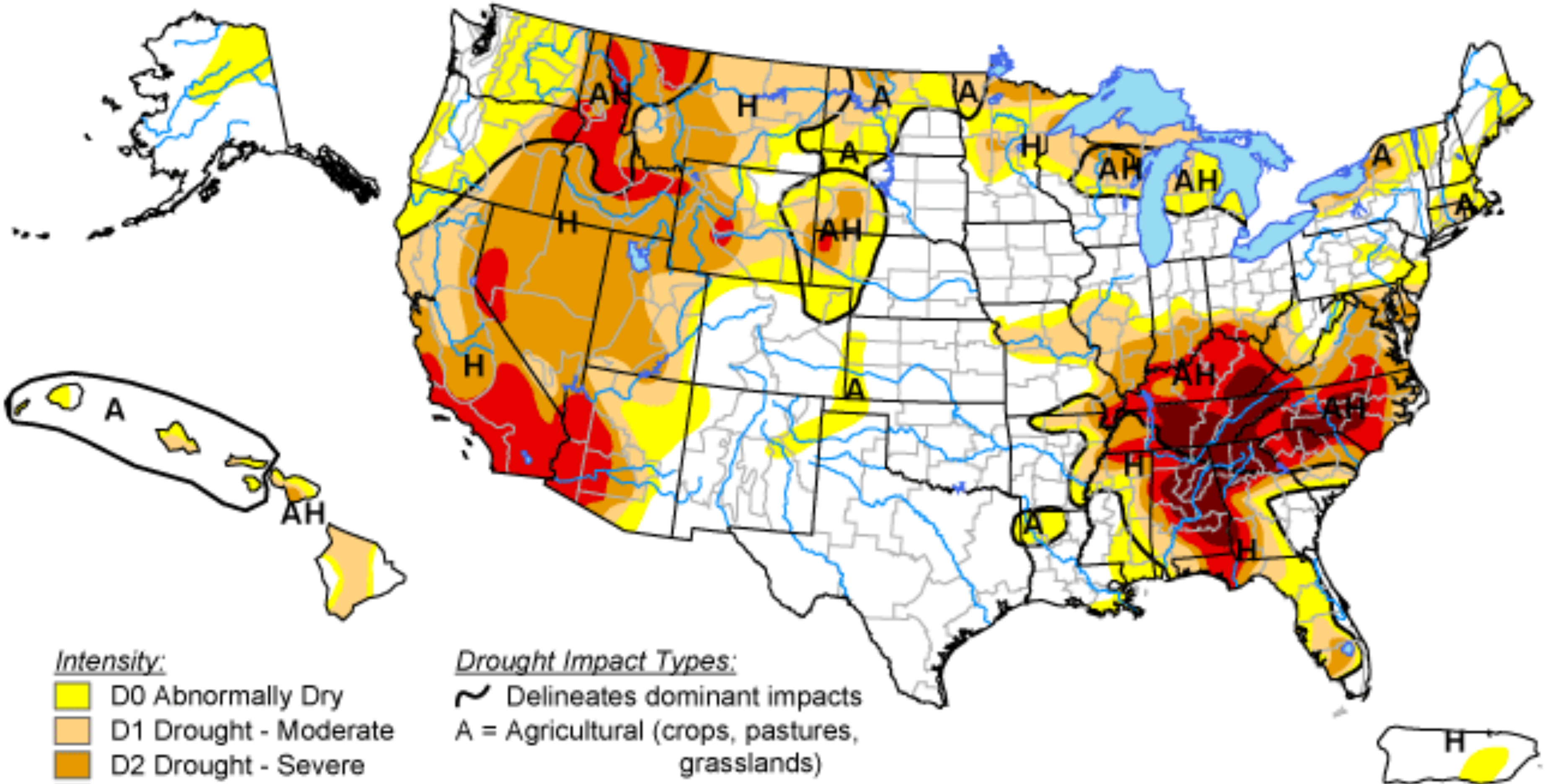
http://drought.unl.edu/dm

Released Thursday, October 5, 2006

Author: Rich Tinker, Climate Prediction Center, NOAA

U.S. Drought Monitor

October 2, 2007
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
- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)

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

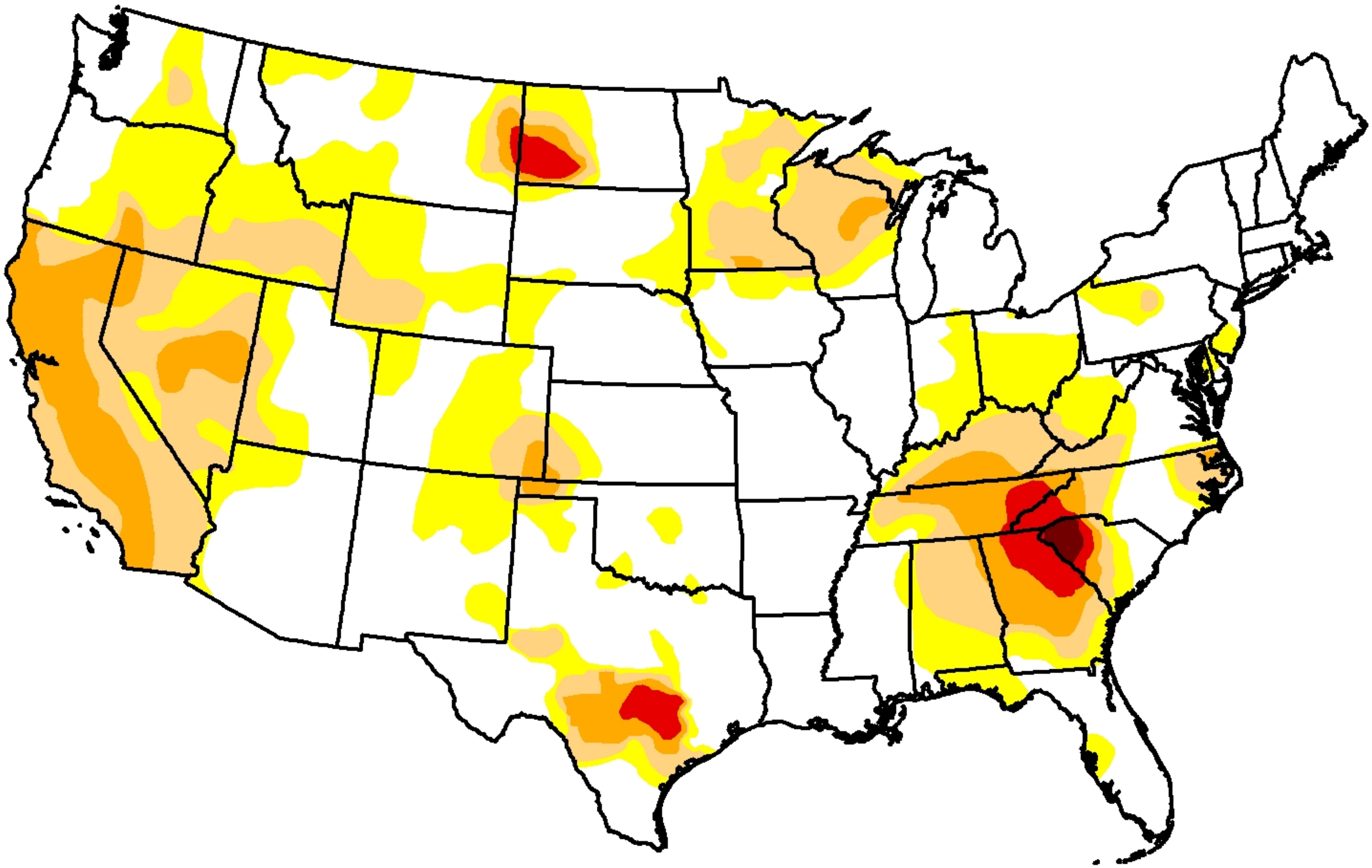
http://drought.unl.edu/dm

USDA — National Drought Mitigation Center

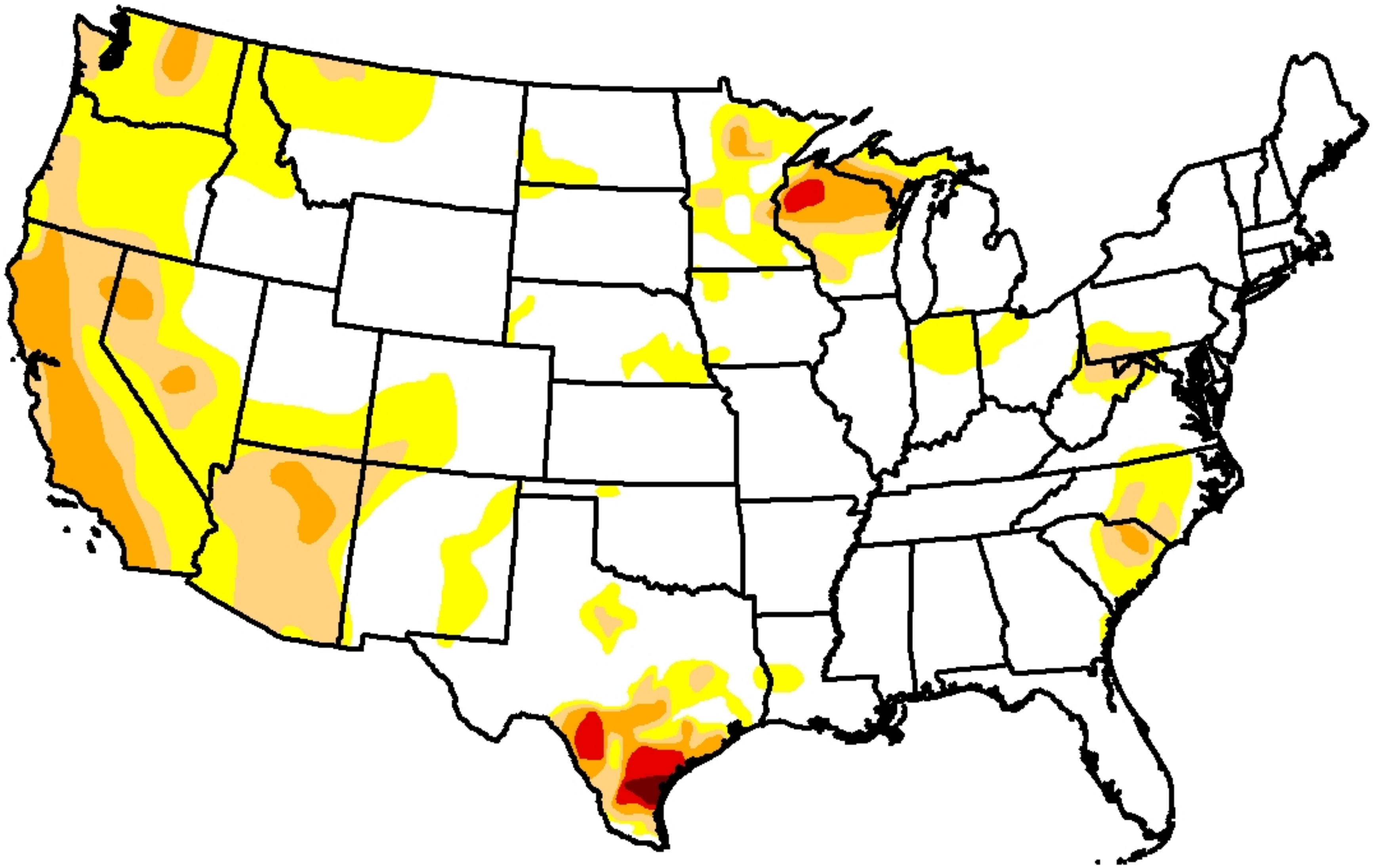
Released Thursday, October 4, 2007

Author: Jay Lawrimore/Liz Love-Brotak, NOAA/NESDIS/NCDC

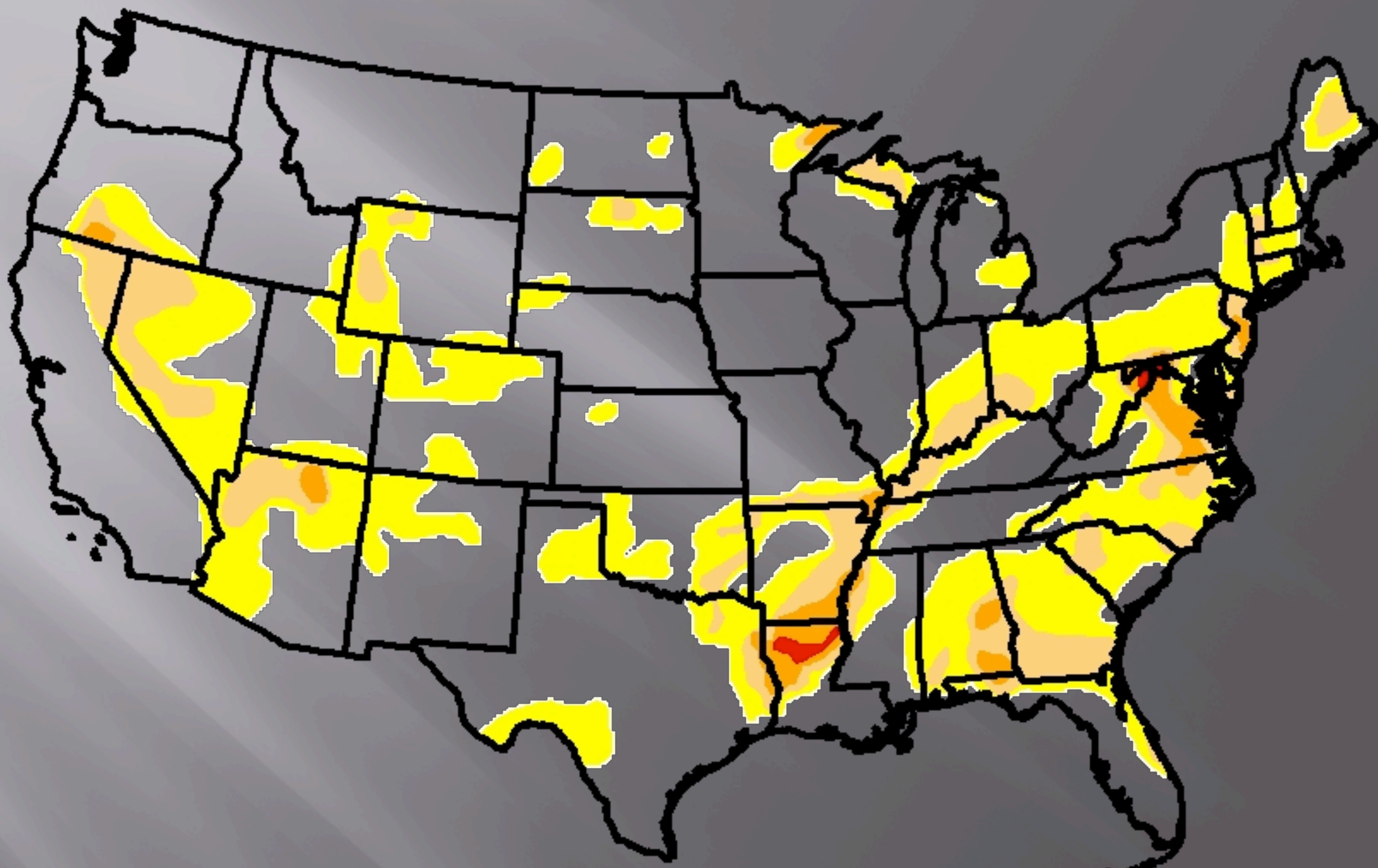
USDM: October 7, 2008



USDM: October 6, 2009



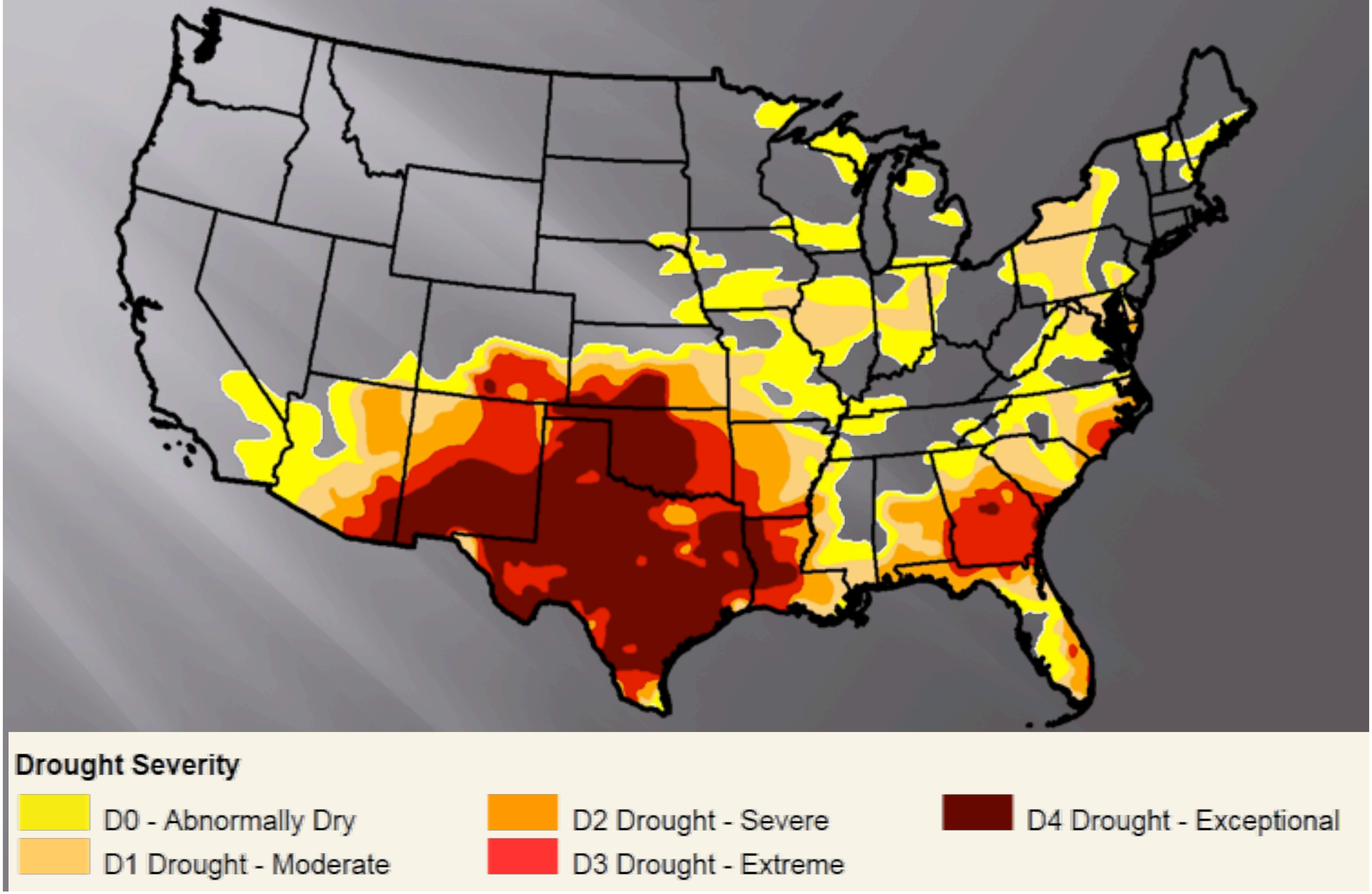
USDM: September 2010



Drought Severity

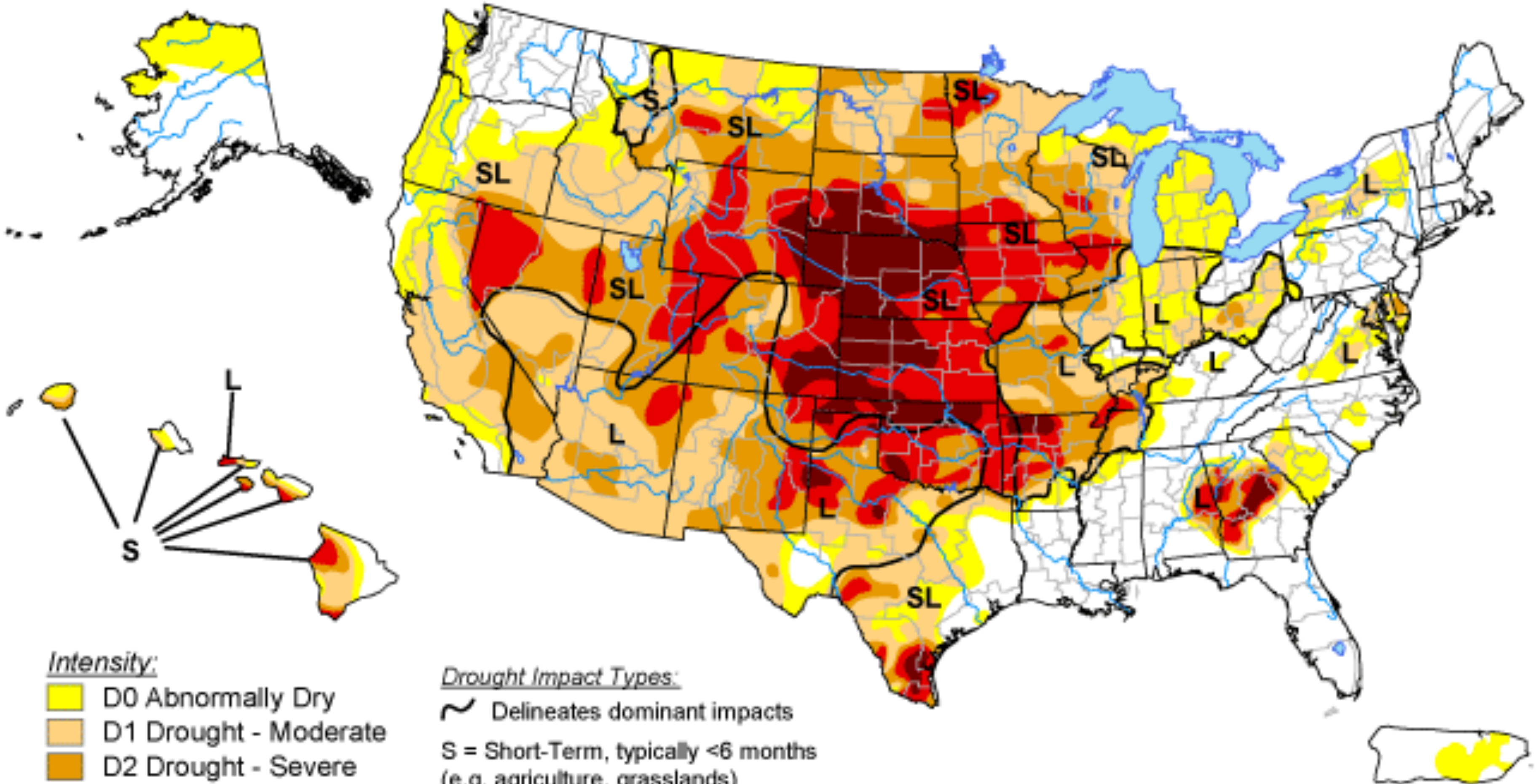
D0 - Abnormally Dry
D1 Drought - Moderate
D2 Drought - Severe
D3 Drought - Extreme
D4 Drought - Exceptional

USDM: August 2011



U.S. Drought Monitor

October 9, 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)

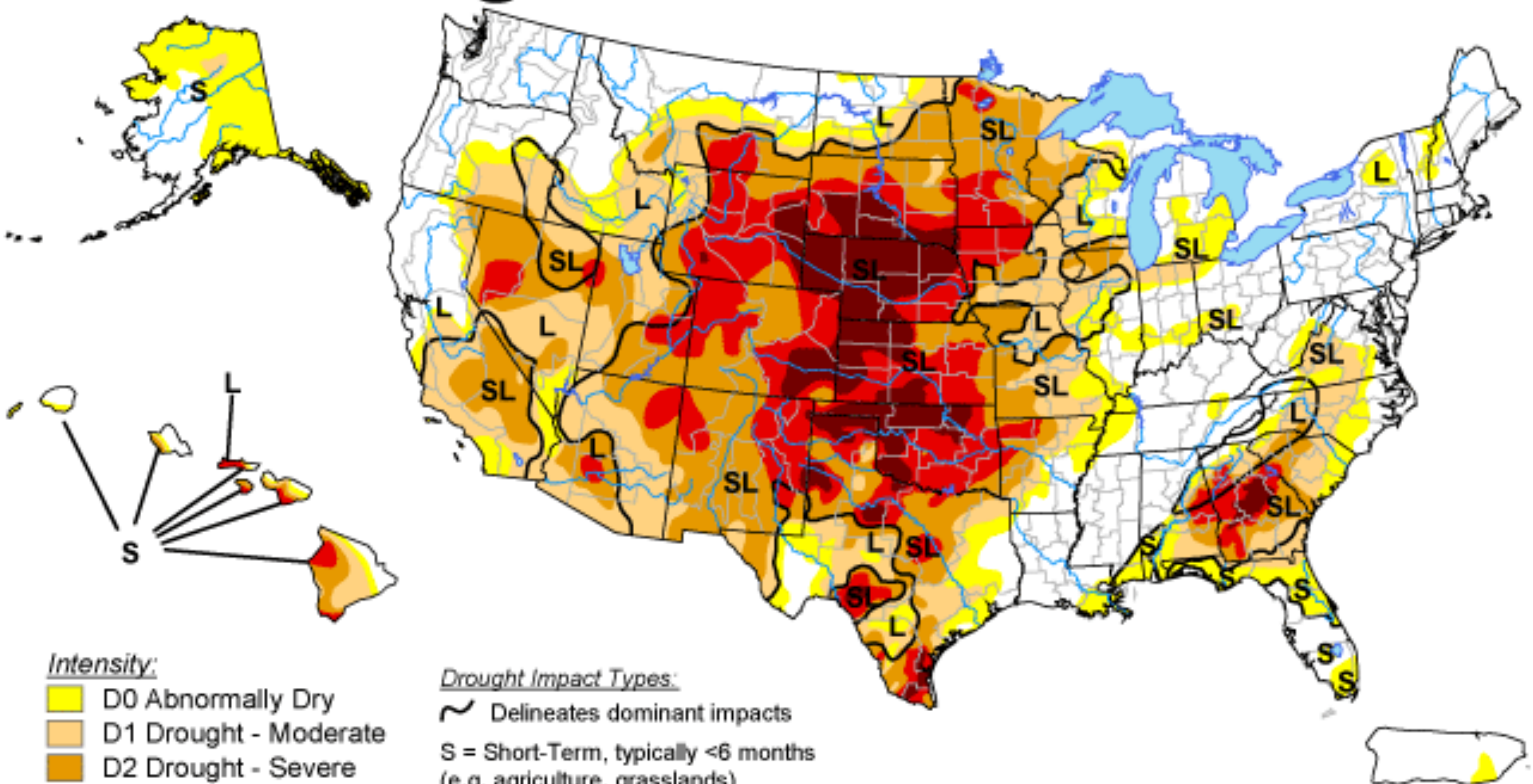
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu/

Released Thursday, October 11, 2012
Author: Matthew Rosencrans, NOAA/NWS/NCEP/CPC

U.S. Drought Monitor

January 15, 2013
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)

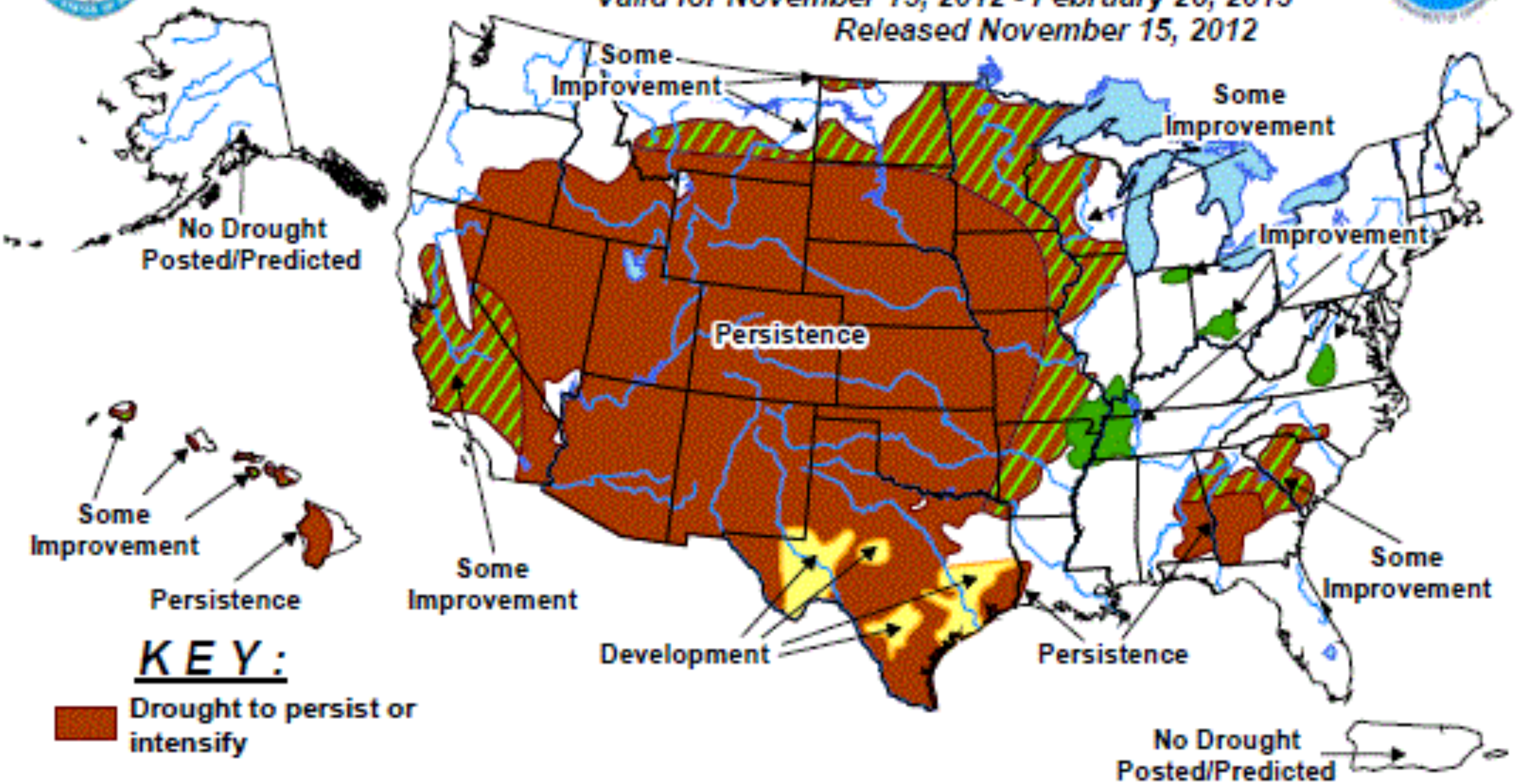
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu/

Released Thursday, January 17, 2013

Author: David Simeral, Western Regional Climate Center

U.S. Seasonal Drought Outlook
Drought Tendency During the Valid Period
Valid for November 15, 2012 - February 28, 2013
Released November 15, 2012



KEY:

- Drought to persist or intensify
- Drought ongoing, some improvement
- Drought likely to improve, impacts ease
- Drought development likely

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.

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

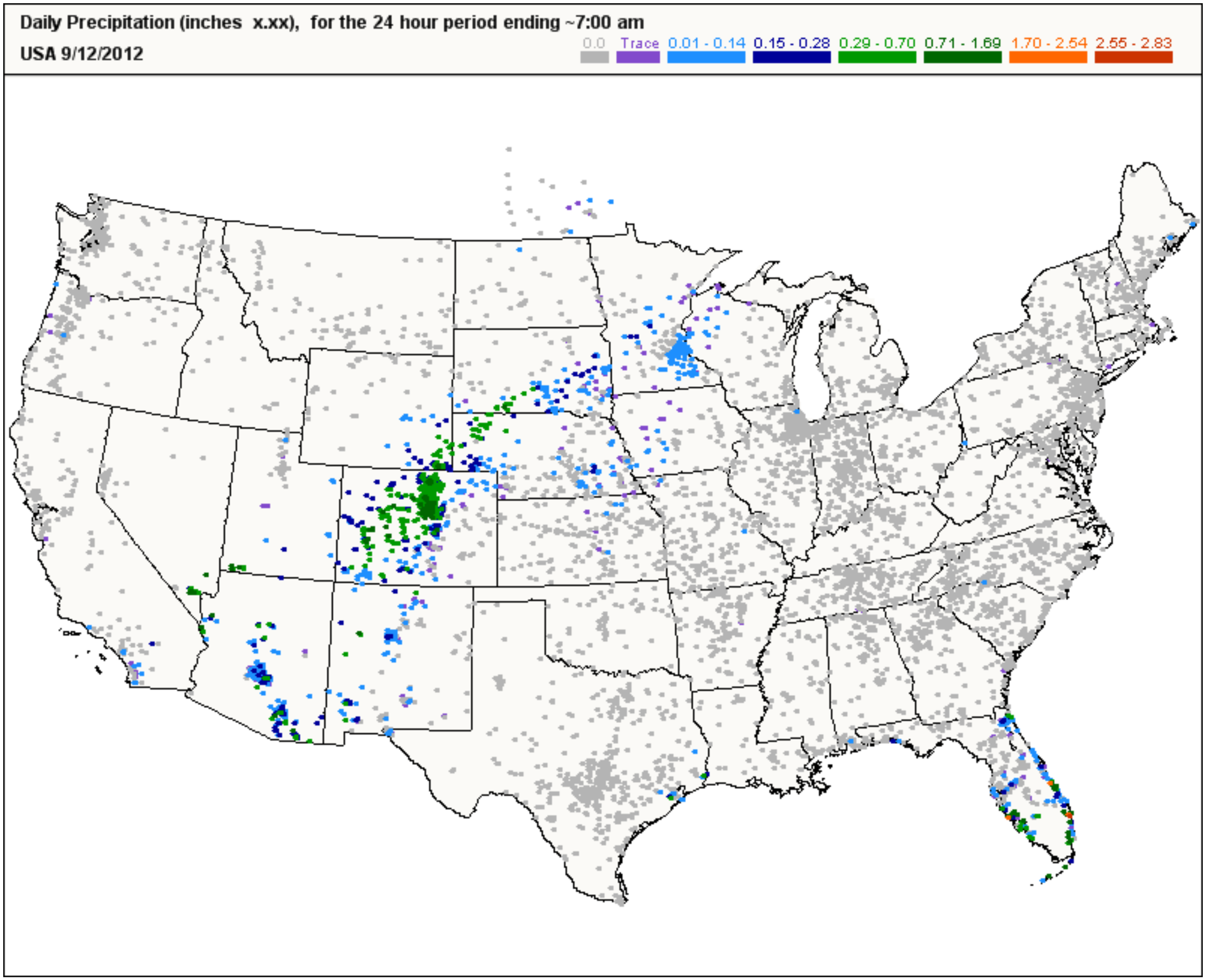
or see me today

Please Help Us Monitor Colorado's Climate!

CoCoRaHS and Colorado Water 2012

- **CoCoRaHS offered free rain gauges to ALL schools in Colorado (1,800+)**
- **Local communities/organizations donated the gauges**
- **Over 100 schools signed up and received training**
- **Ongoing efforts to train, provide lesson plans and recruit**

U.S. Rainfall 9/12/2012 – based on CoCoRaHS volunteers



Colorado: It’s a great place but we have to be ready

Photo by Lynn Kral, Loveland, January 2006

Colorado Climate Center

Data and Power Point Presentations available for downloading

http://ccc.atmos.colostate.edu

Nolan.Doesken@Colostate.edu

Colorado State University
Knowledge to Go Places

COLORADO CLIMATE CENTER