

Climate Change – What Changes Might We See in the Arkansas Watershed in the Next 100 Years?

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Atmospheric Science Department**

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Prepared by Odie Bliss
with assistance of Wendy Ryan, Daniel Dennison, and Peter Rogers

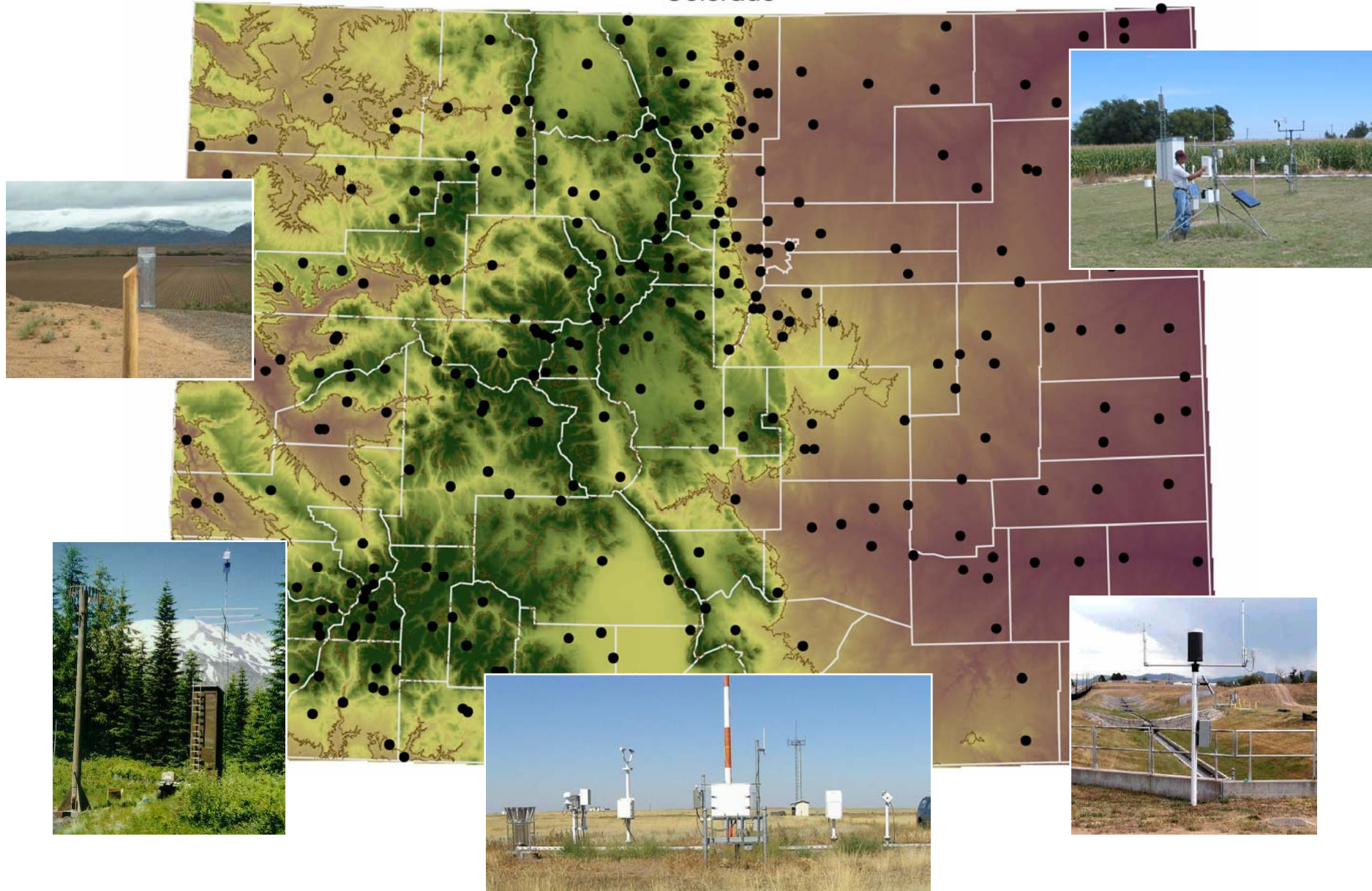
Photo by Ian Wittmeyer

Perspectives on Colorado's Climate:

To look ahead,
climatologists
first look back

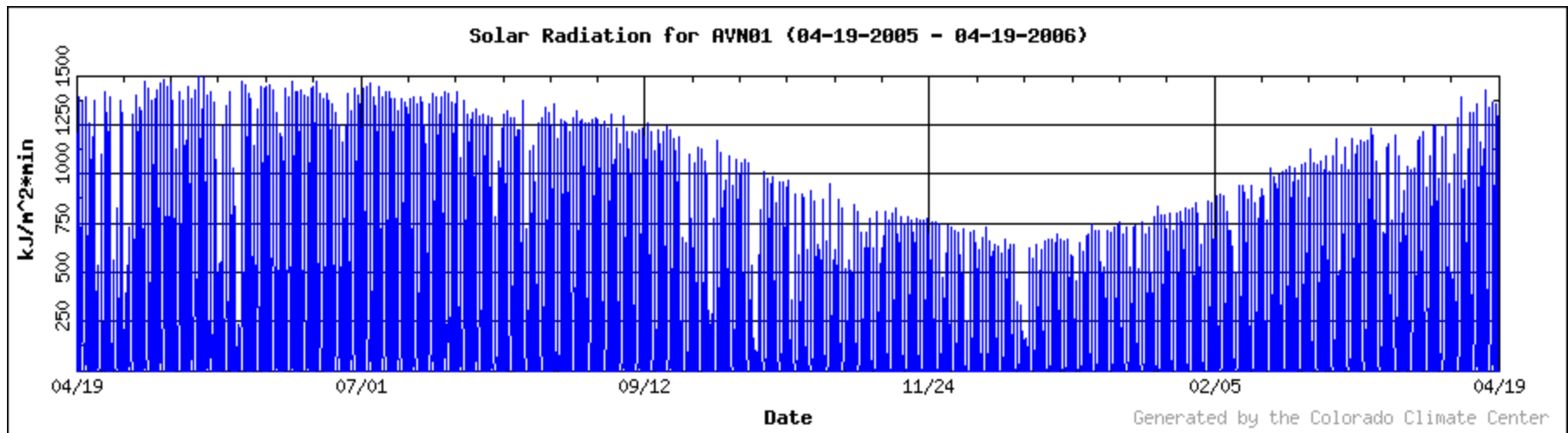
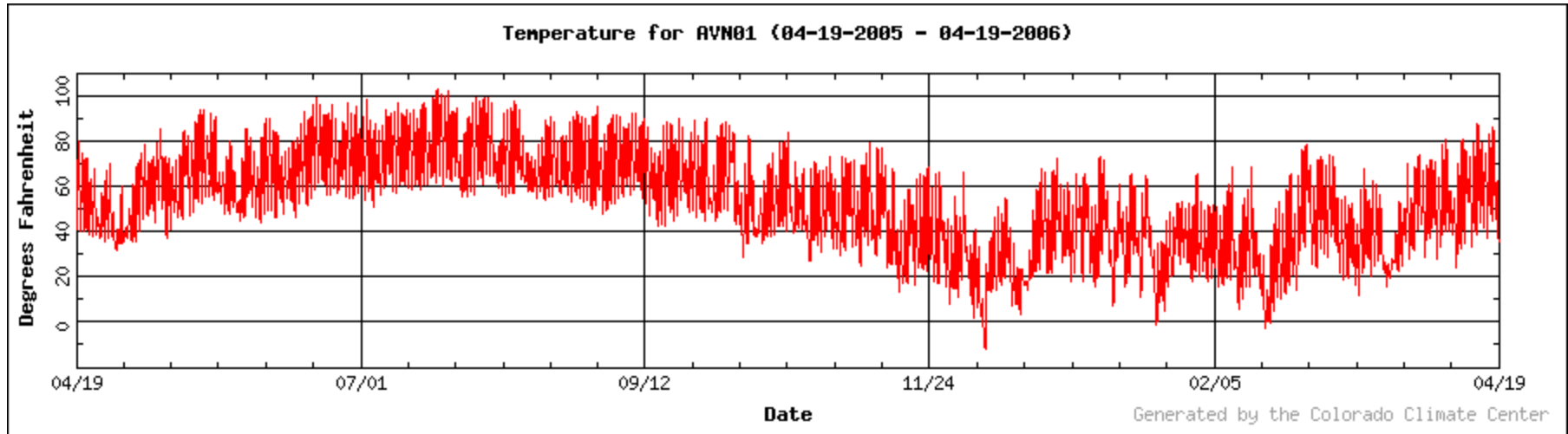
We have a lot of weather data!

Colorado

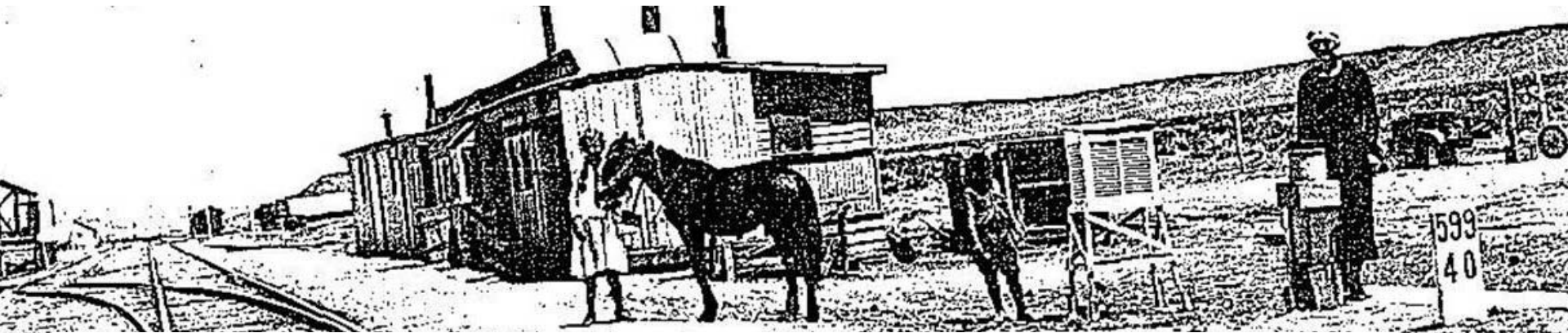
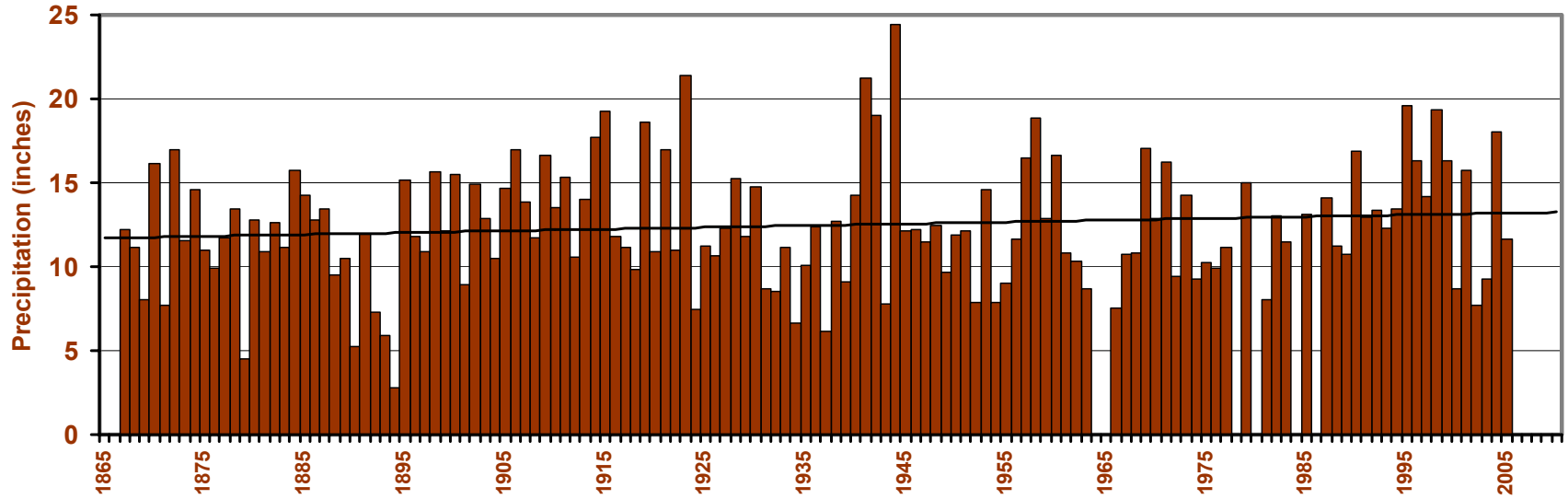


Avondale, Colo, CSU CoAgMet weather

April 2005-2006



Las Animas Annual Precipitation (1867-2005)

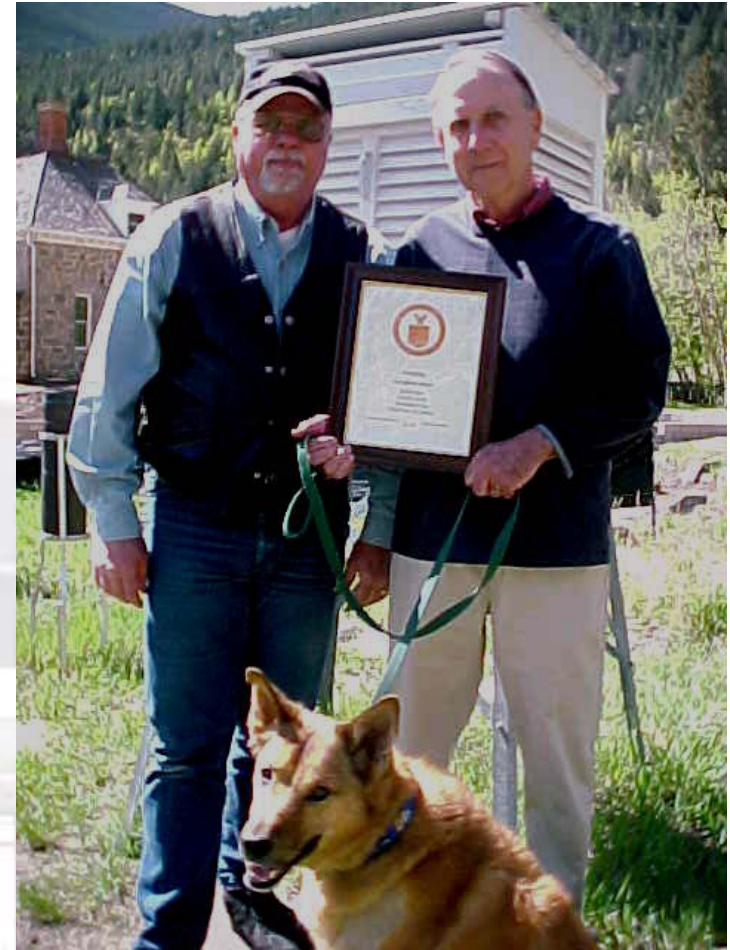


**Instrumental weather observations
date back to the late 1800s**

UTAH 1930

We are indebted to NWS for maintaining long-term weather stations

- ❑ Army Signal Service (began 1870-1891)
- ❑ Weather Bureau (1890-1969)
- ❑ National Weather Service (1970-present)



Climate is variable

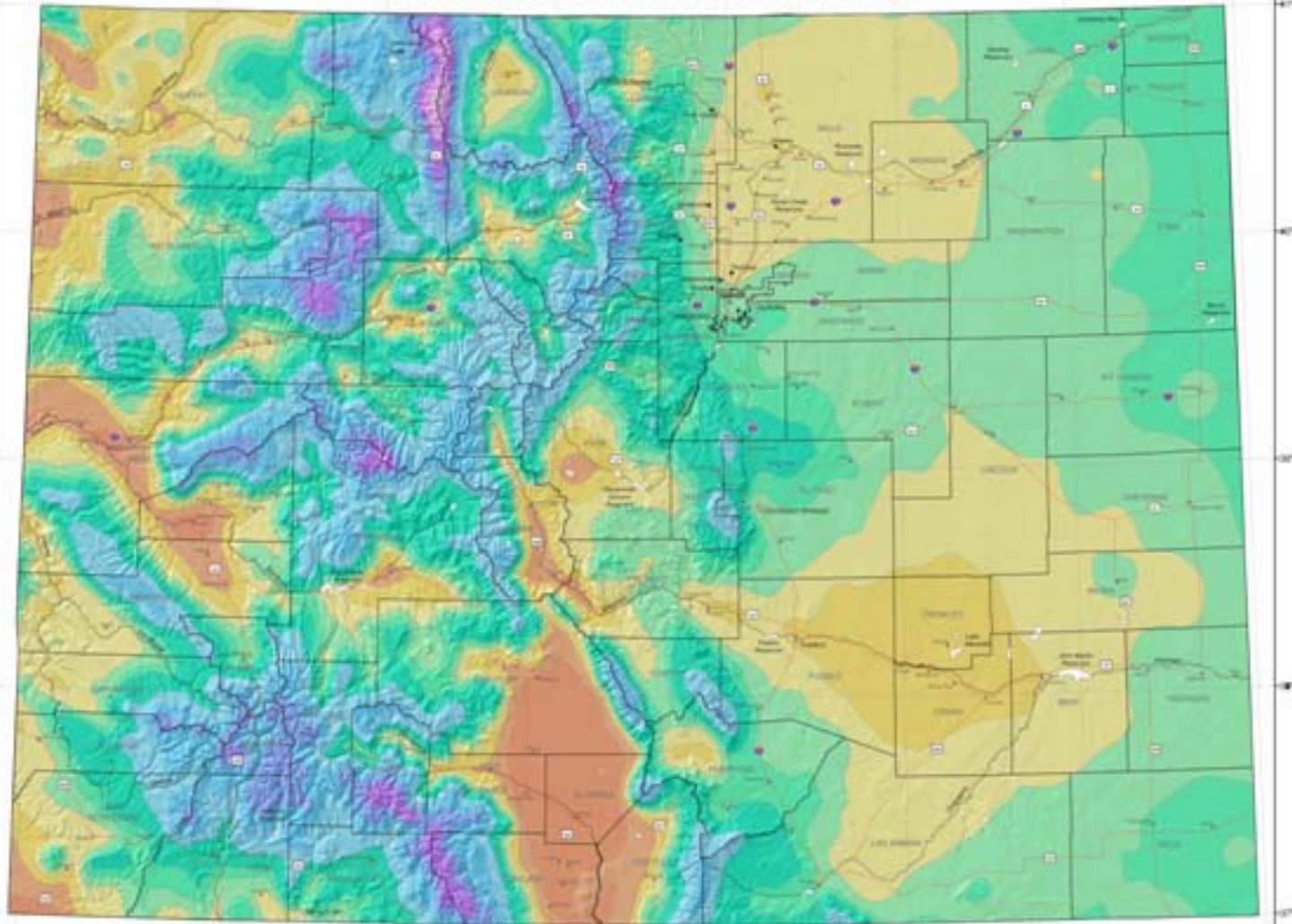


John Haynes Cheyenne Wells, CO 2002

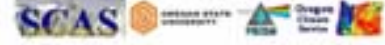


Colorado Average Annual Precipitation

COLORADO
PRISM 1971 - 2000 Mean Annual Precipitation

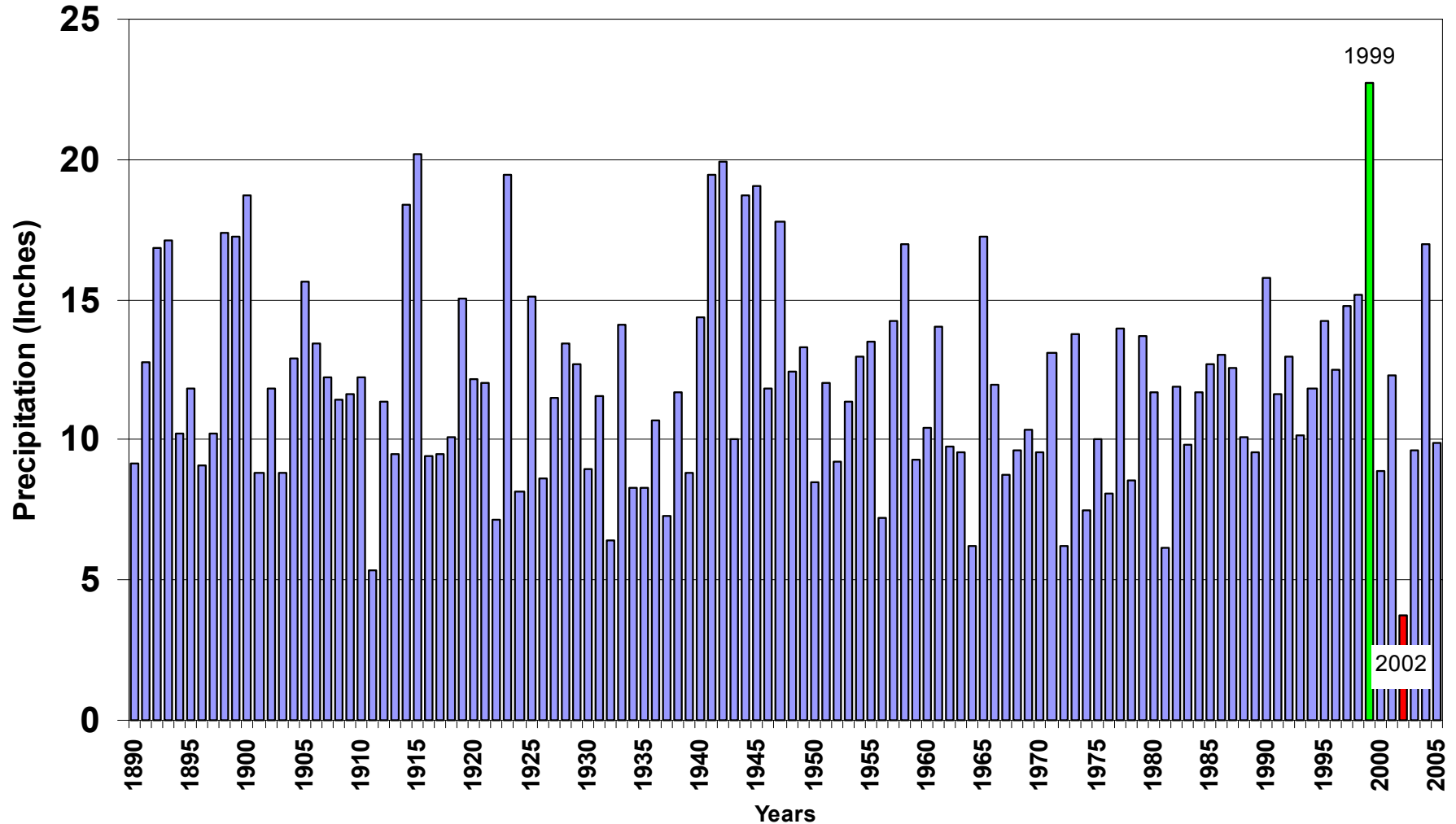


Map prepared with the PRISM climate modeling system by the Spatial Climate Analysis Service, Oregon State University.
<http://www.scas.orst.edu/prism/> Copyright (c) 2004, OSU SCAS



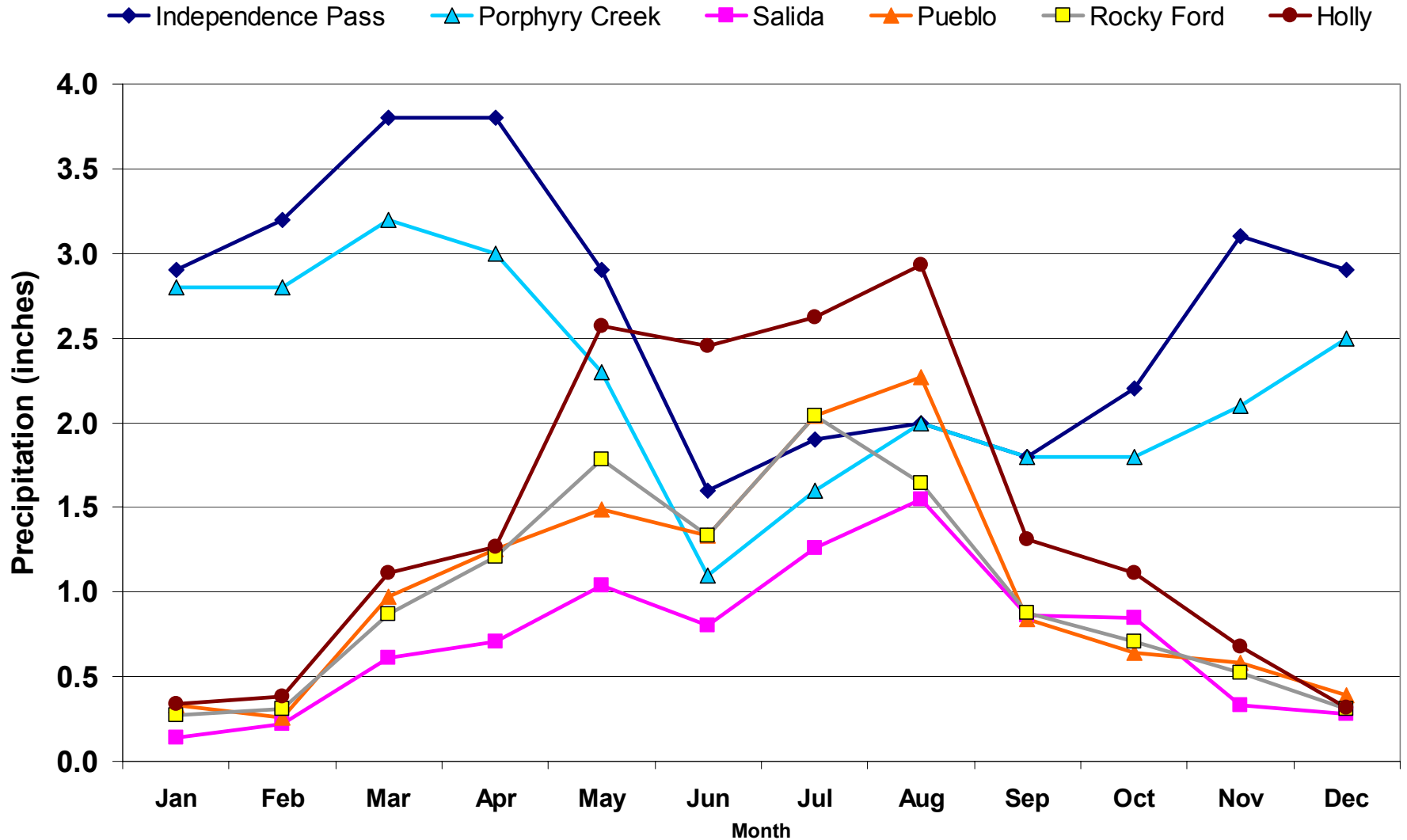
Rocky Ford Precipitation Weather Station –

Rocky Ford Water Year (October - September) Precipitation Totals (from 1890-2005)



Precipitation varies with the seasons

Average Monthly Precipitation for 1971-2000



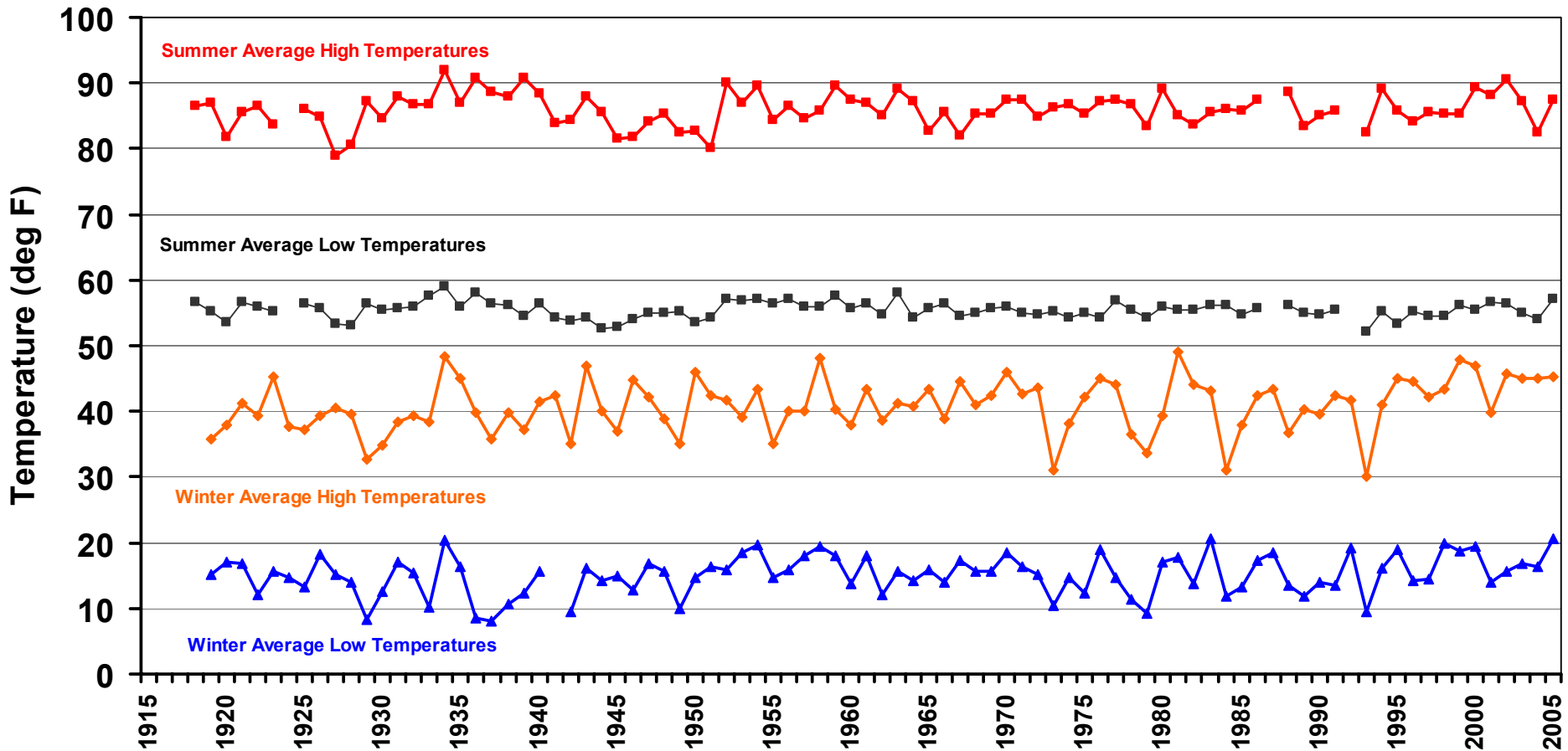
Quiz!

What month is the wettest month of the year (on average) for northeastern Colorado AND the driest month of the year for southwestern Colorado?



Some climate elements are more consistent than others

Akron 4E Temperature

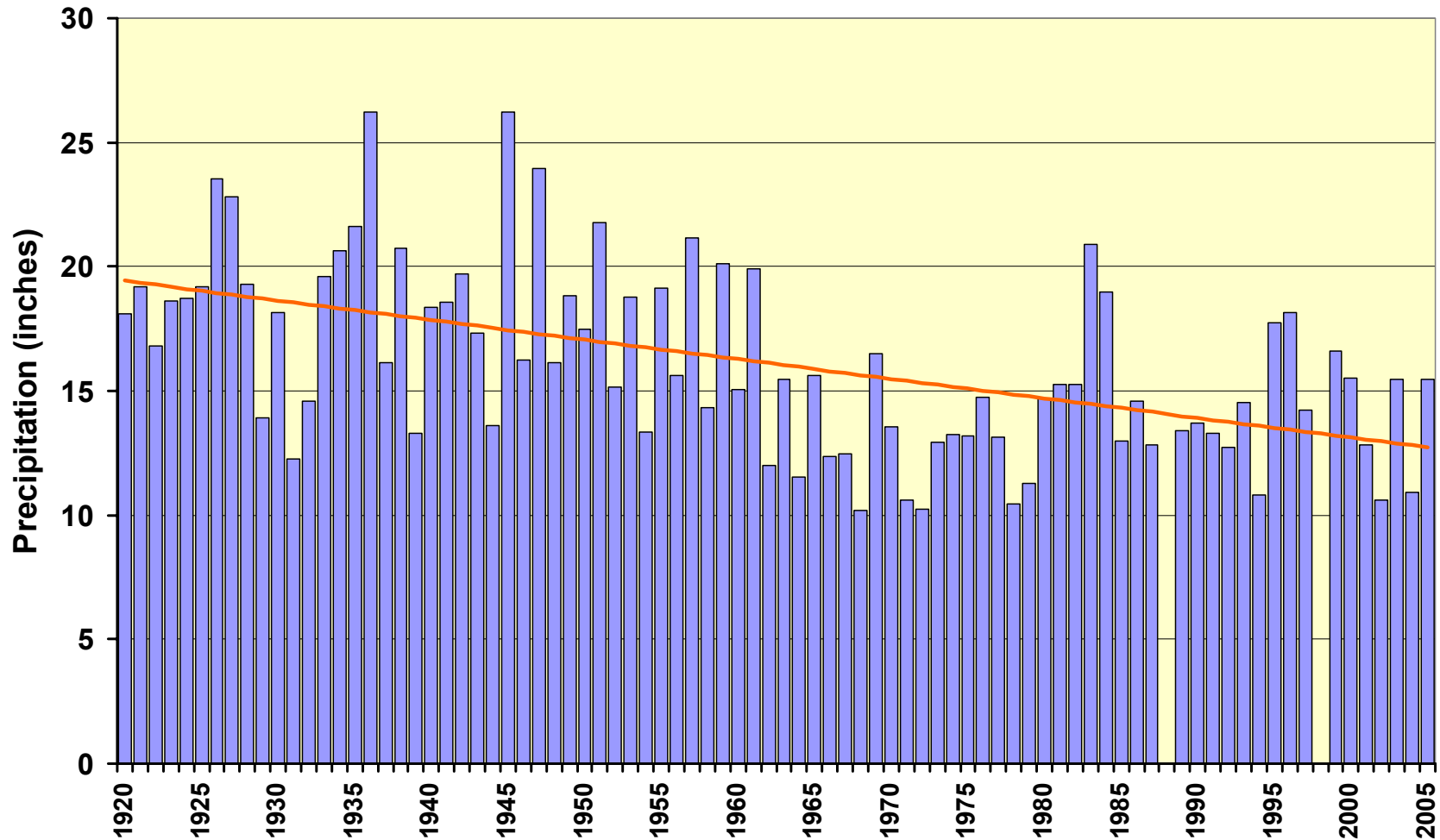


And one more thing to know, the data are good but not great....

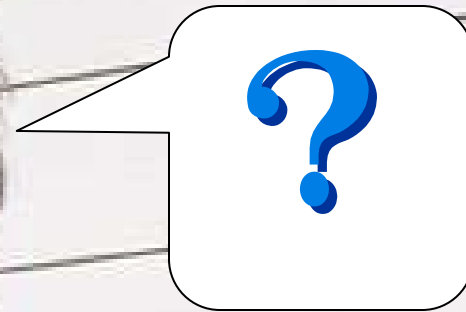


This is quickly revealed when we try to explore long-term changes

Dillon Annual (Jan-Dec) Precipitation Totals

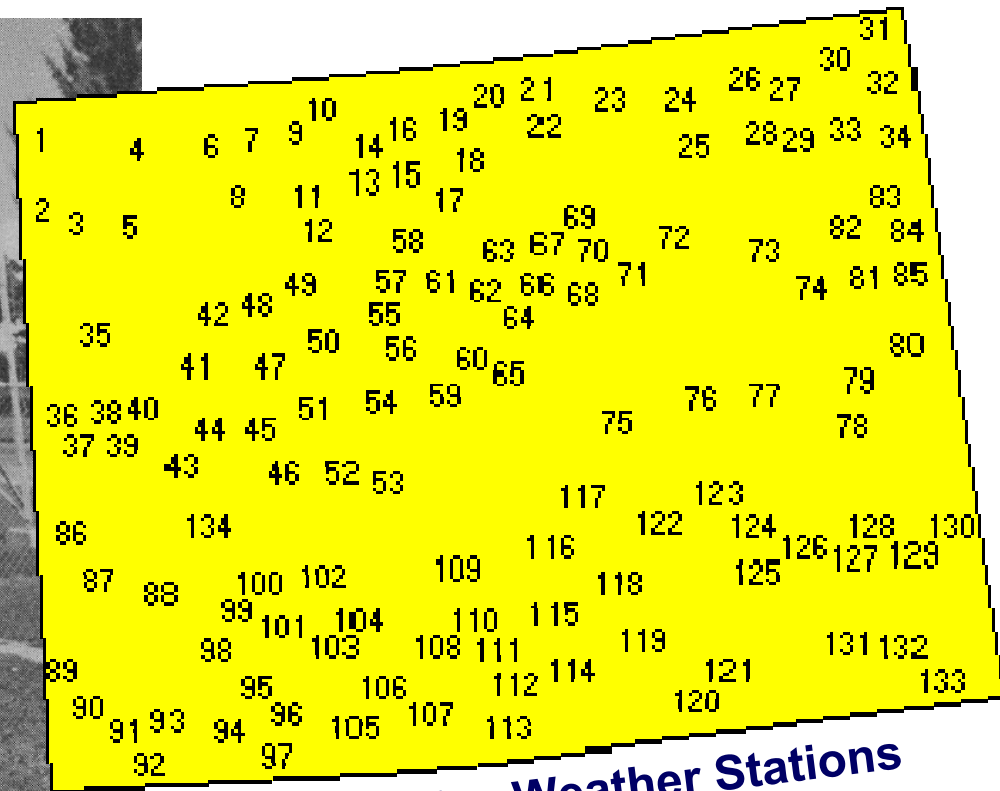
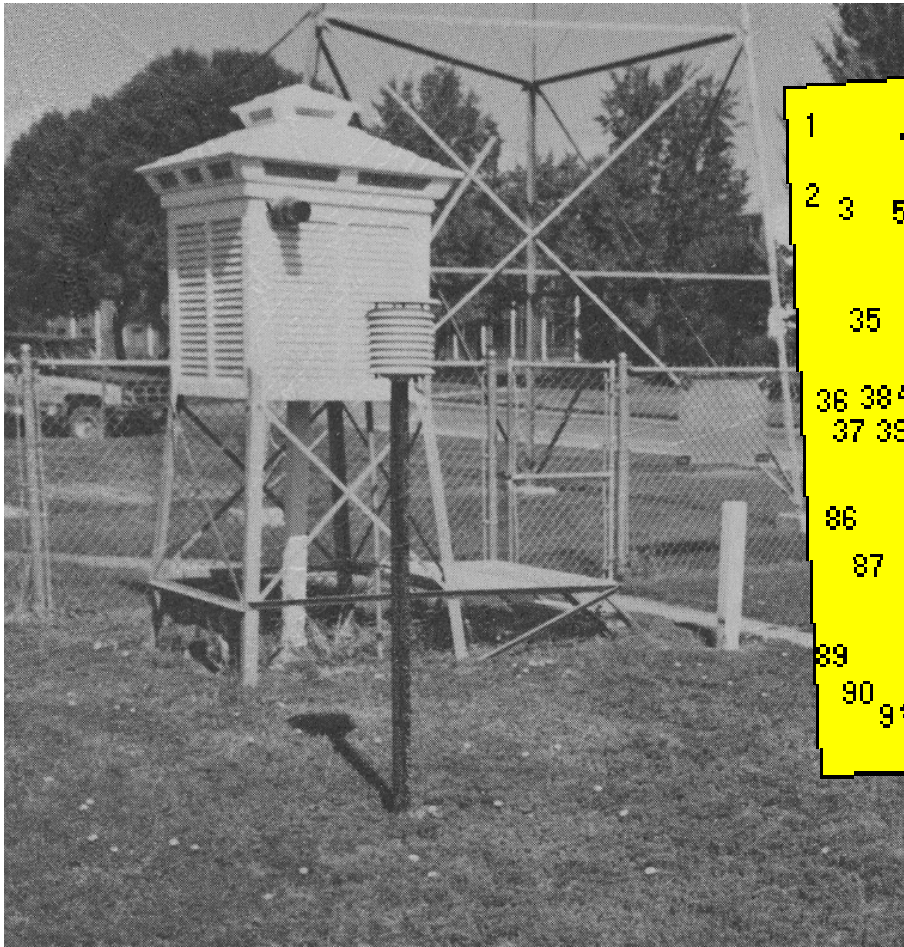


So! Based on our available data, can we tell if our climate is changing?



First, let's look at temperatures

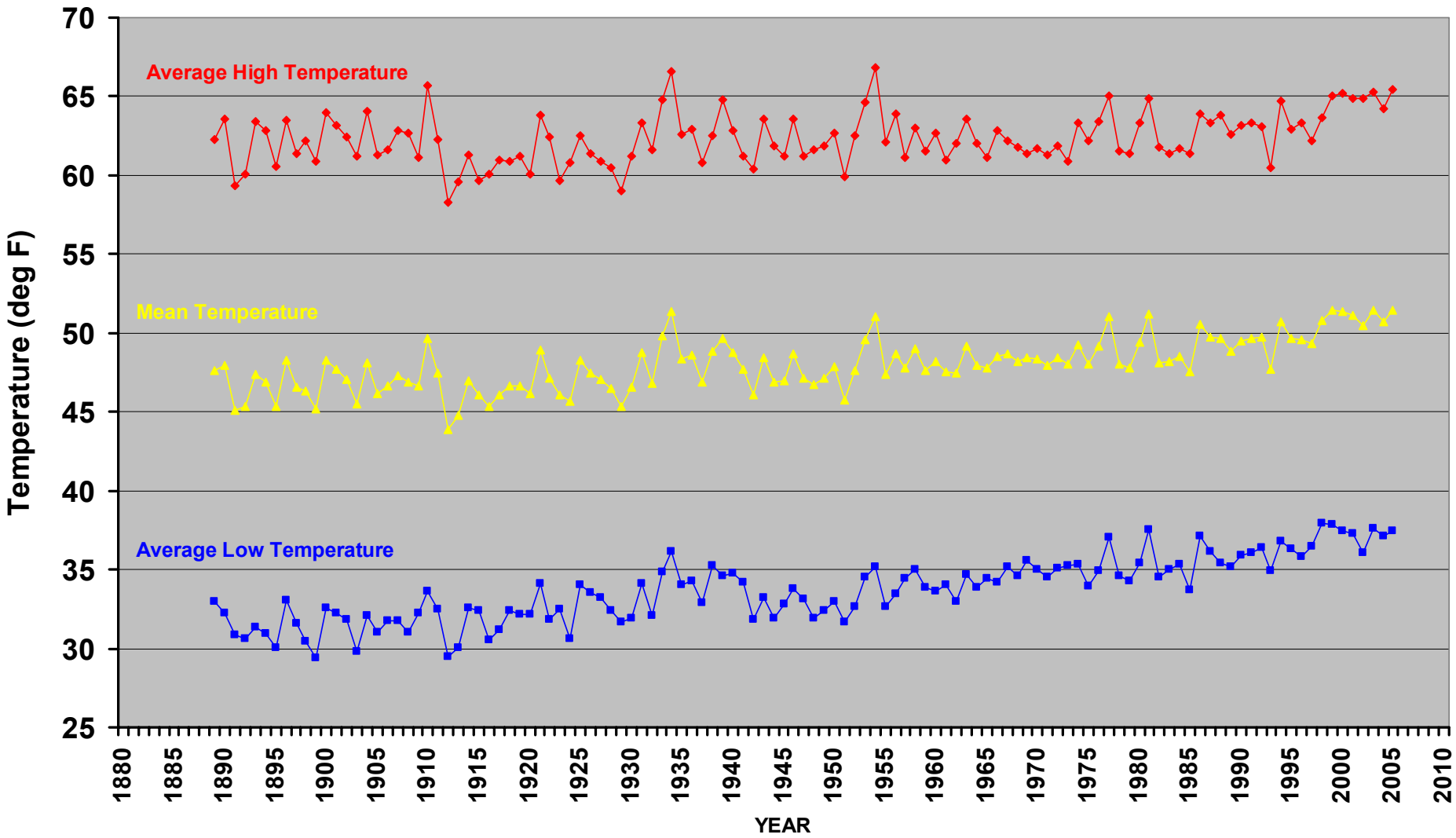
- Of all the state's long-term weather stations, very few have uninterrupted, consistent data for analyzing climate trends.



**Cooperative Weather Stations
in Colorado**

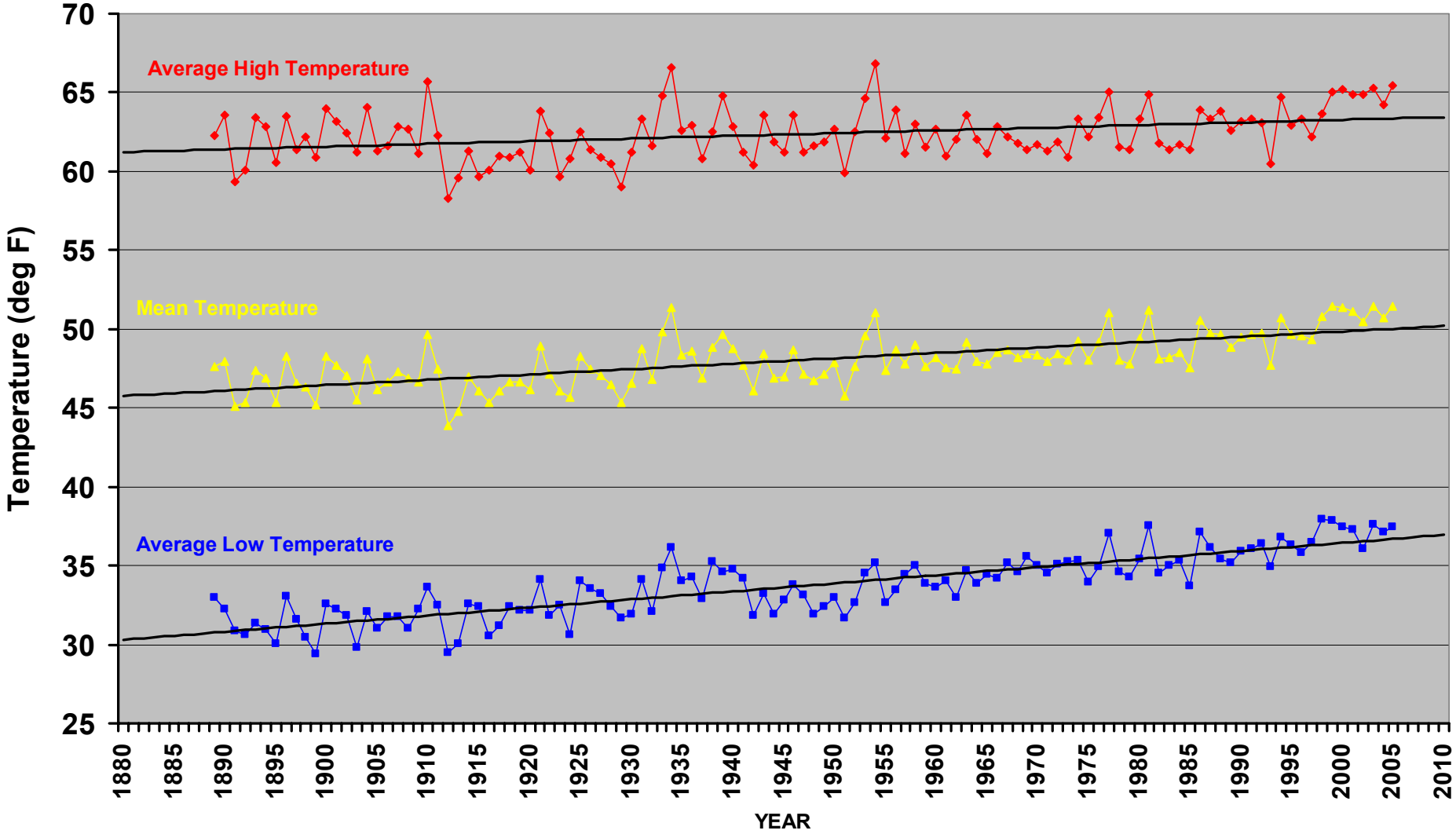
Fort Collins Temperatures

Fort Collins Average Temperatures from 1889 to 2005



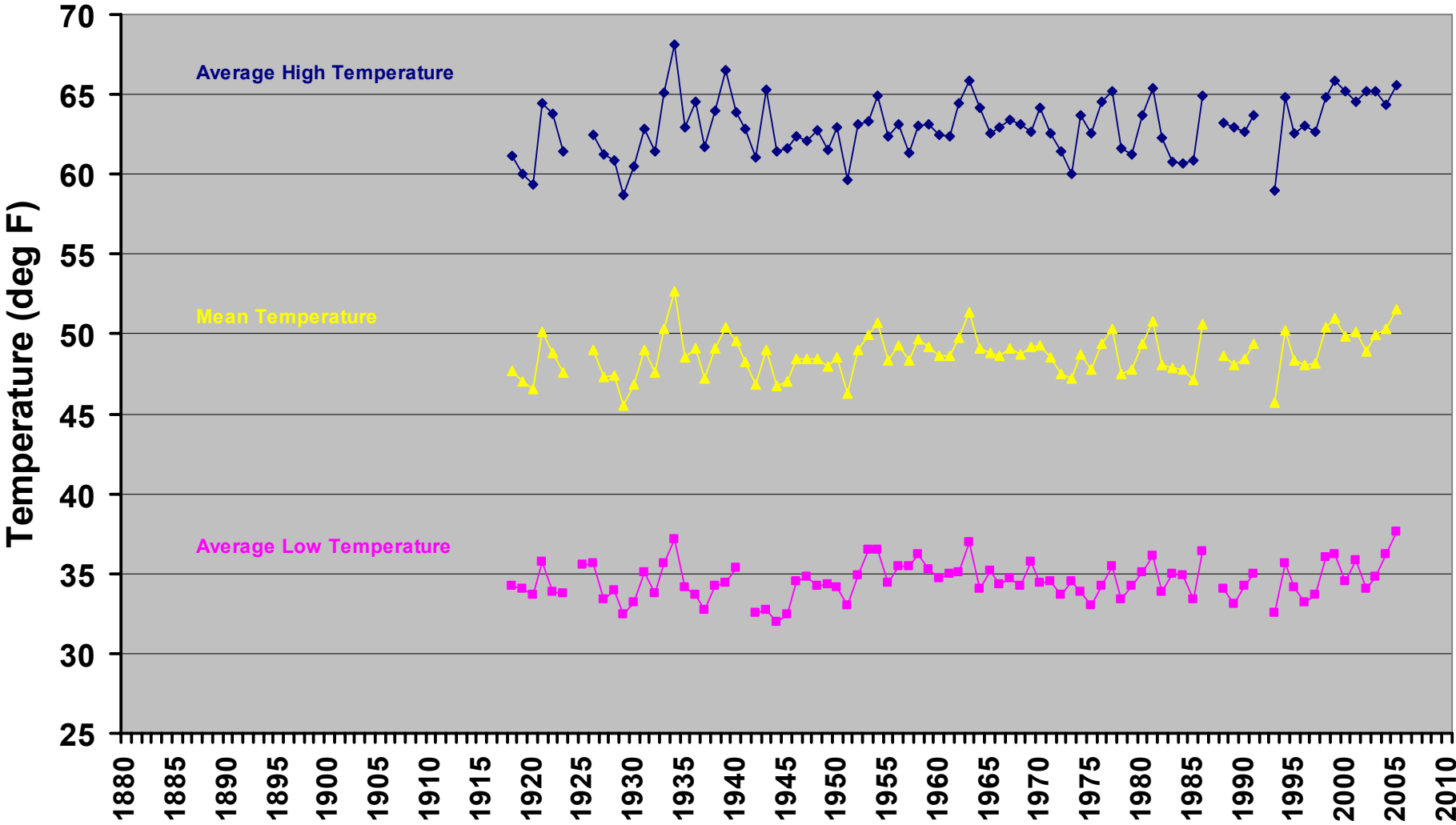
Fort Collins Temperatures

Fort Collins Average Temperatures from 1889 to 2005



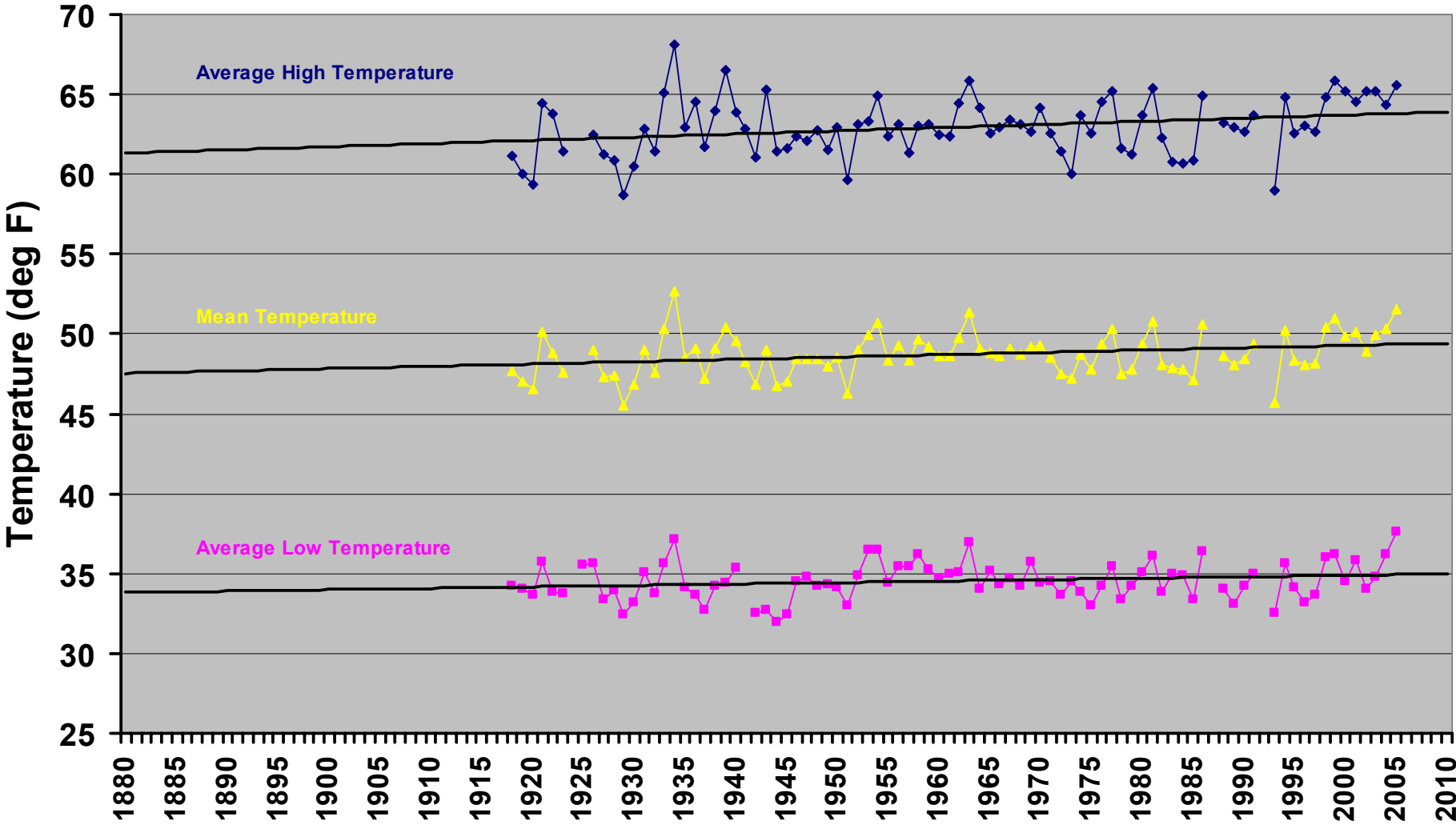
Akron Temperatures

Akron Average Temperatures (from 1918-2005)



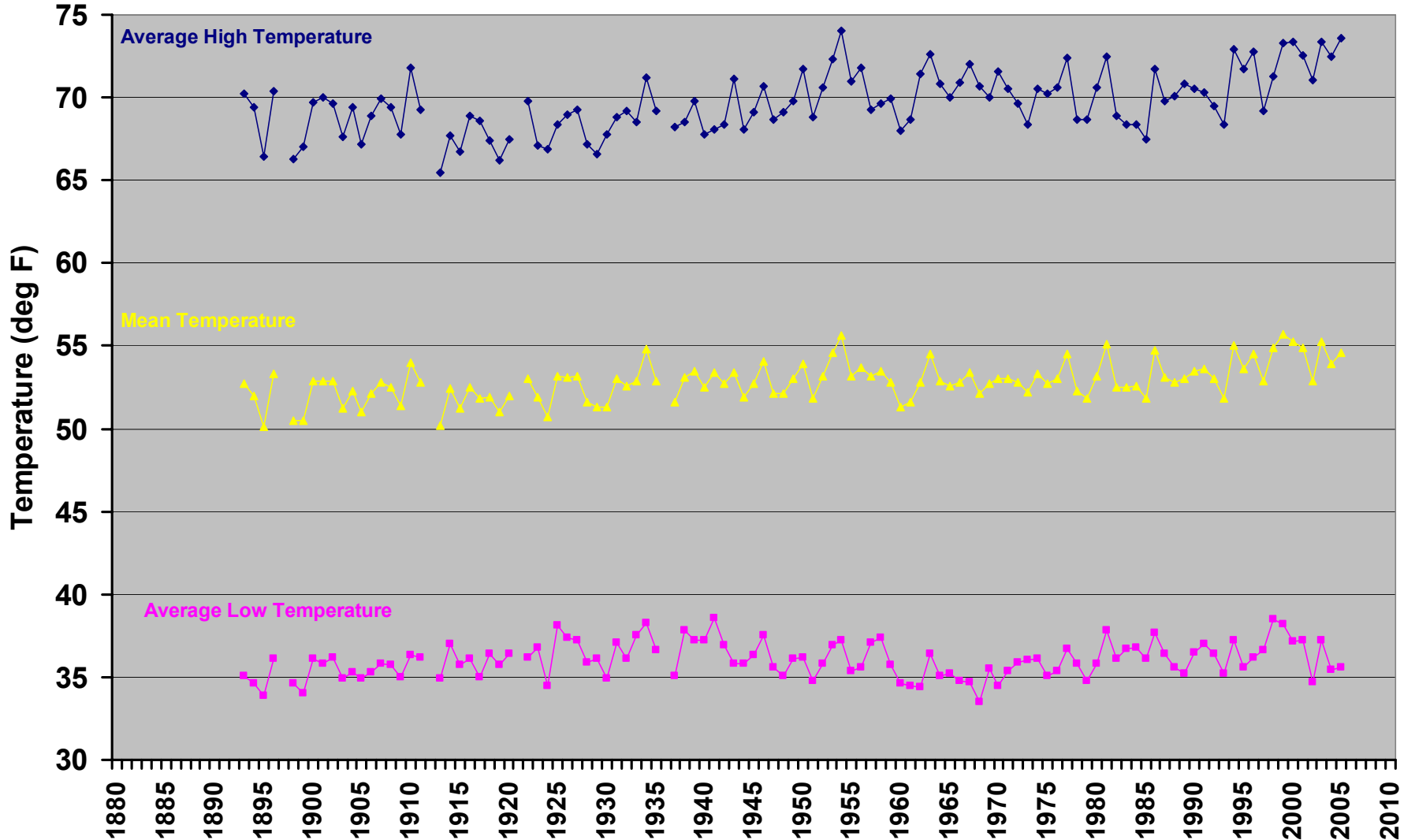
Akron Temperatures

Akron Average Temperatures (from 1918-2005)



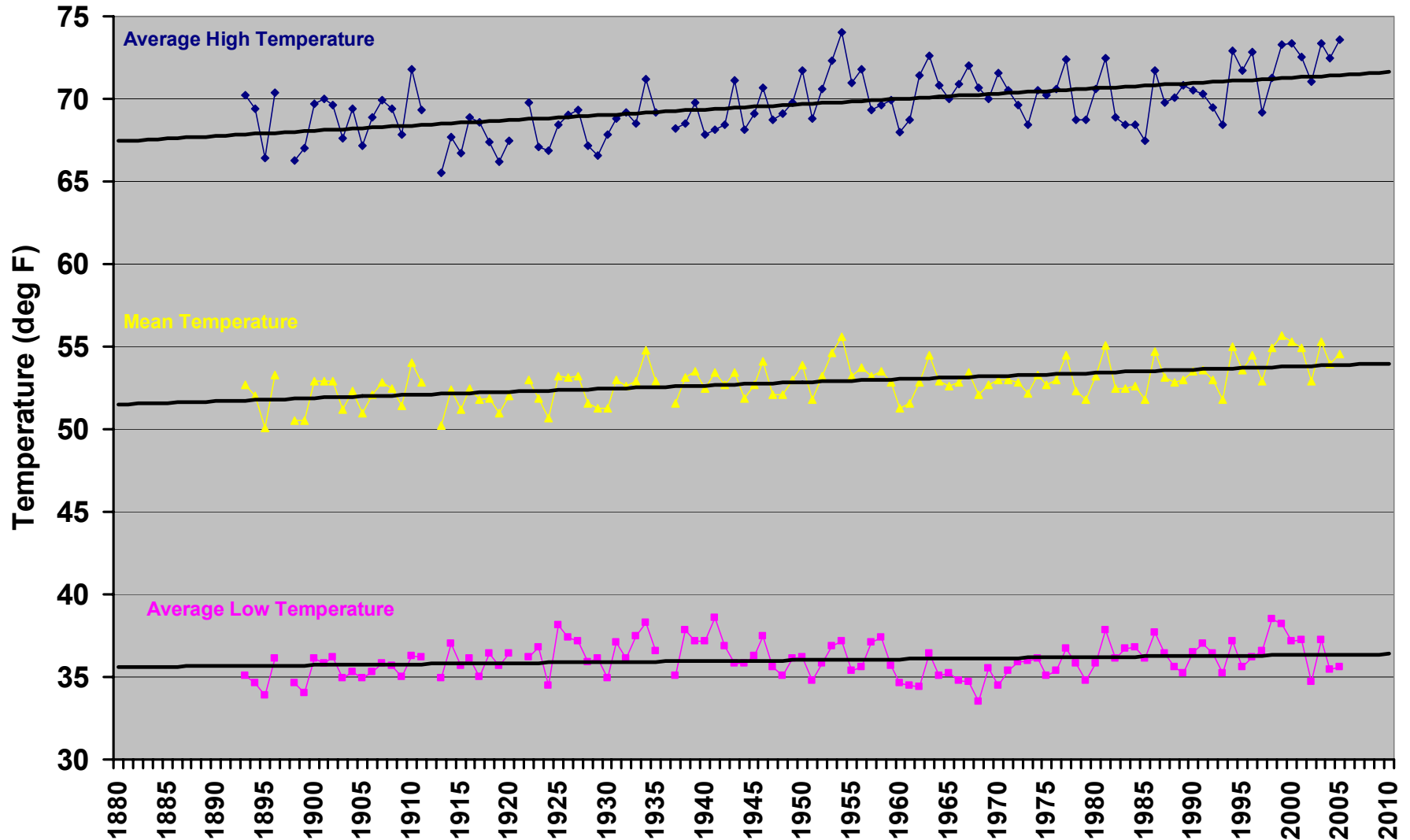
Rocky Ford Temperatures

Rocky Ford Monthly Average Temperatures (1893-2005)



Rocky Ford Temperatures

Rocky Ford Monthly Average Temperatures (1893-2005)

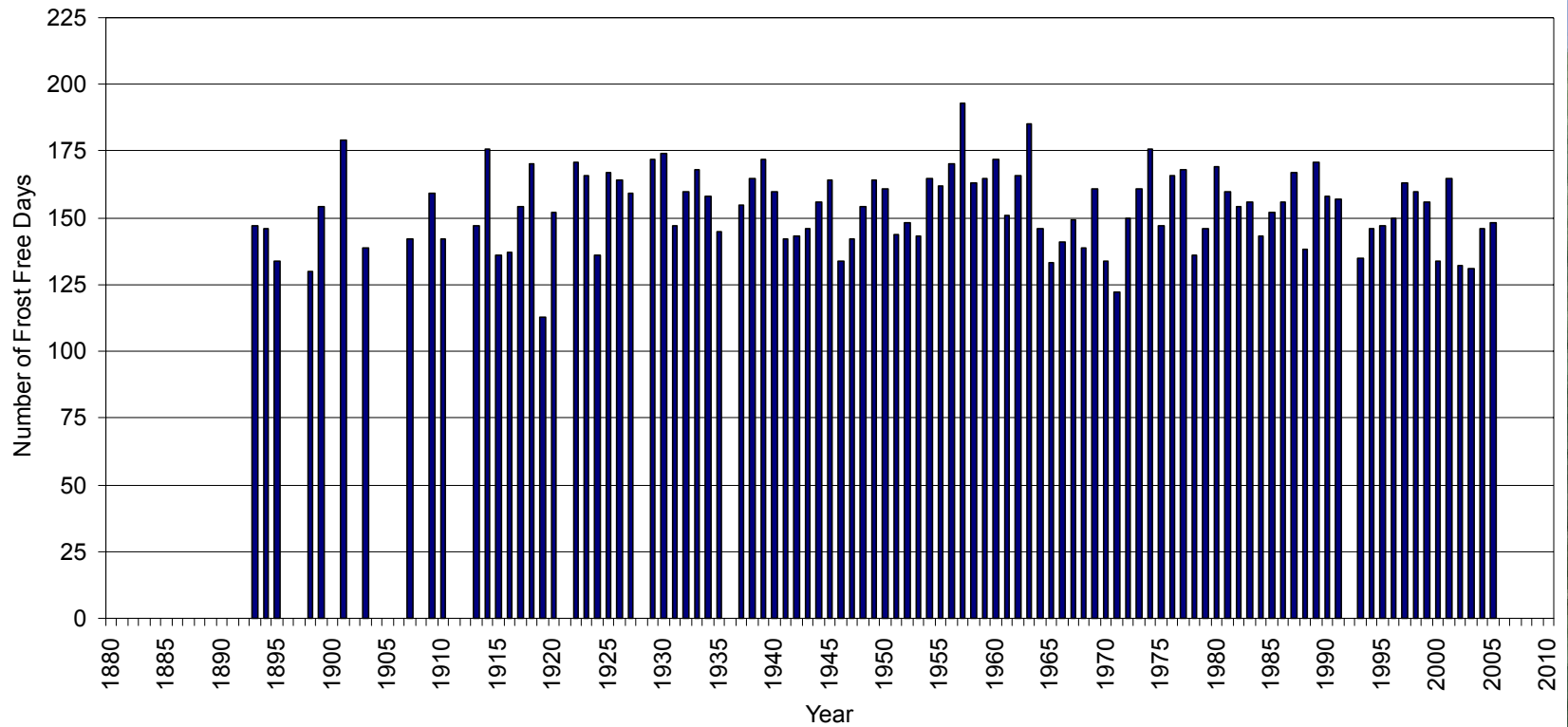


Frost Free Days (Growing Season)



Rocky Ford Frost Free Days

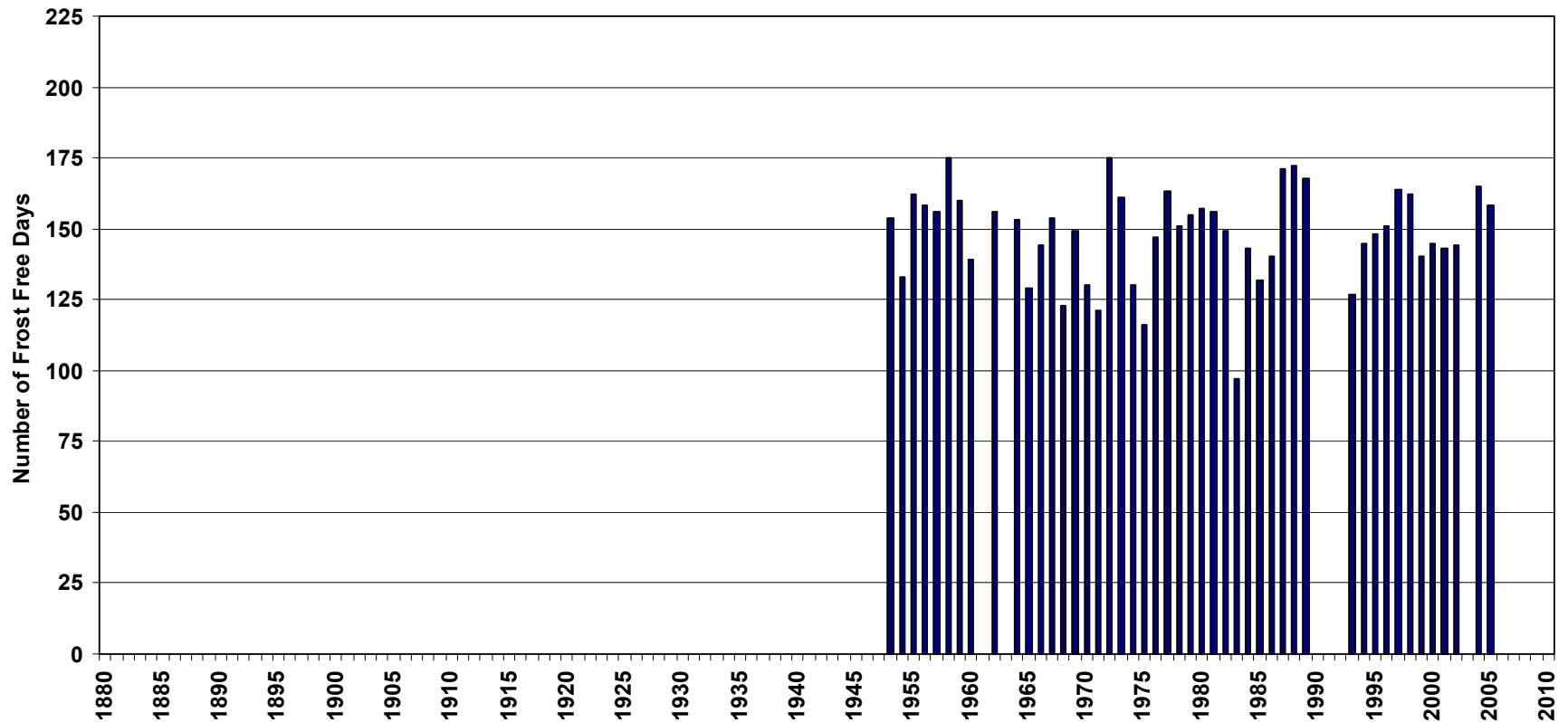
Rocky Ford 2SE Length of Frost Free Period Based on 32 F Threshold



Trinidad

Frost Free Days

Trinidad Length of Frost free Period Based on 32 F Threshold

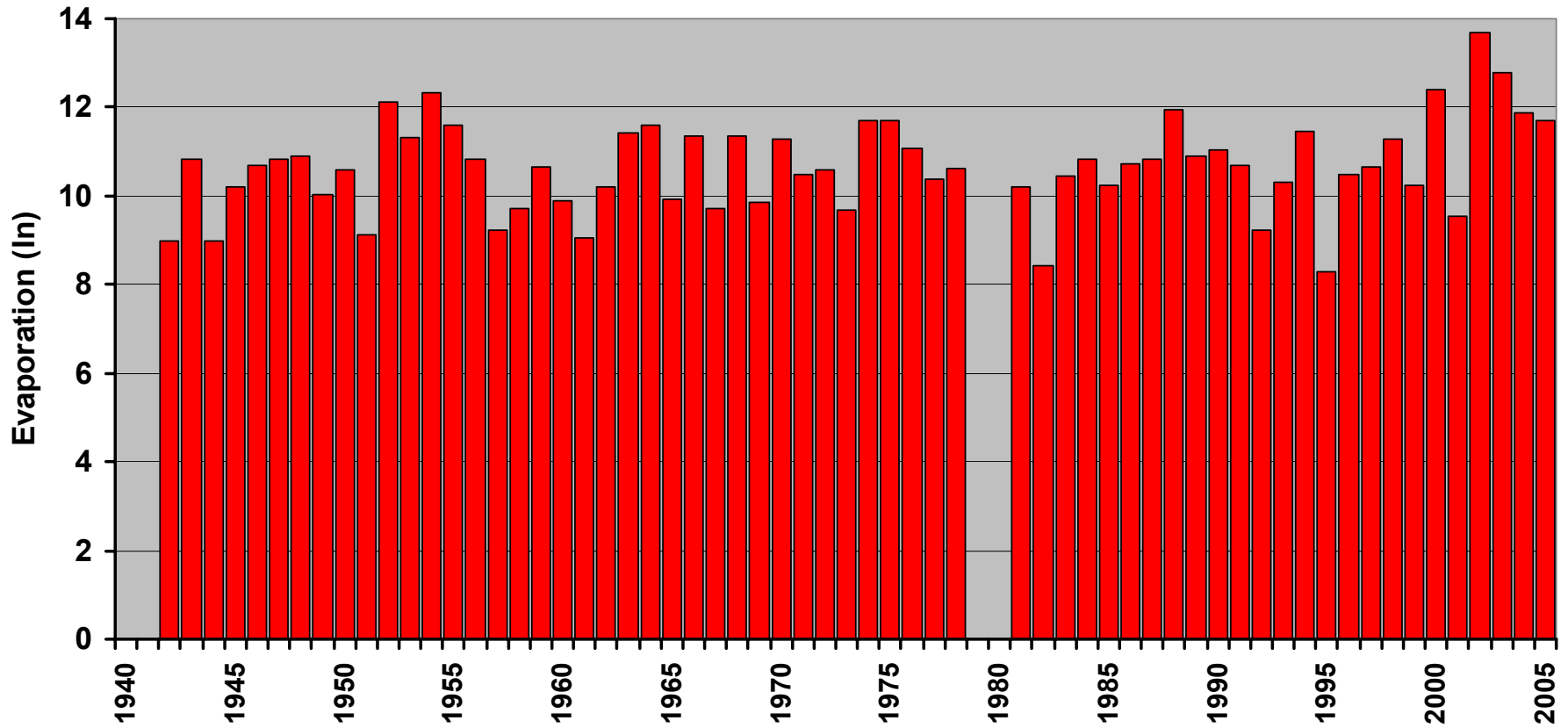




Evaporation

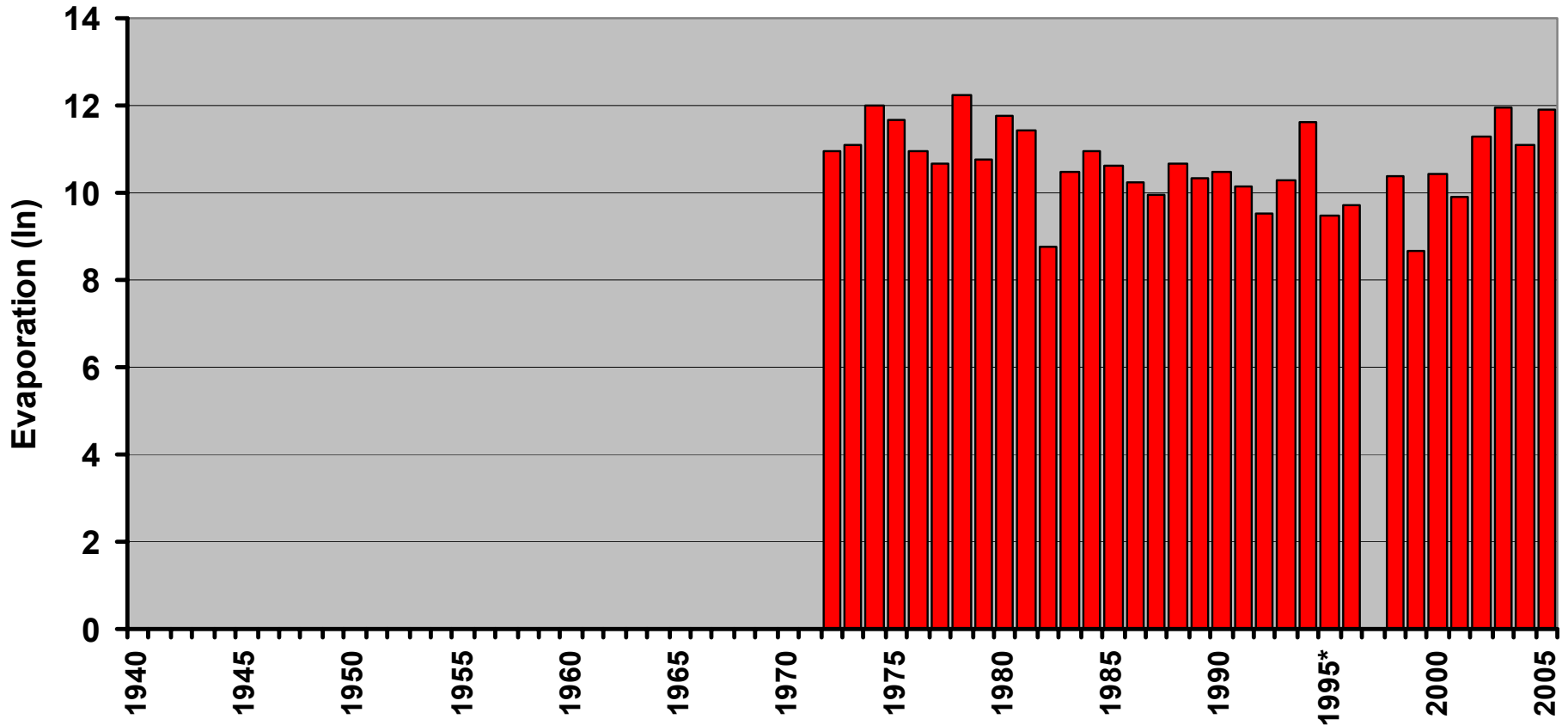
John Martin Dam Evaporation

John Martin Dam
May through Sept Pan Evaporation



Pueblo Evaporation

Pueblo WSO
May through Sept Pan Evaporation



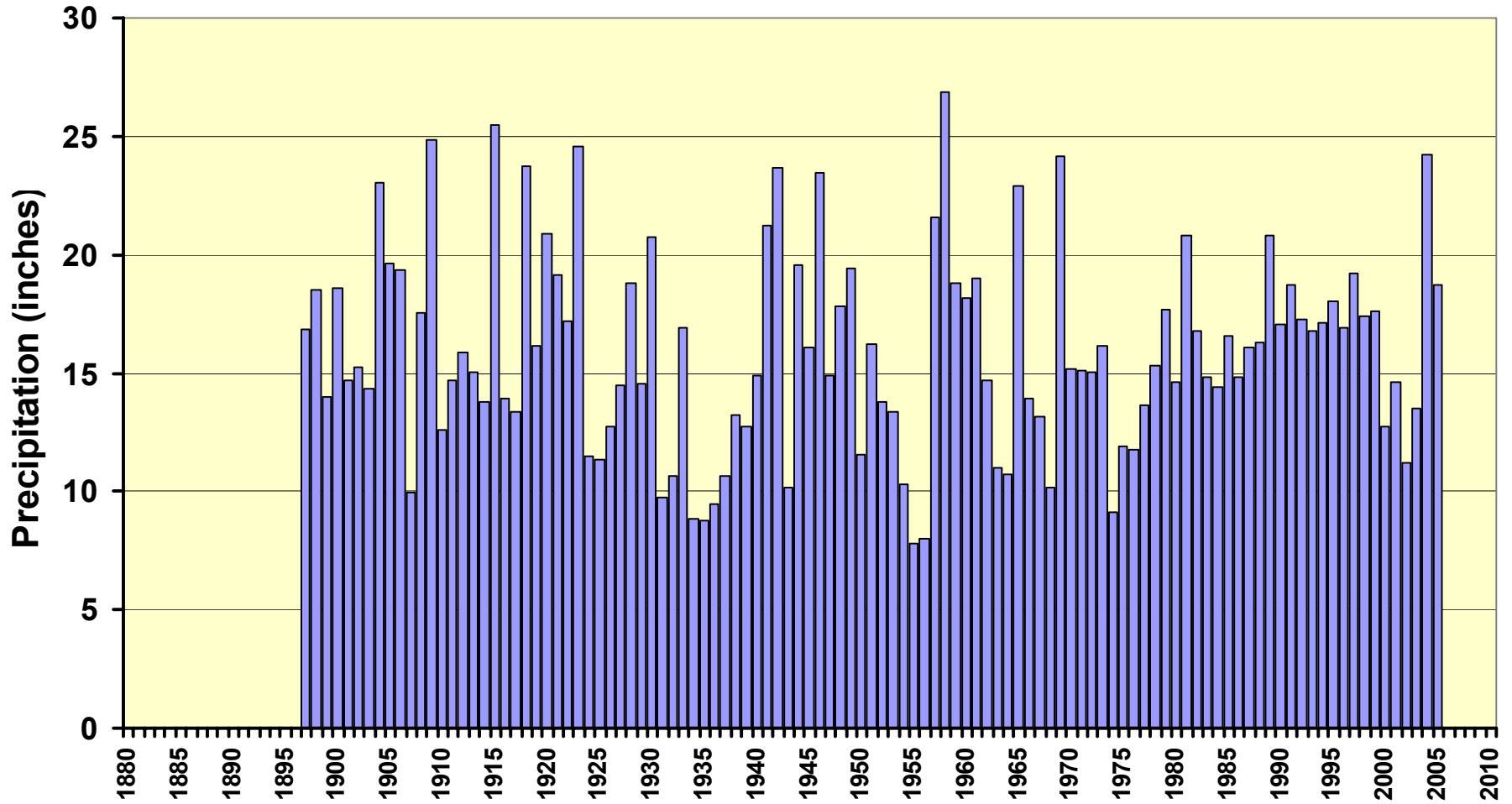


Precipitation

Photo by Wendy Ryan

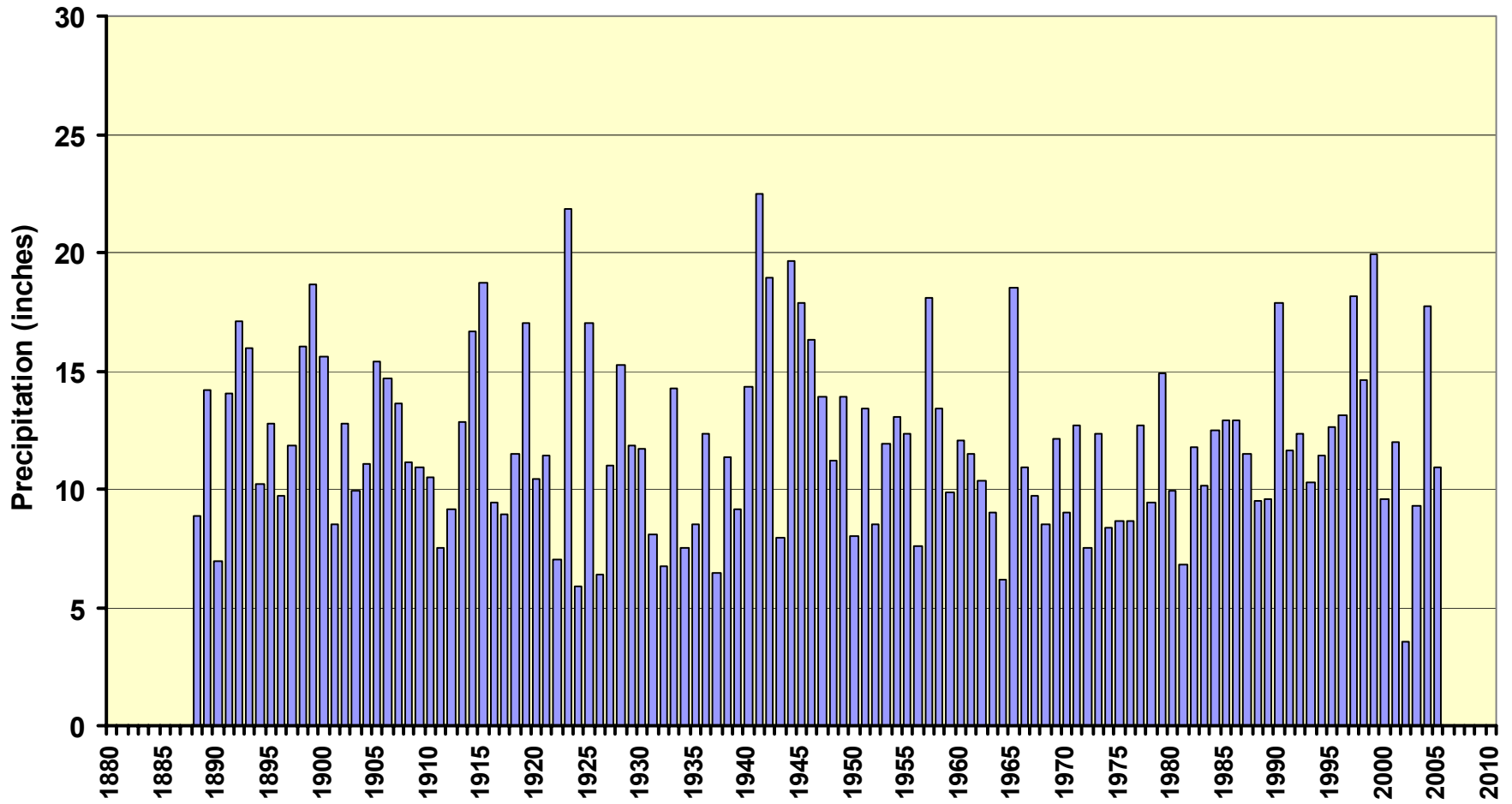
Cheyenne Wells Precipitation

Cheyenne Wells Annual Precip



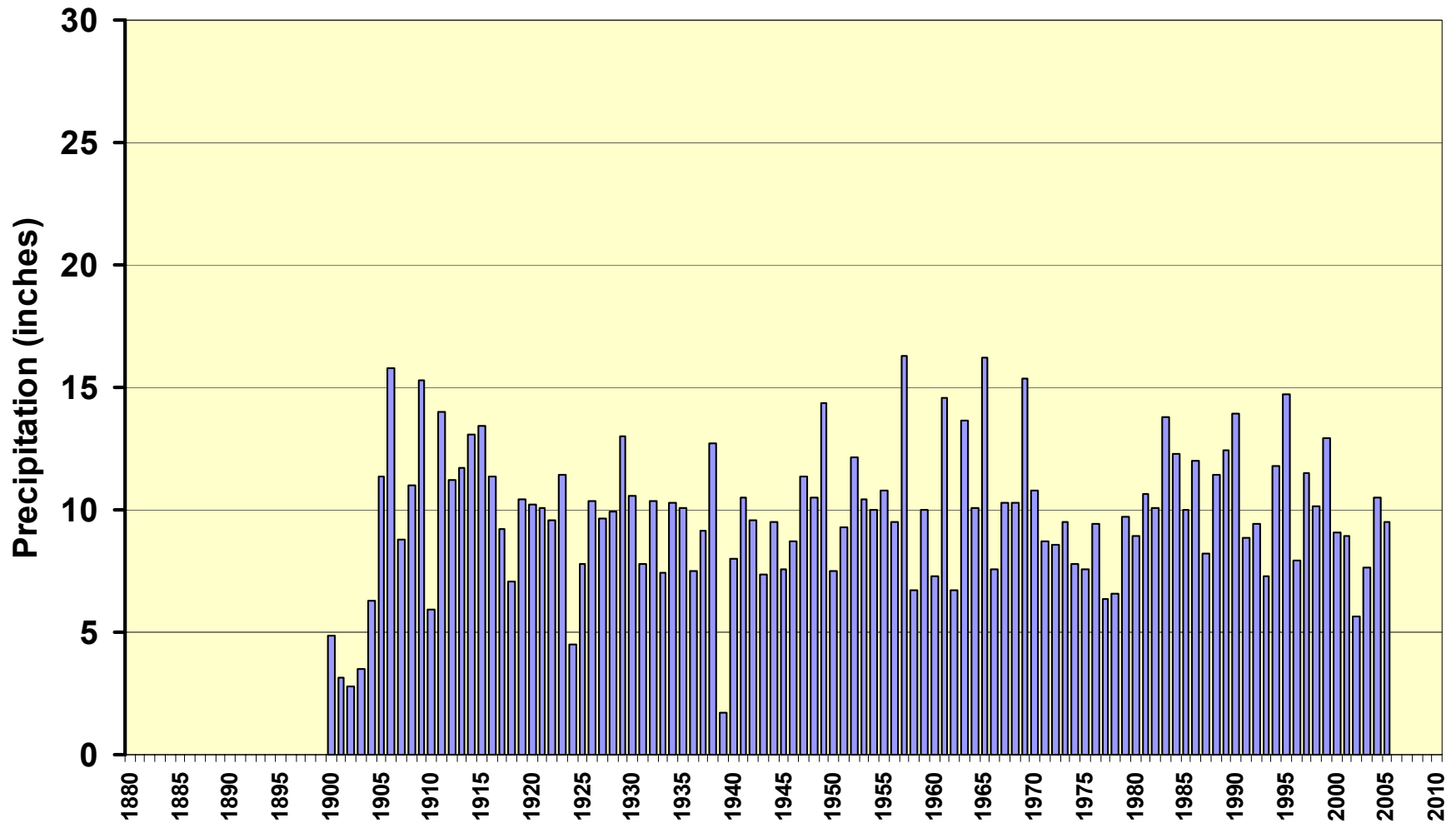
Rocky Ford Precipitation

Rocky Ford Annual Precipitation



Buena Vista Precipitation

Buena Vista Annual Precipitation



Rocky Ford

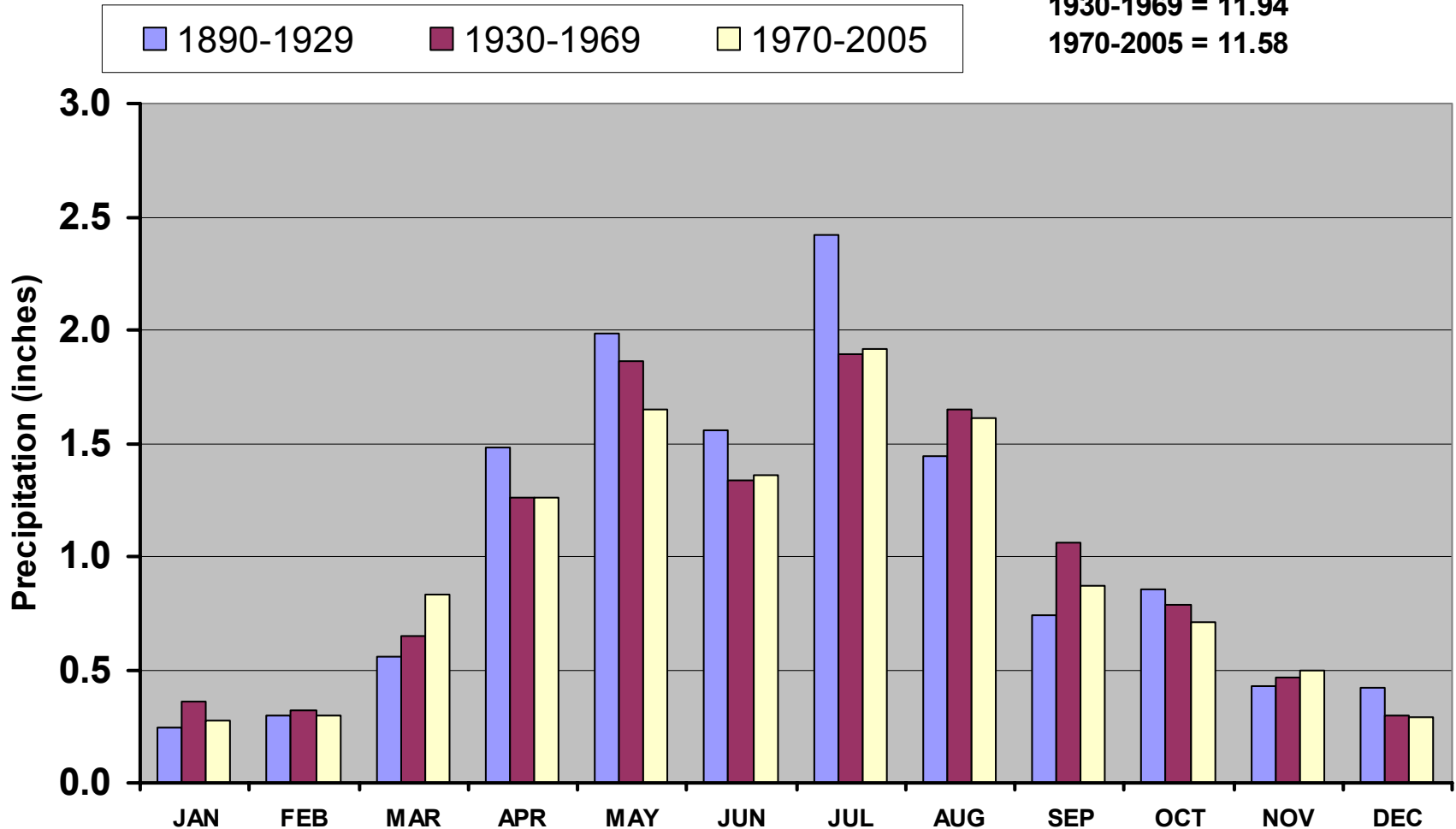
Seasonal Patterns of Precipitation

Rocky Ford Seasonal Precipitation Patterns

1890-1929 = 12.43 inches

1930-1969 = 11.94

1970-2005 = 11.58



Montrose

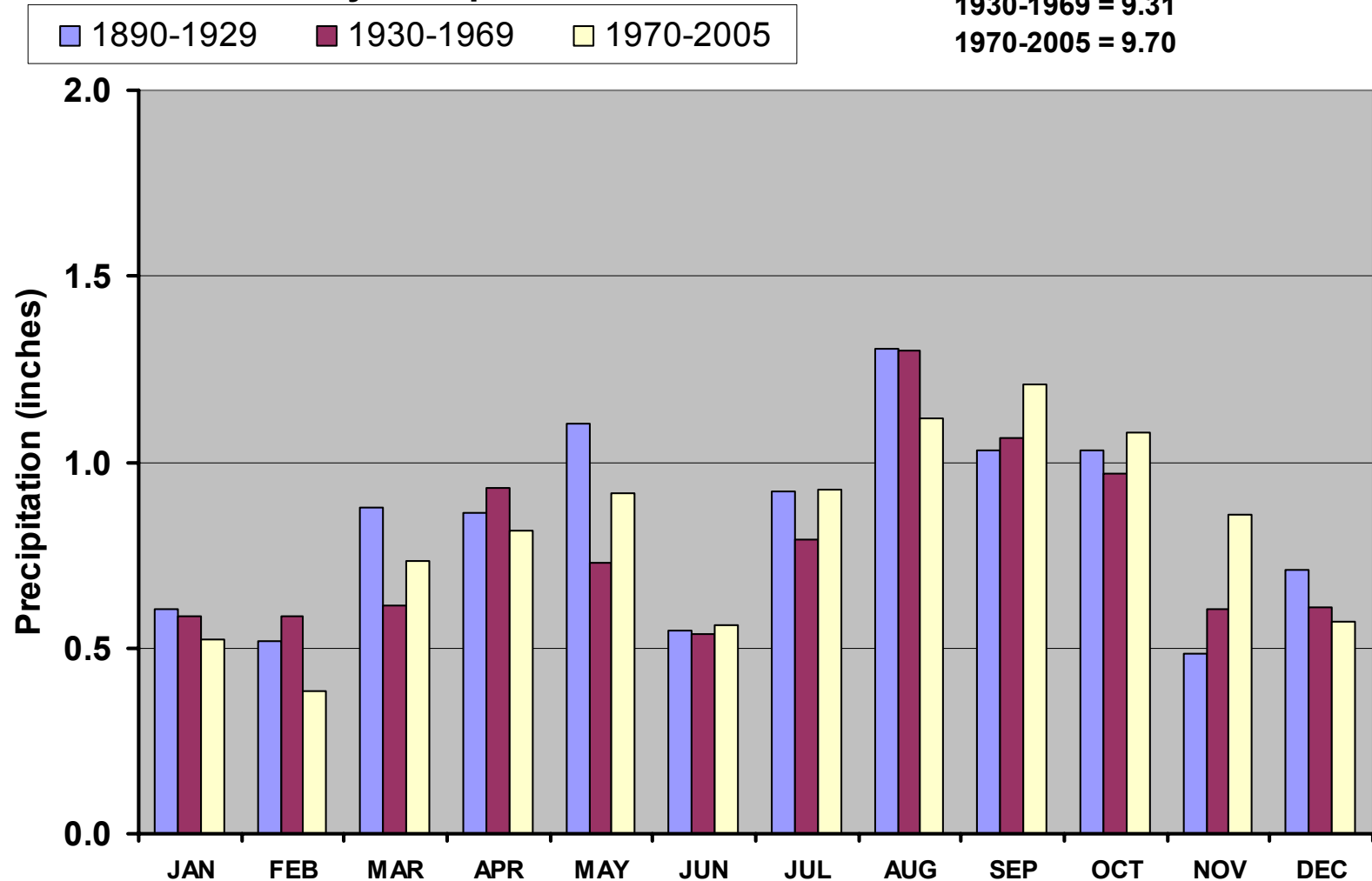
Seasonal Patterns of Precipitation

Montrose Monthly Precipitation Patterns

1897-1929 = 10.0 inches

1930-1969 = 9.31

1970-2005 = 9.70



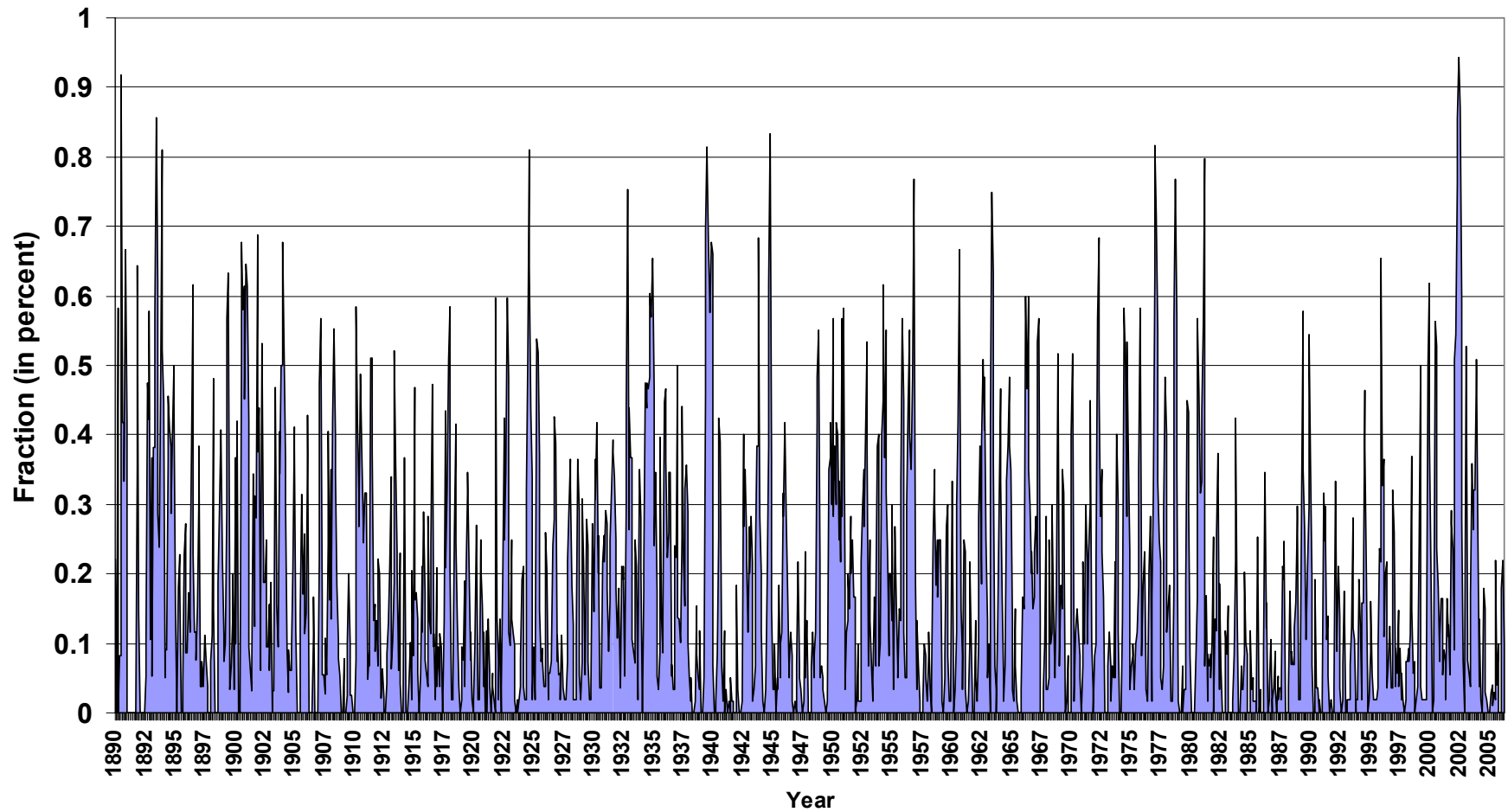
Drought!



Standardized Precipitation Index 3 Month

Fraction of Colorado in Drought Based on 3 month SPI

(1890 - March 2006)

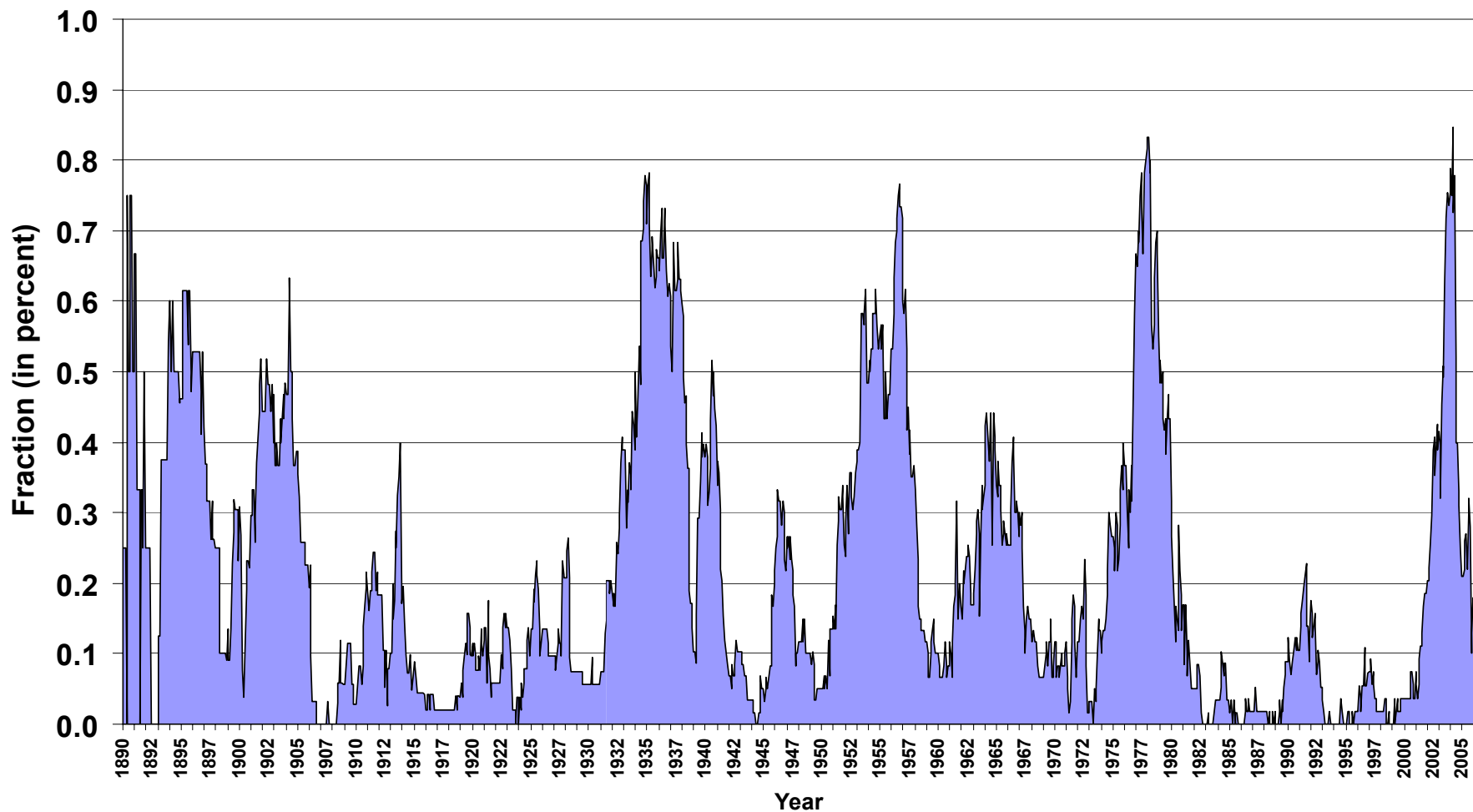


Standardized Precipitation Index 48 month

Fraction of Colorado in Drought

Based on 48 month SPI

(1890 - March 2006)



Mountain Snow

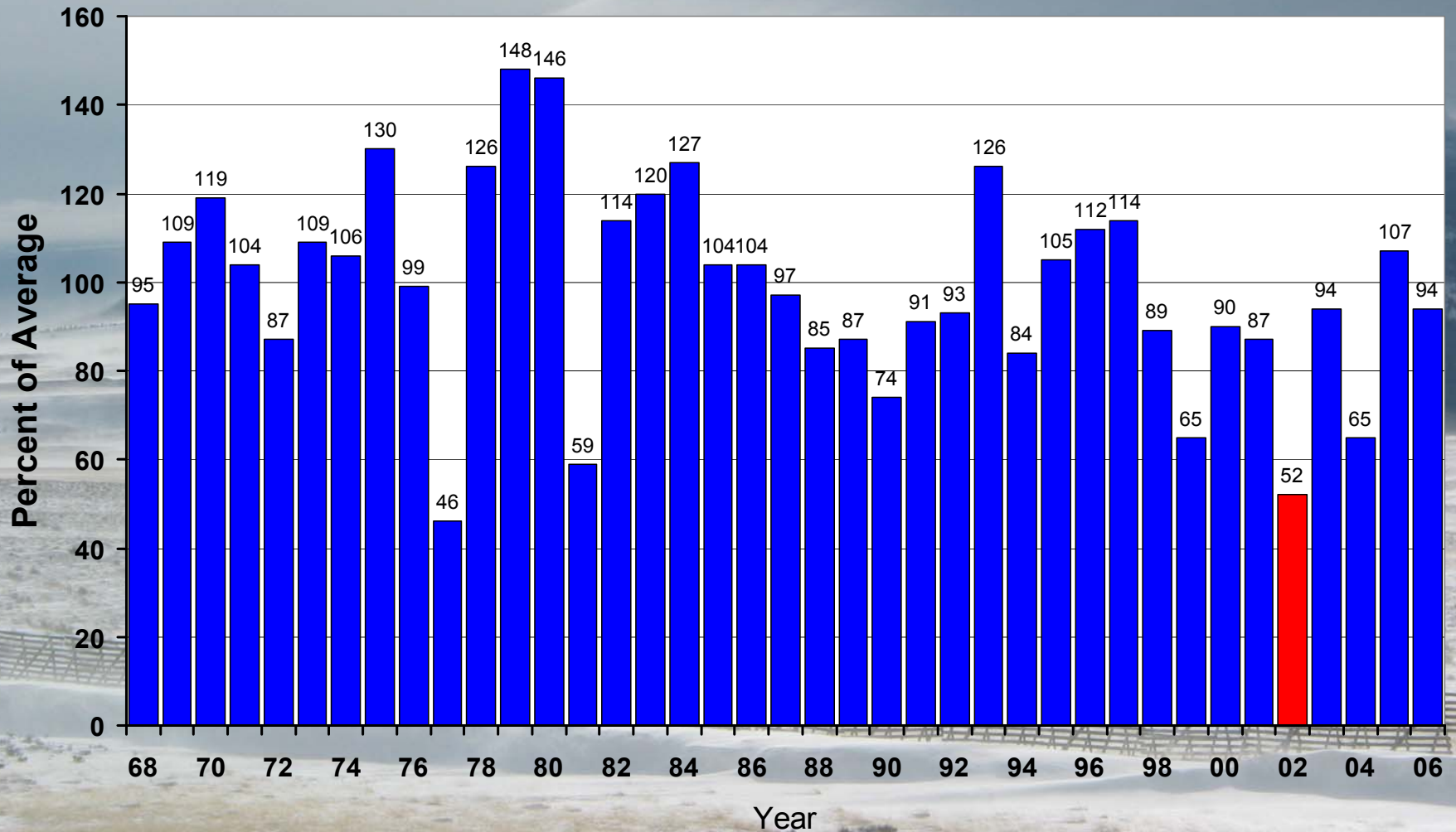


Photo by Wendy Ryan



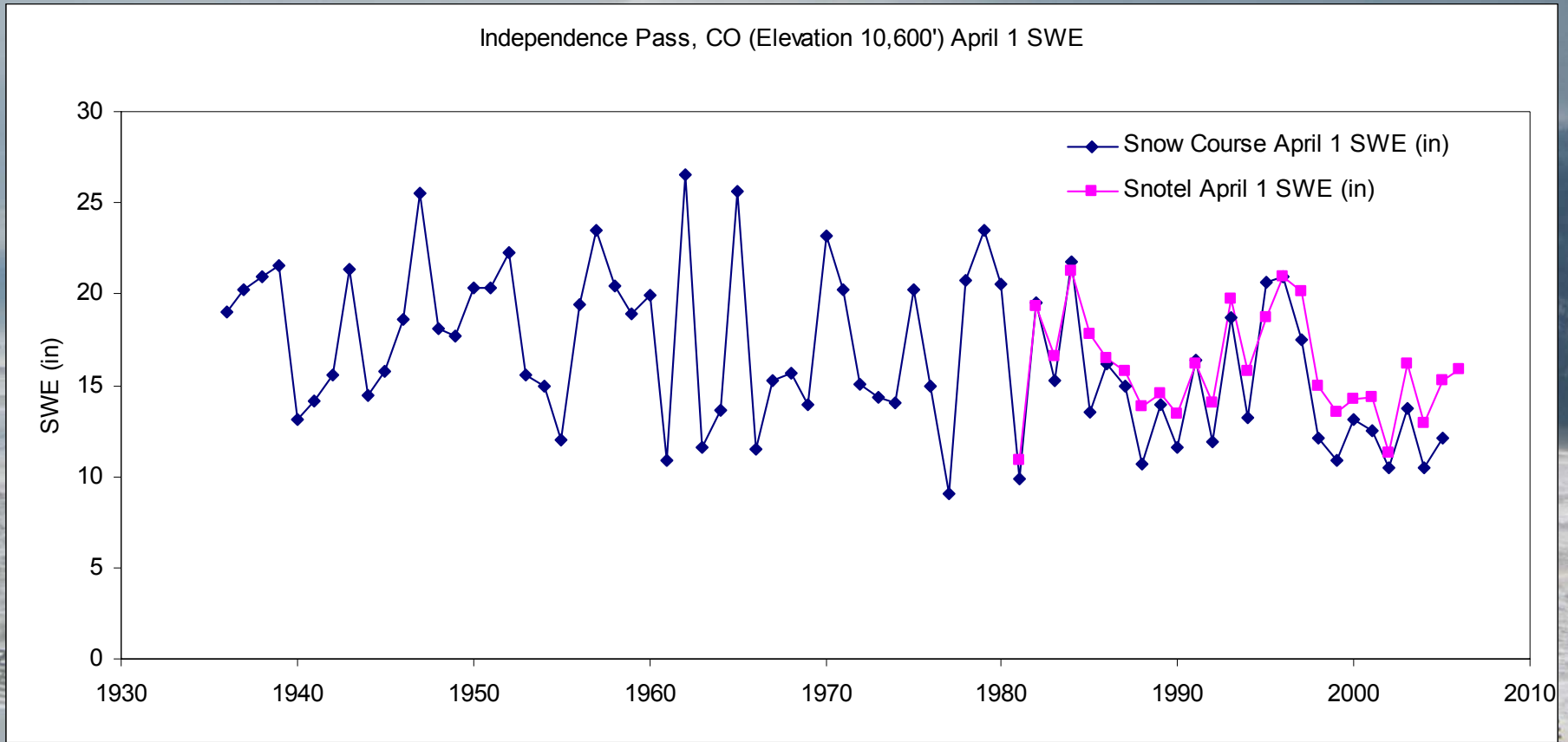
April 1 Colorado Snowpack

APRIL 1 SNOWPACK COLORADO STATEWIDE



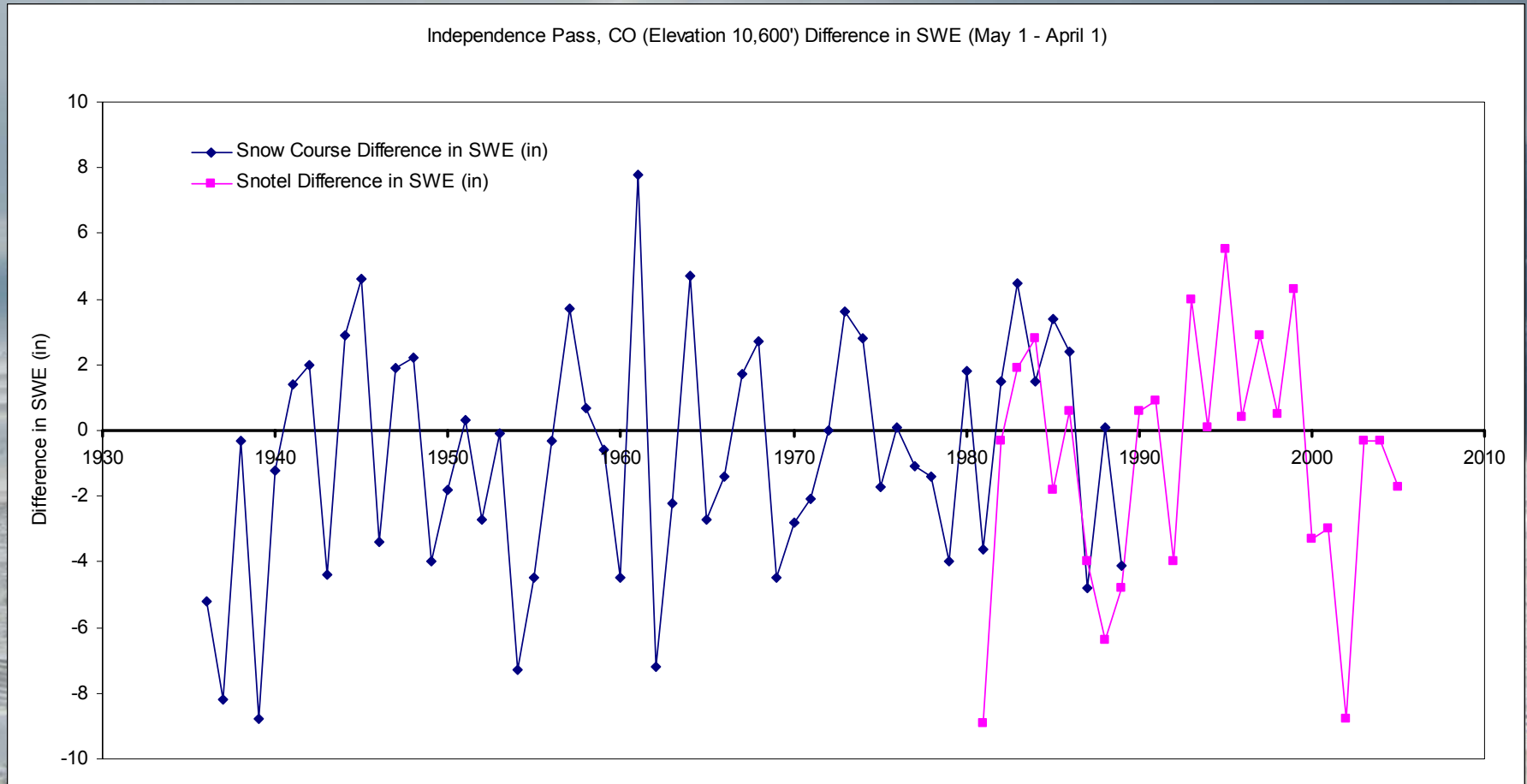
Independence Pass

April 1 Snow Course and Snotel



Independence Pass

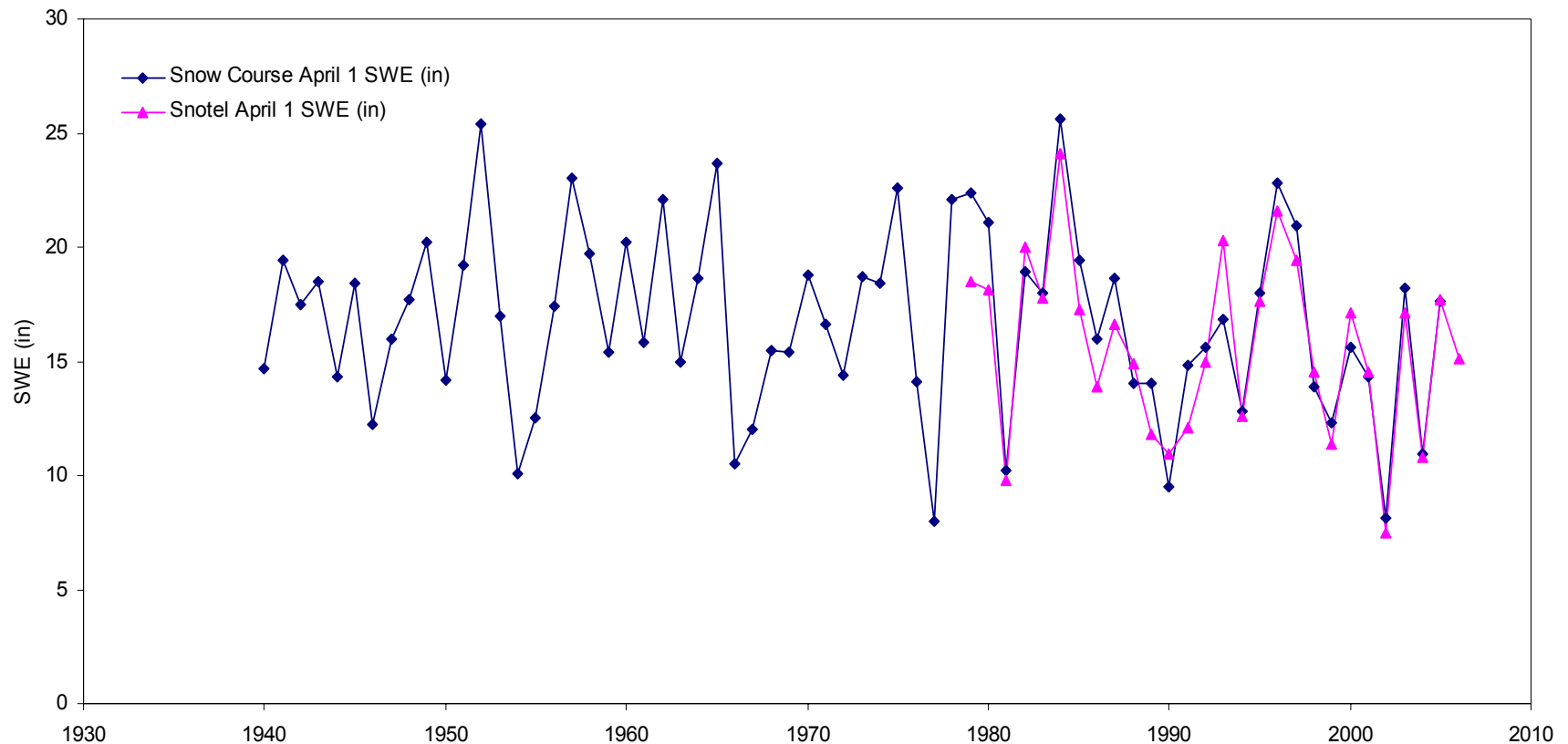
May 1 – April 1 SWE Difference



Porphyry Creek

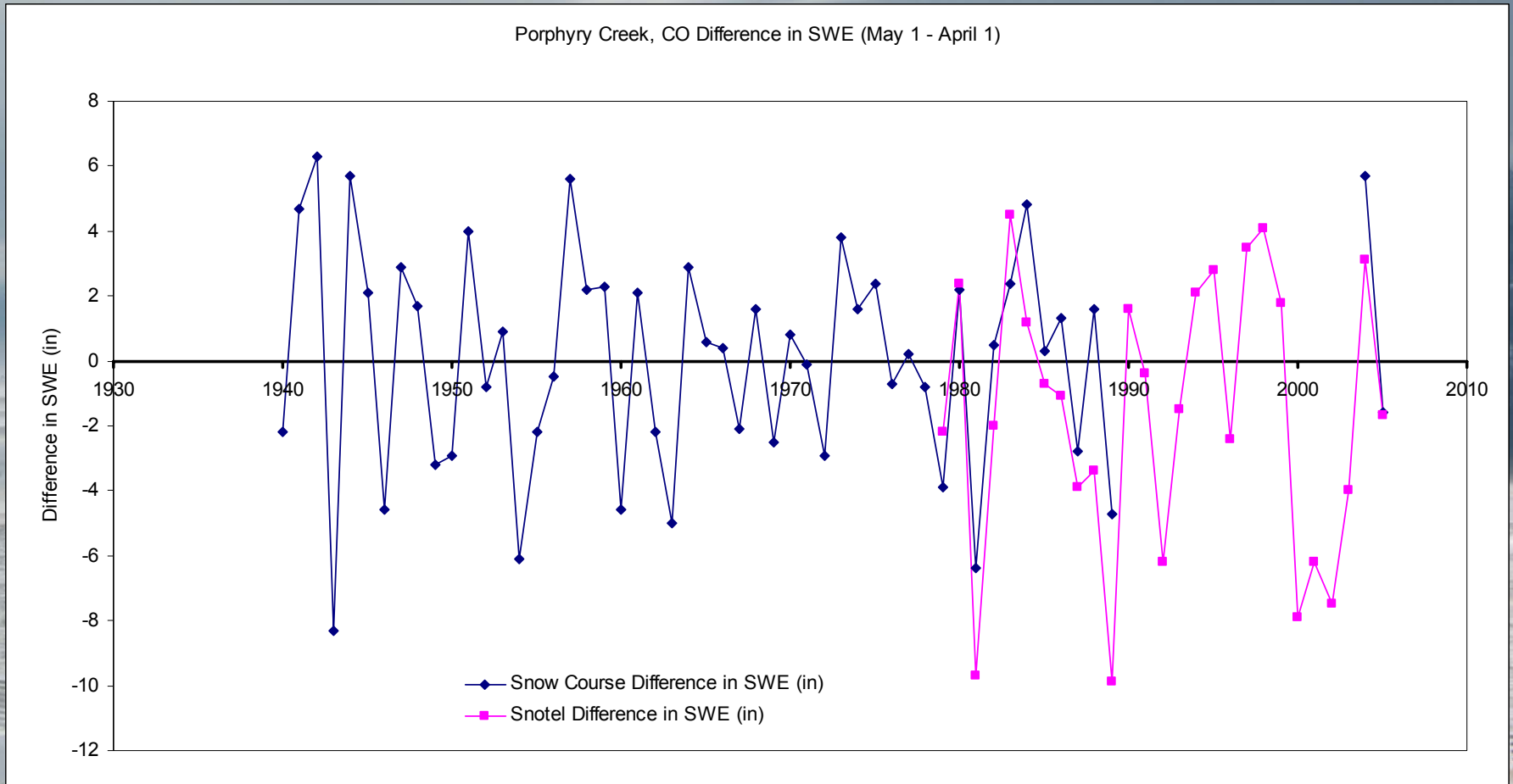
April 1 Snow Course and Snotel

Porphyry Creek, CO (Elevation 10,760') April 1 and May 1 SWE (in)



Porphyry Creek

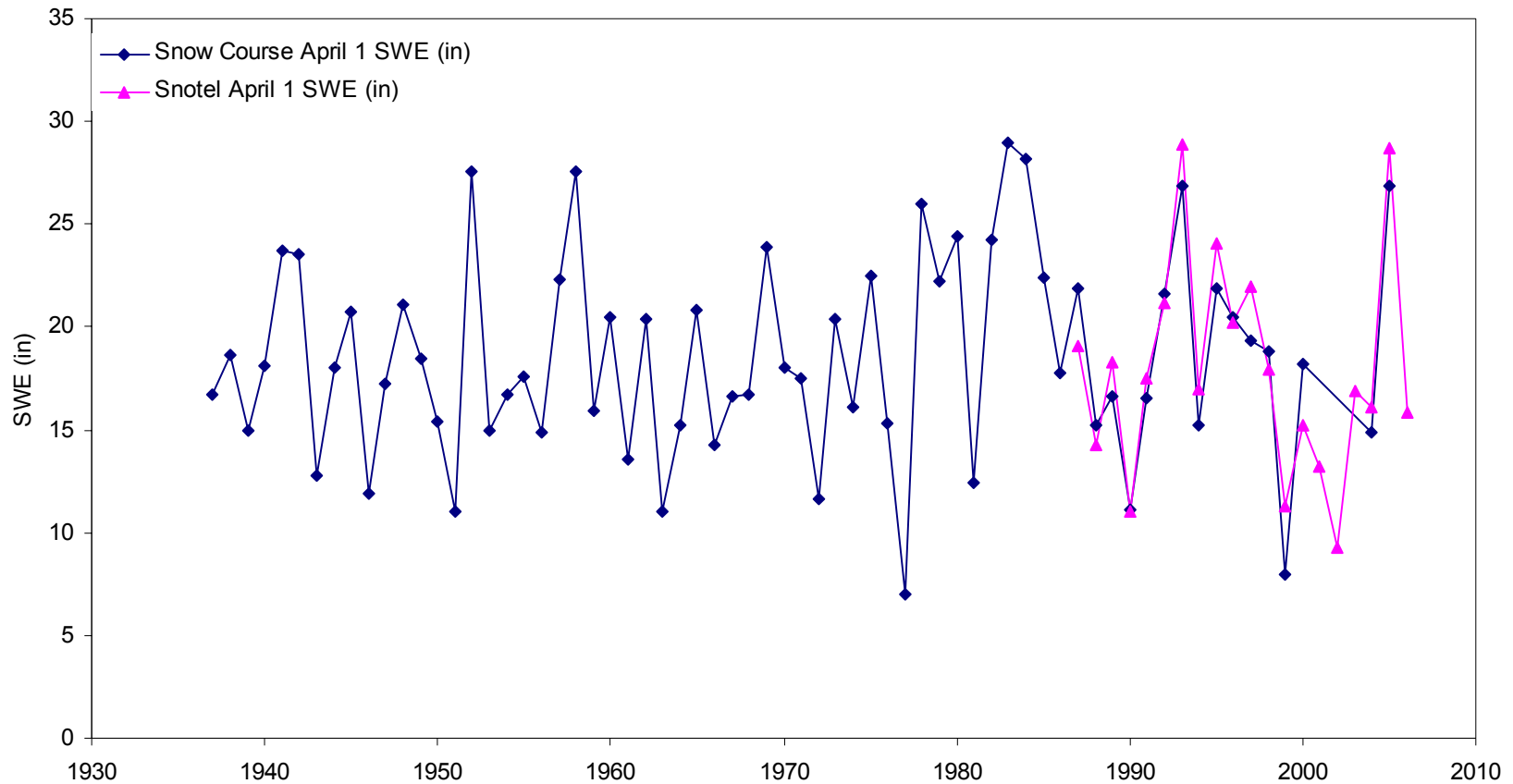
May 1 – April 1 SWE Difference



Mesa Lakes

April 1 Snow Course and Snotel

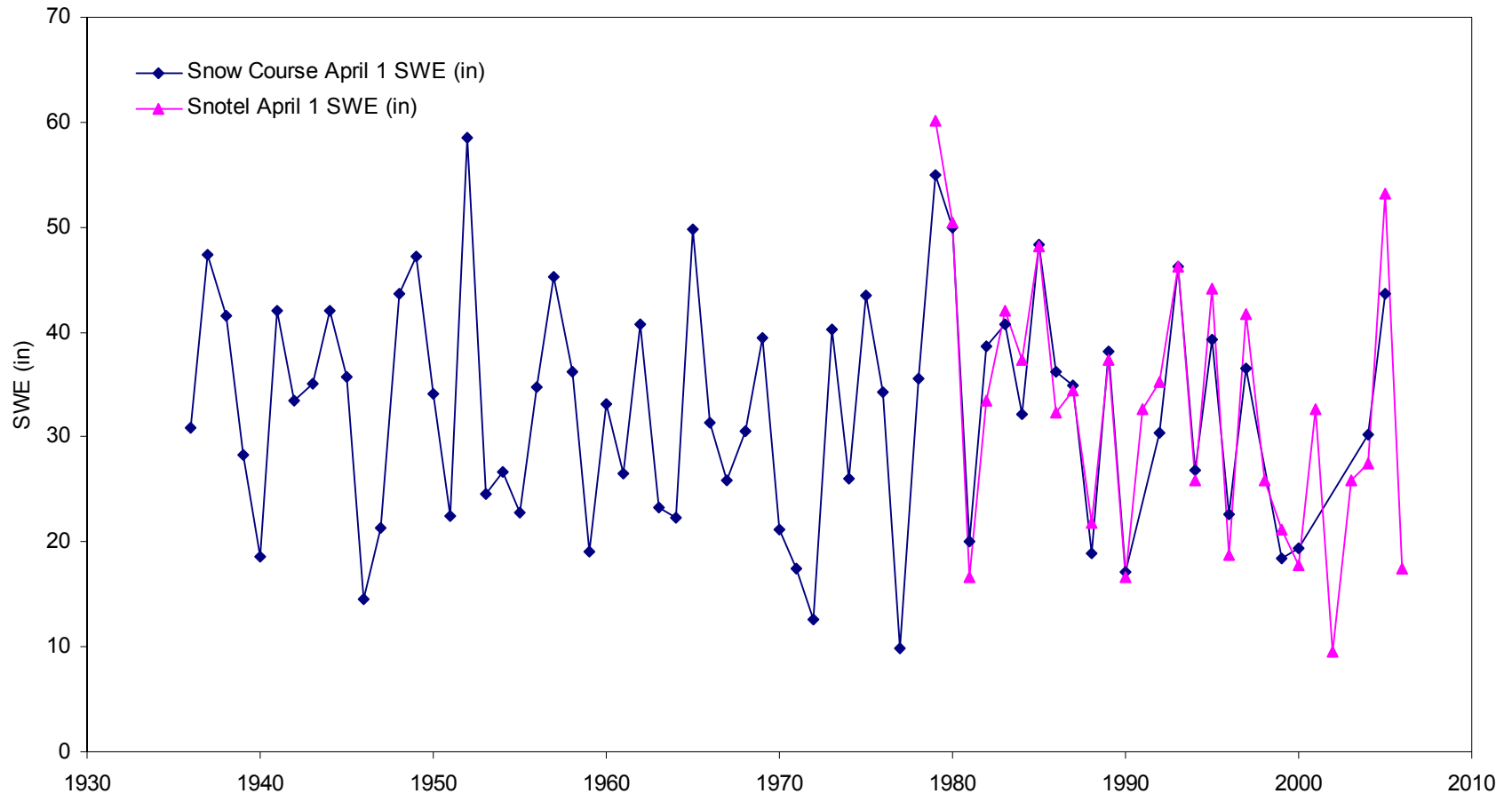
Mesa Lakes, CO (Elevation 10,000') April 1 SWE



Upper San Juan

April 1 Snow Course and Snotel

Upper San Juan, CO (Elevation 10,200') April 1 SWE (in)





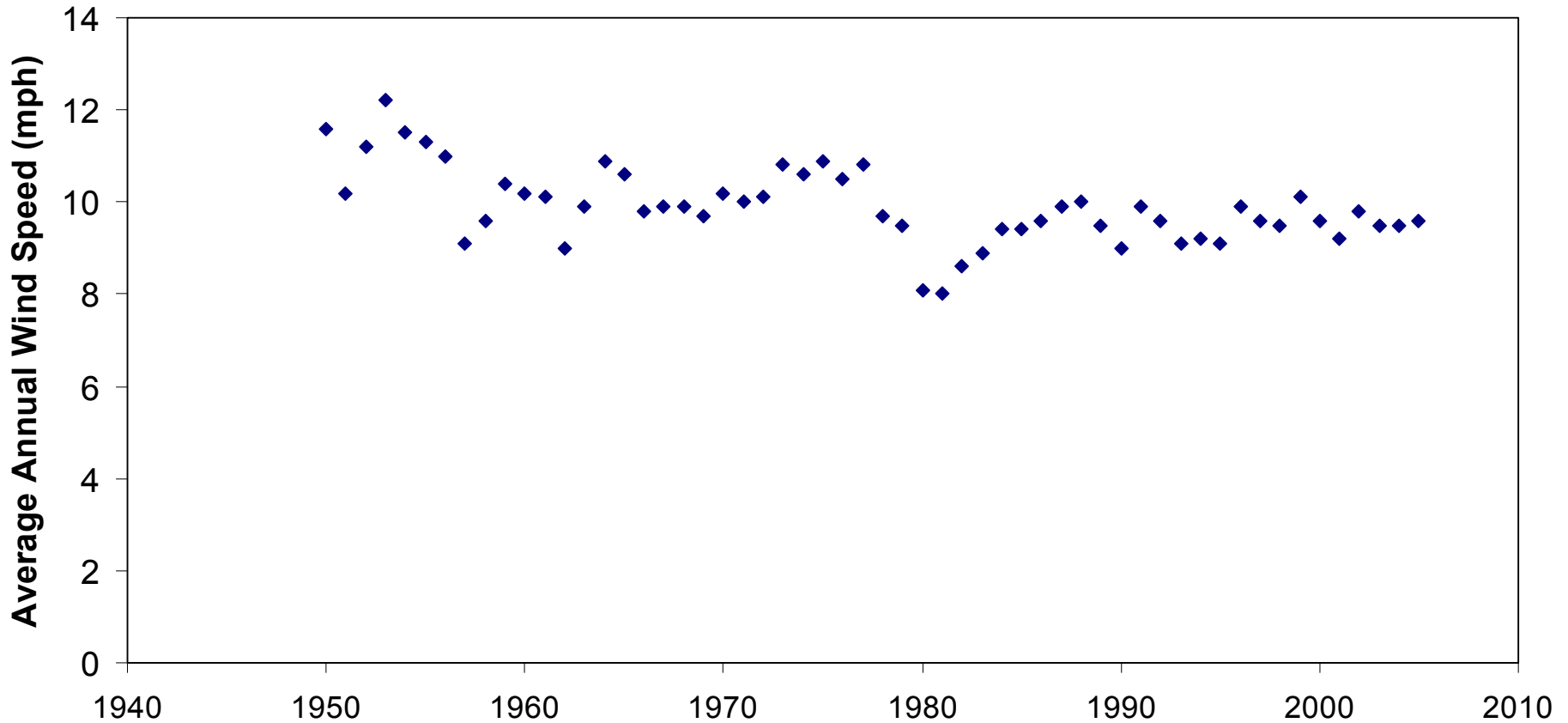
Wind!!



<http://www.state.co.us/oemc/programs/renewable/anemometer.htm>

Colorado Springs Average Annual Wind Speed

Colorado Springs Airport Average Annual Wind Speed (mph)



That's what we've seen –

What will we see in the
next 100 years?









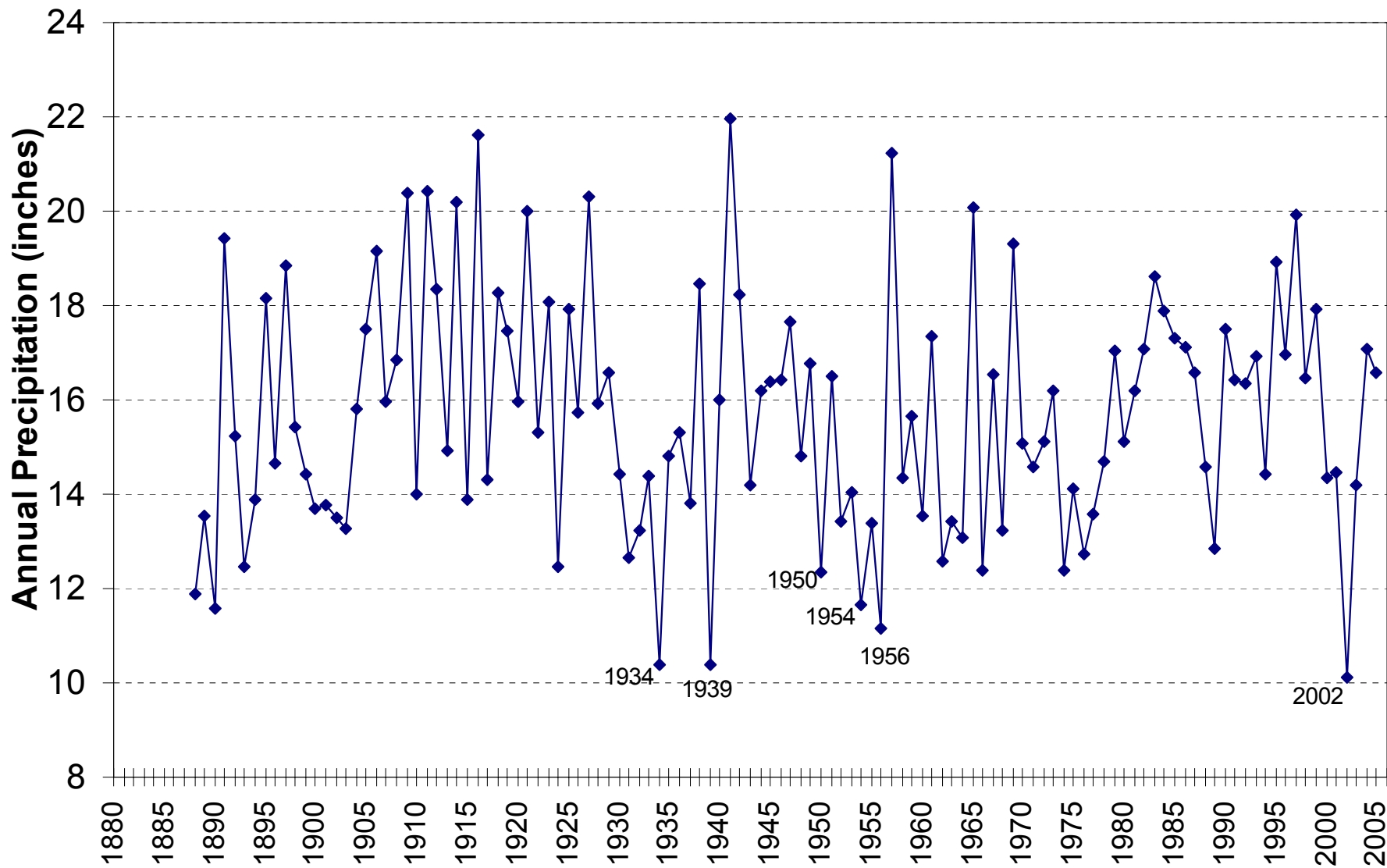


Flooded farm near LaJunta May 15, 1999



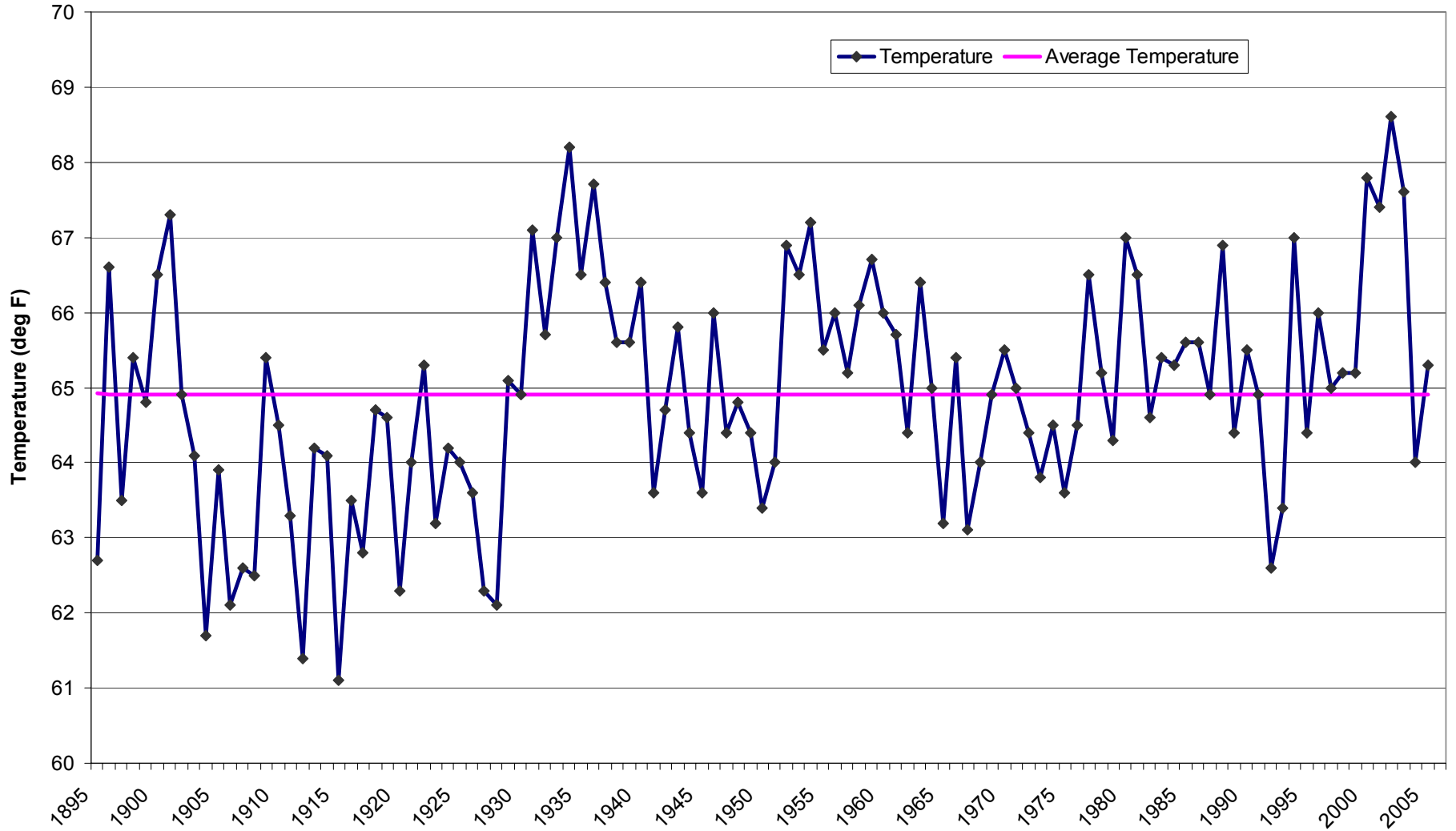


Colorado Statewide Annual Precipitation



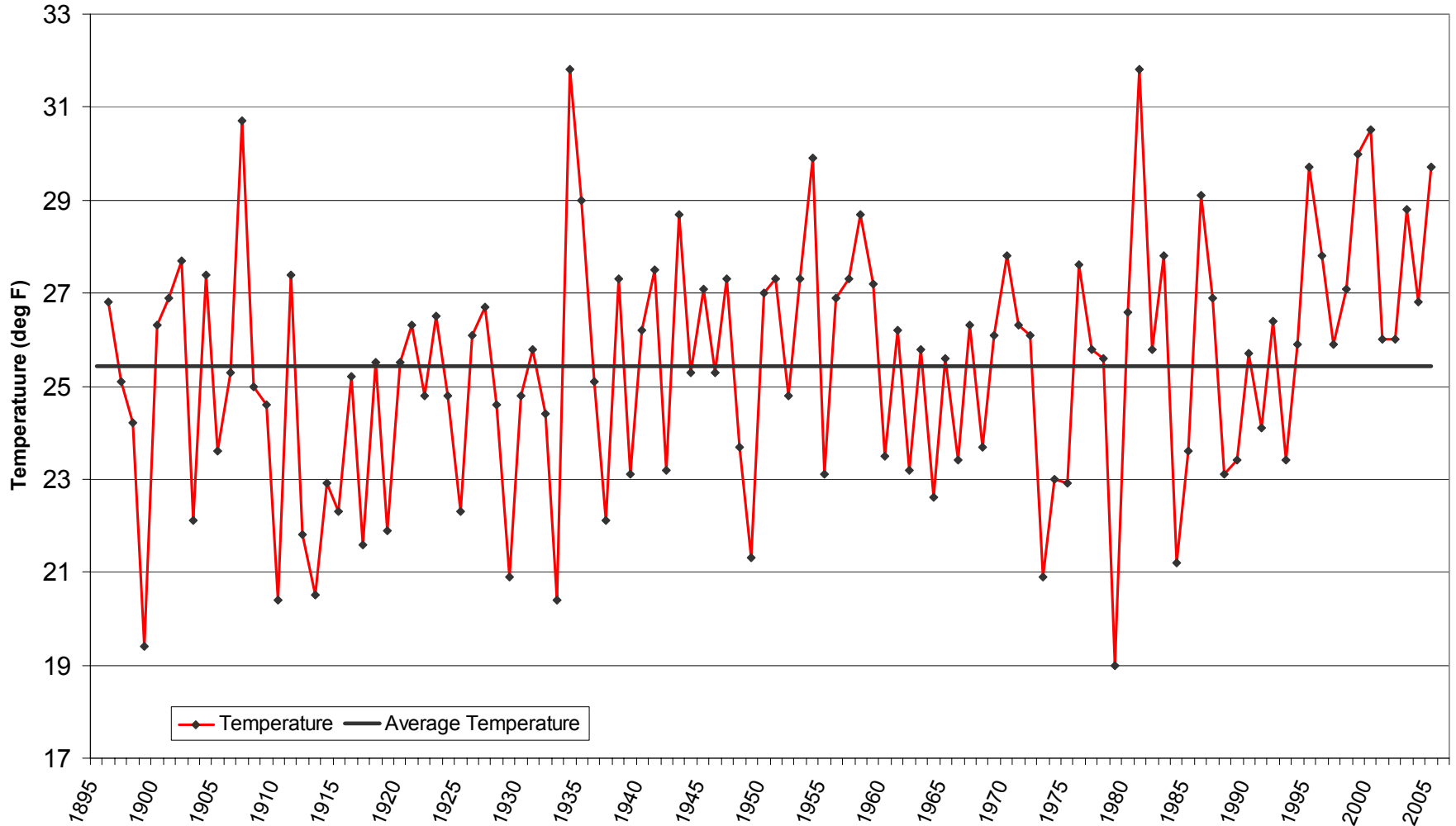
Colorado Summer Temperatures (June-Aug)

Colorado Statewide Average Summer (Jun-Aug) Temperature



Colorado Winter Temperatures (Dec-Feb)

Colorado Statewide Average Winter (Dec-Feb) Temperature



So, what should I do?

- Join CoCoRaHS!



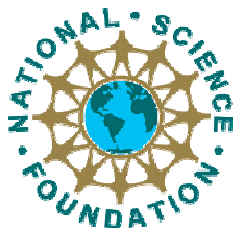
Community Collaborative Rain, Hail and Snow Network



For More Information,
Visit the CoCoRaHS Web Site



<http://www.cocorahs.org>



Support for this project provided by
Informal Science Education Program,
National Science Foundation
and
many local charter sponsors.

Colorado Climate Center

Data and Power Point Presentations available for downloading

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

- click on “Drought”
- then click on “Presentations”

