Drought: What is the Status?

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Colorado State University

http://ccc.atmos.colostate.edu

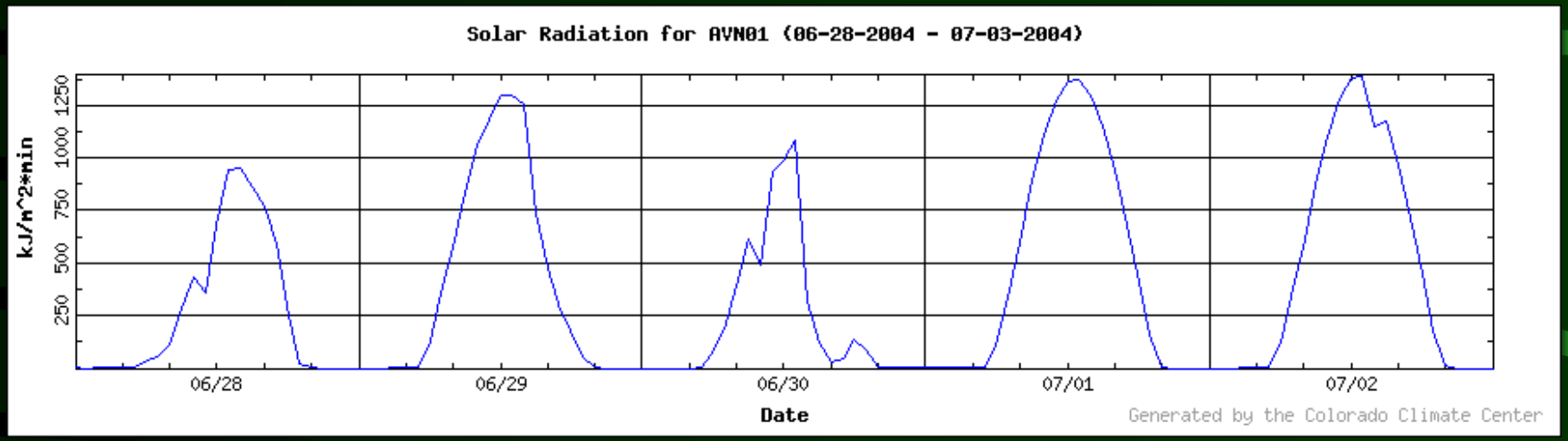
Presented at 2005 Peak to Prairie Landscape Symposium,
February 11, 2005, Colorado Springs, Colorado
Prepared by Odie Bliss

Our climate is great – sort of

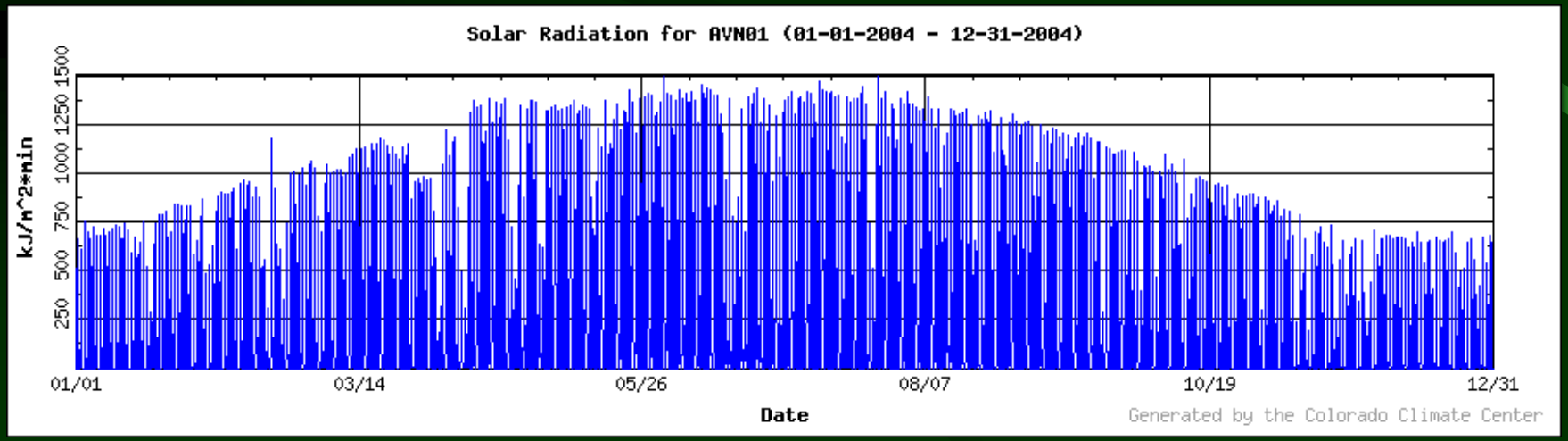
http://www.lensflare.com/~doubt/pics/garden/

Solar Energy Drives Our Climate

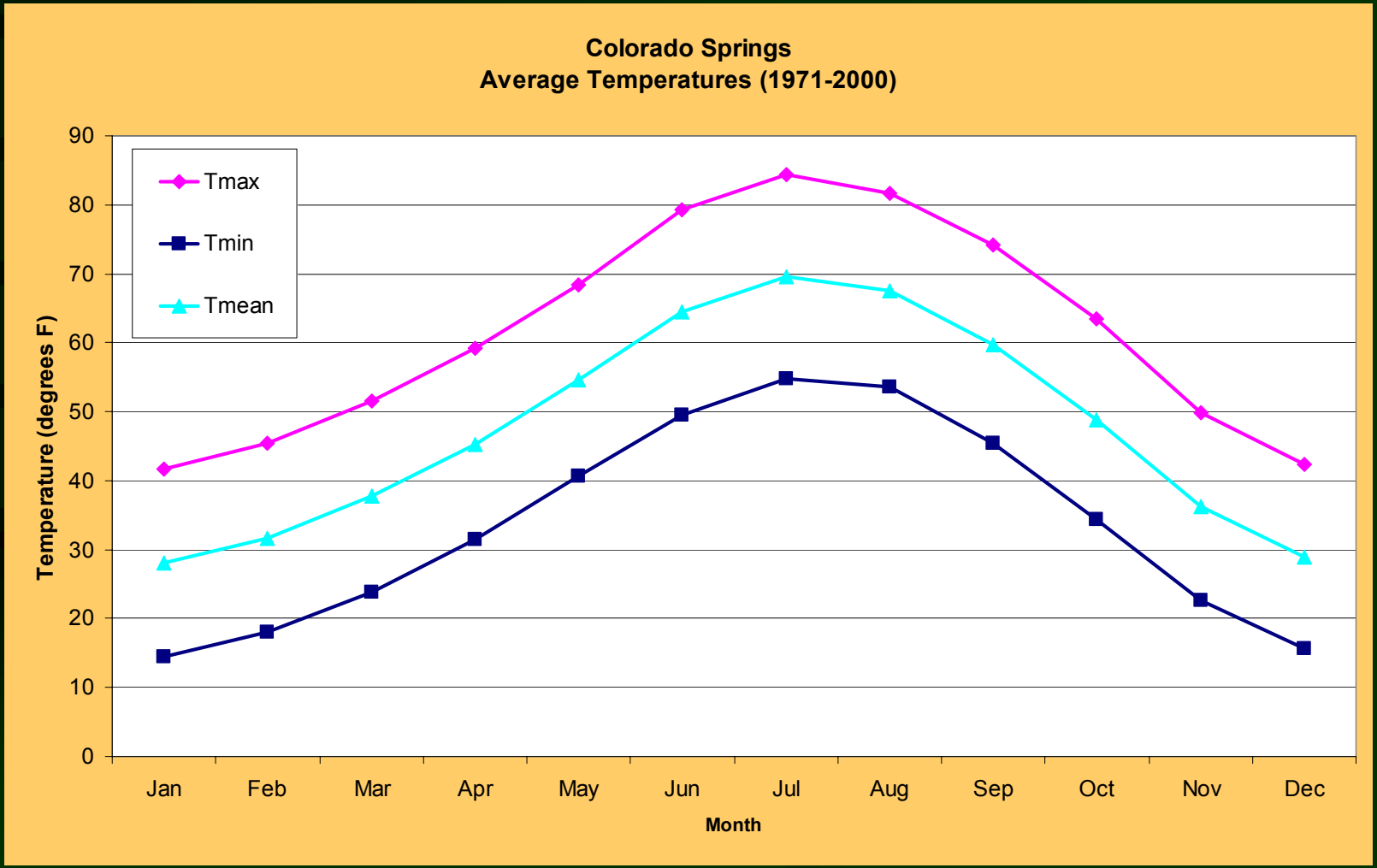
Avondale, June 28 – July 3, 2004



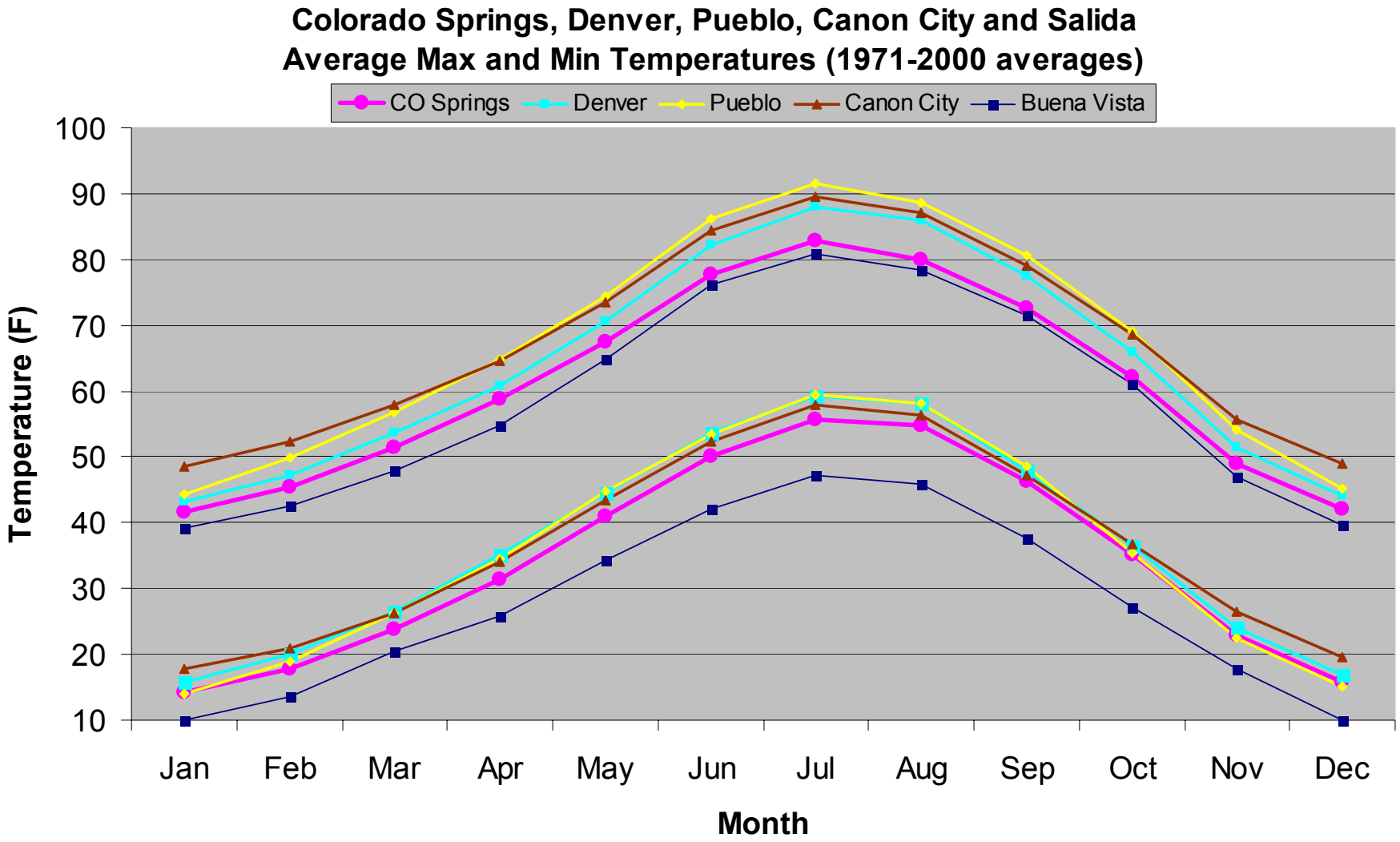
Avondale, June 28 – July 3, 2004



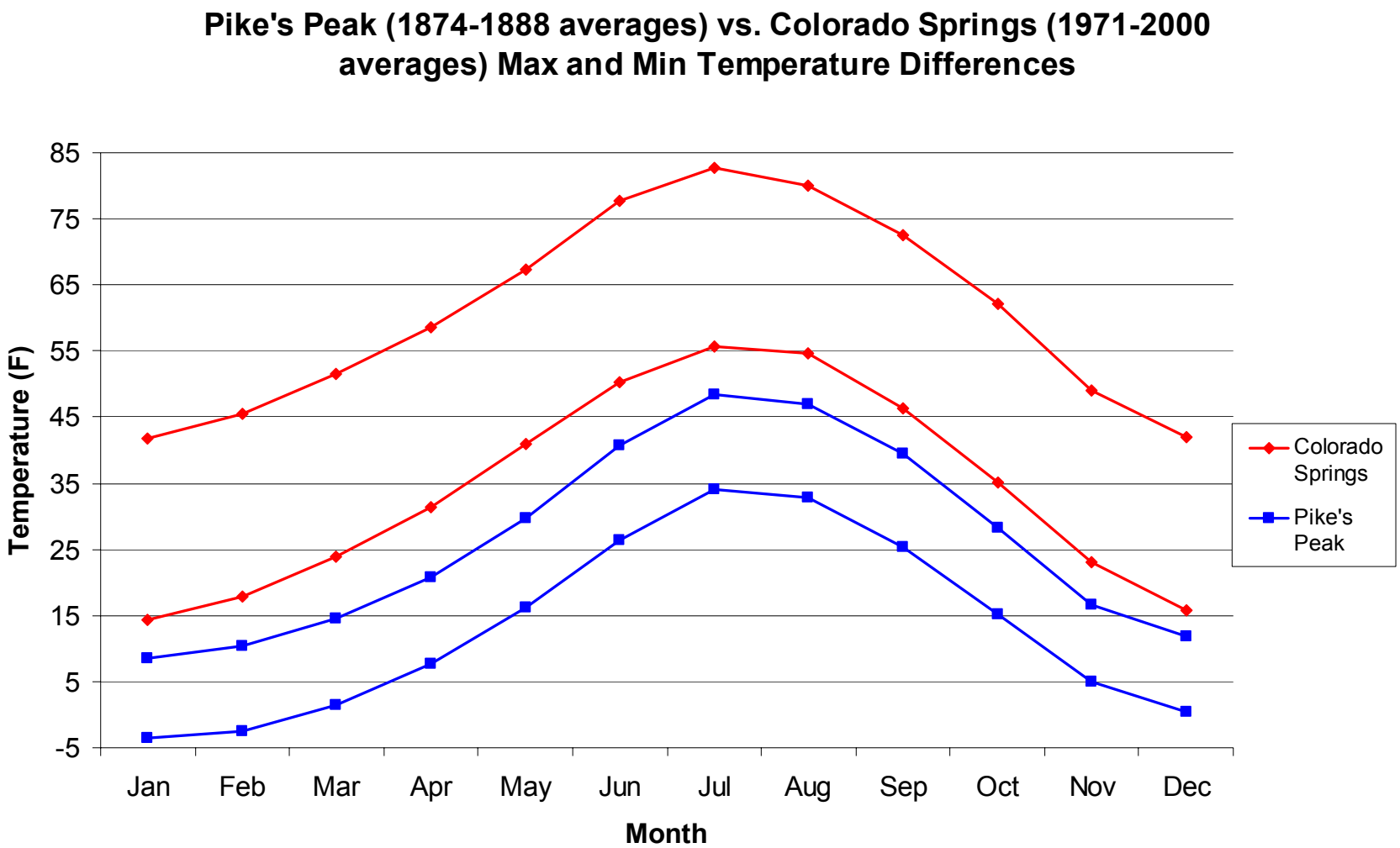
Colorado Springs Average Temperatures



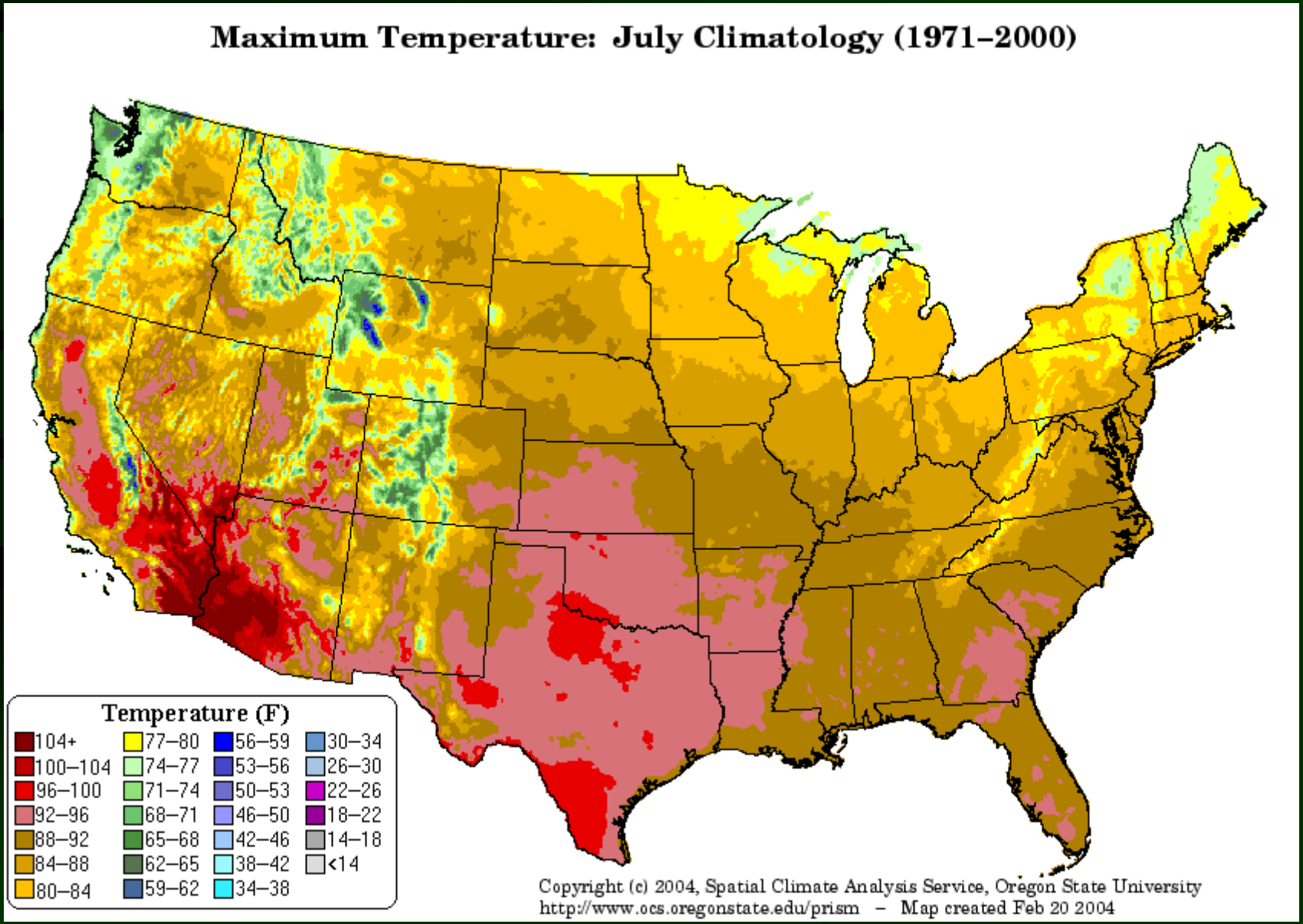
Comparison of Average Temperatures



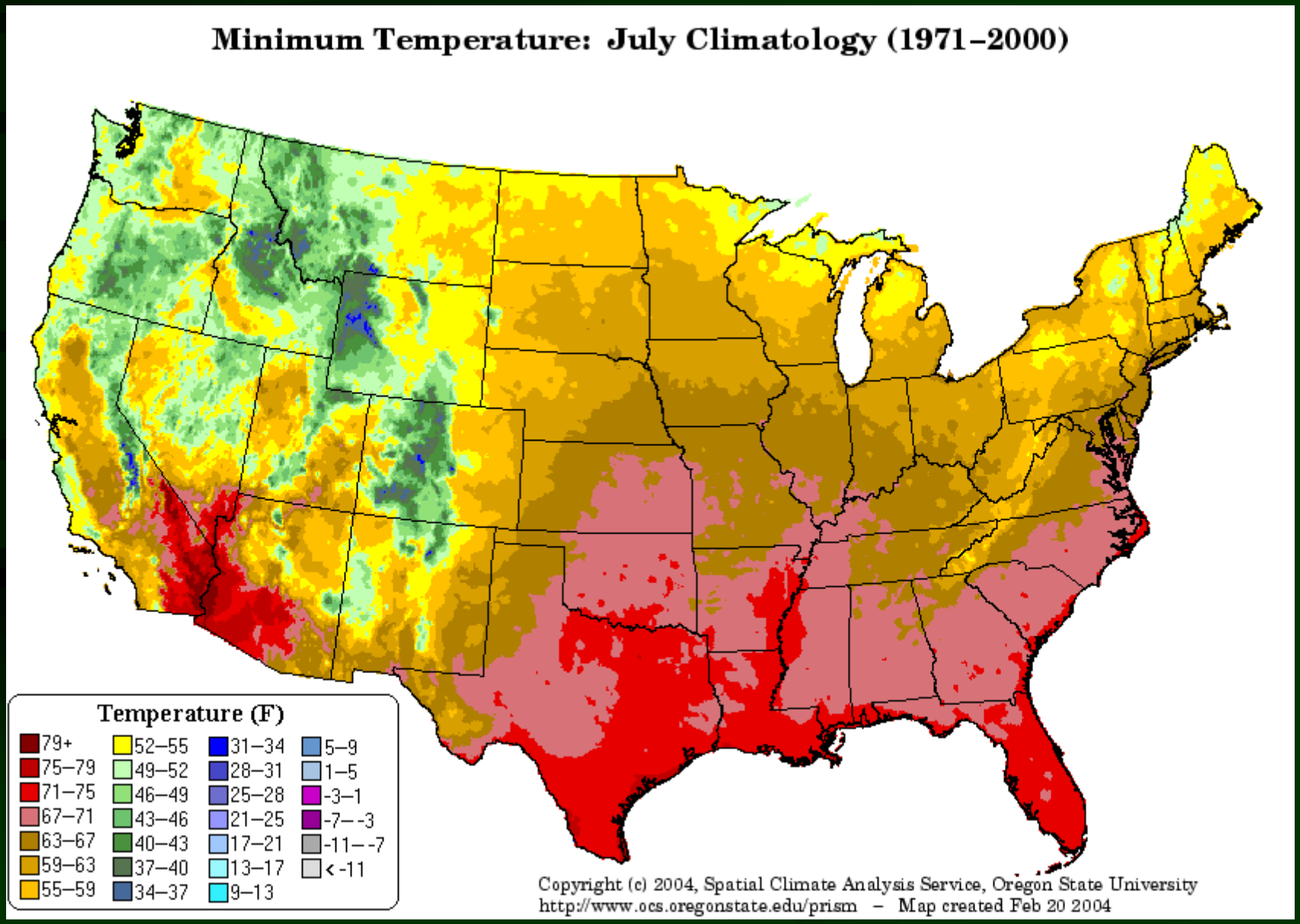
Pike's Peak vs. Colorado Springs



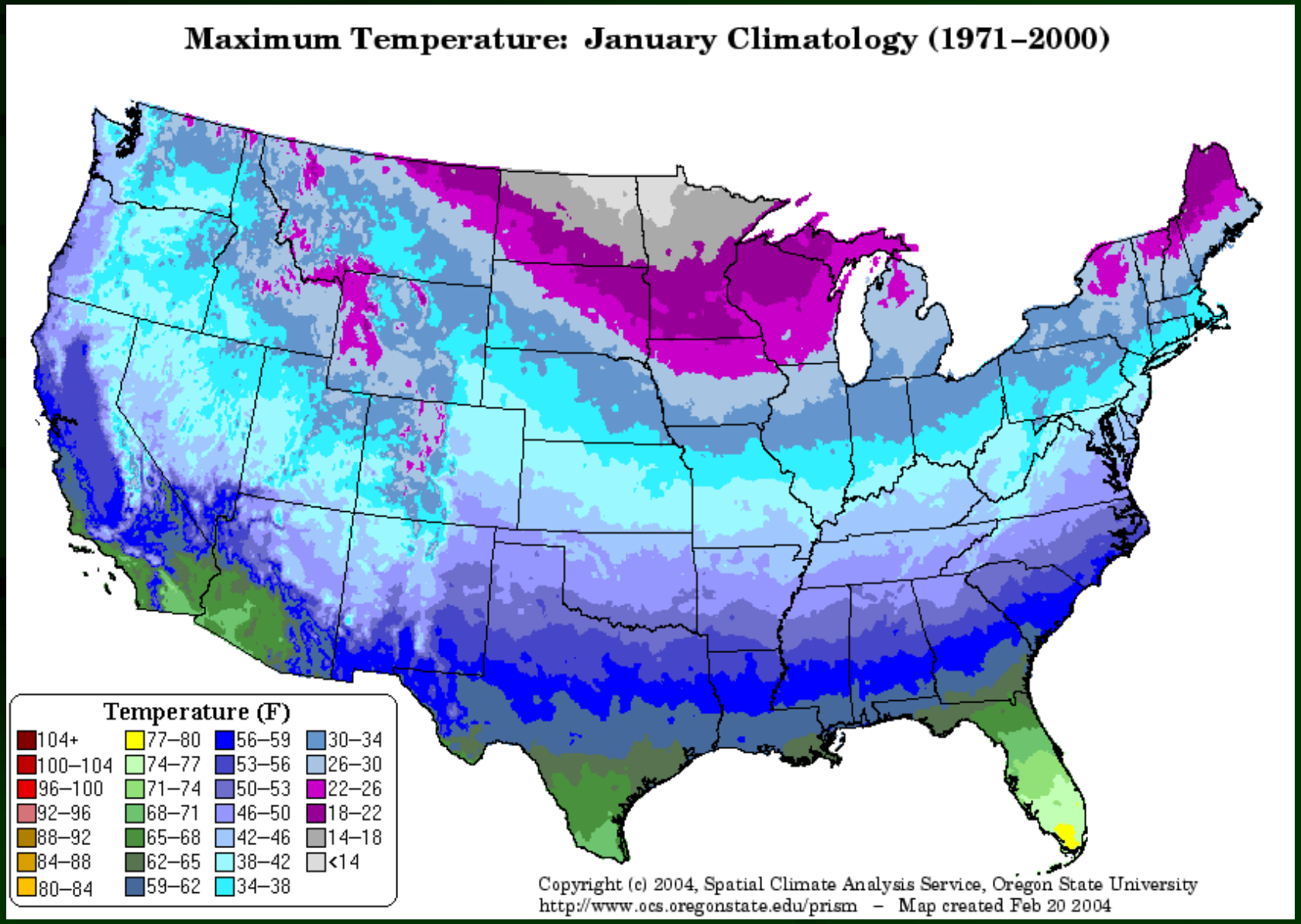
Summer Temperature Perspective



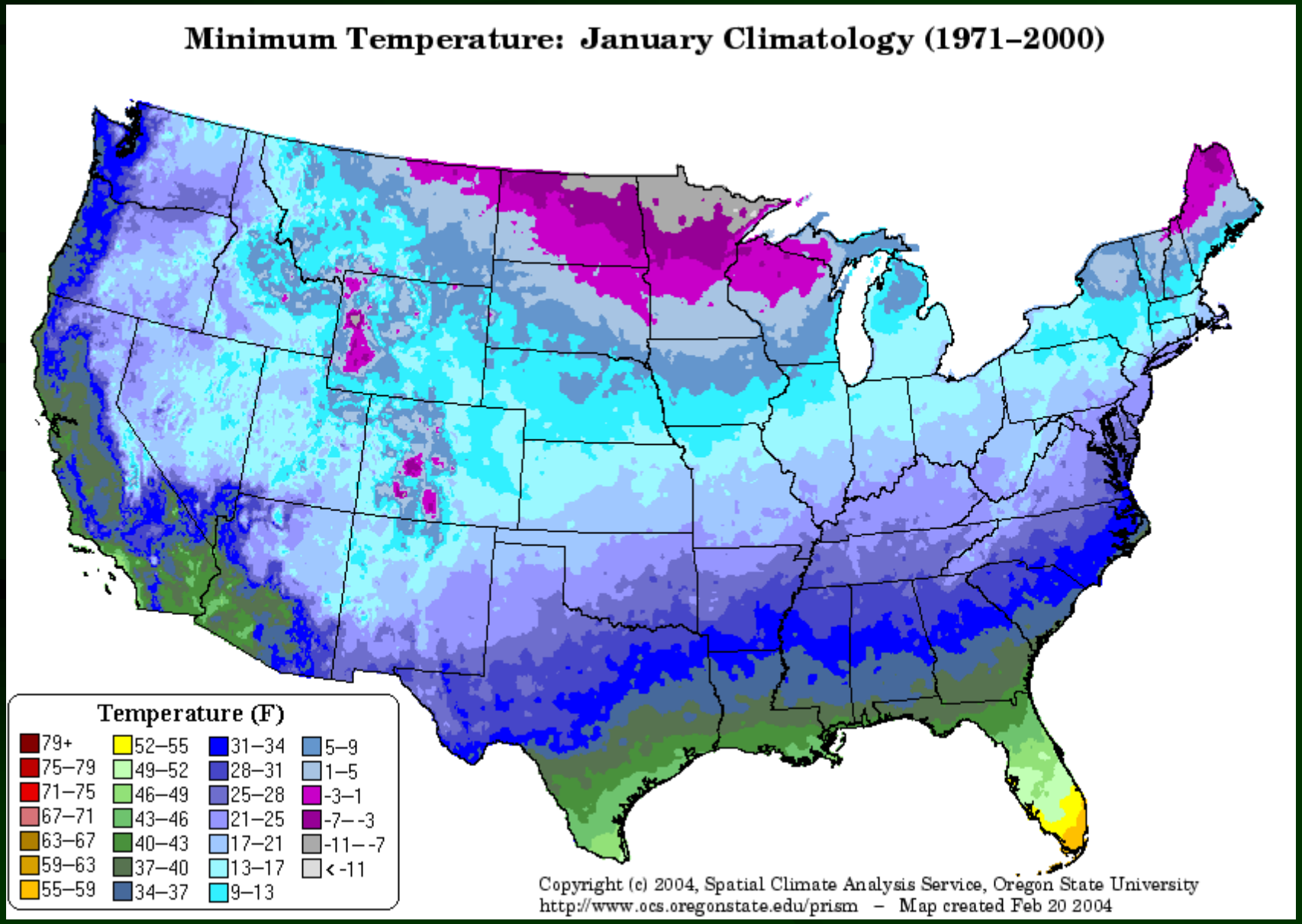
Summer Temperature Perspective



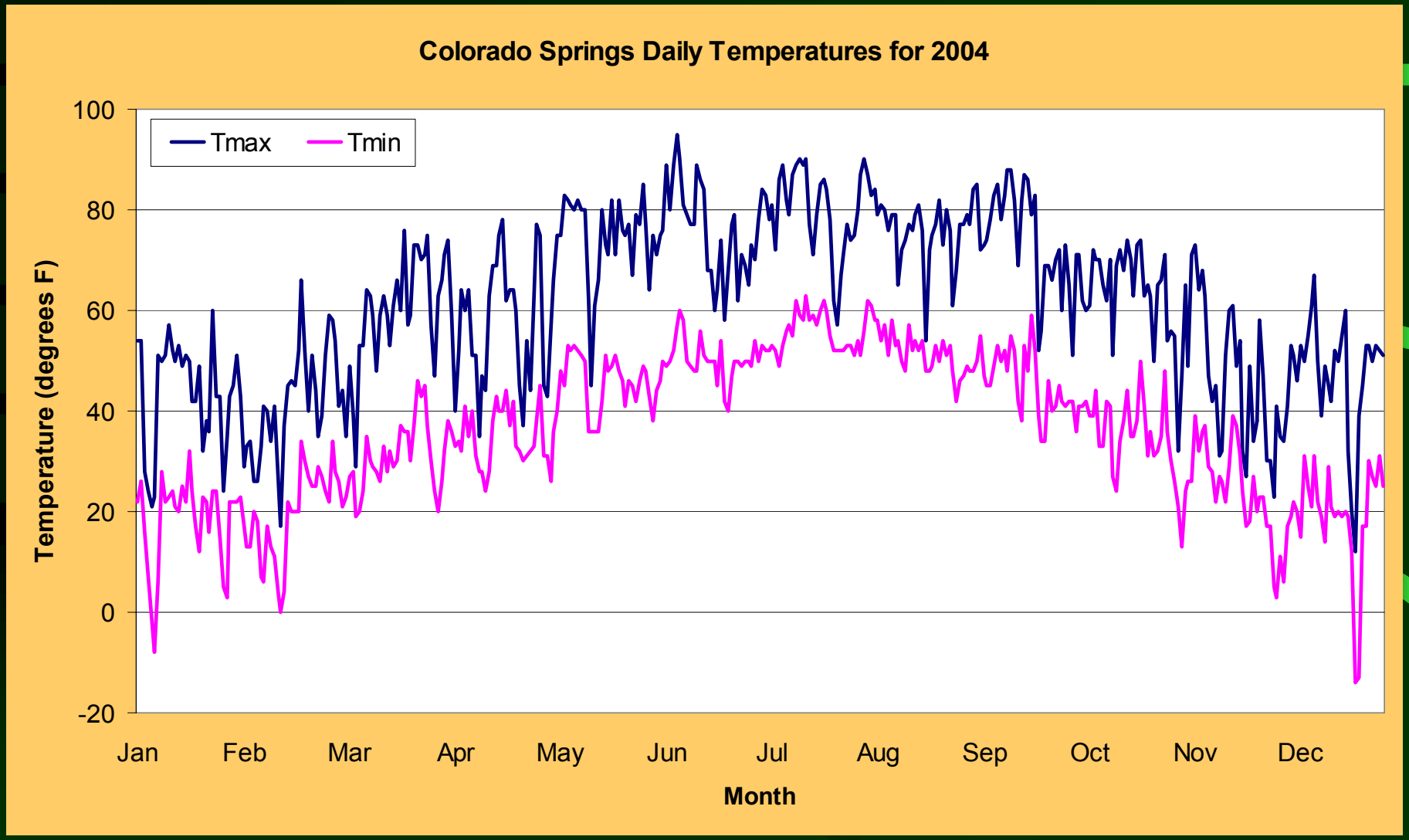
Winter Temperature Perspective



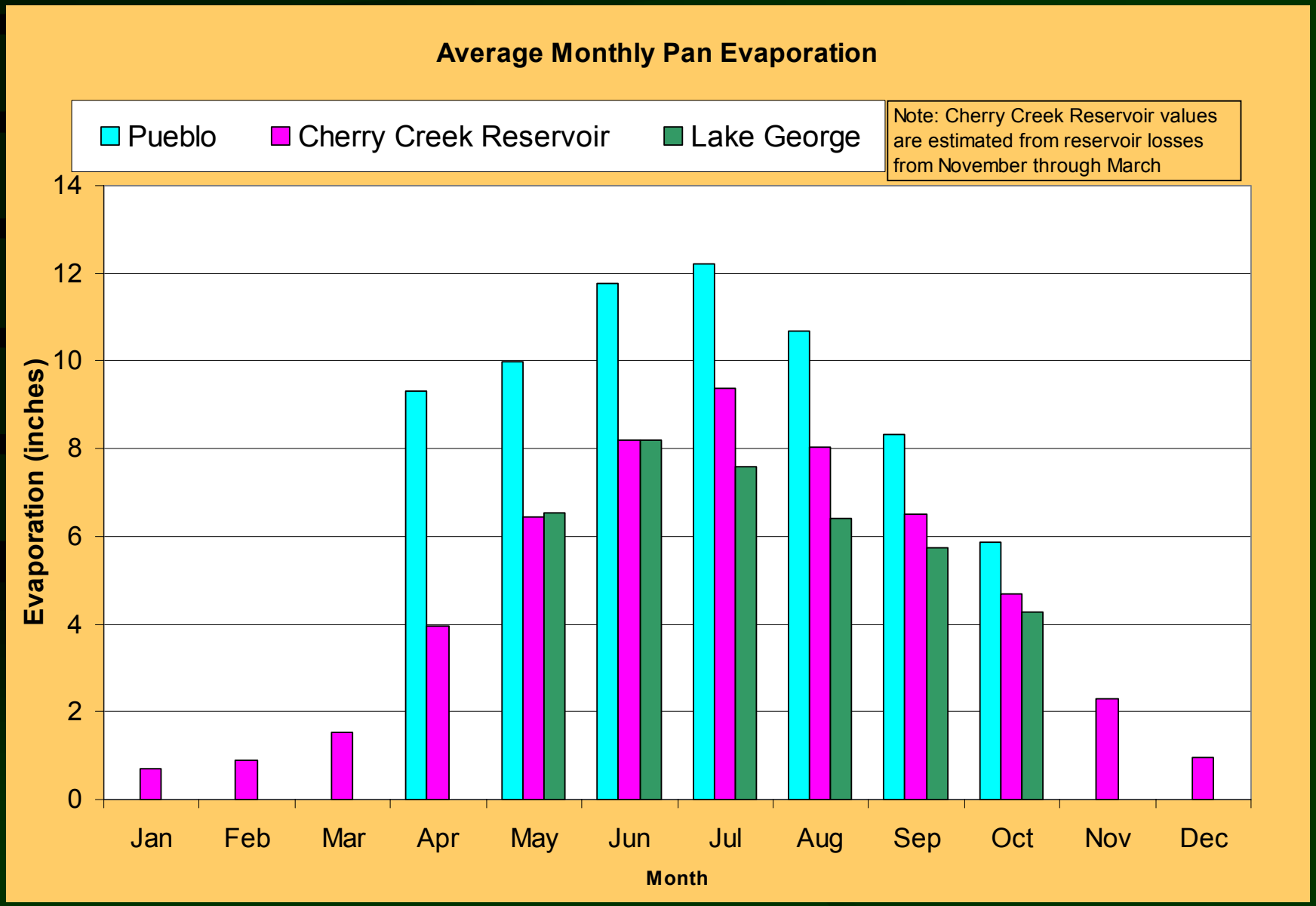
Winter Temperature Perspective



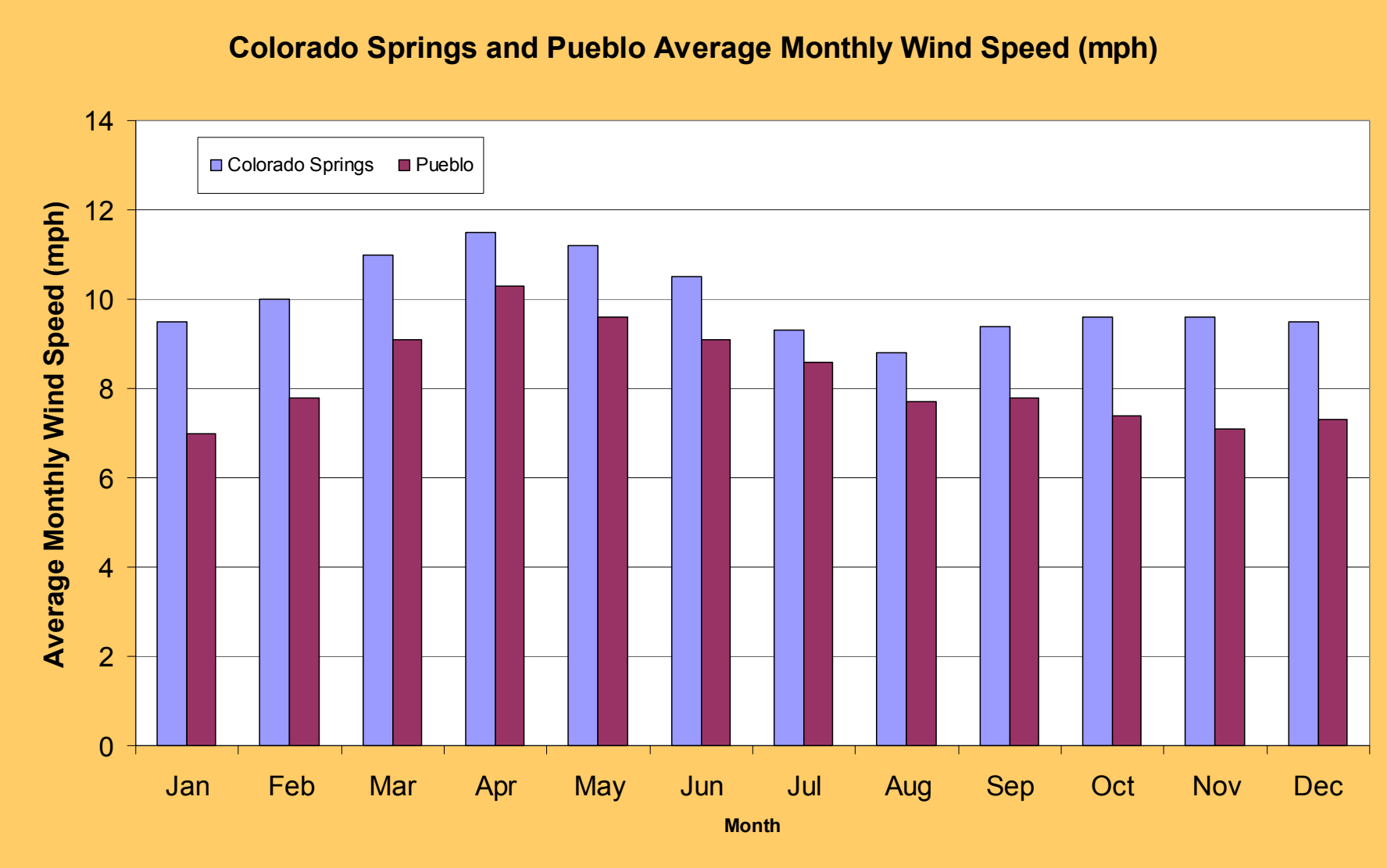
2004 Daily Temperatures for Colorado Springs



Mean Monthly Pan Evaporation

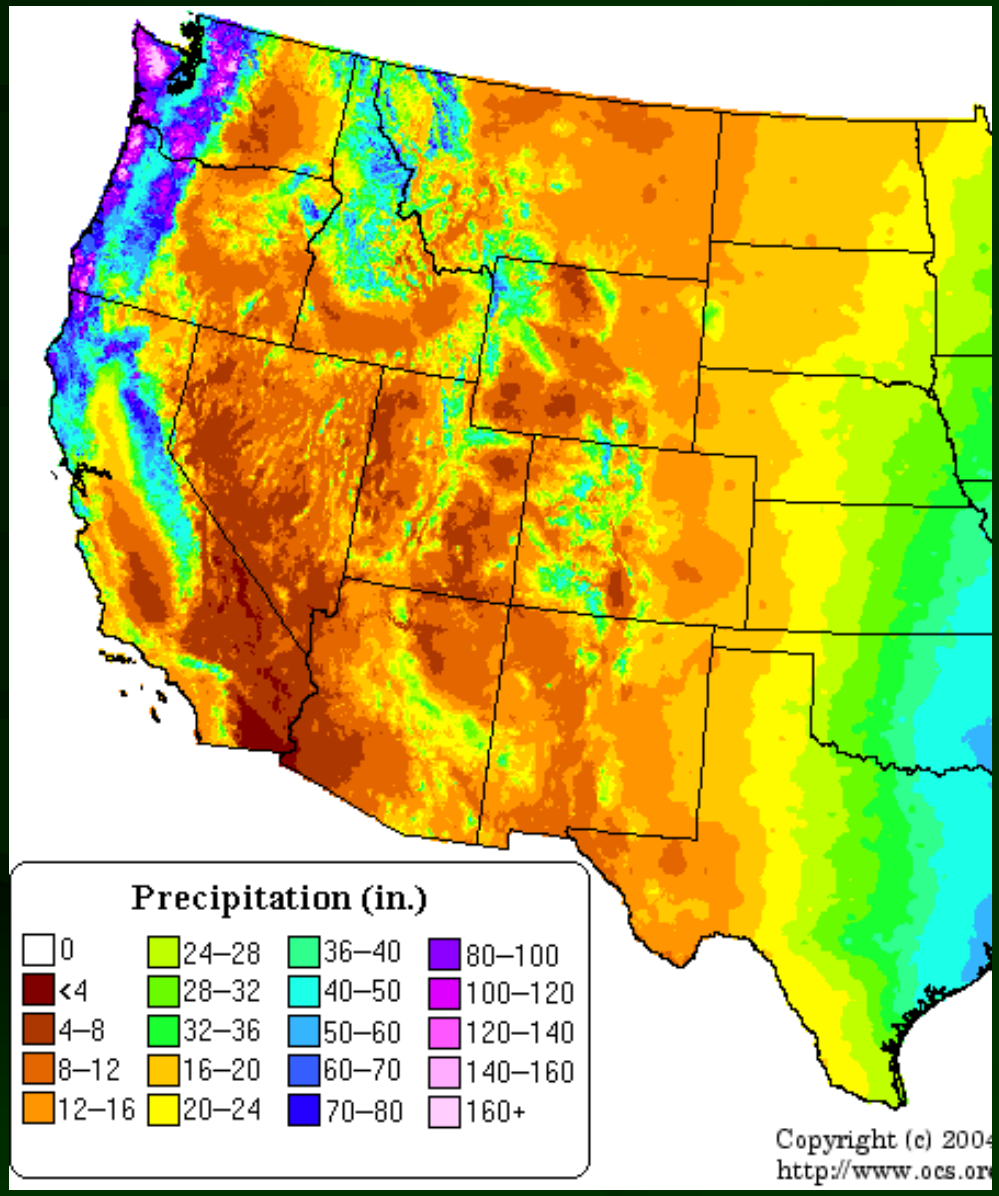


Colorado Springs and Pueblo Average Wind Speed



Precipitation – The most variable of all!

Precipitation: Annual Climatology (1971-2000)



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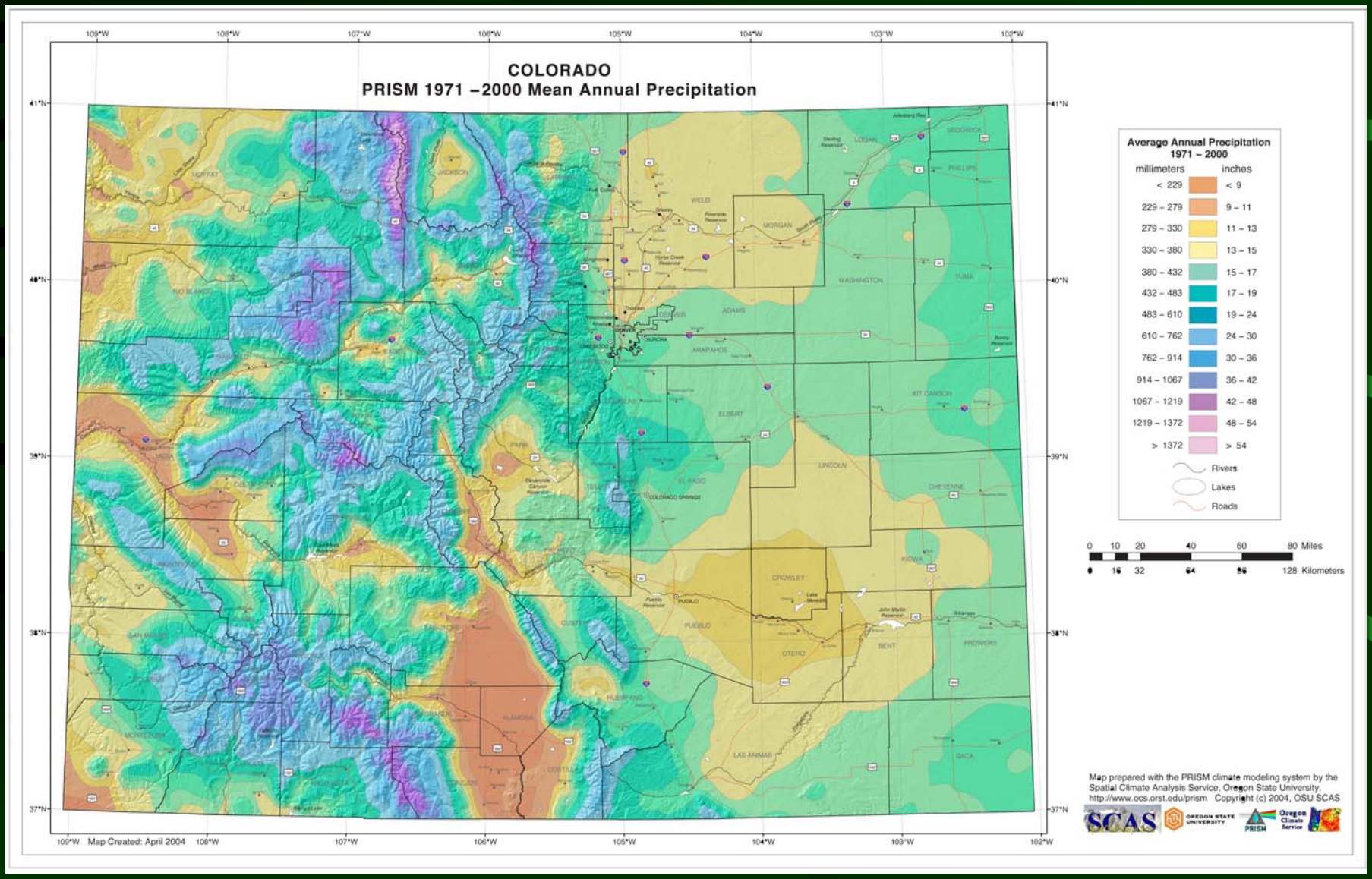
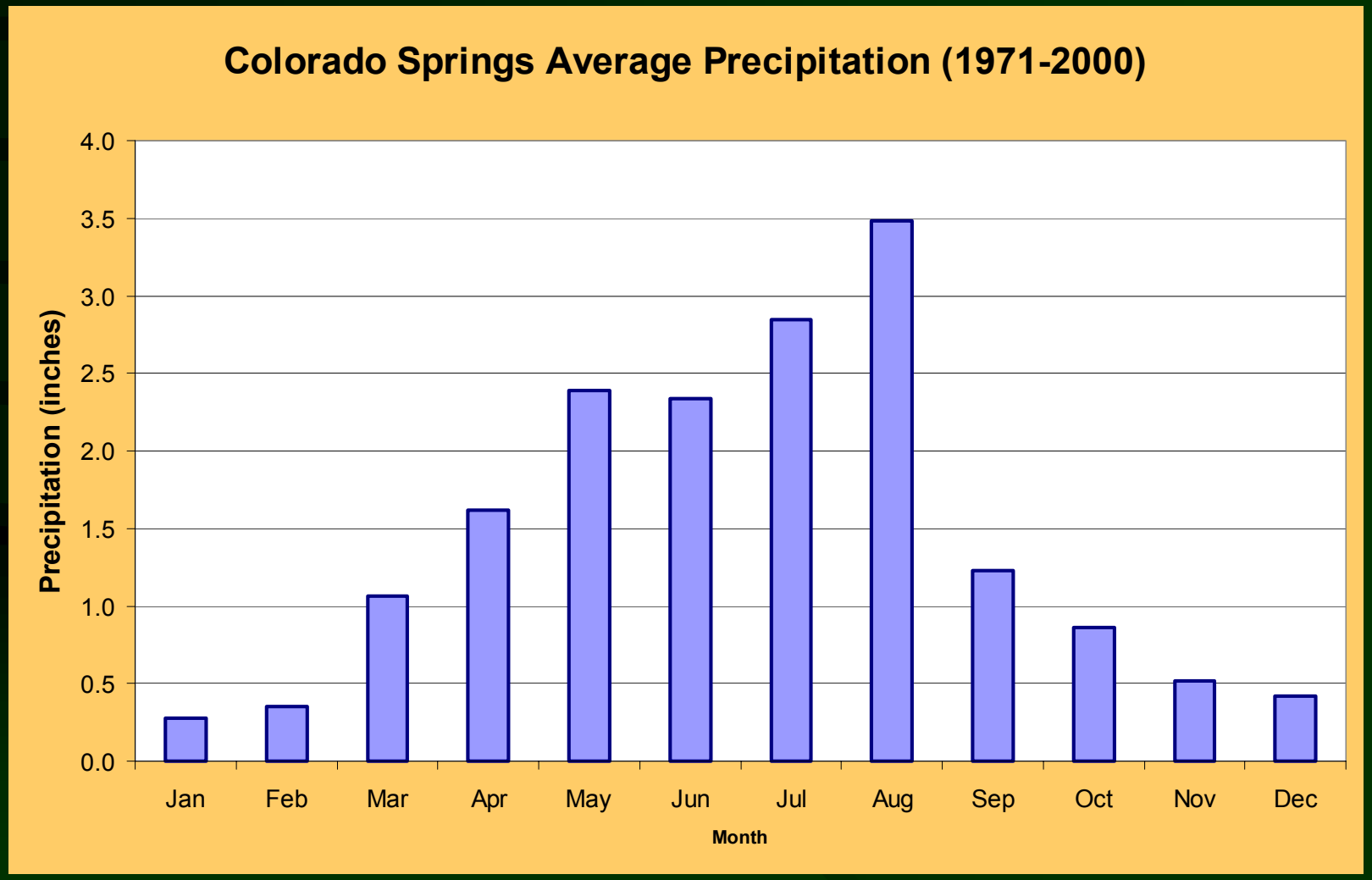
http://www.ocs.oregonstate.edu/prism - Map created Feb 20 2004

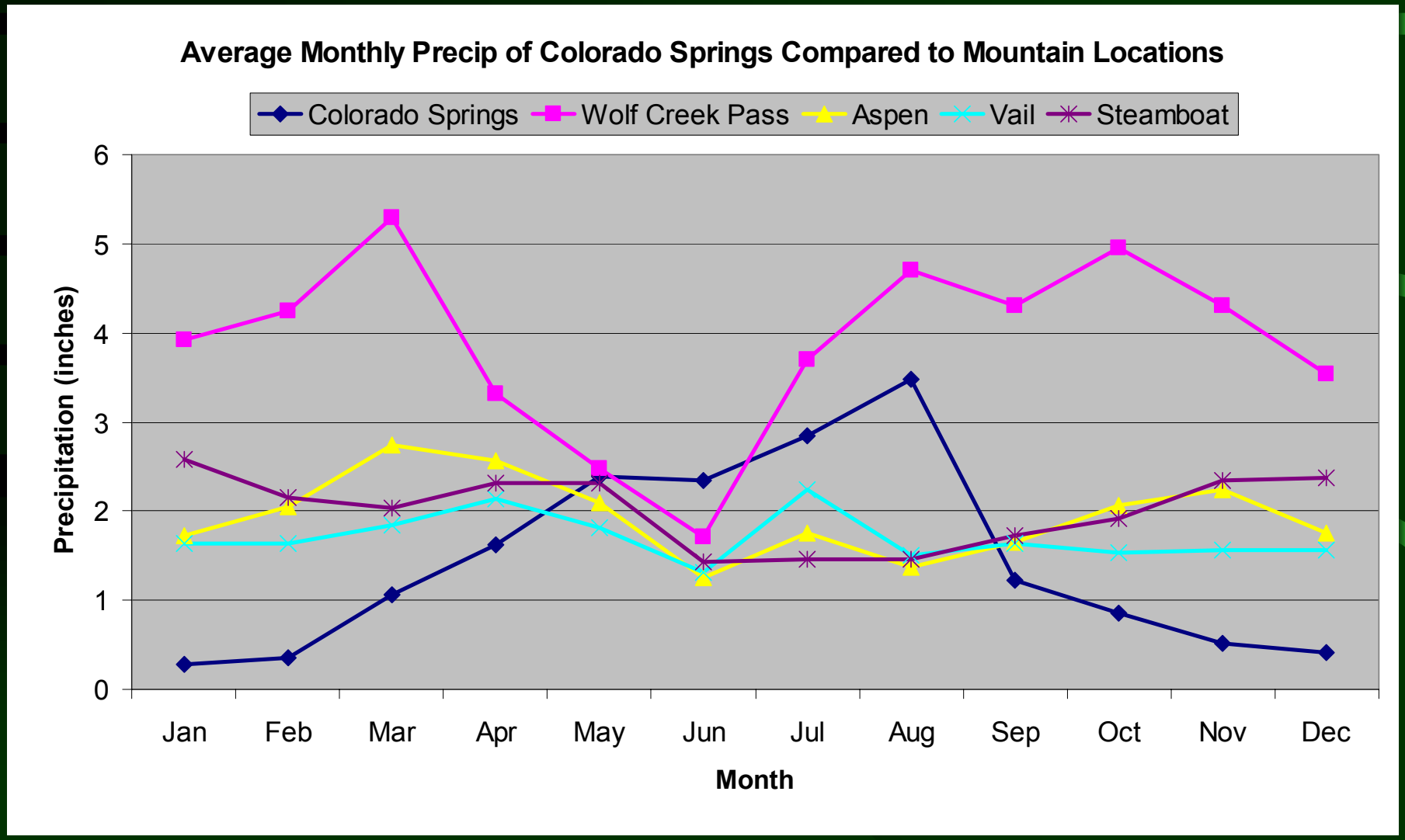
Colorado Average Precipitation



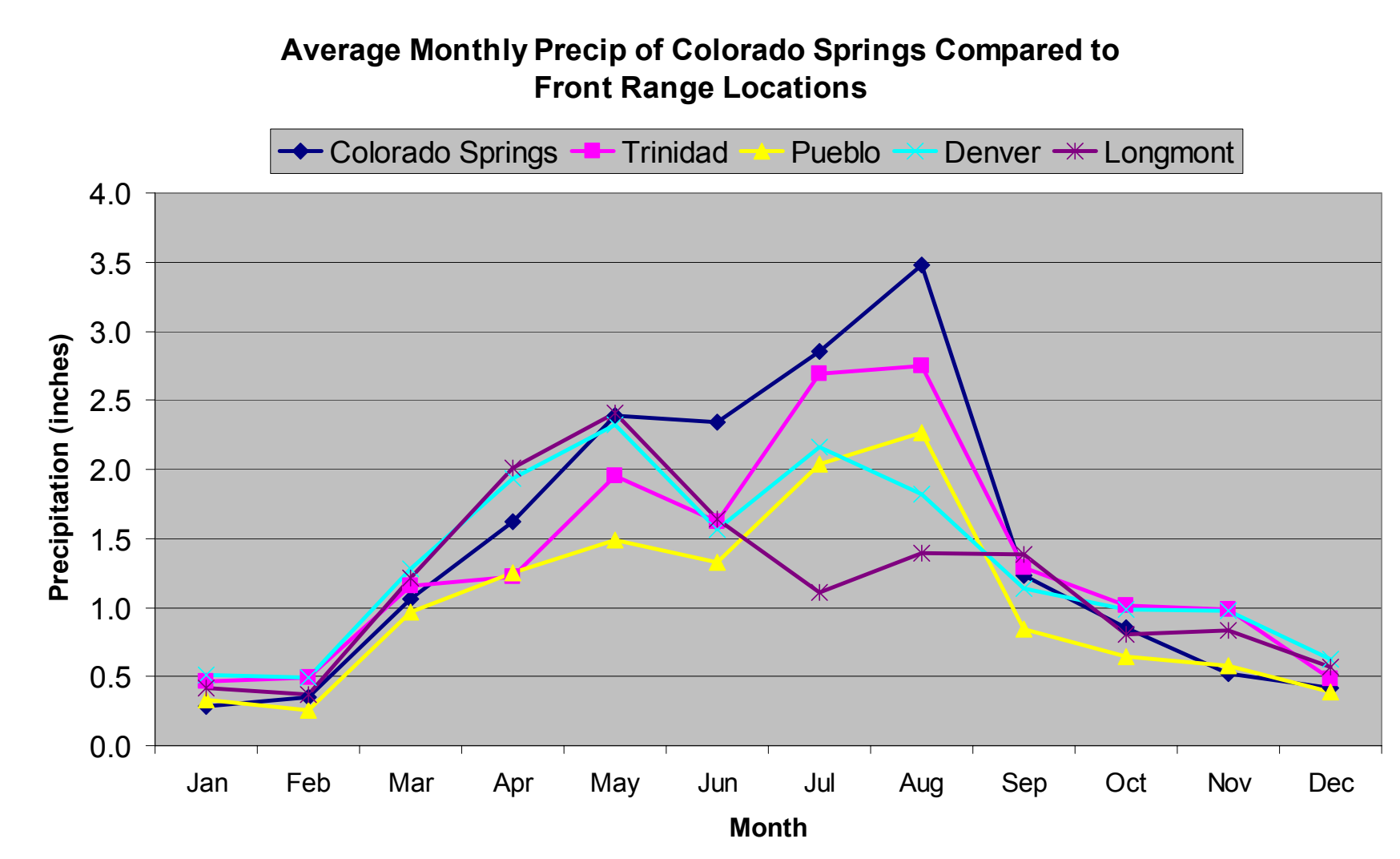
Colorado Springs Monthly Average Precipitation (1971-2000)



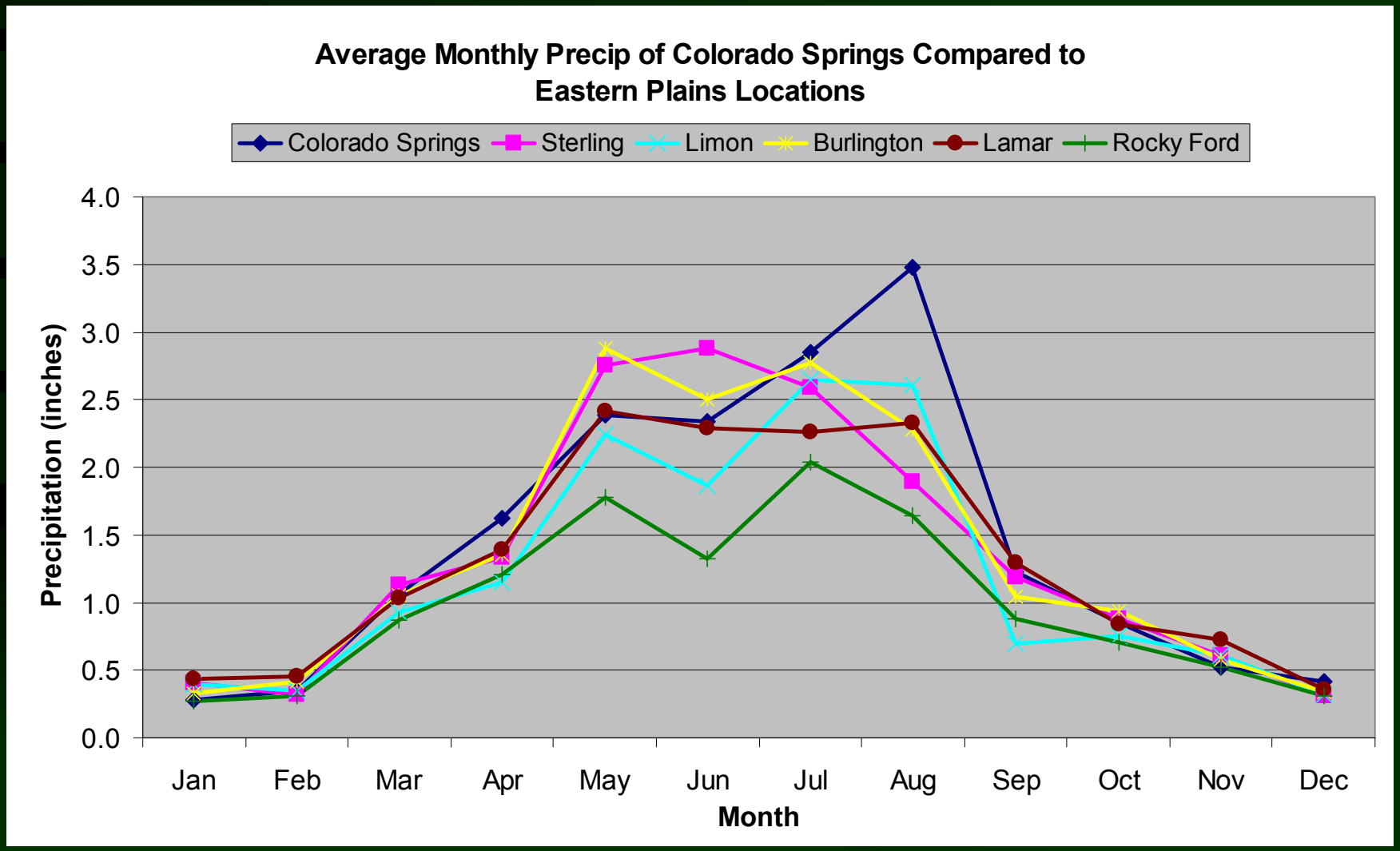
Average Monthly Precipitation Compared to Mountain Locations



Average Monthly Precipitation Compared to Other Front Range Cities

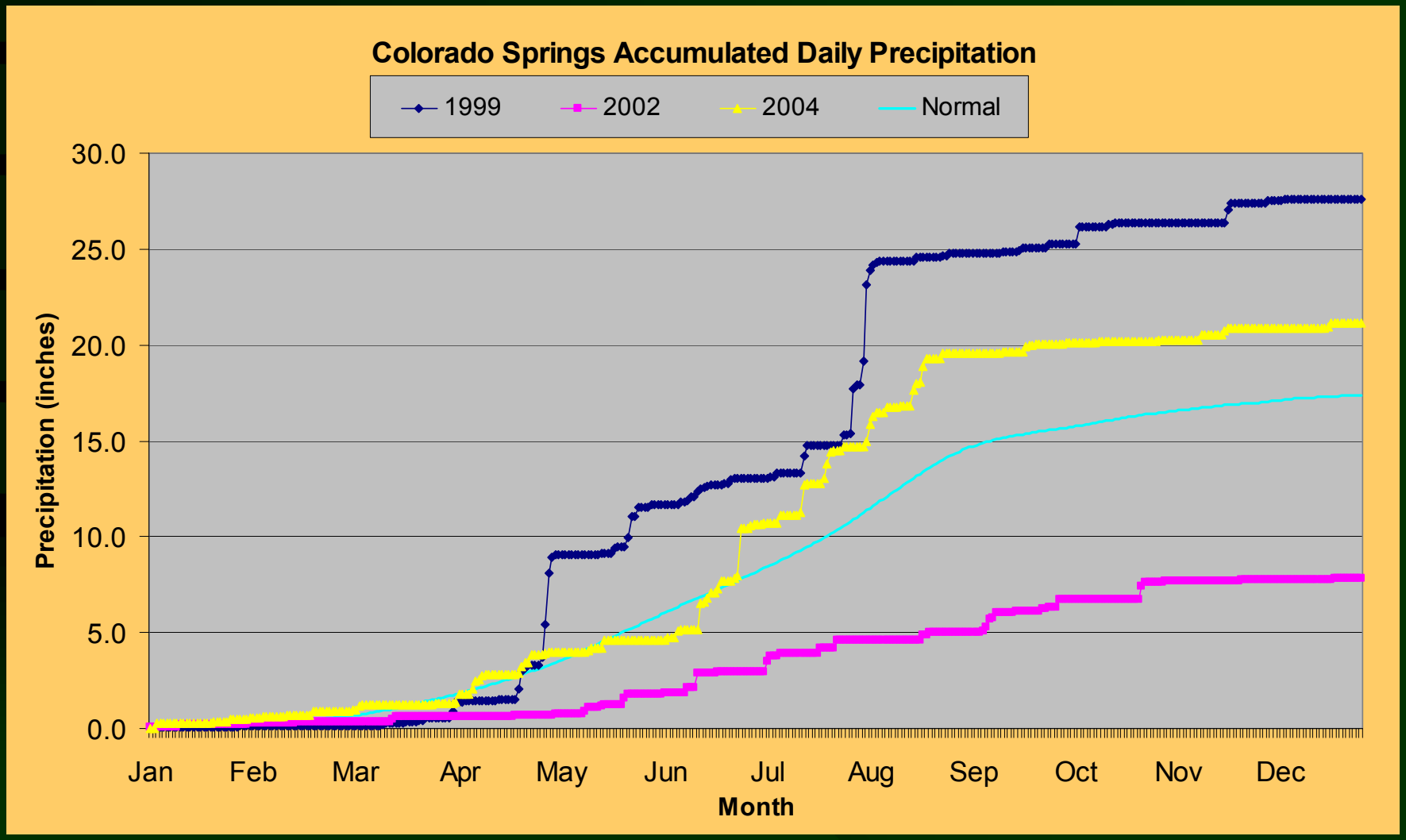


Average Monthly Precipitation Compared to Eastern Plains Locations



Comparing averages is instructive, but, are we ever average?

Colorado Springs Daily Precipitation Accumulation for 1999, 2002, and 2004

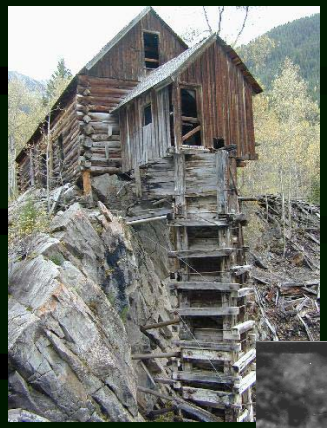


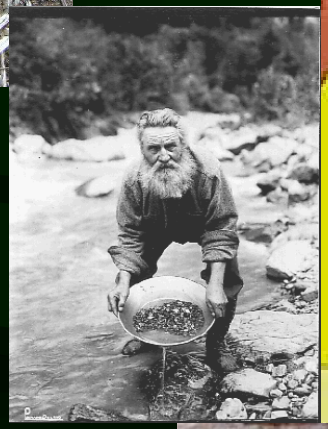
A Few Storms Contribute The Majority of Our Annual Precipitation

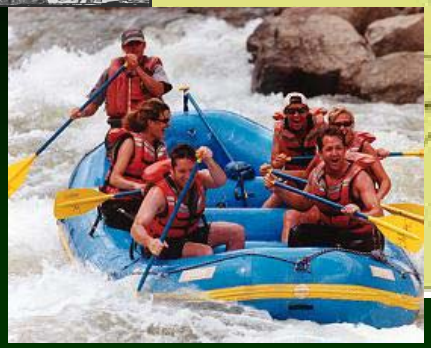
The difference between a very dry and very wet year is often just a few storms.

March 2003 Snowstorm in Fort Collins

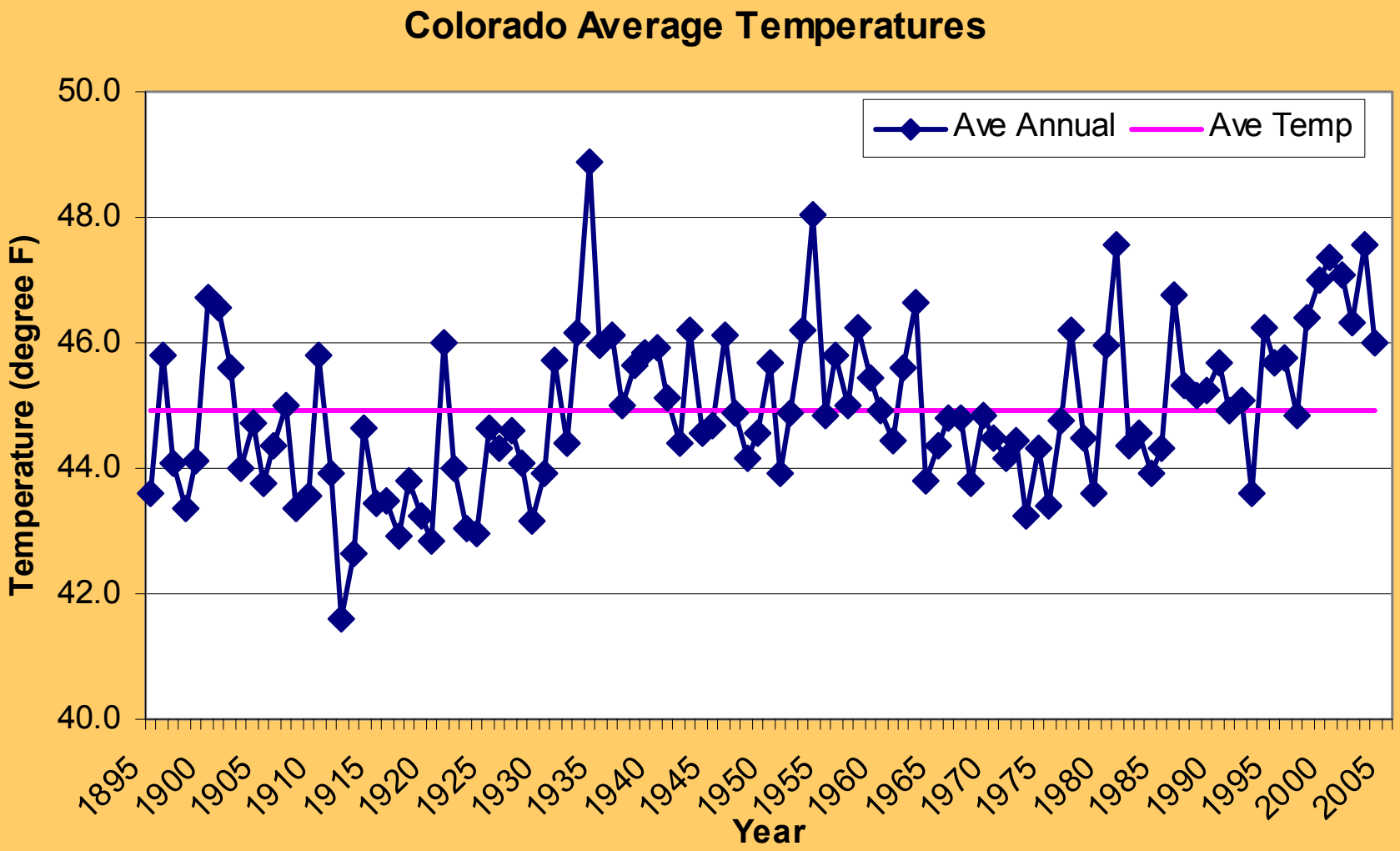
What Does History Show Us?



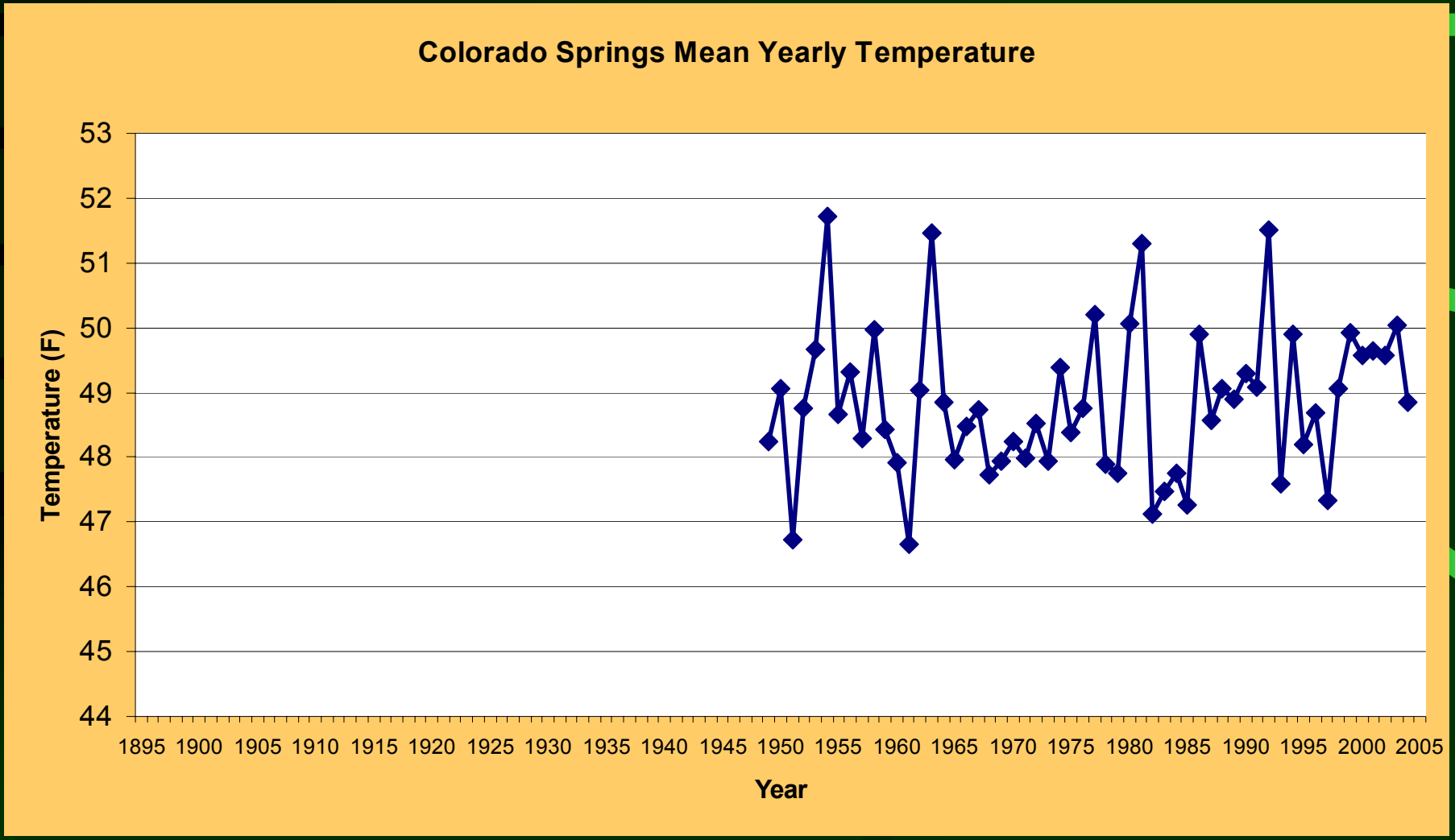




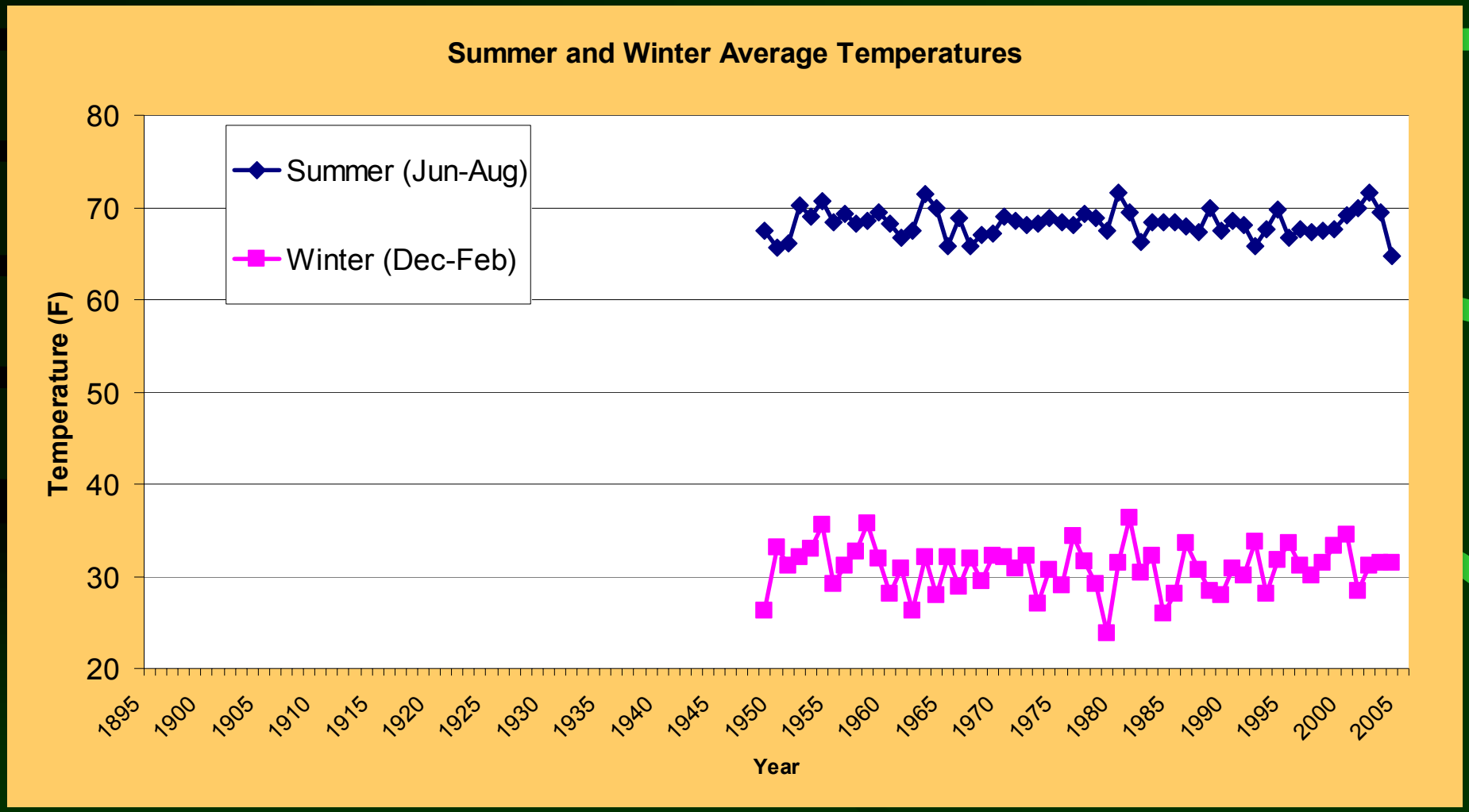
Statewide Mean Annual Temperature History



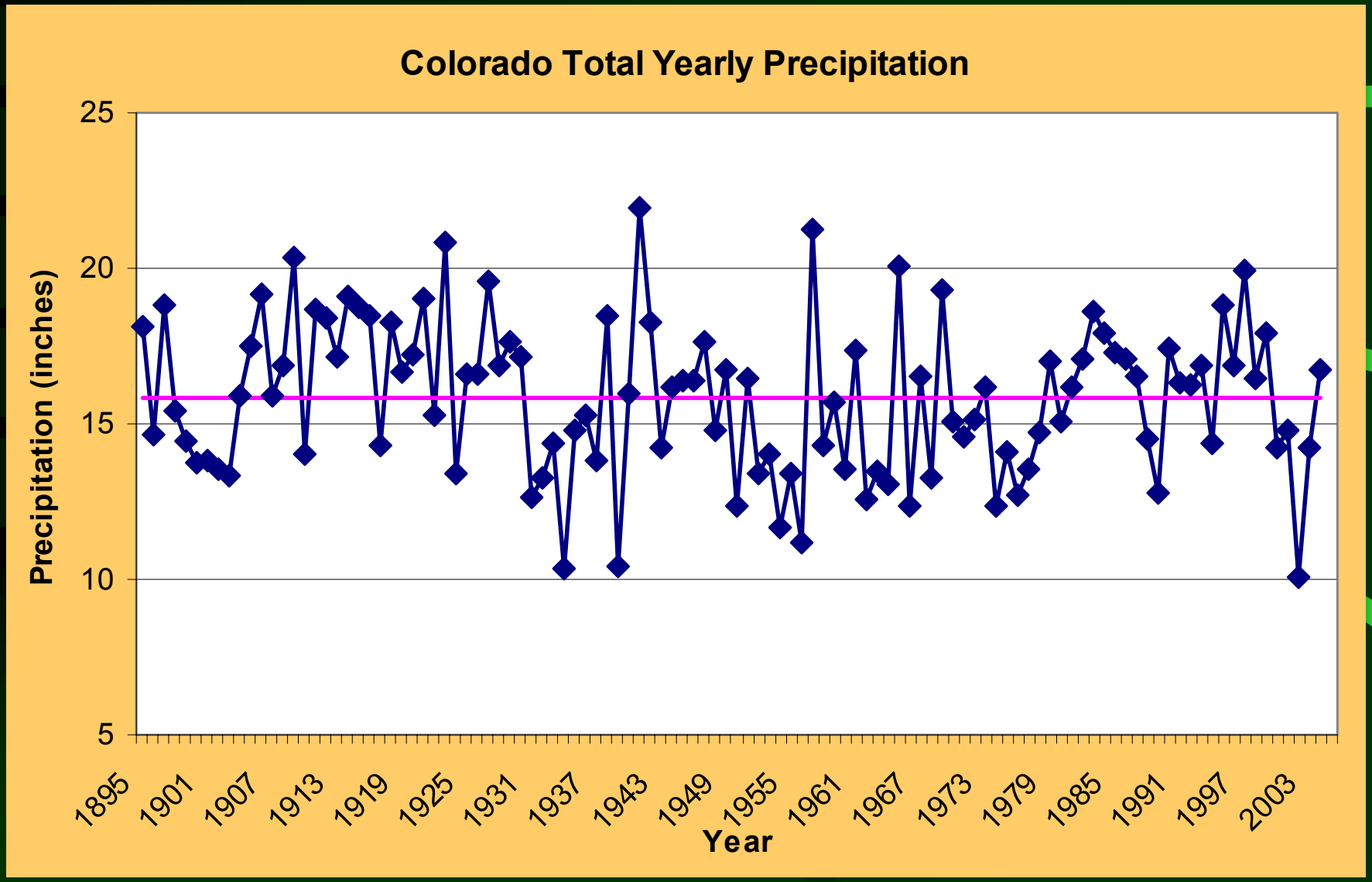
Colorado Springs Average Temperature History



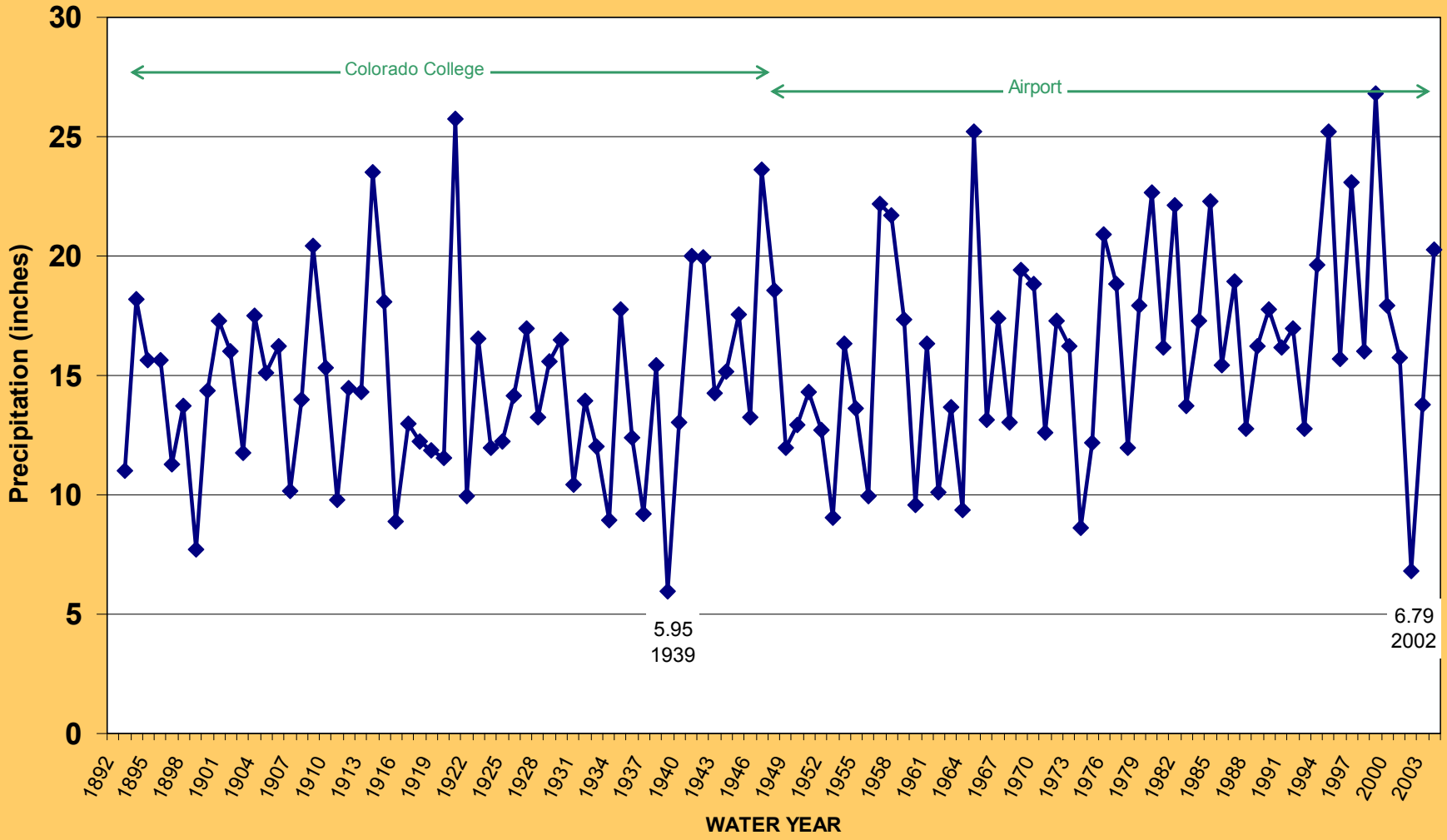
Colorado Springs Summer and Winter Average Temperatures



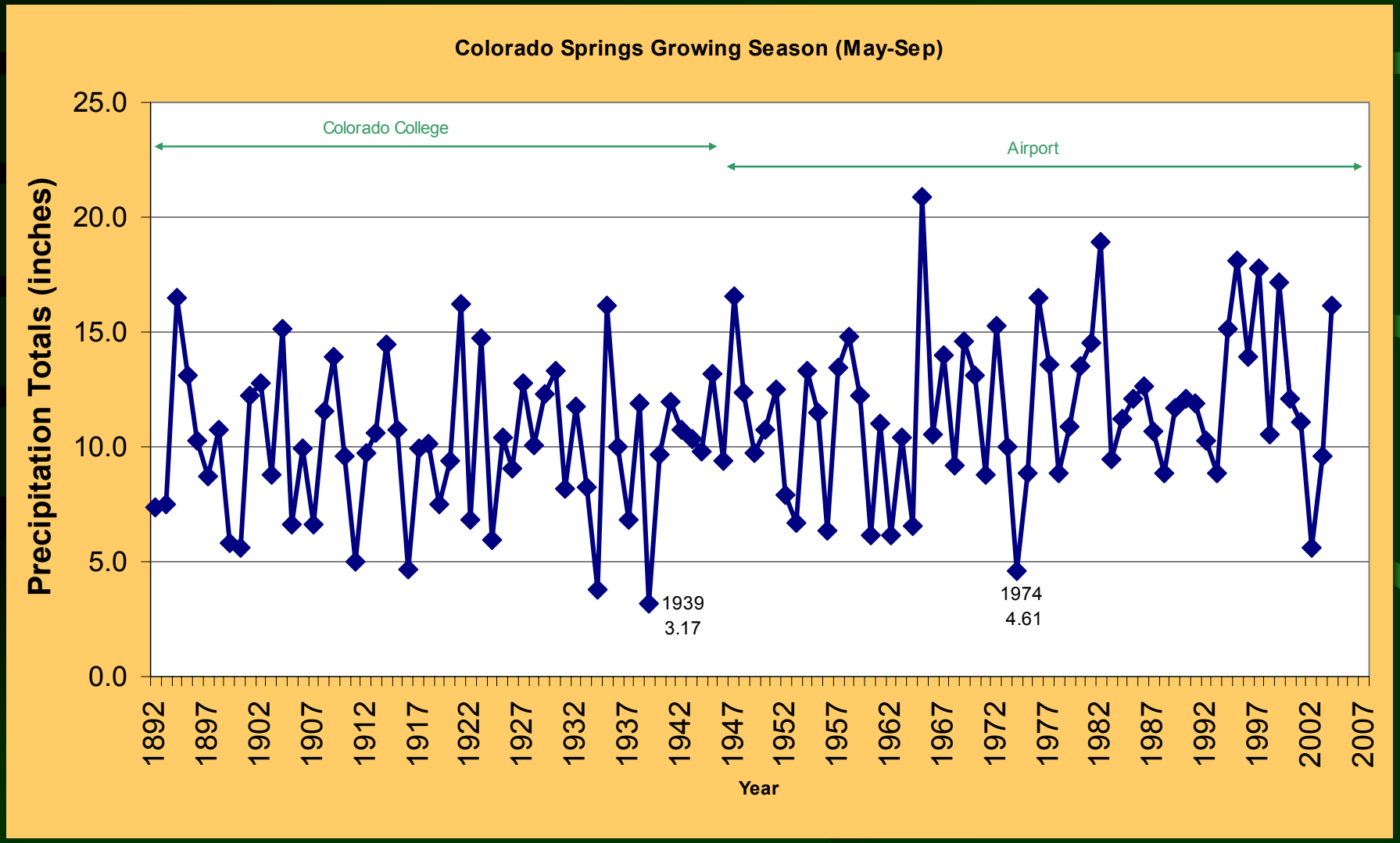
Statewide Annual Precipitation History



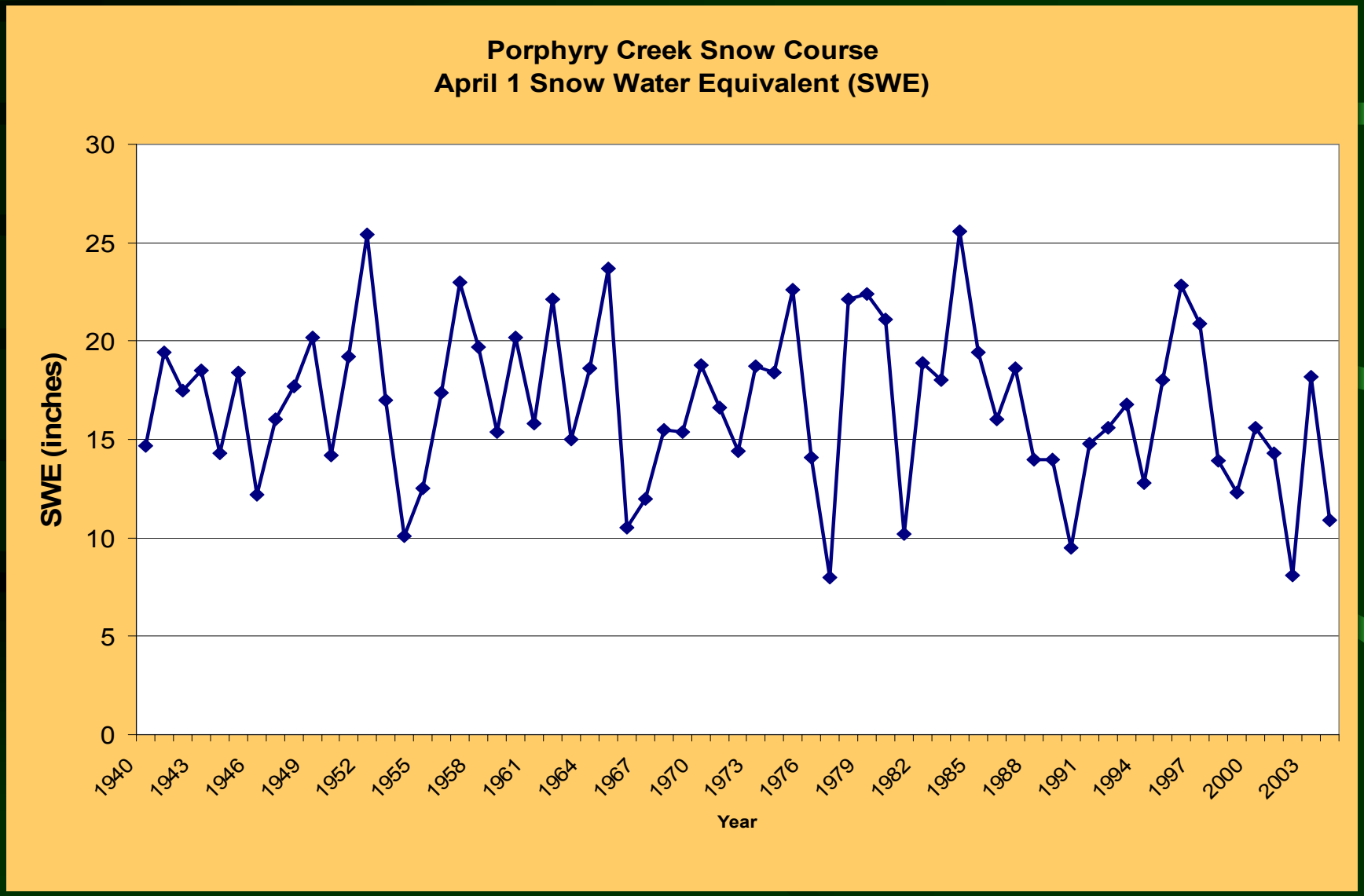
Colorado Springs Precipitation History



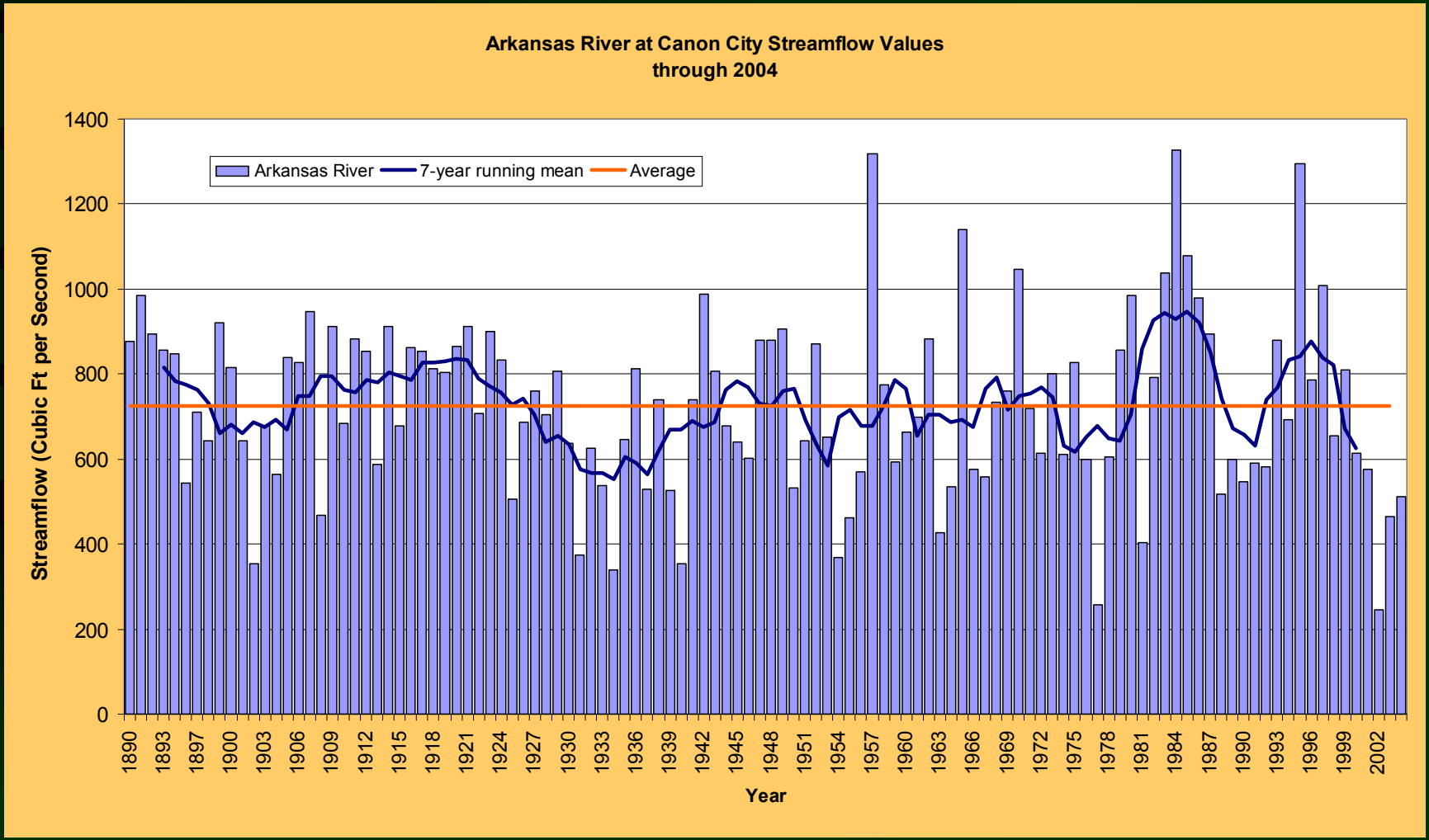
Colorado Springs Growing Season (May – Sep) Precipitation History



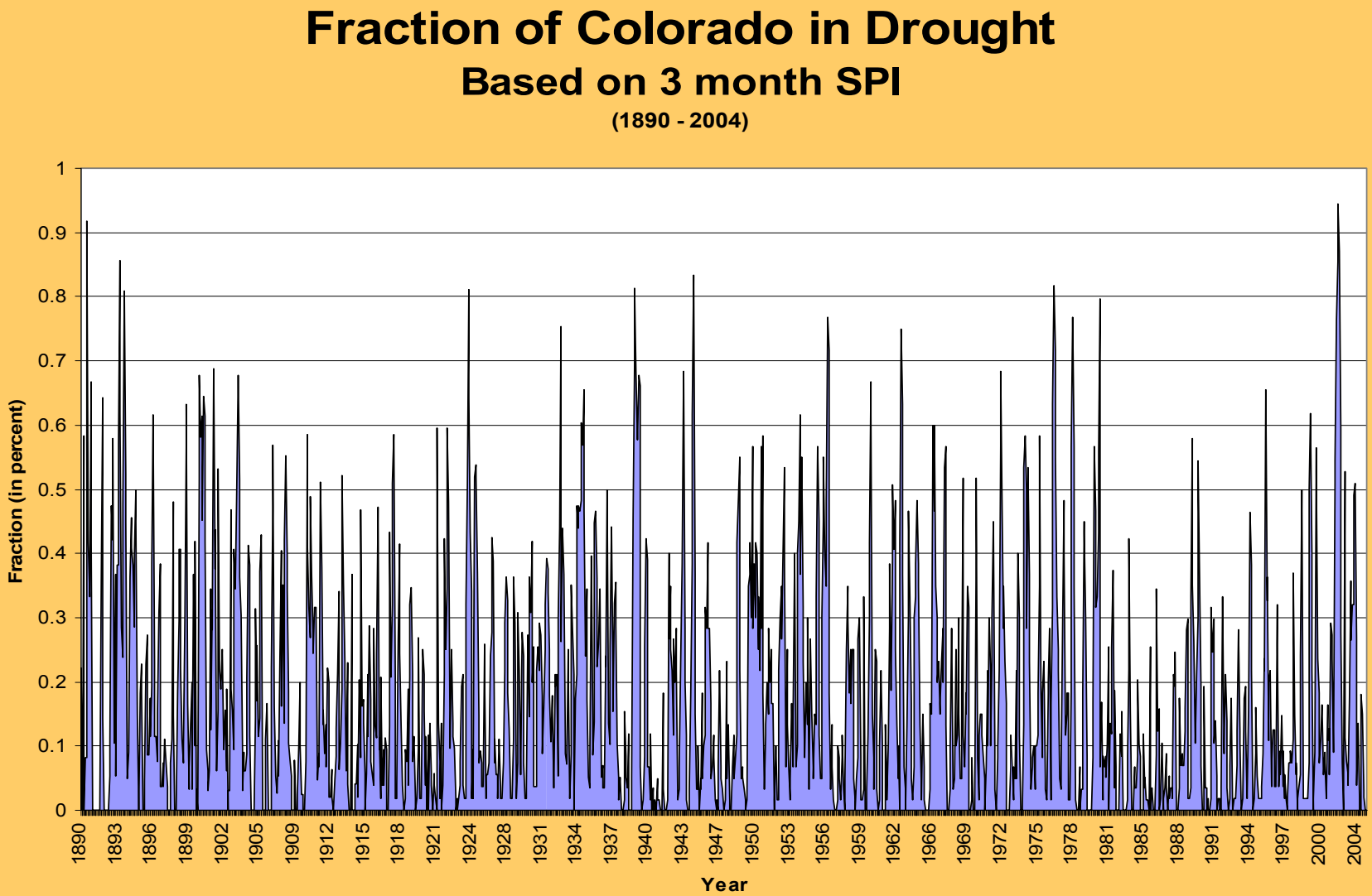
Porphyry Creek April 1 Snowpack History



Arkansas River at Canon City Streamflow History



3-Month SPI


Fraction of Colorado in Drought
Based on 3 month SPI
(1890 - 2004)
Fraction (in percent)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1890
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1899
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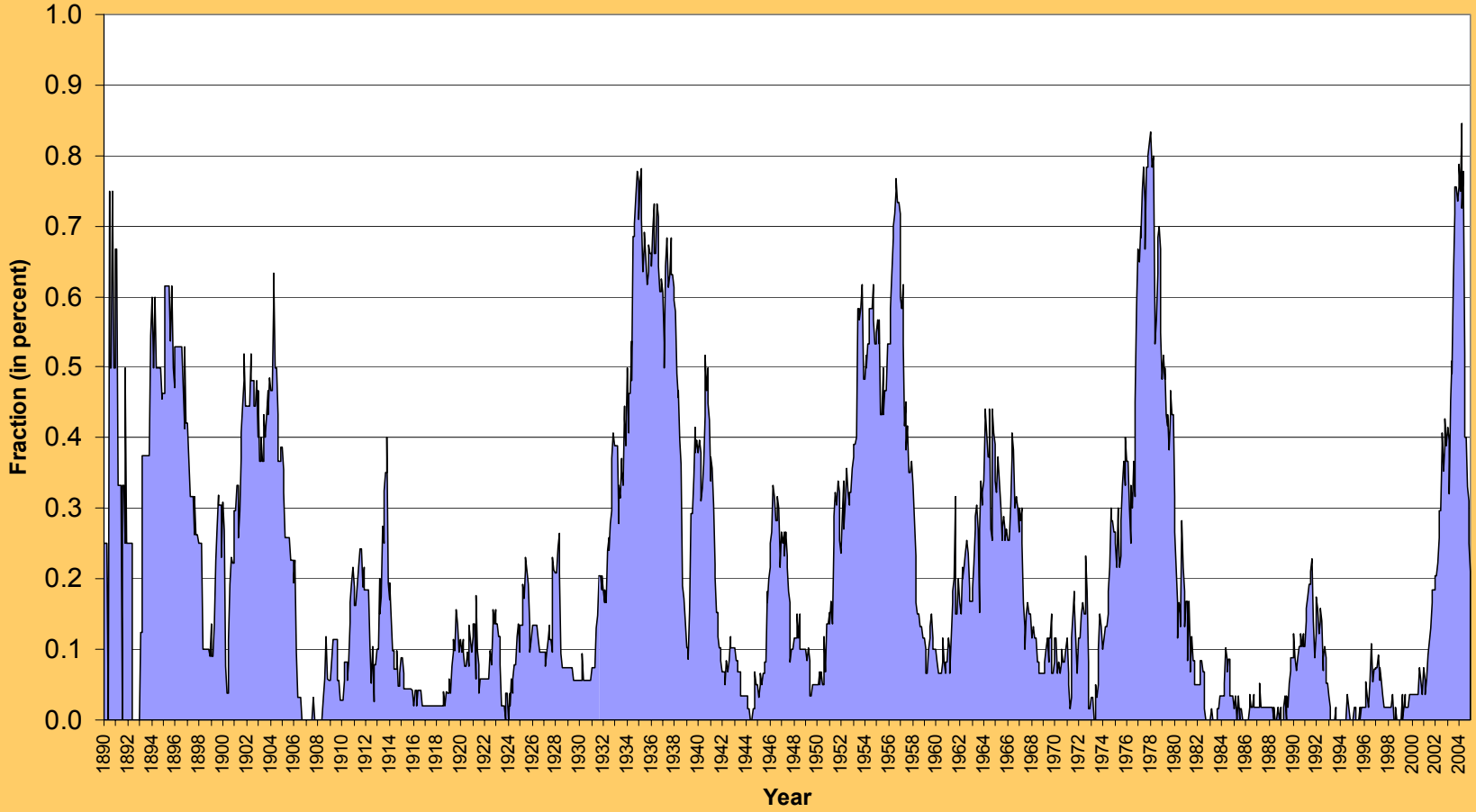
2000
2004
Year

48-Month SPI


Fraction of Colorado in Drought
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1.0
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0.1
0.0
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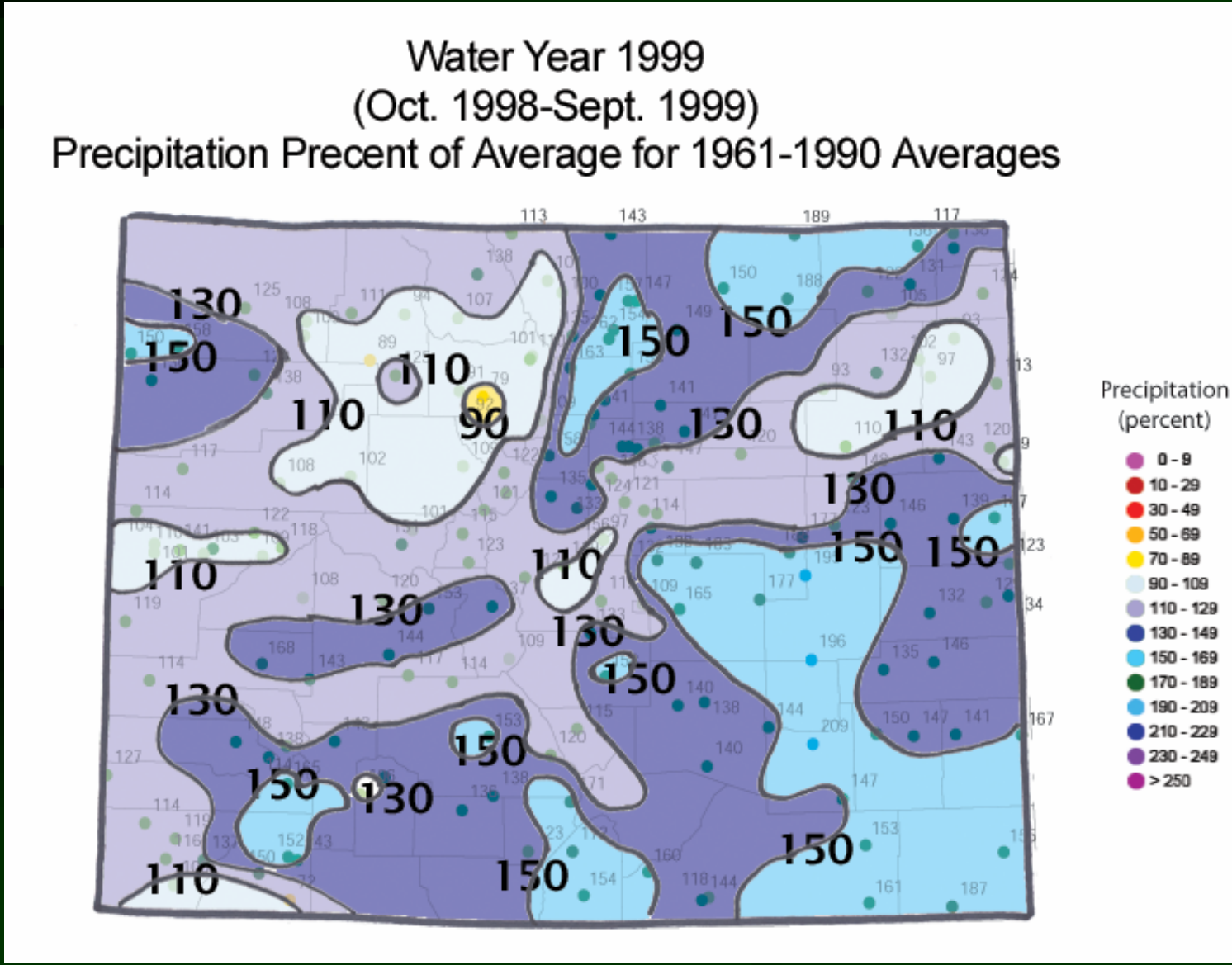
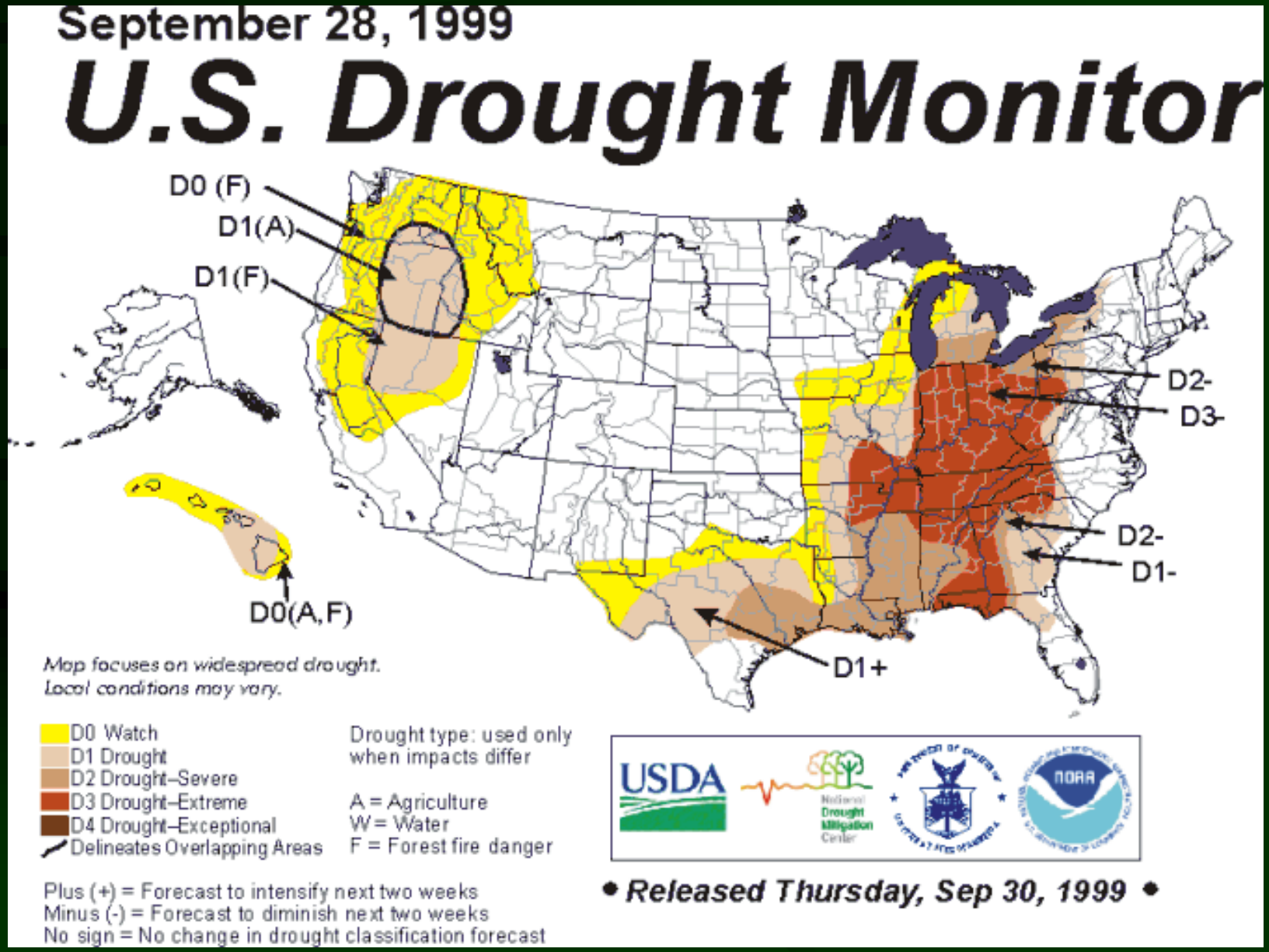
2002
2004
Year

OK then – So what is the current status of Drought??

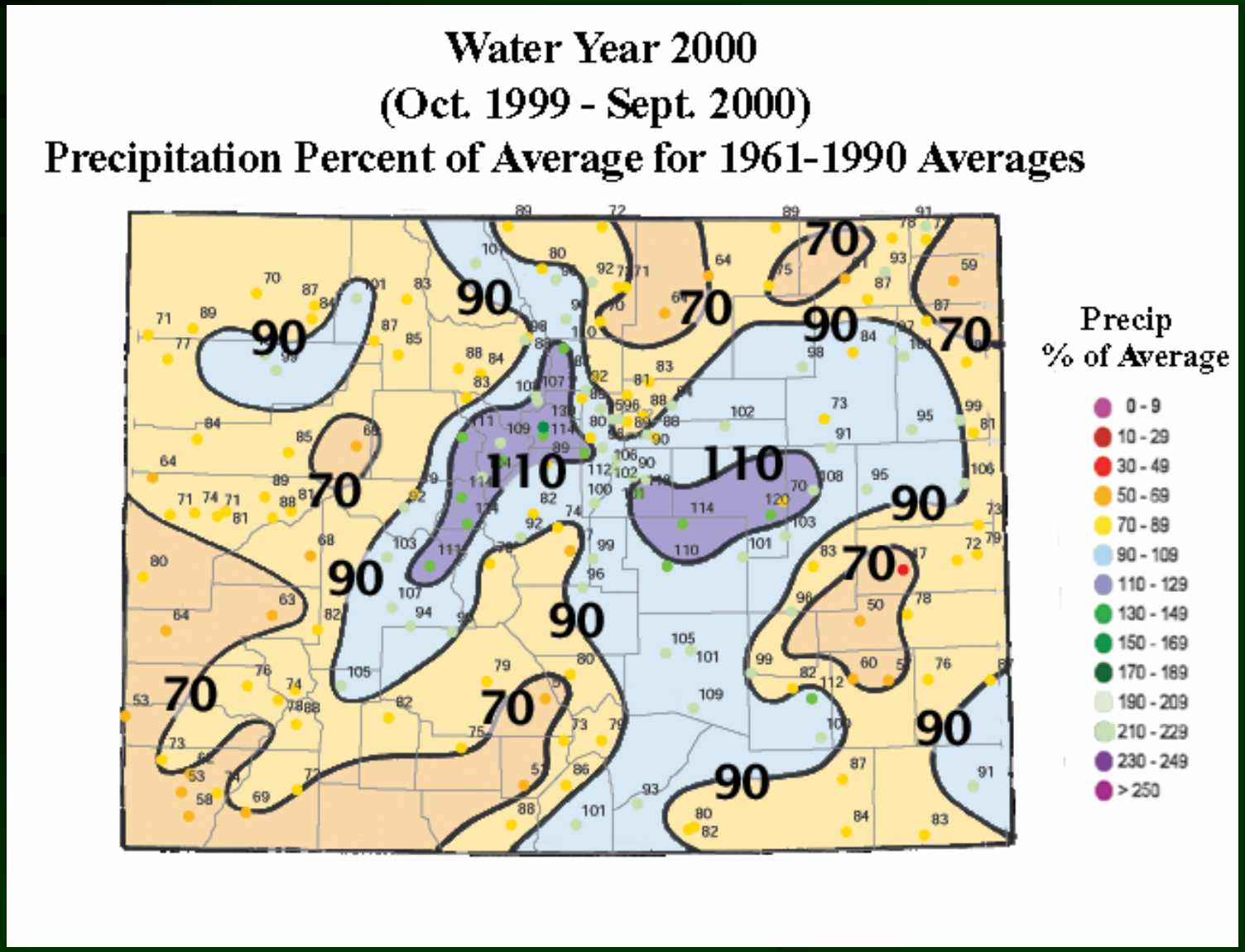
1999 Water Year Precipitation



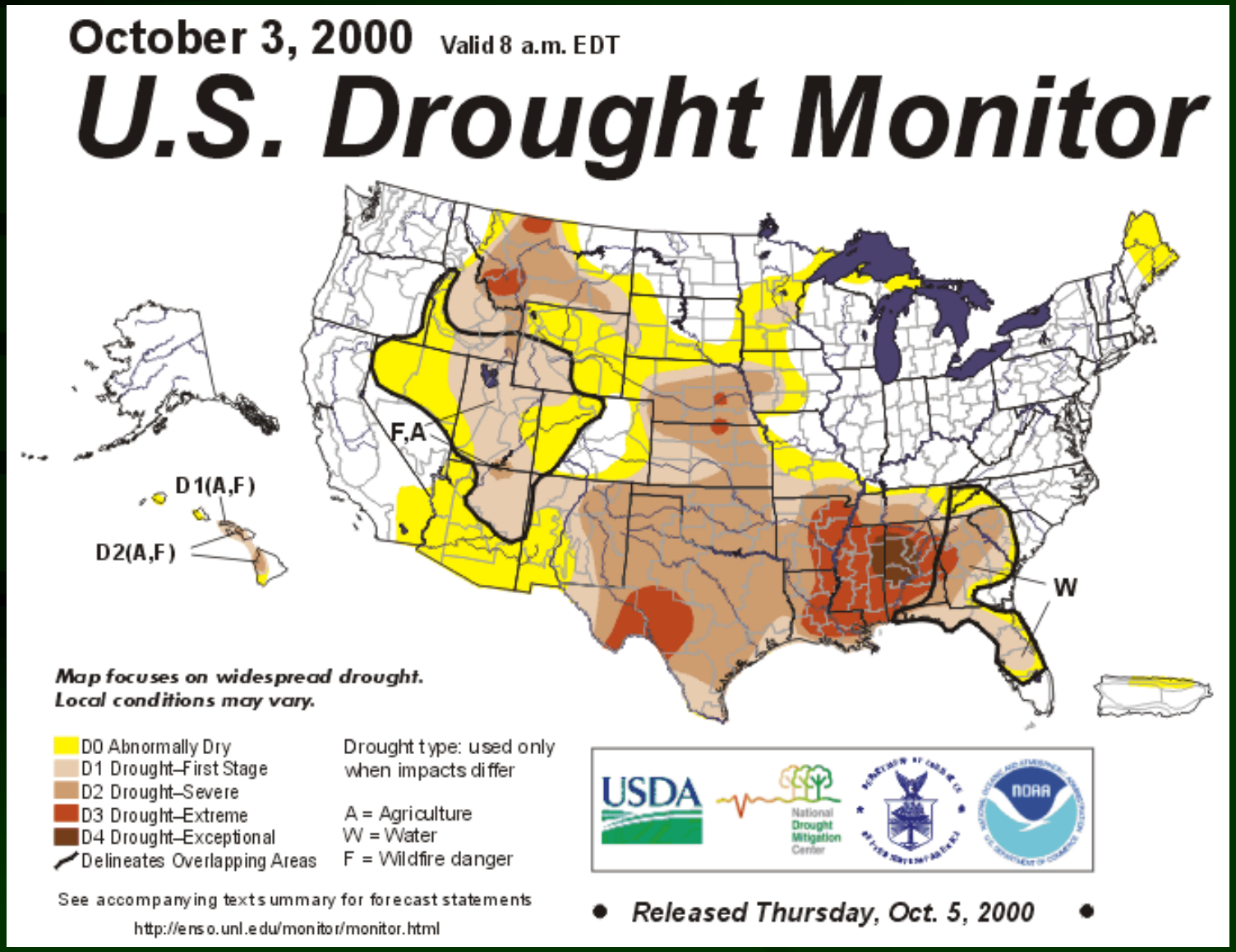
September 1999 Drought Monitor Map



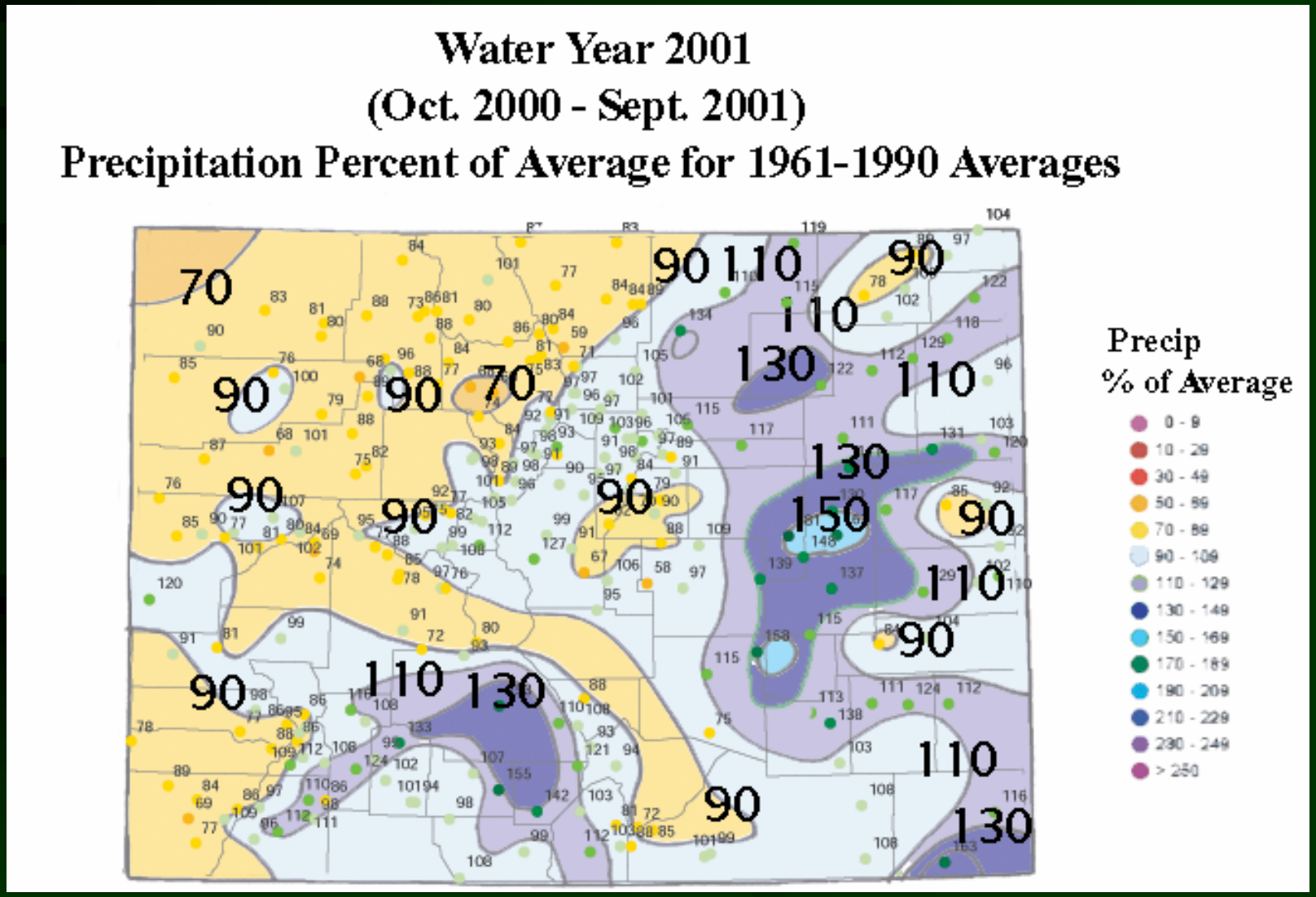
2000 Water Year Precipitation



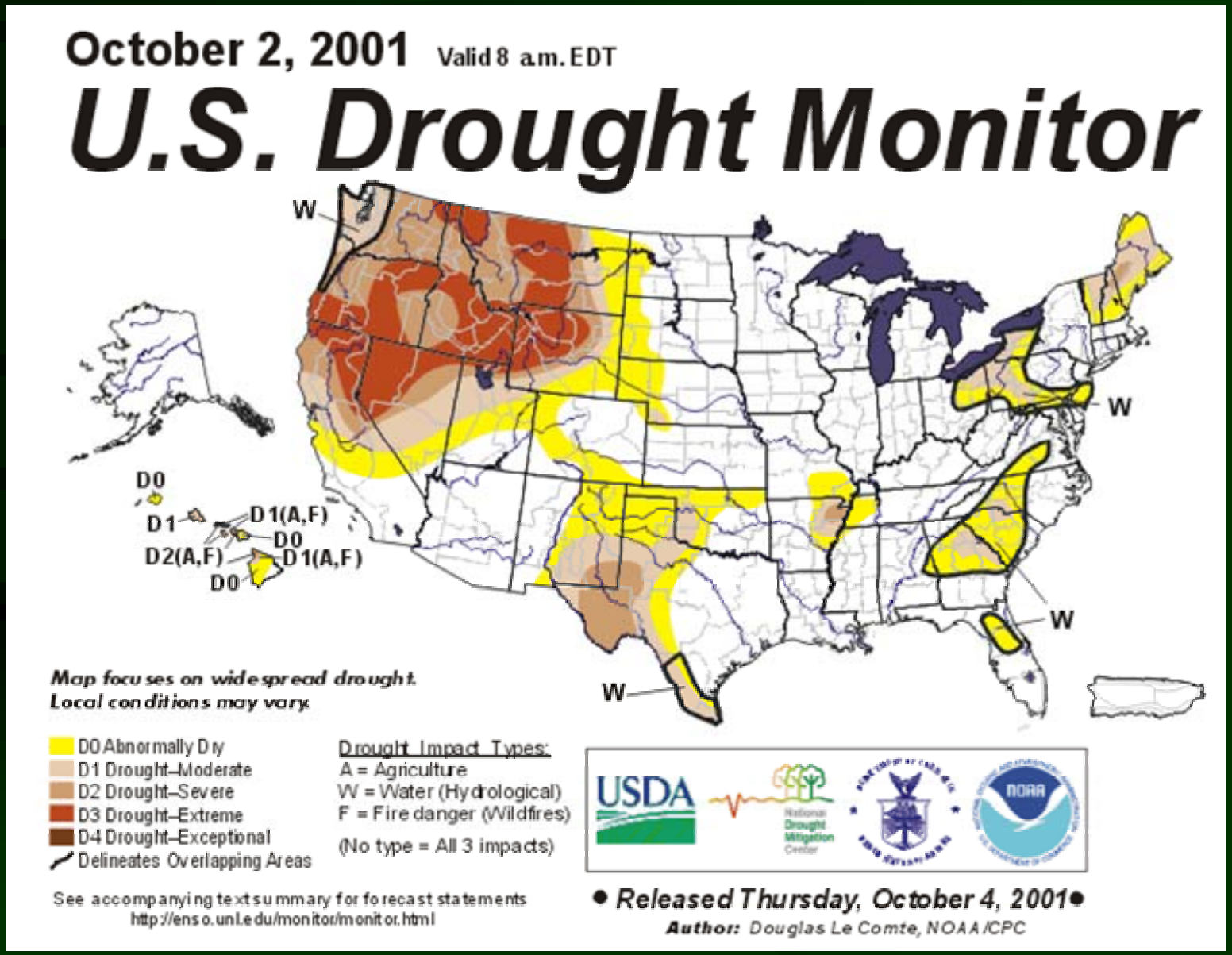
October 2000 Drought Monitor Map



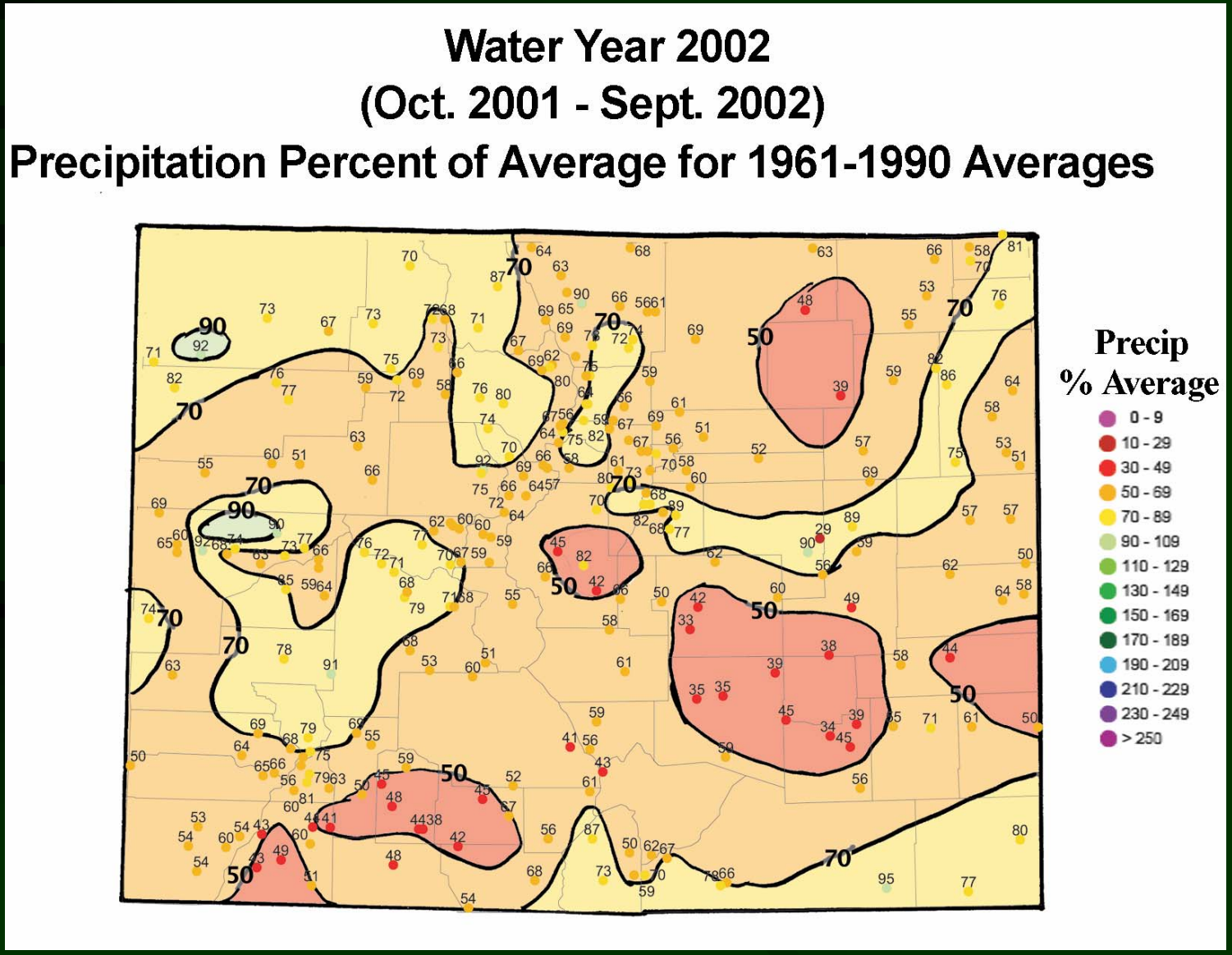
2001 Water Year Precipitation



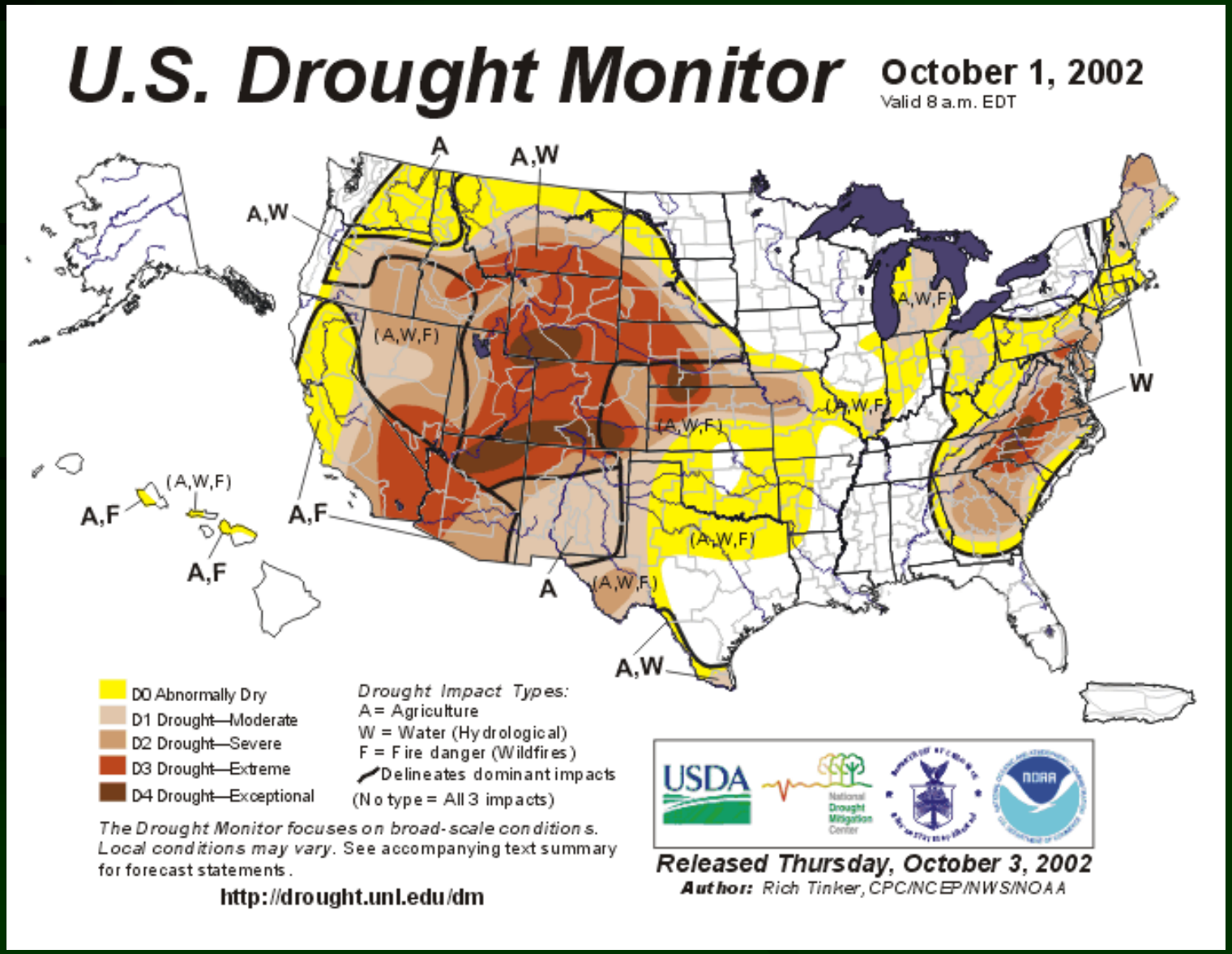
October 2001 Drought Monitor Map



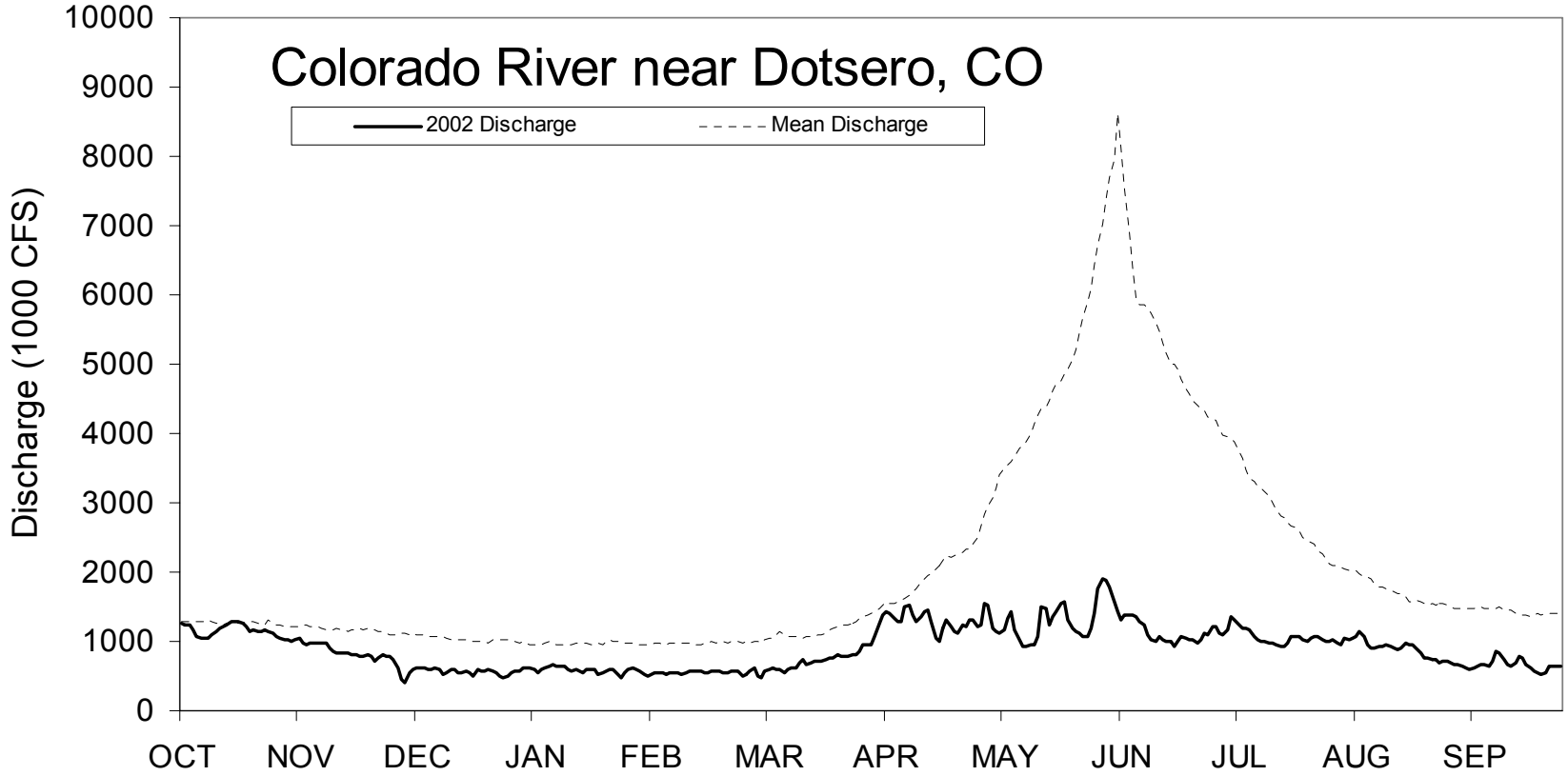
2002 Water Year Precipitation



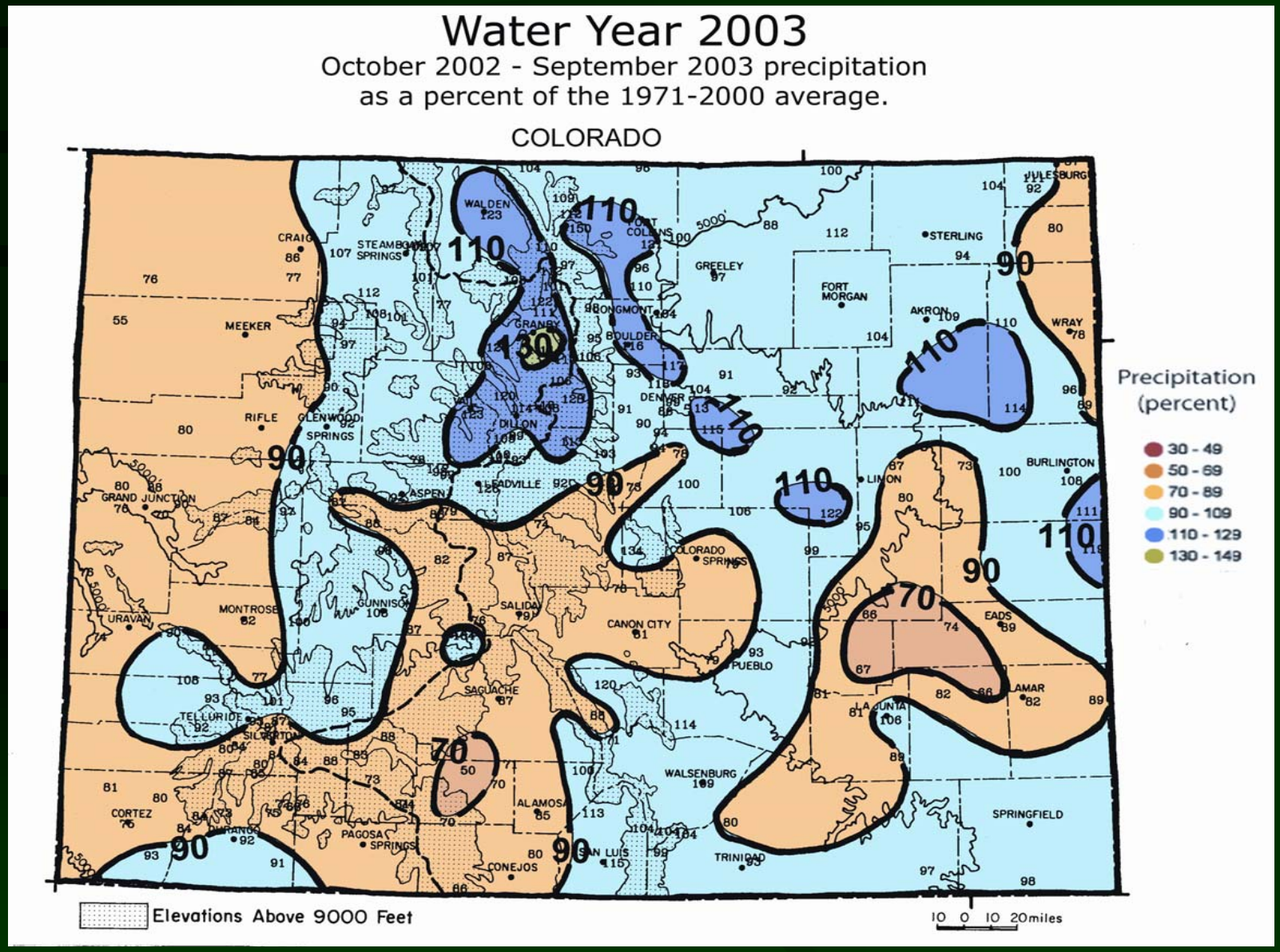
October 2002 Drought Monitor Map



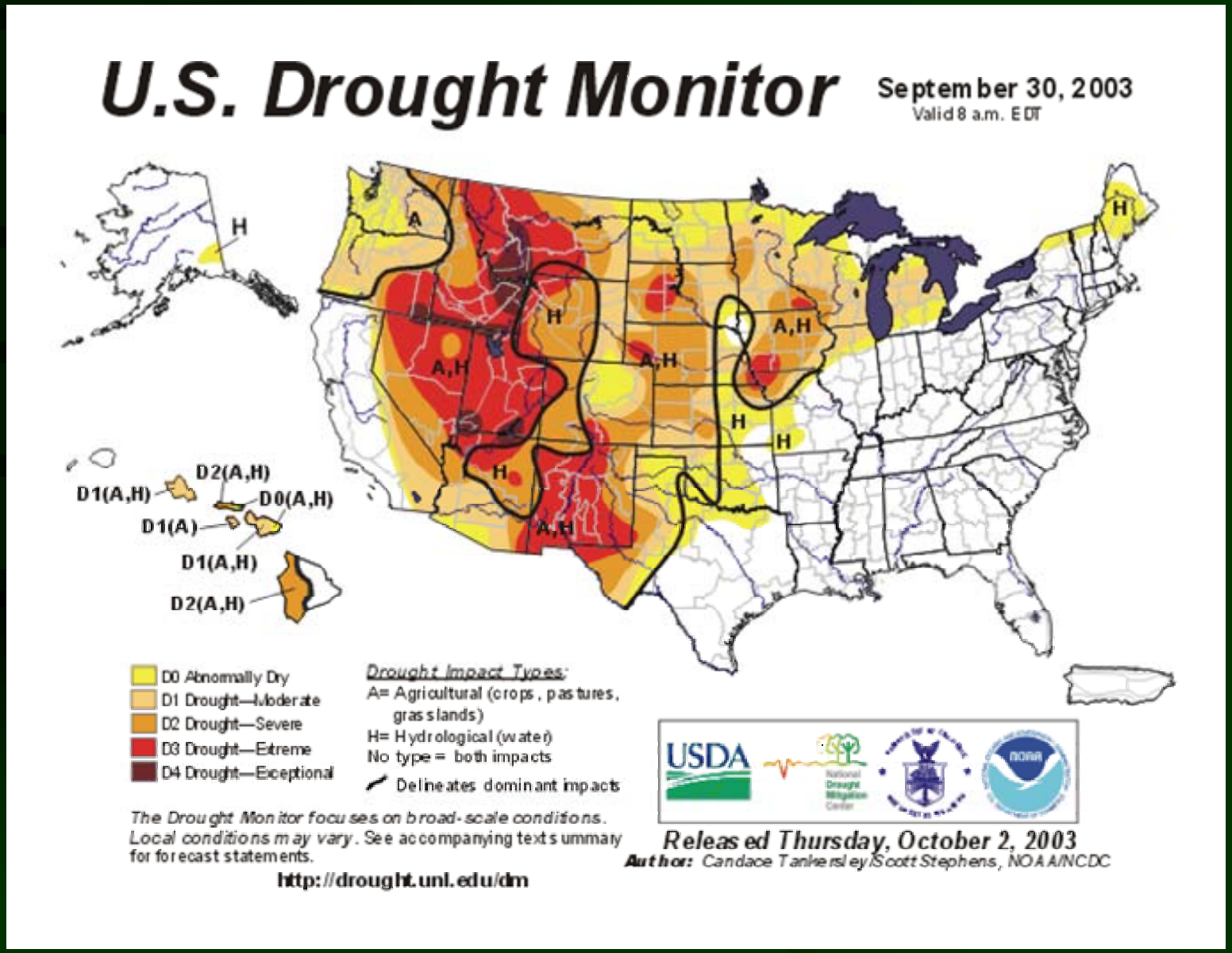
2002 Daily Streamflow



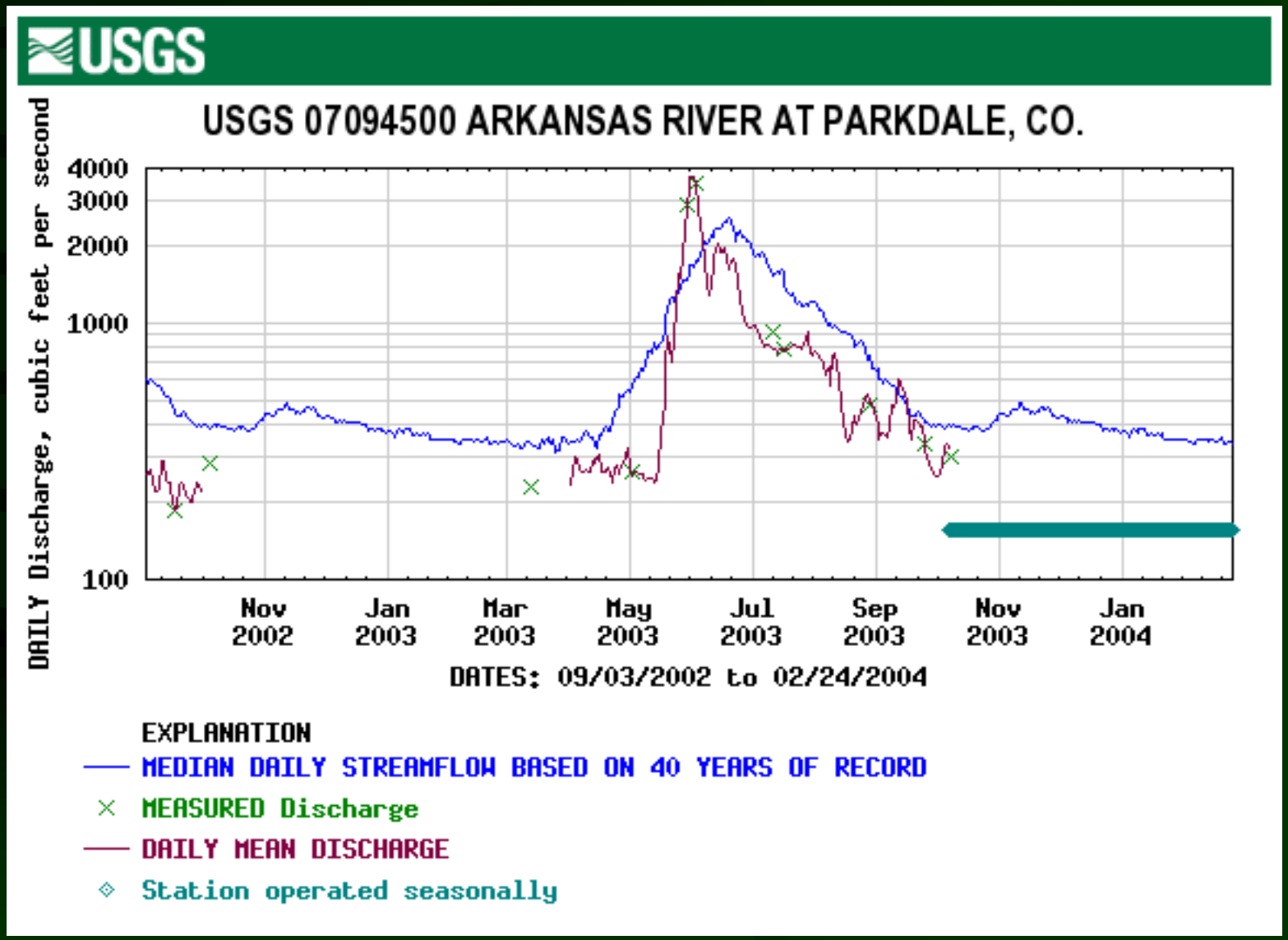
2003 Water Year Precipitation



September 2003 Drought Monitor Map



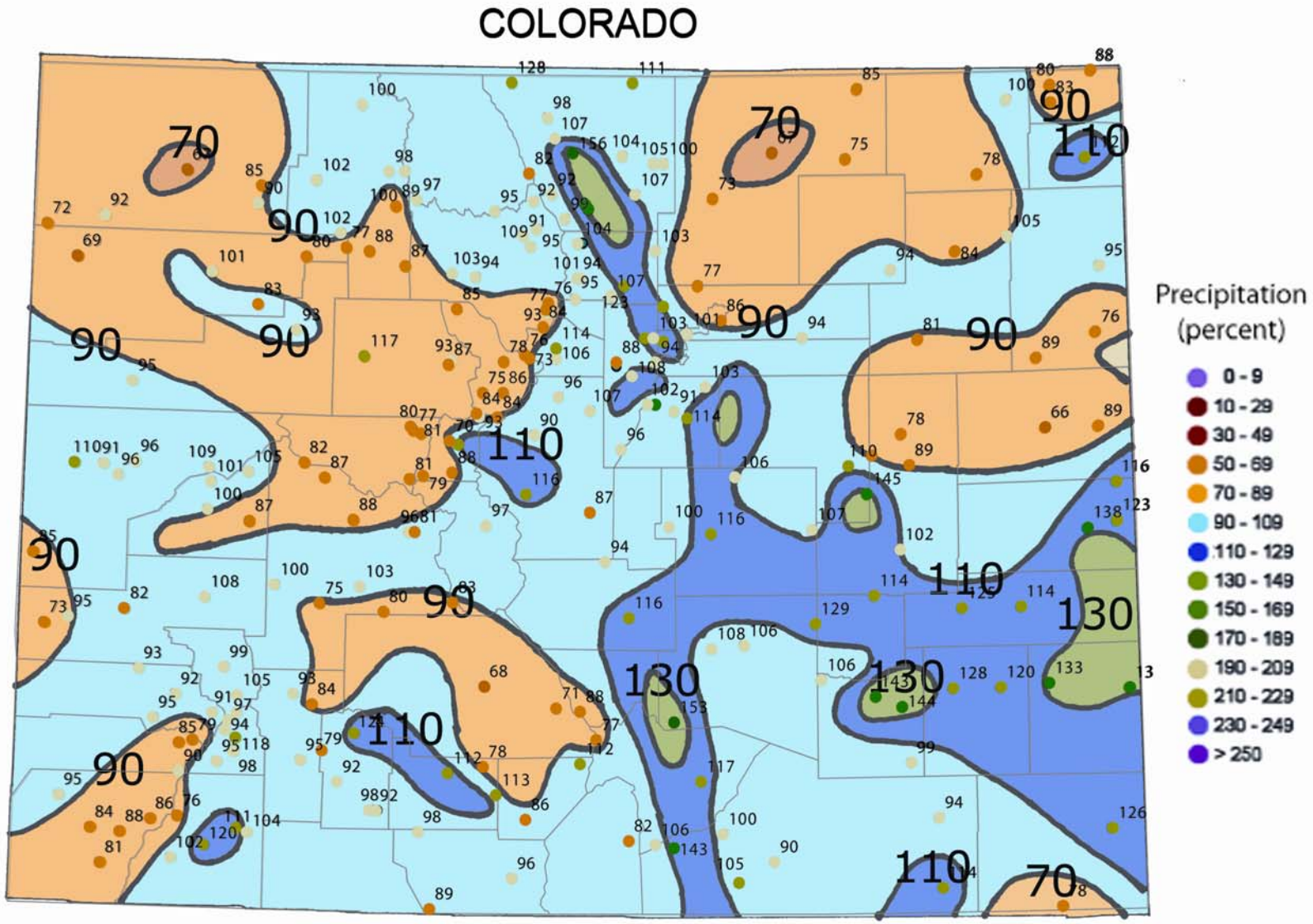
2003 Daily Streamflow



http://water.usgs.gov/cgi-bin/daily_flow?co

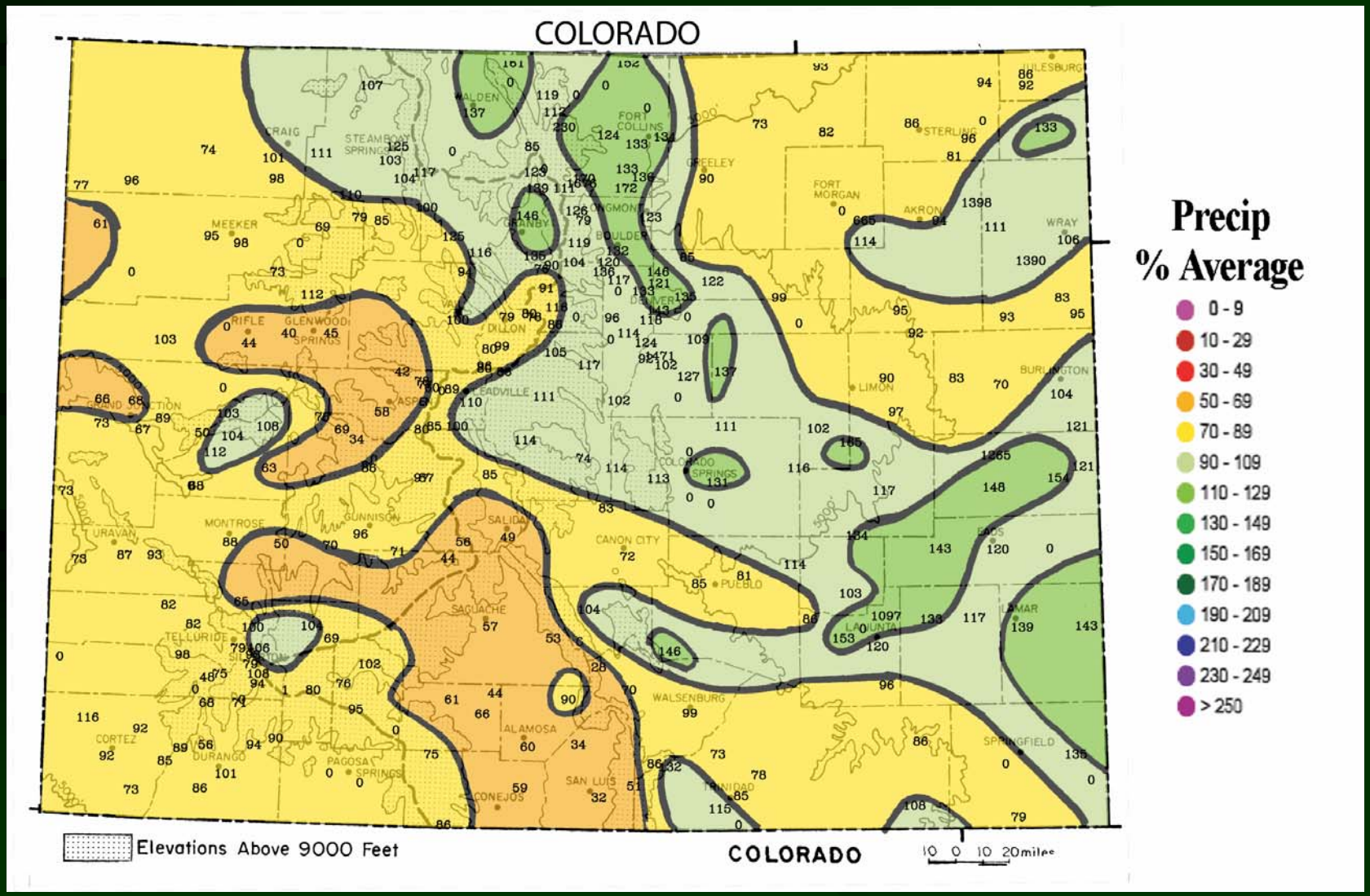
Where Do We Stand Now?

2004 Water Year Precipitation



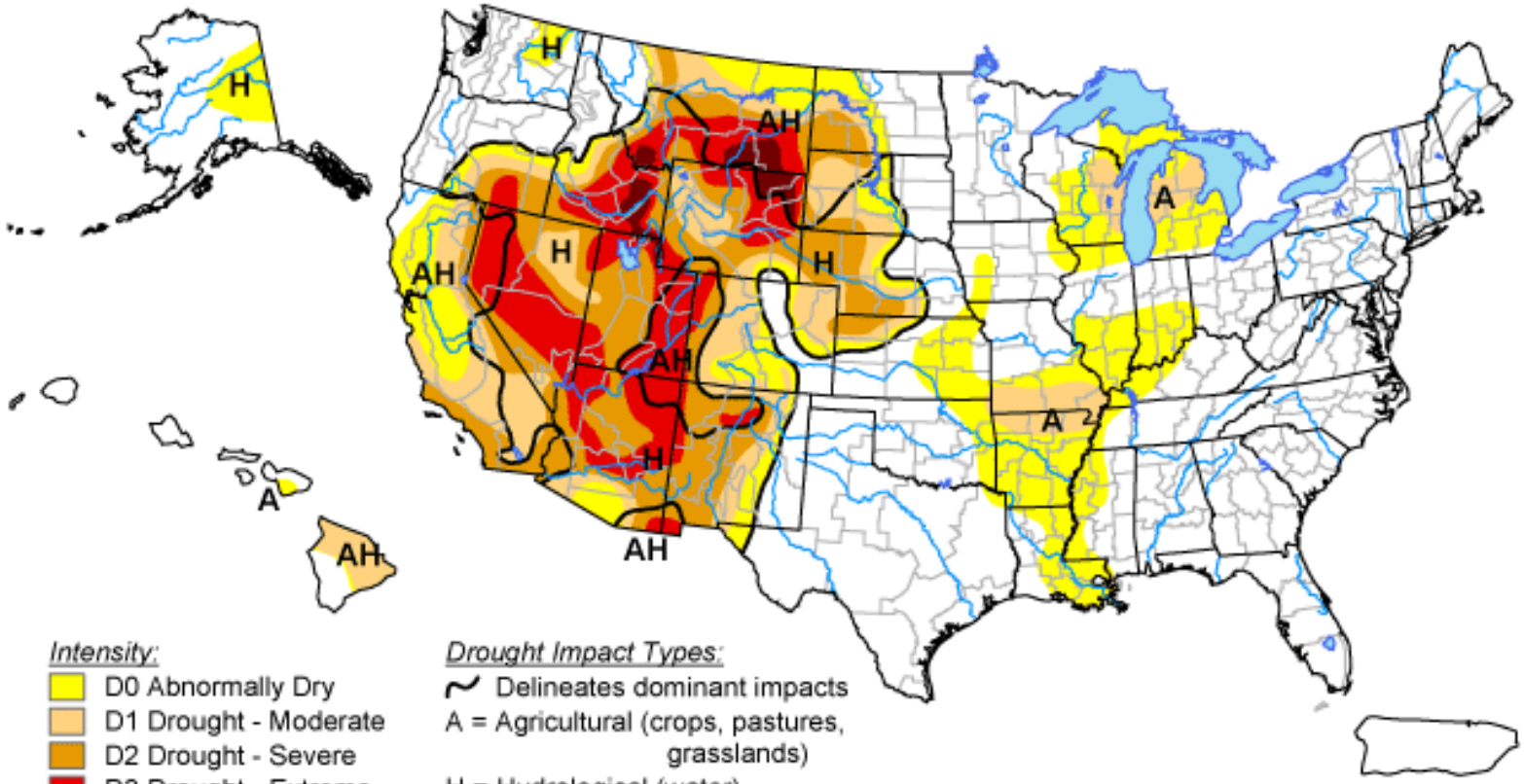
Water Year 2004 (October 2003 through September 2004) precipitation as a percent of the 1971-2000 average.

Growing Season (May-Sep) 2004 Precipitation as Percent of Average



U.S. Drought Monitor

October 5, 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)

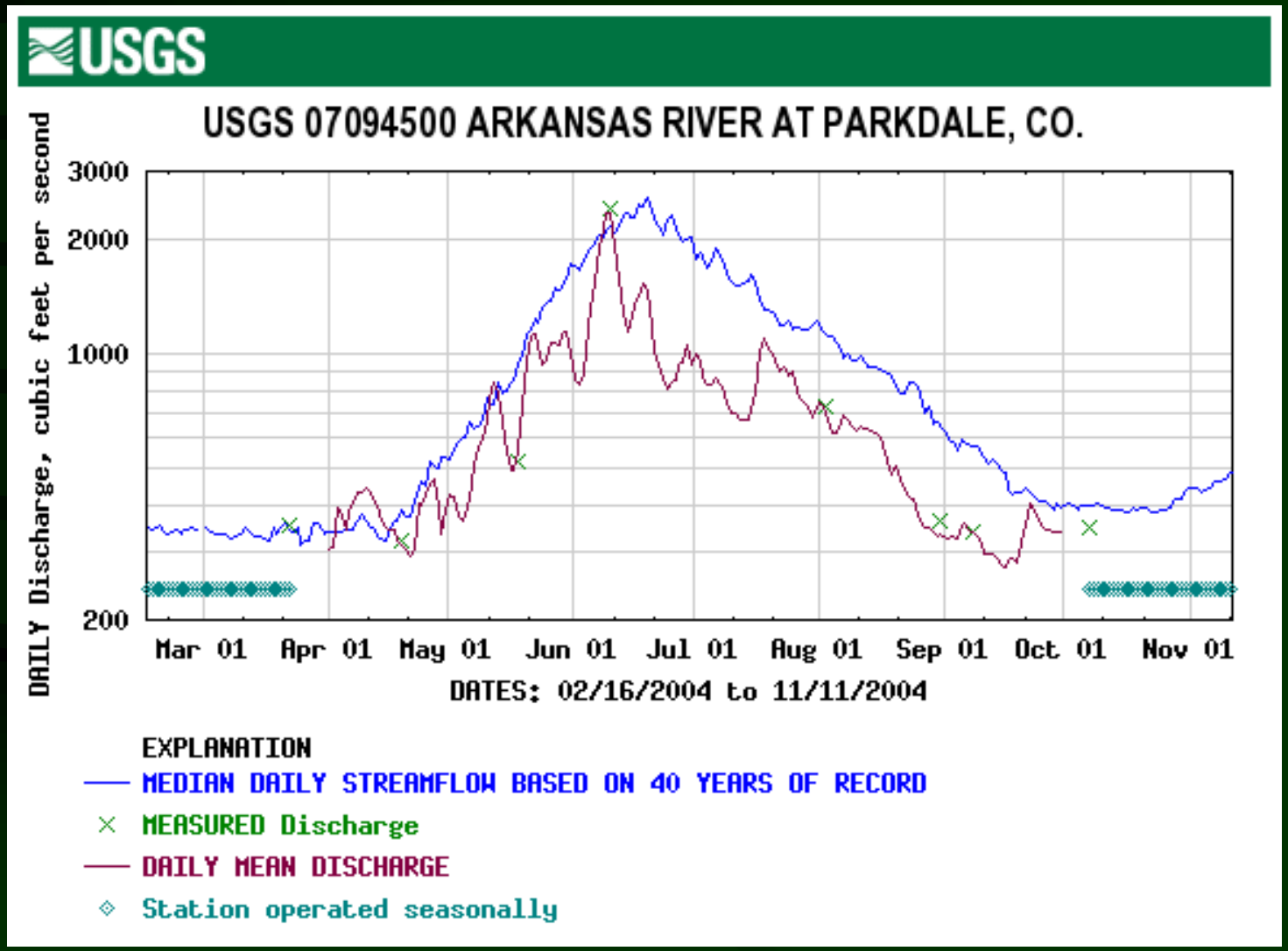
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://drought.unl.edu/dm

USDA National Drought Mitigation Center

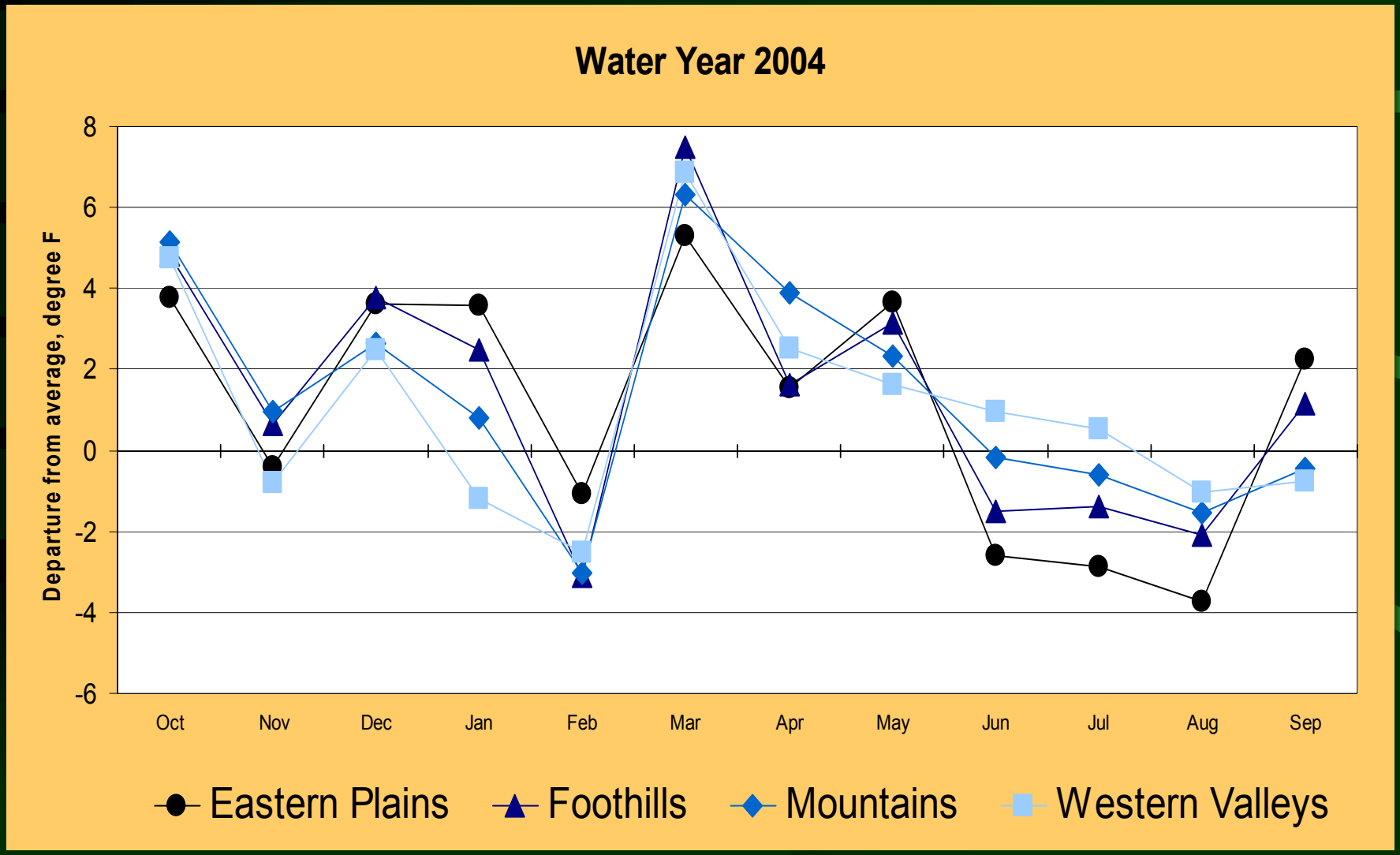
Released Thursday, October 7, 2004
Author: Michael Hayes, NDMC

2004 Daily Streamflow

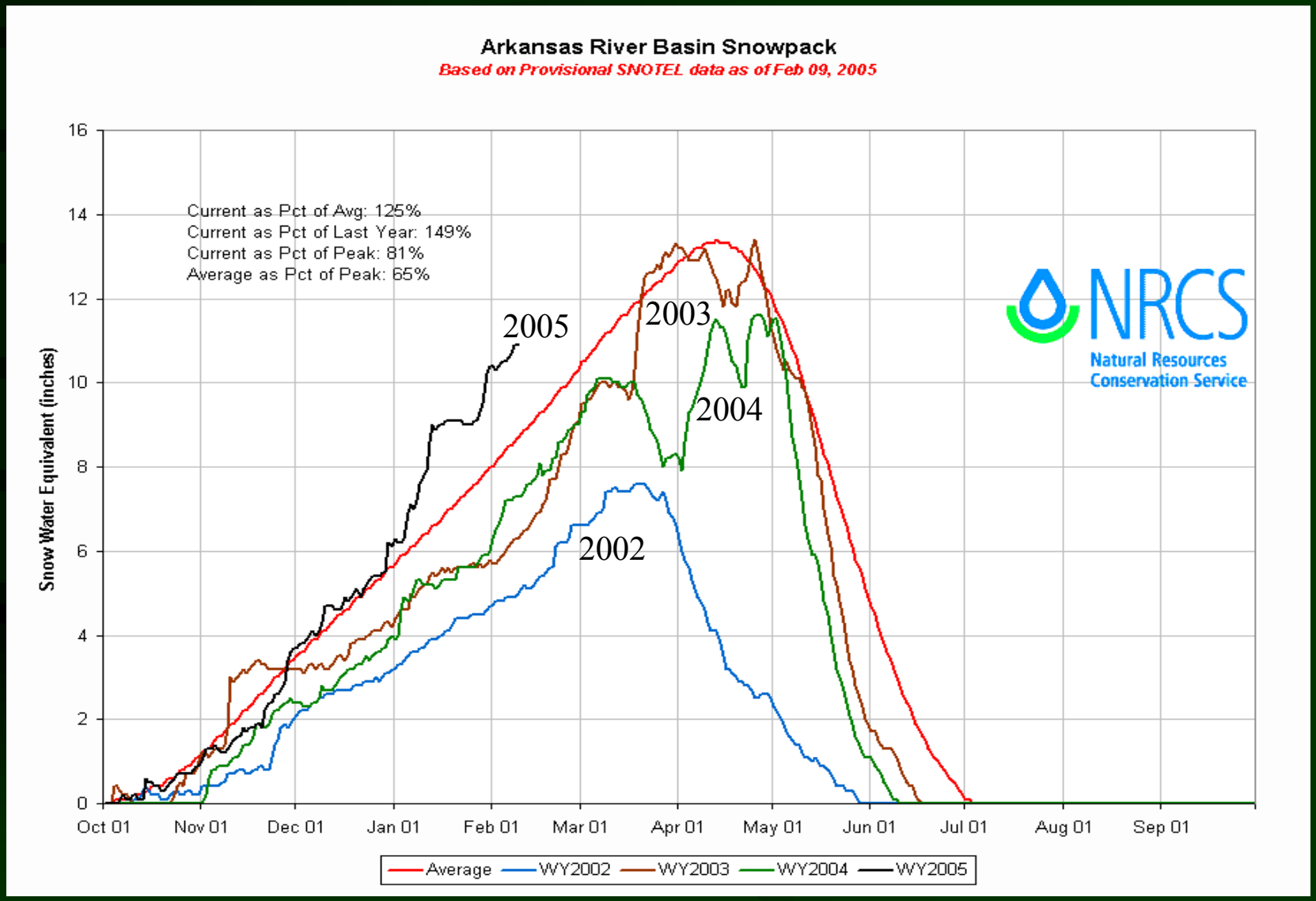


http://water.usgs.gov/cgi-bin/daily_flow?co

WY2004 Temperature Departures

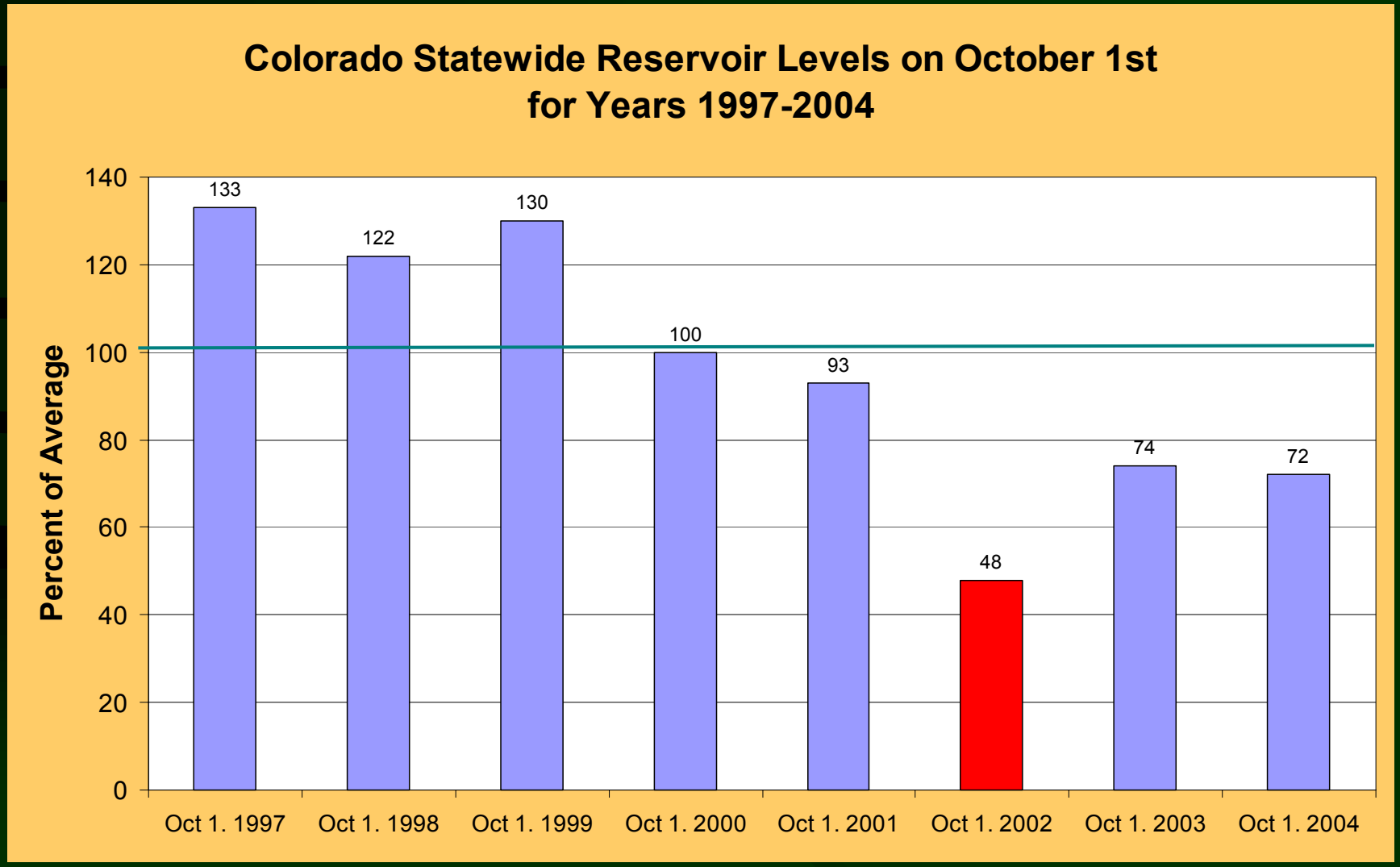


Arkansas Basin Snowpack

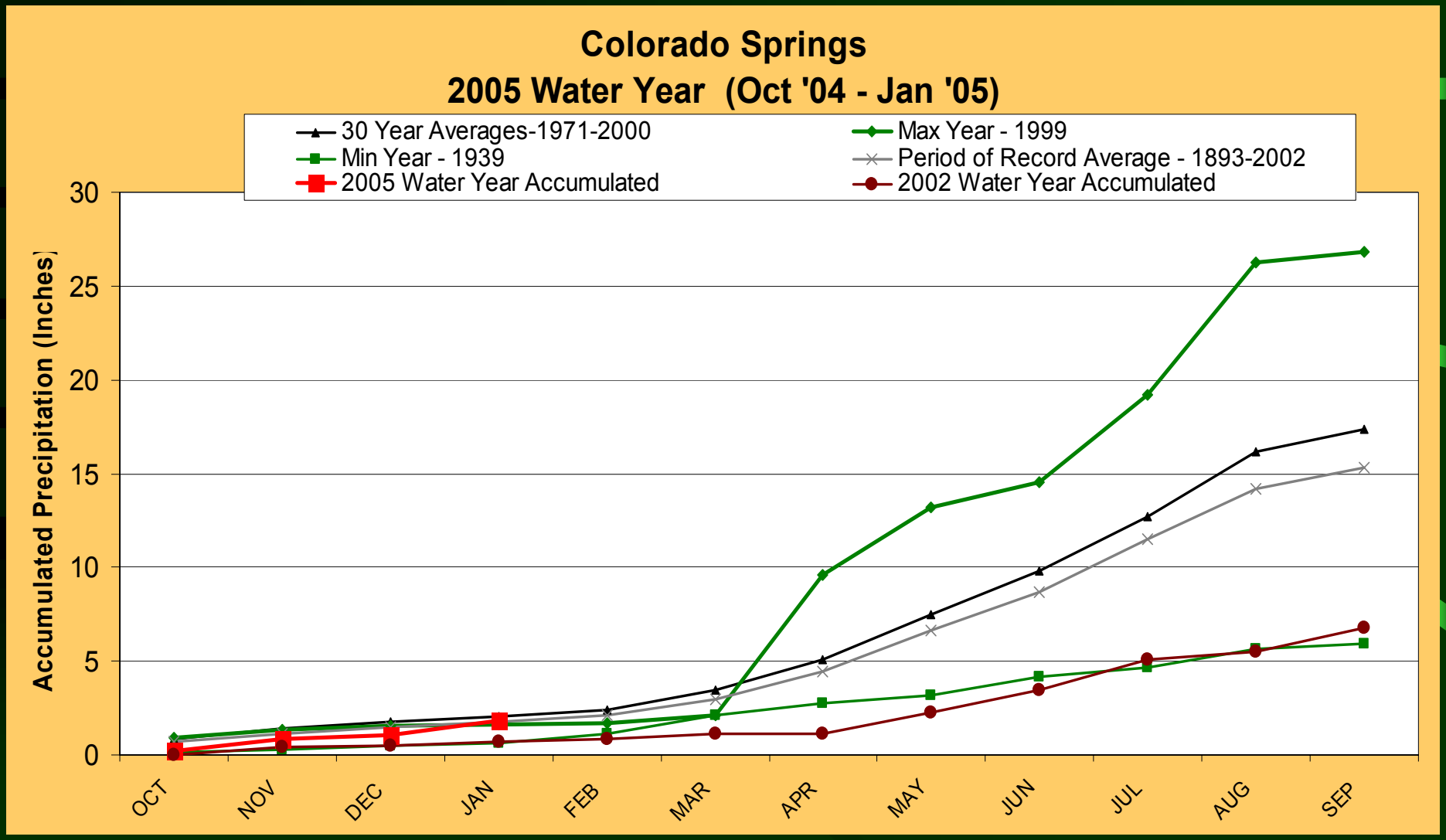


http://www.co.nrcs.usda.gov/snow/data/basins.html

Reservoir Levels

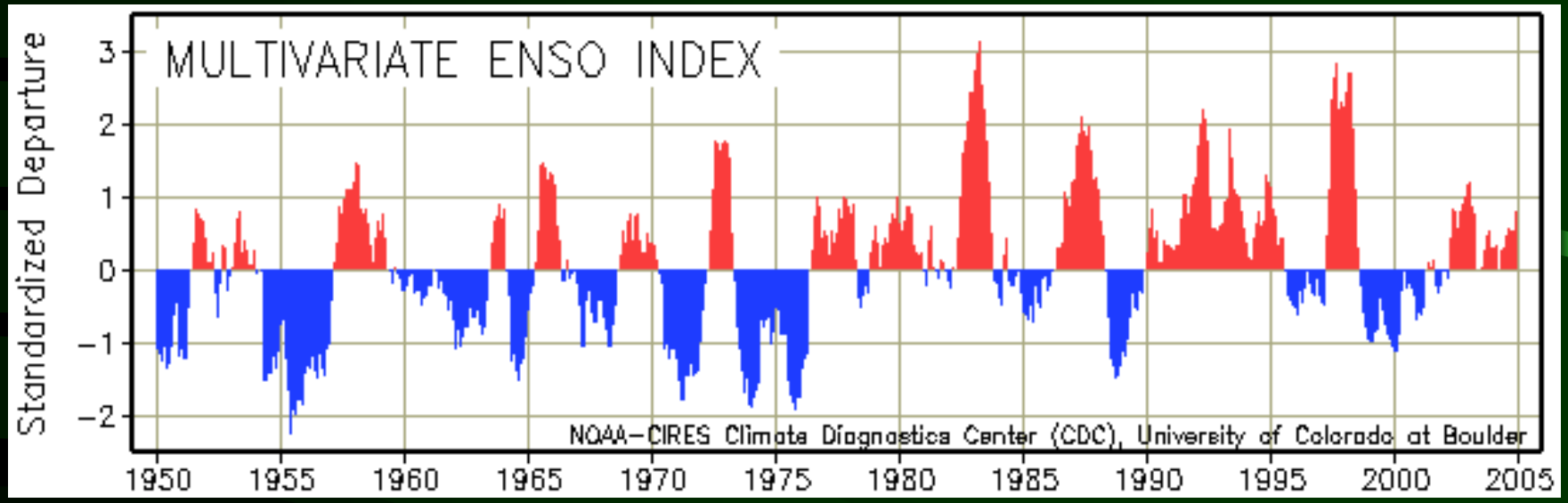


Colorado Springs 2005 Water Year Precipitation



What Comes Next? – Do We Really Know?

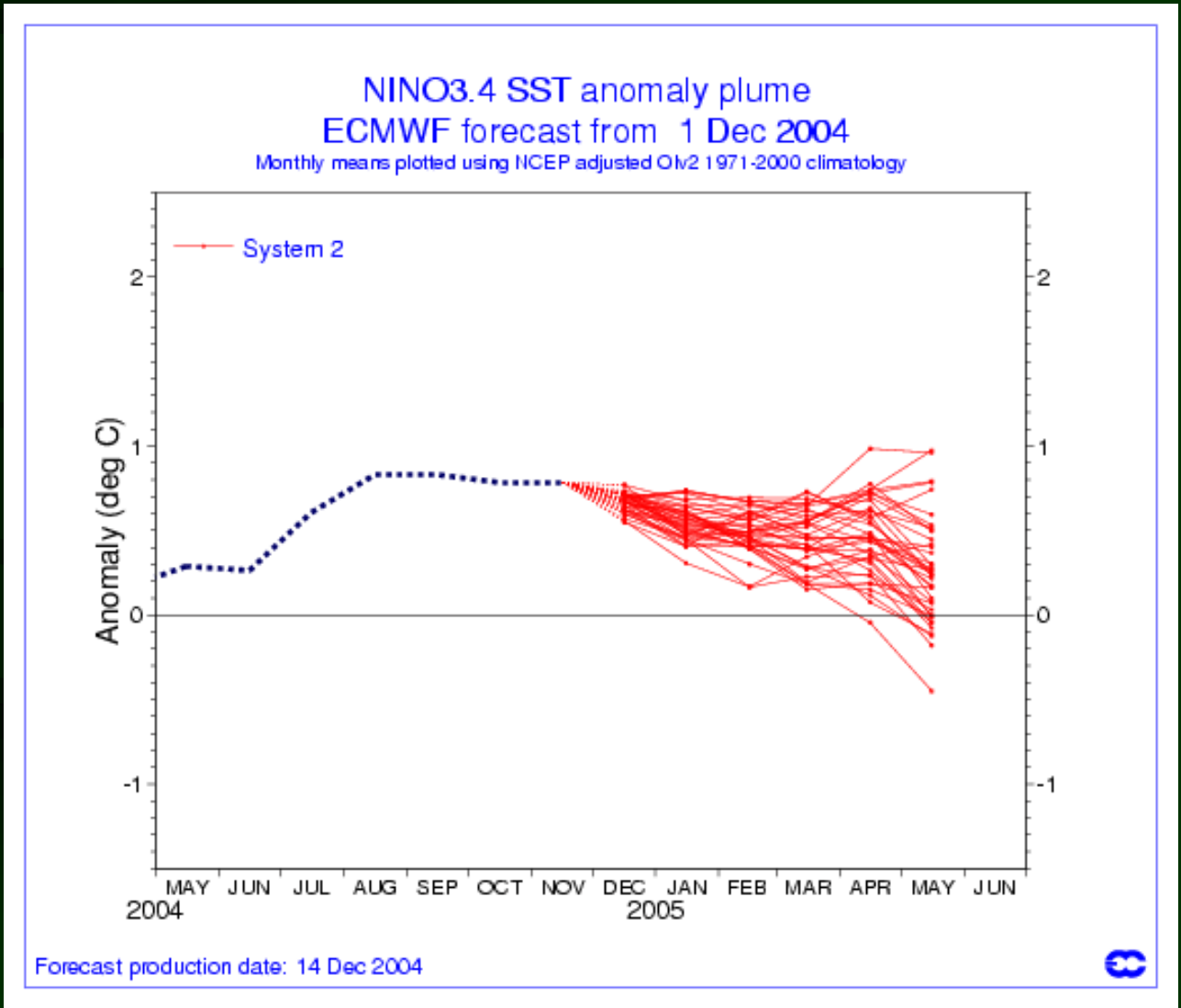
Multivariate ENSO Index (MEI)



Last update: 8 February 2005

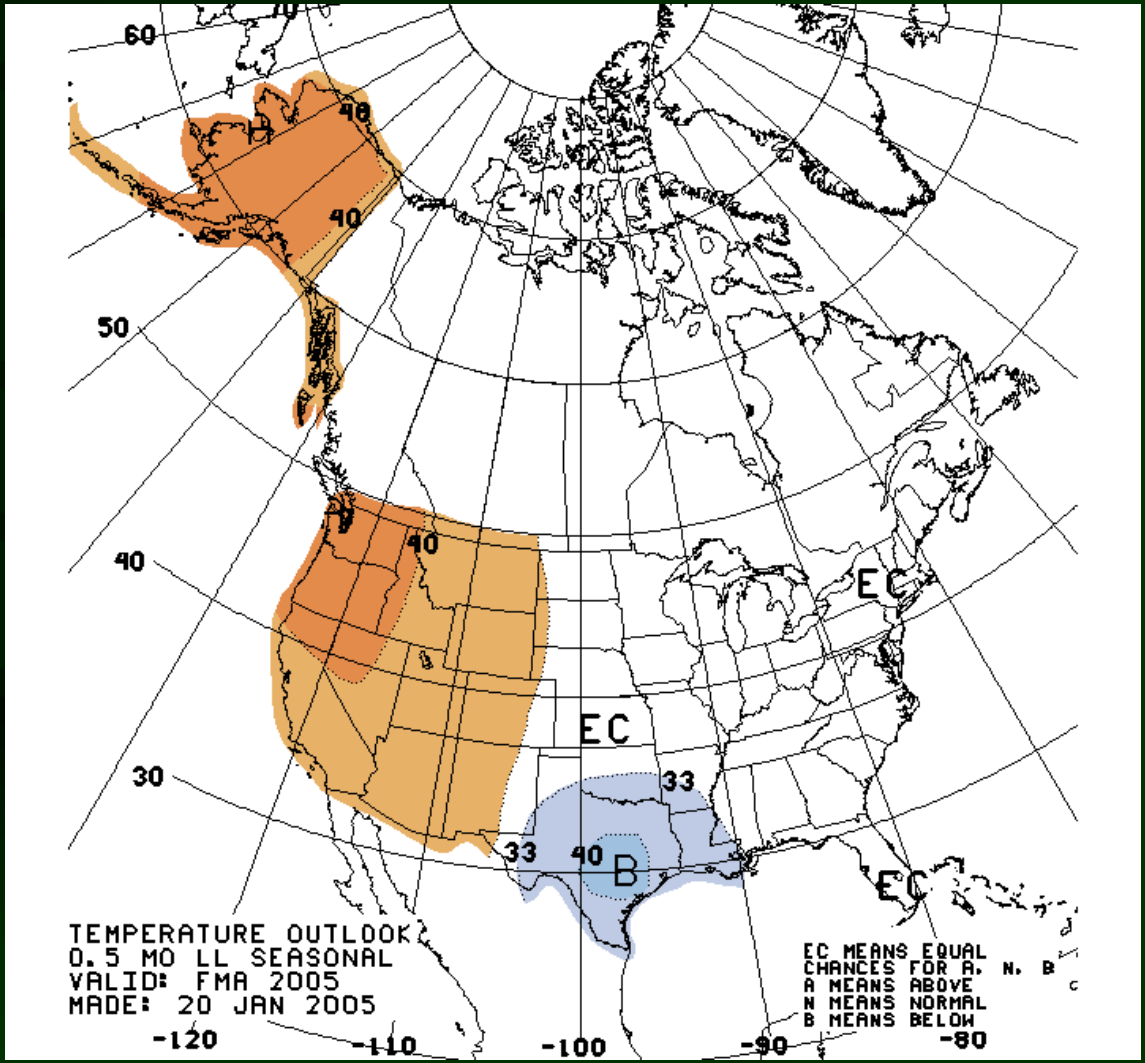
http://www.cdc.noaa.gov/people/klaus.wolter/MEI/

El Nino Forecast



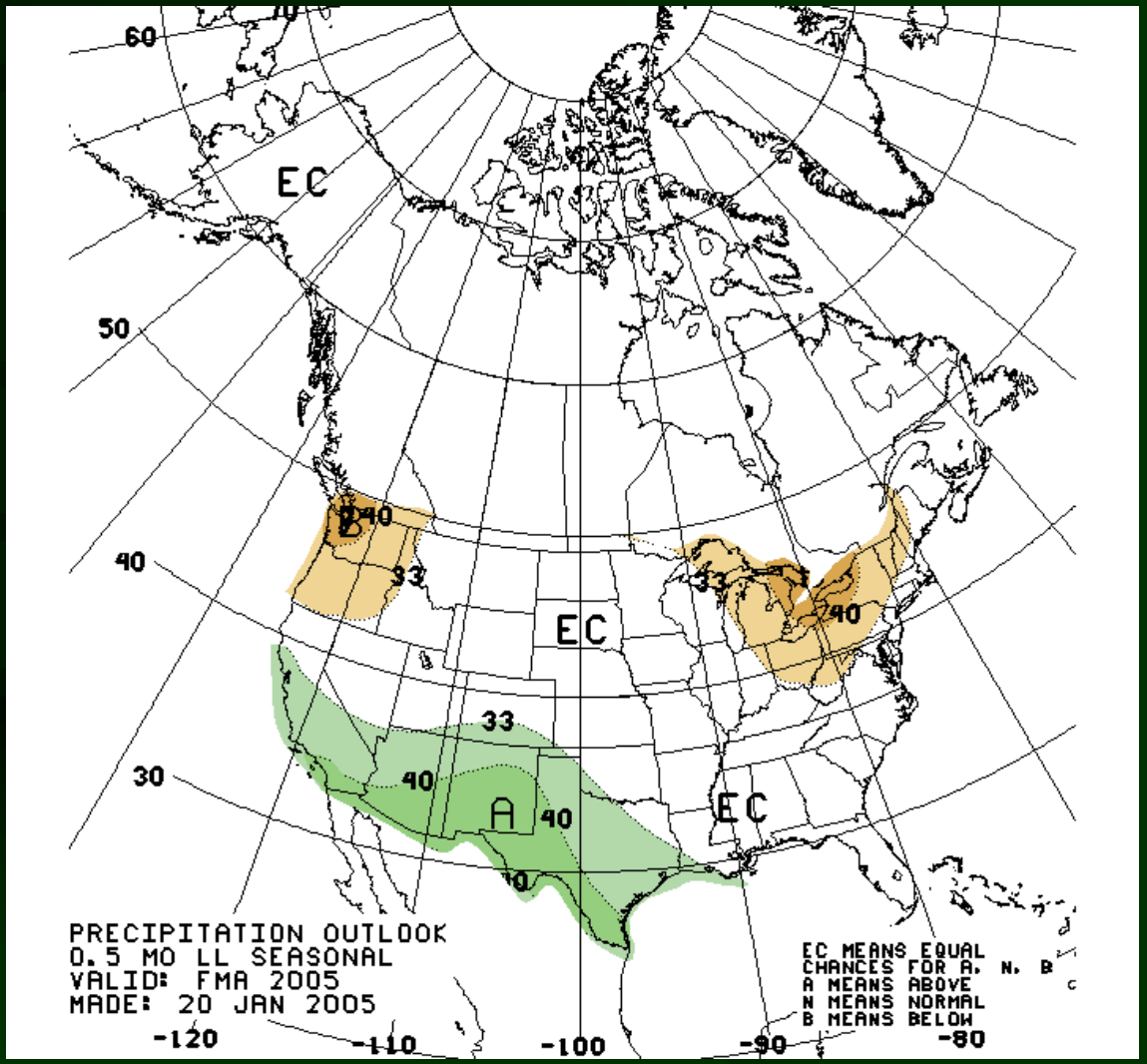
http://www.cdc.noaa.gov/people/klaus.wolter/SWcasts/

Temperature
Feb-Apr 2005



From the Colorado Prediction Center
http://www.cpc.ncep.noaa.gov/products/predictions/multi_season/13_seasonal_outlooks/color/churchill.html

Precipitation
Feb-Apr 2005



From the Colorado Prediction Center
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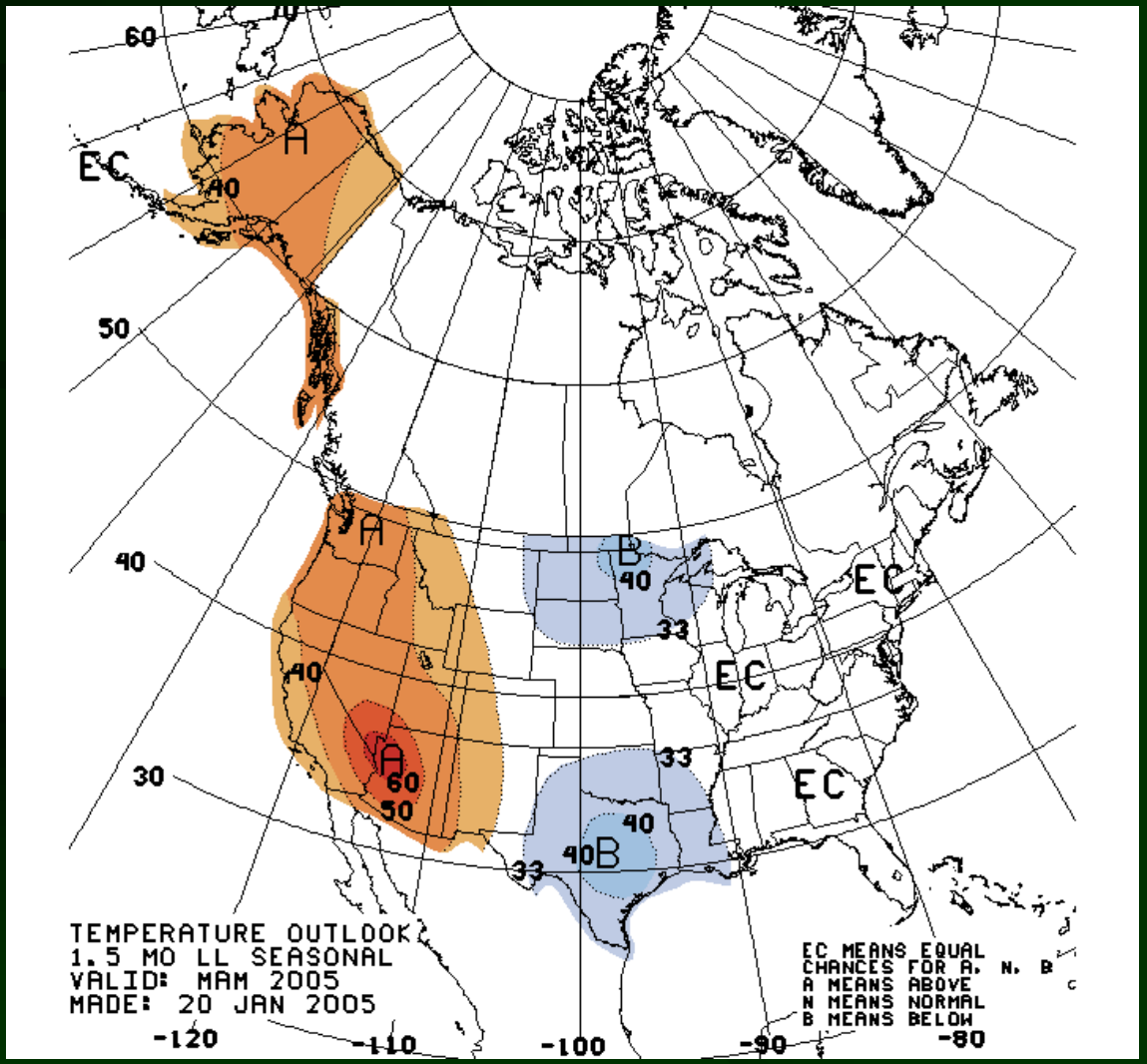
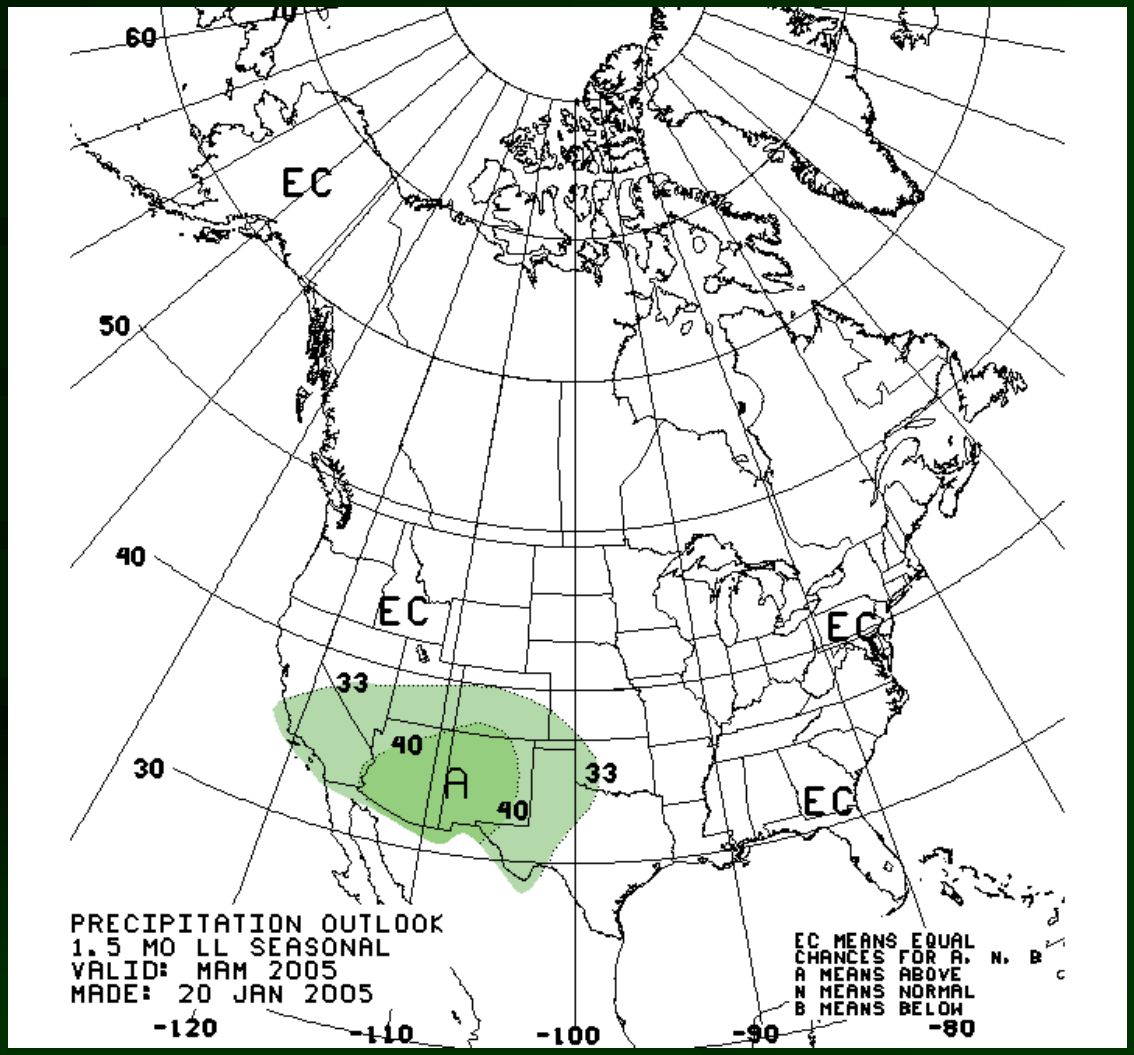
Temperature
Mar-May 2005



From the Colorado Prediction Center
http://www.cpc.ncep.noaa.gov/products/predictions/multi_season/13_seasonal_outlooks/color/churchill.html

Precipitation
Mar-May 2005



From the Colorado Prediction Center
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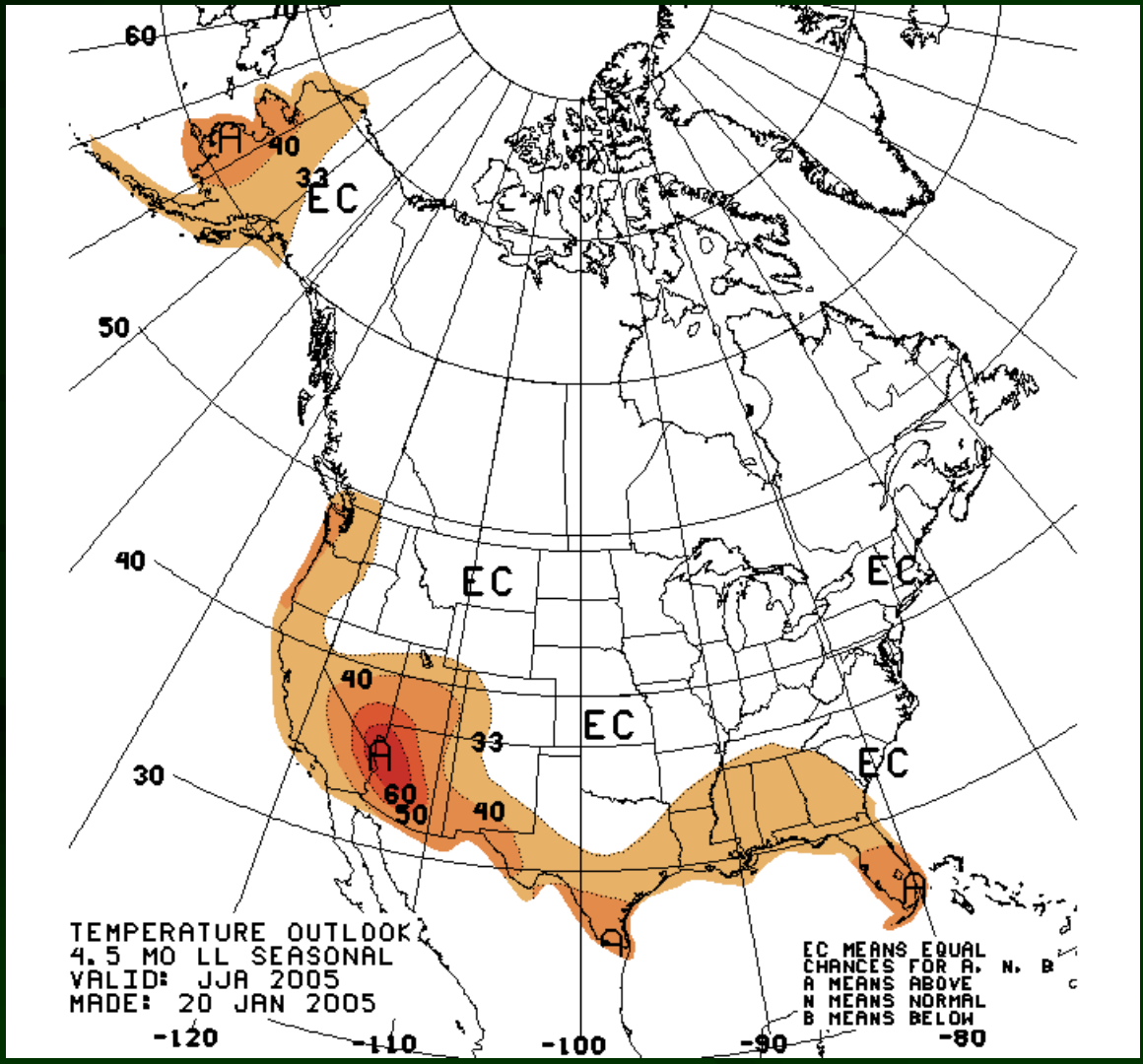
Temperature
Jun-Aug 2005



From the Colorado Prediction Center
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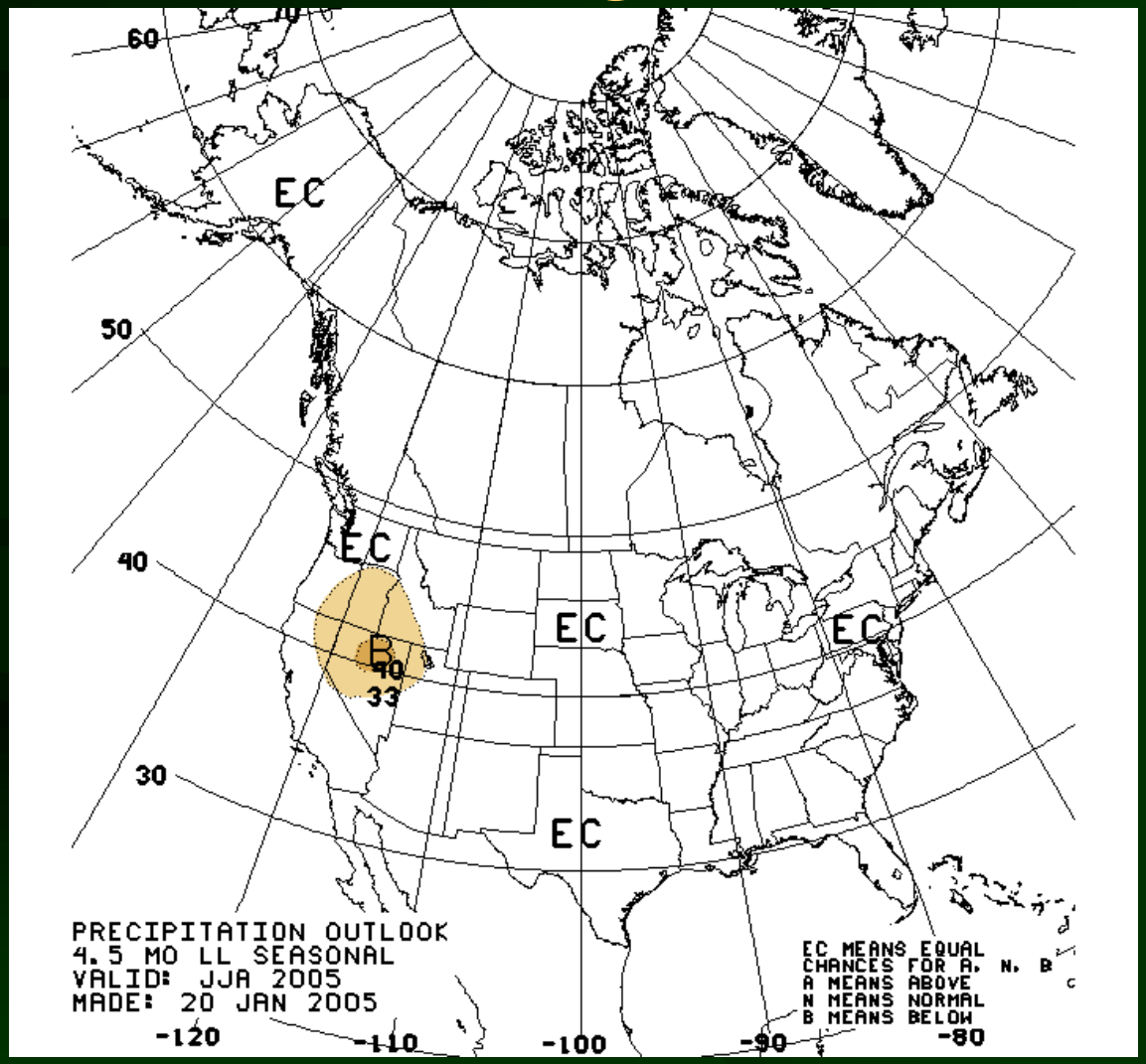
Precipitation
Jun-Aug 2005



From the Colorado Prediction Center
http://www.cpc.ncep.noaa.gov/products/predictions/multi_season/13_seasonal_outlooks/color/churchill.html

For Colorado Springs,

Average Precipitation = ~ 17 inches

(WY2004 = 20.25 inches)

Average Evaporation = ~ > 24 inches

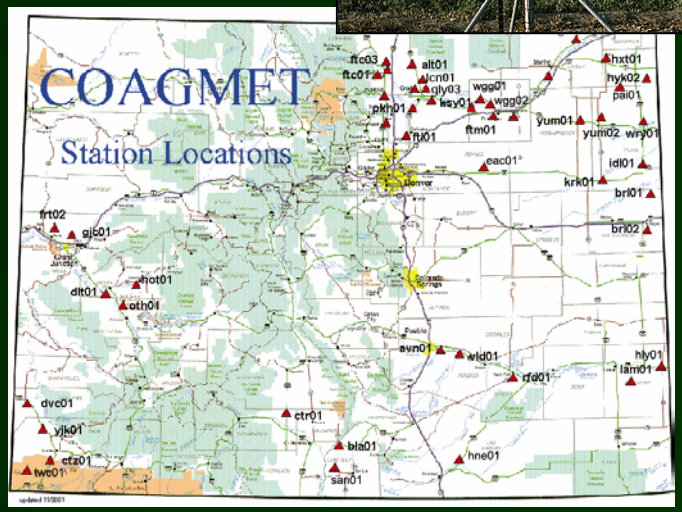
therefore,

Drought is ***NEVER*** really over.

While we may not be able to predict it, at least we should know what we get!

CoAgMet
Weather Data for Agriculture

- *Automated weather stations with daily and hourly readings of:*
  - *Temperature*
  - *Humidity*
  - *Wind*
  - *Precipitation*
  - *Solar energy*
  - *Evapotranspiration*



http://www.coagmet.com

Colorado Climate Magazine

- *Good bedtime reading about the climate of Colorado -- recent and historic*
- *$15/year subscription pays printing and mailing costs*

http://ccc.atmos.colostate.edu/magazine.php

Colorado Climate Center
Colorado State University

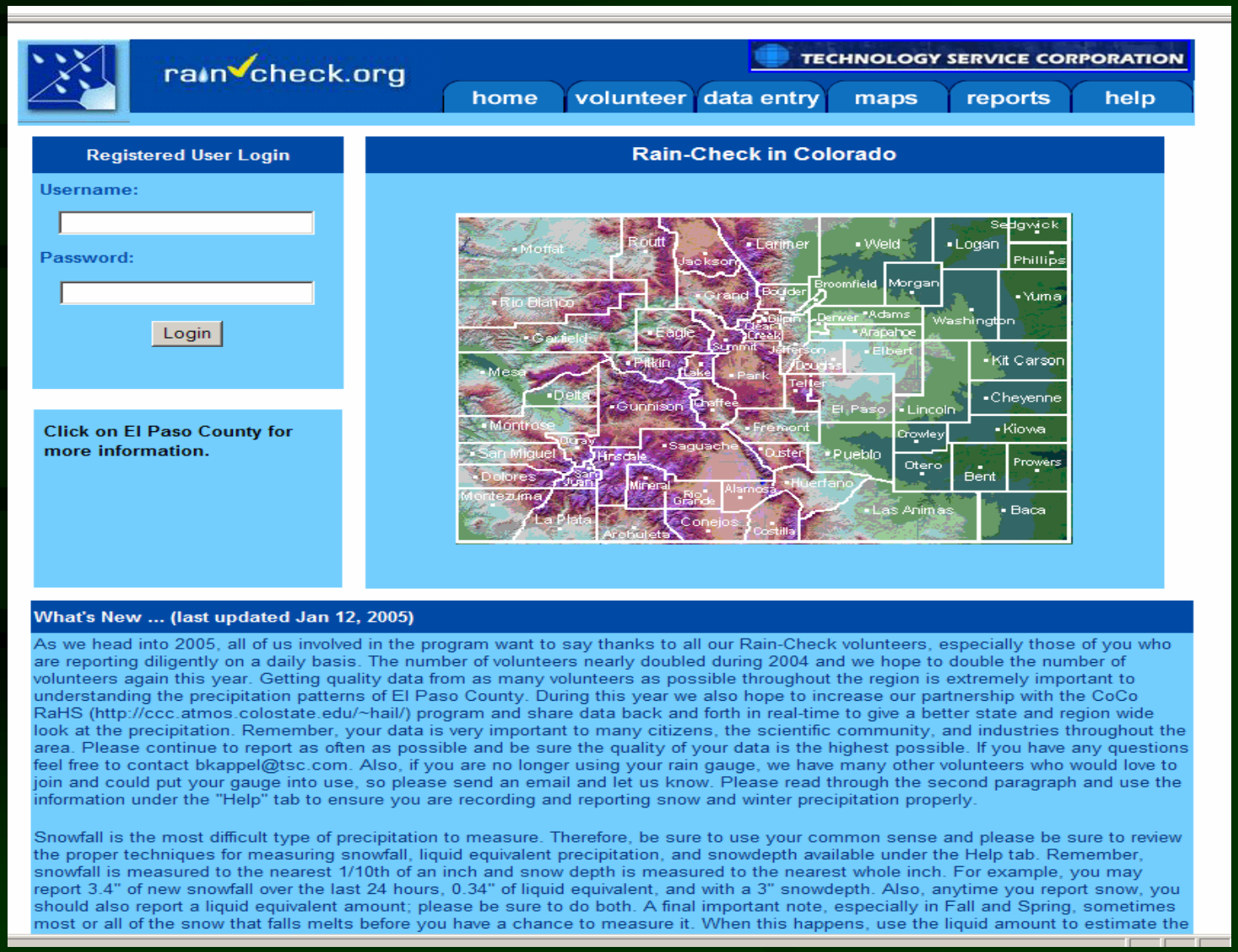
- *Data and Power Point Presentations available for downloading*

- http://ccc.atmos.colostate.edu

  click on "Drought"

  then click on "Presentations"

El Paso County's RainCheck Program



http://www.rain-check.org/

CoCoRaHS

Community Collaborative Rain, Hail, & Snow Network

CoCoRaHS

Community Collaborative Rain, Hail, and Snow Network

http://www.cocorahs.org

- Over 1,000 volunteers participate in rain, hail and snow measurements.
- More accurate maps, verifies forecasting, radar research, crop damage, drought/flooding, educational purposes.

CoCo RaHS

Volunteers of all ages helping scientists study storms.
The exploration begins in your back yard!

What Does It Take To Be A Volunteer?

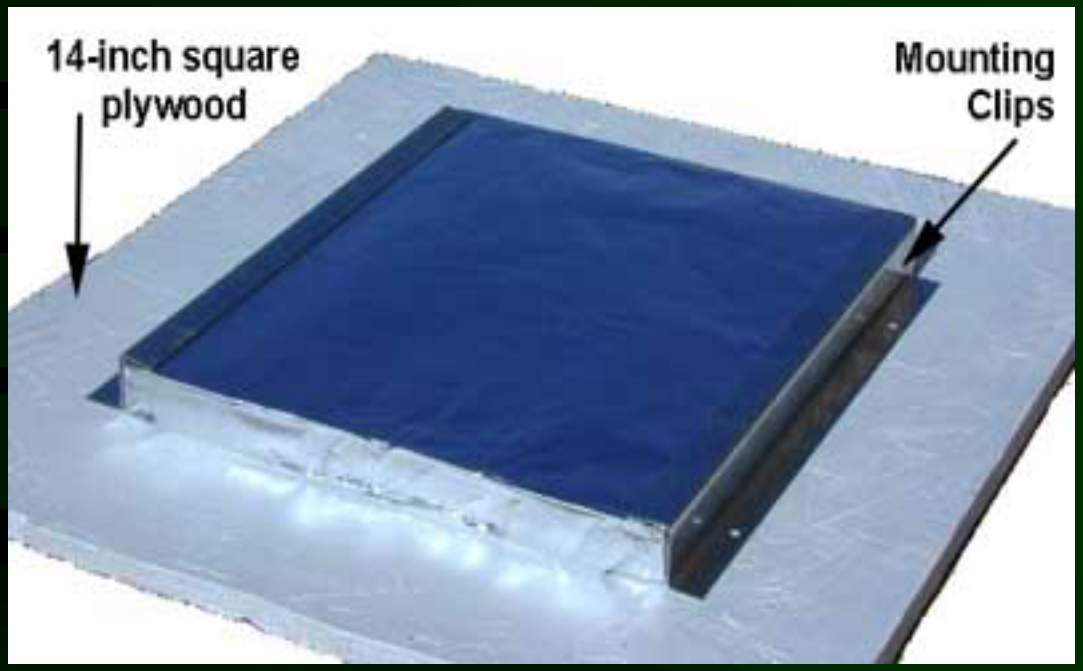
- Scientific curiosity.
- An interest in weather and an appreciation for water.
- Enough unobstructed space to install a rain gauge.
- Two minutes a day for a good cause.

CoCo RaHS
Simple Tools to Study Rain

Rain Gauge

Example Station

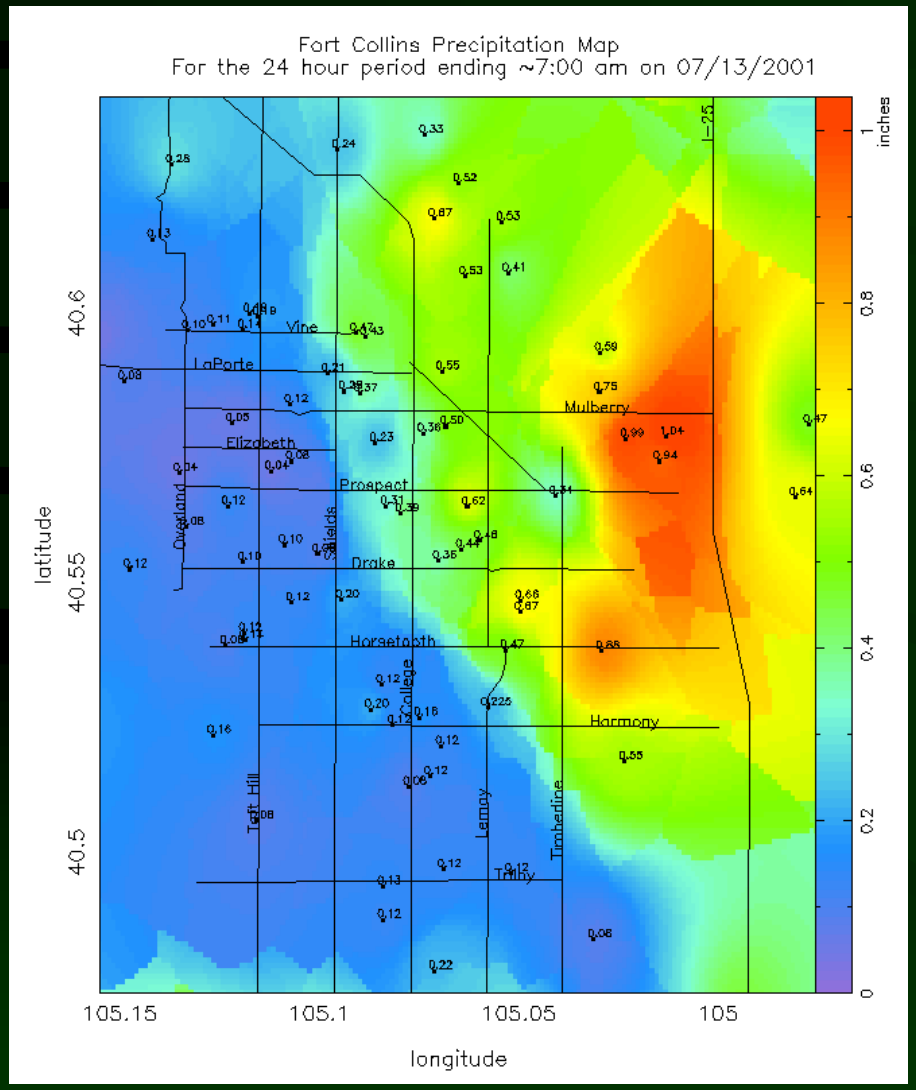
CoCo RaHS
Simple Tools To Study Hail

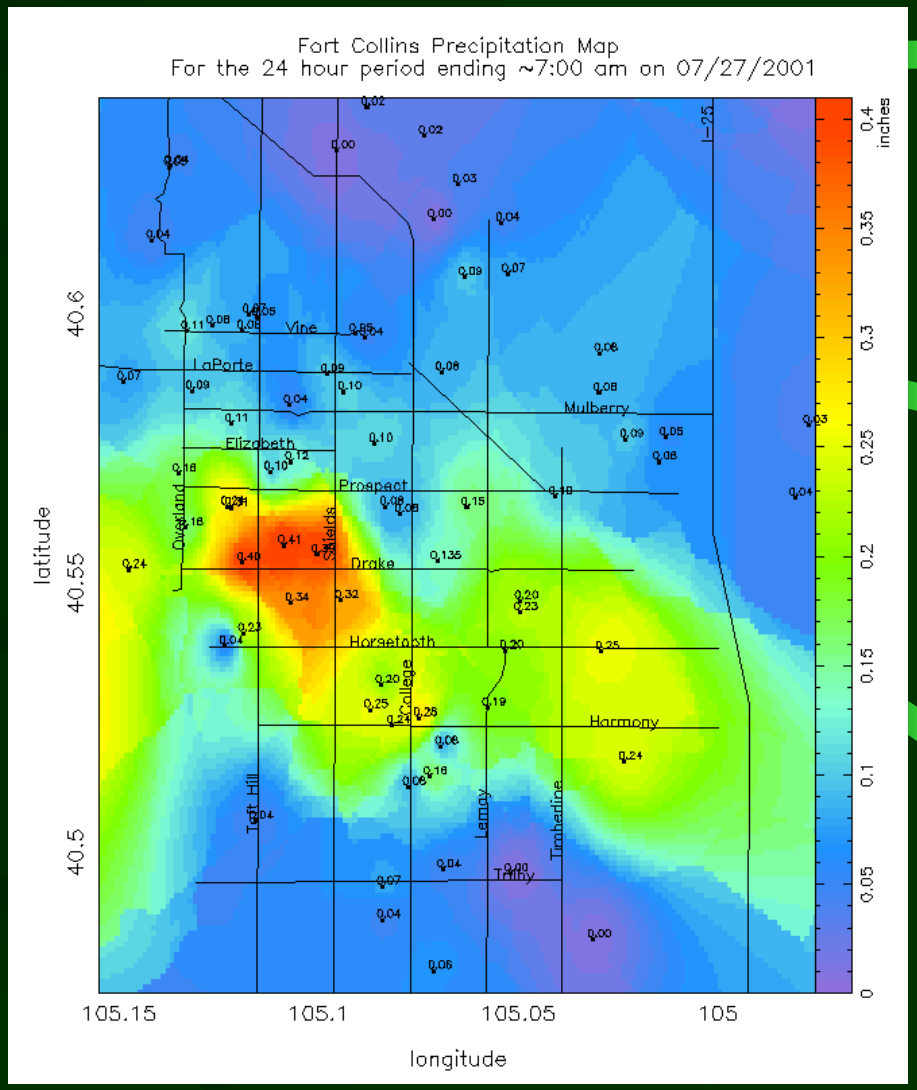


Hail Pad

Damaged Hail Pad

Fort Collins Daily Rainfall Examples





Colorado Hailstorm

July 10, 2002, Parker, CO

Damaged Hailpad.

One of the culprits.

How many volunteers do we need?

- Our goal is at least one per square mile over urbanized areas.
- As many as we can find in rural areas.

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.