



# ***The Climate of the South Platte Basin***

Colorado Climate Center

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

Colorado  
State  
University

*Knowledge to Go Places*

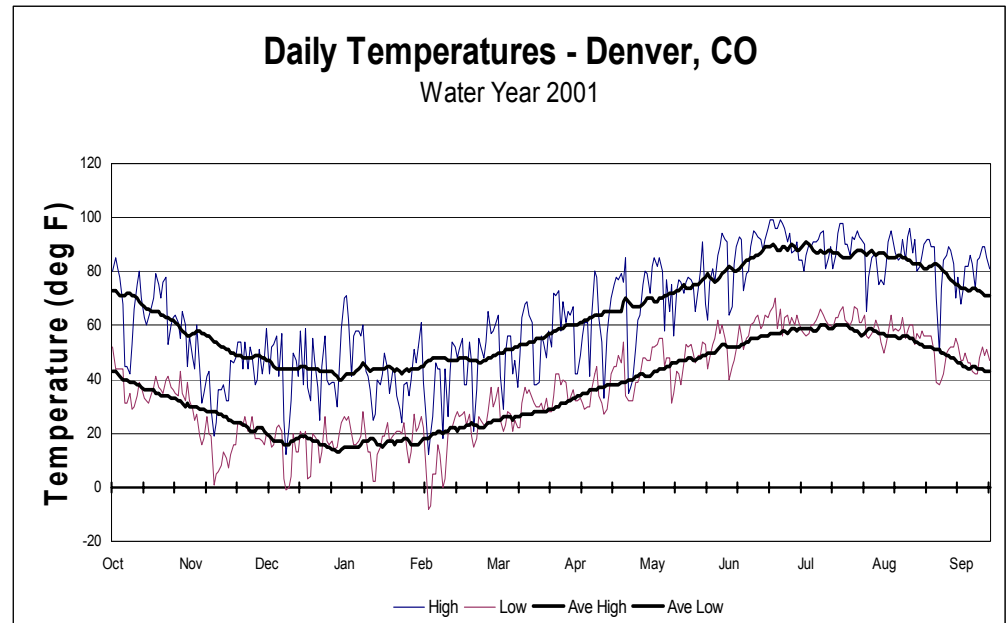
# Key Features of the Climate of the South Platte Basin

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# Temperature

- Cold winters
- Hot summers
- Large daily changes
- Temperature decrease with altitude, especially in summer
- Mild zone near eastern base of Rockies



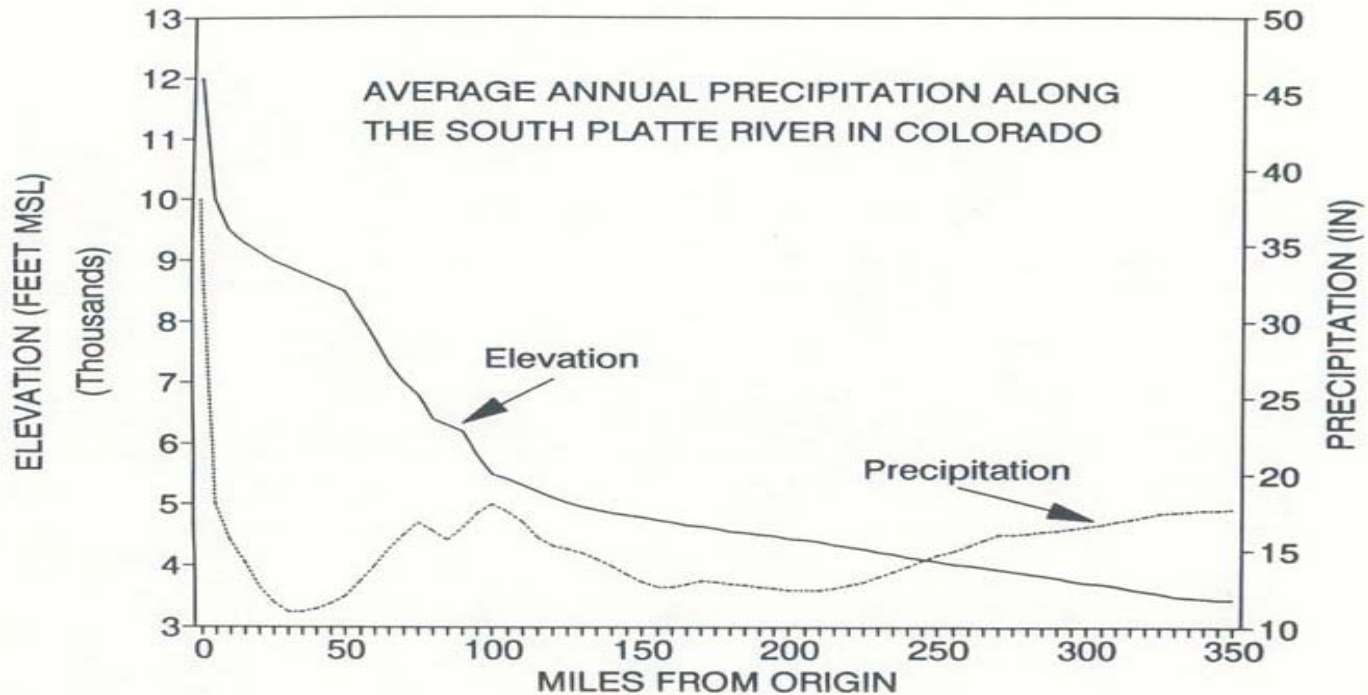
# Humidity

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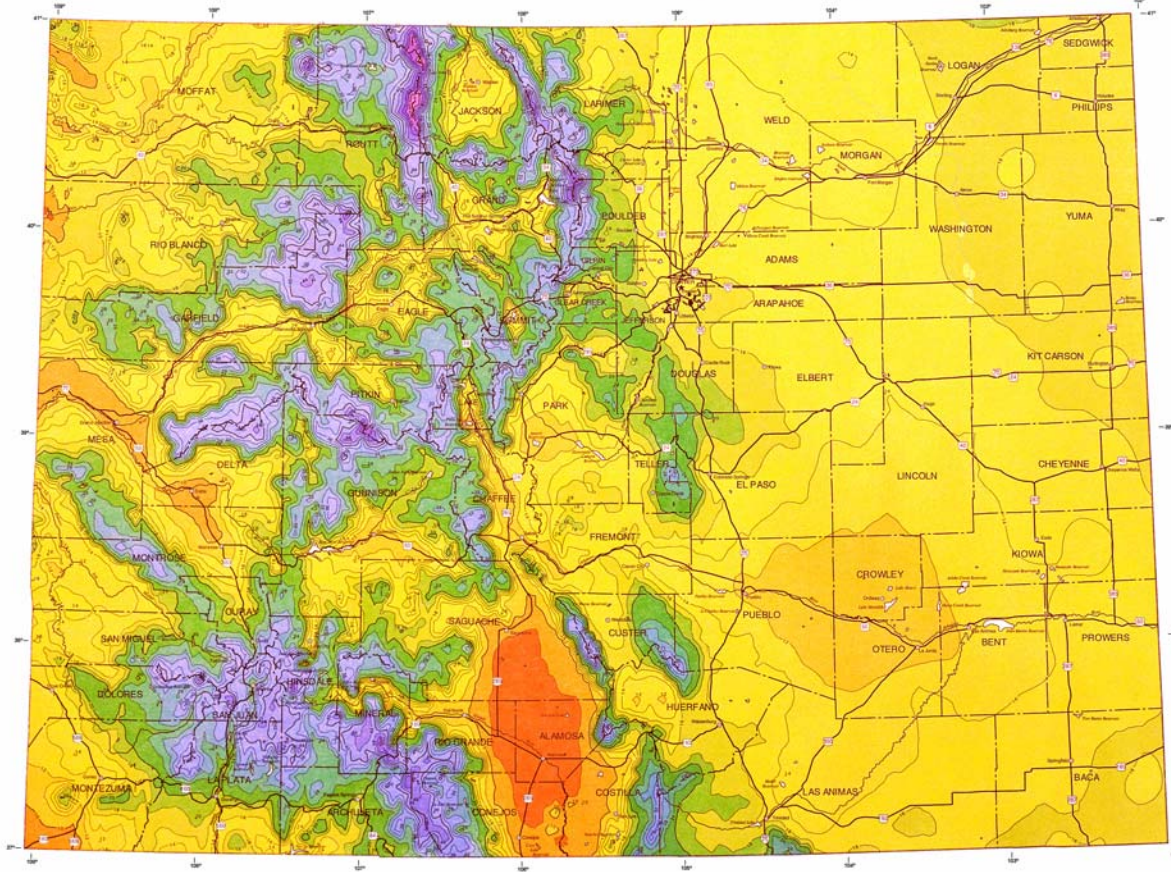
- Low humidity but with occasional intrusions of more humid air

# Precipitation

- Precipitation varies greatly with topography



# COLORADO ANNUAL PRECIPITATION



**Average  
Annual Precipitation  
1961 - 1990  
inches per year**

- <8
- 8-10
- 10-12
- 12-14
- 14-16
- 16-18
- 18-20
- 20-24
- 24-28
- 28-32
- 32-36
- 36-40
- 40-44
- 44-48
- 48-52
- 52-56
- 56-60
- 60-70

Made in cooperation with Oregon State University.  
 Data Source: NOAA Cooperative Station Network (1961-1990) climate observations, NCEP SNO2TEL Station normals, and supplemental data provided by regional and state climatologists and hydrologic agencies.  
 Digital Elevation Model: The PRISM DEM is derived from a 30-m second Colorado Mapping Agency (CMA) Digital Terrain Elevation Dataset (DTED) obtained from the ERDC Data Center.  
 USDA-NRCS National Cartography & Geographic Center, Fort Worth, TX, 1998

Estimation Technology: Contour estimates were derived from station point values using the PRISM model developed at Oregon State University. The resulting grid was reprojected and resampled to 30-m resolution using a Spline Interpolation.  
 Climate Dataset: April 1988. Albers Equal Area Projection, 98°W & 37°N, NAD 83



SCALE 1:1, 185, 000

SOURCE NOTE: Users are cautioned that contours may not exactly match station-observed precipitation, especially in regions with significant precipitation gradients and/or areas topography.  
 April 1988, 1998

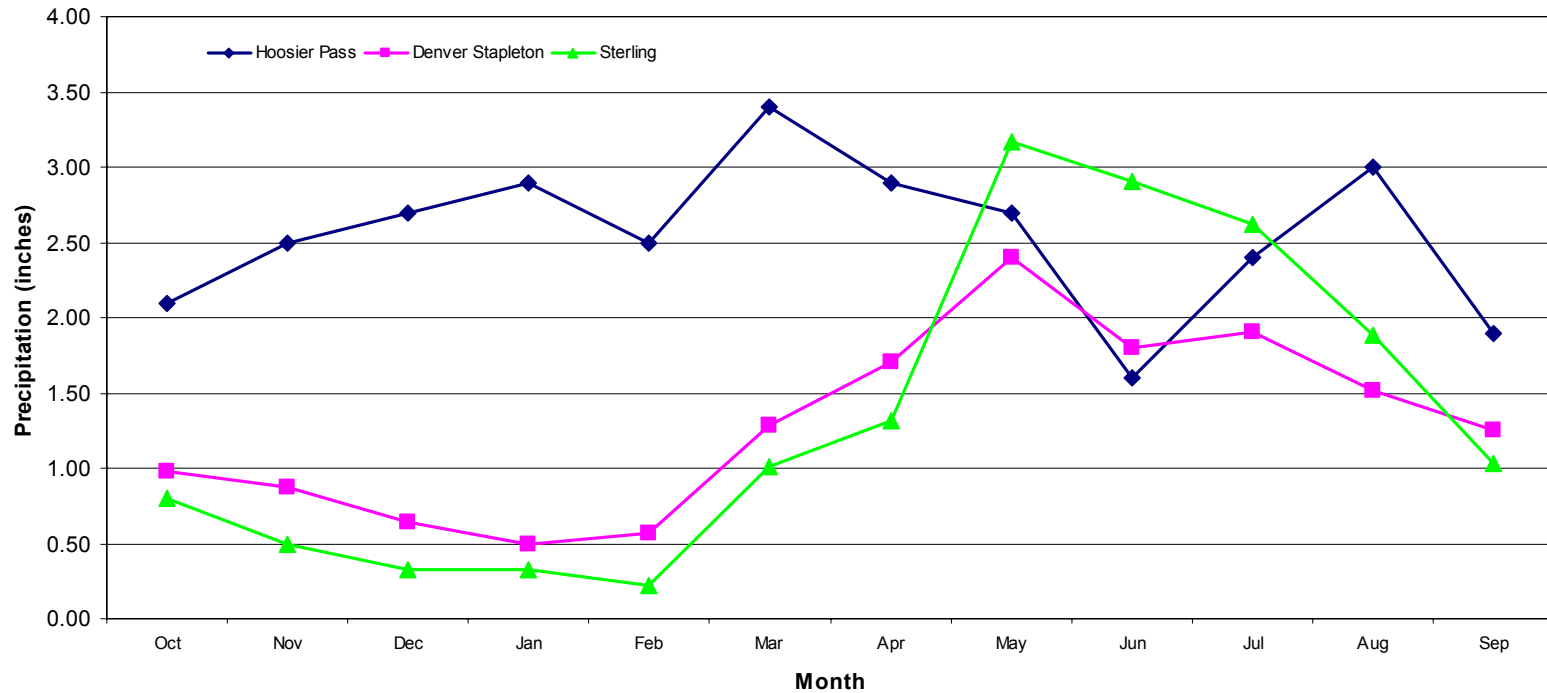
# Precipitation

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- Highly seasonal, but seasonal pattern varies with topography
  - High mountains wet in winter-spring and again in later summer
  - Foothills and eastern plains very dry in winter, wet in spring and early summer

# Precipitation

Monthly Average Precipitation for Selected Sites  
in the South Platte Basin



# Precipitation

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- A few storms contribute a large fraction of annual precipitation while many small events contribute a small fraction

# Precipitation

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- A few storms contribute a large fraction of annual precipitation while many small events contribute a small fraction

# Other Climate Factors

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- Occasional severe storms
  - Tornadoes
  - Hail
  - Blizzards
  - Dust storms
  - Front Range Windstorms
  - Cold waves
  - Etc.

# The Pulse of Colorado's Climate

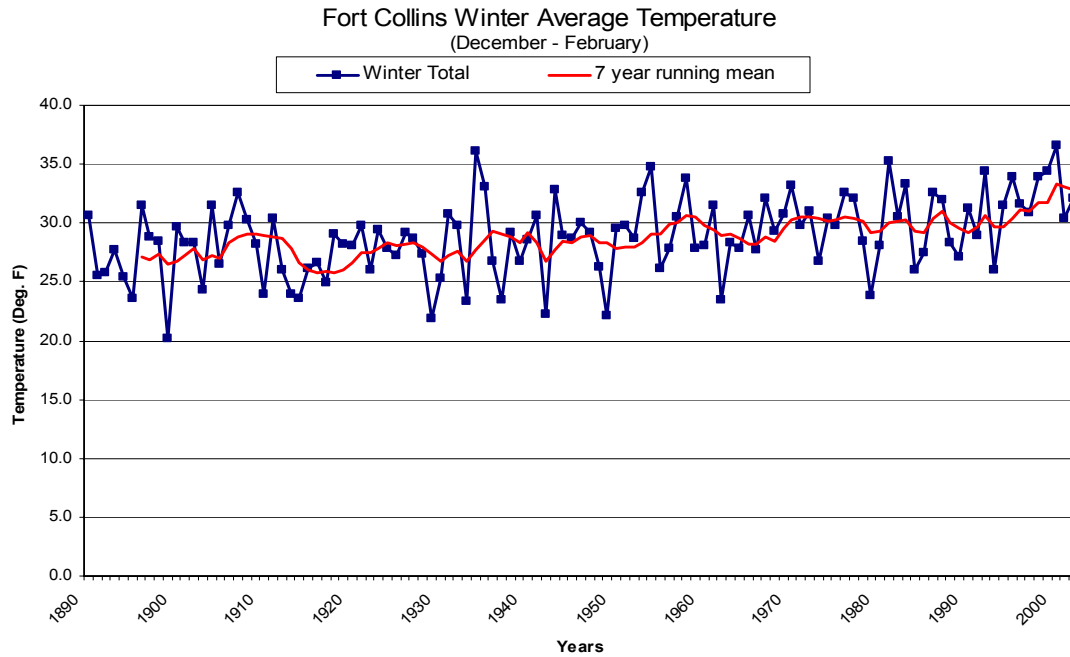
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- Tracking long-term variations



# Temperature

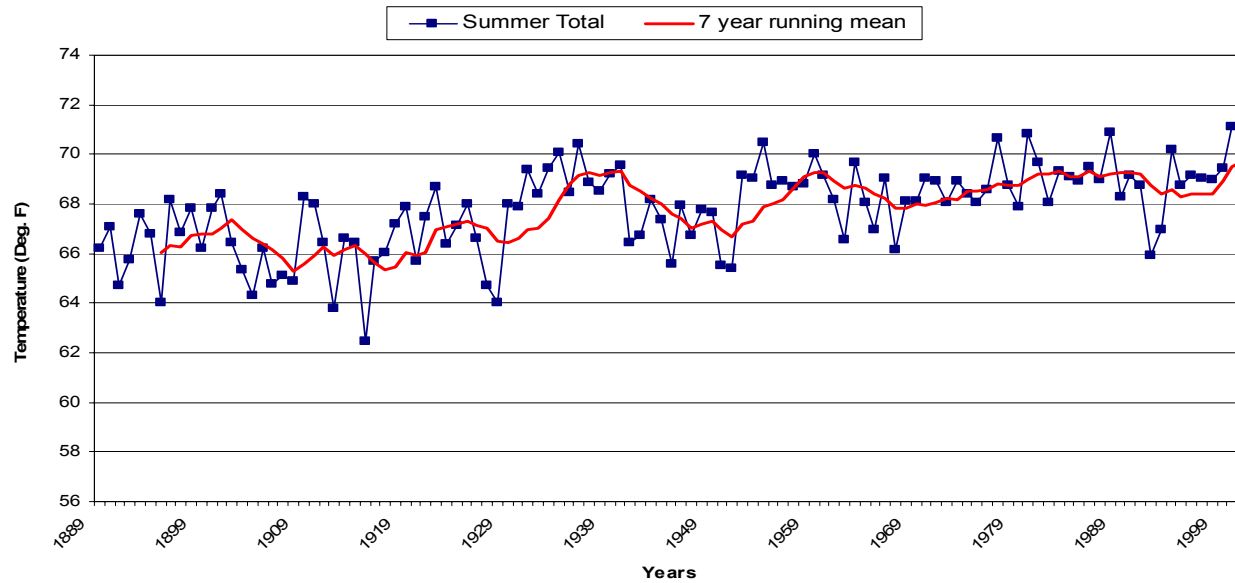
## Seasonal Trends



# Temperature

## Seasonal Trends

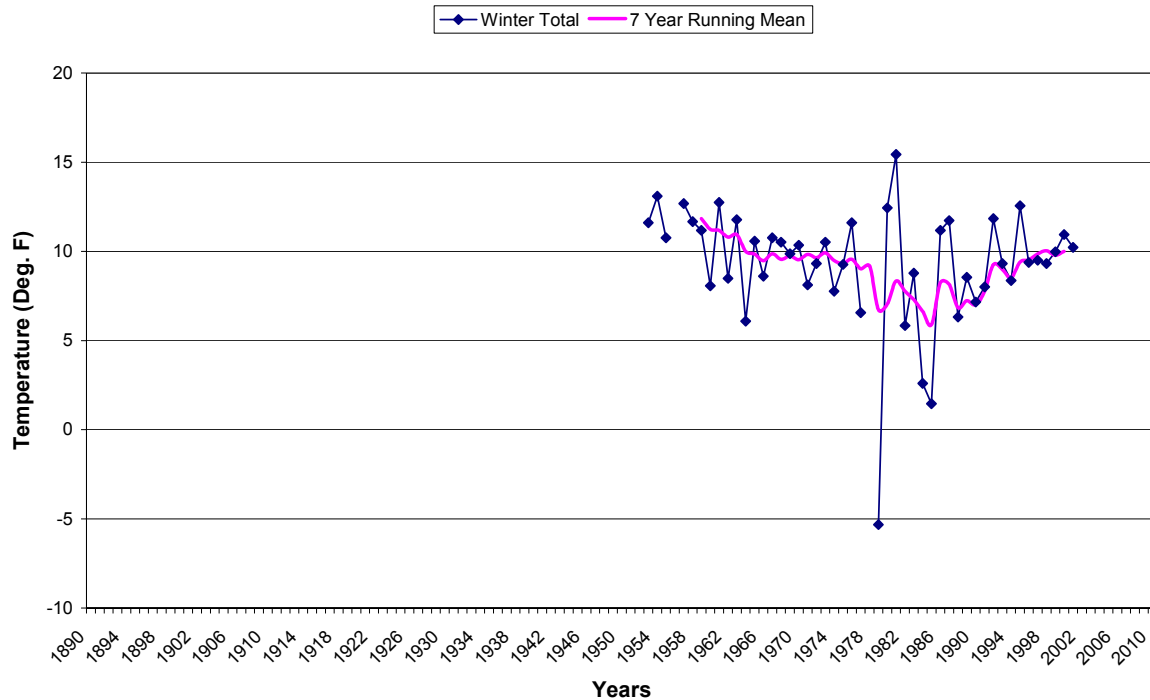
Fort Collins Summer Average Temperature  
(June - August)



# Temperature

## Seasonal Trends

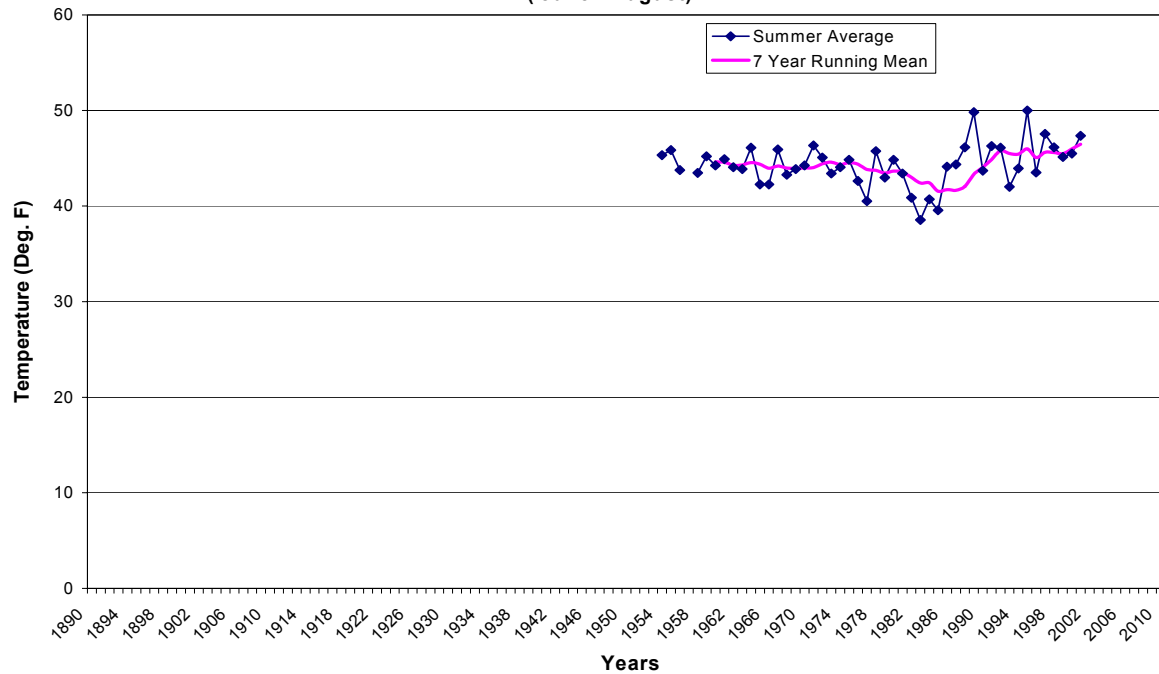
**Niwot Ridge D-1 Winter Average Temperature**  
(December - February)



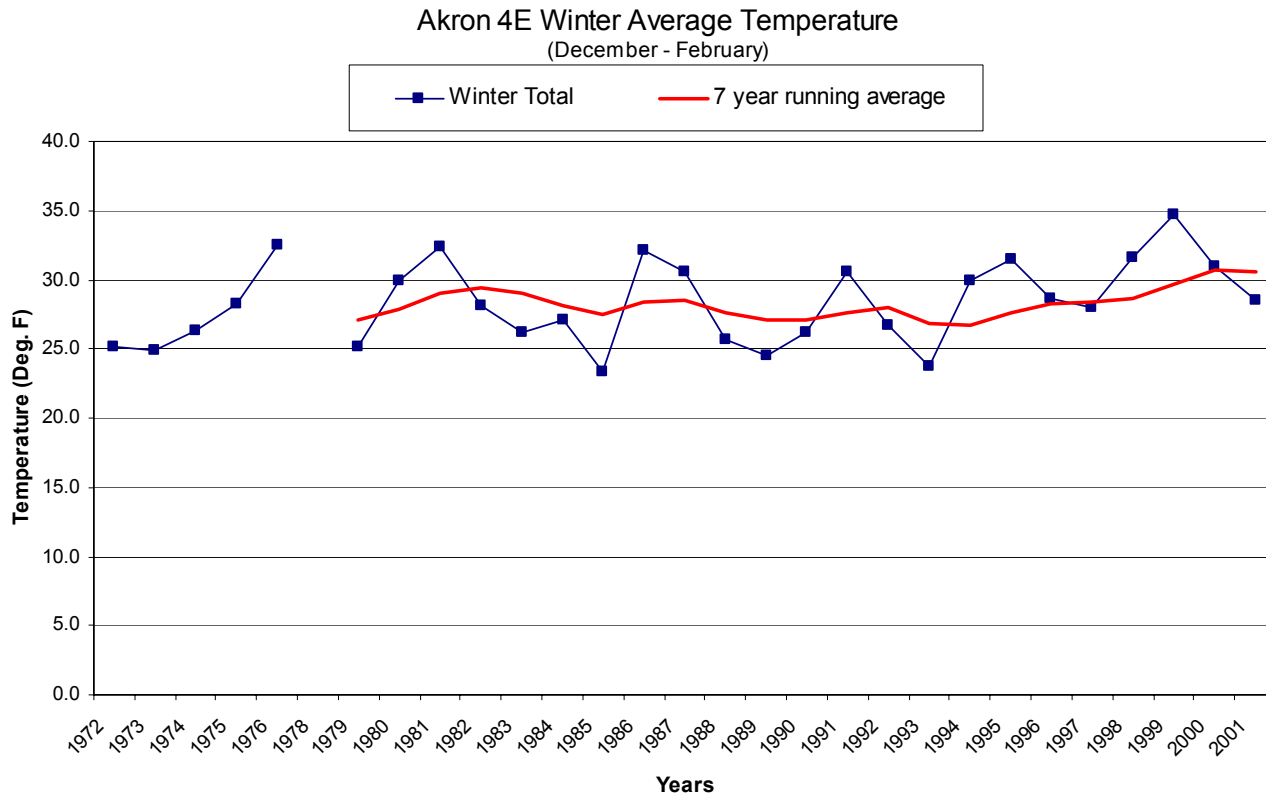
# Temperature

## Seasonal Trends

Niwot Ridge D- 1 Summer Average Temperature  
( June - August)

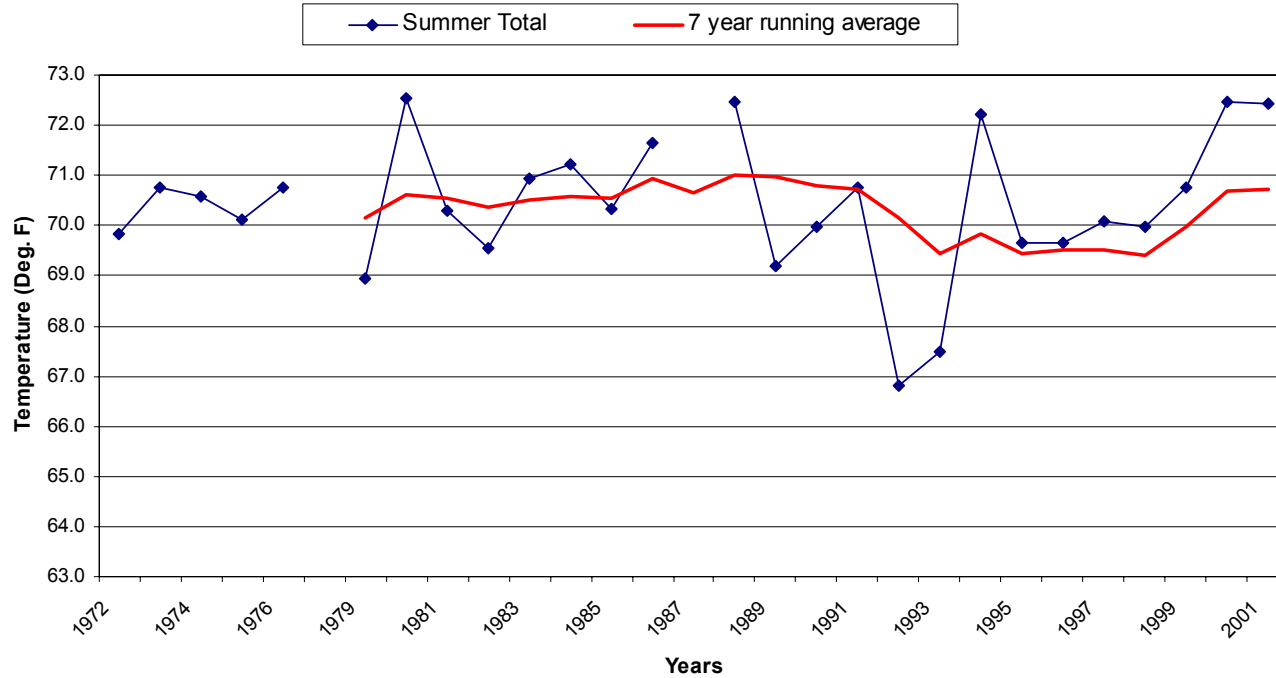


# Temperature



# Temperature

Akron 4E Summer Average Temperature  
(June - August)



# Temperature

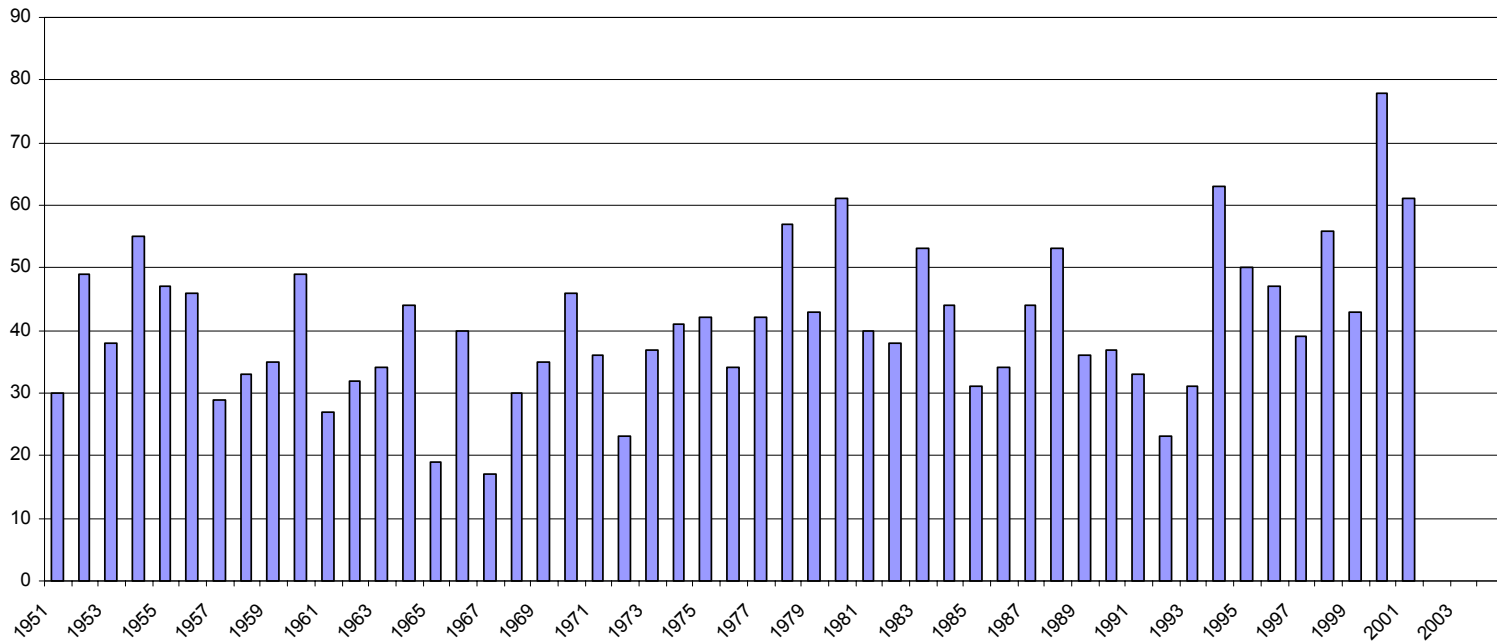
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- Winter warming, spring warming, summer nighttime warming, fall little change. Changes with elevation and location. Trends not consistent

# Frequency of Extremes

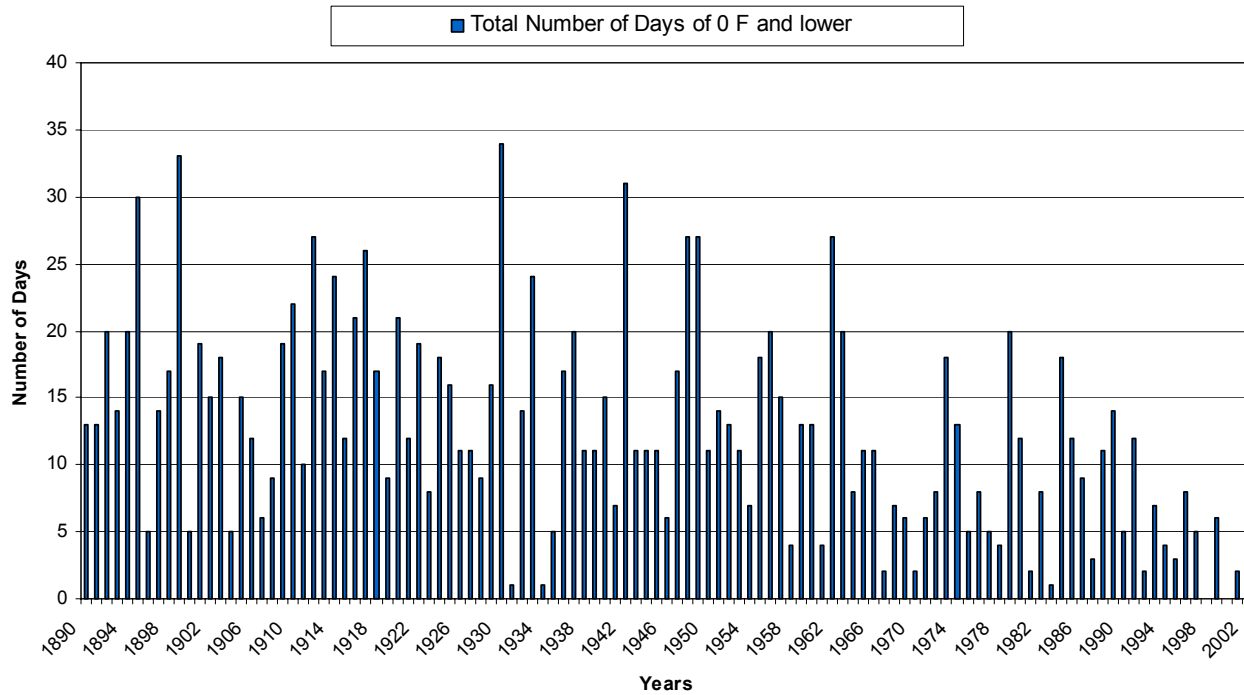
Longmont

Number of days of 90 degrees and above



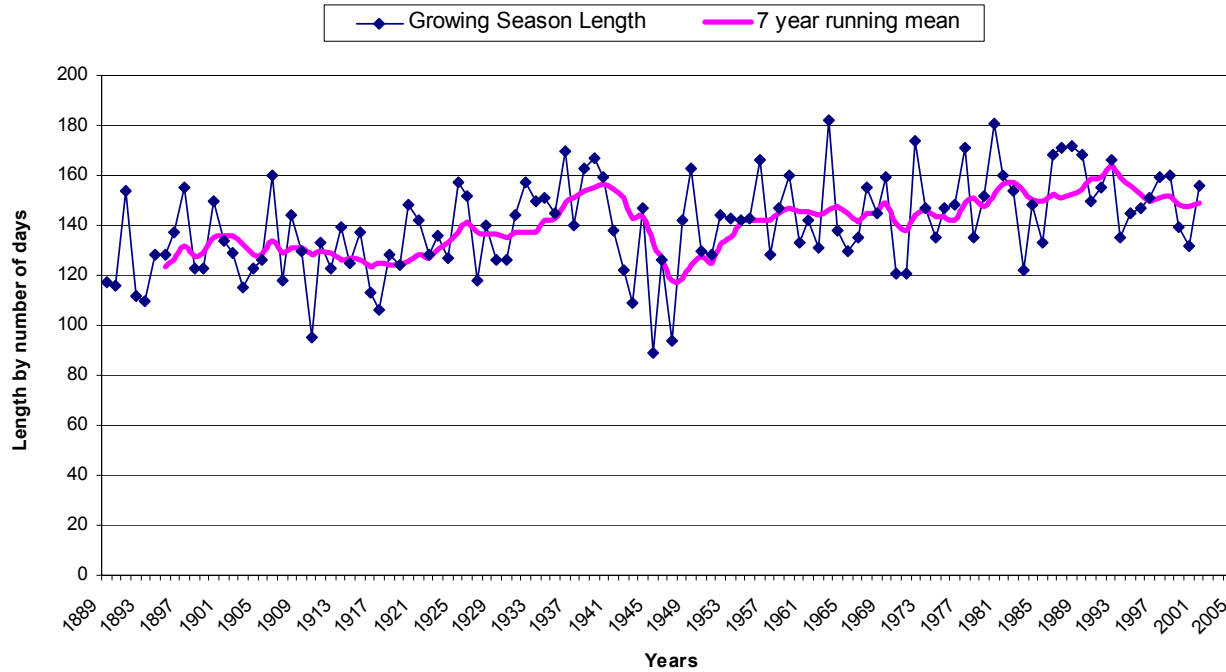
# Frequency of Extremes

Fort Collins Winter Season  
(July - June)



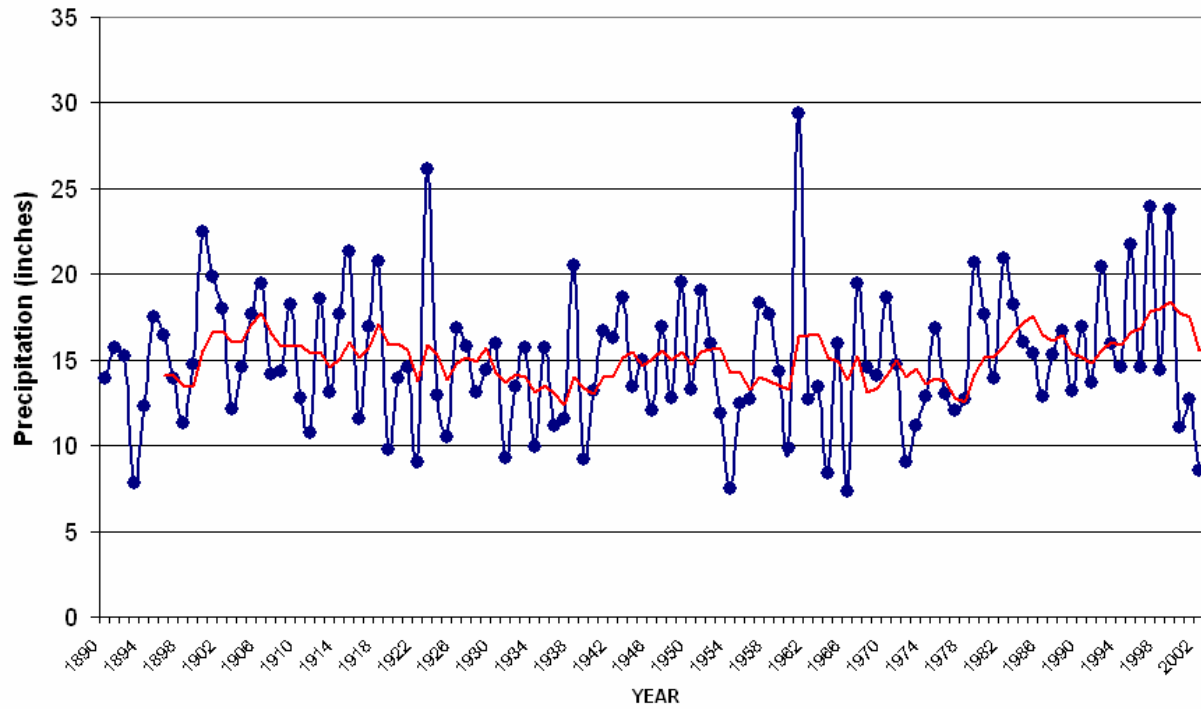
# Growing Season

**Fort Collins Growing Season Length**  
(at 32 Degrees F)



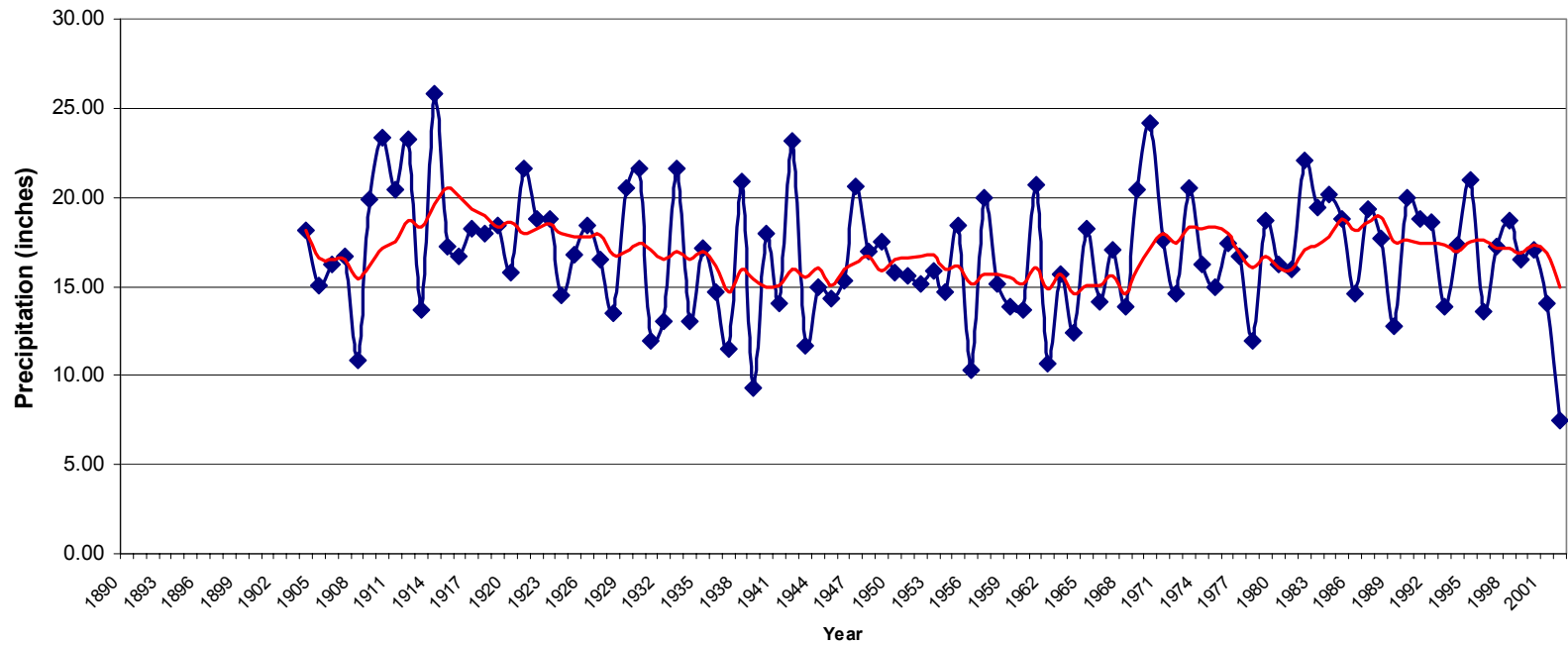
# Precipitation

Fort Collins Water Year  
(Oct-Sep) Precipitation Totals



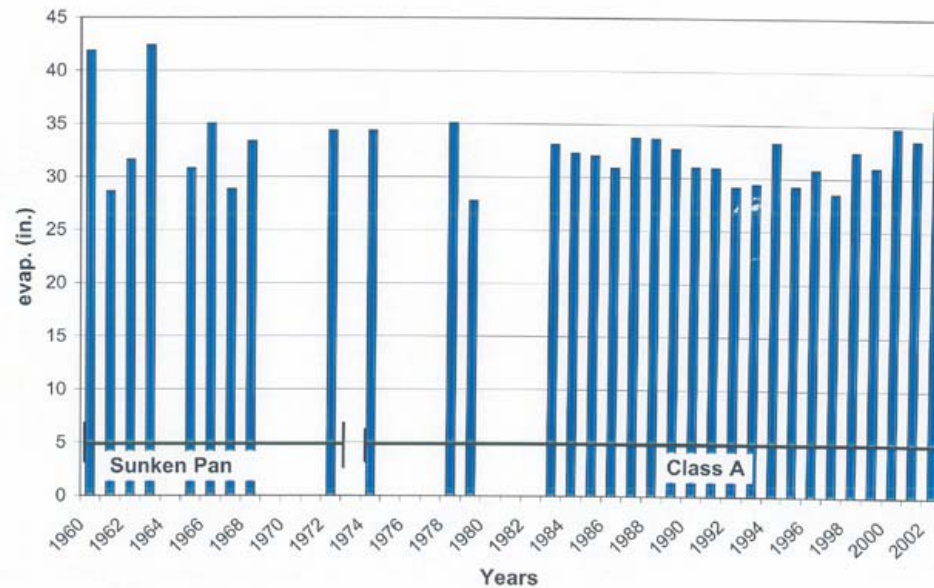
# Precipitation

Water Year Totals for Cheesman



# Growing Season Evaporation

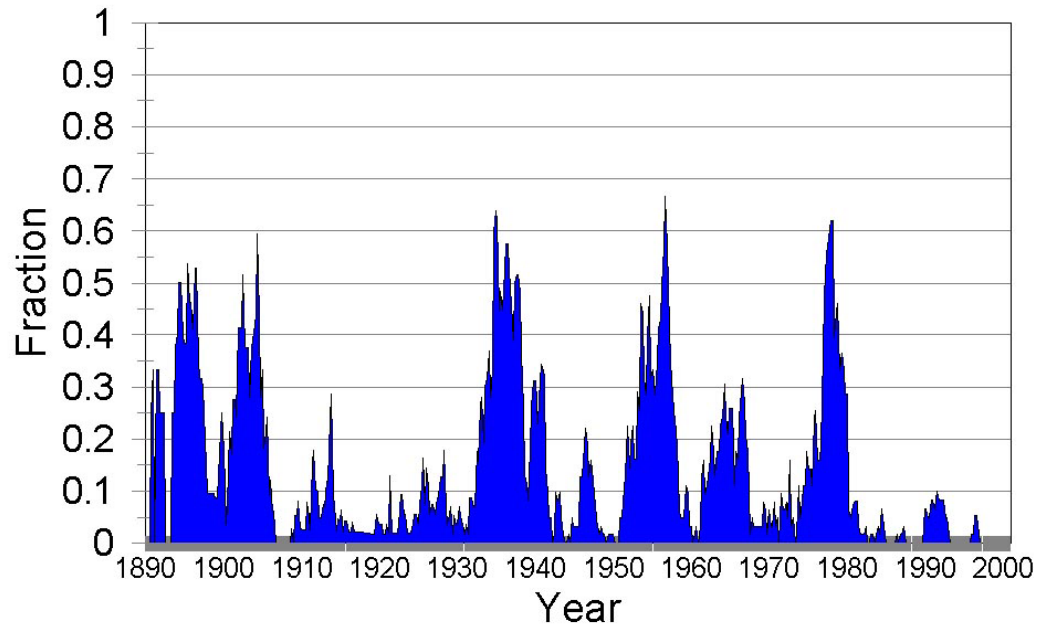
Total evap. of Fort Collins (May-Sept)



# Precipitation

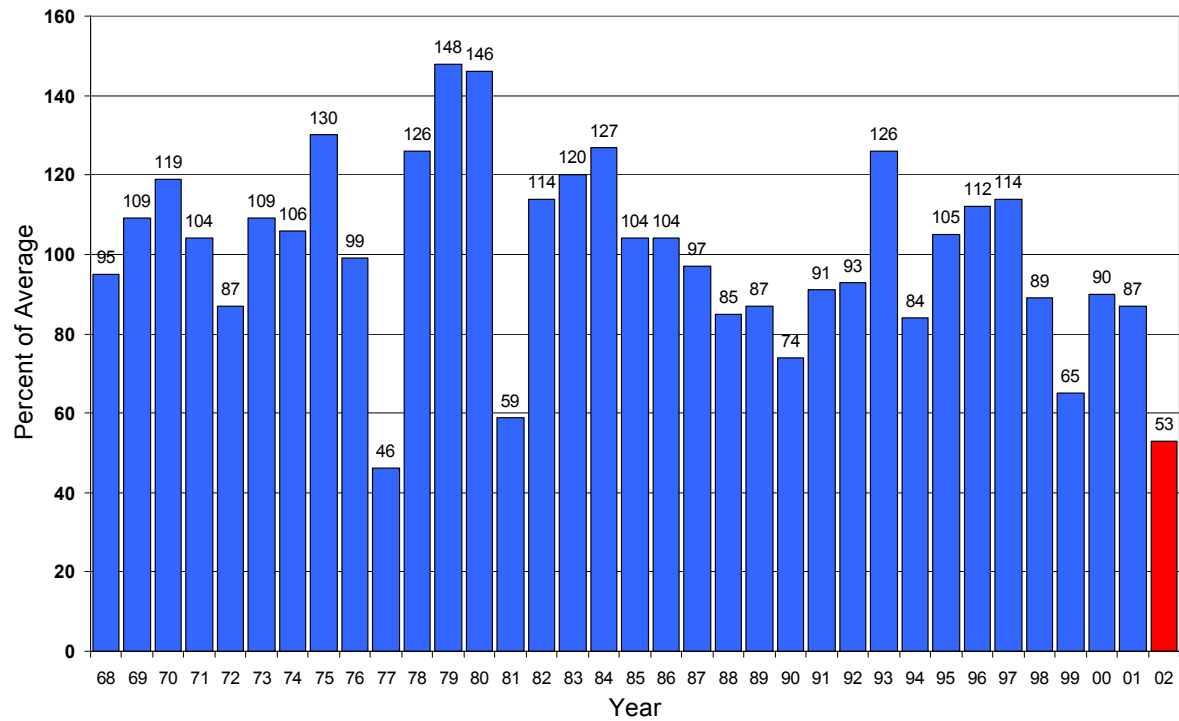
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**Fraction of Colorado in Drought  
Based on 48-month SPI**



# Snow Pack

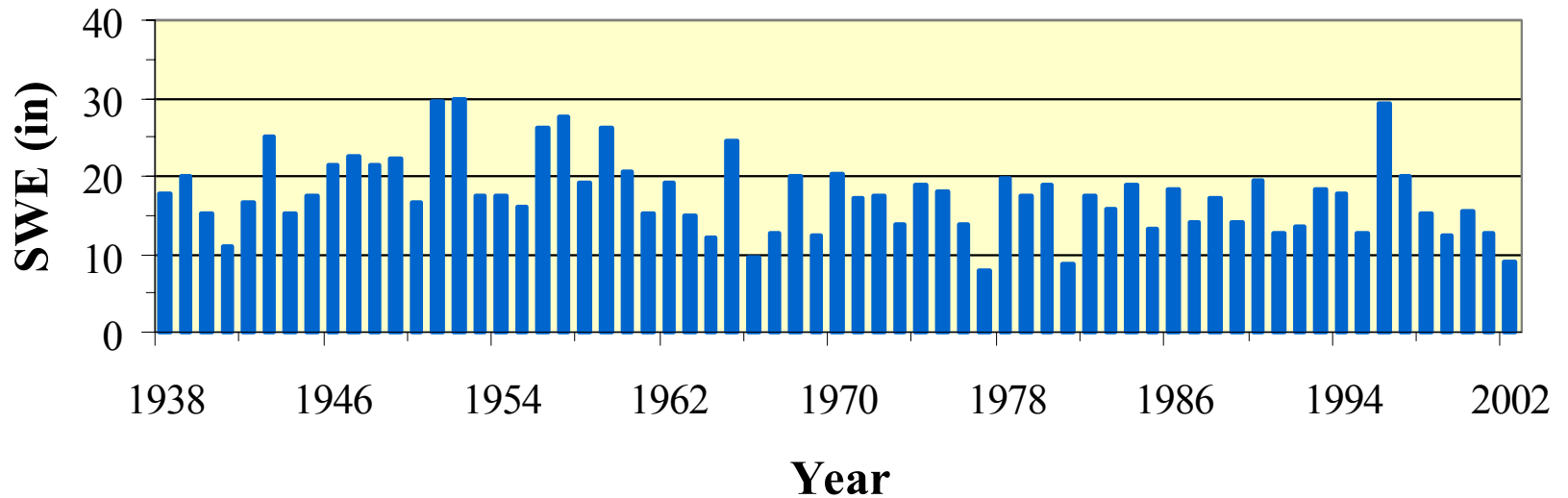
APRIL 1 SNOWPACK COLORADO STATEWIDE



# Snow Pack

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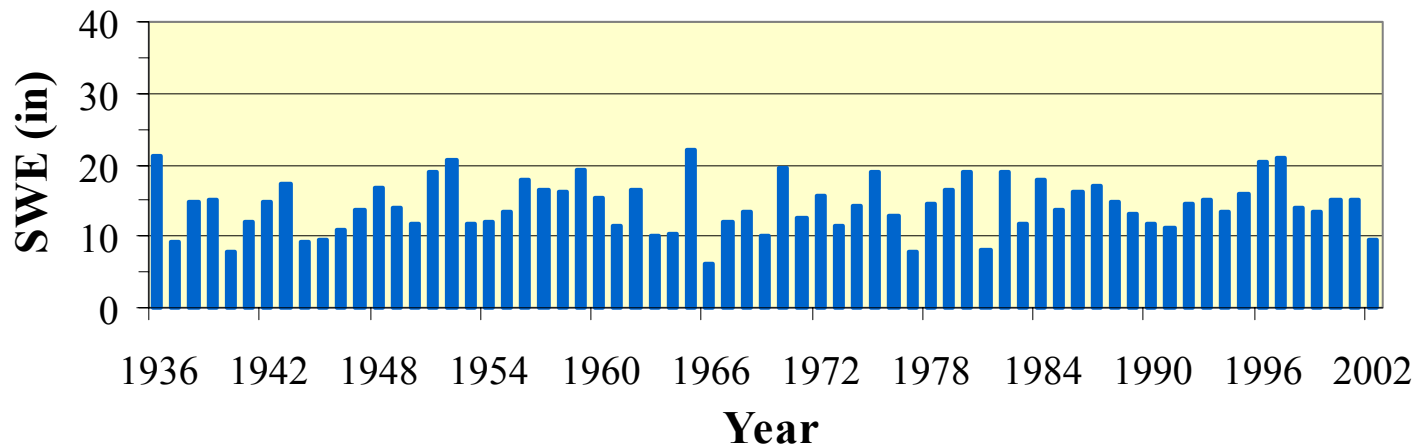
**April 1 Snow Water Equivalent (SWE)  
at University Camp - Elevation 10,300 feet**



# Snow Pack

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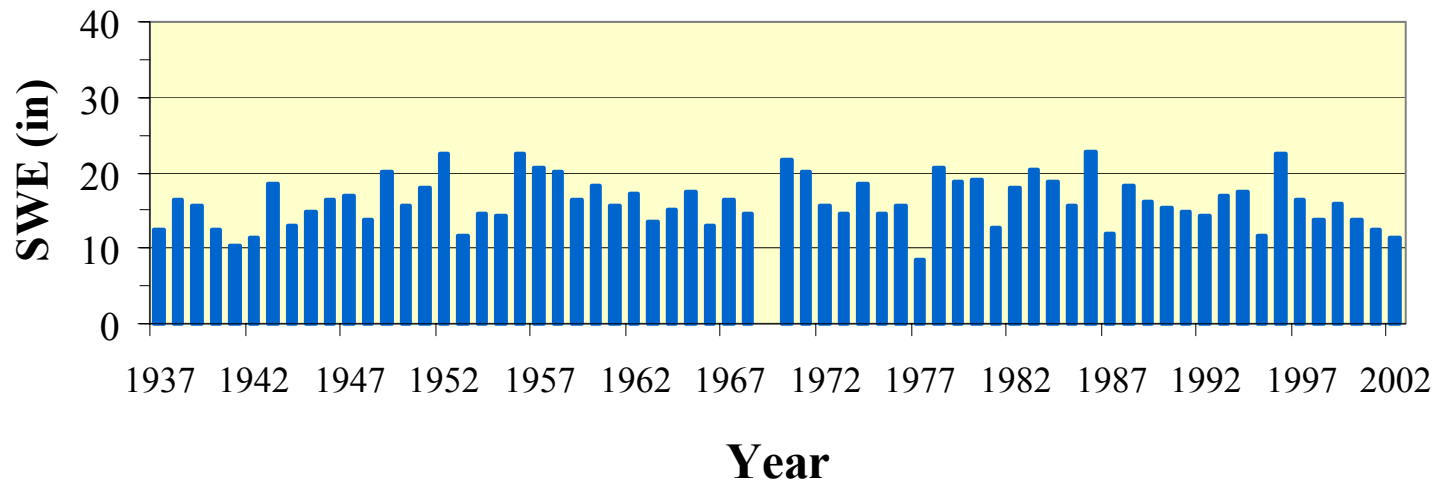
**April 1 Snow Water Equivalent (SWE)  
at Hoosier Pass - Elevation 11,400 feet**



# Snow Pack

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**April 1 Snow Water Equivalent (SWE)  
at Deadman Hill - Elevation 10,220 feet**



# Conclusions

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- Some evidence of warming over past century in most seasons, magnitude small to modest except in cities
- Warming most apparent at night and in/near Front Range Cities
- Data not as consistent as we would like
- Conclusions uncertain

# Conclusions

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- Precipitation highly variable
- Precipitation had been showing signs of increasing, until recent drought
- Not all sites show same trends

# Conclusions

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- Evaporation
  - Had shown signs of decreasing, until recent drought
- Cloudiness
  - Had shown signs of increasing, until recent drought period
  - Clearly we have more high cirrus clouds than 50 years ago – likely related to aircraft cirrus

# Conclusions

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- Snow pack
  - Also varies among observing sites; no obvious trends
- Indication of early snowmelt?
  - Still doing analysis – preliminary analysis shows no trend