Precipitation Patterns in South Park

Nolan J. Doesken, State Climatologist

Colorado Climate Center, Atmospheric Science Department, Colorado State University

Presented at South Park Symposium, August 3, 2007
Fairplay, Colorado

Colorado State University
Knowledge to Go Places

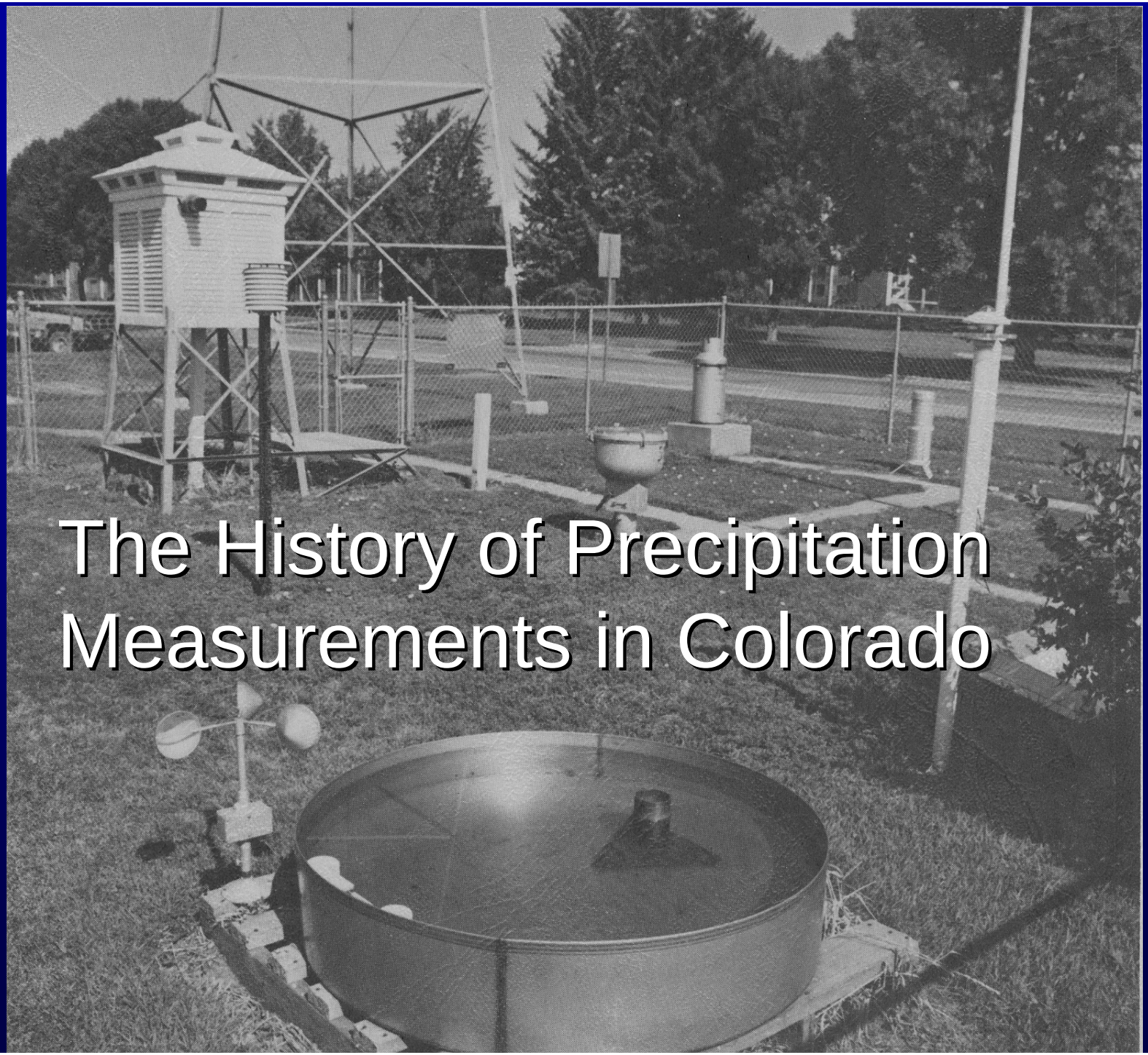
http://ccc.atmos.colostate.edu

Prepared by Odie Bliss

Why We Care About Precipitation?

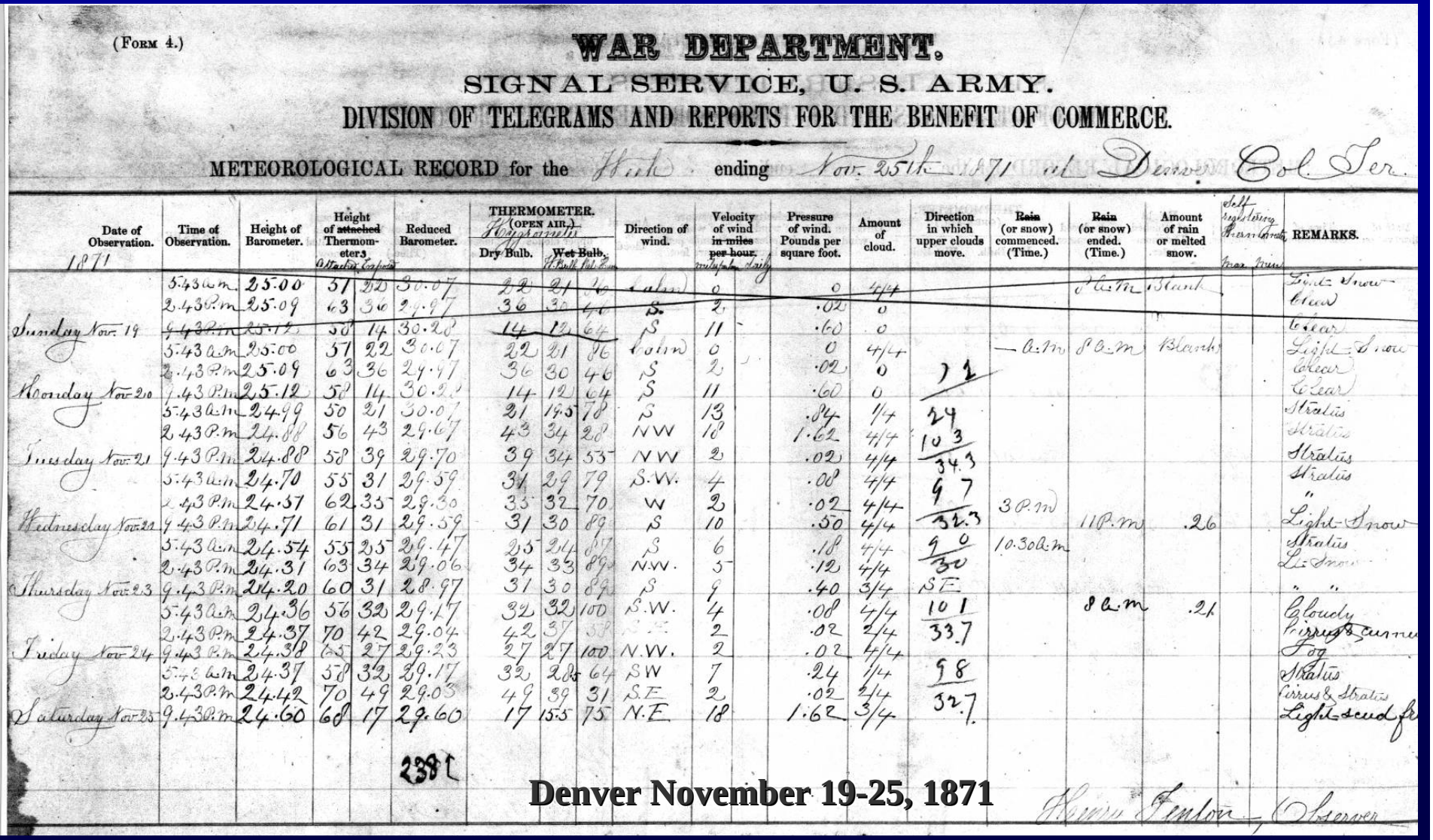
South Park – The Headwaters of the South Platte River

Precipitation in South Park and It's Role in Local History



The History of Precipitation Measurements in Colorado

First Denver observation form



(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.

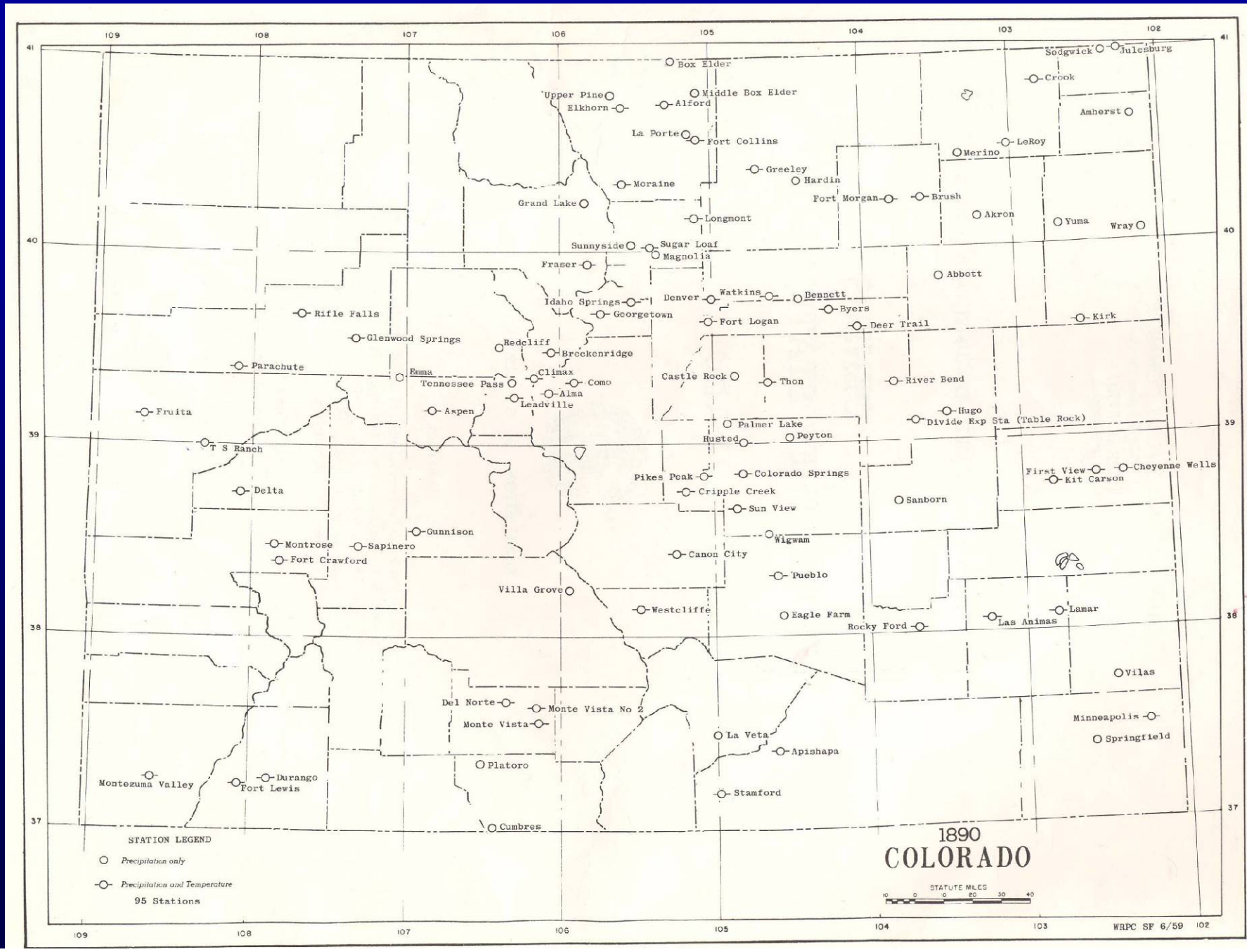
Date of Observation. 1871	Time of Observation.	Height of Barometer.	Height of attached Thermometers (Attached to Capsule)	Reduced Barometer.	THERMOMETER. (OPEN AIR.) Hygrometer Dry Bulb.	Wet Bulb. (Wet Bulb Col. 2 m)		Direction of wind.	Velocity of wind in miles per hour. (multiply by daily)	Pressure 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 Thermometers. Lowest. Highest.	REMARKS.
	5.43 a.m	25.00	37	22	30.07	22	21	96	Calm	0		0	4/4			8 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	37	22	30.07	22	21	96	Calm	0		0	4/4						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						Clear
	5.43 a.m	24.99	50	21	30.07	21	19.5	78	S	13		.84	1/4						Stratus
	2.43 P.m	24.88	56	43	29.67	43	34	28	NW	10		1.62	4/4						Stratus
Tuesday Nov. 21	9.43 P.m	24.88	58	39	29.70	39	34	53	NW	2		.02	4/4						Stratus
	5.43 a.m	24.70	55	31	29.59	31	29	79	S.W.	4		.08	4/4						Stratus
	2.43 P.m	24.37	62	35	29.30	35	32	70	W	2		.02	4/4						"
Wednesday Nov. 22	9.43 P.m	24.71	61	31	29.59	31	30	89	S	10		.50	4/4		3 P.m	11 P.m	.26		Light Snow
	5.43 a.m	24.54	55	25	29.47	25	24	87	S	6		.18	4/4						Stratus
	2.43 P.m	24.31	63	34	29.06	34	33	89	N.W.	5		.12	4/4		10.30 a.m				Le Snow
Thursday Nov. 23	9.43 P.m	24.20	60	31	28.97	31	30	89	S	9		.40	3/4						" "
	5.43 a.m	24.36	56	32	29.17	32	32	100	S.W.	4		.08	4/4			8 a.m	.21		Cloudy
	2.43 P.m	24.37	70	42	29.04	42	37	58	[illegible]	2		.02	2/4						Drizzle & Snow
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	38	32	29.17	32	28	64	SW	7		.24	1/4						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						Light scud fr

238 [illegible]

Henry Fenton Observer

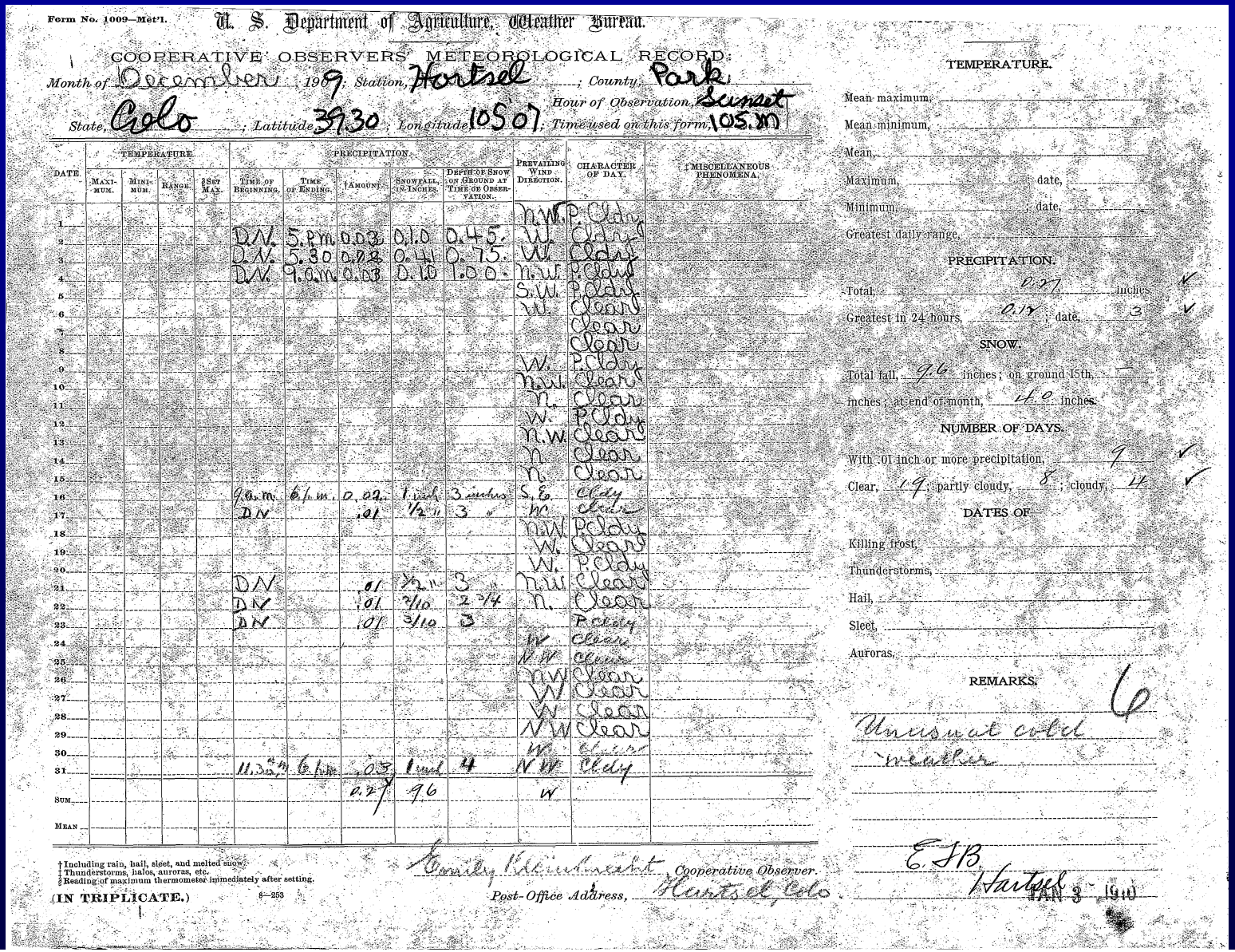
Denver November 19-25, 1871

Colorado Weather Stations in 1890



Hartsel, December 1909

First South Park Cooperative observation form



Form No. 1009—Met'l. U. S. Department of Agriculture, Weather Bureau.

COOPERATIVE OBSERVERS' METEOROLOGICAL RECORD.

Month of December 1909. Station, Hartsel; County, Park.
State, Colo.; Latitude 39 30; Longitude 105 07; Hour of Observation, Sunset; Time used on this form, 105.M

DATE	TEMPERATURE. Maximum.	Minimum.	Range.	‡See Max.	PRECIPITATION. Time of Beginning.	Time of Ending.	†Amount.	Snowfall, in Inches.	Depth of Snow on Ground at Time of Observation.	Prevailing Wind Direction.	Character of Day.	Miscellaneous Phenomena.
1										N.W.	P. Cldy	
2					D.N.	5 P.m.	0.03	0.10	0.45.	W.	Clear	
3					D.N.	5.30	0.02	0.41	0. 15.	W.	Cldy	
4					D.N.	9 a.m.	0.03	0.10	1.00.	N.W.	P.Cldy	
5										S.W.	P.Cldy	
6										W.	Clear	
7											Clear	
8											Clear	
9										W.	P.Cldy	
10										N.W.	Clear	
11										N.	Clear	
12										W.	P.Cldy	
13										N.W.	Clear	
14										N.	Clear	
15										N.	Clear	
16					9 a.m.	6 p.m.	0.02.	1 inch	3 inches	S.E.	Cldy	
17					D.N.		.01	1/2 "	3 "	N.	Clear	
18										N.W.	P.Cldy	
19										W.	Clear	
20										W.	P.Cldy	
21					D.N.		.01	1/2 "	3 "	N.W.	Clear	
22					D.N.		.01	2/10	2 3/4	N.	Clear	
23					D.N.		.01	3/10	3		Cldy	
24										W.	Clear	
25										N.W.	Clear	
26										N.W.	Clear	
27										W.	Clear	
28										W.	Clear	
29										N.W.	Clear	
30										W.	Clear	
31					11.30 a.m.	6 p.m.	.03	1 inch	4	N.W.	Cldy	
SUM							0.27	9.6		W.		
MEAN												

†Including rain, hail, sleet, and melted snow.
‡Thunderstorms, halos, auroras, etc.
§Reading of maximum thermometer immediately after setting.

(IN TRIPLICATE.) 8—253

Emily Kleinhardt Cooperative Observer.
Post-Office Address, Hartsel, Colo.

TEMPERATURE.

Mean maximum,
Mean minimum,
Mean,
Maximum, date,
Minimum, date,
Greatest daily range,

PRECIPITATION.

Total, 0.27 inches. ✓
Greatest in 24 hours, 0.17; date, 3 ✓

SNOW.

Total fall, 9.6 inches; on ground 15th, — inches; at end of month, 10.0 inches.

NUMBER OF DAYS.

With .01 inch or more precipitation, 9 ✓
Clear, 19; partly cloudy, 8; cloudy, 4 ✓

DATES OF

Killing frost,
Thunderstorms,
Hail,
Sleet,
Auroras,

REMARKS.

6

Unusual cold weather

E. J. B.

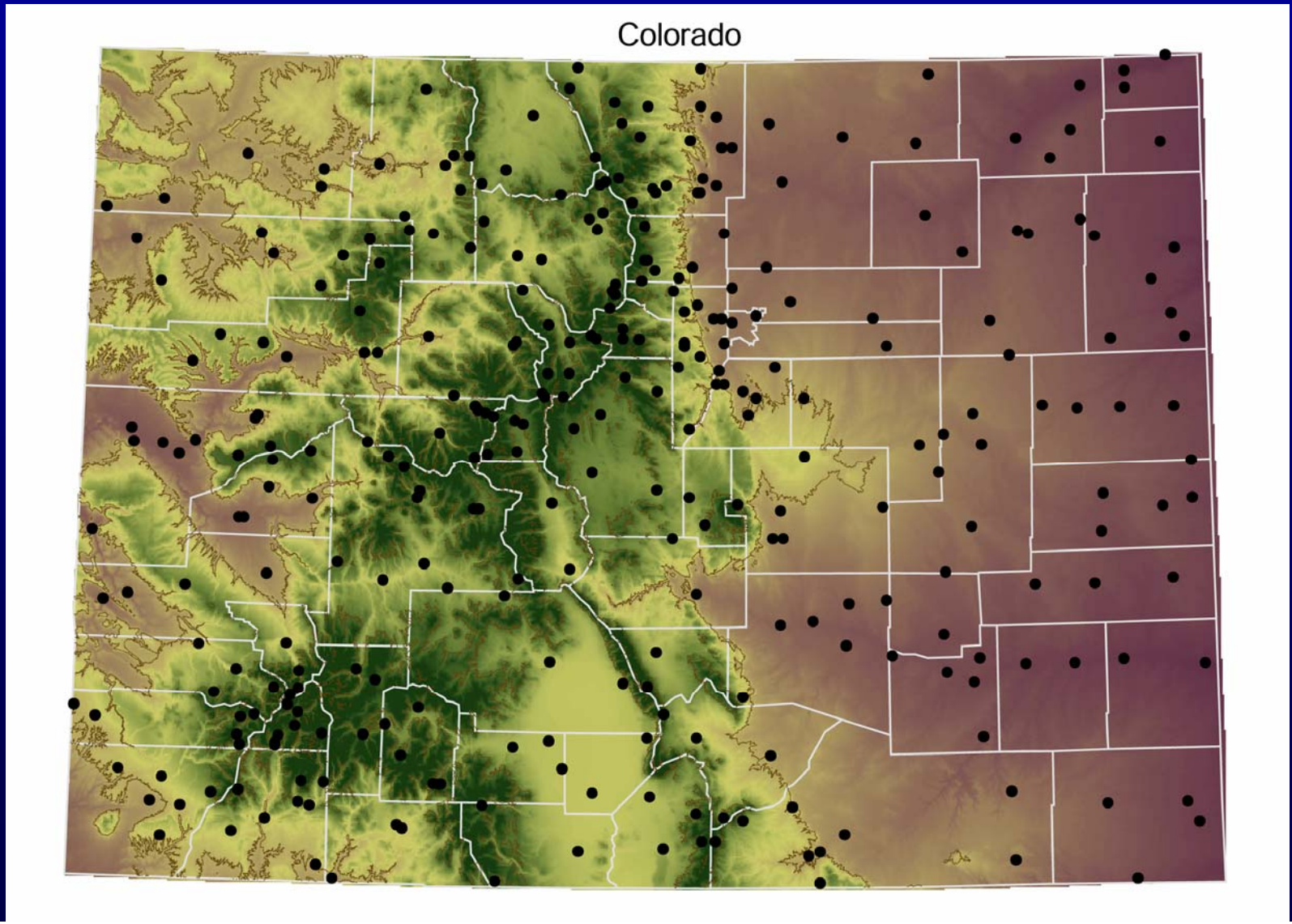
Hartsel JAN 3 1910

National Weather Service Cooperative Network

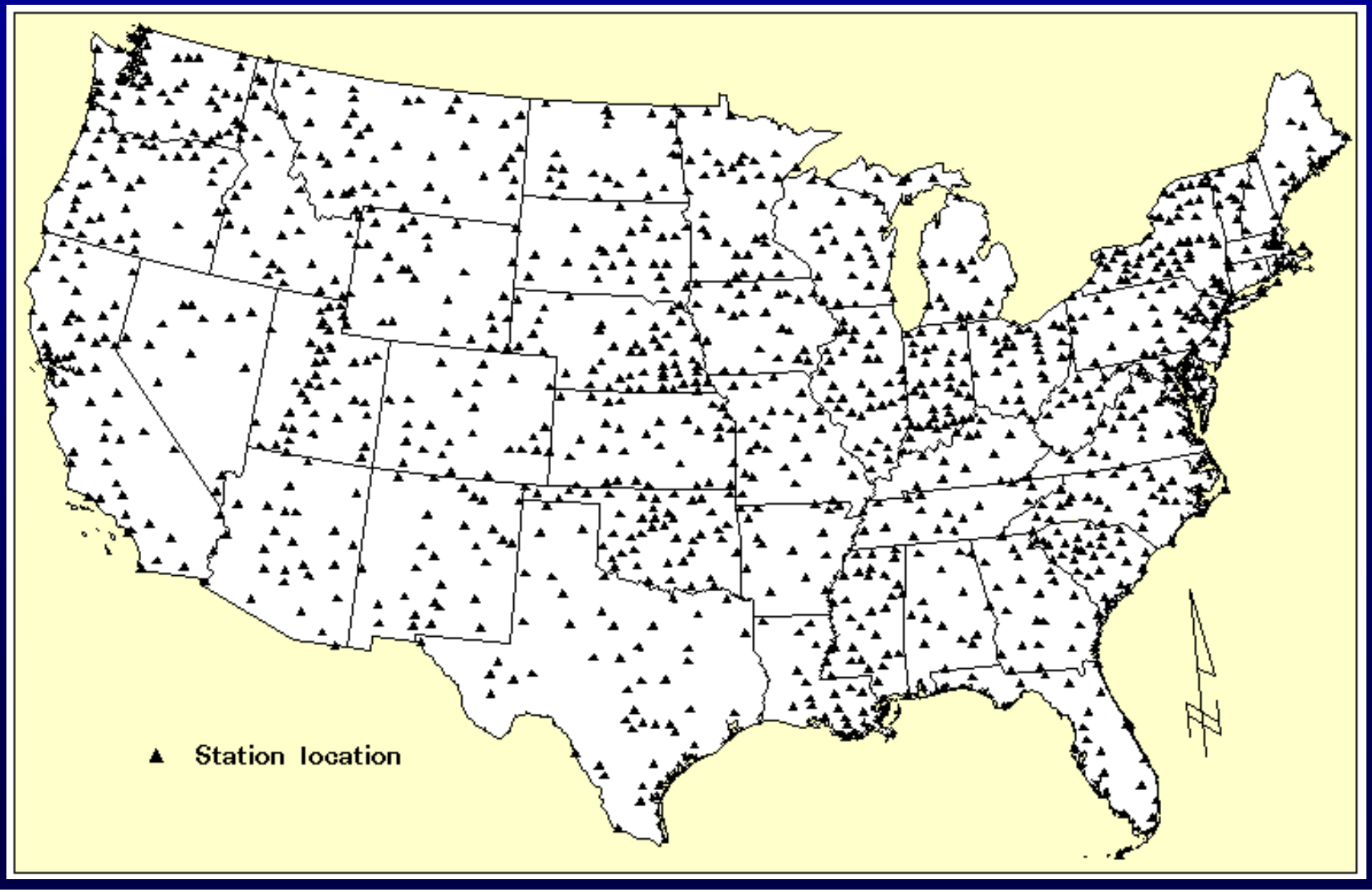
From Kelly Redmond, WRCC

Approximately 5000 daily max/min temperature stations, 8000 daily precipitation stations, 3000 automated hourly precipitation stations.

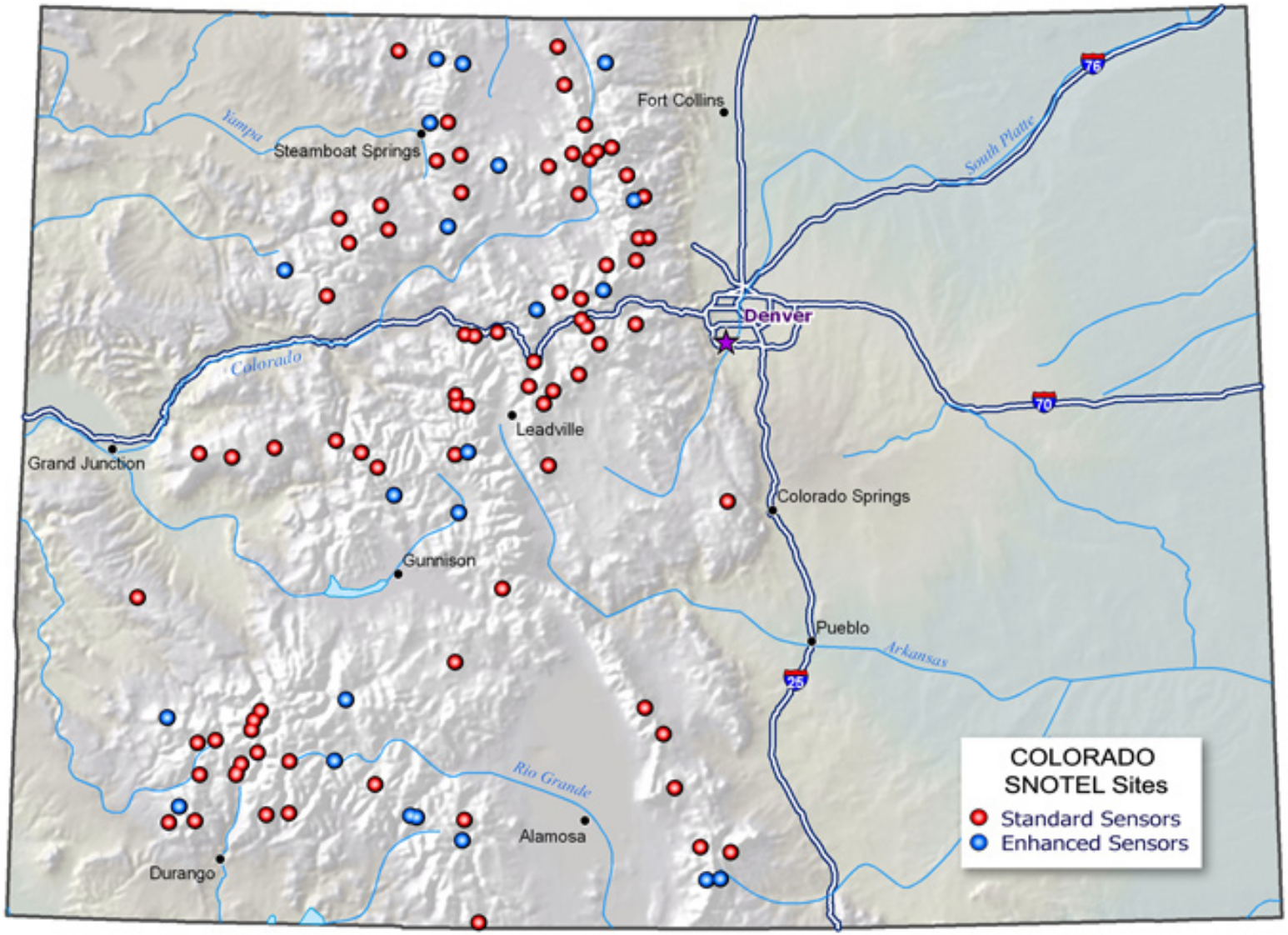
National Weather Service Cooperative Stations



Historical Cooperative Network (HCN) stations



Colorado SNOTEL Sites



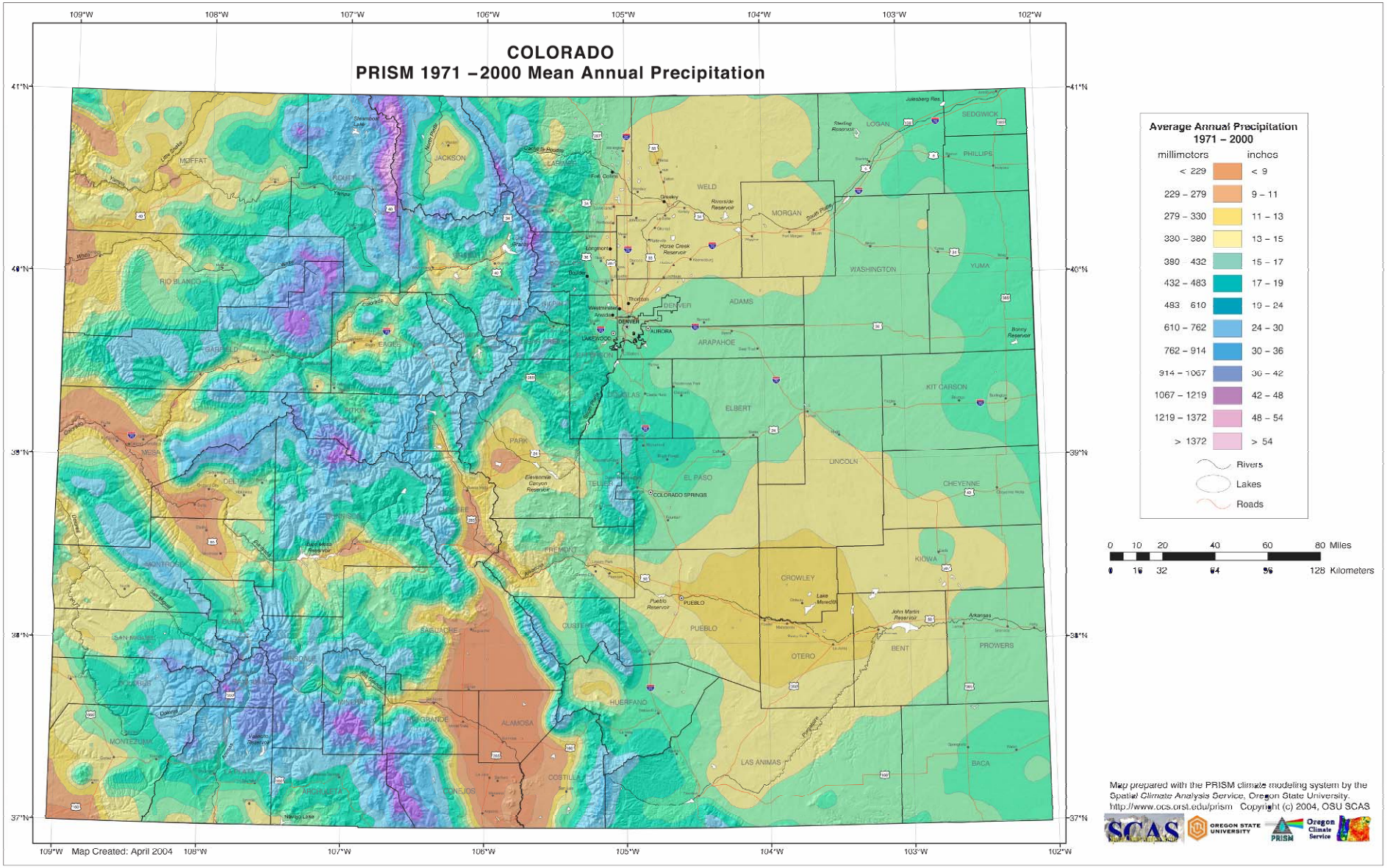
Colorado Precipitation Patterns

- (show first Colorado Average Annual Precip map) -- there was one in an old book that showed precip estimates in the 1800s but I have no idea where to tell you to find that

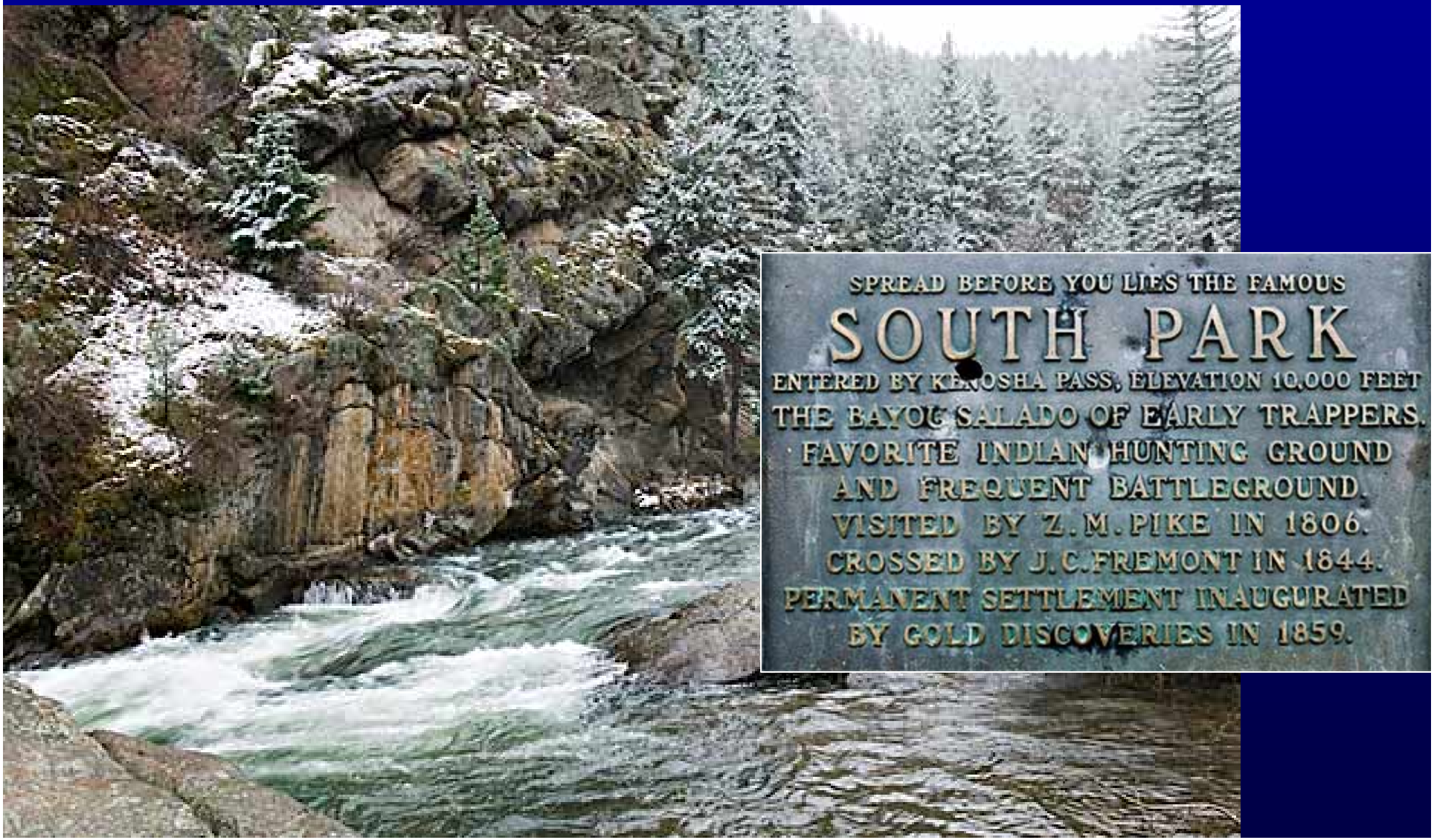
Colorado average annual precipitation map

- (show the one that Scott Archer gave us -- it was framed, I believe -- 1920s??

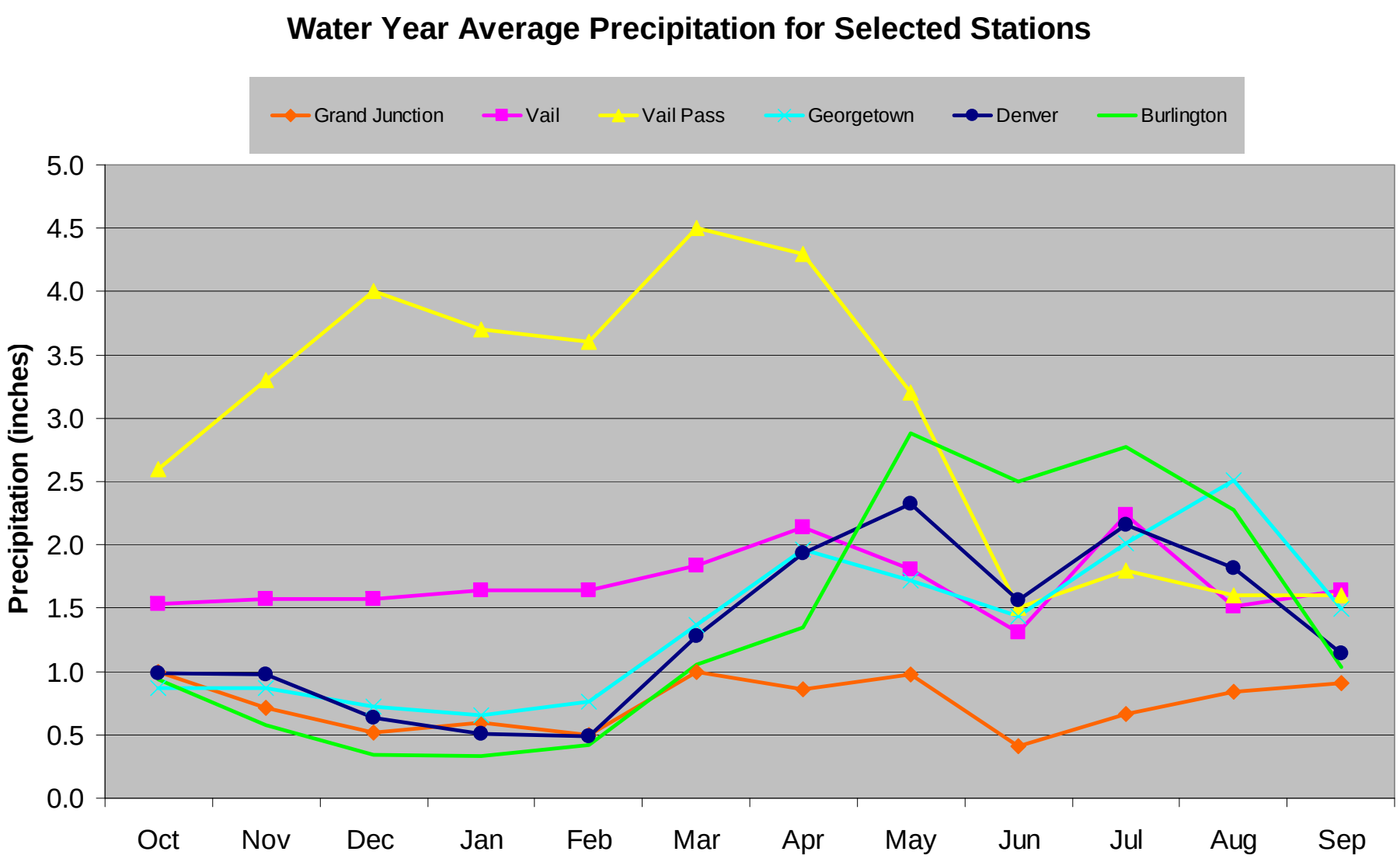
Colorado Average Annual Precipitation



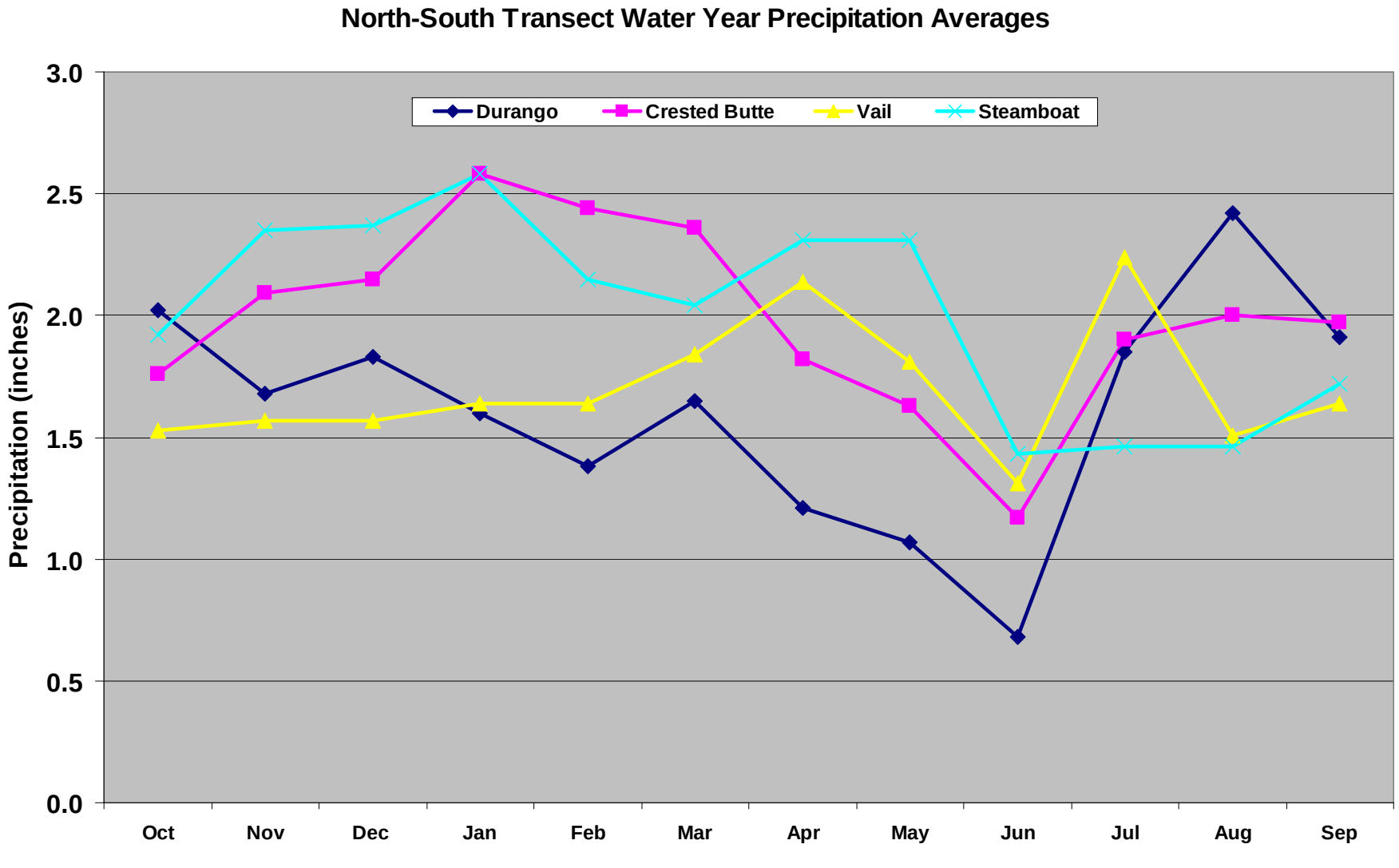
Precipitation In Colorado – and Where South Park Fits In



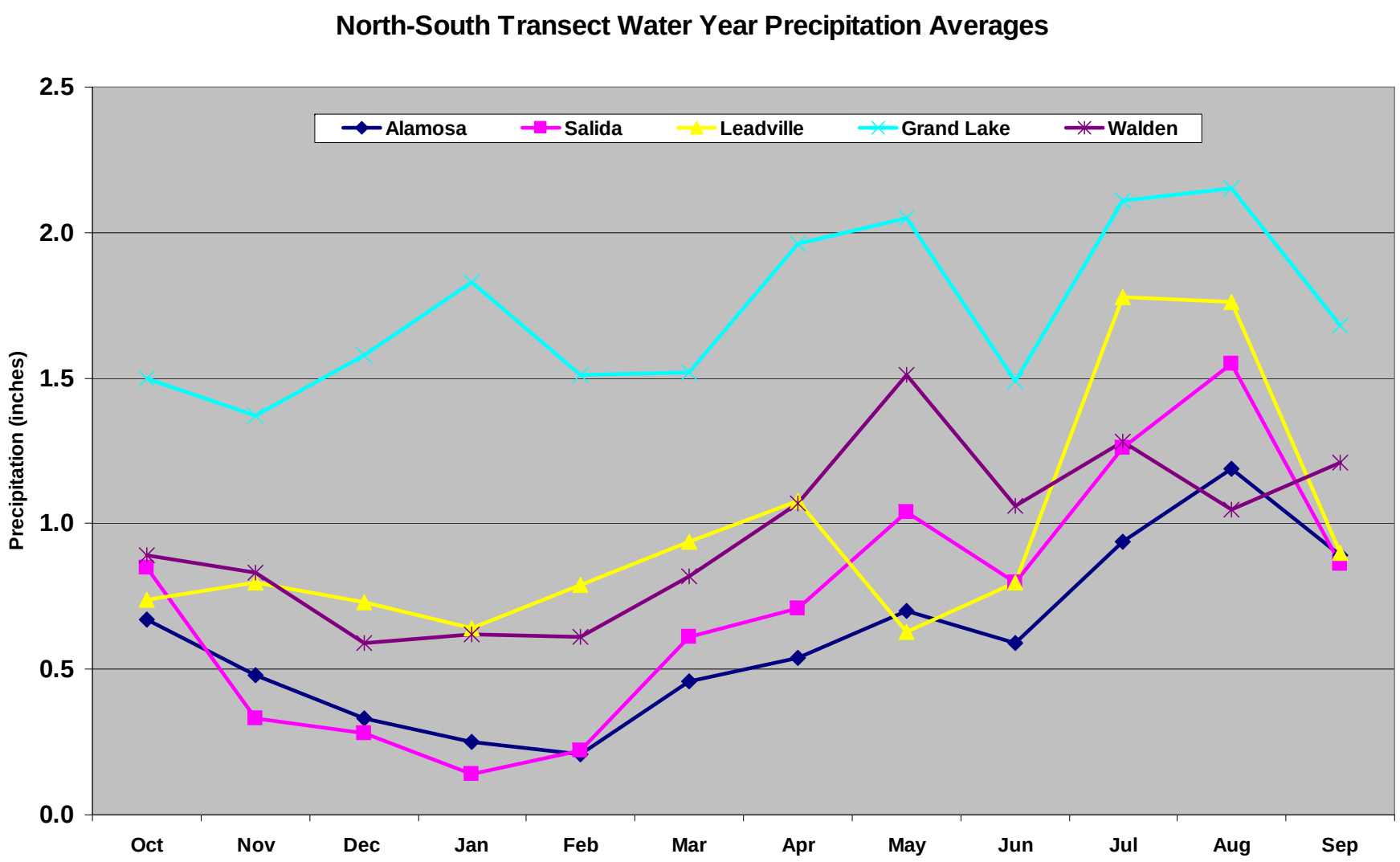
Seasonal Patterns of Precipitation – I-70 Transect



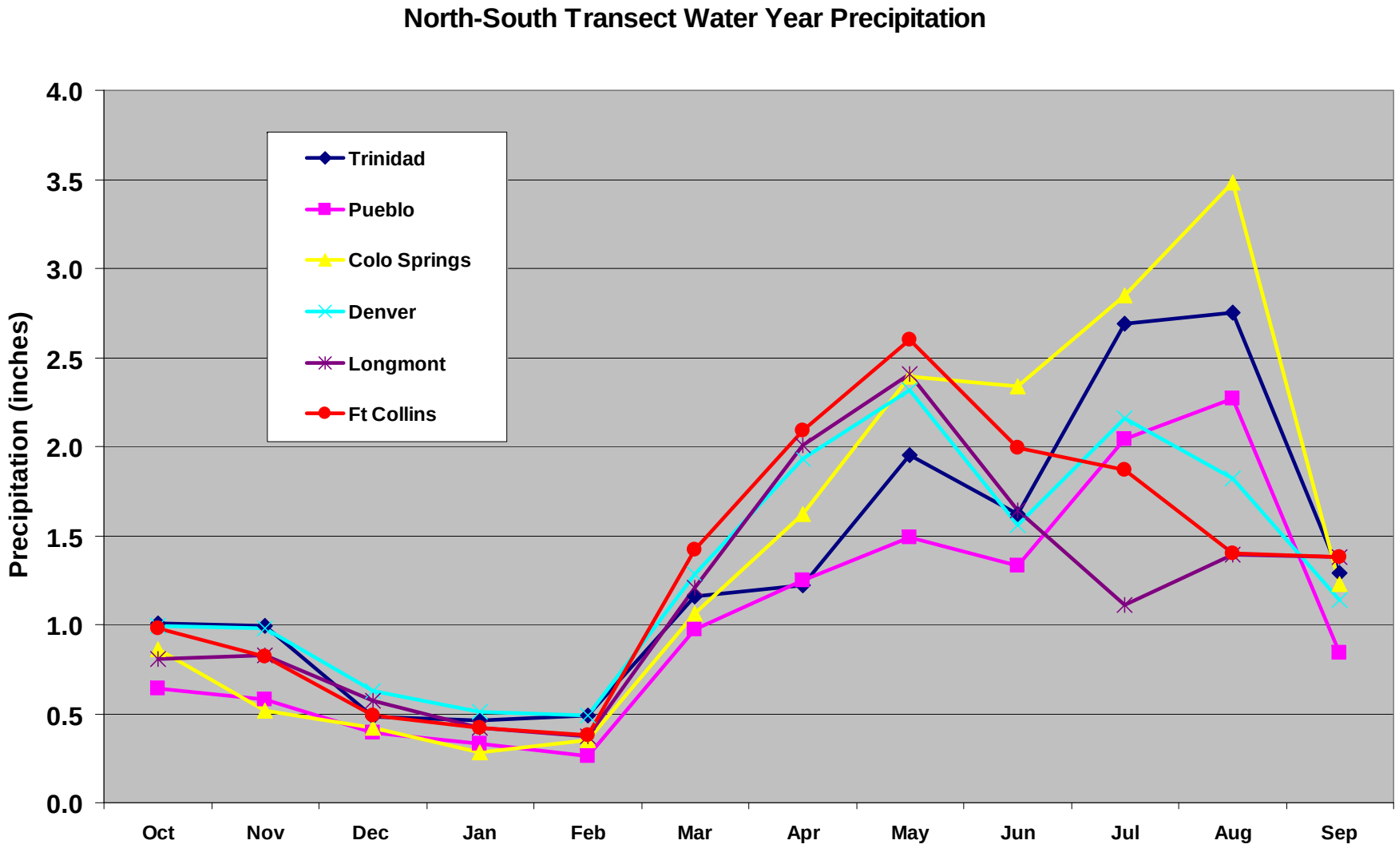
North-South Transect – Durango, Crested Butte, Vail and Steamboat



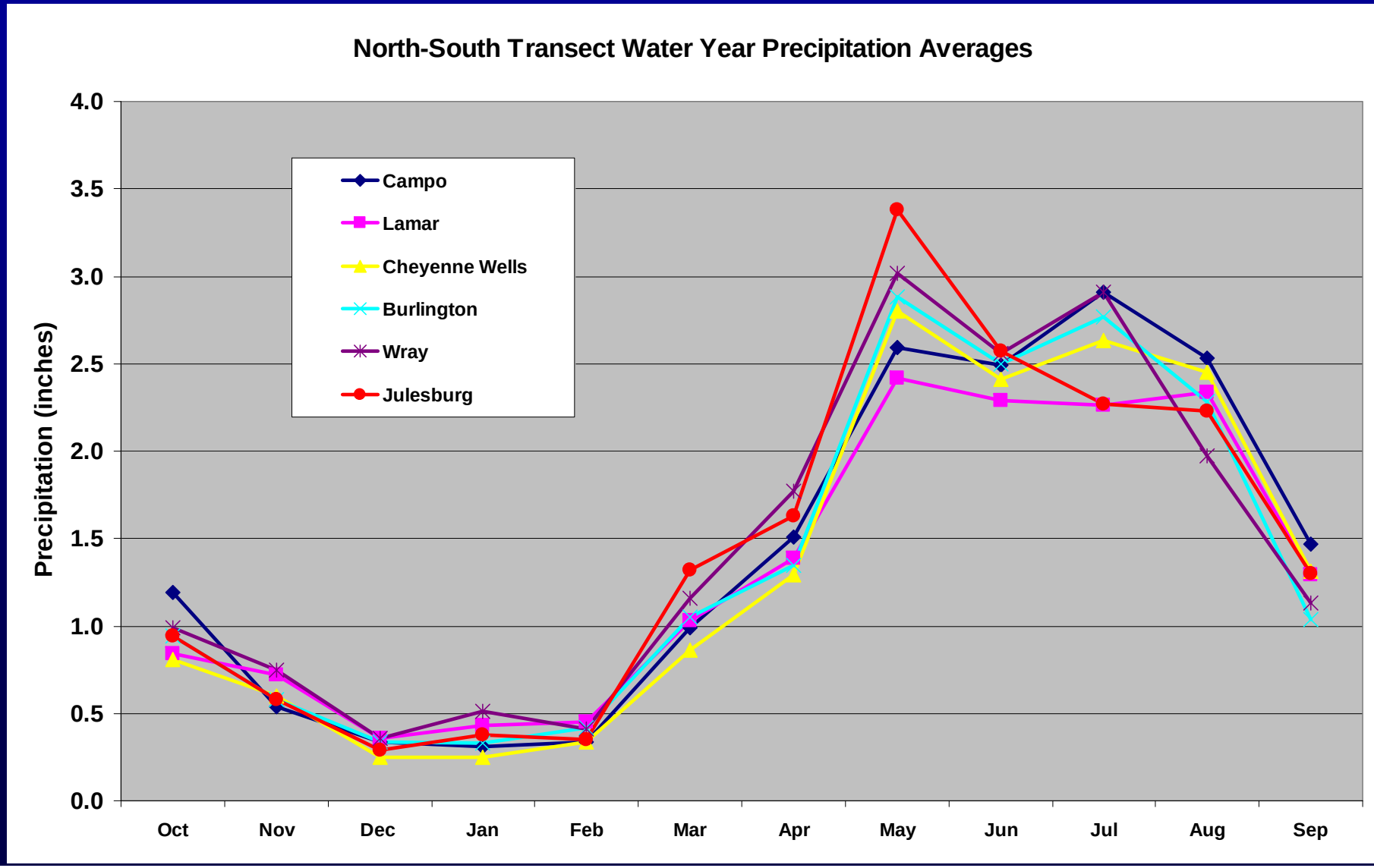
North-South Transect – Alamosa, Salida, Leadville, Grand Lake, Walden



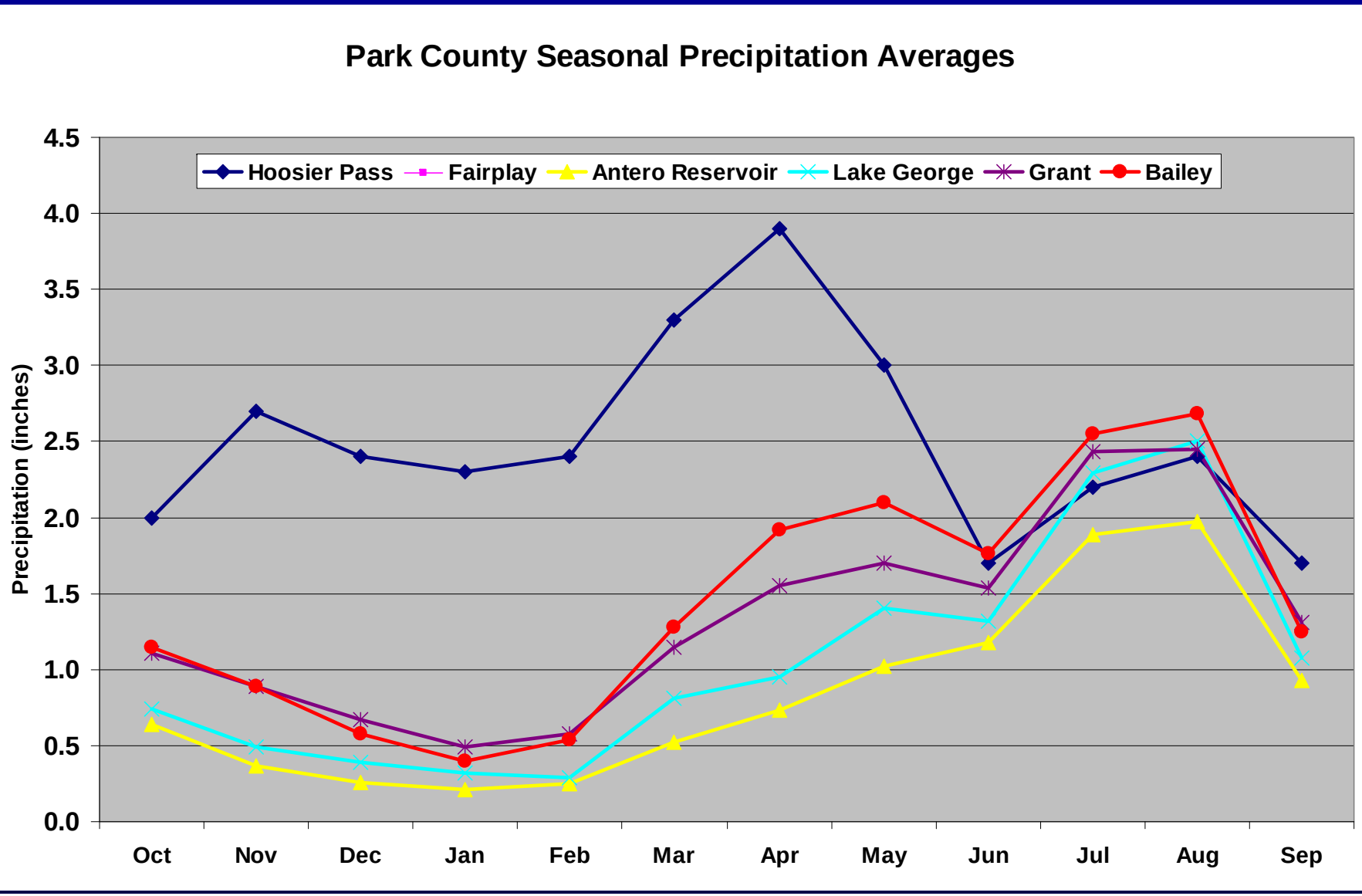
North-South Transect – Trindad, Pueblo, Colorado Springs, Denver, Longmont, Ft. Collins



North-South Transect – Campo, Lamar, Cheyenne Wells, Burlington, Wray, Julesburg

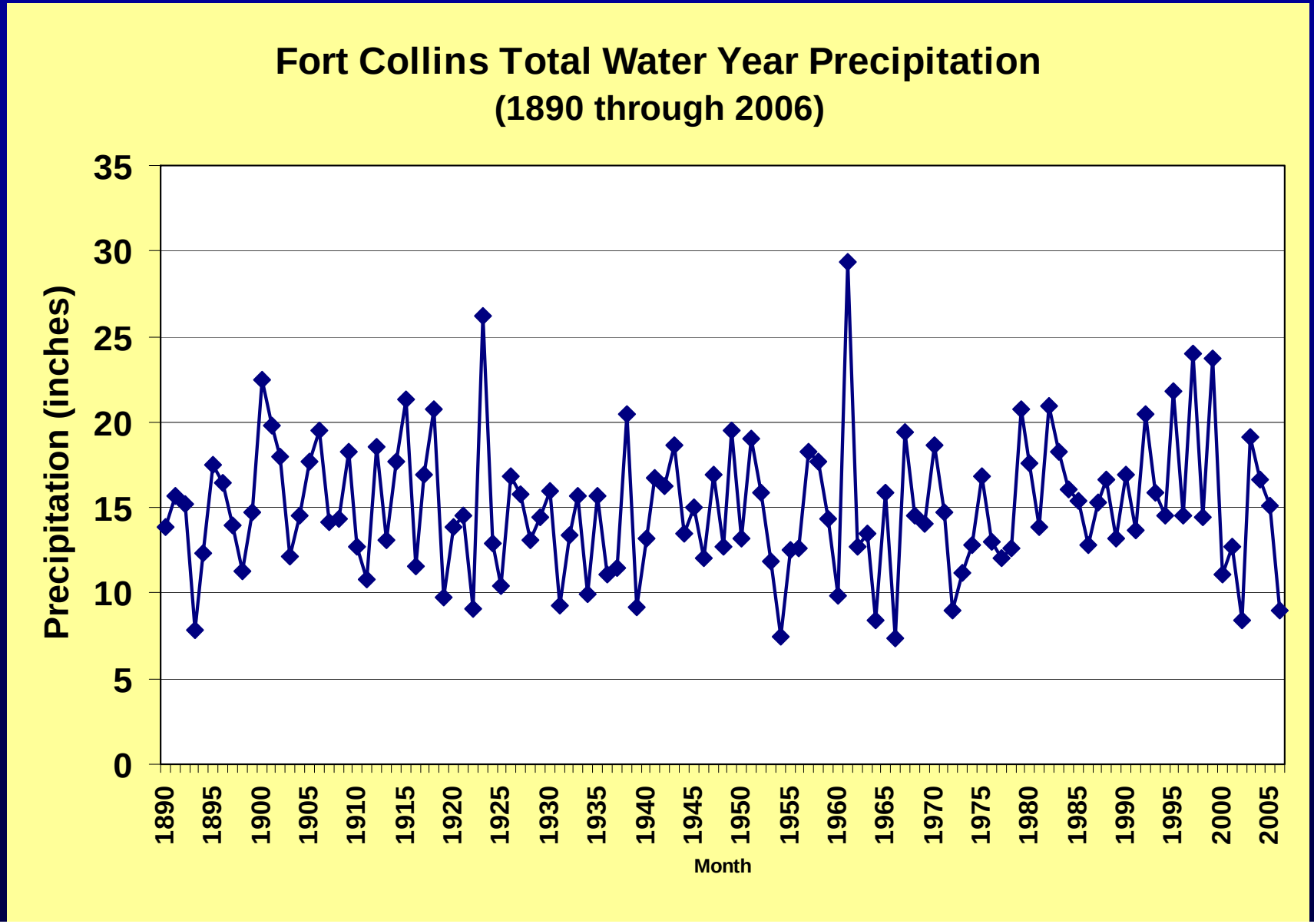


Park County Seasonal Precipitation Patterns (Water Year)

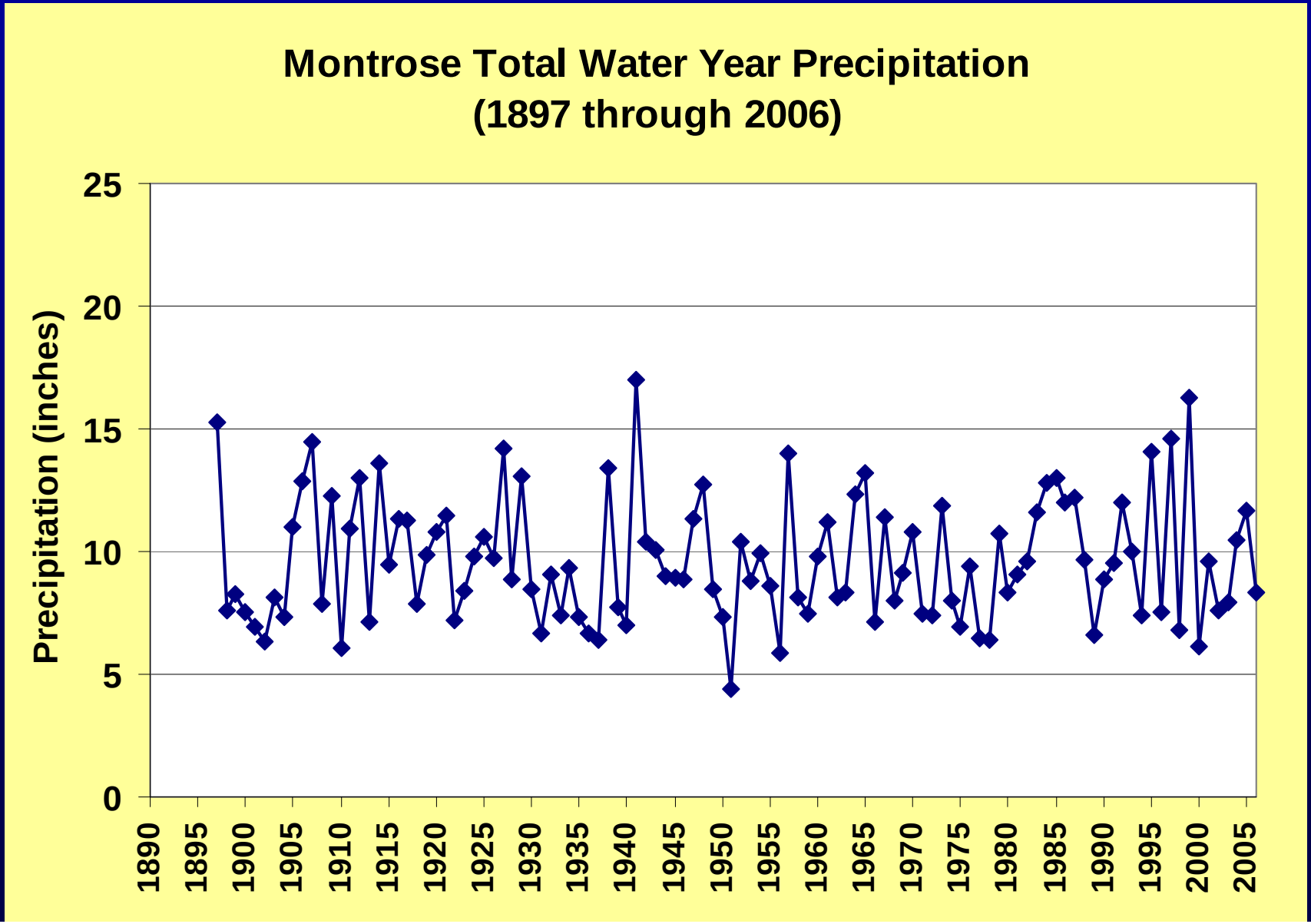



Variations Over Time

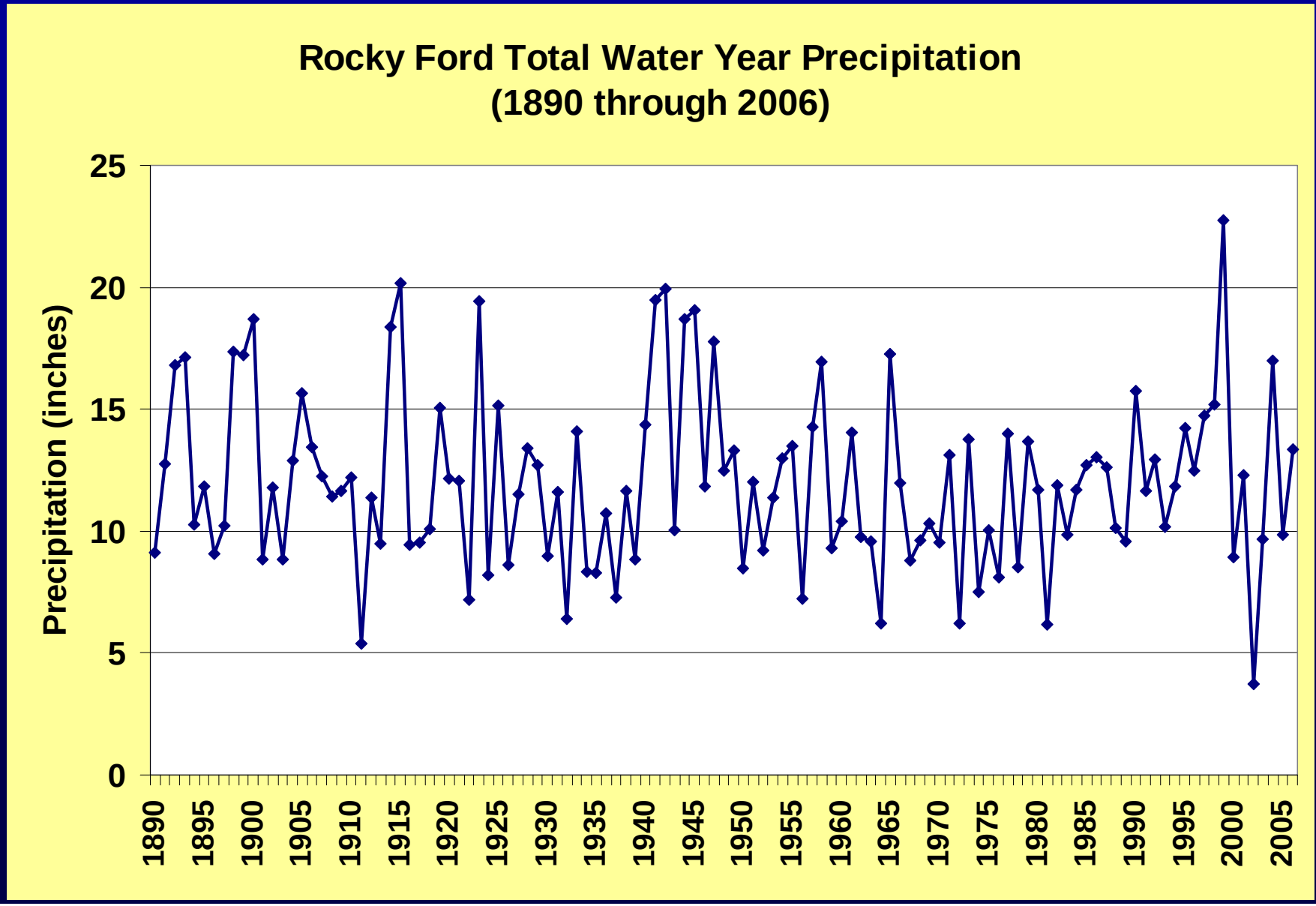
Fort Collins Water Year Precipitation



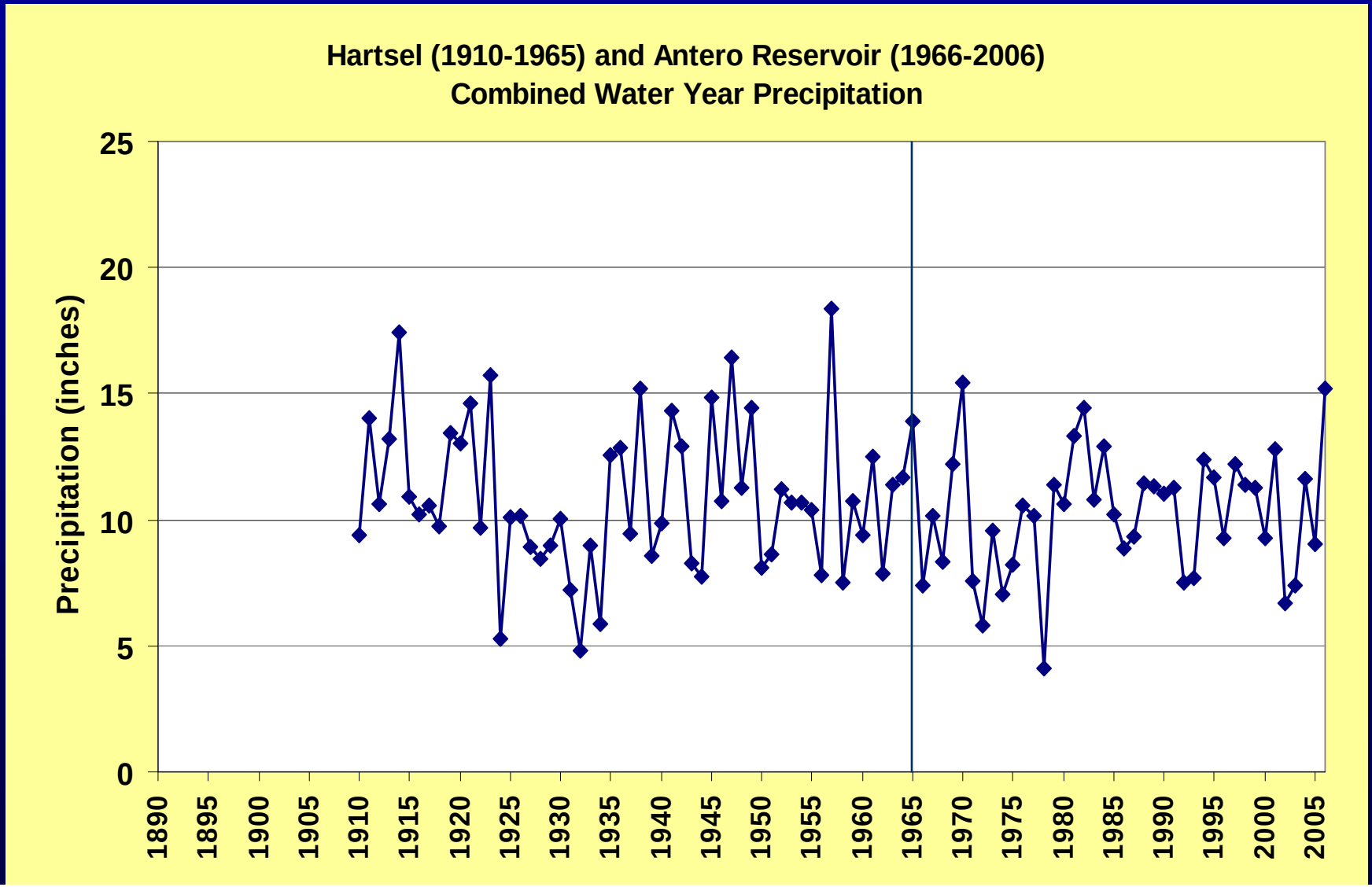
Montrose Water Year Precipitation



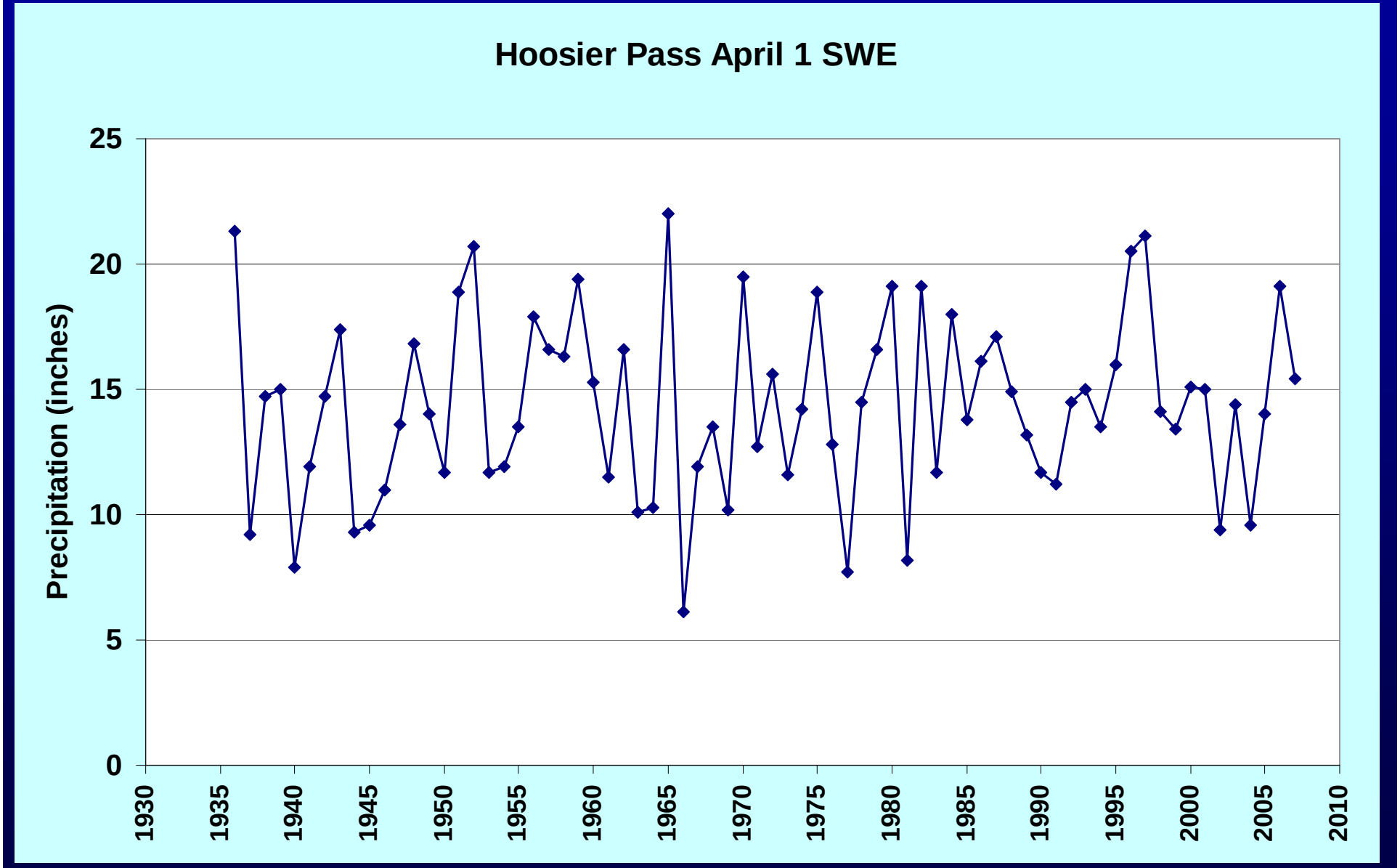
Rocky Ford Water Year Precipitation



Hartsel and Antero Reservoir Water Year Precipitation

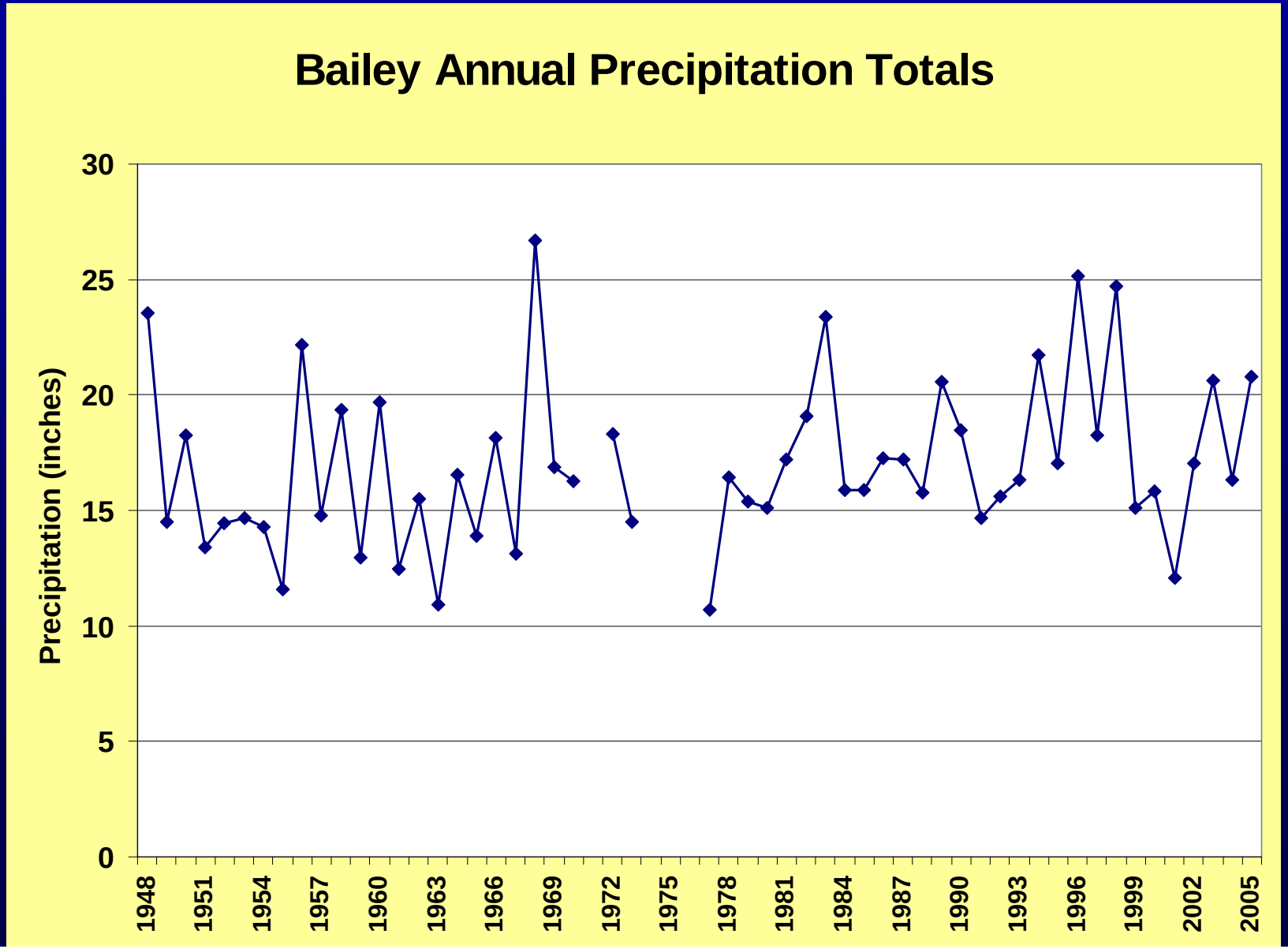


Hoosier Pass April 1 Snowpack

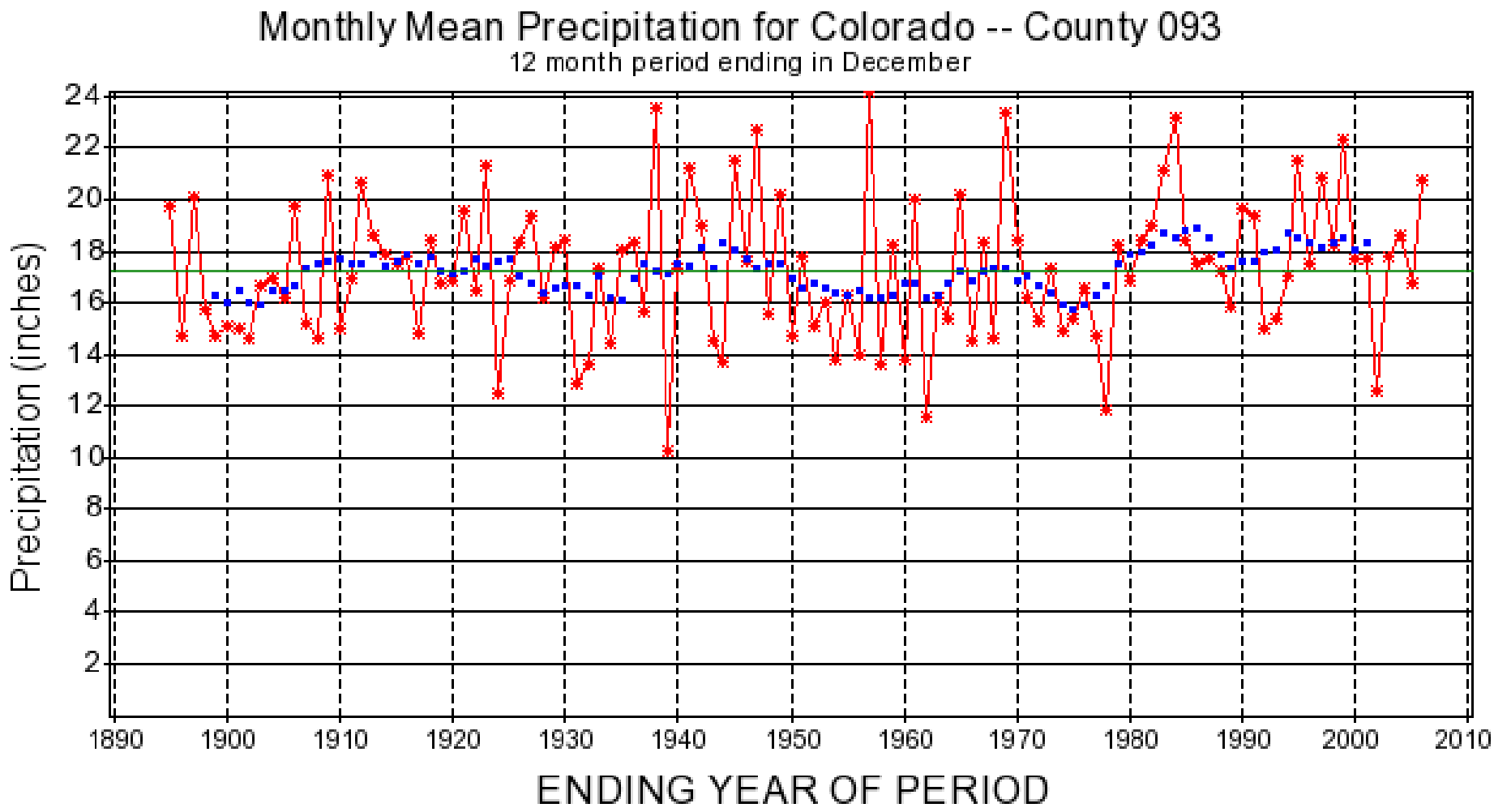


Grant

Bailey Annual Precipitation



Park County Mean Precipitation

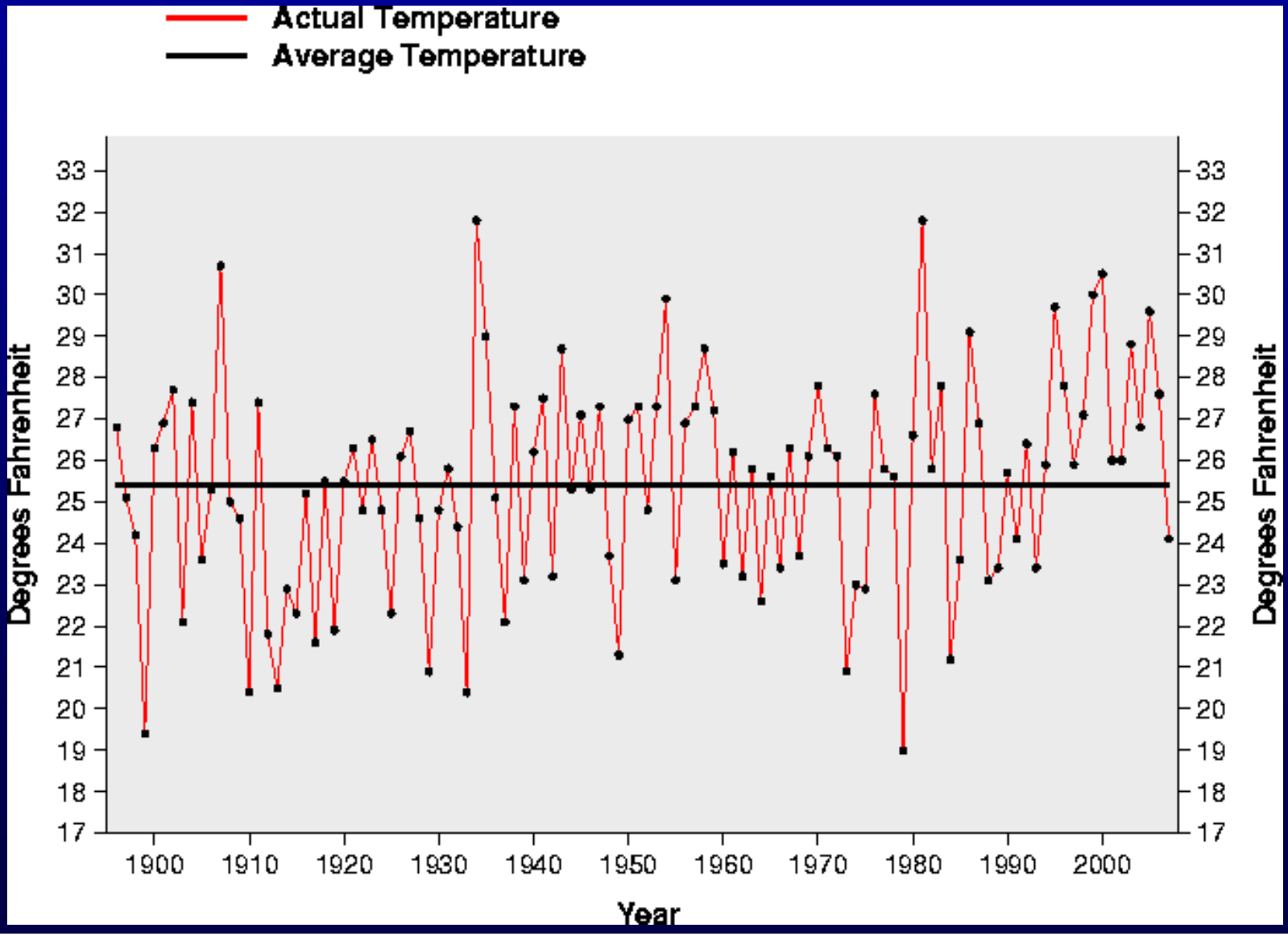


Westmap at http://www.wrcc.dri.edu

What About Temperature?

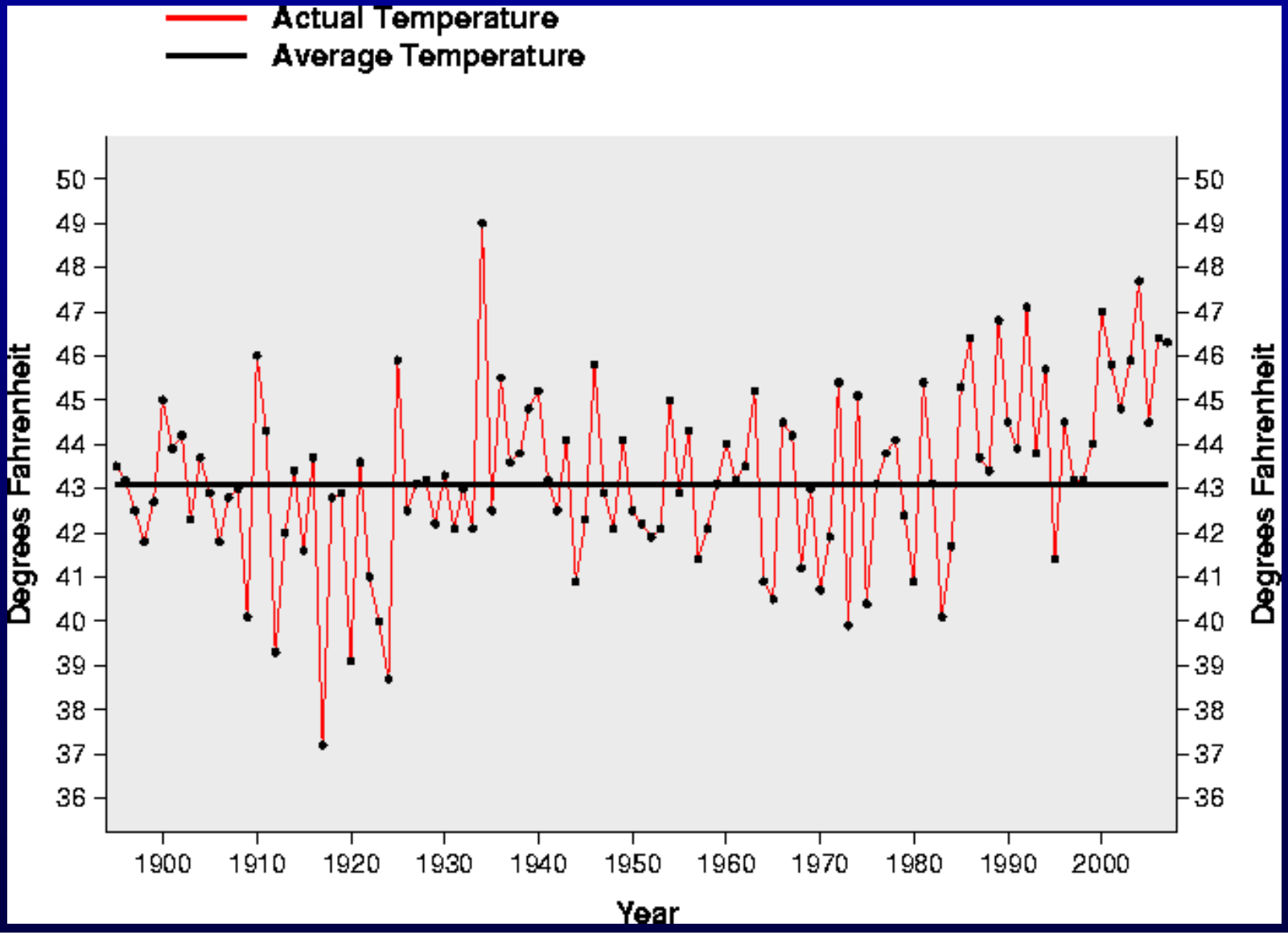
Colorado Statewide

Winter (Dec-Feb) Average Temperatures



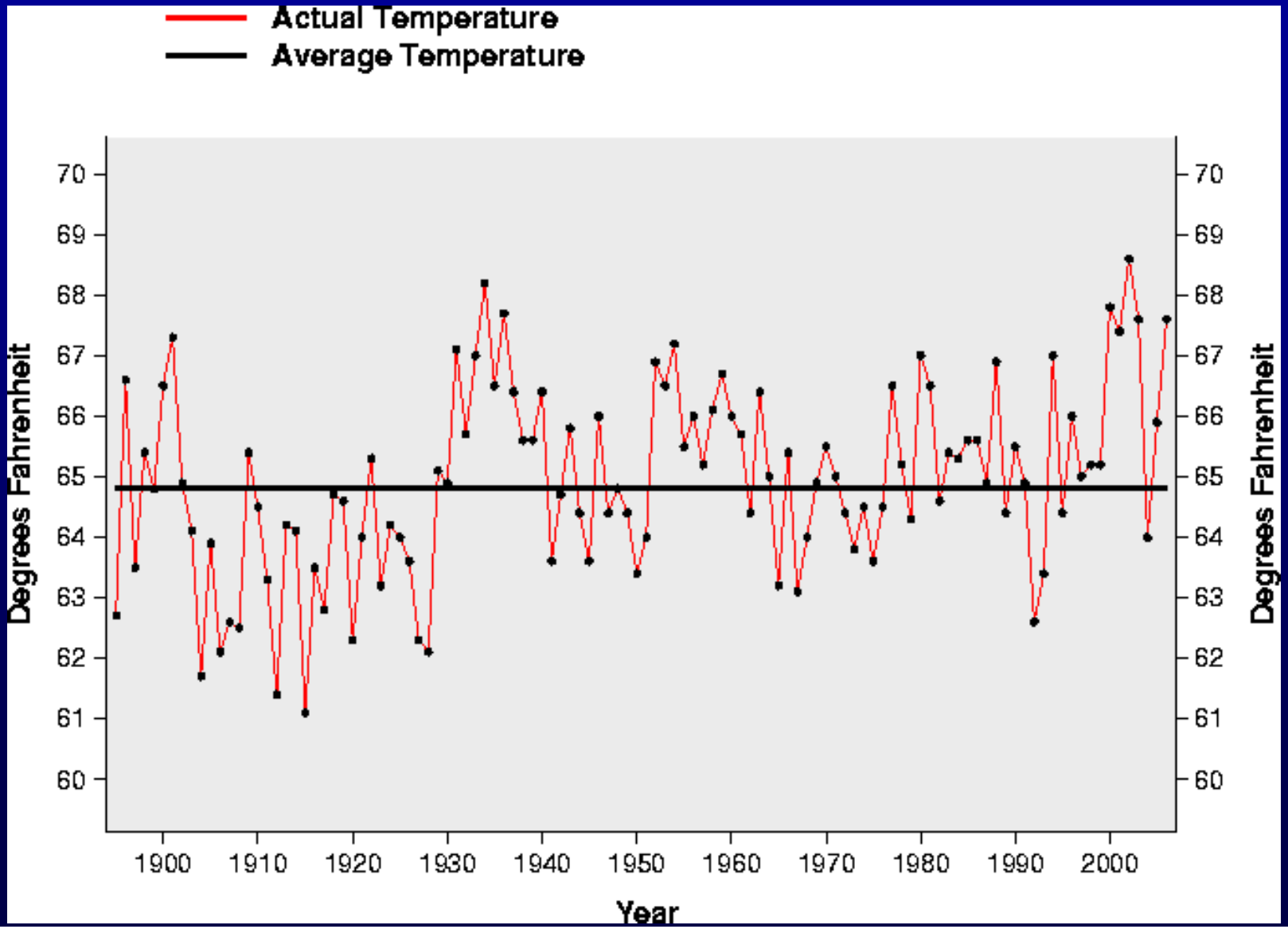
Colorado Statewide

Spring (Mar-May) Average Temperatures



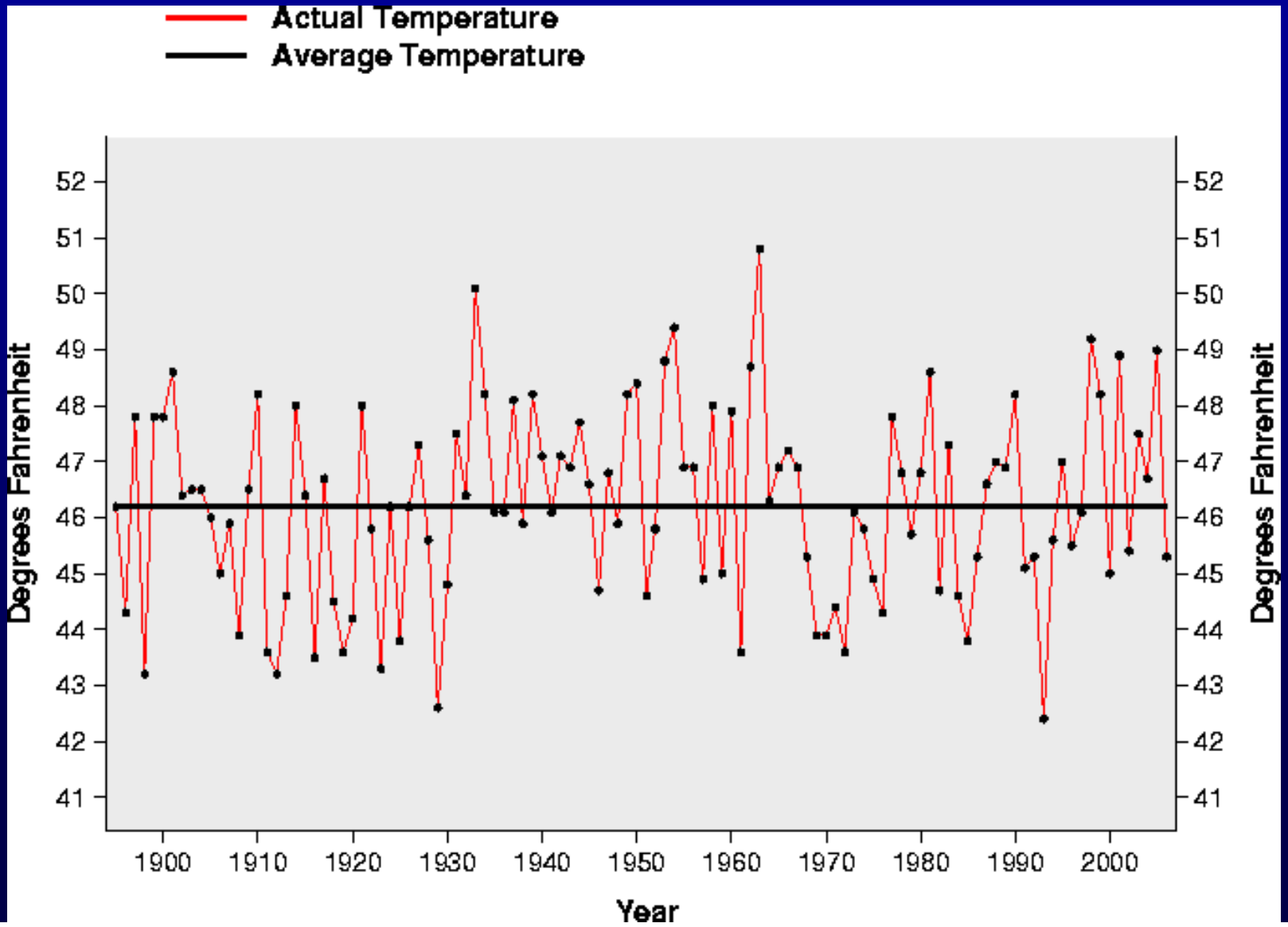
Colorado Statewide

Summer (Jun-Aug) Average Temperatures

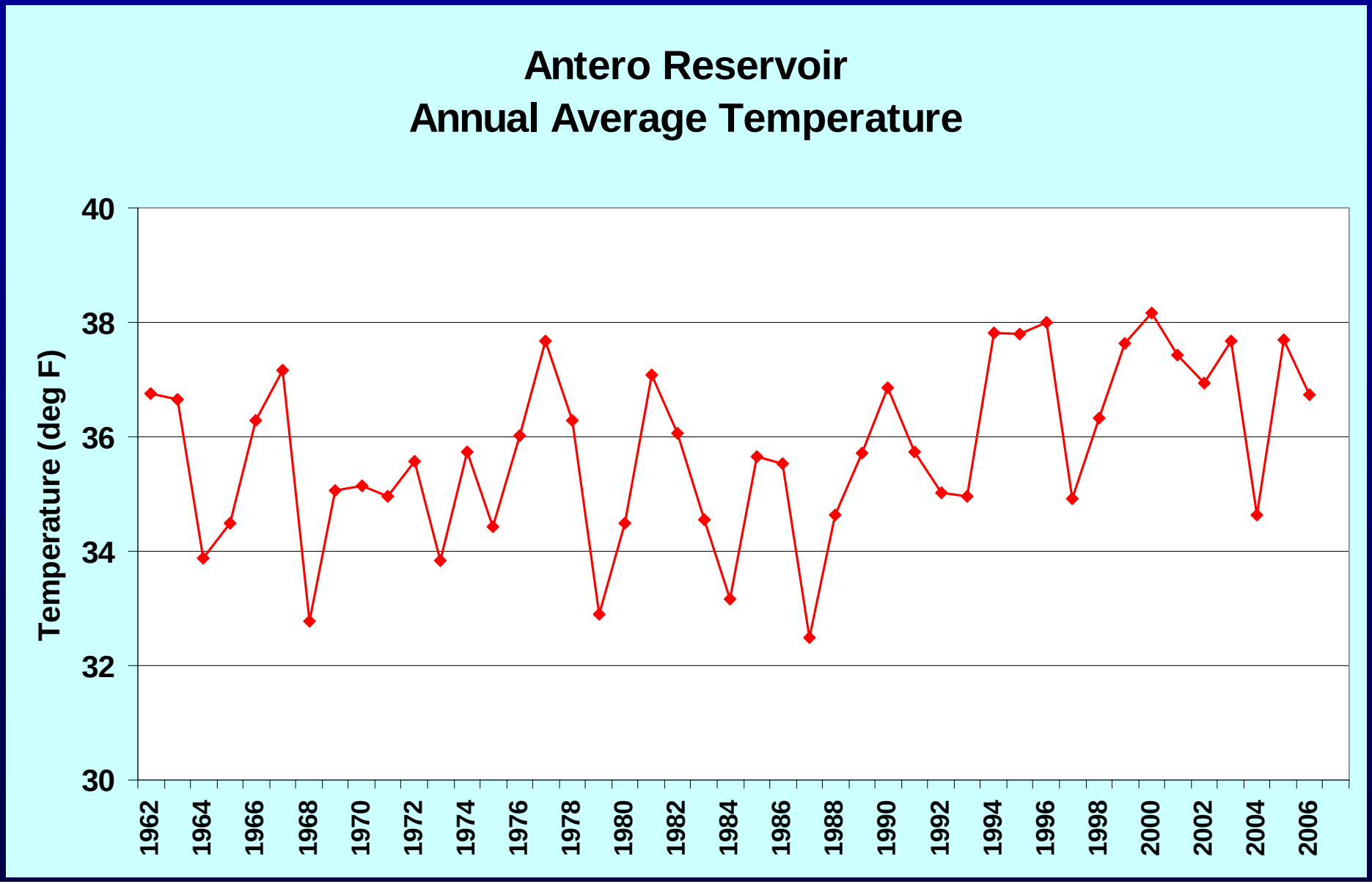


Colorado Statewide

Fall (Sep-Nov) Average Temperatures



Antero Reservoir Temperatures



Conclusions

Help us monitor precipitation!

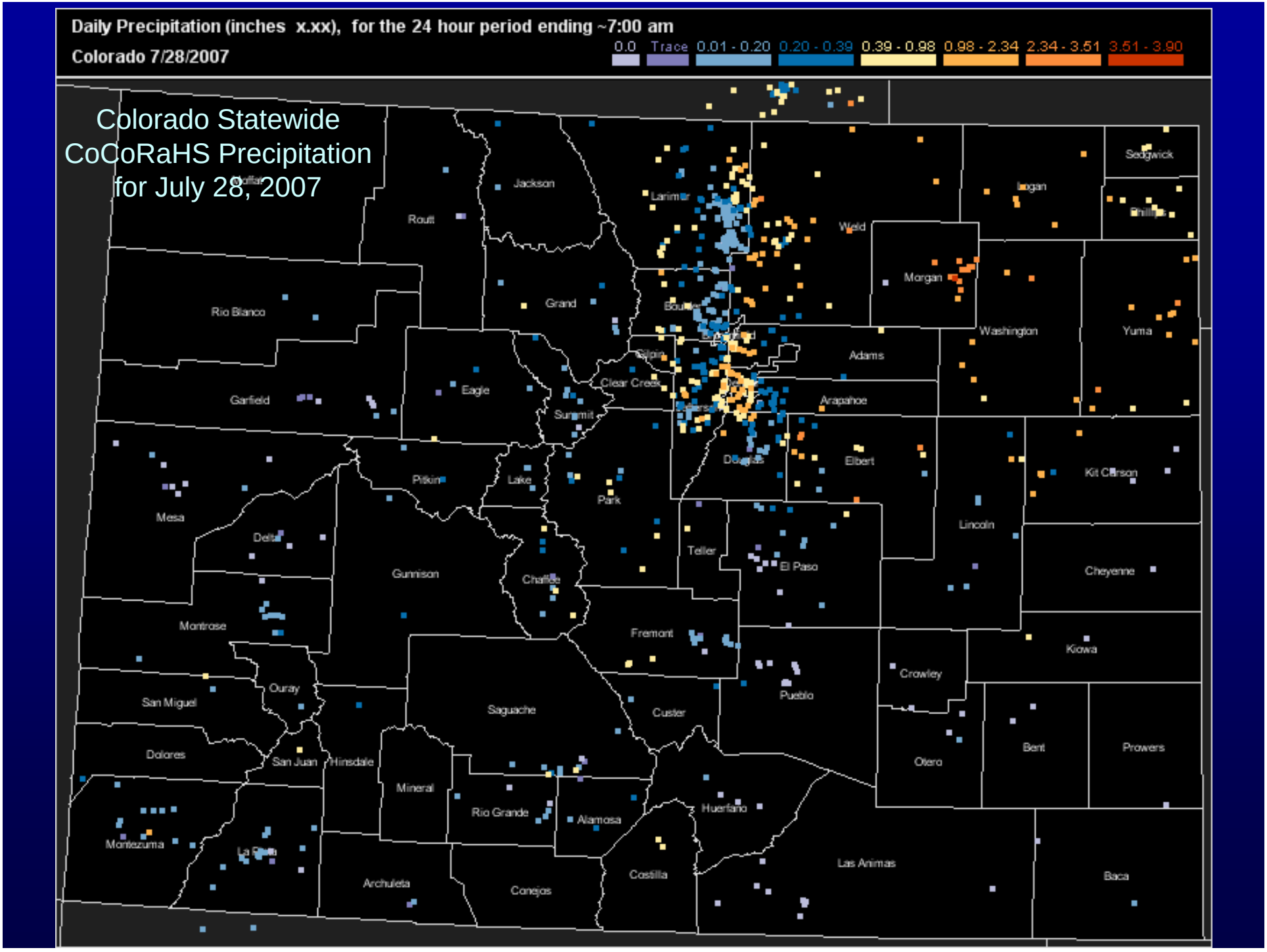
CoCoRaHS

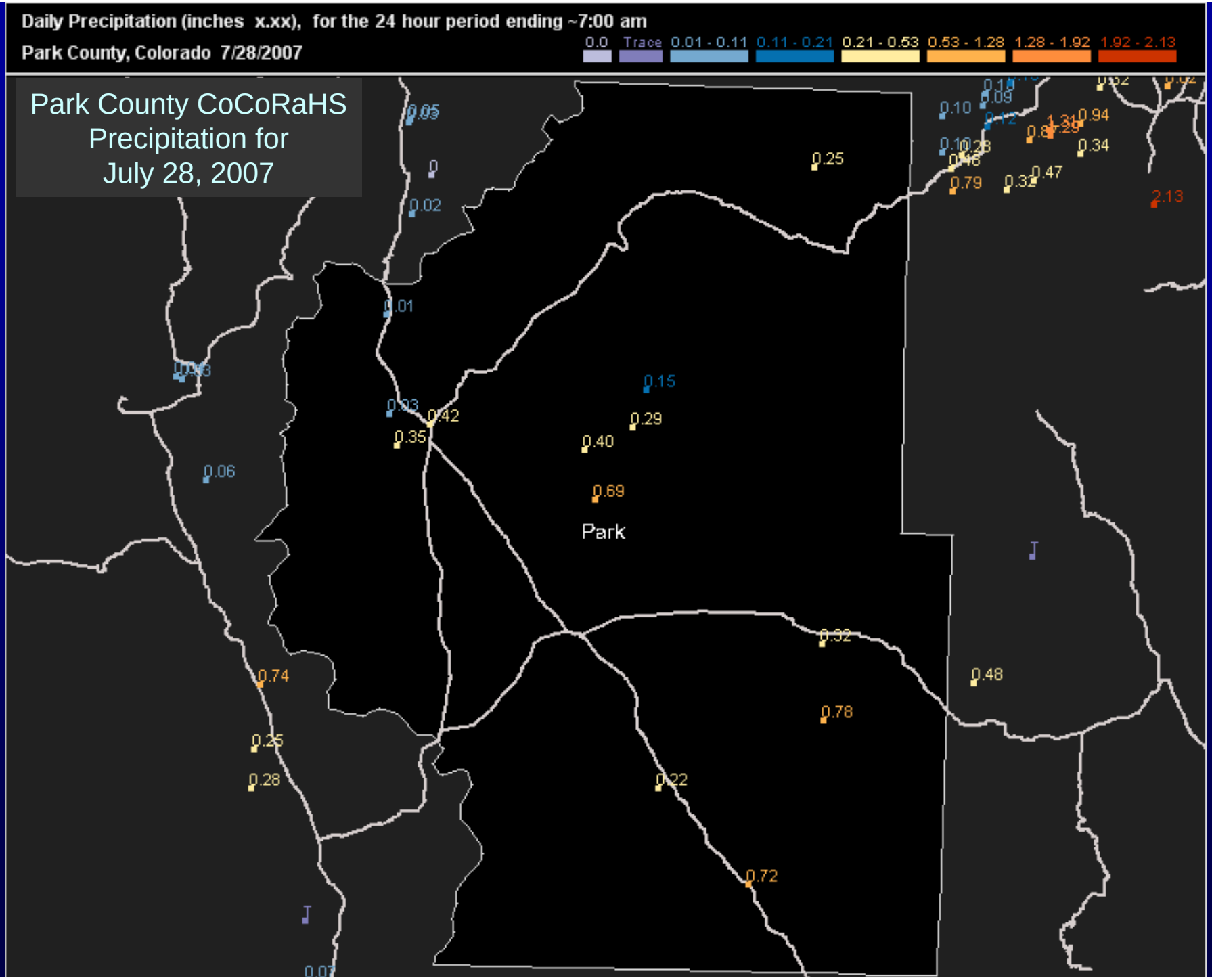
Community Collaborative Rain, Hail, and Snow Network

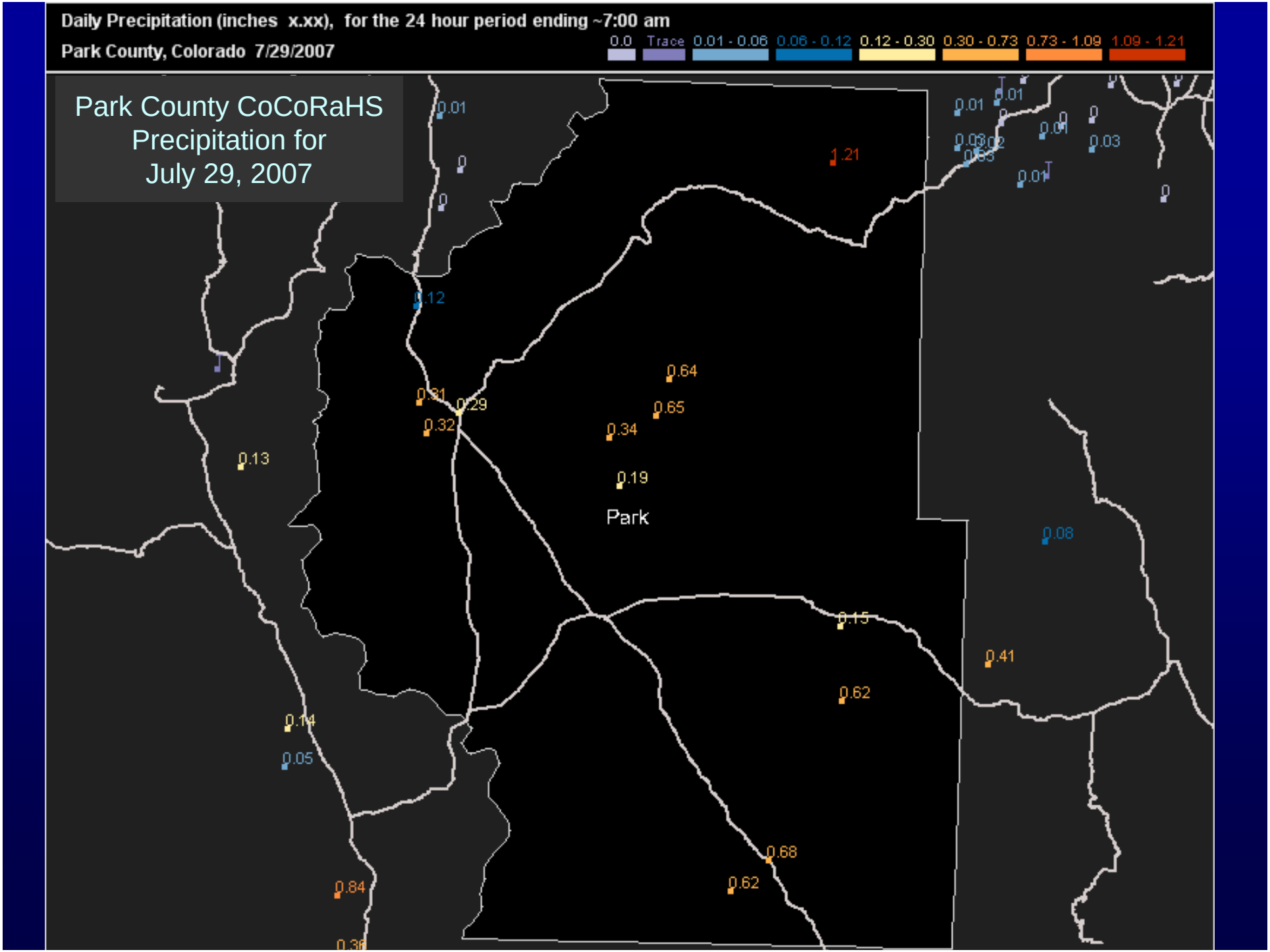
HAIL

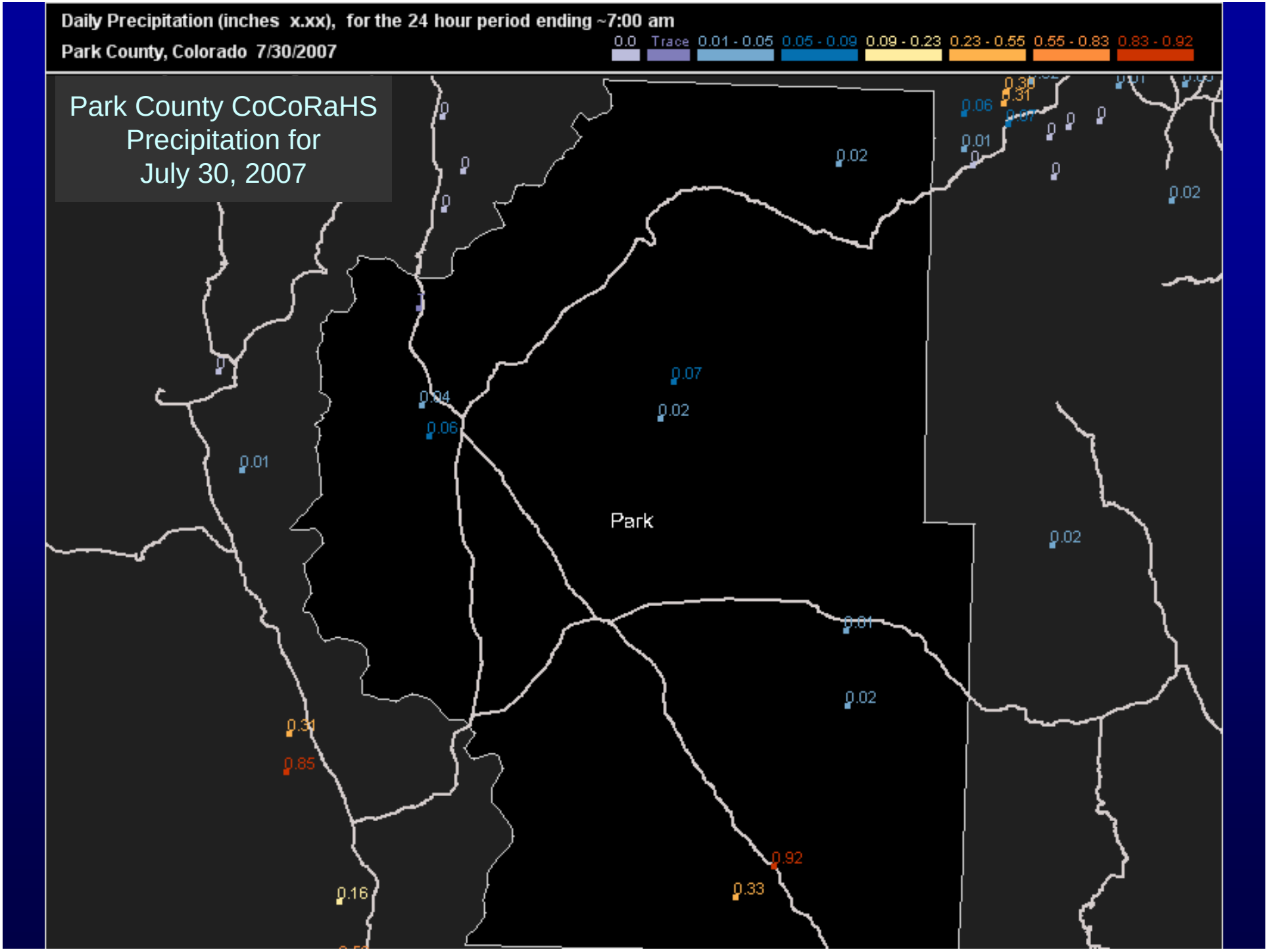
RAIN

SNOW


Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am
Colorado 7/28/2007
0.0 Trace 0.01 - 0.20 0.20 - 0.39 0.39 - 0.98 0.98 - 2.34 2.34 - 3.51 3.51 - 3.90
Colorado Statewide CoCoRaHS Precipitation for July 28, 2007
Jackson
Routt
Larimer
Weld
Logan
Sedgwick
Rio Blanco
Grand
Morgan
Washington
Yuma
Garfield
Eagle
Clear Creek
Adams
Arapahoe
Summit
Elbert
Kit Carson
Pitkin
Lake
Park
Lincoln
Mesa
Delta
Teller
El Paso
Cheyenne
Gunnison
Chaffee
Montrose
Fremont
Kiowa
Crowley
Ouray
San Miguel
Saguache
Custer
Pueblo
Dolores
San Juan
Hinsdale
Mineral
Rio Grande
Alamosa
Huerfano
Otero
Bent
Prowers
Montezuma
La Plata
Archuleta
Conejos
Costilla
Las Animas
Baca


Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am
Park County, Colorado 7/28/2007
0.0 Trace 0.01 - 0.11 0.11 - 0.21 0.21 - 0.53 0.53 - 1.28 1.28 - 1.92 1.92 - 2.13
Park County CoCoRaHS
Precipitation for
July 28, 2007
0.05
0
0.02
0.25
0.10
0.09
0.94
0.34
0.79
0.47
2.13
0.01
0.15
0.03
0.42
0.35
0.29
0.40
0.69
Park
0.06
0.74
0.25
0.28
0.32
0.48
0.78
0.22
0.72
T
T
0.07


Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am
Park County, Colorado 7/29/2007
0.0 Trace 0.01 - 0.06 0.06 - 0.12 0.12 - 0.30 0.30 - 0.73 0.73 - 1.09 1.09 - 1.21
Park County CoCoRaHS Precipitation for July 29, 2007
0.01
0
0
1.21
0.01
T
0.01
0.03
0.02
0.03
0.01
T
0
0.12
T
0.64
0.31
0.29
0.65
0.32
0.34
0.13
0.19
Park
0.08
0.15
0.41
0.62
0.14
0.05
0.68
0.62
0.84
0.36


Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am
Park County, Colorado 7/30/2007
0.0 Trace 0.01 - 0.05 0.05 - 0.09 0.09 - 0.23 0.23 - 0.55 0.55 - 0.83 0.83 - 0.92
Park County CoCoRaHS Precipitation for July 30, 2007
Park
0.02
0.06
0.31
0.01
0.07
0.04
0.06
0.01
0.02
0.02
0.01
0.02
0.31
0.85
0.92
0.33
0.16

Join Us!
Visit the CoCoRaHS Web Site:
http://www.cocorahs.org

Support for this project provided by NOAA Environmental Literacy Program 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”**

Colorado State University
Knowledge to Go Places


Me
Jim
Nikki
Harry
Ted
Tres
Amy
Kim
Ralph
Paul
Dave
Scott
Denis
Kevin
George
Jack
Robbie
Negron

The End