Colorado Climate Summary
Water-Year Series

(October 1986-September 1987)

by

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I. INTRODUCTION

The 1987 Water Year marked the 14th year of existence of the Colorado Climate Center (CCC) and the 11th year of closely monitoring the climate of this diverse and interesting state. The first monthly climate summary prepared by the CCC was written in early 1977 in the midst of an unprecedented severe winter drought. Since that time Colorado has experienced a myriad of extremes -- record winter cold, incredible snowstorms, disastrous hail storms and tornadoes, brief dry periods, and, more recently, some of the snowiest years in the past 60 years and one of the wettest consecutive periods in the state as a whole. Our monthly descriptions of Colorado climate have expanded to document and describe as much of this information as possible.

The monthly climate descriptions are intended to accomplish several purposes. They are a written historical record of what our climate has been which can hopefully always be used as a reference in the future. By tracking monthly departures of temperature and precipitation from long-term normals, these summaries have also become tools for operations, planning and policy-making related to agriculture, water resources, recreation, land use and energy. Finally these summaries are used to educate the people of Colorado about our unique climate and its impact on our lives and livelihoods.

In Colorado, the Water Year (October 1 through September 30) is the most appropriate period for monitoring climate. This 12-month period is directly correlated with the state's water storage--water usage cycle. In October snow usually begins to accumulate in the high mountains. As

winter progresses, the snowpack normally continues to build. This snow is the frozen reservoir which supports the huge ski and winter recreation industry. As it melts in the subsequent spring and summer, it supplies much of the water for human consumption, for extensive irrigation, for industry, and to satisfy long-standing streamflow compacts with neighboring states. Irrigated agriculture still accounts for the vast majority of water used in Colorado. Therefore, demand for water peaks during the summer and tapers off as temperatures drop, crops are harvested, and autumn arrives. September marks an appropriate end to the water year.

Because of the crucial importance of water to Colorado, this publication emphasizes precipitation and water-year accumulated precipitation. Comparisons with long-term averages are made to help determine which parts of the state are wetter or drier than average. This makes it possible to document the availability of water resources and to assess potential drought situations.

A new report format was developed during the 1985 Water Year for displaying and describing the month by month climate and this format has been continued. The following paragraphs describe the information content of this report format.

Each month's summary begins with a brief one-paragraph description of observed general temperature and precipitation patterns. This is followed by a section called: "A Look Ahead." This section is not a forecast in the normal sense but is a generalized statewide climatological description (based on past records) of what weather conditions can most typically be expected. This section is really designed as an educational tool for newcomers to Colorado and to those

just learning about climate to help familiarize themselves with the nature of our climate--how it varies both in time and in space. It is also a potential planning tool for those individuals, businesses, researchers, and government agencies who are just starting to try to take climate into account in planning and scheduling activities.

Following the "Look Ahead" section is a special feature story on some aspect of Colorado's climate. Research results, new climate publications, and items of general public interest may appear in this section. Here is a list of this year's special features and the pages on which they are found.

1) How Many Sunny Days Does Colorado Really Have? (pp. 10-12)
2) White Christmas -- What are the Odds? (pp. 19, 27)
3) The Temperature's Below Zero? -- So What! (pp. 28, 36)
4) New Publication -- Precipitation Station Index. (pp. 36)
5) 10 to 1 -- The Story of Snow Densities in Colorado. (pp. 37, 45)
6) Dark Clouds on the Horizon? (pp. 46, 54)
7) Which Comes First, the Flood or the Drought? (pp. 63, 71)
8) More Stimulating Facts About Colorado Precipitation. (pp. 72, 80)
9) How Hot Can It Get In Colorado? (pp. 81, 89)
10) Are Our Fall Frosts Coming Earlier? (pp. 90, 98)
11) The Elusive First Snow. (pp. 99, 107)
12) 1987 Water Year Wrap-Up. (pp. 111-112)

The daily weather description, which has been a part of the monthly summary for several years, has been continued and includes a table of extremes of temperature, precipitation and snow. This narrative section

gives the dates of major storms, heat waves and cold blasts and gives selected examples from across Colorado.

One page is dedicated each month to the precipitation pattern. A brief narrative description is followed by a list of the wettest and driest National Weather Service reporting stations. A detailed map showing precipitation amounts is contoured to show which areas were above and below average.

The next page of the summary includes a similar assessment of the water year accumulated precipitation. A brief narrative comparison is made between the current and the past year's precipitation. This is accompanied by a tabular comparison of the wettest and driest locations in the state and a contoured map analysis of the current year's accumulated precipitation compared to average.

Temperature data for the month and comparisons to average are described in a short paragraph. The monthly temperatures for approximately 55 selected locations are plotted on a map and are analyzed using contour lines of departures from the 1961-80 averages. Along with the air temperature data, a detailed analysis of Fort Collins daily soil temperatures at several depths is presented. Soil temperature is an important climatic element in agriculture, construction, and energy conservation. Unfortunately, detailed soil temperature data are not available throughout Colorado.

Heating degree day data for 36 Colorado cities is published each month in a data table similar to previous years. A description of heating degree days and their use is given in Section II of this report.

Our present summary format ends with two pages of tabular climate information for the month for selected Colorado stations. Stations are

divided into 4 regions: the Eastern Plains, the Foothills/Adjacent Plains (includes the Front Range urban corridor), the Mountains and High Interior Valleys, and the Western Valleys (includes stations in western Colorado below 7,000 feet). Data presented for each station include the average high, low and mean temperature for the month and the departure from the 1961-1980 average, the highest and lowest temperature recorded during the month, the monthly total of heating, cooling and growing degree days (see Section II for definitions), the monthly total precipitation, the departure from the 1961-1980 average, the percent of the 1961-1980 average, and the total number of days with measurable precipitation.

The final information contained in each monthly report is a comparative table of number of clear, partly cloudy and cloudy days and the percent of possible sunshine for 5 National Weather Service stations. This is followed by a graph of daily total solar radiation data measured at Fort Collins.

Specific daily temperature and precipitation data are not listed here. Daily data can be obtained in digital and/or hard copy form from the Colorado Climate Center and the National Climatic Data Center (Asheville, NC). Much of the daily data are published in the government document, Climatological Data.

Most temperature and precipitation data used in the monthly summaries were obtained from the National Weather Service cooperative observer network. Data from the major National Weather Service stations, such as Denver and Grand Junction, are also used extensively.

The averages which are used in this report for both temperature and precipitation were calculated using 1961-1980 data. Heating degree day normals were based on 1951-1980 data.

The written descriptions give a good general accounting of each month's weather, but the majority of information is contained on the maps and tables which accompany each report. The accuracy of all of these maps and tables is quite good. However, these reports were initially prepared soon after the end of each month, and preliminary information had to be used. Therefore, some of the precipitation, temperature, and heating, cooling and growing degree day values may differ slightly from what is later published by the National Climatic Data Center.

II. EXPLANATION OF DEGREE DAYS

Many climatic factors affect fuel consumption for heating and cooling. Wind, solar radiation and humidity all play a part, but temperature is by far the most important element. Very simply, the colder it gets; the more energy is needed to stay warm.

A simple index, given the name, heating degree days, was devised several years ago to relate air temperatures to energy consumption (for heating). The number of heating degrees for a given day is calculated by subtracting the mean daily temperature (the average of the daily high and low temperature) from 65°F. Sixty-five degrees is used as the base temperature because at that temperature a typical building will not require any heating to maintain comfortable indoor temperatures. That difference (65°F minus the mean daily temperature) is the number of heating degrees for that day. The daily values are accumulated throughout the heating season to give heating degree day totals. Different base temperatures can be used to calculate heating degree days, but 65° is the long-standing traditional base.

The heating degree day total for a month or for an entire heating season is approximately proportional to the quantity of fuel consumed for heating. Therefore, the colder it gets and the longer it stays cold, the more heating degree days are accumulated and the more energy is required to heat buildings to a comfortable temperature.

So why is this important? Very simply, if you know how much energy you have used for heating your home or business during a certain period of time, and if you also know the heating degree day total for the same

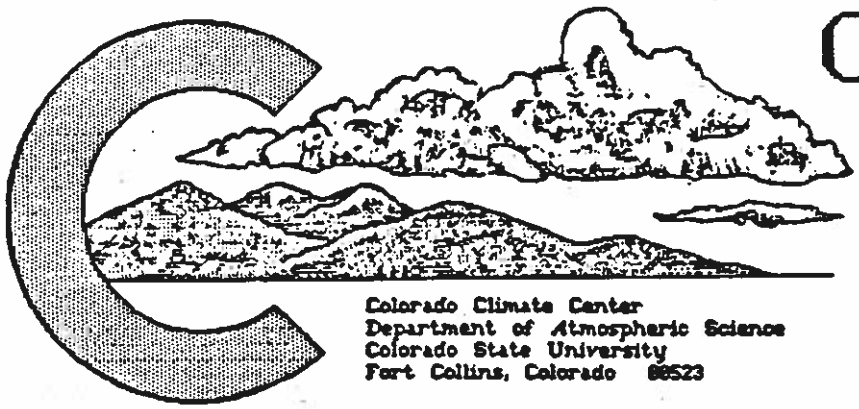
period, you can then establish an energy consumption ratio. With that information you can then make reasonable estimates of your future energy consumption and costs. Also, you can easily check the success and calculate the savings resulting from energy conservation measures such as new insulation, storm windows or lowering the thermostat.

Cooling degree days are calculated in a similar fashion. Cooling degrees occur each day the daily mean temperature is above 65°F. They are accumulated each day throughout the cooling season and are roughly proportional to the amount of energy required to cool a building to a comfortable inside temperature. Cooling degree days are less useful than heating degree days, especially here in Colorado where air conditioning requirements are minimal in many parts of the state. However, they still offer a means of making general comparisons from site to site, year to year or month to month.

Growing degree days are a measure of temperature which has been found to correlate with the rate of development and maturation of crops. Several methods exist for computing growing degree days. In this report the "corn" growing degree day definition was used. The optimum growth occurs at 86°F and essentially no growth occurs at temperatures below 50°F. Therefore, when computing the daily mean temperature any minimum temperature below 50° is counted at 50° and any maximum above 86° is counted as 86°. Growing degree day totals are this adjusted mean temperature (°F) minus 50°F summed for each day.

III. 1987 WATER-YEAR IN REVIEW

In previous years up through the 1984 water year summary several pages were written recapping the highlights of the year's climate and the impact it had on Colorado. This section now appears in abbreviated form as the special feature story that accompanies the September 1986 summary. This can be found on pages 111-112.



COLORADO CLIMATE

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OCTOBER 1986

October in Review:

Pleasant autumn weather was interrupted every 7 to 10 days by major storm systems. As a result, most of Colorado ended up wetter and a little cooler than average. Halloween lived up to its stormy reputation by dropping cold rain and wet snow on most of the state.

A Look Ahead — December 1986:

Imagine yourself driving westward on Interstate 70 from Goodland, Kansas, to Grand Junction on your way to visit your uncle for Christmas. It's still dark as you begin the drive, and the brisk northwest wind is painfully cold. By the time you get to Limon the sun is finally up filtered by a high thin cloud layer. The road is clear but you can spot huge snow drifts near bridges and overpasses left by a late November blizzard. Winds diminish as you approach Denver and a cloud of pollution nearly hides your view of the mountains. The air is warm enough that you open your window just a bit. As you pass Golden, the air suddenly becomes crystal clear and the sky a deep blue. You are surprised that there is hardly any snow on the ground even in the foothills. Gusty winds from the west begin to buffet your car.

It's still clear and windy as you reach Georgetown and begin the steep climb up to the Eisenhower tunnel. The snow in the trees seems to get deeper each mile you drive, and there are patches of packed snow on the road here and there. At last you enter the tunnel and when you emerge you are surprised to find snow falling moderately and deep snow piled on either side of the road. You nearly plow into the car in front of you before you successfully adjust to the new driving conditions. As you descend to Dillon the snow lets up, but you crank up your heater to stay warm. Again on Vail Pass the snow falls heavily, and again diminishes as you descend into the Gore Valley. There is hardly any wind and you can smell wood smoke as you drive past Vail and Avon. By the time you get to Eagle the snow has stopped and the skies have cleared. There are only a few inches of snow on the ground.

In Glenwood Canyon a few more snowflakes fall, but temperatures are noticeably warmer. Then from Glenwood Springs to Grand Junction the weather doesn't change much. It's cloudy, and here and there you drive through patches of fog that formed after sunset. You happily stop in Grand Junction. It's chilly but not too cold as you walk up to your uncle's house.

The story above describes a typical December day in Colorado. One or two major storms will usually hit eastern Colorado during the month, and a similar number of arctic cold waves will send the temperature below zero across the Plains. Significant precipitation is limited to the mountains where measurable snowfall occurs on more than half the days. Chinook windstorms along the Front Range become a distinct possibility and can be locally severe.

How Many Sunny Days Does Colorado Really Have?

The Colorado Climate Center receives thousands of requests for climate information each year. One of the frequently asked questions is, "How many sunshine days do we receive per year here in (my town), Colorado?" The main reason this question is asked is because it must be answered on a government form called a "community profile" which each incorporated area must file with the State every few years. The traditional answer to that question has been 300 days except down around Alamosa where they prefer to answer 330. Those numbers sound so good that many area Chamber of Commerce offices started

(continued)

How Many Sunny Days Does Colorado Really Have? continued

including them in their brochures. They also took liberties with the terminology to make it easier to understand. Instead of saying 300 days of sunshine they began to say 300 sunny days.

Ok, now let's talk about facts. To set the record straight, I don't know where these statistics came from. In truth, consistent measurements of cloudcover throughout the day are only taken at a very few locations in Colorado and have only been historically summarized at 5 locations: Alamosa, Colorado Springs, Denver, Grand Junction and Pueblo. The National Weather Service employs the following definitions to describe the nature of a day.

Description	Definition
clear day	0 to 3/10 of the sky is covered by cloud, averaged over the period from sunrise to sunset.
partly cloudy	4/10 to 7/10 of the sky is covered by cloud, averaged over the period from sunrise to sunset.
cloudy	8/10 to 10/10 of the sky is covered by cloud, averaged over the period from sunrise to sunset.

Based on these statistics, Colorado stations stack up as follows. Some other cities in the U.S. are included for comparison.

	Average Number of Days Per Year			Percent of Possible Sunshine
	Clear	Partly Cloudy	Cloudy	
Alamosa	148	137	80	—
Colorado Springs	128	119	118	—
Denver	116	130	119	70
Grand Junction	137	106	122	70
Pueblo	139	120	106	76
Dallas, TX	138	97	130	65
Seattle, WA	56	81	228	46
Los Angeles, CA	145	116	104	73
Chicago, IL	85	105	175	52
Miami, FL	76	173	116	72
New York, NY	106	127	132	58
Atlanta, GA	110	106	149	61
Honolulu, HI	87	179	99	67

Interestingly, none of these numbers add up to 300 for any of our Colorado cities in any way, shape or form. To help unravel the mystery, the Colorado Climate Center looked at the past several years of detailed hourly cloudcover and sunshine data measured at Denver and Grand Junction.

Here are some of the pertinent statistics.

1) Since 1980 in Denver, 215 days per year averaged at least half the sky covered by clouds from sunrise to sunset. 150 days have less than half of the sky covered. Of these 150 days, only 33 are truly clear (less than 1/10 of the sky covered by cloud). On approximately 5 days per year there are no clouds at all reported from sunrise to sunset. Ninety-eight days per year have at least 9/10 of the sky covered by clouds throughout the day. Fifty-seven of these days are completely overcast, but on at least half of these 57 days some sunshine is still observed through thin spots in the clouds. On only 23 days per year is the sun totally hidden from view throughout the day. The 1980s have been cloudier than the previous decade.

How Many Sunny Days Does Colorado Really Have? continued

2) Despite substantial climatic differences Grand Junction statistics are remarkably similar: 209 days per year with at least half the sky covered by clouds and 156 days with less than half the sky covered. Grand Junction has more clear days with an average of 43 per year (about 12 with no clouds at all). One hundred days per year have at least 9/10 of the sky covered by clouds and 52 days are totally overcast. On 23 days per year the sun is totally hidden by clouds throughout the day.

Average number of clear and overcast days each month based on 1980-86 data

Sunrise-sunset Cloudiness	Month												
	Ja	Fe	Mr	Ap	My	Jn	Jl	Au	Se	Oc	No	De	Total
Clear (less than 1/10):													
Denver	5	3	1	2	1	2	2	2	4	5	3	3	33
Grand Junction	5	2	2	3	1	5	3	2	5	6	5	4	43
Overcast (10/10):													
Denver	5	5	8	5	5	2	2	1	4	7	6	7	57
Grand Junction	6	5	9	4	3	2	0	1	3	5	6	8	52

Comparing clear and overcast days at these two cities, it is interesting to note that late spring and summer are characterized by very few days that are either completely clear or completely overcast. (June is an exception in western Colorado where clear days are common.) The days that are totally clear during those months are almost always extremely hot. The greatest number of clear days occur during the fall and early winter. But the greatest number of overcast days also occurs during this same period and continues into the spring. At Denver, October is the month when totally clear days occur most frequently, but it is also second only to March in the number of totally overcast days. March has the most overcast days both east and west of the mountains. There are physically-based reasons for those observed patterns. An entire course on climatology could be taught while explaining these patterns.

You can now see why it has been possible to get away with a generic "300 days of sunshine" statement for Colorado. By using definitions loosely, you can say about anything you want about Colorado sunshine. By defining any day that is not totally overcast as a "sunshine day" you can end up with about 300. I just can't do that with a clear conscience. To call a day when the sun peaks between clouds for 20 minutes just before sunset a sunny day is stretching the truth just a bit. But we shouldn't sell ourselves short, either. Compared to much of the country, we get abundant sunshine in Colorado.

The best way to objectively compare how much sunshine we get is by measuring solar energy, not by counting cloudcover. The Colorado Climate Center compiled and published solar energy measurements taken in this state in 1982. Since then, important solar measurements in Colorado have actually decreased.

If solar energy is to become the valuable energy source that it could be, we need to be able to document how much sunshine we really get. There are some beautiful solar energy atlases now available that map the solar energy resources in this country. What they may not tell you is that these maps are based on little measured data. For most areas, solar energy has been approximated from those few cities where cloud observations have been summarized. These may lead to good estimates for many parts of the country, but here in Colorado the results are suspect. The effects of the mountains on increasing local cloudiness have not been included in those analyses.

We need better solar data now on a statewide basis so that 10 years from now when someone calls and asks for sunshine days we can give them an answer that means something. If you have any information on high quality solar energy measurements being taken anywhere in Colorado, please contact the Colorado Climate Center.

OCTOBER 1986 DAILY WEATHER

Date	Event
1-3	Lovely autumn weather on the 1st but increasing cloudiness late in the day west of mountains. Partly cloudy and warm east of the mountains on the 2nd (Pueblo reached 82°F), but rain developed over northwestern Colorado during the day with nearly 0.50" reported at several stations. Fog, low clouds and cold rain developed east of the mountains late on the 2nd and continued on the 3rd as much colder air enveloped the state. Several inches of snow fell at higher elevations. Mount Evans reported 12" of new snow.
4-9	Clearing and chilly on the 4th. Alamosa dropped to 17°. Lingering morning fog east of the mountains. Then gradually warming 5-7th with lots of sunshine. Las Animas hit 86° on the 7th, the hottest in the state for the month. A cold front slipped southward across the Eastern Plains on the 8th triggering a little light rain particularly at the base of the foothills. Lakewood received 0.44" of cold rain before it ended on the 9th.
10-13	Mild weather was abruptly terminated on the 10th as a blast of polar air from the north combined with the remnants of the storm system that had been spinning harmlessly over southern California. The result was plummeting temperatures (Fort Collins was 71° at 2 pm and by 10 pm it was snowing) and heavy precipitation. The storm brushed northern Colorado quickly and was gone by noon on the 11th leaving cold temperatures in its wake. But in southern Colorado precipitation continued for 2 more days. Most of the state received significant moisture, but some storm totals in southern Colorado were very large. Alamosa received a humble 0.37", Crestone 0.96" (6" snow), Durango 2.72" and Wolf Creek Pass 6.00" (54" snow). The coldest weather of the season accompanied the storm. Grand Junction had its first fall freeze on the 12th. Temperatures in the mountains flirted with the zero mark. Taylor Park's -3°F on the 13th took honors for coldest in the state.
14-17	Beautiful autumn weather returned. Low elevation snows melted quickly and daytime temperatures in the 60s and 70s were widespread.
18-24	A large low pressure area aloft formed over Nevada on the 18th and slowly drifted eastward. Mild temperatures continued on the 18-19th as clouds and showers increased. Thunderstorm activity was surprizingly widespread 19-21st for so late in the year and there were numerous reports of small hail 20-21st. Precipitation from this storm system was spotty and fell mostly as rain except in the mountains. But areas of southeastern Colorado were deluged by one of their heavier autumn rains on record. Reports included 1.91" at Trinidad, 3.05" at Walsh and 3.11" at Springfield for the 20-21st period. As the storm finally began moving eastward, heavy snows developed in the northern and central mountains late on the 21st and continued on the 22nd. Winter Park received 7" and Walden got 5.6" of wet snow. Finally, the storm moved eastward 23-24th but still dropped more cold rainshowers over northeastern Colorado.
24-29	Clear to partly cloudy, mild and dry. A fast moving weak Pacific cold front zipped across the state on the 28th.
30-31	Warm with increasing clouds and winds on the 30th as a major storm system began developing northwest of Colorado. Widespread moderate precipitation developed on Halloween as much colder air moved in. Heavy mountain snow fell during the day, and rain began changing to snow at low elevations during the evening making for sloppy trick-or-treating.

October 1986 Extremes

Highest Temperature	86°F	October 7	Las Animas
Lowest Temperature	-3°F	October 13	Taylor Park Reservoir
Greatest Total Precipitation	9.81"		Wolf Creek Pass 1E
Least Total Precipitation	0.40"		Rush 4N
Greatest Total Snowfall*	77"		Wolf Creek Pass 1E

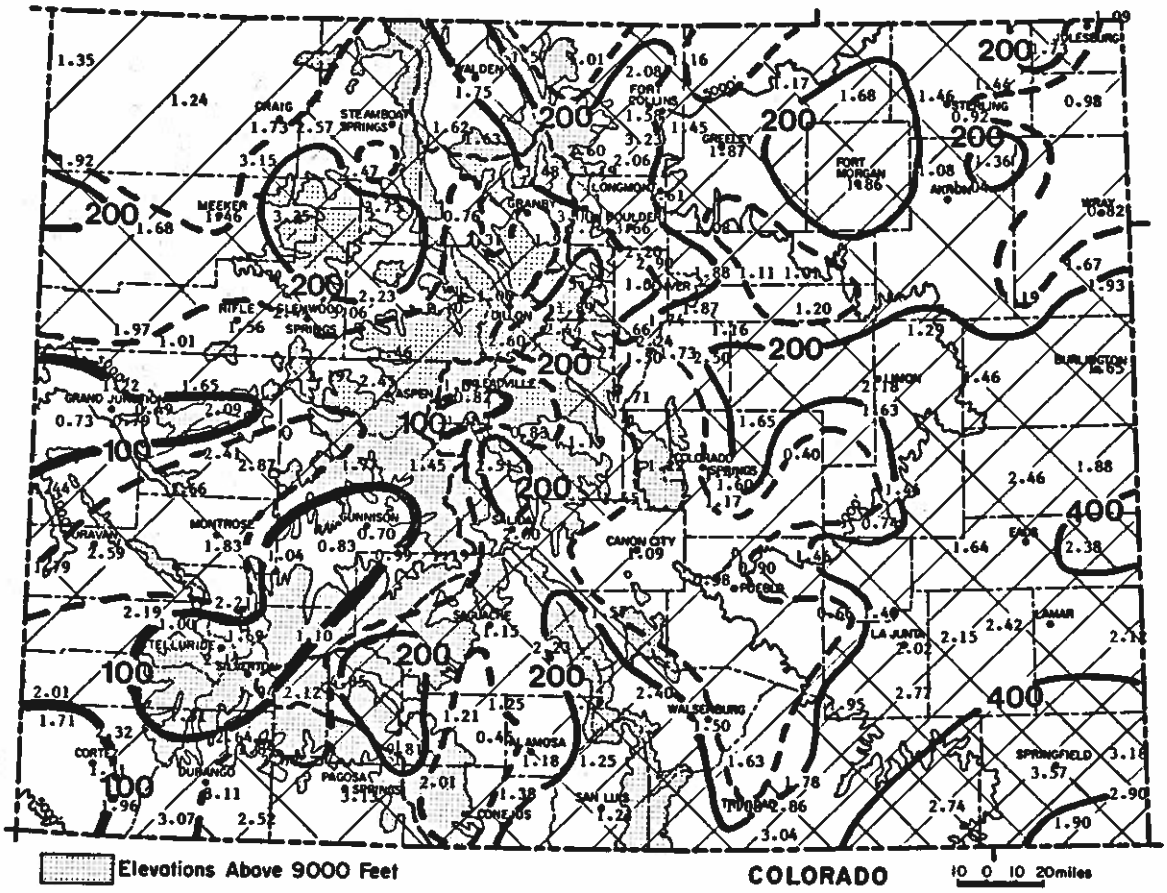
* data derived only from those stations with complete daily snowfall records.

OCTOBER 1986 PRECIPITATION

The 1987 water year got off to a wet start over most of Colorado. Drier than average conditions were limited to small areas of western Colorado including parts of the Gunnison Valley near Gunnison, the northwestern slopes of the San Juan mountains and a portion of the Grand Mesa and Grand Valley near Grand Junction. Substantial areas of the state were much wetter than usual for October. More than double the average moisture fell along much of the Front Range, over portions of the Upper Colorado drainage, over the eastern slope of the San Juan Mountains and across most of the southeastern plains. Three to five times the normal October precipitation was noted in extreme southeastern Colorado.

The precipitation pattern for the month was complicated by the fact that the storm which struck on October 31 came at an awkward time. Depending on designated observation times at each weather station, many observers recorded precipitation from this storm on the 31st, but many others will properly report it on November 1, and it will be reflected in next month's report.

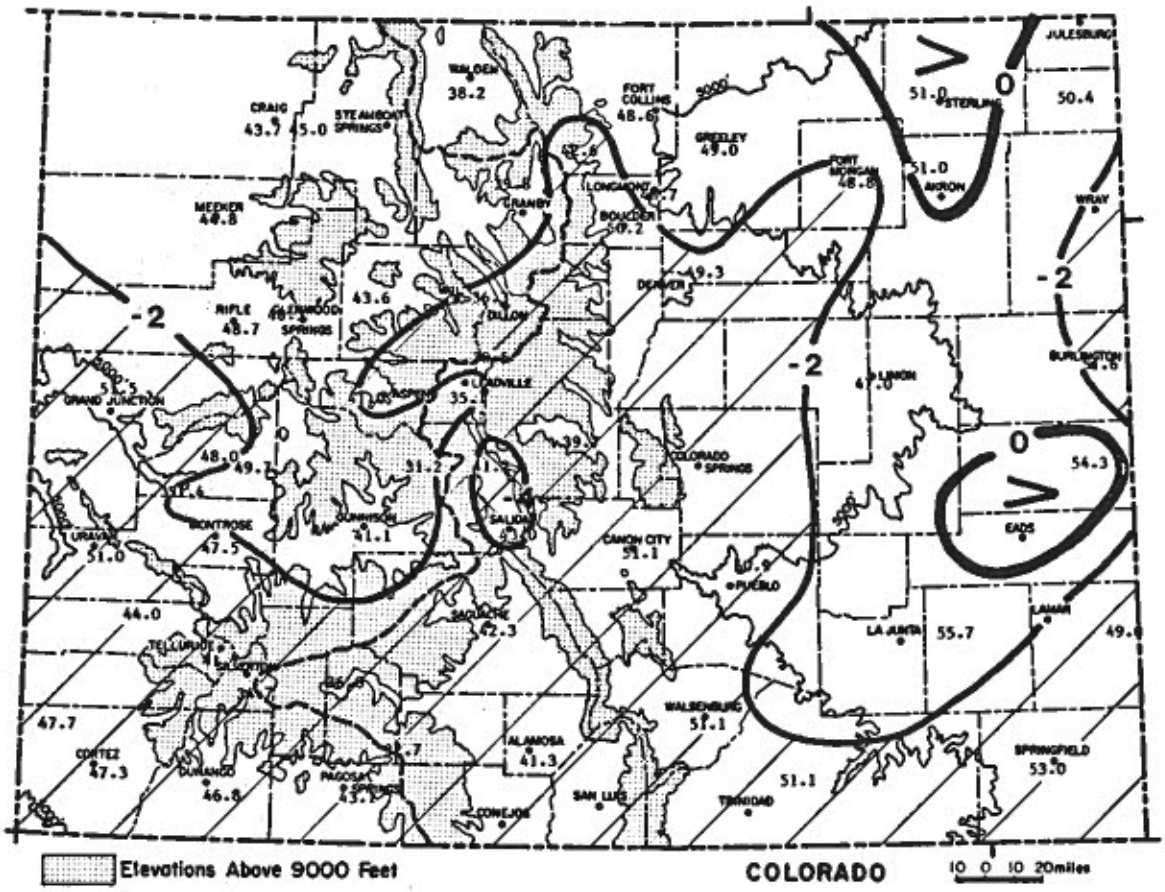
Greatest		Least	
Wolf Creek Pass 1E	9.81"	Rush 4N	0.40"
Mount Evans Research Center	5.77"	Monte Vista 1E	0.45"
Hermit 7ESE	4.85"	Twin Lakes Resvr	0.48"
Lemon Dam	3.89"	Palisade	0.49"
Coal Creek	3.85"	Pueblo Reservoir	0.58"



Precipitation amounts (inches) for October 1986 and contours of precipitation as a percent of the 1961-1980 average. The dashed line represents 150% of average.

OCTOBER 1986 TEMPERATURES AND DEGREE DAYS

Temperatures took a rollercoaster ride in October, but generally ended up a few degrees cooler than average for the month. Across northern Colorado temperatures were near average to about 2 degrees Fahrenheit below average. Across the southern half of the state, temperatures were mostly 2 to 4 degrees cooler than average.



October 1986 temperatures (degrees Fahrenheit) and contours of departures from 1961-1980 averages.

OCTOBER 1986 SOIL TEMPERATURES

Soil temperatures declined erratically during October. From now until early spring, deep soil temperature will drop slowly but will remain warmer than near-surface soil temperatures.

These soil temperature measurements were taken at Colorado State University beneath sparse unirrigated sod with a flat, open exposure. These data are not representative of all Colorado locations.

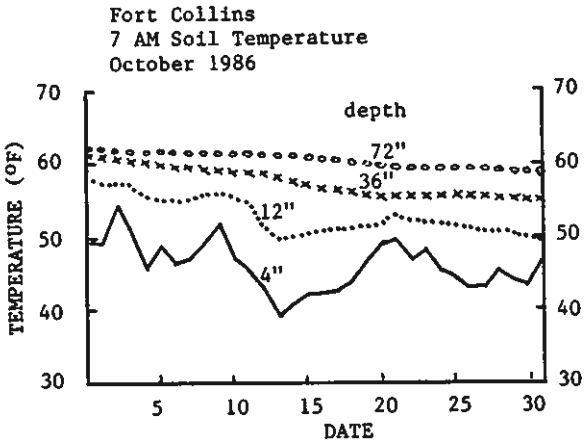


Table 1. Colorado Heating Degree Day Data through October 1986.

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
ALAMOSA	AVE	40	100	303	657	1076	1457	1519	1182	1035	732	453	165	8717
	85-86	30	66	378	634	1045	1472	1231	983	864	638	446	138	7925
	86-87	63	75	366	728									1232
ASPEN	AVE	95	150	348	651	1029	1339	1376	1162	1116	798	524	262	8850
	85-86	119	107	453	656	1066	1278	1175	1029	848	739	530	185	8185
	86-87	147	132	428	735									1442
BOULDER	AVE	0	6	130	357	714	908	1004	804	775	483	220	59	5460
	85-86	0	0	222	400	982	1018	674	762	496	423	249	16	5242
	86-87	1	0	175	450									626
BUENA VISTA	AVE	47	116	285	577	936	1184	1218	1025	983	720	459	184	7734
	85-86	63	54	405	597	938	1158	972	946	806	661	450	149	7199
	86-87	79	69	388	730									1266
BURLING-TON	AVE	6	5	108	364	762	1017	1110	871	803	459	200	38	5743
	85-86	0	5	206	405	977	1142	740	820	525	386	163	12	5381
	86-87	0	0	76	406									482
CANON CITY	AVE	0	9	81	301	639	831	911	734	707	411	179	33	4836
	85-86	0	6	186	397	886	1036	711	756	507	399	248	40	5172
	86-87	4	2	132	422									560
COLORADO SPRINGS	AVE	8	25	162	440	819	1042	1122	910	880	564	296	78	6346
	85-86	5	8	253	487	978	1143	822	840	635	487	315	49	6022
	86-87	4	14	174	519									711
CORTEZ	AVE	0	11	115	434	813	1132	1181	921	828	555	292	68	6350
	85-86		4	264	484	884	1081		805	711	572	321		5126
	86-87	10	6	214	541									771
CRAIG	AVE	32	58	275	608	996	1342	1479	1193	1094	687	419	193	8376
	85-86	10	42	353	649	1043	1487	1362	1023	780	669	461	76	7955
	86-87	31	15	338	654									1038
DELTA	AVE	0	0	94	394	813	1135	1197	890	753	429	167	31	5903
	85-86	0		113	335	658			684	530	365	174	6	2865
	86-87	0	0	145	414									559
DENVER	AVE	0	0	135	414	789	1004	1101	879	837	528	253	74	6014
	85-86		1	241	435	1051	1094	758	802	548	456	260	22	5668
	86-87	0	0	145	477									622
DILLON	AVE	273	332	513	806	1167	1435	1516	1305	1296	972	704	435	10754
	85-86	260	300	609	856	1183	1439	1380	1175	1072	915	716	388	10293
	86-87	322	318	580	883									2103
DURANGO	AVE	9	34	193	493	837	1153	1218	958	862	600	366	125	6848
	85-86	3	8	274	476	916	1159	967	802	686	575	341	70	6277
	86-87	23	9	295	559									886
EAGLE	AVE	33	80	288	626	1026	1407	1448	1148	1014	705	431	171	8377
	85-86	19	52	356	605	995	1352	1324	890	736	598	428	88	7443
	86-87	37		314	658									1009
EVER-GREEN	AVE	59	113	327	621	916	1135	1199	1011	1009	730	489	218	7827
	85-86	62	90	387	651	1039	1119	947	927	770	608	532	157	7289
	86-87	75	90	380										545
FORT COLLINS	AVE	5	11	171	468	846	1073	1181	930	877	558	281	82	6483
	85-86	1	8	243	499	1078	1199	883	816	568	470	261	22	6048
	86-87	0	0	178	500									678
FORT MORGAN	AVE	0	6	140	438	867	1156	1283	969	874	516	224	47	6520
	85-86	0	2	239	548	1165	1425	1160	915	616	401	246	19	6736
	86-87	0	4	138	495									637
GRAND JUNCTION	AVE	0	0	65	325	762	1138	1225	882	716	403	148	19	5683
	85-86	0	0	139	351	779	1018	949	685	489	366	168	3	4947
	86-87	0	0	130	414									544

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
GRAND LAKE	AVE	214	264	468	775	1128	1473	1593	1369	1318	951	654	384	10591
	85-86	206	265	513	744	1115	1454	1494	1174	1083	896	651	304	9899
	86-87	245	242	488	777									1752
GREELEY	AVE	0	0	149	450	861	1128	1240	946	856	522	238	52	6442
	85-86	0	6	249	501	1131	1311	1010	845	545	440	232	15	6285
	86-87	0	0	142	484									626
GUNNISON	AVE	111	188	393	719	1119	1590	1714	1422	1231	816	543	276	10122
	85-86	84	152	433	678	1058	1648	1712	1084	952	711	517	204	9233
	86-87	123	146	420	734									1423
LAS ANIMAS	AVE	0	0	45	296	729	998	1101	820	698	348	102	9	5146
	85-86	0	0	134	313	816	1106	737	715	409	220	77		4527
	86-87	0	0	32	280									312
LEAD-VILLE	AVE	272	337	522	817	1173	1435	1473	1318	1320	1038	726	439	10870
	85-86	333	359	666	871	1258	1470	1328	1251	1168	994	760	441	10899
	86 87	372	369	626	920									2287
LIMON	AVE	8	6	144	448	834	1070	1156	960	936	570	299	100	6531
	85-86	1	12	274	544	1078	1233	861	910	662	508	336	57	6476
	86-87	4	8	171	551									734
LONGMONT	AVE	0	6	162	453	843	1082	1194	938	874	546	256	78	6432
	85-86	0	6	236	486	1095	1228	869	814	549	469	262	20	6034
	86-87		0	154	498									652
MEEKER	AVE	28	56	261	564	927	1240	1345	1086	998	651	394	164	7714
	85-86	6	31	358	599	967	1249	1164	893	742	646	458	75	7188
	86-87	41	28	402	623									1094
MONTROSE	AVE	0	10	135	437	837	1159	1218	941	818	522	254	69	6400
	85-86	0	0	211	443	803	1106	1032	766	577	453	235	24	5650
	86-87	1	6	183	532									722
PAGOSA SPRINGS	AVE	82	113	297	608	981	1305	1380	1123	1026	732	487	233	8367
	85-86	34	73	376	600	1000	1373	1191	952	803	668	481	183	7734
	86-87	98	45	385	668									1196
PUEBLO	AVE	0	0	89	346	744	998	1091	834	756	421	163	23	5465
	85-86	0	0	172	410	1012	1161	783	728	523	346	167	21	5323
	86 87	0	0	94	428									522
RIFLE	AVE	6	24	177	499	876	1249	1321	1002	856	555	298	82	6945
	85-86	1	6	232	484	882	1147	1076	769	607	477	287	16	5984
	86-87	1	3	226	499									729
STEAMBOAT SPRINGS	AVE	113	169	390	704	1101	1476	1541	1277	1184	810	533	297	9595
	85-86	57	130	434	729	1144	1554	1495	1097	915	688	533	185	8961
	86-87	120	119											
STERLING	AVE	0	6	157	462	876	1163	1274	966	896	528	235	51	6614
	85-86	0	6	230	519	1161	1395	1155	990	594	439	279	22	6790
	86-87	0	4	105	427									536
TELLURIDE	AVE	163	223	396	676	1026	1293	1339	1151	1141	849	589	318	9164
	85-86	121	152	463	648	1023	1270	1130	1011	892	740	585	257	8292
	86-87	200	129	434	716									1479
TRINIDAD	AVE	0	0	86	359	738	973	1051	846	781	468	207	35	5544
	85-86	0	0	175	380	772	1046	738	764	529	365	194	32	4995
	86-87	1	0	90	421									512
WALDEN	AVE	198	285	501	822	1170	1457	1535	1313	1277	915	642	351	10466
	85-86	171	271	578	824	1224	1458	1381	1155	989	836	656	256	9799
	86-87	225	224	530	825									1804
WALSEN-BURG	AVE	0	8	102	370	720	924	989	820	781	501	240	49	5504
	85-86	0	0	165	358	770	982	681	734	515	404	221	42	4872
	86-87	0	0	84	420									504

OCTOBER 1986 CLIMATIC DATA

Eastern Plains*

	Temperature						Degree Days			Precipitation			
Name	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
STERLING	65.4	36.5	51.0	1.1	80	20	427	0	263	1.46	0.62	173.8	8
FORT MORGAN	64.4	33.2	48.8	-2.2	78	21	495	0	246	1.86	1.29	326.3	10
AKRON FAA AP	64.2	37.9	51.0	0.1	75	18	428	0	239	1.08	0.43	166.2	8
HOLYOKE	63.8	37.0	50.4	-1.9	80	20	446	0	240	0.98	0.25	134.2	6
BURLINGTON	63.3	40.0	51.6	-2.4	77	22	406	1	235	1.65	0.89	217.1	5
LIMON WSMO	60.7	33.4	47.0	-1.6	76	13	551	0	193	2.18	1.58	363.3	7
CHEYENNE WELLS	67.6	41.0	54.3	1.0	80	24	325	0	286	1.88	1.05	226.5	6
LAS ANIMAS	72.5	38.9	55.7	-0.1	86	24	280	0	362	2.15	1.52	341.3	6
HOLLY	68.0	29.9	49.0	-5.0	83	18	492	0	284	2.12	1.32	265.0	4
SPRINGFIELD 7WSW	66.8	39.1	53.0	-2.2	80	18	366	0	280	3.57	2.87	510.0	10

Foothills/Adjacent Plains*

	Temperature						Degree Days			Precipitation			
Name	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
FORT COLLINS	61.7	35.5	48.6	-1.4	75	24	500	0	203	1.58	0.57	156.4	11
GREELEY UNC	63.3	34.8	49.0	-1.7	79	24	484	0	229	1.87	0.88	188.9	7
ESTES PARK	56.5	28.7	42.6	-2.7	65	18	686	0	118	2.60	1.82	333.3	15
LONGMONT	63.2	34.2	48.7	-1.7	76	24	498	0	230	1.61	0.73	183.0	11
BOULDER	63.6	36.9	50.2	-3.3	76	21	450	0	228	3.66	2.48	310.2	12
DENVER WSFO AP	62.2	36.4	49.3	-2.4	74	24	477	0	223	1.80	0.92	204.5	11
LAKE GEORGE 8SW	52.3	27.0	39.7	-2.6	63	13	778	0	82	1.19	0.46	163.0	9
COLORADO SPRINGS	60.4	35.6	48.0	-2.6	74	20	519	0	189	1.41	0.66	188.0	9
CANON CITY 2SE	64.8	37.4	51.1	-3.1	78	24	422	0	248	1.09	0.22	125.3	8
PUEBLO WSO AP	67.4	34.4	50.9	-3.1	82	24	428	0	288	0.90	0.32	155.2	5
WALSENBURG	66.1	36.2	51.1	-2.0	76	21	420	0	265	1.50	0.42	138.9	7
TRINIDAD FAA AP	65.9	36.4	51.1	-2.5	79	23	421	0	263	1.78	0.89	200.0	8

Mountains/Interior Valleys*

	Temperature						Degree Days			Precipitation			
Name	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
WALDEN	54.5	21.9	38.2	-0.5	65	9	825	0	94	1.75	0.93	213.4	8
LEADVILLE 2SW	47.8	22.4	35.1	-1.9	58	5	920	0	31	0.82	-0.28	74.5	10
SALIDA	58.5	27.6	43.0	-4.2	69	5	674	0	161	2.00	0.98	196.1	5
BUENA VISTA	56.1	26.4	41.2	-4.9	68	9	730	0	132	2.51	1.73	321.8	8
SAGUACHE	56.5	28.1	42.3	-2.5	67	22	539	0	104	1.15	0.41	155.4	5
HERMIT 7ESE	53.7	19.9	36.8	-1.7	62	-3	866	0	88	4.86	3.29	309.6	5
ALAMOSA WSO AP	58.2	24.4	41.3	-2.4	67	17	728	0	153	1.18	0.46	163.9	6
GRAND LAKE 6SSW	52.3	27.3	39.8	0.0	58	21	777	0	57	1.74	0.85	195.5	9
DILLON 1E	50.4	22.2	36.3	-2.8	59	12	883	0	62	1.00	0.25	133.3	9
CLIMAX	41.8	19.2	30.5	-3.5	53	4	1062	0	5	1.65	0.38	129.9	7
ASPEN 1SW	53.5	28.5	41.0	-2.5	63	16	735	0	93	2.45	0.74	143.3	9
TAYLOR PARK	48.5	13.8	31.2	-1.8	58	-3	1044	0	30	1.45	0.21	116.9	6
TELLURIDE	56.1	27.3	41.7	-1.4	65	12	716	0	115	2.14	-0.08	96.4	10
PAGOSA SPRINGS	60.0	26.2	43.1	-2.2	69	20	668	0	177	3.13	1.14	157.3	7
SILVERTON	50.7	18.7	34.7	-2.3	60	2	929	0	59	1.94	-0.33	85.5	10
WOLF CREEK PASS 1	44.5	20.9	32.7	-3.8	55	5	994	0	6	9.81	5.68	237.5	7

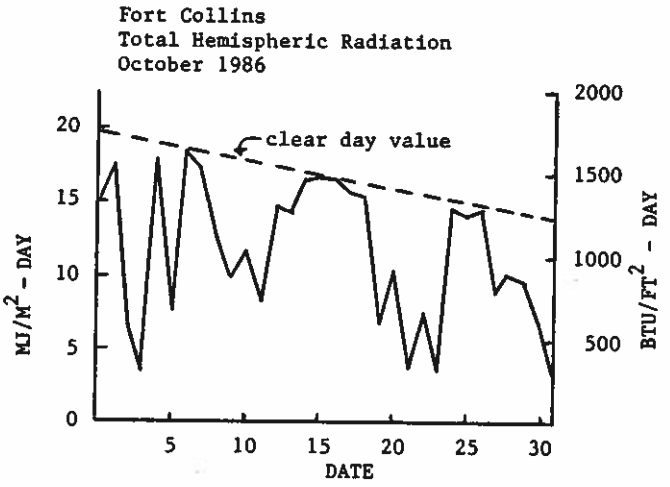
Western Valleys*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
CRAIG 4SW	57.5	29.9	43.7	-1.5	68	20	654	0	138	1.73	0.43	133.1	10
HAYDEN	59.6	30.4	45.0	0.0	70	21	609	0	165	2.57	1.23	191.8	8
MEEKER NO. 2	61.4	28.1	44.8	-1.4	70	19	623	0	191	2.01	0.63	145.7	8
EAGLE FAA AP	59.2	27.9	43.6	-1.2	70	21	658	0	165	2.23	1.35	253.4	6
GLENWOOD SPRINGS	62.5	34.0	48.3	-0.2	72	24	510	0	207	2.44	0.98	167.1	6
RIFLE	65.8	31.5	48.7	-0.0	75	22	499	0	257	1.56	0.41	135.7	10
GRAND JUNCTION WS	63.7	39.2	51.5	-3.4	74	28	414	0	224	1.22	0.31	134.1	8
CEDAREDGE	62.2	33.8	48.0	-2.7	73	17	521	0	206	2.41	1.18	195.9	7
PAONIA 1SW	63.0	36.4	49.7	-1.7	73	18	465	0	221	2.87	1.45	202.1	8
DELTA	66.8	36.0	51.4	-0.3	78	27	414	0	269	1.66	0.78	188.6	10
GUNNISON	58.4	23.8	41.1	-0.2	67	12	734	0	145	0.70	-0.16	81.4	5
MONTROSE NO. 2	61.5	33.6	47.5	-3.0	71	18	532	0	198	1.83	0.70	161.9	7
URAVAN	66.0	36.0	51.0	-3.6	76	29	424	0	263	2.59	1.19	185.0	9
NORWOOD	57.2	30.7	44.0	-2.3	66	9	645	0	134	2.19	0.71	148.0	5
YELLOW JACKET 2W	59.4	36.1	47.7	-2.4	69	22	528	0	159	1.71	-0.24	87.7	7
CORTEZ	62.0	32.6	47.3	-2.7	77	21	541	0	205	1.31	-0.29	81.9	6
DURANGO	61.5	32.0	46.8	-2.2	71	23	559	0	193	3.11	1.09	154.0	7

* Data are received by the Colorado Climate Center for more locations than appear in these tables. Please contact the Colorado Climate Center if additional information is needed.

OCTOBER 1986 SUNSHINE AND SOLAR RADIATION

Station	Number of Days clear	partly cloudy	cloudy	% of possible sunshine	average % of possible
Colorado Springs	11	7	13	—	—
Denver	13	6	12	62%	73%
Fort Collins	8	12	12	—	—
Grand Junction	14	8	9	71%	74%
Pueblo	12	7	12	66%	79%



COLORADO CLIMATE

Colorado Climate Center
Department of Atmospheric Science
Colorado State University
Fort Collins, Colorado 80523

NOVEMBER 1986

November in Review:

November weather seemed pleasant due to the fact that extreme cold was brief, the second half of the month was mild, and most of the snow which fell in the lower elevations melted quickly. However, statistics indicate that temperatures for the month as a whole were near average and precipitation was considerably above average over many sections of the state.

A Look Ahead -- January 1987:

If you were a newcomer to Colorado this past year and enjoyed the sunny, warm and dry January we experienced in 1986, you need to know something -- it's not always like that. It is not a month of heavy snow except up in the mountains, but it is typically the coldest month of the year statewide and the month with the most frequent occurrences of subzero temperatures. Normal daytime temperatures rise into the 30s and 40s (Fahrenheit) from the Eastern Plains into the foothills. The mountains typically see highs in the 20s with 30s common in most western valleys. Temperatures can vary dramatically from day to day east of the mountains but are more persistent in Western Colorado. It is harder to characterize nighttime temperatures. They are greatly affected by local terrain features. In general, lows average around 10° to 15°F east of the mountains with the coldest readings occurring in valley bottoms. Lows are often near 0° in the mountains but colder in the high valleys. Temperatures in the -50° to -60° range have been observed on a few occasions in recent years. In most Januarys (1986 was an exception) there will be at least one episode of bone chilling subzero cold gripping the state. But there are also "chinook" episodes when westerly winds produce downslope warming east of the mountains. Temperatures in the 50s and 60s are common during these episodes. But along with the warmth comes the threat of damaging winds. Several of Colorado's worst windstorms have occurred in January. A windspeed of 147 mph was clocked in Boulder in January 1971. Fortunately, only limited areas of the Colorado Front Range are prone to extreme winds. By contrast, in the valleys of western Colorado, January is the calmest month of the year.

Another sharp contrast is nearly always present in Colorado's January climate. In Colorado's mountains and on the Western Slope, January is frequently the snowiest month of the year. At the same time, areas in the lee (east) of the mountains are extremely dry, and large snowstorms occur infrequently. January precipitation totals average just 0.25" to 0.50" in much of eastern Colorado, but totals increase to more than 4.00" in preferred mountain locations. Almost all January precipitation falls as snow and is often dry and fluffy. Ten inches of wet spring or fall snow will melt down to about 1.00" of water, but in January ten inches of snow may contain only 0.30 to 0.70 inches of moisture as it falls.

White Christmas -- What are the Odds?

I am writing this story against my own better judgement. Frankly, I don't get very excited about analyzing this type of statistic. I could tell you that the high mountains always have White Christmases and the low elevations usually don't, and be done with it. But just to make everyone happy, here are some detailed statistics. You better look now, because I may never print these statistics again.

Some people like snow on Christmas, others prefer it on Christmas Eve. Some like fresh snow and others don't mind how old it is as long as the ground is covered. Still others aren't satisfied until there is at least half a foot of snow on the ground -- enough to do some serious sledding. And then there are those who would rather be playing tennis. Hopefully, the statistics that follow will satisfy all of you.

(continued on last page)

NOVEMBER 1986 DAILY WEATHER

Date	Event
1-4	Remnants of Halloween storm lingered over Arizona and New Mexico. Temperatures gradually moderated, but precipitation continued in southern Colorado throughout the period. More than 1" of moisture was reported for the period in parts of southeast Colorado, while 2" totals were observed in portions of the southwest.
5-9	A fine sunny warm day on the 5th. Then rapid deterioration on the 6th as a deep low pressure area formed directly over Colorado. Light to moderate precipitation fell over western Colorado 6-7th, and light rains turned to snow late on the 6th along the Northern Front Range. Boulder got 4" of snow from the storm. As the storm moved northeastward away from Colorado it developed into a major early season blizzard 7-8th over the Dakotas and southern Canada. Low elevation conditions improved on the 8th and 9th, but snow showers continued in the mountains. Many mountain areas totalled 1 foot or more of snow from the storm. Very cold morning in the mountains on the 9th. Silverton shivered with a -16°F, but Taylor Park Dam's -18°F reading was the coldest in the state for the month.
10-13	Two brief but potent assaults of polar air hit eastern Colorado in rapid succession on the 10th and 12th with an interlude of mild chinook winds between them. A little snow accompanied each blast along the eastern foothills with up to 4 inches of snow slowing rush hour traffic on the 12th in Denver. The first subzero temperature of the year came to a few parts of northeast Colorado on the 13th. Sedgwick hit -5°F. Most of western Colorado was not affected by these cold waves.
13-17	Mild and dry over the state. Sunny except for a narrow strip of clouds perched on the Continental Divide associated with strong westerly winds aloft. Las Animas reached 78°F on the 17th, the warmest in the state for the month.
18-30	A steady progression of storm systems from the Pacific crossed Colorado approximately every 3 days. Between storms, there was plenty of sunshine and mild temperatures for this late in the fall. The first storm hit on the 18-19th dumping considerable amounts of rain at lower elevations of southwestern Colorado with snow in the higher mountains. Heavier precipitation reports included 1.25" at Cedaredge and 1.08" at Crested Butte (10.5" snow). Only a few sprinkles and flurries spilled across the mountains leaving the plains dry but breezy. The next storm appeared 22-23rd affecting primarily the southern mountains and southern Front Range. Walsenburg picked up 0.66" of precipitation (6.5" snow) from this storm. Ouray received 0.81" (8.3" snow). Again there was a respite until the 25-26th when another Pacific cold front and upper level disturbance crossed the state. Most precipitation from this storm fell in southwestern Colorado. Grand Junction received 0.31" of cold rain. Lemon Dam totalled 0.88" of precipitation (14" snow). Weather improved for Thanksgiving (27th) and remained dry and warm 28-29th. Denver temperatures soared to 69° on the 28th. Pueblo reached 71° on the 29th. Then came a rapid change, and by morning of the 30th much of the state was receiving snow and strong winds. Near blizzard conditions developed across the Eastern Plains during the day bringing travel to an untimely standstill on the Sunday after Thanksgiving. Limon totalled 6.1" of snow, 46 mph wind gusts, and hundreds of stranded motorists. For parts of the plains this was the first precipitation since the Halloween storm.

November 1986 Extremes

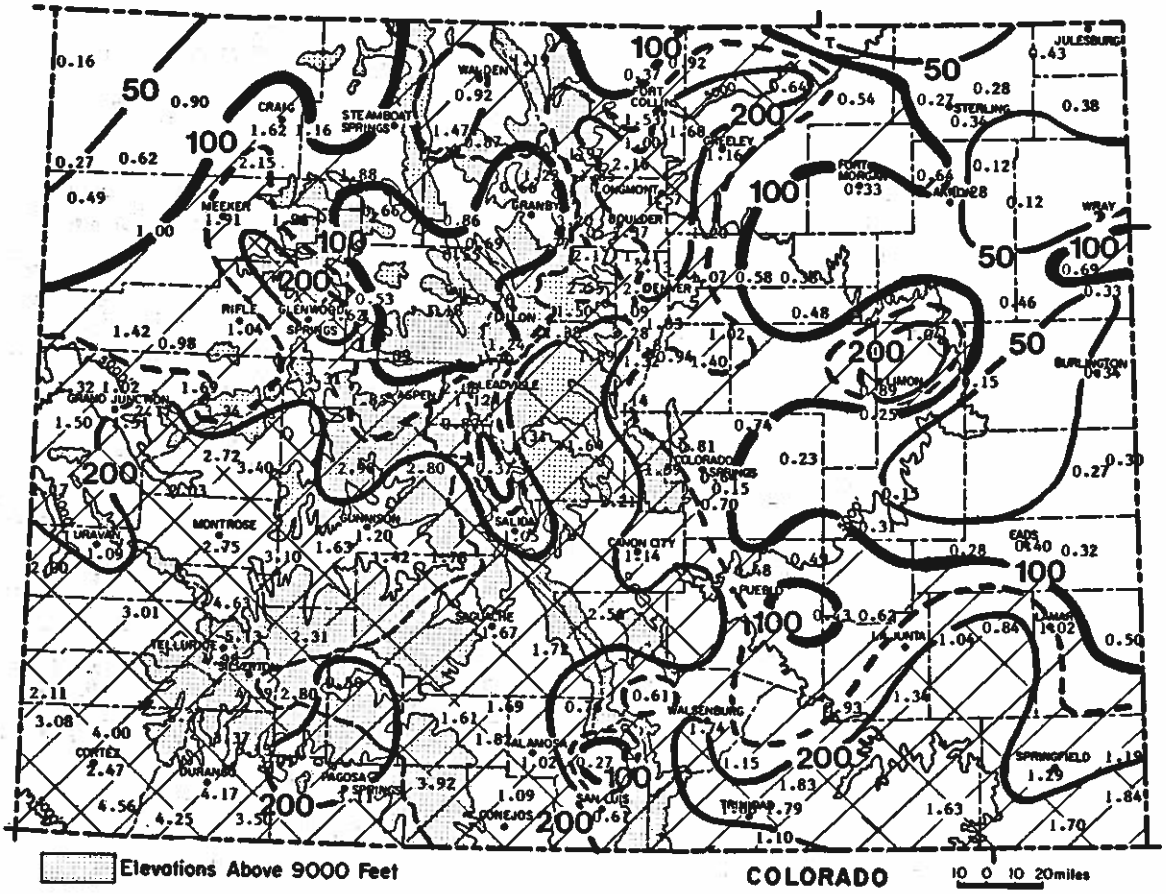
Highest Temperature	78°F	November 17	Las Animas
Lowest Temperature	-18°F	November 9	Taylor Park Reservoir
Greatest Total Precipitation	6.23"		Rico
Least Total Precipitation	T		Kauffman 4SSE
Greatest Total Snowfall*	57"		Telluride

* data derived only from those stations with complete daily snowfall records.

NOVEMBER 1986 PRECIPITATION

Very wet weather for November was the rule in all of southwestern Colorado, portions of the extreme southeastern plains and in a narrow band from west of Pikes Peak northward along the Front Range. These areas generally received 2 to 4 times their November average precipitation. The northern portions of the state were skirted by several of the storms which dampened southern areas. As a result, precipitation totals were below average in several regions. Dry areas included extreme northwestern Colorado, portions of the upper Colorado River basin from near Eagle to Granby and much of the east central and northeastern plains. A few locations such as Yuma, Wray, and Flagler received less than 25% of their November average.

Greatest		Least	
Rico	6.23"	Kauffman 4SSE	Trace
Ouray	5.13"	Wray	Trace
Lemon Dam	5.13"	Yuma	0.12"
Telluride	4.98"	Otis 11NE	0.12"
Ridgway	4.63"	Fountain	0.15"
Mesa Verde Natl Park	4.50"	Karval	0.15"



Precipitation amounts (inches) for November 1986 and contours of precipitation as a percent of the 1961-1980 average. The dashed line represents 150% of average.

1987 WATER YEAR PRECIPITATION

Once again, Colorado is getting off to a fine start to the new water year. Practically the entire state is wetter than average for the October-November period. Much above average (greater than 200%) precipitation has accumulated across most of southeastern Colorado, on both the northern and southern sides of the San Juan mountains and in a band from Fort Collins and Boulder southward to the San Luis Valley. Only a few tiny areas are below average, and these are scattered across the northern half of the state both east and west of the mountains.

Comparison to Last Year

The 1986 water year also got off to a fairly wet start. Wetter conditions are present this year in southeast Colorado, along the Front Range and in the Gunnison Valley while northwestern Colorado is drier than at this time last year.

1987 Water Year to Date through November

Wettest (as % of average)

Walsh	373%	4.37"
Stonington	367%	4.74"
Troy 1SE	359%	4.34"

Driest (as % of average)

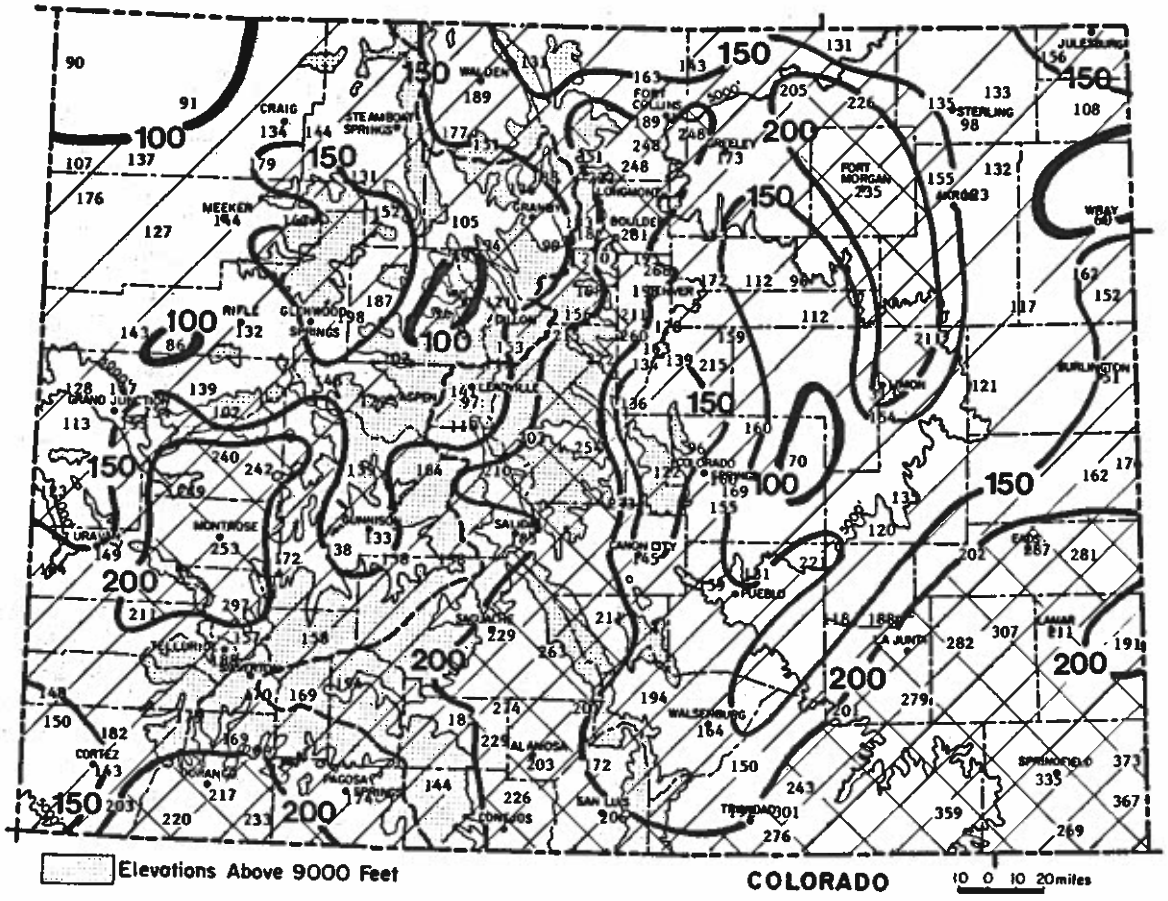
Wray	60%	0.82"
Rush 4N	70%	0.63"
Parachute	86%	1.99"

Wettest (total precipitation)

Lemon Dam	9.02"	200%
Mount Evans Research Center	8.32"	198%
Rico	7.74"	179%

Driest (total precipitation)

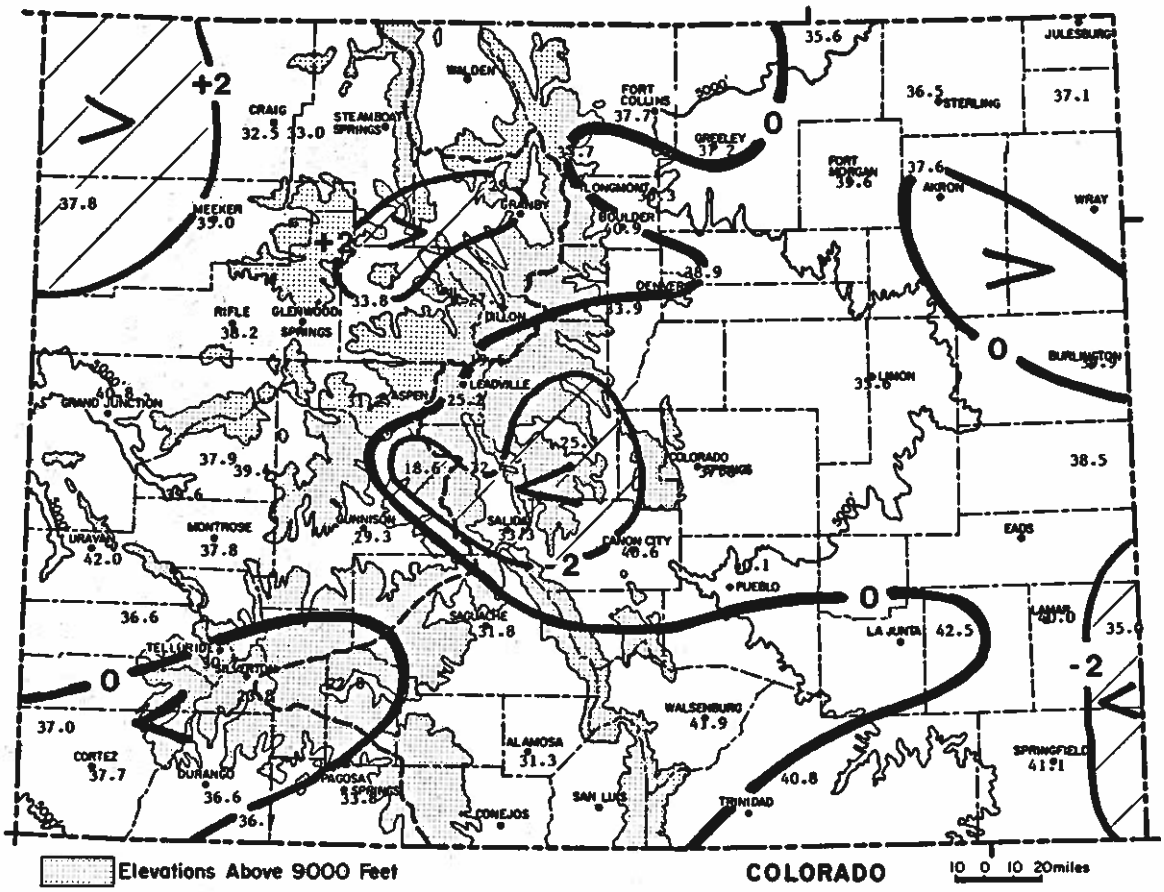
Rush	0.63"	70%
Wray	0.82"	60%
Kauffman 4SSE	1.05"	131%
Ordway 21N	1.05"	120%



Precipitation for October 1986 through November 1986 as a percent of the 1961-1980 average.

NOVEMBER 1986 TEMPERATURES AND DEGREE DAYS

Most of western Colorado was 1 or 2 degrees Fahrenheit warmer than average for November. Eastern Colorado was generally near to slightly cooler than average. Unusually deep early-season snowcover near Salida and Buena Vista produced a local cold spot in that area.



November 1986 temperatures (degrees Fahrenheit) and contours of departures from 1961-1980 averages.

NOVEMBER 1986 SOIL TEMPERATURES

Near-surface soil temperatures dropped quickly in early November and then held steady through the second half of the month.

These soil temperature measurements were taken at Colorado State University beneath sparse unirrigated sod with a flat, open exposure. These data are not representative of all Colorado locations.

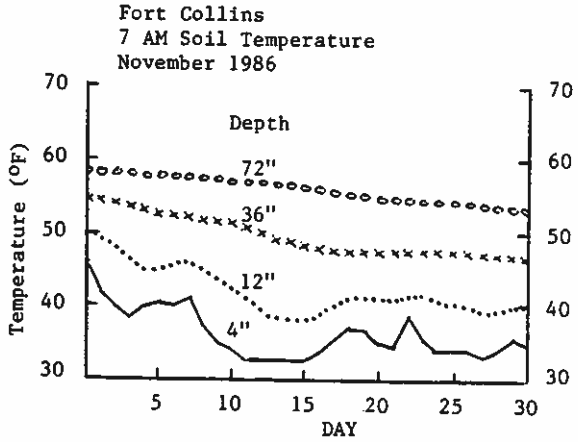


Table 1. Colorado Heating Degree Day Data through November 1986.

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
ALAMOSA	AVE	40	100	303	657	1074	1457	1519	1182	1035	732	453	165	8717
	85-86	30	66	378	634	1045	1472	1231	983	864	638	446	138	7925
	86-87	63	75	366	728	1004								2236
ASPEN	AVE	95	150	348	651	1029	1339	1376	1162	1116	798	524	262	8850
	85-86	119	107	453	656	1066	1278	1175	1029	848	739	530	185	8185
	86-87	147	132	428	735	1009								2451
BOULDER	AVE	0	6	130	357	714	908	1004	804	775	483	220	59	5460
	85-86	0	0	222	400	982	1018	674	762	496	423	249	16	5242
	86-87	1	0	175	450	714								1340
BUENA VISTA	AVE	47	116	285	577	936	1184	1218	1025	983	720	459	184	7734
	85-86	63	54	405	597	938	1158	972	946	806	661	450	149	7199
	86-87	79	69	388	730	970								2236
BURLING-TON	AVE	6	5	108	364	762	1017	1110	871	803	459	200	38	5743
	85-86	0	5	206	405	977	1142	740	820	525	386	163	12	5381
	86-87	0	0	76	406	745								1227
CANON CITY	AVE	0	9	81	301	639	831	911	734	707	411	179	33	4836
	85-86	0	6	186	397	886	1036	711	756	507	399	248	40	5172
	86-87	4	2	132	422	724								1284
COLORADO SPRINGS	AVE	8	25	162	440	819	1042	1122	910	880	564	296	78	6346
	85-86	5	8	253	487	978	1143	822	840	635	487	315	49	6022
	86-87	4	14	174	519	813								1524
CORTEZ	AVE	0	11	115	434	813	1132	1181	921	828	555	292	68	6350
	85-86		4	264	484	884	1081		805	711	572	321		5126
	86-87	10	6	214	541	813								1584
CRAIG	AVE	32	58	275	608	996	1342	1479	1193	1094	687	419	193	8376
	85-86	10	42	353	649	1043	1487	1362	1023	780	669	461	76	7955
	86-87	31	15	338	654	967								2005
DELTA	AVE	0	0	94	394	813	1135	1197	890	753	429	167	31	5903
	85-86	0	M	113	335	658	1026	948	684	530	365	174	6	4839
	86-87	0	0	145	414	M								559
DENVER	AVE	0	0	135	414	789	1004	1101	879	837	528	253	74	6014
	85-86		1	241	435	1051	1094	758	802	548	456	260	22	5668
	86-87	0	0	145	477	775								1397
DILLON	AVE	273	332	513	806	1167	1435	1516	1305	1296	972	704	435	10754
	85-86	260	300	609	856	1183	1439	1380	1175	1072	915	716	388	10293
	86-87	322	318	580	883	1125								3228
DURANGO	AVE	9	34	193	493	837	1153	1218	958	862	600	366	125	6848
	85-86	3	8	274	476	916	1159	967	802	686	575	341	70	6277
	86-87	23	9	295	559	844								1730
EAGLE	AVE	33	80	288	626	1026	1407	1448	1148	1014	705	431	171	8377
	85-86	19	52	356	605	995	1352	1324	890	736	598	428	88	7443
	86-87	37		314	658	930								1939
EVER-GREEN	AVE	59	113	327	621	916	1135	1199	1011	1009	730	489	218	7827
	85-86	62	90	387	651	1039	1119	947	927	770	608	532	157	7289
	86-87	75	90	380	699	927								2171
FORT COLLINS	AVE	5	11	171	468	846	1073	1181	930	877	558	281	82	6483
	85-86	1	8	243	499	1078	1199	883	816	568	470	261	22	6048
	86-87	0	0	178	500	809								1487
FORT MORGAN	AVE	0	6	140	438	867	1156	1283	969	874	516	224	47	6520
	85-86	0	2	239	548	1165	1425	1160	915	616	401	246	19	6736
	86-87	0	4	138	495	874								1511
GRAND JUNCTION	AVE	0	0	65	325	762	1138	1225	882	716	403	148	19	5683
	85-86	0	0	139	351	779	1018	949	685	489	366	168	3	4947
	86-87	0	0	130	414	718								1262

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
GRAND LAKE	AVE	214	264	468	775	1128	1473	1593	1369	1318	951	654	384	10591
	85-86	206	265	513	744	1115	1454	1494	1174	1083	896	651	304	9899
	86-87	245	242	488	777	1051								2803
GREELEY	AVE	0	0	149	450	861	1128	1240	946	856	522	238	52	6442
	85-86	0	6	249	501	1131	1311	1010	845	545	440	232	15	6285
	86-87	0	0	142	484	825								1451
GUNNISON	AVE	111	188	393	719	1119	1590	1714	1422	1231	816	543	276	10122
	85-86	84	152	433	678	1058	1648	1712	1084	952	711	517	204	9233
	86-87	123	146	420	734	1064								2487
LAS ANIMAS	AVE	0	0	45	296	729	998	1101	820	698	348	102	9	5146
	85-86	0	0	134	313	816	1106	737	715	409	220	77		4527
	86-87	0	0	32	280	668								980
LEAD-VILLE	AVE	272	337	522	817	1173	1435	1473	1318	1320	1038	726	439	10870
	85-86	333	359	666	871	1258	1470	1328	1251	1168	994	760	441	10899
	86-87	372	369	626	920	1188								3475
LIMON	AVE	8	6	144	448	834	1070	1156	960	936	570	299	100	6531
	85-86	1	12	274	544	1078	1233	861	910	662	508	336	57	6476
	86-87	4	8	171	551	873								1607
LONGMONT	AVE	0	6	162	453	863	1082	1194	938	874	546	256	78	6432
	85-86	0	6	236	486	1095	1228	869	814	549	469	262	20	6034
	86-87		0	154	498	852								1504
MEEKER	AVE	28	56	261	564	927	1240	1345	1086	998	651	394	164	7714
	85-86	6	31	358	599	967	1249	1164	893	742	646	458	75	7188
	86-87	41	28	402	623	894								1988
MONTROSE	AVE	0	10	135	437	837	1159	1218	941	818	522	254	69	6400
	85-86	0	0	211	443	803	1106	1032	766	577	453	235	24	5650
	86-87	1	6	183	532	809								1531
PAGOSA SPRINGS	AVE	82	113	297	608	981	1305	1380	1123	1026	732	487	233	8367
	85-86	34	73	376	600	1000	1373	1191	952	803	668	481	183	7734
	86-87	98	43	385	668	927								2123
PUEBLO	AVE	0	0	89	346	744	998	1091	834	756	421	163	23	5465
	85-86	0	0	172	410	1012	1161	783	728	523	346	167	21	5323
	86-87	0	0	94	428	741								1263
RIFLE	AVE	6	24	177	499	876	1249	1321	1002	856	555	298	82	6945
	85-86	1	6	232	484	682	1147	1076	769	607	477	287	16	5984
	86-87	1	3	226	499	795								1524
STEAMBOAT SPRINGS	AVE	113	169	390	704	1101	1476	1541	1277	1184	810	533	297	9595
	85-86	57	130	434	729	1144	1554	1495	1097	915	688	533	185	8961
	86-87	120	119											
STERLING	AVE	0	6	157-	462	876	1163	1274	966	896	528	235	51	6614
	85-86	0	6	230	519	1161	1395	1155	990	594	439	279	22	6790
	86-87	0	4	105	427	847								1383
TELLURIDE	AVE	163	223	396	676	1026	1293	1339	1151	1141	849	589	318	9164
	85-86	121	152	463	648	1023	1270	1130	1011	892	740	585	257	8292
	86-87	200	129	434	716	1018								2497
TRINIDAD	AVE	0	0	86	359	738	973	1051	846	781	468	207	35	5544
	85-86	0	0	175	380	772	1046	738	764	529	365	194	32	4995
	86-87	1	0	90	421	719								1231
WALDEN	AVE	198	285	501	822	1170	1457	1535	1313	1277	915	642	351	10466
	85-86	171	271	578	824	1224	1458	1381	1155	989	836	656	256	9799
	86-87	225	224	530	825	1126								2930
WALSEN-BURG	AVE	0	8	102	370	720	924	989	820	781	501	240	49	5504
	85-86	0	0	165	358	770	982	681	734	515	404	221	42	4872
	86-87	0	0	84	420	682								1186

NOVEMBER 1986 CLIMATIC DATA

Eastern Plains*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
KAUFFMAN 4SSE	50.5	20.8	35.6	-0.3	72	-8	872	0	75	0.00	-0.28	0.0	0
STERLING	50.7	22.3	36.5	0.4	71	1	847	0	82	0.27	-0.17	61.4	3
FORT MORGAN	50.9	20.3	35.6	-1.1	68	4	874	0	76	0.33	-0.03	91.7	3
AKRON FAA AP	51.0	24.3	37.6	0.9	68	3	813	0	75	0.64	0.18	139.1	4
HOLYOKE	51.9	22.4	37.1	-0.8	72	-5	828	0	98	0.38	-0.14	73.1	3
BURLINGTON	53.2	26.6	39.9	0.2	72	6	745	0	99	0.34	-0.21	61.8	2
LIMON WSMO	49.7	21.5	35.6	-0.4	69	5	873	0	81	0.89	0.51	234.2	4
CHEYENNE WELLS	53.1	23.9	38.5	-0.6	70	5	789	0	93	0.27	-0.22	55.1	2
LAMAR	54.4	25.6	40.0	-0.3	73	12	743	0	114	1.02	0.42	170.0	4
LAS ANIMAS	59.4	25.5	42.5	1.5	78	14	668	0	162	1.04	0.54	208.0	5
HOLLY	52.1	17.9	35.0	-4.3	75	5	894	0	105	0.50	-0.07	87.7	2
SPRINGFIELD 7WSW	55.9	26.3	41.1	-0.6	73	11	710	0	131	1.29	0.54	172.0	7

Foothills/Adjacent Plains*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
FORT COLLINS	50.5	25.0	37.7	0.5	65	4	809	0	64	1.53	0.90	242.9	5
GREELEY UNC	49.3	25.1	37.2	0.3	67	4	825	0	70	1.16	0.40	152.6	6
ESTES PARK	44.7	22.7	33.7	-0.9	57	-4	932	0	20	1.97	1.45	378.8	9
LONGMONT	50.1	22.5	36.3	-0.9	65	2	852	0	83	1.57	0.96	257.4	7
BOULDER	53.3	28.5	40.9	0.1	69	5	714	0	93	2.37	1.41	246.9	7
DENVER WSFO AP	51.4	26.5	38.9	0.2	70	7	775	0	91	1.07	0.24	128.9	6
EVERGREEN	48.6	19.2	33.9	-0.3	65	3	927	0	62	1.09	0.09	109.0	4
LAKE GEORGE 8SW	35.6	15.0	25.3	-3.0	52	5	1181	0	1	1.64	1.26	431.6	7
COLORADO SPRINGS	49.8	25.5	37.6	-0.1	69	10	813	0	80	0.64	0.11	120.8	5
CANON CITY 2SE	53.2	28.1	40.6	-1.7	70	10	724	0	110	1.14	0.48	172.7	4
PUEBLO WSO AP	56.4	23.8	40.1	-0.4	74	8	741	0	140	0.48	0.01	102.1	2
WALSENBURG	55.4	28.5	41.9	0.8	70	6	682	0	110	1.74	0.85	195.5	7
TRINIDAD FAA AP	55.7	25.9	40.8	-0.2	74	7	719	0	121	1.83	1.24	310.2	7

Mountains/Interior Valleys*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
WALDEN	38.1	16.2	27.2	0.9	50	1	1126	0	0	0.92	0.33	155.9	10
LEADVILLE 2SW	38.2	12.2	25.2	0.2	50	-5	1188	0	0	1.12	0.22	124.4	8
SALIDA	45.5	21.1	33.3	-3.2	59	5	943	0	27	1.05	0.43	169.4	4
BUENA VISTA	46.4	18.3	32.4	-1.4	55	4	970	0	12	0.37	-0.22	62.7	2
SAGUACHE	44.8	18.8	31.8	0.5	56	8	857	0	15	1.67	1.18	340.8	7
HERMIT 7ESE	38.9	6.7	22.8	-1.8	49	-10	1260	0	0	0.50	-0.68	42.4	2
ALAMOSA WSO AP	46.0	16.5	31.3	1.5	59	4	1004	0	25	1.02	0.66	283.3	6
GRAND LAKE 6SSW	40.1	19.4	29.7	2.0	49	5	1051	0	0	0.66	-0.21	75.9	6
DILLON 1E	39.9	14.6	27.3	0.6	55	0	1125	0	5	0.78	0.07	109.9	11
CLIMAX	31.2	7.9	19.5	-2.2	43	-8	1355	0	0	1.70	-0.03	98.3	14
ASPEN 1SW	43.2	19.2	31.2	1.2	58	4	1009	0	14	1.85	0.25	115.6	9
TAYLOR PARK	37.3	0.0	18.6	-0.6	46	-18	1385	0	0	2.80	1.73	261.7	11
TELLURIDE	43.6	17.9	30.7	-0.4	54	-4	1018	0	8	4.98	3.43	321.3	10
PAGOSA SPRINGS	49.5	18.1	33.8	0.8	57	5	927	0	39	3.11	1.51	194.4	7
SILVERTON	41.9	5.6	23.8	-0.0	51	-16	1229	0	1	4.39	2.94	302.8	9

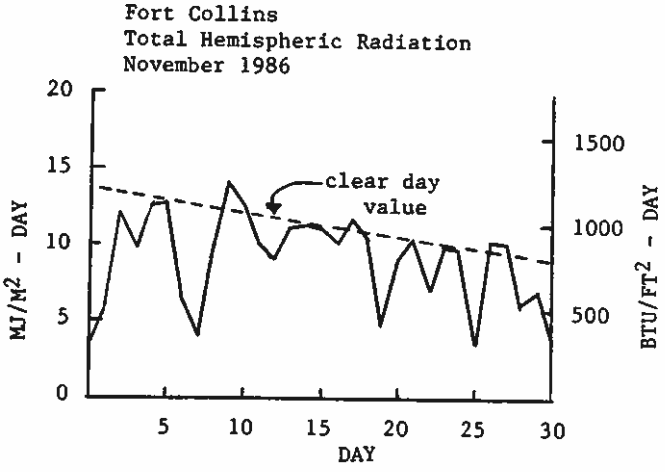
Western Valleys*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
CRAIG 4SW	42.0	23.0	32.5	1.0	57	13	967	0	10	1.62	0.42	135.0	9
HAYDEN	43.1	23.0	33.0	1.2	57	12	951	0	12	1.16	-0.08	93.5	10
MEEKER NO. 2	47.1	22.8	35.0	1.9	57	10	894	0	29	1.91	0.95	199.0	7
RANGELY 1E	50.2	25.3	37.8	4.1	59	18	783	0	38	0.49	-0.14	77.8	4
EAGLE FAA AP	46.5	21.1	33.8	2.2	59	7	930	0	27	0.53	-0.06	89.8	7
RIFLE	52.0	24.5	38.2	1.5	62	15	795	0	62	1.04	0.23	128.4	8
GRAND JUNCTION WS	51.0	30.6	40.8	0.6	63	24	718	0	49	1.02	0.41	167.2	9
CEDAREDGE	48.6	27.3	37.9	0.0	59	14	805	0	32	2.72	1.82	302.2	7
PAONIA 1SW	50.5	28.3	39.4	0.7	60	15	760	0	51	3.40	2.23	290.6	10
DELTA	53.2	26.8	39.6	1.1	66	9	428	0	35	2.03	1.43	338.3	9
GUNNISON	43.5	15.1	29.3	1.2	56	-5	1064	0	8	1.20	0.64	214.3	6
MONTROSE NO. 2	49.1	26.5	37.8	0.3	62	15	809	0	42	2.75	2.07	404.4	8
URAVAN	55.6	28.4	42.0	1.0	72	19	683	0	99	1.09	0.03	102.8	4
NORWOOD	49.7	23.6	36.6	2.8	62	9	816	0	46	3.01	2.03	307.1	7
YELLOW JACKET 2W	47.2	26.8	37.0	-0.3	56	10	833	0	19	3.08	1.84	248.4	8
CORTEZ	49.9	25.4	37.7	-0.6	60	12	813	0	40	2.47	1.44	239.8	8
DURANGO	49.6	23.7	36.6	-0.8	60	11	844	0	40	4.17	2.84	313.5	10
IGNACIO 1N	51.3	22.1	36.7	1.0	60	10	841	0	49	3.50	2.47	339.8	11

* Data are received by the Colorado Climate Center for more locations than appear in these tables. Please contact the Colorado Climate Center if additional information is needed.

NOVEMBER 1986 SUNSHINE AND SOLAR RADIATION

Station	Number of Days clear	partly cloudy	cloudy	% of possible sunshine	average % of possible
Colorado Springs	10	12	8	--	--
Denver	10	7	13	60%	65%
Fort Collins	10	11	9	--	--
Grand Junction	7	14	9	70%	63%
Pueblo	12	10	8	66%	74%



White Christmas -- What are the Odds? continued

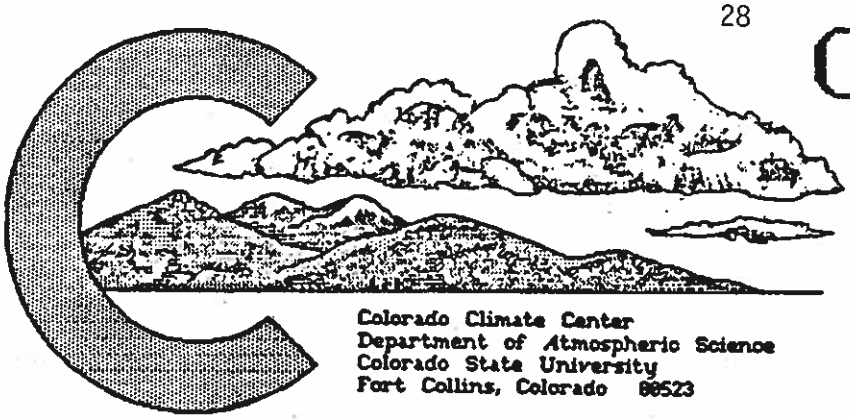
Location	Elev. (ft)	Years of Data used in Analysis	Percent Probability: Snow-depth ≥ 1" on Dec 25	Snow-depth ≥ 6" on Dec 25	Snowfall ≥ 0.5" on Dec 24	Snowfall ≥ 0.5" on Dec 25	Snowfall ≥ 0.5" on Dec 24-25 combined
Alamosa	7536	35	50%	6%	8%	3%	11%
Aspen	7930	37	99%	82%	34%	26%	47%
Berthoud Pass	11310	30	100%	99%	65%	60%	74%
Boulder	5375	31	31%	6%	16%	13%	25%
Colo. Springs	6090	37	26%	3%	8%	2%	10%
Denver	5286	33	38%	6%	18%	3%	21%
Dillon	9070	37	96%	61%	26%	18%	32%
Durango	6600	34	63%	43%	9%	14%	23%
Fort Collins	5004	39	40%	4%	9%	5%	13%
Grand Junction	4849	37	32%	6%	8%	3%	9%
Lamar	3620	35	25%	2%	14%	2%	16%
Pueblo	4640	37	21%	3%	8%	3%	11%
Salida	7060	28	24%	4%	7%	7%	9%
Sedgwick	3990	36	35%	12%	11%	14%	19%
Steamboat Spr.	6770	37	97%	92%	42%	34%	50%
Telluride	8800	32	97%	86%	33%	30%	49%
Trinidad A.P.	5746	37	26%	5%	16%	8%	21%

As you can see, the odds of having snow on the ground on Christmas are nearly 100% throughout the Colorado Rockies, and the chances are also good of having deep snow. The average snowdepth on Christmas Day is 16" at Steamboat Springs, 14" at Telluride and Aspen, and 8" at Dillon. Higher up, Berthoud Pass averages 36". But you don't have to go far from the mountains until the chances of having snow on the ground drop drastically, and the chances for deep snow become slight. On the Western Slope, the chances for having at least 1" of snow on the ground on Christmas Day range between 30 and 60%. East of the mountains probabilities are even lower ranging from 40% at Fort Collins and 38% at Denver to only 26% at Colorado Springs, 25% at Lamar and 21% at Pueblo. Of the stations analyzed, Pueblo is the place most likely to be free of snow on Christmas Day with Salida a surprisingly close second (24%).

The chances of having fresh snow fall on either December 24 or 25 are slim in all but the higher mountains. Berthoud Pass tops the list with a 65% chance on the 24th, 60% chance on the 25th, and a 74% chance over the 2-day period combined. At nearly all locations at lower elevations the chance for fresh snow on either of the 2 days is less than 25%, and on Christmas Day itself is less than 15%. Snow on Christmas Day has been very infrequent east of the mountains in recent decades. At Colorado Springs it has been more than 40 years since the last time 1/2" or more of snow fell on Christmas Day. There have been a few large storms on either side of Christmas Day in recent years (notably, December 24, 1982), but there has not been a major Colorado snowstorm east of the Continental Divide on Christmas Day since a blizzard roared across the Eastern Plains in 1941. The same is not true in the mountains. Large Christmas storms occur about one year in six. As recently as 1983 the mountains were greeted with 1-3 feet of snow on the 24-25th.

Have the last few decades been consistent with longer records? We looked at 100 years of Fort Collins snowfall data to come up with an answer. Since 1950, Fort Collins has had measurable snowfall on Christmas Day 4 times and at least 1/2" just twice. These work out to occurrence probabilities of 11% and 5.4%, respectively. Using a full 100 years of data, measurable snowfall has occurred 10 times and at least 1/2" has occurred 7 times. These represent occurrence probabilities of 10% and 7%, respectively. In other words, things haven't changed much.

One nice thing about this part of the country is you can often choose whether or not to have a white Christmas. Since the majority of the state's population lives near but not in the mountains, it is just a short drive up to where Christmases are almost always white. If that's not what you want, stay at home (or drive down to Pueblo) and the odds are you won't have to put up with snow. There's even a chance you might get to play some outdoor tennis.



COLORADO CLIMATE

Colorado Climate Center
Department of Atmospheric Science
Colorado State University
Fort Collins, Colorado 80523

DECEMBER 1986

December in Review:

Colorado experienced an easy-going December with plentiful sunshine, calm winds and very little precipitation. The lack of December snow in the mountains revived memories of the severe drought of 1976-77. Temperatures were moderate with only one brief cold wave early in the month. However, cold air remained trapped in some of the high snowcovered mountain valleys resulting in a few local pockets of extreme cold.

A Look Ahead -- February 1987:

One of the great things about the weather is that, even with our use of current high technology, our ability to look ahead and anticipate accurately the weather weeks or months ahead is still only marginal. Our use of historical records doesn't produce accurate forecasts either, but it does offer reasonable insight into the most typical weather patterns and the expected ranges of variability.

One thing we know for certain about February -- daylength will increase noticeably as the sun begins its trek northward. This begins to have an effect on our climate, especially later in the month, as warmer temperatures occur more frequently. This warmup begins first at lower elevations away from the mountains. Locations such as Grand Junction and Lamar are often 8 to 10 degrees Fahrenheit warmer in February than in January. However, the higher areas experience very little change. In the mountains, subzero temperatures are just as likely in February as in January. The coldest temperature extremes ever observed in Colorado have occurred in February. The all-time record low of -61°F occurred in Maybell on February 1, 1985.

Last year, February brought an incredible snow blitz to the Colorado Rockies. But often February brings a slight respite in advance of the typical late winter onslaught in March. At lower elevations, especially east of the mountains, February is usually very dry with monthly precipitation totals of only about 0.25" (3-8" snow). Precipitation increases to 0.50-1.00" in the eastern foothills (8-20" snow) and rises to 2.00-4.00" in the higher mountains (30-60" snow). In the western valleys precipitation varies from about 0.50" to 1.50".

The Temperature's Below Zero? -- So What!

In much of this country, and even in a few parts of Colorado, temperatures of zero degrees Fahrenheit or below occur infrequently. But in some of our mountain valleys, subzero temperatures are as common as rainy days in Seattle (well, almost). This may sound pretty frightening to a newcomer, but Colorado's cold spots do have one thing going for them -- light winds. From the High Plains east to New England, brisk winds often accompany extreme cold. In much of Colorado winter winds are light, especially during the coldest periods. As a result, extremes are bearable. The chances are excellent that a -20°F temperature in Steamboat Springs won't feel any worse than a +10°F in Chicago.

The following table shows comparative information for locations in Colorado and elsewhere in this country. The number of days when the temperature dips to 0° or below can vary incredibly from year to year in some places. For example, in Fort Collins in the winter of 1898-1899, 32 days had minimum temperatures $\leq 0^{\circ}$F compared to only one day in the 1966-67 winter and again in 1982-83. These averages don't describe this variabilty, but at least they provide some comparative information.

(continued on last page)

DECEMBER 1986 DAILY WEATHER

Date	Event
1	Snow ended during the morning in southeast and extreme eastern Colorado, but brisk winds continued on the Eastern Plains. Several inches of snow were recorded at some stations along the southern Front Range from near Trinidad to La Junta. Roads were reopened following the previous day's blizzard-like conditions over portions of the plains.
2-4	Sunny and dry statewide. Warmer than average in western Colorado, but chilly east of the mountains.
5-7	Increasing clouds and quite mild on the 5th especially along the eastern foothills. Pueblo's 65°F reading was the highest in the state for December. An ominous storm system began spreading rain into western Colorado early on the 6th. Snow began later in the day east of the mountains as colder air pushed down from the north. Precipitation continued on the 7th diminishing during the day. But the storm really never got its act together. Only southwestern Colorado had impressive precipitation totals. Durango totalled 1.04" for the storm with most of it falling as rain. The total at Lemon Dam was 1.08" where it fell as 18" of snow.
8-10	The original storm fizzled over southern New Mexico but a new strong surge of polar air pushed southward across the entire state on the 8th triggering another round of precipitation which continued on the 9th. Most precipitation was light, but several inches of fluffy snow fell along the Front Range. Heavier amounts included 8" at Walsenburg and 10" at Boulder. As skies cleared later on the 9th, temperatures plummetted to their lowest levels so far this winter. Some examples of low temperatures the morning of the 10th were: Grand Junction 14°F, Boulder -2°, Denver, Pueblo and Longmont -9°, Fort Morgan -15°, Crested Butte -30°, Antero Reservoir -44° and, as usual, Taylor Park claimed ice-box honors with a lovely -53° reading. That is the earliest in the winter that they have gotten so cold.
11-31	An unusually lengthy period of "non-weather" took place for the duration of the month. Except for some scant snowshowers in the mountains on the 18-19th and again on the 30th-31st, no precipitation fell anywhere in the state. Upper level winds were surprisingly light throughout the period and sunshine was plentiful. Day to day temperatures remained remarkably consistent. During this period some interesting temperature patterns developed and persisted. Several valleys of western Colorado, which are normally snowcovered in December, remained brown. Temperatures in those areas stayed well above average throughout the month. Where snowcover was present in the mountains as usual, temperatures remained near average. However, there were several areas primarily east of the mountains where more snowcover was present than in many Decembers. In combination with the lack of strong upper-level winds, valley cold pockets formed in areas that are frequently warmer but much windier. The most striking example was the daily temperature difference between the weather station at Eleven Mile Reservoir and Cheesman Lake. Throughout this entire 3-week period, daily high and low temperatures at Eleven Mile Reservoir averaged 8.7°F and -16.6°F, respectively. This compared to Lake Cheesman temperatures of 46.7°F for daily highs and +7.4°F for the daily lows. On the 19th there was a 44 degree difference in high temperatures between those 2 stations on the South Platte River separated by only 1700 feet of elevation and 25 horizontal miles.

December 1986 Extremes

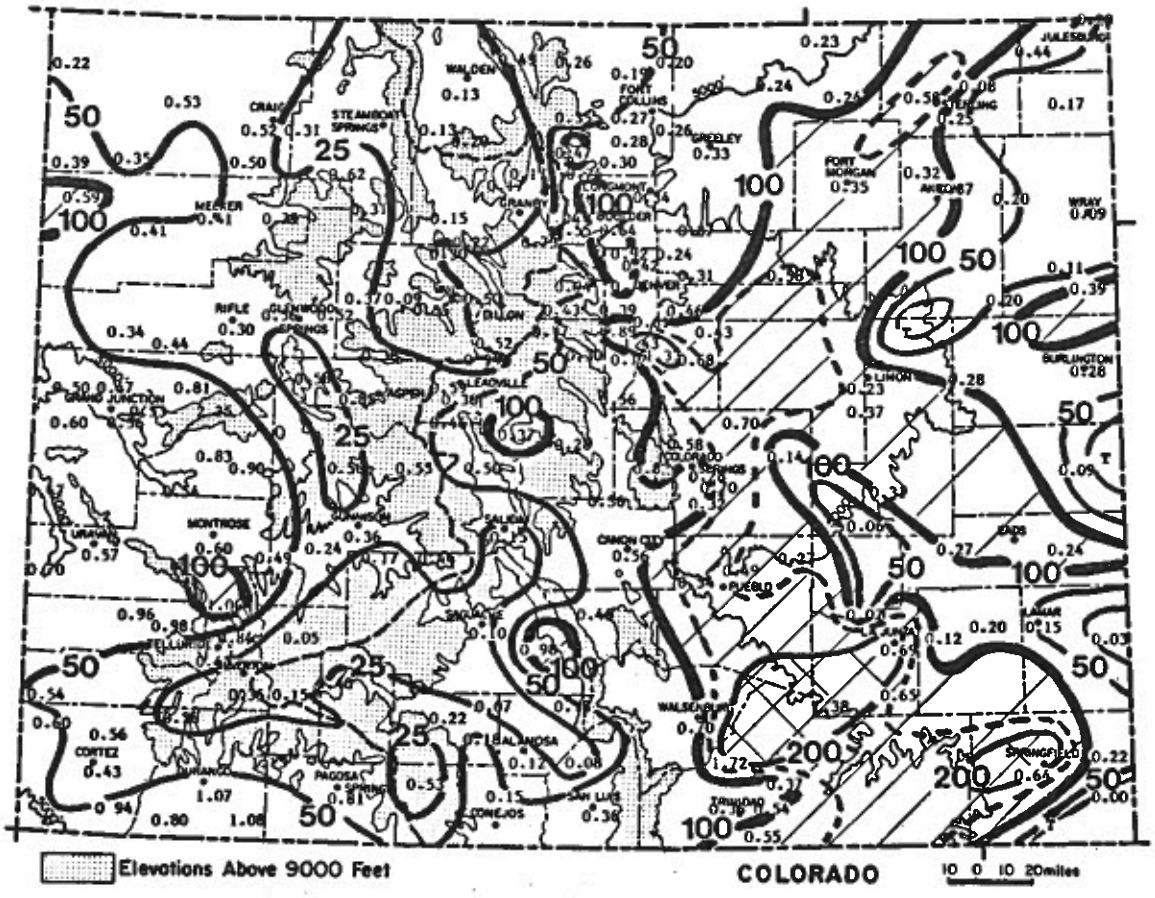
Highest Temperature	65°F	December 5	Pueblo WSO AP
Lowest Temperature	-53°F	December 10	Taylor Park Reservoir
Greatest Total Precipitation	2.25"		Bonham Reservoir
Least Total Precipitation	0		Stonington
Greatest Total Snowfall*	29"		Aguilar
Greatest Snowdepth	60"	December 30	Wolf Creek Summit (SCS Snowcourse)

* data derived only from those stations with complete daily snowfall records.

DECEMBER 1986 PRECIPITATION

Except for some lingering snows in eastern Colorado on the 1st and a few snowshowers later in the month, the only significant precipitation fell from the 6th through the 9th. Even then, heavy amounts were hard to find. Monthly totals ended up far below average over most of the state. Mountain totals were typically only 10 to 50% of average. Percents of average looked a little better east of the mountains, but higher numbers aren't all that significant since precipitation amounts are normally so low in midwinter. The 2.25" total at Bonham Reservoir on the Grand Mesa was the greatest in the state. The analysis was complicated by the fact that the storm of November 30 was reported by some stations on November 30 and others on December 1 depending on their observation time.

Greatest		Least	
Bonham Reservoir	2.25"	Stonington	0.0"
Aguilar 1SE	1.72"	Campo 7S	Trace
Kassler	1.43"	Shaw 2E	Trace
		Arapahoe	Trace



Precipitation amounts (inches) for December 1986 and contours of precipitation as a percent of the 1961-1980 average. The dashed line represents 150% of average.

1987 WATER YEAR PRECIPITATION

Despite a very dry December, precipitation totals for the first 3 months of the 1987 water year are still above average in nearly all of Colorado. The only areas drier than average are portions of the Northern and Central Mountains and some of the northwestern valleys.

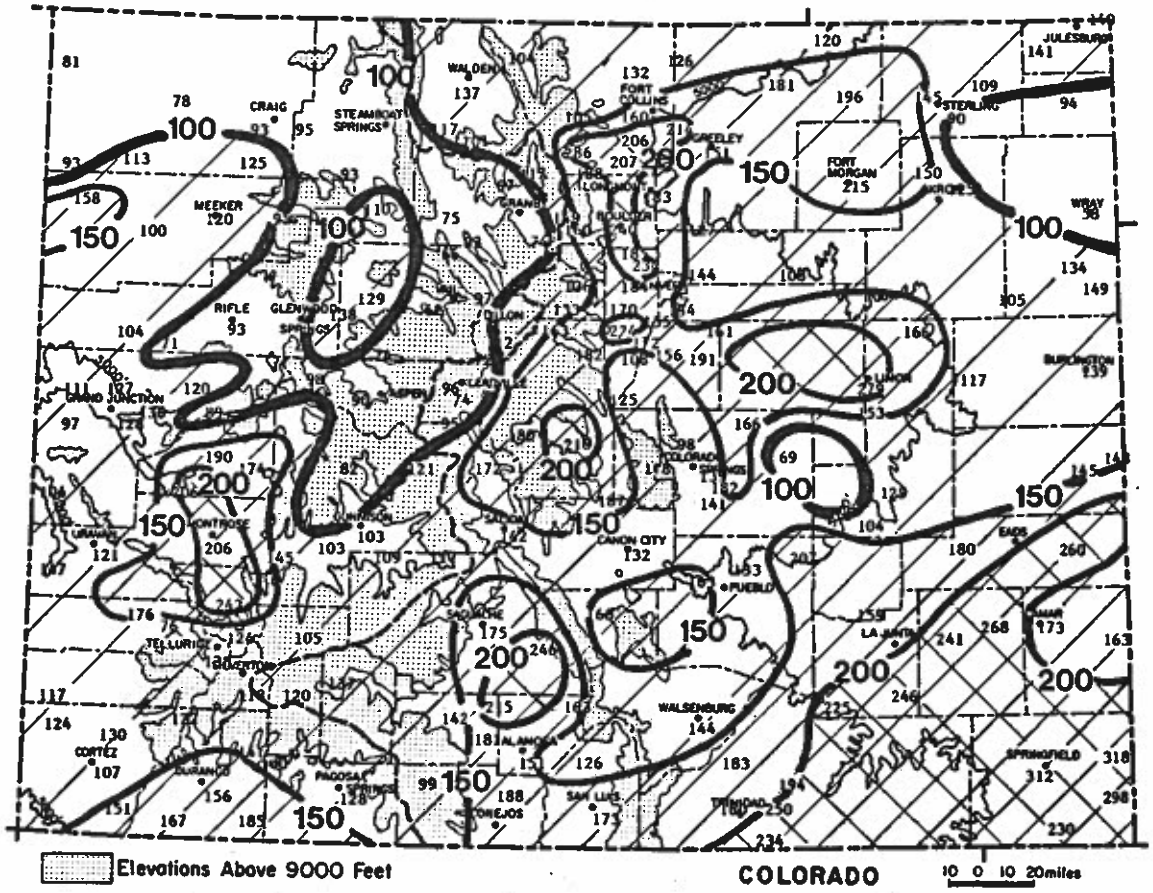
Comparison to Last Year

The Eastern Plains are generally a bit wetter than they were at this time last year. The Gunnison and Uncompahgre Basins of western Colorado are also wetter. But most of the mountains and western valleys are now drier than they were last year.

1987 Water Year to Date through November

Wettest (as % of average)			Driest (as % of average)		
Walsh 1W	318%	4.59"	Wray	53%	0.91"
Springfield 7WSW	312%	5.50"	Vail	62%	3.63"
Stonington	298%	4.74"	Green Mountain Dam	66%	2.14"

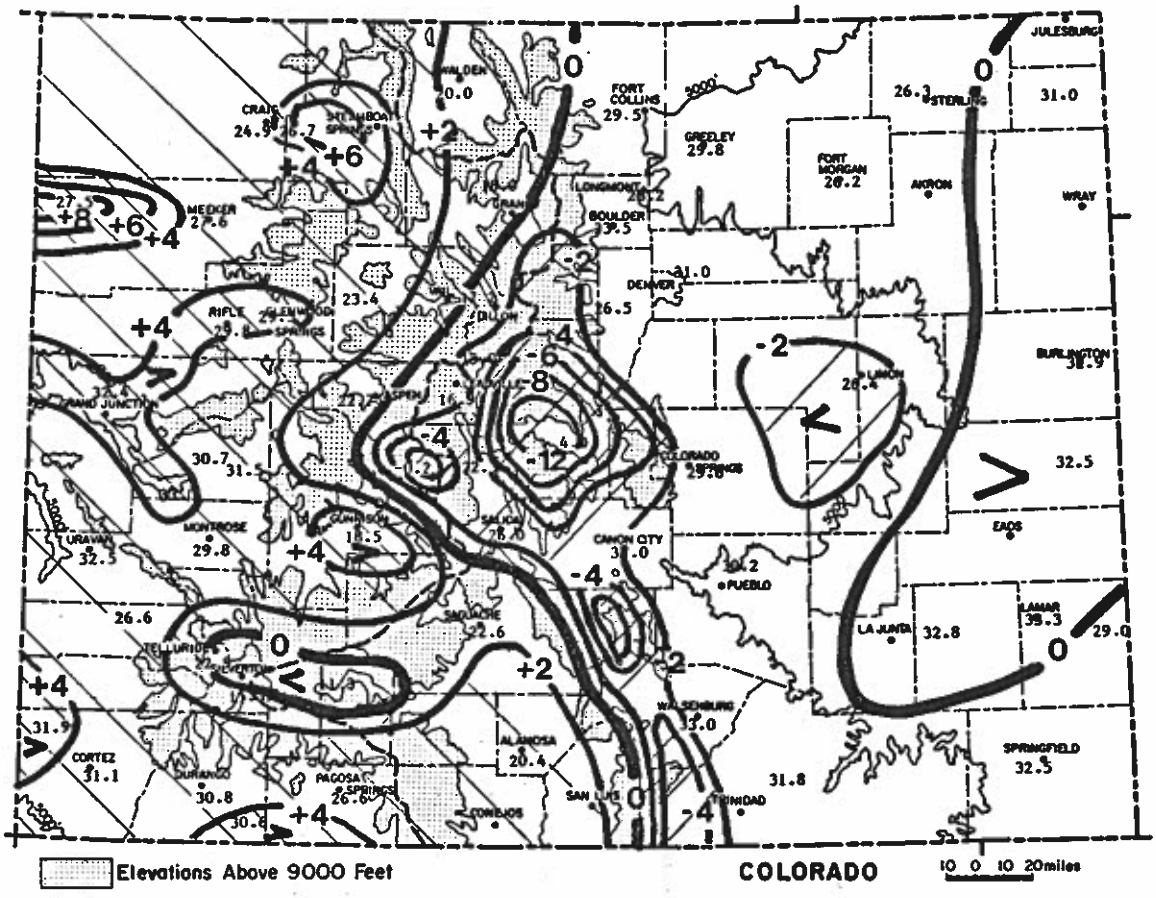
Wettest (total precipitation)			Driest (total precipitation)		
Lemon Dam	10.17"	141%	Rush 4W	0.77"	69%
Mount Evans Research Center	9.26"	136%	Wray	0.91"	53%
Durgano	8.35"	156%	Ordway 21N	1.11"	104%



Precipitation for October 1986 through December 1986 as a percent of the 1961-1980 average.

DECEMBER 1986 TEMPERATURES AND DEGREE DAYS

Due to predominantly clear skies and light winds in December, factors such as snowcover produced dramatic local variations in the temperature pattern. Generally, temperatures were above average west of the mountains and near or little below average to the east. However, some extraordinary extremes were noted with Rangely reporting December temperatures 8.3 degrees above average while Eleven Mile Reservoir was 14.3 degrees below average.



December 1986 temperatures (degrees Fahrenheit) and contours of departures from 1961-1980 averages.

DECEMBER 1986 SOIL TEMPERATURES

Despite normal air temperatures, soil temperatures cooled more quickly than usual (due to lack of much insulating snowcover).

These soil temperature measurements were taken at Colorado State University beneath sparse unirrigated sod with a flat, open exposure. These data are not representative of all Colorado locations.

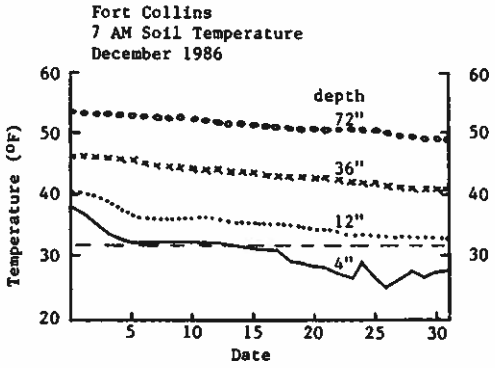


Table 1. Colorado Heating Degree Day Data through December 1986.

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
ALAMOSA	AVE	40	100	303	657	1074	1457	1519	1182	1035	732	453	165	8717
	85-86	30	66	378	634	1045	1472	1231	983	864	638	446	138	7925
	86-87	63	75	366	728	1004	1377							3613
ASPEN	AVE	95	150	348	651	1029	1339	1376	1162	1116	798	524	262	8850
	85-86	119	107	453	656	1066	1278	1175	1029	848	739	530	185	8185
	86-87	147	132	428	735	1009	1307							3758
BOULDER	AVE	0	6	130	357	714	908	1004	804	775	483	220	59	5460
	85-86	0	0	222	400	982	1018	674	762	496	423	249	16	5242
	86-87	1	0	175	450	714	970							2310
BUENA VISTA	AVE	47	116	285	577	936	1184	1218	1025	983	720	459	184	7734
	85-86	63	54	405	597	938	1158	972	946	806	661	450	149	7199
	86-87	79	69	388	730	970	1316							3552
BURLING-TON	AVE	6	5	108	364	762	1017	1110	871	803	459	200	38	5743
	85-86	0	5	206	405	977	1142	740	820	525	386	163	12	5381
	86-87	0	0	76	406	745	984							2211
CANON CITY	AVE	0	9	81	301	639	831	911	734	707	411	179	33	4836
	85-86	0	6	186	397	886	1036	711	756	507	399	248	40	5172
	86-87	4	2	132	422	724	952							2236
COLORADO SPRINGS	AVE	8	25	162	440	819	1042	1122	910	880	564	296	78	6346
	85-86	5	8	253	487	978	1143	822	840	635	487	315	49	6022
	86-87	4	14	174	519	813	1081							2605
CORTEZ	AVE	0	11	115	434	813	1132	1181	921	828	555	292	68	6350
	85-86		4	264	484	884	1081		805	711	572	321		5126
	86-87	10	6	214	541	813	1041							2625
CRAIG	AVE	32	58	275	608	996	1342	1479	1193	1094	687	419	193	8376
	85-86	10	42	353	649	1043	1487	1362	1023	780	669	461	76	7955
	86-87	31	15	338	654	967	1234							3239
DELTA	AVE	0	0	94	394	813	1135	1197	890	753	429	167	31	5903
	85-86	0	M	113	335	658	1026	948	684	530	365	174	6	4839
	86-87	0	0	145	414	M	984							1543
DENVER	AVE	0	0	135	414	789	1004	1101	879	837	528	253	74	6014
	85-86		1	241	435	1051	1094	758	802	548	456	260	22	5668
	86-87	0	0	145	477	775	1045							2442
DILLON	AVE	273	332	513	806	1167	1435	1516	1305	1296	972	704	435	10754
	85-86	260	300	609	856	1183	1439	1380	1175	1072	915	716	388	10293
	86-87	322	318	580	883	1125	1473							4701
DURANGO	AVE	9	34	193	493	837	1153	1218	958	862	600	366	125	6848
	85-86	3	8	274	476	916	1159	967	802	686	575	341	70	6277
	86-87	23	9	295	559	844	1055							2785
EAGLE	AVE	33	80	288	626	1026	1407	1448	1148	1014	705	431	171	8377
	85-86	19	52	356	605	995	1352	1324	890	736	598	428	88	7443
	86-87	37		314	658	930	1283							3222
EVER-GREEN	AVE	59	113	327	621	916	1135	1199	1011	1009	730	489	218	7827
	85-86	62	90	387	651	1039	1119	947	927	770	608	532	157	7289
	86-87	75	90	380	699	927	1186							3357
FORT COLLINS	AVE	5	11	171	468	846	1073	1181	930	877	558	281	82	6483
	85-86	1	8	243	499	1078	1199	883	816	568	470	261	22	6048
	86-87	0	0	178	500	809	1091							2578
FORT MORGAN	AVE	0	6	140	438	867	1156	1283	969	874	516	224	47	6520
	85-86	0	2	239	548	1165	1425	1160	915	616	401	246	19	6736
	86-87	0	4	138	495	874	1193							2704
GRAND JUNCTION	AVE	0	0	65	325	762	1138	1225	882	716	403	148	19	5683
	85-86	0	0	139	351	779	1018	949	685	489	366	168	3	4947
	86-87	0	0	130	414	718	1001							2263

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
GRAND LAKE	AVE	214	264	468	775	1128	1473	1593	1369	1318	951	654	384	10591
	85-86	206	265	513	744	1115	1454	1494	1174	1083	896	651	304	9899
	86-87	245	242	488	777	1051	1450							4253
GREELEY	AVE	0	0	149	450	861	1128	1240	946	856	522	238	52	6442
	85-86	0	6	249	501	1131	1311	1010	845	545	440	232	15	6285
	86-87	0	0	142	484	825	1085							2536
GUNNISON	AVE	111	188	393	719	1119	1590	1714	1422	1231	816	543	276	10122
	85-86	84	152	433	678	1058	1648	1712	1084	952	711	517	204	9233
	86-87	123	146	420	734	1064	1430							3917
LAS ANIMAS	AVE	0	0	45	296	729	998	1101	820	698	348	102	9	5146
	85-86	0	0	134	313	816	1106	737	715	409	220	77		4527
	86-87	0	0	32	280	668	991							1971
LEAD-VILLE	AVE	272	337	522	817	1173	1435	1473	1318	1320	1038	726	439	10870
	85-86	333	359	666	871	1258	1470	1328	1251	1168	994	760	441	10899
	86-87	372	369	626	920	1188	1482							4957
LIMON	AVE	8	6	144	448	834	1070	1156	960	936	570	299	100	6531
	85-86	1	12	274	544	1078	1233	861	910	662	508	336	57	6476
	86-87	4	8	171	551	873	1190							2797
LONGMONT	AVE	0	6	162	453	843	1082	1194	938	874	546	256	78	6432
	85-86	0	6	236	486	1095	1228	869	814	549	469	262	20	6034
	86-87		0	154	498	852	1135							2639
MEEKER	AVE	28	56	261	564	927	1240	1345	1086	998	651	394	164	7714
	85-86	6	31	358	599	967	1249	1164	893	742	646	458	75	7188
	86-87	41	28	402	623	894	1147							3135
MONTROSE	AVE	0	10	135	437	837	1159	1218	941	818	522	254	69	6400
	85-86	0	0	211	443	803	1106	1032	766	577	453	235	24	5650
	86-87	1	6	183	532	809	1085							2616
PAGOSA SPRINGS	AVE	82	113	297	608	981	1305	1380	1123	1026	732	487	233	8367
	85-86	34	73	376	600	1000	1373	1191	952	803	668	481	183	7734
	86-87	98	45	385	668	927	1182							3305
PUEBLO	AVE	0	0	89	346	744	998	1091	834	756	421	163	23	5465
	85-86	0	0	172	410	1012	1161	783	728	523	346	167	21	5323
	86-87	0	0	94	428	741	1069							2332
RIFLE	AVE	6	24	177	499	876	1249	1321	1002	856	555	298	82	6945
	85-86	1	6	232	484	882	1147	1076	769	607	477	287	16	5984
	86-87	1	3	226	499	795	1081							2605
STEAMBOAT SPRINGS	AVE	113	169	390	704	1101	1476	1541	1277	1184	810	533	297	9595
	85-86	57	130	434	729	1144	1554	1495	1097	915	688	533	185	8961
	86-87	120	119	M	M	M	M							
STERLING	AVE	0	6	157	462	876	1163	1274	966	896	528	235	51	6614
	85-86	0	6	230	519	1161	1395	1155	990	594	439	279	22	6790
	86-87	0	4	105	427	847	1193							2576
TELLURIDE	AVE	163	223	396	676	1026	1293	1339	1151	1141	849	589	318	9164
	85-86	121	152	463	648	1023	1270	1130	1011	892	740	585	257	8292
	86-87	200	129	434	716	1018	1297							3794
TRINIDAD	AVE	0	0	86	359	738	973	1051	846	781	468	207	35	5544
	85-86	0	0	175	380	772	1046	738	764	529	365	194	32	4995
	86-87	1	0	90	421	719	1022							2253
WALDEN	AVE	198	285	501	822	1170	1457	1535	1313	1277	915	642	351	10466
	85-86	171	271	578	824	1224	1458	1381	1155	989	836	656	256	9799
	86-87	225	224	530	825	1126	1388							4318
WALSEN-BURG	AVE	0	8	102	370	720	924	989	820	781	501	240	49	5504
	85-86	0	0	165	358	770	982	681	734	515	404	221	42	4872
	86-87	0	0	84	420	682	984							2170

D E C E M B E R 1 9 8 6 C L I M A T I C D A T A

Eastern Plains*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
STERLING	39.9	12.7	26.3	-0.7	52	-7	1193	0	1	0.58	0.27	187.1	4
FORT MORGAN	42.3	10.1	26.2	-1.1	56	-15	1193	0	6	0.35	0.10	140.0	4
HOLYOKE	45.4	16.5	31.0	1.3	57	-2	1048	0	22	0.17	-0.20	45.9	3
BURLINGTON	44.3	21.6	32.9	1.0	56	1	984	0	10	0.28	-0.04	87.5	2
LIMON WSMO	38.7	14.1	26.4	-2.3	50	-9	1190	0	0	0.23	0.03	115.0	5
CHEYENNE WELLS	45.1	20.0	32.5	1.8	59	0	999	0	14	0.09	-0.13	40.9	1
LAMAR	46.5	20.2	33.3	1.7	59	-1	974	0	27	0.15	-0.23	39.5	3
LAS ANIMAS	47.0	18.5	32.8	1.1	56	2	991	0	20	0.12	-0.12	50.0	3
HOLLY	45.8	12.1	29.0	-1.8	54	-1	1110	0	11	0.03	-0.22	12.0	1
SPRINGFIELD 7WSW	44.3	20.8	32.5	-1.7	60	0	998	0	14	0.64	0.33	206.5	4

Foothills/Adjacent Plains*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
FORT COLLINS	42.4	16.6	29.5	-0.4	55	-6	1091	0	9	0.27	-0.19	58.7	3
GREELEY UNC	43.8	15.8	29.8	0.1	57	-7	1085	0	11	0.33	-0.14	70.2	4
LONGMONT	42.2	14.2	28.2	-1.3	55	-9	1135	0	8	0.34	-0.09	79.1	3
BOULDER	45.0	22.0	33.5	-1.6	56	-2	970	0	18	0.64	0.01	101.6	5
DENVER WSFO AP	43.5	18.5	31.0	-1.0	58	-9	1045	0	16	0.31	-0.23	57.4	4
EVERGREEN	43.7	9.2	26.5	-1.7	55	-13	1186	0	13	0.39	-0.36	52.0	4
LAKE GEORGE 8SW	16.8	-8.5	4.1	-14.3	42	-27	1880	0	0	0.28	-0.09	75.7	3
COLORADO SPRINGS	41.5	18.1	29.8	-0.9	57	-6	1081	0	9	0.28	-0.11	71.8	3
CANON CITY 2SE	46.6	21.5	34.0	-2.0	60	4	952	0	28	0.56	-0.02	96.6	4
PUEBLO WSO AP	44.8	15.6	30.2	-1.8	65	-9	1069	0	18	0.49	0.14	140.0	4
WALSENBURG	45.1	20.9	33.0	-1.5	56	-5	984	0	18	0.70	-0.05	93.3	3
TRINIDAD FAA AP	44.4	19.2	31.8	-1.4	55	-5	1022	0	11	0.37	-0.20	64.9	4

Mountains/Interior Valleys*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
WALDEN	35.6	4.4	20.0	1.8	45	-22	1388	0	0	0.13	-0.49	21.0	2
LEADVILLE 2SW	33.2	0.6	16.9	-1.1	44	-25	1482	0	0	0.36	-0.74	32.7	4
SALIDA	40.4	11.6	26.0	-2.8	51	-8	1201	0	1	0.15	-0.46	24.6	2
BUENA VISTA	38.7	5.9	22.3	-3.9	51	-15	1316	0	1	0.50	-0.08	86.2	4
SAGUACHE	35.9	9.3	22.6	1.9	48	-5	1304	0	0	0.10	-0.33	23.3	1
HERMIT 7ESE	27.3	-4.6	11.3	-1.6	40	-20	1655	0	0	0.40	-1.03	28.0	1
ALAMOSA WSO AP	36.8	3.9	20.4	2.9	47	-16	1377	0	0	0.12	-0.33	26.7	3
GRAND LAKE 6SSW	31.9	4.1	18.0	0.4	47	-12	1450	0	0	0.17	-0.70	19.5	6
DILLON 1E	34.4	0.0	17.2	-1.5	46	-21	1473	0	0	0.50	-0.37	57.5	6
CLIMAX	26.2	-0.1	13.0	-2.4	37	-22	1603	0	0	0.34	-1.77	16.1	6
ASPEN 1SW	35.6	9.8	22.7	0.7	47	-12	1307	0	0	0.85	-1.56	35.3	3
TAYLOR PARK	22.9	-23.4	-0.2	-6.7	41	-53	2015	0	0	0.55	-1.10	33.3	4
TELLURIDE	37.8	7.9	22.9	-0.3	45	-13	1297	0	0	0.45	-1.26	26.3	4
PAGOSA SPRINGS	43.6	9.6	26.6	3.1	54	-1	1182	0	4	0.81	-1.08	42.9	4
SILVERTON	36.1	-5.5	15.3	1.3	45	-20	1531	0	0	0.35	-1.59	18.0	2

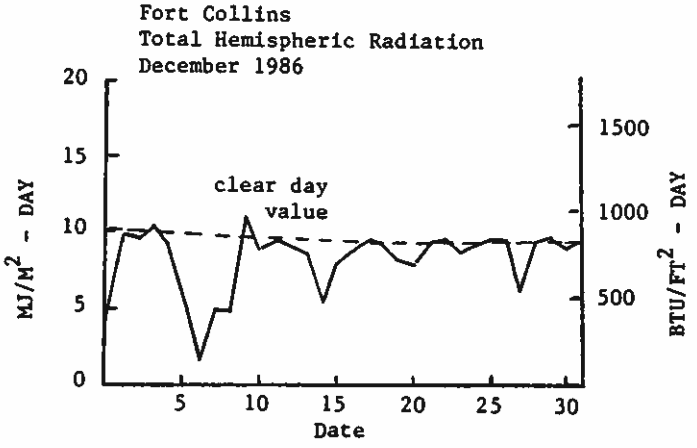
Western Valleys*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
CRAIG 4SW	37.6	12.2	24.9	3.6	50	-3	1234	0	0	0.52	-1.13	31.5	5
HAYDEN	39.5	13.9	26.7	6.7	51	-3	1179	0	1	0.31	-1.34	18.8	5
MEEKER NO. 2	41.4	13.9	27.6	2.7	51	-4	1147	0	1	0.41	-0.40	50.6	2
RANGELY 1E	39.5	15.6	27.5	8.3	48	6	1154	0	0	0.59	0.04	107.3	2
EAGLE FAA AP	38.9	7.9	23.4	3.5	53	-12	1283	0	2	0.37	-0.57	39.4	3
GLENWOOD SPRINGS	41.1	17.9	29.5	4.5	53	5	1094	0	2	0.56	-0.89	38.6	5
RIFLE	44.6	15.0	29.8	5.2	55	5	1081	0	7	0.30	-0.83	26.5	3
GRAND JUNCTION WS	42.6	22.2	32.4	4.6	51	14	1001	0	1	0.47	-0.13	78.3	3
CEDAREDGE	42.2	19.2	30.7	2.4	53	3	1056	0	2	0.83	-0.17	83.0	4
PAONIA 1SW	43.1	20.0	31.5	2.9	54	4	1032	0	3	0.90	-0.61	59.6	5
DELTA	45.9	20.2	33.0	4.6	53	10	984	0	3	0.54	-0.03	94.7	5
GUNNISON	33.7	3.4	18.5	4.8	45	-8	1431	0	0	0.36	-0.41	46.8	3
MONTROSE NO. 2	41.1	18.5	29.8	2.4	50	5	1085	0	0	0.60	-0.10	85.7	2
URAVAN	45.3	19.8	32.5	2.2	63	6	1000	0	9	0.57	-0.46	55.3	3
NORWOOD	39.5	13.7	26.6	2.6	51	-11	1183	0	1	0.96	-0.08	92.3	3
YELLOW JACKET 2W	42.3	21.4	31.9	4.6	53	6	1021	0	4	0.60	-0.55	52.2	2
CORTEZ	44.4	17.9	31.1	3.1	55	7	1041	0	7	0.43	-0.84	33.9	2
DURANGO	43.8	17.8	30.8	3.3	52	7	1055	0	3	1.07	-0.92	53.8	4
IGNACIO 1N	45.2	16.1	30.6	5.2	54	5	1057	0	6	1.08	-0.16	87.1	5

* Data are received by the Colorado Climate Center for more locations than appear in these tables. Please contact the Colorado Climate Center if additional information is needed.

DECEMBER 1986 SUNSHINE AND SOLAR RADIATION

Station	Number of Days clear	partly cloudy	cloudy	% of possible sunshine	average % of possible
Colorado Springs	14	7	10	—	—
Denver	15	5	11	72%	65%
Fort Collins	15	10	6	—	—
Grand Junction	9	11	11	74%	63%
Pueblo	14	3	14	69%	74%



The Temperature's Below Zero? -- So What! continued

Average number of days per year, 1951-1980, with minimum temperature $\leq 0^{o}F$

Location	# of days
COLORADO	
Alamosa	48
Berthoud Pass	53
Boulder	5
Burlington	7
Canon City	4
Colorado Springs	7
Denver	8
Dillon	55
Durango	11
Eagle	39
Estes Park	14
Fort Collins	11
Glenwood Springs	10
Grand Junction	5
Gunnison	68
Lamar	8
Leadville	39
Limon	16
Meeker	29
Mesa Verde Natl Park	1
Montrose	7
Ouray	6
Pueblo	9
Salida	12
Steamboat Springs	48
Sterling	14
Taylor Park	91
Trinidad	5
OTHER STATES	
Amarillo, Texas	2
Anchorage, Alaska	33
Barrow, Alaska	170
Boise, Idaho	3
Boston, Massachusetts	1
Caribou, Maine	43
Chicago, Illinois	14
International Falls, Minnesota	69
Louisville, Kentucky	2
Mount Washington, New Hampshire	66
Omaha, Nebraska	16
Pittsburgh, Pennsylvania	5
Saint Louis, Missouri	4
Rapid City, South Dakota	21

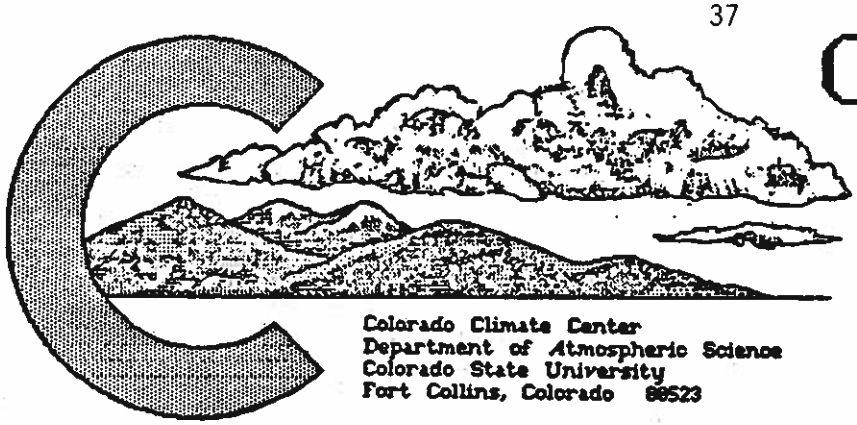
N E W P U B L I C A T I O N

Precipitation Station Index:

The Colorado Climate Center has recently completed an index of precipitation measurement sites in Colorado. This project has been a cooperative effort of the Colorado Hydrometeorological Committee -- an organization composed primarily of Federal, State and local agencies responsible for monitoring various elements of Colorado's water resources.

A computer data base and a published index have been developed containing information on the locations, types of precipitation measurements and brief histories of each of the 1410 stations which were indexed. Weather stations owned and operated by the National Weather Service, Soil Conservation Service, Bureau of Reclamation, Forest Service, Bureau of Land Management, Geological Survey, State Engineers Office and the Denver Water Department were included in this index.

The printing of this 84-page document will be completed after the demand is assessed. Copies will be available from the Colorado Climate Center for a cost of $6.00 per copy. To order a copy of this report, please contact our office by calling (303) 491-8545 or write to us at the address shown on the cover. Copies will be distributed when printing has been completed.



COLORADO CLIMATE

Colorado Climate Center
Department of Atmospheric Science
Colorado State University
Fort Collins, Colorado 80523

JANUARY 1987

January in Review:

January was pleasantly mild for much of the month. Precipitation was below average over nearly all of western and northern Colorado, particularly the northern and central mountains. However, a powerful storm in mid-month brought heavy snows to southern Colorado. In 24-hours on the 15th portions of south central Colorado, such as Pueblo and Colorado Springs, got as much moisture as they usually get in all of January and February combined.

A Look Ahead -- March 1987:

If you have found Colorado's winter weather to be too dry, calm, sunny and dull to satisfy you, then I've got some good news. March is just around the corner, and it usually packs a few surprises up its sleeves.

By the end of March, daylength is a full 3 hours longer than it was in late December. The amount of energy received from the sun doubles from what it was in early winter. Air and soil temperatures warm in response to this energy source. However, the atmosphere aloft remains cold, and frigid polar air masses still hold their grip over the snowcovered interior of most of Canada. The strong vertical and horizontal temperature differences which result provide the fuel for developing energetic storm systems. What this means for Colorado is more and thicker clouds, heavier precipitation (especially east of the mountains), wetter snows, rapid temperature changes, and more widespread strong winds.

March is often the snowiest month of the year east of the mountains with average totals ranging from 7 inches in southeast Colorado to 18 inches at the base of the foothills. March is a prime blizzard month on the Eastern Plains as livestock producers know all too well. This year marks the 10th anniversary of the infamous blizzard of March 10-11, 1977 which claimed 9 human lives and the lives of countless cattle. Snowdrifts literally buried buildings in portions of northeastern Colorado, and winds of 60-100 mph made outdoor life nearly impossible. Such storms are not common but are always possible when March rolls around. And if snow doesn't fall, then the chances are pretty fair that dust storms will develop when the March winds blow.

The mountains get their share of snow, too. Forty to 80 inches of new snow is common on many of Colorado's mountain passes. Depending on temperatures, snowpack below 9,000 feet may begin to melt during March, but in general, mountain snowdepths continue to increase on into April.

March temperatures at elevations below 6,000 feet average in the 50s for highs with 20s for lows. Drastic day to day differences (20 degrees or more) are likely, though, especially from the mountains eastward. In the mountains above 9,000 feet, highs still average in the 20s and 30s with nighttime temperatures typically in single digits. Subzero temperatures continue to occur regularly.

10 to 1 -- The Story of Snow Densities in Colorado:

Anyone who has ever walked through, shovelled, skied on, driven through, or in any way interacted with snow in Colorado knows that not all snow is the same. The physics of snow is complex and fascinating -- both in terms of the formation of snow flakes in clouds and also in terms of the structure of accumulated snow on the ground. We will not get into these complexities here except to say that many factors are responsible for how dense snow is.

(continued on last page)

10 to 1 -- The Story of Snow Densities in Colorado: continued

The density of snow is defined as the ratio of the mass to the volume of a given sample of either fresh or old snow. This quantity is often expressed as the depth of liquid water associated with a given depth of snow. Those of us who have spent sizeable parts of our lives in other parts of this country outside the Rockies have long heard of the traditional "10 to 1 rule" for snow. Indeed, in much of the country fresh snow often has a density of about 0.1 which simply means that 10 inches of snow has a water content of about 1 inch. It also can be translated into weight. At a 10 to 1 ratio (a density of 0.1) one cubic foot of snow will weigh a little more than 6 lbs.

What about here in Colorado -- does the 10 to 1 rule apply? To answer that question, daily snowfall amounts and their water contents were examined for each month since January 1982 for 2 locations in Colorado, Berthoud Pass and Fort Collins. At both locations a distinct seasonal pattern in snow density occurs although wide fluctuations in snow density have been observed in all months. Densities have ranged from as low as 0.01 to more than 0.13. A density of 0.01 is so light that a hearty sneeze may cause the snow around you to collapse. Such low densities have occurred only during midwinter light snow events with total accumulations less than 2" and no wind. High density snows (greater than 0.10) have occurred in most months at both locations but primarily occur from warm wet snows in the spring and fall. These are sometimes hard to measure since melting may occur as the snow falls. High density snows have also been noted a few times in midwinter when air temperatures are extremely cold. Densities from the largest snowstorms in the past five years have been 0.06-0.09 at both locations. The following table shows a comparison of typical densities at each site by month. "Typical" is defined as the median value of the total distribution of daily snowfall densities.

Typical Snowfall Densities

Month	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ALL
Fort Collins	>0.12	0.11	0.06	0.05	0.05	0.05	0.10	0.10	>0.10	—	0.06
Berthoud Pass	>0.12	0.09	0.08	0.07	0.07	0.07	0.08	0.09	0.10	>0.12	0.08

Observed densities are actually lower at the lower elevation station.

Once snow is on the ground the density tends to increase with time. By the time the spring snowmelt begins in the high country, the snowpack normally has reached a density from 0.3 to 0.5. At these densities, the snowpack quickly can become saturated with liquid water. Warming the snowpack then produces runoff and no further increase in density occurs.

Snow density is significant for a number of reasons. Density differences in snow already on the ground can be a cause for avalanches. The cost and difficulty of snow removal from city streets is also affected by density. Ten inches of snow with a density of 0.10 requires more effort to remove than 10 inches of snow at a substantially lower density. Likewise, more snow shovelling injuries and heart attacks occur with dense snows. The popularity of Rocky Mountain skiing is related to the low density snows that fall here.

For a final comparison, here are some average January snowfall densities at selected Colorado locations. In spring and fall all Colorado locations return to densities close to 0.10.

Location	Average January Snowfall Density
Akron	0.05
Alamosa	0.06
Aspen	0.08
Boulder	0.06
Burlington	0.07
Colorado Springs	0.05
Denver	0.07
Durango	0.10
Evergreen	0.06
Grand Junction	0.08
Grand Lake	0.06
Gunnison	0.06
Lamar	0.08
Pueblo	0.05
Steamboat Springs	0.07

JANUARY 1987 DAILY WEATHER

After an easy going December, the pace of the weather picked up markedly in January. Day to day weather changes were very noticeable as sunshine, unseasonal warmth, frigid cold, heavy snows and damaging windstorms all played a role in the month's weather.

Date	Event
1-2	Sunny but cold on the 1st with increasing clouds late in the day. A brief but welcome surge of Pacific moisture plowed into the mountains from the northwest on the 2nd. Most mountain areas received significant snowfall particularly the northern and central mountains. The cooperative stations at Hayden and Marvine Ranch reported 10" and 20" of new snow, respectively.
3-4	Partly sunny. Rapid warm up east of the mountains. Denver hit 66°F on the 4th. Burlington's 71°F tied for the highest January temperature in the state.
5-8	A strong storm system rapidly crossed the state on the 5th producing locally heavy mountain snows primarily in southwest Colorado. Conditions remained unsettled 6-8th statewide as an upper level low pressure trough lingered over Colorado. Easterly "upslope" winds developed east of the mountains and produced occasional light wet snow, freezing drizzle, and slippery driving conditions over most of the Eastern Plains.
9-13	A large high pressure ridge dominated Colorado's weather. Cold, breezy conditions on the 9th gave way to golfing weather at lower elevations by the 11-13th. Several near record maximum temperatures were reported on the 13th including 47° at Climax at 11,400 feet and 60° at Salida and Estes Park. Several locations in southeast Colorado including Walsh and Springfield reached 71°.
14-17	Sharply colder across Colorado on the 14th as Arctic air pushed southward from Canada at the same time that a strong low pressure area developed south of Colorado. Heavy snow developed early on the 15th across much of southern Colorado and portions of the Front Range urban corrider. Snow tapered off on the 16th leaving behind deep snows in several areas. Storm totals ranged from only a trace over most of the northern and central mountains and 1-4" over the northeast plains and northwestern valleys, to more than 8" over the southern and eastern slopes of the San Juan Mountains, much of the San Luis Valley, the extreme southeastern plains, and much of the Front Range. Totals exceeded 2 feet in parts of the San Juans and along the southern Front Range. Rye's official total of 50" was the greatest in the state, but Colorado Springs 23.5" certainly put a damper on travel there. Meanwhile, only a few inches fell on Pikes Peak. The Denver area also had an unusual distribution with totals ranging from only 2" in southeast Denver to about 18" in the northwest suburbs. Clearing and very cold on the 17th with subzero morning temperatures in most parts of the state. Taylor Park's -45° took honors for the month's coldest temperature.
18-19	Increasing clouds but continued cold on the 18th. Snow developed again on the 19th as a strong upper level disturbance crossed the state. About a foot of dry snow fell at Trinidad, Walsenburg and again at Rye.
20-31	A strong jet stream pattern developed with northwesterly winds aloft over Colorado. Wind conditions prevailed in exposed high mountain and eastern foothill locations. Temperatures remained cold early in the period but began to moderate on the 23rd. Strong downslope winds developed east of the mountains late on the 24th and continued through the 29th. These chinook winds produced unseasonably warm temperatures. Boulder's low temperture on the 27th only dropped to 49°. Daytime temperatures in the 50s and 60s were common across most of eastern Colorado. Extremely strong winds, approaching 100 mph in some Front Range locations late on the 28th and early on the 29th, caused extensive property damage particularly on the west side of Denver. Periods of snow occurred in the mountains with heaviest amounts occurring on the 25th and again on the 28th. None of this moisture spilled into eastern Colorado. Winds and precipitation diminished on the 29th, and the month ended with pleasant mild weather 30-31st.

January 1987 Extremes

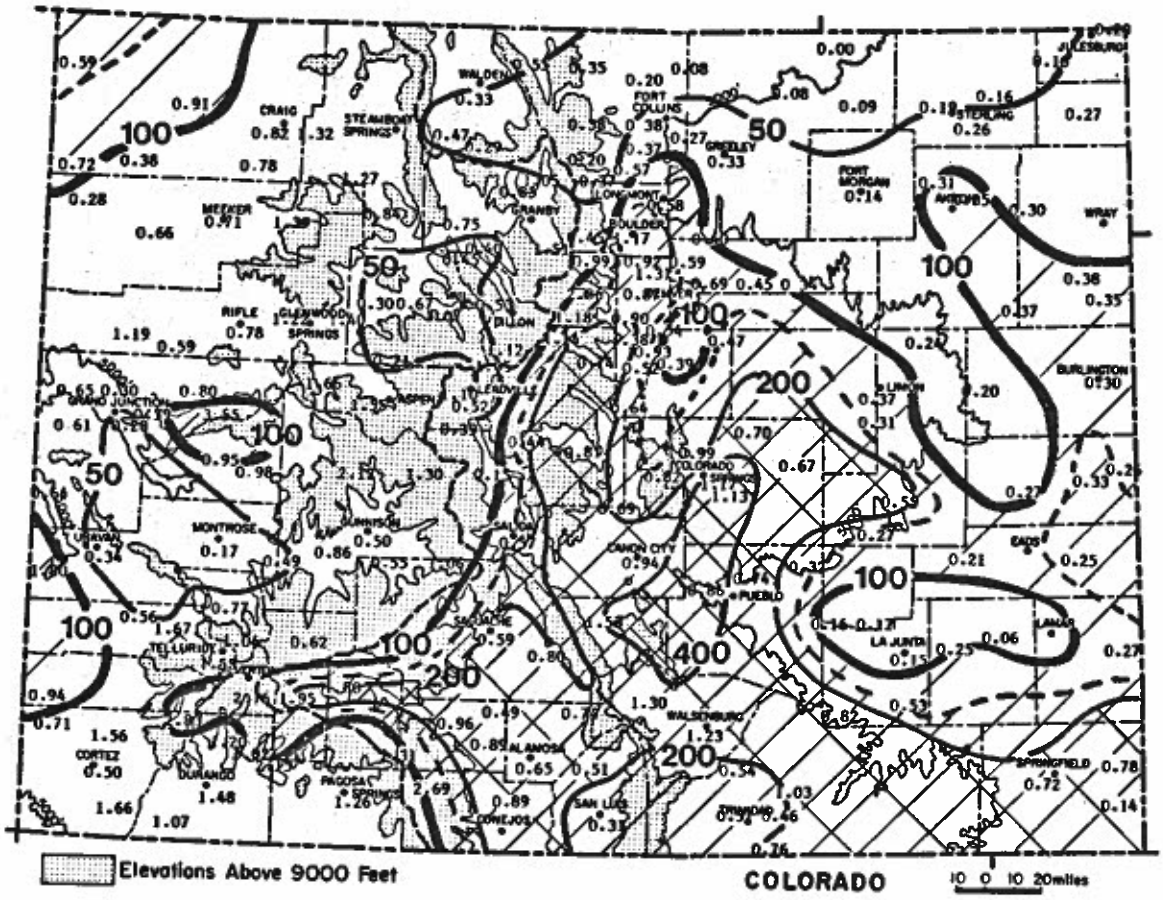
Highest Temperature	71°F	January 4	Burlington
		January 12	Wheatridge
		January 13	Pueblo, Walsh
			Springfield 7WSW
		January 28	Las Animas
Lowest Temperature	-45°F	January 17	Taylor Park Reservoir
Greatest Total Precipitation	4.03"		Rye
Least Total Precipitation	0.00"		Kauffman 4SSE
Greatest Total Snowfall*	62"		Rye
Greatest Snowdepth**	81"	January 27	Tower (Buffalo Pass)

* data derived only from those stations with complete daily snowfall records.
** from Soil Conservation Service Snowpack measurements.

JANUARY 1987 PRECIPITATION

January precipitation was much above average in those areas like Alamosa, Springfield, Colorado Springs and Wheatridge that were hard hit by the January 15 snowstorm. Both Rye and Colorado Springs reported their wettest January on record. However, more than half of the state including the northern and central mountain areas ended up drier than normal. The area near Vail reported less than 50% of their average precipitation for the 2nd consecutive month.

Greatest		Least	
Rye	4.03"	Kauffman 4SSE	0.00"
Bonham Reservoir	3.55"	John Martin Dam	0.06"
Lemon Dam	3.02"	Briggsdale	0.08"
Mount Evans Research Center	2.86"	Nunn	0.08"



Precipitation amounts (inches) for January 1987 and contours of precipitation as a percent of the 1961-1980 average.

1987 WATER YEAR PRECIPITION

Despite widespread dry conditions in January the majority of Colorado continues above averge for the first 4 months of the 1987 water year. However, the dry areas have increased somewhat in northern Colorado and include most of the high runoff production areas within the northern and central mountains.

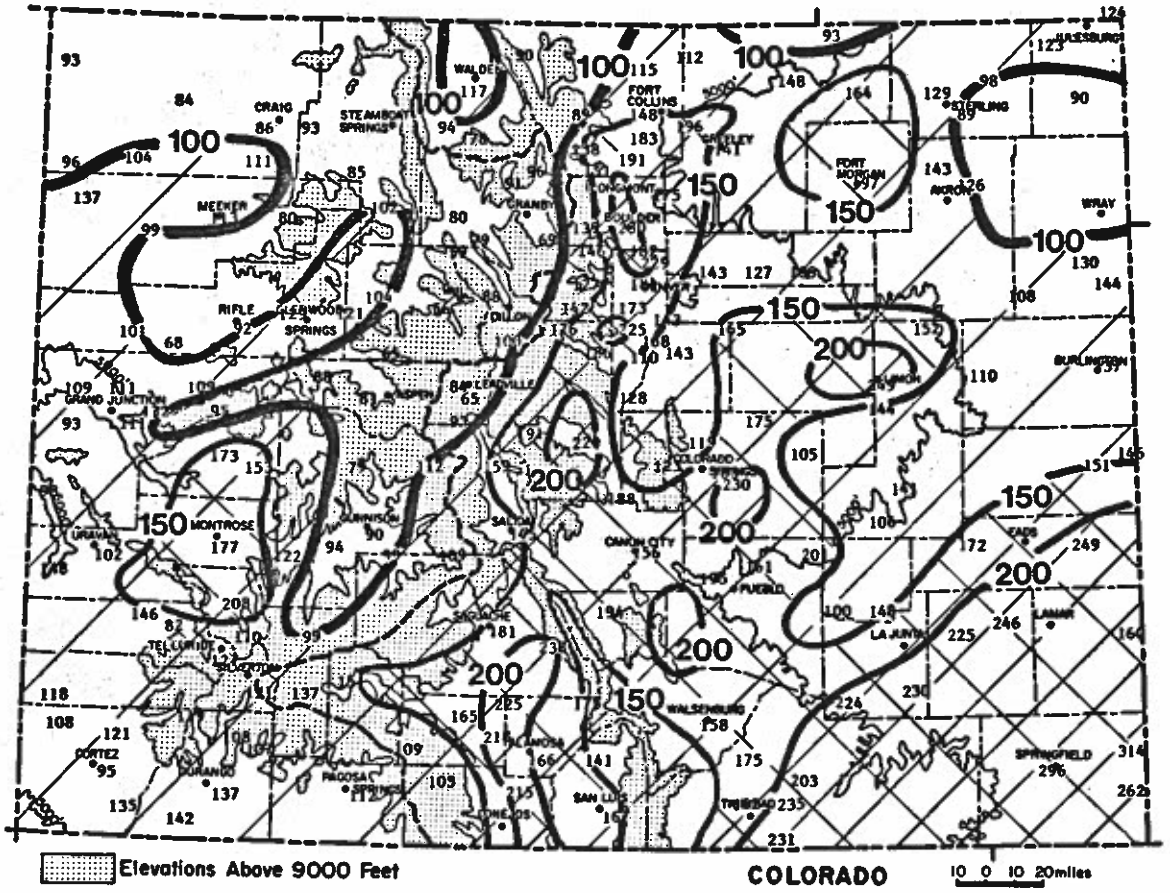
Comparison to Last Year

A year ago most of northern Colorado was considerably wetter than average, while southern sections and the Palmer Ridge tended to be dry. This year the pattern is reversed with the wettest portions of the state concentrated in southern Colorado and on the Palmer Ridge while northern sections are dry.

1987 Water Year to Date through January

Wettest (as % of average)			Driest (as % of average)		
Walsh	314%	5.37"	Vail	56%	4.70"
Springfield 7WSW	296%	6.22"	Green Mountain Dam	59%	2.59"
Stonington	262%	4.88"	Meredith	65%	3.64"

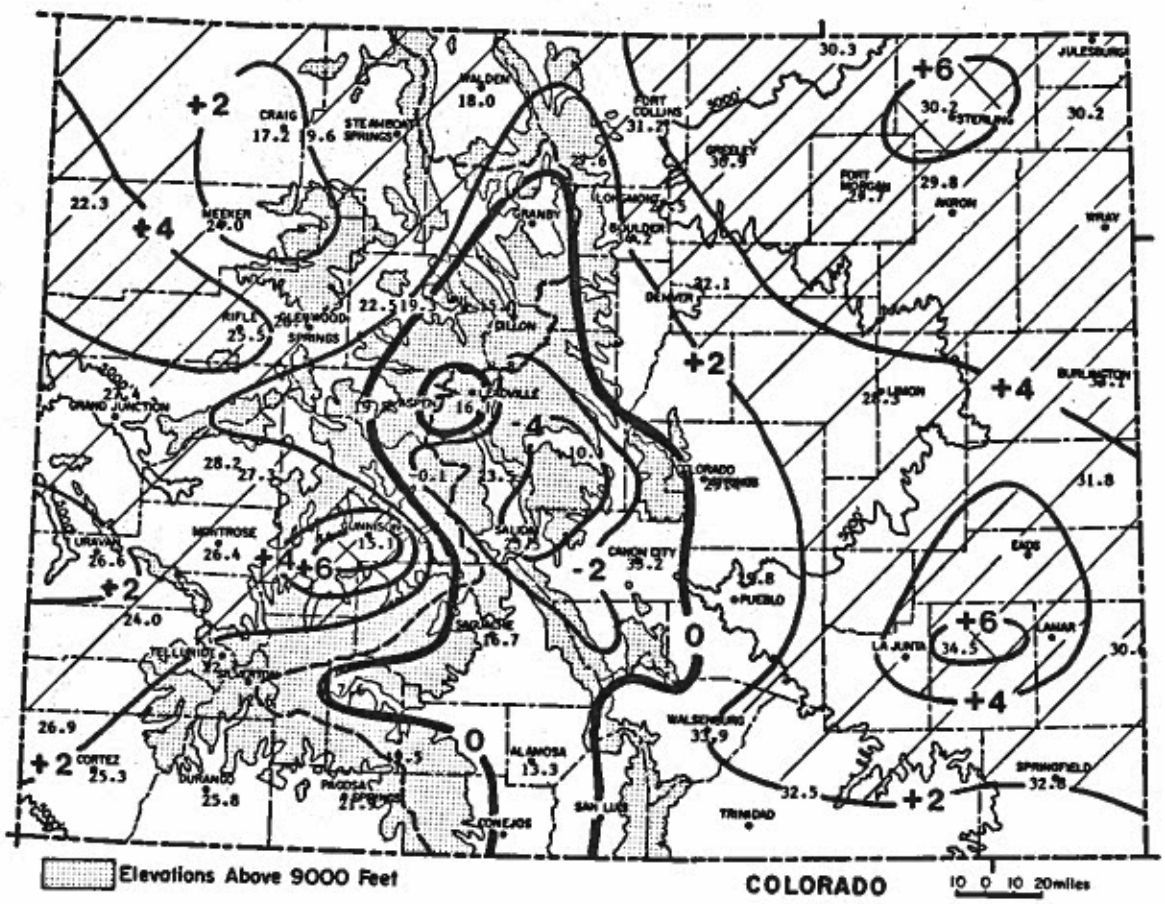
Wettest (total precipitation)			Driest (total precipitation)		
Wolf Creek Pass 1E	18.31"	109%	Kauffman 4SSE	1.28"	93%
Lemon Dam	13.19"	137%	Ordway 21N	1.38"	106%
Mount Evans Research Center	12.12"	127%	Fowler	1.40"	100%



Precipitation for October 1986 through January 1987 as a percent of the 1961-1980 average.

JANUARY 1987 TEMPERATURES AND DEGREE DAYS

Warm temperatures prevailed in January in spite of the frigid week that accompanied and followed the January 15 snowstorm. All of Colorado ended up warmer than average except for the high elevation valleys such as the San Luis Valley, South Park and Middle Park. For the second month in a row South Park experienced abnormally severe and persistent cold. The warmest parts of the state were the western valleys and Eastern Plains where temperatures were as much as six degrees Fahrenheit above average.



January 1987 temperatures (degrees Fahrenheit) and contours of departures from 1961-1980 averages.

JANUARY 1987 SOIL TEMPERATURES

A typical midwinter soil temperature pattern progression was observed in January at the Fort Collins station. The deepest frost penetration so far this winter occurred following the mid-month cold spell.

These soil temperature measurements were taken at Colorado State University beneath sparse unirrigated sod with a flat, open exposure. These data are not representative of all Colorado locations.

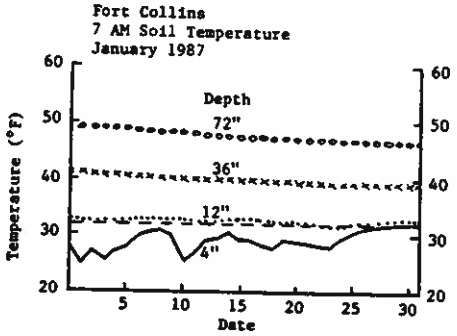


Table 1. Colorado Heating Degree Day Data for January 1987.

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
ALAMOSA	AVE	40	100	303	657	1074	1457	1519	1182	1035	732	453	165	8717
	85-86	30	66	378	634	1045	1472	1231	983	864	638	446	138	7925
	86-87	63	75	366	728	1004	1377	1593						5206
ASPEN	AVE	95	150	348	651	1029	1339	1376	1162	1116	798	524	262	8850
	85-86	119	107	453	656	1066	1278	1175	1029	848	739	530	185	8185
.	86-87	147	132	428	735	1009	1307	1398						5156
BOULDER	AVE	0	6	130	357	714	908	1004	804	775	483	220	59	5460
	85-86	0	0	222	400	982	1018	674	762	496	423	249	16	5242
	86-87	1	0	175	450	714	970	947						3257
BUENA VISTA	AVE	47	116	285	577	936	1184	1218	1025	983	720	459	184	7734
	85-86	63	54	405	597	938	1158	972	946	806	661	450	149	7199
	86-87	79	69	388	730	970	1316	1280						4832
BURLING-TON	AVE	6	5	108	364	762	1017	1110	871	803	459	200	38	5743
	85-86	0	5	206	405	977	1142	740	820	525	386	163	12	5381
	86-87	0	0	76	406	745	984	980						3191
CANON CITY	AVE	0	9	81	301	639	831	911	734	707	411	179	33	4836
	85-86	0	6	186	397	886	1036	711	756	507	399	248	40	5172
	86-87	4	2	132	422	724	952	976						3212
COLORADO SPRINGS	AVE	8	25	162	440	819	1042	1122	910	880	564	296	78	6346
	85-86	5	8	253	487	978	1143	822	840	635	487	315	49	6022
	86-87	4	14	174	519	813	1081	1096						3701
CORTEZ	AVE	0	11	115	434	813	1132	1181	921	828	555	292	68	6350
	85-86		4	264	484	884	1081		805	711	572	321		5126
	86-87	10	6	214	541	813	1041	1224						3849
CRAIG	AVE	32	58	275	608	996	1342	1479	1193	1094	687	419	193	8376
	85-86	10	42	353	649	1043	1487	1362	1023	780	669	461	76	7955
	86-87	31	15	338	654	967	1234	1473						4712
DELTA	AVE	0	0	94	394	813	1135	1197	890	753	429	167	31	5903
	85-86	0	M	113	335	658	1026	948	684	530	365	174	6	4839
	86-87	0	0	145	414	M	984	M						1543
DENVER	AVE	0	0	135	414	789	1004	1101	879	837	528	253	74	6014
	85-86		1	241	435	1051	1094	758	802	548	456	260	22	5668
	86-87	0	0	145	477	775	1045	1012						3454
DILLON	AVE	273	332	513	806	1167	1435	1516	1305	1296	972	704	435	10754
	85-86	260	300	609	856	1183	1439	1380	1175	1072	915	716	388	10293
	86-87	322	318	580	883	1125	1473	1542						6243
DURANGO	AVE	9	34	193	493	837	1153	1218	958	862	600	366	125	6848
	85-86	3	8	274	476	916	1159	967	802	686	575	341	70	6277
	86-87	23	9	295	559	844	1055	1204						3989
EAGLE	AVE	33	80	288	626	1026	1407	1448	1148	1014	705	431	171	8377
	85-86	19	52	356	605	995	1352	1324	890	736	598	428	88	7443
	86-87	37		314	658	930	1283	1309						4531
EVER-GREEN	AVE	59	113	327	621	916	1135	1199	1011	1009	730	489	218	7827
	85-86	62	90	387	651	1039	1119	947	927	770	608	532	157	7289
	86-87	75	90	380	699	927	1186	1178						4535
FORT COLLINS	AVE	5	11	171	468	846	1073	1181	930	877	558	281	82	6483
	85-86	1	8	243	499	1078	1199	883	816	568	470	261	22	6048
	86-87	0	0	178	500	809	1091	1042						3620
FORT MORGAN	AVE	0	6	140	438	867	1156	1283	969	874	516	224	47	6520
	85-86	0	2	239	548	1165	1425	1160	915	616	401	246	19	6736
	86-87	0	4	138	495	874	1193	1148						3852
GRAND JUNCTION	AVE	0	0	65	325	762	1138	1225	882	716	403	148	19	5683
	85-86	0	0	139	351	779	1018	949	685	489	366	168	3	4947
	86-87	0	0	130	414	718	1001	1159						3422

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
GRAND LAKE	AVE	214	264	468	775	1128	1473	1593	1369	1318	951	654	384	10591
	85-86	206	265	513	744	1115	1454	1494	1174	1083	896	651	304	9899
	86-87	245	242	488	777	1051	1450	1612						5865
GREELEY	AVE	0	0	149	450	861	1128	1240	946	856	522	238	52	6442
	85-86	0	6	249	501	1131	1311	1010	845	545	440	232	15	6285
.	86-87	0	0	142	484	825	1085	1054						3590
GUNNISON	AVE	111	188	393	719	1119	1590	1714	1422	1231	816	543	276	10122
	85-86	84	152	433	678	1058	1648	1712	1084	952	711	517	204	9233
	86-87	123	146	420	734	1064	1430	1539						5456
LAS ANIMAS	AVE	0	0	45	296	729	998	1101	820	698	348	102	9	5146
	85-86	0	0	134	313	816	1106	737	715	409	220	77		4527
	86-87	0	0	32	280	668	991	937						2908
LEAD-VILLE	AVE	272	337	522	817	1173	1435	1473	1318	1320	1038	726	439	10870
	85-86	333	359	666	871	1258	1470	1328	1251	1168	994	760	441	10899
	86-87	372	369	626	920	1188	1482	1510						6467
LIMON	AVE	8	6	144	448	834	1070	1156	960	936	570	299	100	6531
	85-86	1	12	274	544	1078	1233	861	910	662	508	336	57	6476
	86-87	4	8	171	551	873	1190	1132						3929
LONGMONT	AVE	0	6	162	453	843	1082	1194	938	874	546	256	78	6432
	85-86	0	6	236	486	1095	1228	869	814	549	469	262	20	6034
	86-87		0	154	498	852	1135	1155						3794
MEEKER	AVE	28	56	261	564	927	1240	1345	1086	998	651	394	164	7714
	85-86	6	31	358	599	967	1249	1164	893	742	646	458	75	7188
	86-87	41	28	402	623	894	1147	1262						4397
MONTROSE	AVE	0	10	135	437	837	1159	1218	941	818	522	254	69	6400
	85-86	0	0	211	443	803	1106	1032	766	577	453	235	24	5650
	86-87	1	6	183	532	809	1085	1190						3806
PAGOSA SPRINGS	AVE	82	113	297	608	981	1305	1380	1123	1026	732	487	233	8367
	85-86	34	73	376	600	1000	1373	1191	952	803	668	481	183	7734
	86-87	98	45	385	668	927	1182	1326						4631
PUEBLO	AVE	0	0	89	346	744	998	1091	834	756	421	163	23	5465
	85-86	0	0	172	410	1012	1161	783	728	523	346	167	21	5323
	86-87	0	0	94	428	741	1069	1082						3414
RIFLE	AVE	6	24	177	499	876	1249	1321	1002	856	555	298	82	6945
	85-86	1	6	232	484	882	1147	1076	769	607	477	287	16	5984
	86-87	1	3	226	499	795	1081	1216						3821
STEAMBOAT SPRINGS	AVE	113	169	390	704	1101	1476	1541	1277	1184	810	533	297	9595
	85-86	57	130	434	729	1144	1554	1495	1097	915	688	533	185	8961
	86-87	120	119	M	M	M	M	M						
STERLING	AVE	0	6	157	462	876	1163	1274	966	896	528	235	51	6614
	85-86	0	6	230	519	1161	1395	1155	990	594	439	279	22	6790
	86-87	0	4	105	427	847	1193	1072						3648
TELLURIDE	AVE	163	223	396	676	1026	1293	1339	1151	1141	849	589	318	9164
	85-86	121	152	463	648	1023	1270	1130	1011	892	740	585	257	8292
.	86-87	200	129	434	716	1018	1297	1304						5098
TRINIDAD	AVE	0	0	86	359	738	973	1051	846	781	468	207	35	5544
	85-86	0	0	175	380	772	1046	738	764	529	365	194	32	4995
	86-87	1	0	90	421	719	1022	998						3251
WALDEN	AVE	198	285	501	822	1170	1457	1535	1313	1277	915	642	351	10466
	85-86	171	271	578	824	1224	1458	1381	1155	989	836	656	256	9799
	86-87	225	224	530	825	1126	1388	1449						5767
WALSEN-BURG	AVE	0	8	102	370	720	924	989	820	781	501	240	49	5504
	85-86	0	0	165	358	770	982	681	734	515	404	221	42	4872
	86-87	0	0	84	420	682	984	958						3128

JANUARY 1987 CLIMATIC DATA

Eastern Plains*

Name	Temperature						Degree Days			Precipitation			
	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
KAUFFMAN 4SSE	44.0	16.5	30.3	5.1	65	-12	1065	0	48	0.00	-0.31	0.0	0
STERLING	44.2	16.2	30.2	7.3	66	-4	1072	0	41	0.19	-0.15	55.9	2
FORT MORGAN	43.5	11.8	27.7	5.0	65	-9	1148	0	36	0.14	-0.04	77.8	4
AKRON FAA AP	40.9	18.7	29.8	4.9	61	-6	1084	0	32	0.31	0.03	110.7	4
HOLYOKE	43.7	16.7	30.2	3.9	69	2	1072	0	47	0.27	-0.11	71.1	3
BURLINGTON	45.5	20.8	33.1	4.4	71	2	980	0	64	0.30	0.06	125.0	2
LIMON WSMO	40.2	16.4	28.3	3.8	63	-10	1132	0	37	0.37	0.08	127.6	5
CHEYENNE WELLS	45.1	18.5	31.8	3.7	67	3	1022	0	66	0.33	0.17	206.2	3
LAS ANIMAS	50.2	18.9	34.5	6.2	71	-1	937	0	94	0.25	0.04	119.0	3
HOLLY	48.1	13.0	30.6	3.7	70	-3	1064	0	61	0.27	0.07	135.0	1
SPRINGFIELD 7WSW	45.8	19.8	32.8	2.0	71	0	994	0	68	0.72	0.38	211.8	7

Foothills/Adjacent Plains*

Name	Temperature						Degree Days			Precipitation			
	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
FORT COLLINS	44.3	18.1	31.2	4.8	65	-6	1042	0	47	0.38	-0.06	86.4	6
GREELEY UNC	44.2	17.6	30.9	4.8	66	-6	1054	0	43	0.33	-0.05	86.8	5
ESTES PARK	39.4	15.8	27.6	0.8	60	-18	1152	0	16	0.20	-0.24	45.5	6
LONGMONT 2ESE	42.9	12.2	27.5	1.8	64	-11	1155	0	37	0.58	0.17	141.5	6
BOULDER	45.6	22.9	34.2	2.7	65	-4	947	0	52	1.17	0.54	185.7	7
DENVER WSFO AP	44.9	19.4	32.1	3.6	66	-11	1012	0	48	0.69	0.18	135.3	6
EVERGREEN	44.0	9.5	26.8	0.7	65	-15	1178	0	48	0.90	0.42	187.5	5
LAKE GEORGE 8SW	26.9	-6.7	10.1	-5.4	46	-32	1696	0	0	0.81	0.58	352.2	9
COLORADO SPRINGS	41.1	17.6	29.4	1.5	66	-11	1096	0	37	1.17	0.93	487.5	6
CANON CITY 2SE	45.9	20.6	33.2	-0.3	68	-11	976	0	60	0.94	0.66	335.7	6
PUEBLO WSO AP	45.3	14.3	29.8	0.8	71	-14	1082	0	63	0.74	0.52	336.4	5
WALSENBURG	46.3	21.5	33.9	2.0	68	-6	958	0	55	1.23	0.69	227.8	6
TRINIDAD FAA AP	46.6	18.5	32.5	2.0	70	-5	998	0	64	1.03	0.62	251.2	7

Mountains/Interior Valleys*

Name	Temperature						Degree Days			Precipitation			
	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
WALDEN	32.6	3.5	18.0	2.9	47	-23	1449	0	0	0.33	-0.30	52.4	6
LEADVILLE 2SW	30.1	2.1	16.1	1.6	56	-20	1510	0	4	0.52	-0.68	43.3	11
SALIDA	38.7	8.2	23.5	-4.4	60	-19	1279	0	12	0.57	0.22	162.9	5
BUENA VISTA	36.7	10.2	23.5	-2.2	53	-13	1280	0	4	0.15	-0.12	55.6	5
SAGUACHE	30.7	2.6	16.7	-1.2	41	-14	1496	0	0	0.59	0.32	218.5	4
HERMIT 7ESE	22.8	-7.5	7.6	-2.7	30	-29	1771	0	0	1.80	0.98	219.5	3
ALAMOSA WSO AP	32.3	-5.6	13.3	-1.5	48	-27	1593	0	0	0.65	0.40	260.0	5
GRAND LAKE 6SSW	27.6	-2.2	12.7	-0.3	40	-22	1612	0	0	0.85	-0.26	76.6	10
DILLON 1E	30.7	-0.7	15.0	-0.5	52	-16	1542	0	1	0.53	-0.33	61.6	11
AVON	34.5	4.0	19.3	-0.2	50	-8	1409	0	0	0.67	-0.73	47.9	6
CLIMAX	21.6	-4.1	8.8	-3.9	47	-18	1735	0	0	1.05	-1.18	47.1	14
ASPEN 1SW	32.1	7.6	19.8	-0.2	54	-12	1398	0	2	1.55	-0.95	62.0	11
TAYLOR PARK	22.6	-22.8	-0.1	-2.2	36	-45	2011	0	0	1.30	-0.14	90.3	8
TELLURIDE	37.5	8.0	22.7	1.6	52	-9	1304	0	2	1.55	-0.15	91.2	15
PAGOSA SPRINGS	40.6	3.2	21.9	1.7	54	-7	1326	0	7	1.26	-0.62	67.0	7
SILVERTON	33.1	-7.8	12.6	1.2	50	-25	1615	0	0	2.16	0.55	134.2	16
WOLF CREEK PASS 1	36.1	3.0	19.5	2.6	55	-9	1402	0	8	2.31	-1.42	61.9	9

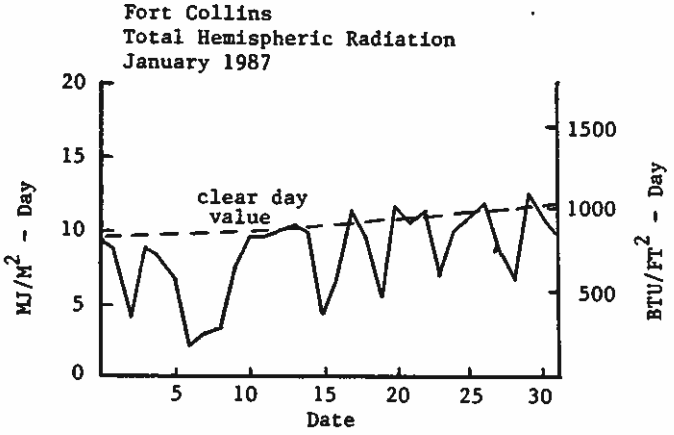
Western Valleys*

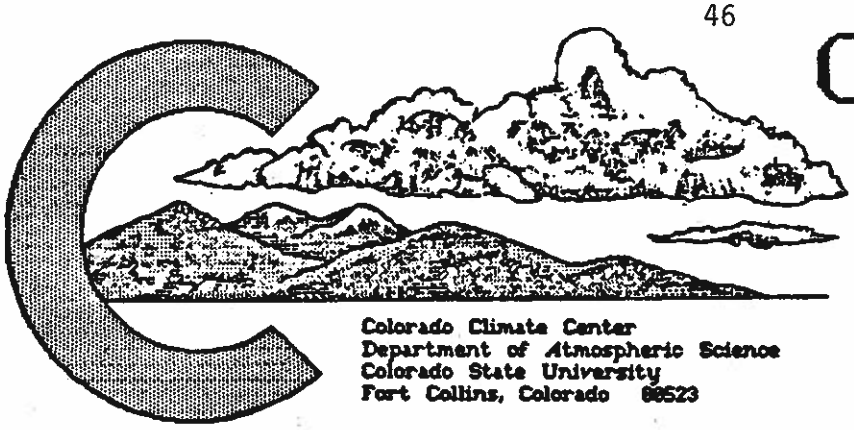
Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
CRAIG 4SW	29.7	4.6	17.2	0.2	46	-11	1473	0	0	0.82	-0.48	63.1	10
HAYDEN	31.1	8.1	19.6	3.3	48	-20	1399	0	0	1.32	-0.17	88.6	6
MEEKER NO. 2	37.8	10.1	24.0	1.8	53	-14	1262	0	3	0.71	-0.10	87.7	4
RANGELY 1E	35.2	9.3	22.3	6.7	51	-10	1317	0	1	0.28	-0.25	52.8	3
EAGLE FAA AP	37.6	7.4	22.5	4.4	55	-10	1309	0	4	0.30	-0.58	34.1	4
GLENWOOD SPRINGS	37.0	15.3	26.1	3.5	51	-1	1197	0	1	1.22	-0.36	77.2	8
RIFLE	38.8	12.3	25.5	4.5	53	-6	1216	0	4	0.78	-0.12	86.7	9
GRAND JUNCTION WS	38.8	16.0	27.4	3.7	51	0	1159	0	2	0.30	-0.28	51.7	7
CEDAREDGE	40.6	15.9	28.2	2.8	58	-3	1132	0	8	0.95	0.09	110.5	8
PAONIA 1SW	39.0	15.5	27.3	3.0	53	-3	1165	0	6	0.98	-0.24	80.3	8
GUNNISON	31.5	-1.4	15.1	6.8	48	-17	1539	0	0	0.50	-0.35	58.8	7
MONTROSE NO. 2	38.2	14.6	26.4	2.5	52	0	1190	0	3	0.17	-0.33	34.0	3
URAVAN	39.8	13.5	26.6	-0.9	50	-7	1184	0	0	0.34	-0.66	34.0	4
NORWOOD	37.1	10.9	24.0	2.6	51	-11	1264	0	2	0.56	-0.52	51.9	5
YELLOW JACKET 2W	37.9	16.0	26.9	3.0	55	-4	1172	0	5	0.71	-0.55	56.3	6
CORTEZ	40.3	10.3	25.3	0.8	55	-9	1224	0	4	0.50	-0.53	48.5	7
DURANGO	38.9	12.7	25.8	1.3	53	-8	1204	0	3	1.48	-0.32	82.2	9

* Data are received by the Colorado Climate Center for more locations than appear in these tables. Please contact the Colorado Climate Center if additional information is needed.

JANUARY 1987 SUNSHINE AND SOLAR RADIATION

Station	Number of Days clear	partly cloudy	cloudy	% of possible sunshine	average % of possible
Colorado Springs	12	6	13	—	—
Denver	6	13	12	64%	72%
Fort Collins	7	12	12	—	—
Grand Junction	7	8	16	67%	58%
Pueblo	13	5	13	68%	75%





COLORADO CLIMATE

Colorado Climate Center
Department of Atmospheric Science
Colorado State University
Fort Collins, Colorado 80523

FEBRUARY 1987

February in Review:

Springlike weather began in Colorado at least a month earlier than usual with an assortment of warmth, rain, wet snow and even some thunderstorms. The first half of the month was generally dry and unseasonably warm, but chilly, damp and stormy weather prevailed throughout the latter portion of the month. Temperatures ended up a few degrees warmer than average over most of the state. Precipitation was far above average over all of the Eastern Plains and some of the southern mountains and valleys. Unusually dry conditions continued over the northern and central mountains.

A Look Ahead -- April 1987:

Last month we described March as a month of dramatic climatic variation in Colorado. Well, April is every bit as interesting and exciting as March -- it's just scaled up a few degrees warmer.

Snows continue to fall in the Colorado Rockies in April and typically reach their greatest depths of the year during the month. In parts of the central Colorado mountains, April is the wettest month of the year. Also, for some foothill areas east of the Continental Divide, April is often the snowiest month of the year. Monthly precipitation averages range from less than 1" in several western valleys to more than 4" in some northern and central mountain areas. For most of the state including all of eastern Colorado, totals in the 1-2" range are normal. Much of the low elevation precipitation may fall as rain, but heavy spring snows are not uncommon. April snowfall averages only 1-3" in our western valleys and on the southeast plains but increases to 6-12" along the Front Range Urban corrider with much higher amounts in the mountains. Last year in early April, close to 50" of snow fell in just one day in the mountains directly west of Denver.

Temperatures vary greatly from day to day in April but tend to warm gradually through the month. Below 7,500 feet, daytime temperatures average in the 50s and 60s with 30s at night. Higher in the mountains, daytime temperatures remain in the 30s and 40s with lows typically in the teens. Subzero temperatures may still occur in some mountain communities, but they become infrequent after the first week of the month. Subfreezing temperatures are a good possibility throughout the month statewide except near Grand Junction when the threat of frost eases by the end of April.

The Colorado thunderstorm season begins in April. With it comes the threat of hail and tornadoes, primarily on the eastern plains. For storm watchers, the sight of developing thunderheads (cumulonimbus) is a welcome sight after 6 or 7 months without them. Welcome to spring!

Dark Clouds on the Horizon?

A few months ago we did a special story about the frequency of sunny days in Colorado (Colorado Climate, October 1986). I am pleased to say that one of the outcomes of publishing our analysis has been a lot of lively discussion with many different people about our sunshine situation here in this state and how we compare with the rest of the country. Several long-time residents of Colorado have mentioned that while they agreed with our results and always doubted that we really got 300 sunny days each year, that they also remember it being a lot sunnier in Colorado before the big population boom in the 1970s. That was an interesting observation but I did not take it too seriously. Over the years I have consistently found that subjective perceptions about our climate, based on personal experience and memory, are usually not supported by objective climate data. In other words, our perceptions are often wrong. Nevertheless, it raised an interesting question worthy of further pursuit.

(continued on last page)

FEBRUARY 1987 DAILY WEATHER

Date	Event
1-2	Partly cloudy, warm, breezy and dry. A little rain early on the 1st in extreme southeast Colorado from a storm crossing Texas.
3-5	Increasing clouds but continued mild on the 3rd as an upper level disturbance approached from the west. Rain and snow began early on the 4th west of the mountains and spread into eastern Colorado later in the day. Precipitation was mostly very light, but a few locations in western Colorado such as Norwood and Delta received at least 0.25". Icy roads greeted early travelers on the northeastern plains on the 5th.
6-9	Dry period with unseasonably warm temperatures. Several new record highs were set on the 7th east of the mountains including 71° at Denver and 74° in Boulder. Even in the mountains, highs rose into the 40s and 50s producing spring skiing conditions. Cooler air slipped into eastern Colorado on the 8th, but readings jumped back into the 60s on the 9th. The clear dry air resulted in huge day to night temperature difference in some areas. In Silverton temperatures varied nearly 60 degrees from day to night.
10-13	Continued warm statewide. Light winds aloft and increased humidity resulted in unsettled weather. Denver experienced a brief surprise thundershower on the 11th. Mostly very light rains and snows were scattered over western Colorado throughout the period.
14-15	A complex storm system crossed Colorado bringing significant low-elevation precipitation to most of western Colorado on the 14th and moderate to heavy mountain snows. A mixture of rain and snow fell east of the mountains with heavy rains in portions of southeast and east central Colorado. From Limon southward to LaJunta and Springfield, many areas reported from 0.75" to 1.30" of moisture. That is more than often falls in the entire winter in that part of Colorado.
16-20	A deep trough of low pressure aloft over the central and southern Rockies produced cool, damp unsettled weather. Summerlike showers developed over the southwestern mountains and in some areas along the Front Range 16-18th. Parts of the Denver area were blitzed by several inches of wet snow in just an hour or two from a rare winter thunder snowshower on the 18th. On the 19th, a more organized upslope flow developed east of the mountains producing moderate to locally heavy snows along the Front Range. Boulder reported 10" of wet snow before skies began to clear on the 20th. Colorado Springs had 7".
21-22	Clear with some of the lowest temperatures of the month recorded.
23-28	For the remainder of the month Colorado was affected by a huge storm system which developed over Nevada on the 23rd, weakened, then reorganized over northern New Mexico on the 26th and finally moved out of the area on the 28th. Precipitation began early on the 24th in parts of western Colorado and also along the northern Front Range where a shallow wedge of cold air intruded from the north. Heavy snows began in the southwest mountains later on the 25th spreading to eastern Colorado on the 26th but avoiding northwestern Colorado. Snows melted as they fell across some of the Eastern Plains, but some very heavy precipitation totals occurred such as 1.40" at Akron and 1.47" at Holyoke. Colorado Springs was clobbered by 14.8" of wet snow (1.49" water) and high winds. Skies cleared on the 28th but cold temperatures remained. Taylor Park Reservoir shivered with a -44° reading.

February 1987 Extremes

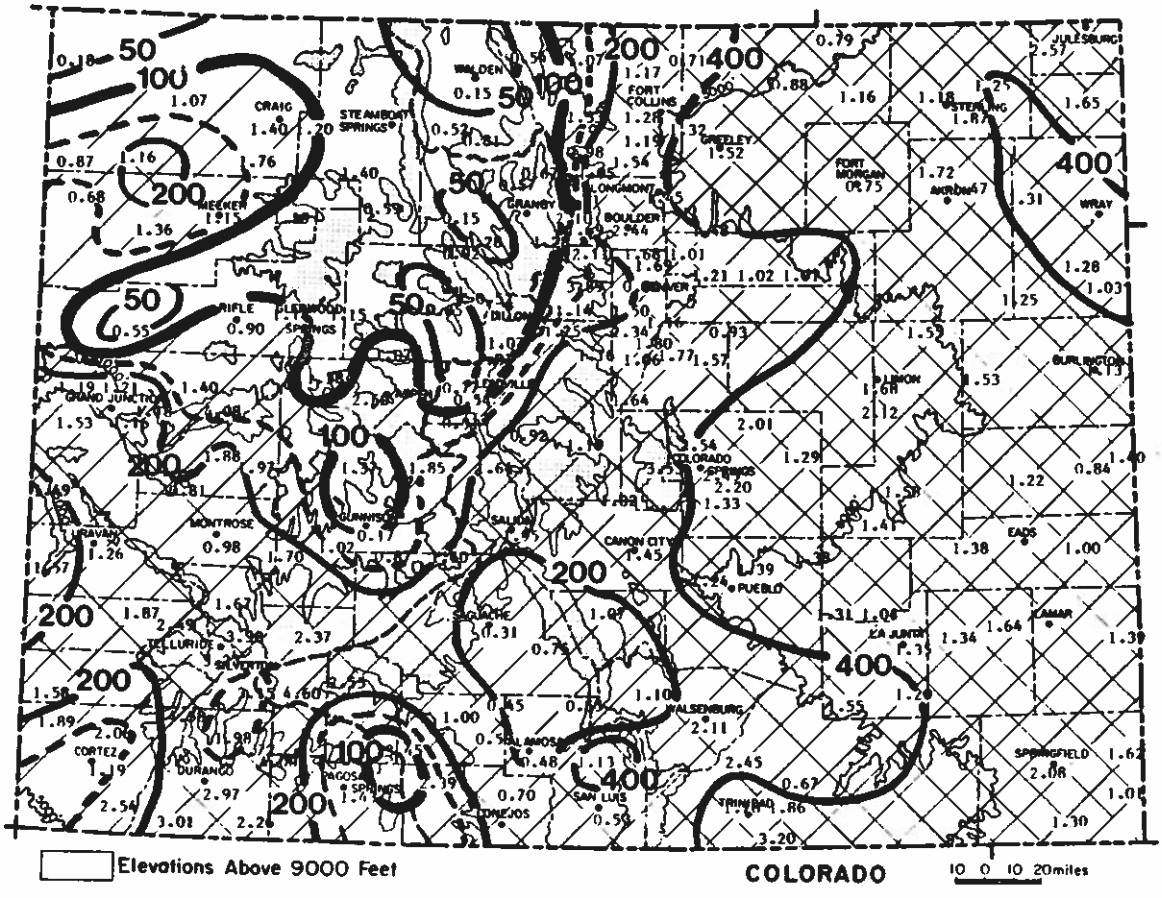
Highest Temperature	76°F	February 7	Holyoke Wheatridge
Lowest Temperature	-44°F	February 28	Taylor Park Reservoir
Greatest Total Precipitation	4.72"		Lemon Dam
Least Total Precipitation	0.15"		Kremmling 1E Walden
Greatest Total Snowfall*	101"		Mount Evans Research Center
Greatest Snowdepth*	104"	February 27	Mount Evans Research Center

* data derived only from those stations with complete daily snowfall records.

FEBRUARY 1987 PRECIPITATION

Colorado had more than its share of climatic diversity in February. Precipitation totals across the eastern Colorado plains were equal to or greater than those in the northern and central mountains. Climax (Fremont Pass) totalled 1.01" for the month while nearly all locations east of the mountains exceeded that total. February, which in recent decades has been a reliably dry month on the plains, produced 4 to 10 times the 1961-80 average precipitation. At Akron, Boulder and Colorado Springs this was the wettest February in nearly 100 years of recorded history. Above average precipitation was also observed over the San Juan Mountains and most of the lower valleys of western Colorado. At the same time, the northern and central mountains were unusually dry. A few locations such as Grand Lake, Walden and Vail received less than half of their average moisture.

Greatest		Least	
Lemon Dam	4.72"	Kremmling 1E	0.15"
Rio Grande Reservoir	4.60"	Walden	0.15"
Rico	4.58"	Browns Park Refuge	0.17"



Precipitation amounts (inches) for February 1987 and contours of precipitation as a percent of the 1961-1980 average. Dotted line is 150% of average.

1987 WATER YEAR PRECIPITION

February precipitation accentuated the pattern that had become established in previous months. Above to much above average precipitation for the first 5 months of the 1987 water year is widespread except in the northern and central Colorado mountains where totals are typically 10 to 30% below average.

Comparison to Last Year

The precipitation pattern is nearly reversed from this time in 1986. At that time, dry conditions were noted in parts of southern Colorado and over some areas east of the mountains, while most of the northern and central mountains were wetter than usual.

1987 Water Year to Date through February

Wettest (as % of average)

Walsh	360%	6.99"
Springfield 7WSW	341%	8.30"
Limon WSMO	324%	5.35"

Driest (as % of average)

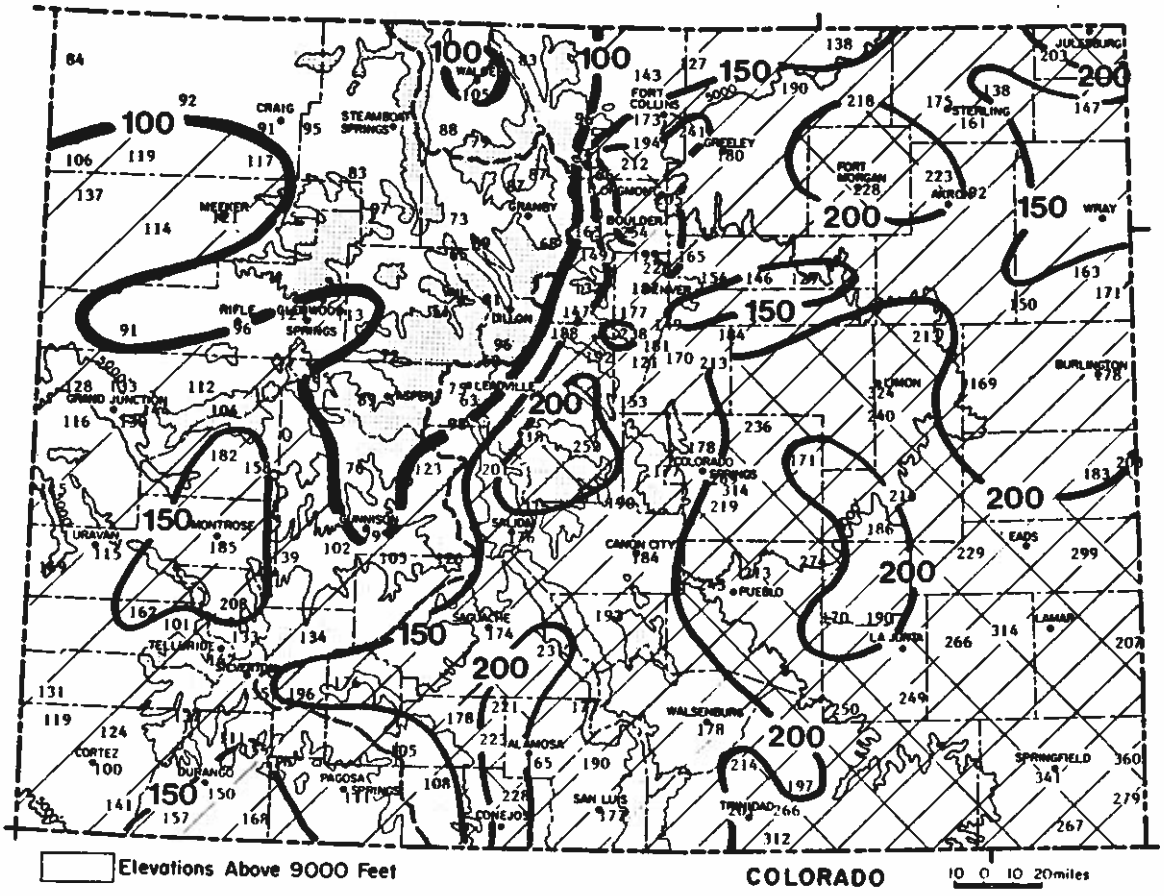
Vail	51%	5.35"
Climax	62%	5.75"
Leadville	63%	3.36"

Wettest (total precipitation)

Wolf Creek Pass 1E	21.76"	105%
Lemon Dam	17.91"	155%
Mount Evans Research Center	16.01"	132%

Driest (total precipitation)

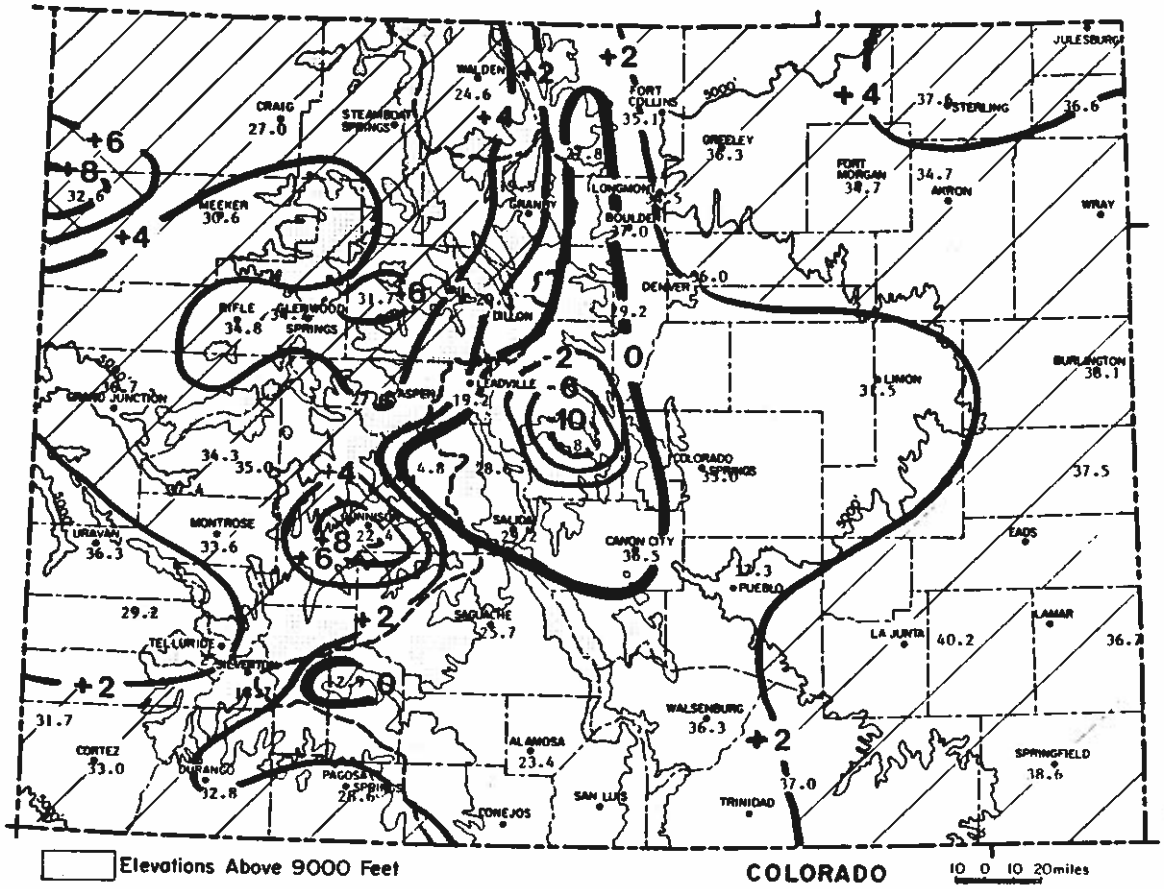
Kauffman 4SSE	2.07"	138%
Browns Park Refuge	2.50"	84%
Twin Lakes Reservoir	2.66"	98%



Precipitation for October 1986 through February 1987 as a percent of the 1961-1980 average.

FEBRUARY 1987 TEMPERATURES AND DEGREE DAYS

The temperature pattern was very similar to each of the past two months. Most of the state was warmer than average except for an area in central Colorado along and immediately east of the Continental Divide. For the South Park area this has been a long, cold winter, averaging about 10 degrees Fahrenheit colder than usual. But strong winds and ground blizzards (for which the area is well known) have been few and far between. The warmest parts of the state in February, compared to average, were some of the western valleys near Gunnison, Rangely and Eagle and also the South Platte valley in northeastern Colorado and the North Platte valley near Walden. These areas were all at least 6 degrees warmer than average.



February 1987 temperatures (degrees Fahrenheit) and contours of departures from 1961-1980 averages.

FEBRUARY 1987 SOIL TEMPERATURES

The frost came out of the soil in Fort Collins a little earlier than usual this year as soil temperatures responded to above average air temperatures during January and February.

These soil temperature measurements were taken at Colorado State University beneath sparse unirrigated sod with a flat, open exposure. These data are not representative of all Colorado locations.

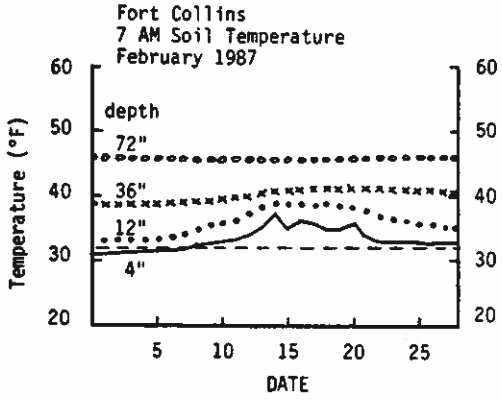


Table 1. Colorado Monthly Heating Degree Day Data through February 1987.

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
ALAMOSA	AVE	40	100	303	657	1074	1457	1519	1182	1035	732	453	165	8717
	85-86	30	66	378	634	1045	1472	1231	983	864	638	446	138	7925
	86-87	63	75	366	728	1004	1377	1593	1160					6366
ASPEN	AVE	95	150	348	651	1029	1339	1376	1162	1116	798	524	262	8850
	85-86	119	107	453	656	1066	1278	1175	1029	848	739	530	185	8185
	86-87	147	132	428	735	1009	1307	1398	1063					6219
BOULDER	AVE	0	6	130	357	714	908	1004	804	775	483	220	59	5460
	85-86	0	0	222	400	982	1018	674	762	496	423	249	16	5242
	86-87	1	0	175	450	714	970	947	779					4036
BUENA VISTA	AVE	47	116	285	577	936	1184	1218	1025	983	720	459	184	7734
	85-86	63	54	405	597	938	1158	972	946	806	661	450	149	7199
	86-87	79	69	388	730	970	1316	1280	1011					5843
BURLING-TON	AVE	6	5	108	364	762	1017	1110	871	803	459	200	38	5743
	85-86	0	5	206	405	977	1142	740	820	525	386	163	12	5381
	86-87	0	0	76	406	745	984	980	746					3937
CANON CITY	AVE	0	9	81	301	639	831	911	734	707	411	179	33	4836
	85-86	0	6	186	397	886	1036	711	756	507	399	248	40	5172
	86-87	4	2	132	422	724	952	976	793					4005
COLORADO SPRINGS	AVE	8	25	162	440	819	1042	1122	910	880	564	296	78	6346
	85-86	5	8	253	487	978	1143	822	840	635	487	315	49	6022
	86-87	4	14	174	519	813	1081	1096	888					4589
CORTEZ	AVE	0	11	115	434	813	1132	1181	921	828	555	292	68	6350
	85-86		4	264	484	884	1081		805	711	572	321		5126
	86-87	10	6	214	541	813	1041	1224	888					4737
CRAIG	AVE	32	58	275	608	996	1342	1479	1193	1094	687	419	193	8376
	85-86	10	42	353	649	1043	1487	1362	1023	780	669	461	76	7955
	86-87	31	15	338	654	967	1234	1473	1059					5771
DELTA	AVE	0	0	94	394	813	1135	1197	890	753	429	167	31	5903
	85-86	0	M	113	335	658	1026	948	684	530	365	174	6	4839
	86-87	0	0	145	414	M	984	M	764					2307
DENVER	AVE	0	0	135	414	789	1004	1101	879	837	528	253	74	6014
	85-86		1	241	435	1051	1094	758	802	548	456	260	22	5668
	86-87	0	0	145	477	775	1045	1012	804					4258
DILLON	AVE	273	332	513	806	1167	1435	1516	1305	1296	972	704	435	10754
	85-86	260	300	609	856	1183	1439	1380	1175	1072	915	716	388	10293
	86-87	322	318	580	883	1125	1473	1542	1244					7487
DURANGO	AVE	9	34	193	493	837	1153	1218	958	862	600	366	125	6848
	85-86	3	8	274	476	916	1159	967	802	686	575	341	70	6277
	86-87	23	9	295	559	844	1055	1204	895					4884
EAGLE	AVE	33	80	288	626	1026	1407	1448	1148	1014	705	431	171	8377
	85-86	19	52	356	605	995	1352	1324	890	736	598	428	88	7443
	86-87	37		314	658	930	1283	1309	925					5456
EVER-GREEN	AVE	59	113	327	621	916	1135	1199	1011	1009	730	489	218	7827
	85-86	62	90	387	651	1039	1119	947	927	770	608	532	157	7289
	86-87	75	90	380	699	927	1186	1178	995					5530
FORT COLLINS	AVE	5	11	171	468	846	1073	1181	930	877	558	281	82	6483
	85-86	1	8	243	499	1078	1199	883	816	568	470	261	22	6048
	86-87	0	0	178	500	809	1091	1042	830					4450
FORT MORGAN	AVE	0	6	140	438	867	1156	1283	969	874	516	224	47	6520
	85-86	0	2	239	548	1165	1425	1160	915	616	401	246	19	6736
	86-87	0	4	138	495	874	1193	1148	842					4694
GRAND JUNCTION	AVE	0	0	65	325	762	1138	1225	882	716	403	148	19	5683
	85-86	0	0	139	351	779	1018	949	685	489	366	168	3	4947
	86-87	0	0	130	414	718	1001	1159	785					4207

M = data missing for that month

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
GRAND LAKE	AVE	214	264	468	775	1128	1473	1593	1369	1318	951	654	384	10591
	85-86	206	265	513	744	1115	1454	1494	1174	1083	896	651	304	9899
	86-87	245	242	488	777	1051	1450	1612	1265					7130
GREELEY	AVE	0	0	149	450	861	1128	1240	946	856	522	238	52	6442
	85-86	0	6	249	501	1131	1311	1010	845	545	440	232	15	6285
	86-87	0	0	142	484	825	1085	1054	797					4387
GUNNISON	AVE	111	188	393	719	1119	1590	1714	1422	1231	816	543	276	10122
	85-86	84	152	433	678	1058	1648	1712	1084	952	711	517	204	9233
	86-87	123	146	420	734	1064	1430	1539	1187					6643
LAS ANIMAS	AVE	0	0	45	296	729	998	1101	820	698	348	102	9	5146
	85-86	0	0	134	313	816	1106	737	715	409	220	77		4527
	86-87	0	0	32	280	668	991	937	685					3593
LEAD-VILLE	AVE	272	337	522	817	1173	1435	1473	1318	1320	1038	726	439	10870
	85-86	333	359	666	871	1258	1470	1328	1251	1168	994	760	441	10899
	86-87	372	369	626	920	1188	1482	1510	1276					7743
LIMON	AVE	8	6	144	448	834	1070	1156	960	936	570	299	100	6531
	85-86	1	12	274	544	1078	1233	861	910	662	508	336	57	6476
	86-87	4	8	171	551	873	1190	1132	931					4860
LONGMONT	AVE	0	6	162	453	843	1082	1194	938	874	546	256	78	6432
	85-86	0	6	236	486	1095	1228	869	814	549	469	262	20	6034
	86-87		0	154	498	852	1135	1155	848					4642
MEEKER	AVE	28	56	261	564	927	1240	1345	1086	998	651	394	164	7714
	85-86	6	31	358	599	967	1249	1164	893	742	646	458	75	7188
	86-87	41	28	402	623	894	1147	1262	957					5354
MONTROSE	AVE	0	10	135	437	837	1159	1218	941	818	522	254	69	6400
	85-86	0	0	211	443	803	1106	1032	766	577	453	235	24	5650
	86-87	1	6	183	532	809	1085	1190	876					4682
PAGOSA SPRINGS	AVE	82	113	297	608	981	1305	1380	1123	1026	732	487	233	8367
	85-86	34	73	376	600	1000	1373	1191	952	803	668	481	183	7734
	86-87	98	45	385	668	927	1182	1326	1013					5644
PUEBLO	AVE	0	0	89	346	744	998	1091	834	756	421	163	23	5465
	85-86	0	0	172	410	1012	1161	783	728	523	346	167	21	5323
	86-87	0	0	94	428	741	1069	1082	768					4182
RIFLE	AVE	6	24	177	499	876	1249	1321	1002	856	555	298	82	6945
	85-86	1	6	232	484	882	1147	1076	769	607	477	287	16	5984
	86-87	1	3	226	499	795	1081	1216	839					4660
STEAMBOAT SPRINGS	AVE	113	169	390	704	1101	1476	1541	1277	1184	810	533	297	9595
	85-86	57	130	434	729	1144	1554	1495	1097	915	688	533	185	8961
	86-87	120	119	M	M	M	M	M	M					
STERLING	AVE	0	6	157	462	876	1163	1274	966	896	528	235	51	6614
	85-86	0	6	230	519	1161	1395	1155	990	594	439	279	22	6790
	86-87	0	4	105	427	847	1193	1072	762					4410
TELLURIDE	AVE	163	223	396	676	1026	1293	1339	1151	1141	849	589	318	9164
	85-86	121	152	463	648	1023	1270	1130	1011	892	740	585	257	8292
	86-87	200	129	434	716	1018	1297	1304	1091					6189
TRINIDAD	AVE	0	0	86	359	738	973	1051	846	781	468	207	35	5544
	85-86	0	0	175	380	772	1046	738	764	529	365	194	32	4995
	86-87	1	0	90	421	719	1022	998	775					4026
WALDEN	AVE	198	285	501	822	1170	1457	1535	1313	1277	915	642	351	10466
	85-86	171	271	578	824	1224	1458	1381	1155	989	836	656	256	9799
	86-87	225	224	530	825	1126	1388	1449	1127					6894
WALSEN-BURG	AVE	0	8	102	370	720	924	989	820	781	501	240	49	5504
	85-86	0	0	165	358	770	982	681	734	515	404	221	42	4872
	86-87	0	0	84	420	682	984	958	796					3924

FEBRUARY 1987 CLIMATIC DATA

Eastern Plains*

	Temperature						Degree Days			Precipitation			
Name	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
KAUFFMAN 4SSE	48.2	20.9	34.6	4.0	71	8	846	0	68	0.79	0.66	607.7	4
STERLING	50.8	24.4	37.6	6.7	74	1	762	0	80	1.18	1.01	694.1	5
FORT MORGAN	48.7	20.7	34.7	3.8	70	9	842	0	71	0.75	0.61	535.7	6
AKRON FAA AP	45.5	23.9	34.7	3.8	67	13	844	0	47	1.72	1.54	955.6	8
HOLYOKE	49.2	24.1	36.6	4.0	76	16	788	0	72	1.65	1.31	485.3	8
BURLINGTON	49.7	26.5	38.1	3.5	72	14	746	0	63	1.13	0.93	565.0	5
LIMON WSMO	43.0	20.0	31.5	0.4	67	7	931	0	40	1.68	1.50	933.3	4
CHEYENNE WELLS	49.7	25.2	37.5	3.9	71	16	765	0	61	0.84	0.68	525.0	6
LAS ANIMAS	54.3	26.1	40.2	3.9	75	19	685	0	98	1.34	1.08	515.4	5
HOLLY	53.1	20.4	36.7	3.1	69	9	785	0	93	1.39	1.13	534.6	4
SPRINGFIELD 7WSW	50.1	27.0	38.6	2.8	70	13	733	0	76	2.08	1.75	630.3	10

Foothills/Adjacent Plains*

	Temperature						Degree Days			Precipitation			
Name	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
FORT COLLINS	46.7	23.5	35.1	2.6	68	10	830	0	49	1.28	0.91	345.9	12
GREELEY UNC	48.1	24.5	36.3	2.5	70	11	797	0	62	1.52	1.24	542.9	6
ESTES PARK	40.5	15.2	27.8	-1.6	58	-10	1034	0	14	0.98	0.60	257.9	12
LONGMONT 2ESE	47.0	21.9	34.5	2.6	69	6	848	0	54	1.45	1.08	391.9	8
BOULDER	48.1	25.8	37.0	0.8	74	5	779	0	68	2.44	1.80	381.2	13
DENVER WSFO AP	47.1	25.0	36.0	2.3	71	12	804	0	60	1.21	0.63	208.6	10
EVERGREEN	42.9	15.6	29.2	0.3	65	-5	995	0	34	1.50	0.74	197.4	8
LAKE GEORGE 8SW	24.1	-6.4	8.9	-10.8	41	-36	1565	0	0	1.19	0.88	383.9	12
COLORADO SPRINGS	43.6	22.4	33.0	0.5	65	7	888	0	43	2.45	2.15	816.7	6
CANON CITY 2SE	48.2	24.8	36.5	-0.7	69	8	793	0	71	1.45	1.03	345.2	9
PUEBLO WSO AP	50.8	23.8	37.3	1.9	70	9	768	0	76	1.39	1.14	556.0	5
WALSENBURG	48.3	24.3	36.3	0.8	71	4	796	0	64	2.11	1.29	257.3	9
TRINIDAD FAA AP	50.3	23.8	37.0	2.0	68	9	775	0	69	0.67	0.26	163.4	10

Mountains/Interior Valleys*

	Temperature						Degree Days			Precipitation			
Name	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
WALDEN	38.6	10.5	24.6	6.2	53	-7	1127	0	4	0.15	-0.31	32.6	4
LEADVILLE 2SW	34.5	3.9	19.2	2.7	51	-13	1276	0	1	0.54	-0.46	54.0	9
SALIDA	42.0	16.5	29.2	-1.0	56	-12	993	0	15	1.95	1.31	304.7	5
BUENA VISTA	41.9	15.4	28.6	-0.1	56	-3	1011	0	12	1.64	1.29	468.6	9
SAGUACHE	37.0	14.4	25.7	0.8	44	0	1093	0	0	0.31	0.05	119.2	5
HERMIT 7ESE	26.6	-0.8	12.9	-1.6	34	-19	1450	0	0	2.55	1.83	354.2	5
ALAMOSA WSO AP	37.5	9.2	23.4	1.0	48	-6	1160	0	0	0.48	0.18	160.0	7
GRAND LAKE 6SSW	34.6	4.4	19.5	3.4	43	-16	1265	0	0	0.57	-0.24	70.4	12
DILLON 1E	35.6	4.9	20.3	1.8	49	-10	1244	0	0	0.52	-0.37	58.4	8
CLIMAX	27.1	1.8	14.5	-0.4	47	-12	1408	0	0	1.01	-0.83	54.9	12
ASPEN 1SW	41.2	12.9	27.0	4.3	56	0	1063	0	10	2.50	0.40	119.0	11
TAYLOR PARK	30.9	-21.3	4.8	-1.2	42	-44	1679	0	0	1.85	0.79	174.5	10
TELLURIDE	39.3	12.2	25.8	1.8	55	-8	1091	0	8	3.23	1.76	219.7	14
PAGOSA SPRINGS	45.0	12.1	28.6	2.9	56	-13	1013	0	16	1.43	0.09	106.7	9
SILVERTON	38.8	-1.3	18.7	4.8	54	-19	1287	0	3	3.15	1.56	198.1	14
WOLF CREEK PASS 1	34.7	8.1	21.4	3.3	53	-6	1213	0	7	3.45	-0.46	88.2	12

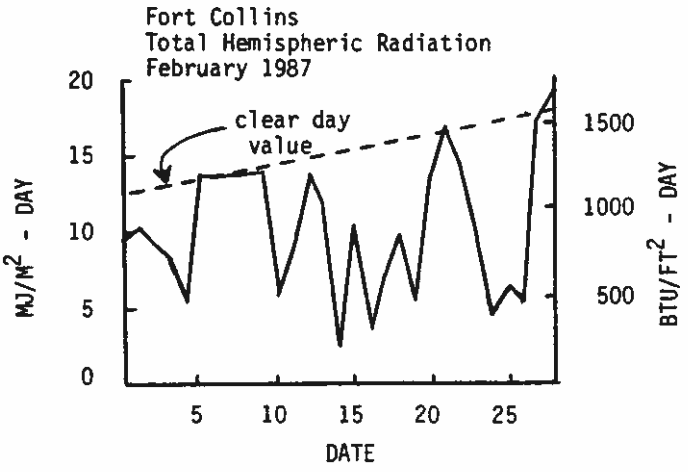
Western Valleys*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
CRAIG 4SW	37.7	16.3	27.0	5.1	50	2	1059	0	0	1.40	0.20	116.7	8
HAYDEN	38.5	17.1	27.8	6.1	49	5	1037	0	0	1.20	0.05	104.3	8
MEEKER NO. 2	43.1	18.2	30.6	3.1	55	0	957	0	10	1.15	0.46	166.7	6
RANGELY 1E	43.3	21.9	32.6	8.3	52	10	899	0	2	0.68	0.19	138.8	8
EAGLE FAA AP	45.3	18.1	31.7	6.8	64	9	925	0	17	0.66	0.06	110.0	8
GLENWOOD SPRINGS	45.9	23.5	34.7	4.9	58	14	841	0	17	1.15	0.02	101.8	8
RIFLE	48.5	21.0	34.8	5.1	57	9	839	0	25	0.90	0.15	120.0	7
GRAND JUNCTION WS	46.4	27.1	36.7	2.7	54	19	785	0	10	1.21	0.74	257.4	10
CEDAREDGE	44.8	23.8	34.3	2.1	57	10	854	0	17	1.88	1.06	229.3	8
PAONIA 1SW	45.9	24.1	35.0	3.1	58	10	837	0	26	1.97	0.89	182.4	12
DELTA	49.1	25.7	37.4	3.8	56	19	764	0	33	0.81	0.40	197.6	6
GUNNISON	37.5	7.3	22.4	8.6	46	-17	1187	0	0	0.17	-0.49	25.8	4
MONTROSE NO. 2	43.9	23.2	33.6	2.1	56	9	876	0	12	0.98	0.57	239.0	9
URAVAN	47.9	24.7	36.3	0.5	56	14	794	0	19	1.26	0.70	225.0	7
NORWOOD	40.9	17.5	29.2	1.6	50	2	997	0	0	1.87	1.17	267.1	7
YELLOW JACKET 2W	41.4	22.1	31.7	2.5	55	4	925	0	12	1.89	0.78	170.3	8
CORTEZ	45.1	20.9	33.0	2.5	57	3	888	0	24	1.19	0.26	128.0	10
DURANGO	44.5	21.1	32.8	1.9	59	1	895	0	15	2.97	1.59	215.2	11
IGNACIO 1N	47.4	21.0	34.3	6.3	57	8	792	0	21	2.26	1.32	240.4	10

* Data are received by the Colorado Climate Center for more locations than appear in these tables. Please contact the Colorado Climate Center if additional information is needed.

FEBRUARY 1987 SUNSHINE AND SOLAR RADIATION

Station	Number of Days clear	partly cloudy	cloudy	% of possible sunshine	average % of possible
Colorado Springs	6	9	13	--	--
Denver	6	9	13	54%	71%
Fort Collins	6	8	14	--	--
Grand Junction	6	5	17	59%	64%
Pueblo	7	7	14	59%	74%



Dark Clouds on the Horizon? continued

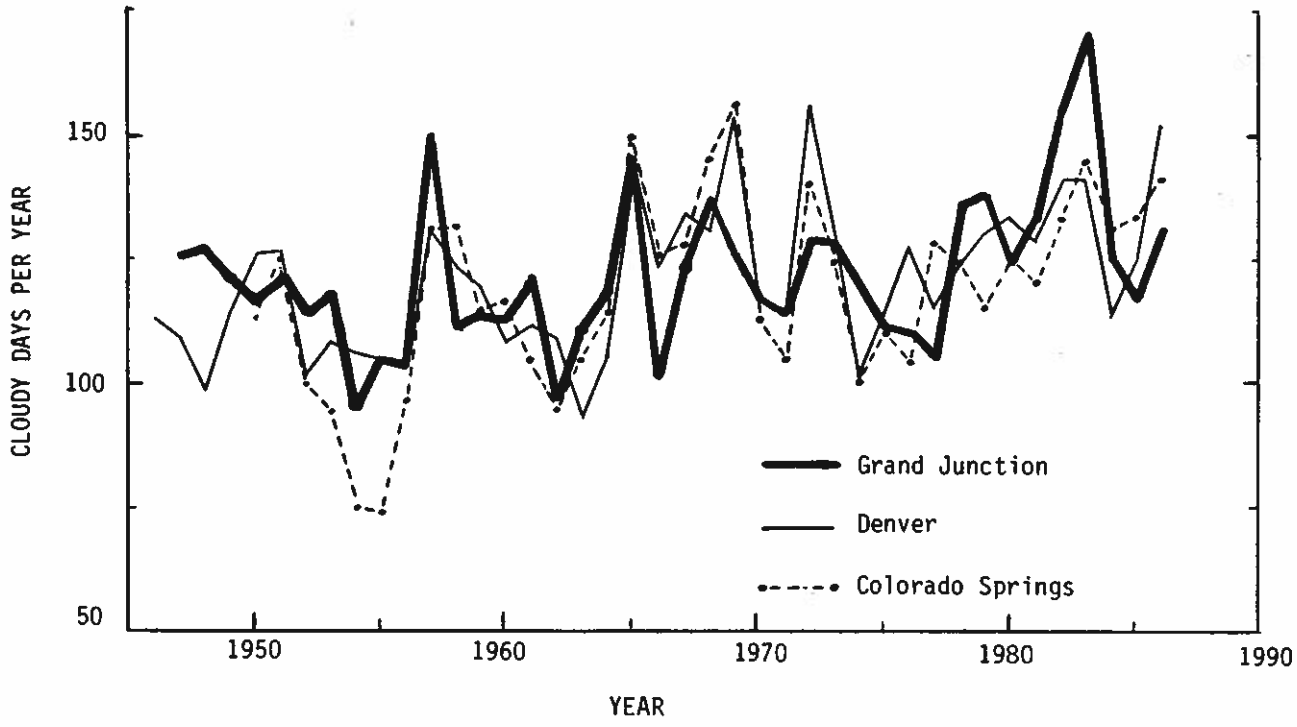
To try to get at an answer, we tabulated daily cloudcover statistics for 3 stations in Colorado that have taken consistent measurements since around 1950: Denver, Grand Junction and Colorado Springs. Using National Weather Service definitions of clear and cloudy days, we generated time series of the total annual number of clear and cloudy days. The results are shown graphically below for cloudy days.

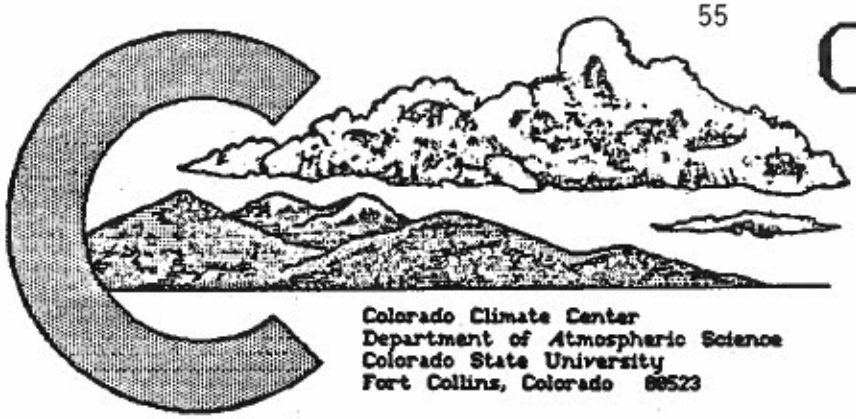
Lo and behold, perception wins. Annual cloudiness has indeed been on the increase at each of these 3 weather stations. In fact, Grand Junction recorded their cloudiest year on record in 1983. For the 3 stations combined, cloudiness has been consistently above average beginning in 1978 (following the 1976-77 winter drought). The last 5 years (1982-86) have been the cloudiest period since 1950--slightly higher than a similar cloudy period in the late 1960s. These last 5 years have averaged 37 more cloudy days per year than the 1952-56 period (the least cloudy period in the sample) and 16 more cloudy days than the 1950-86 average. That is enough to be quite noticeable.

We also made a quick examination of seasonal cloudiness characteristics. Our analysis so far has been crude, but preliminary results seem to indicate that cloudiness has not been increasing uniformally in all seasons or in any 1 particular time of year. Winter and spring cloudiness was unusually great in 1978-80 while summer and fall was about average. But beginning in 1981 summer and fall cloudiness has been well above average, accounting for much of the recent cloudiness anomaly. In terms of the number of cloudy days, Denver experienced its cloudiest summer on record in 1986 and the fall was second only to 1972. Since 1983, winter and spring cloudiness has returned to normal.

Why do we care about this? That's a fair question. Climate variations, extremes and potential trends have had significant effects throughout the history of Colorado. For the future, we are particularly concerned about how we can match our growing demand for water with what nature can provide. Temperature, precipitation and snowpack statistics have traditionally been used to help us monitor and track our climate. Unfortunately, dramatic local variations in precipitation and subtle temperature changes due to termination and relocation of weather stations severely complicate studies of long-term climate fluctuations. Cloudiness is another piece of the puzzle which may offer an independent data set to investigate climate variations and hopefully anticipate conditions that could impact our state. If, in fact, a mid-latitude warming is beginning resulting from increased carbon dioxide in our atmosphere from fossil fuel combustion, a possible natural response may be increased cloudiness. While we may not be able to identify a distinct temperature trend in Colorado for carbon dioxide increases, we may experience other effects.

In the months ahead we hope to examine cloudiness data more carefully and investigate correlations with other climatic elements related to the hydrologic cycle. We will be reporting our findings as they become available.





COLORADO CLIMATE

Colorado Climate Center
Department of Atmospheric Science
Colorado State University
Fort Collins, Colorado 80523

MARCH 1987

March in Review:

March lived up to its reputation. Blizzards on the Eastern Plains, wet snows along the Front Range, good snows in the mountains, and a wide range of temperatures were all observed. For the second consecutive month, pleasant weather occurred for the first few days but deteriorated to cold and sloppy weather in the second half of the month. Temperatures ended up below average for March except in the northern and central mountains. Precipitation was generally above average, although the northern and central mountains were dry again for the fourth consecutive month.

A Look Ahead -- May 1987:

Melting snow, rushing streams, mountain sunshine, rumbling thunderstorms, and comfortable temperatures are some of the features that normally characterize May's climate in Colorado. For people who like honest to goodness rain, May is one of the few times in the year when we get a fair dose (primarily the northeast quarter of the state). People who get a tingle out of hearing the words "severe weather" also have something to look forward to. May has been known to toss lightning, hail, and even tornadoes at parts of this state. And then there are those rude spring snowstorms that occur from time to time, reminding us not to get too carried away planting corn and tomatoes.

May precipitation patterns bear little resemblance to the rest of the year. Mountain precipitation, which still may fall as snow, tapers off considerably from normal winter rates in the southern mountains but continues modestly in the northern areas. Two to four inch totals (water equivalent) are typical in the northern mountains. One to two inches are normal in the southern mountains and also in the valleys of the northern and central mountains. The western valleys can expect 0.50 to 1.00" of moisture most years, although in some recent years such as 1983 totals have been much higher. East of the mountains, May is normally the cloudiest month of the year. Precipitation is more like the humid climates east of here. It's not the month you want to invite your relatives to come for a visit to Colorado unless you hope they don't come back for a long time. From Denver northward to Wyoming and eastward toward Nebraska, May is normally the wettest month of the year with totals in some areas frequently exceeding 3 inches. Drier conditions prevail along the southern foothills, but rainfall increases dramatically from La Junta and Trinidad eastward to the Kansas state line. May moisture usually falls as rain over the lower elevations, but occasionally very wet snows have occurred. The 2-3 foot snowfall on May 5-6, 1978 is still a vivid (and not totally pleasant) memory for residents of Boulder and Fort Collins.

May temperatures are usually pretty nice. At lower elevations highs average in the 70s with lows in the 40s. In the mountains above 9,000 feet, highs in the 40s and 50s are common with lows in the 20s at night. Daily temperature changes are not as dramatic as in March and April, but you should still count on a variety of both mild summer-like days interspersed with cloudy and very chilly days. Farmers and gardeners must still be aware of the threat of frost well into the month.

** NO SPECIAL FEATURE THIS MONTH **

MARCH 1987 DAILY WEATHER

Date	Event
1-2	Clear, cool and dry over state.
3-7	Major ridge over western U.S. with warm, dry air over Colorado. Temperatures crept into the 60s in mountains 5-6th causing early snowmelt. The hottest temperature in state was 81° at Las Animas, La Junta, and John Martin Dam on 6th.
8-10	Brief invasion of polar air accompanied by rain and snow over most of western two-thirds of state -- especially Front Range and lower elevations of western Colorado. Some Front Range precipitation amounts were: 0.80" at Boulder, 0.73" at Inter Canyon, and 0.89" at Waterdale. Western Slope amounts were: 0.53" at Grand Junction, 0.59" at Colorado National Monument, 0.71" at Cortez, and 0.56" at Ouray. Most of this precipitation fell as rain.
11-14	Return to warm spring weather, especially east of mountains with temperature in 60s and 70s. Scattered precipitation in mountains and western valleys 11-12th and again on 14th. Amounts were light; Steamboat Springs with 0.25" was one of the wetter sites.
15-18	Major storm developed. Heavy but localized precipitation began late on 15th and continued on 16th. Looked like doomsday but storm moved further east and became major High Plains blizzard. Finally on the 18th moved east of area. Snowfall amounts for this storm were: 7.6" at Akron, 12.3" at Colorado Springs, 4.0" in Durango, 8.0" in Fort Collins, and 17" at Mount Evans. Many stations reported high wind and blizzard conditions.
19-26	Cold and unsettled period. Trough over western United States. Thunder was heard on the 20th along the northern Front Range early in the day. Area of western Colorado reported snow with 7" at Craig and 8" at Meeker. High winds were noted at La Junta on the 20th (64 mph) and Colorado Springs (86 mph). La Junta had a gust of 59 mph on the 21st. Stormy period 22-24th with blizzard-like conditions; accumulations were light with 1-2 inches being typical.
27-29	Arctic surge of extreme cold for so late in month. Another High Plains blizzard occurred. Burlington reported 12" snowfall, 11" at Bonny Dam, 14" at John Martin Dam, and 17" at La Junta.
30-31	Clearing but still cold and windy across the state.

March 1987 Extremes

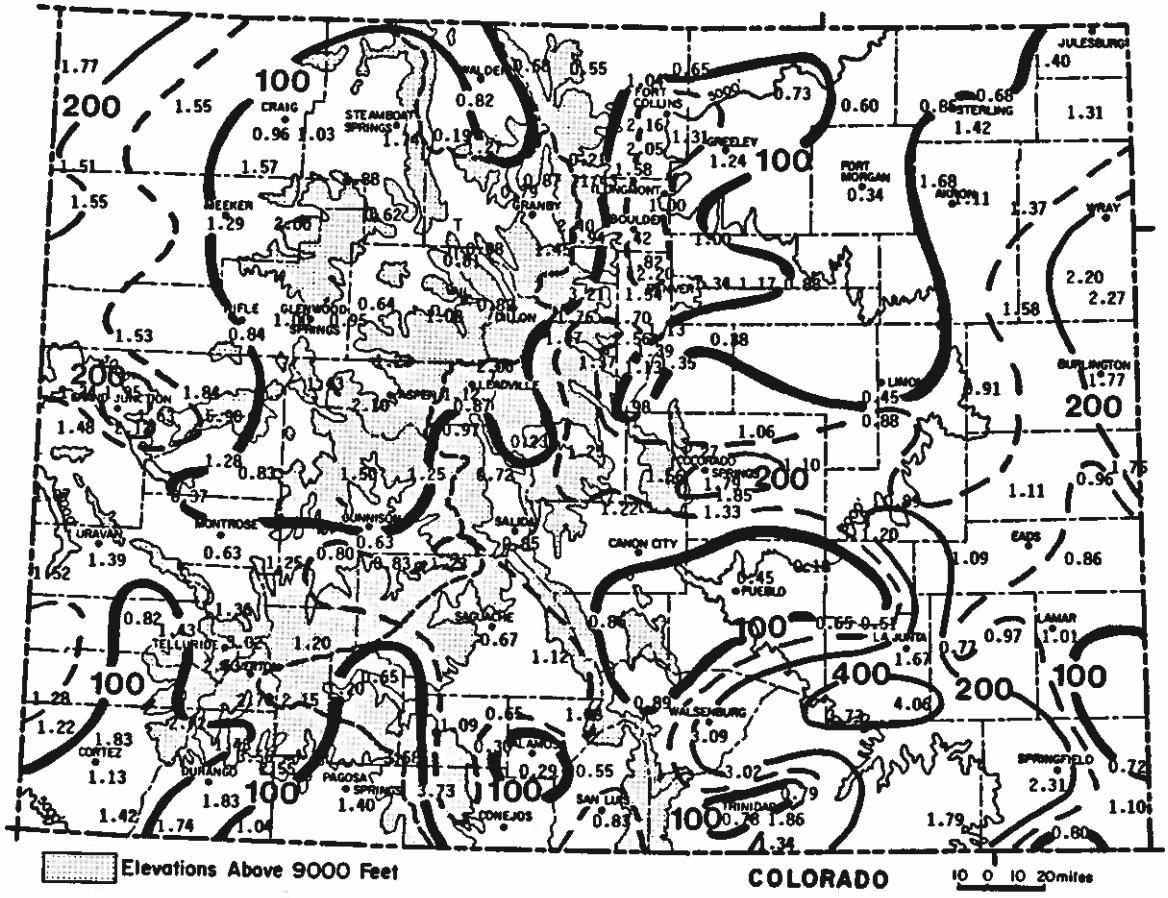
Highest Temperature	81°F	March 6	La Junta 20S, John Martin Dam, and Las Animas
Lowest Temperature	-37°F	March 2	Taylor Park Reservoir
Greatest Total Precipitation	5.90"		Bonham Reservoir
Least Total Precipitation	Trace		Kremmling 1E
Greatest Total Snowfall*	68"		Mount Evans Research Center
Greatest Snowdepth**	109"		Wolf Creek Summit

* data derived only from those stations with complete daily snowfall records.
** from Soil Conservation Service Snowpack measurements.

MARCH 1987 PRECIPITATION

The northern and central mountains of Colorado were drier than average for the fourth consecutive month leaving fears of developing water shortages in a few river basins. But most of the state experienced near average to above average moisture. A pair of blizzard-like snowstorms in eastern Colorado contributed to much above average totals in several areas. Surprisingly, some areas were skipped by much of the March moisture. While Colorado Springs had more than double their average precipitation, the Pueblo area only received about half of average. Similar contrasts were observed in several locations east of the mountains.

Greatest		Least	
Bonham Reservoir	5.90"	Kremmling 1E	Trace
La Junta 20S	4.06"	Tacony 10SE	0.18"
Platoro Dam	3.73"	Spicer	0.19"
Timpas 13SW	3.73"	Estes Park	0.21"



Precipitation amounts (inches) for March 1987 and contours of precipitation as a percent of the 1961-1980 average. The dashed line equals 150%.

1987 WATER YEAR PRECIPITATION

The majority of Colorado is wetter than average for the first 6 months of the 1987 water year. Much of southeast Colorado has received more than double their average moisture. However, a significant region in the northern and central mountains continues to stay well below average. Less than 75% of the average precipitation has fallen from Steamboat Springs south to Crested Butte. This region normally contributes a great deal to the state's surface water supplies.

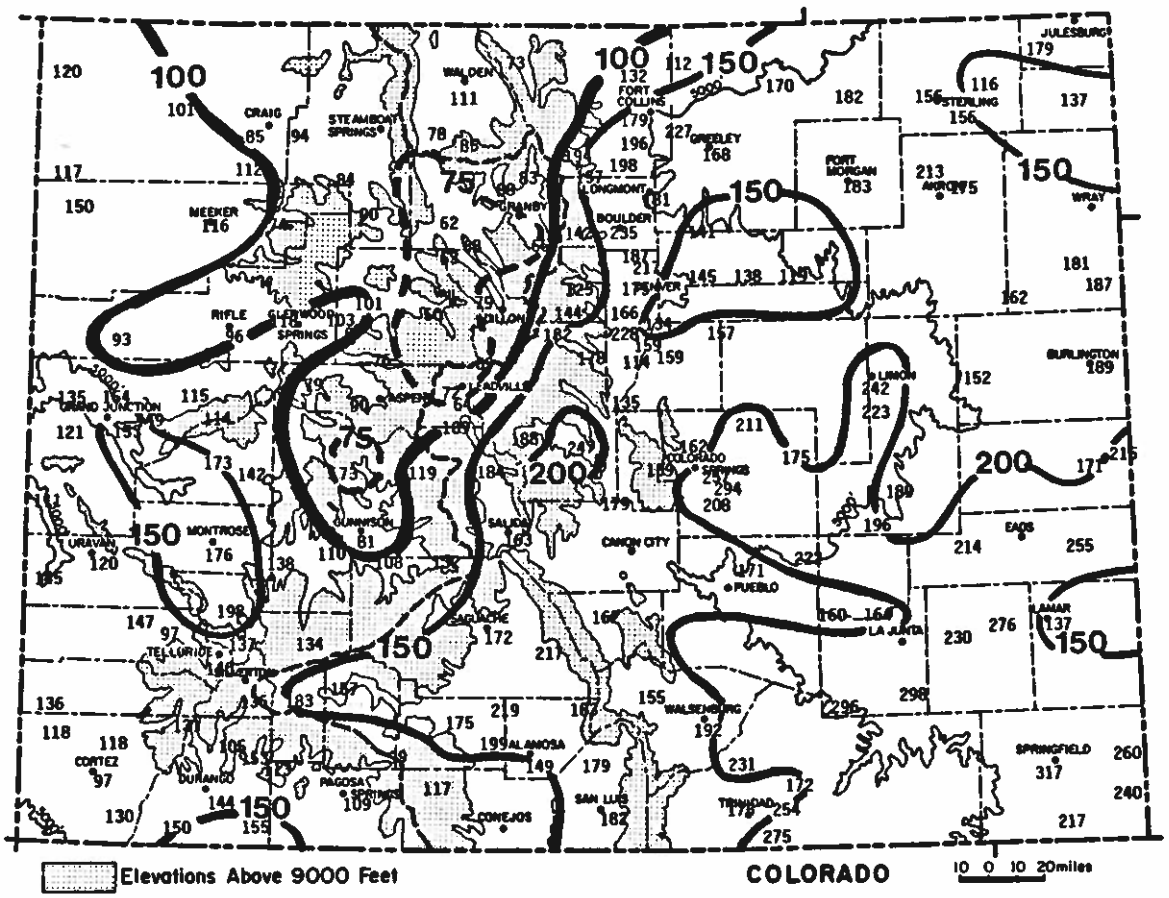
Comparison to Last Year

Last year, drier than average conditions existed over southern and eastern portions of the state with considerably above average moisture in the northern and central mountains and northwestern valleys. This year's pattern is nearly opposite with the wettest areas in the south and east and the driest conditions in the north.

1987 Water Year to Date through March

Wettest (as % of average)			Driest (as % of average)		
Springfield 7WSW	317%	10.61"	Vail	50%	6.43"
La Junta 2OS	298%	10.55"	Kremmling 1E	62%	2.67"
Timpas 13SW	296%	10.36"	Greem Mountain Dam	63%	4.32"

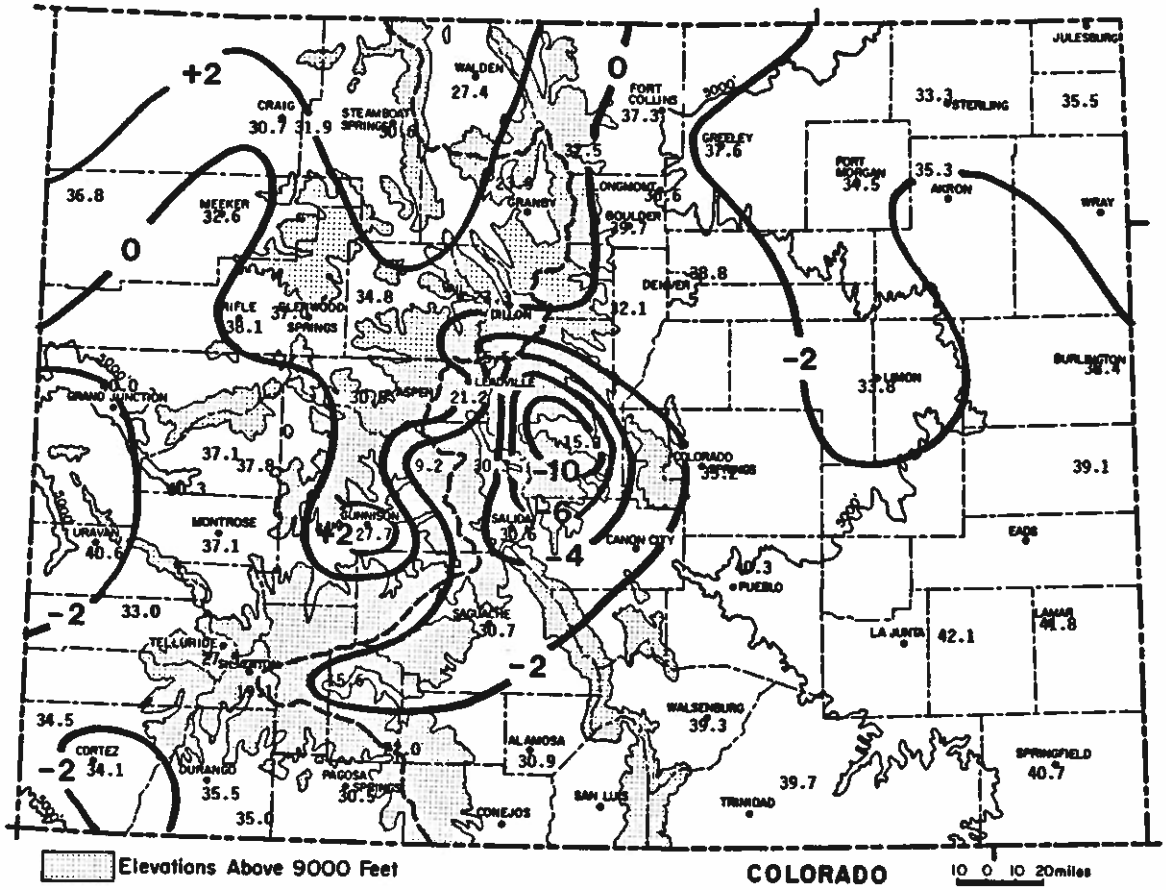
Wettest (total precipitation)			Driest (total precipitation)		
Wolf Creek Pass 1E	25.34"	99%	Kremmling 1E	2.67"	62%
Lemon Dam	21.47"	153%	Fowler	3.36"	160%
Bonham Reservoir	21.21"	114%	Gunnison	3.56"	81%



Precipitation for October 1986 through March 1987 as a percent of the 1961-1980 average.

MARCH 1987 TEMPERATURES AND DEGREE DAYS

Despite a warm start, Colorado temperatures ended up a few degrees cooler than average over most of the state. The exception was northwest Colorado. Steamboat Springs, for example, was nearly 4 degrees Fahrenheit warmer than average. The cold pocket in central Colorado (South Park in particular) continued to persist. For the 4th consecutive month the Antero Reservoir and Eleven Mile Reservoir were at least 10 degrees colder than normal.

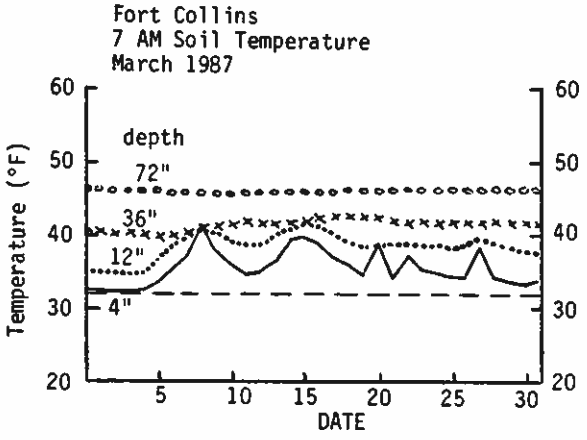


March 1987 temperatures (degrees Fahrenheit) and contours of departures from 1961-1980 averages.

MARCH 1987 SOIL TEMPERATURES

March soil temperatures followed an unusual pattern reaching their warmest levels early in the month and then dropping or holding steady later in the month when they usually begin a steady rise. This pattern was not conducive to early gardening.

These soil temperature measurements were taken at Colorado State University beneath sparse unirrigated sod with a flat, open exposure. These data are not representative of all Colorado locations.



Heating Degree Day Data for Colorado through March 1987.

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
ALAMOSA	AVE	40	100	303	657	1074	1457	1519	1182	1035	732	453	165	8717
	85-86	30	66	378	634	1045	1472	1231	983	864	638	446	138	7925
	86-87	63	75	366	728	1004	1377	1593	1160	1049				7415
ASPEN	AVE	95	150	348	651	1029	1339	1376	1162	1116	798	524	262	8850
	85-86	119	107	453	656	1066	1278	1175	1029	848	739	530	185	8185
	86-87	147	132	428	735	1009	1307	1398	1063	1067				7286
BOULDER	AVE	0	6	130	357	714	908	1004	804	775	483	220	59	5460
	85-86	0	0	222	400	982	1018	674	762	496	423	249	16	5242
	86-87	1	0	175	450	714	970	947	779	776				4812
BUENA VISTA	AVE	47	116	285	577	936	1184	1218	1025	983	720	459	184	7734
	85-86	63	54	405	597	938	1158	972	946	806	661	450	149	7199
	86-87	79	69	388	730	970	1316	1280	1011	1071				6914
BURLING-TON	AVE	6	5	108	364	762	1017	1110	871	803	459	200	38	5743
	85-86	0	5	206	405	977	1142	740	820	525	386	163	12	5381
	86-87	0	0	76	406	745	984	980	746	816				4753
CANON CITY	AVE	0	9	81	301	639	831	911	734	707	411	179	33	4836
	85-86	0	6	186	397	886	1036	711	756	507	399	248	40	5172
	86-87	4	2	132	422	724	952	976	793					4005
COLORADO SPRINGS	AVE	8	25	162	440	819	1042	1122	910	880	564	296	78	6346
	85-86	5	8	253	487	978	1143	822	840	635	487	315	49	6022
	86-87	4	14	174	519	813	1081	1096	888	912				5501
CORTEZ	AVE	0	11	115	434	813	1132	1181	921	828	555	292	68	6350
	85-86		4	264	484	884	1081	978	805	711	572	321	58	6162
	86-87	10	6	214	541	813	1041	1224	888	953				5690
CRAIG	AVE	32	58	275	608	996	1342	1479	1193	1094	687	419	193	8376
	85-86	10	42	353	649	1043	1487	1362	1023	780	669	461	76	7955
	86-87	31	15	338	654	967	1234	1473	1059	1055				6826
DELTA	AVE	0	0	94	394	813	1135	1197	890	753	429	167	31	5903
	85-86	0	M	113	335	658	1026	948	684	530	365	174	6	4839
	86-87	0	0	145	414	M	984	M	764	759				3066
DENVER	AVE	0	0	135	414	789	1004	1101	879	837	528	253	74	6014
	85-86		1	241	435	1051	1094	758	802	548	456	260	22	5668
	86-87	0	0	145	477	775	1045	1012	804	805				5063
DILLON	AVE	273	332	513	806	1167	1435	1516	1305	1296	972	704	435	10754
	85-86	260	300	609	856	1183	1439	1380	1175	1072	915	716	388	10293
	86-87	322	318	580	883	1125	1473	1542	1244	1286				8773
DURANGO	AVE	9	34	193	493	837	1153	1218	958	862	600	366	125	6848
	85-86	3	8	274	476	916	1159	967	802	686	575	341	70	6277
	86-87	23	9	295	559	844	1055	1204	895	906				5790
EAGLE	AVE	33	80	288	626	1026	1407	1448	1148	1014	705	431	171	8377
	85-86	19	52	356	605	995	1352	1324	890	736	598	428	88	7443
	86-87	37		314	658	930	1283	1309	925	927				6383
EVER-GREEN	AVE	59	113	327	621	916	1135	1199	1011	1009	730	489	218	7827
	85-86	62	90	387	651	1039	1119	947	927	770	608	532	157	7289
	86-87	75	90	380	699	927	1186	1178	995	1009				6539
FORT COLLINS	AVE	5	11	171	468	846	1073	1181	930	877	558	281	82	6483
	85-86	1	8	243	499	1078	1199	883	816	568	470	261	22	6048
	86-87	0	0	178	500	809	1091	1042	830	850				5300
FORT MORGAN	AVE	0	6	140	438	867	1156	1283	969	874	516	224	47	6520
	85-86	0	2	239	548	1165	1425	1160	915	616	401	246	19	6736
	86-87	0	4	138	495	874	1193	1148	842	937				5631
GRAND JUNCTION	AVE	0	0	65	325	762	1138	1225	882	716	403	148	19	5683
	85-86	0	0	139	351	779	1018	949	685	489	366	168	3	4947
	86-87	0	0	130	414	718	1001	1159	785	765				4972

M = MISSING DATA

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
GRAND LAKE	AVE	214	264	468	775	1128	1473	1593	1369	1318	951	654	384	10591
	85-86	206	265	513	744	1115	1454	1494	1174	1083	896	651	304	9899
	86-87	245	242	488	777	1051	1450	1612	1265	1265				8395
GREELEY	AVE	0	0	149	450	861	1128	1240	946	856	522	238	52	6442
	85-86	0	6	249	501	1131	1311	1010	845	545	440	232	15	6285
	86-87	0	0	142	484	825	1085	1054	797	844				5231
GUNNISON	AVE	111	188	393	719	1119	1590	1714	1422	1231	816	543	276	10122
	85-86	84	152	433	678	1058	1648	1712	1084	952	711	517	204	9233
	86-87	123	146	420	734	1064	1430	1539	1187	1148				7791
LAS ANIMAS	AVE	0	0	45	296	729	998	1101	820	698	348	102	9	5146
	85-86	0	0	134	313	816	1106	737	715	409	220	77		4527
	86-87	0	0	32	280	668	991	937	685	700				4293
LEAD-VILLE	AVE	272	337	522	817	1173	1435	1473	1318	1320	1038	726	439	10870
	85-86	333	359	666	871	1258	1470	1328	1251	1168	994	760	441	10899
	86-87	372	369	626	920	1188	1482	1510	1276	1349				9092
LIMON	AVE	8	6	144	448	834	1070	1156	960	936	570	299	100	6531
	85-86	1	12	274	544	1078	1233	861	910	662	508	336	57	6476
	86-87	4	8	171	551	873	1190	1132	931	961				5821
LONGMONT	AVE	0	6	162	453	843	1082	1194	938	874	546	256	78	6432
	85-86	0	6	236	486	1095	1228	869	814	549	469	262	20	6034
	86-87		0	154	498	852	1135	1155	848	872				5514
MEEKER	AVE	28	56	261	564	927	1240	1345	1086	998	651	394	164	7714
	85-86	6	31	358	599	967	1249	1164	893	742	646	458	75	7188
	86-87	41	28	402	623	894	1147	1262	957	999				6353
MONTROSE	AVE	0	10	135	437	837	1159	1218	941	818	522	254	69	6400
	85-86	0	0	211	443	803	1106	1032	766	577	453	235	24	5650
	86-87	1	6	183	532	809	1085	1190	876	856				5538
PAGOSA SPRINGS	AVE	82	113	297	608	981	1305	1380	1123	1026	732	487	233	8367
	85-86	34	73	376	600	1000	1373	1191	952	803	668	481	183	7734
	86-87	98	45	385	668	927	1182	1326	1013	1063				6707
PUEBLO	AVE	0	0	89	346	744	998	1091	834	756	421	163	23	5465
	85-86	0	0	172	410	1012	1161	783	728	523	346	167	21	5323
	86-87	0	0	94	428	741	1069	1082	768	756				4938
RIFLE	AVE	6	24	177	499	876	1249	1321	1002	856	555	298	82	6945
	85-86	1	6	232	484	882	1147	1076	769	607	477	287	16	5984
	86-87	1	3	226	499	795	1081	1216	839	826				5486
STEAMBOAT SPRINGS	AVE	113	169	390	704	1101	1476	1541	1277	1184	810	533	297	9595
	85-86	57	130	434	729	1144	1554	1495	1097	915	688	533	185	8961
	86-87	120	119	M	M	M	M	M	M	1059				
STERLING	AVE	0	6	157	462	876	1163	1274	966	896	528	235	51	6614
	85-86	0	6	230	519	1161	1395	1155	990	594	439	279	22	6790
	86-87	0	4	105	427	847	1193	1072	762	974				5384
TELLURIDE	AVE	163	223	396	676	1026	1293	1339	1151	1141	849	589	318	9164
	85-86	121	152	463	648	1023	1270	1130	1011	892	740	585	257	8292
	86-87	200	129	434	716	1018	1297	1304	1091	1156				7345
TRINIDAD	AVE	0	0	86	359	738	973	1051	846	781	468	207	35	5544
	85-86	0	0	175	380	772	1046	738	764	529	365	194	32	4995
	86-87	1	0	90	421	719	1022	998	775	778				4804
WALDEN	AVE	198	285	501	822	1170	1457	1535	1313	1277	915	642	351	10466
	85-86	171	271	578	824	1224	1458	1381	1155	989	836	656	256	9799
	86-87	225	224	530	825	1126	1388	1449	1127	1162				8056
WALSEN-BURG	AVE	0	8	102	370	720	924	989	820	781	501	240	49	5504
	85-86	0	0	165	358	770	982	681	734	515	404	221	42	4872
	86-87	0	0	84	420	682	984	958	796	789				4713

M = MISSING DATA

MARCH 1987 CLIMATIC DATA

Eastern Plains*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
STERLING	45.5	21.2	33.3	-3.5	63	1	974	0	47	0.89	0.09	111.2	10
FORT MORGAN	47.5	21.6	34.5	-2.9	73	0	937	0	82	0.34	-0.22	60.7	7
AKRON FAA AP	46.8	23.9	35.3	-1.0	72	1	912	0	72	1.68	0.81	193.1	9
HOLYOKE	46.9	24.1	35.5	-3.1	77	7	905	0	92	1.31	0.18	115.9	7
BURLINGTON	50.4	26.4	38.4	-1.6	75	2	816	0	105	1.77	0.95	215.9	7
LIMON WSMO	46.1	21.4	33.8	-2.4	70	2	961	0	57	0.45	-0.29	60.8	7
CHEYENNE WELLS	51.5	26.7	39.1	-0.3	75	6	794	0	114	0.96	0.27	139.1	6
LAMAR	56.0	27.6	41.8	-0.9	80	3	642	0	144	1.01	0.08	108.6	6
LAS ANIMAS	58.7	25.5	42.1	-1.4	81	4	700	0	181	0.77	0.15	124.2	5
SPRINGFIELD 7WSW	54.9	26.5	40.7	-0.9	77	3	747	0	138	2.31	1.40	253.8	9

Foothills/Adjacent Plains*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
FORT COLLINS	50.2	24.3	37.3	-0.2	69	9	850	0	76	2.16	1.06	196.4	7
GREELEY UNC	50.7	24.5	37.6	-2.4	72	9	844	0	97	1.24	0.29	130.5	7
ESTES PARK	45.9	19.0	32.5	-0.0	66	0	1004	0	48	0.21	-0.52	28.8	11
LONGMONT 2ESE	49.6	23.6	36.6	-0.8	72	10	872	0	81	1.00	0.09	109.9	5
BOULDER	52.5	26.9	39.7	-0.6	71	8	776	0	102	2.42	1.06	177.9	11
DENVER WSFO AP	50.9	26.7	38.8	0.4	73	7	805	0	100	1.34	0.20	117.5	9
EVERGREEN	47.3	16.9	32.1	-0.1	68	-8	1009	0	61	1.70	0.40	130.8	7
LAKE GEORGE 8SW	31.5	-1.2	15.2	-11.3	45	-20	1539	0	0	1.25	0.70	227.3	7
COLORADO SPRINGS	47.0	23.5	35.2	-1.4	65	3	912	0	47	1.79	0.99	223.7	8
PUEBLO WSO AP	56.4	24.3	40.3	-0.7	76	5	756	0	143	0.45	-0.28	61.6	6
WALSENBURG	53.1	25.5	39.3	-0.6	77	4	789	0	109	3.09	1.77	234.1	11
TRINIDAD FAA AP	54.9	24.5	39.7	-0.6	77	8	778	0	139	0.79	-0.10	88.8	10

Mountains/Interior Valleys*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
WALDEN	42.1	12.6	27.4	3.3	70	-11	1162	0	27	0.82	0.25	143.9	8
LEADVILLE 2SW	38.0	4.5	21.2	0.2	61	-13	1349	0	14	0.87	-0.43	66.9	14
SALIDA	44.6	16.5	30.6	-5.6	58	-4	1061	0	17	0.85	0.07	109.0	5
BUENA VISTA	43.5	17.1	30.3	-3.3	58	4	1071	0	19	0.72	0.09	114.3	3
SAGUACHE	43.0	18.5	30.7	-2.2	55	2	1056	0	8	0.67	0.25	159.5	6
HERMIT 7ESE	32.5	-1.3	15.6	-3.7	43	-22	1524	0	0	1.20	-0.26	82.2	4
ALAMOSA WSO AP	45.5	16.4	30.9	-0.7	57	-3	1049	0	14	0.29	-0.14	67.4	10
STEAMBOAT SPRINGS	45.1	16.1	30.6	3.8	58	-5	1059	0	18	1.74	-0.18	90.6	11
GRAND LAKE 6SSW	39.2	8.6	23.9	1.5	55	-13	1265	0	7	0.79	-0.06	92.9	11
DILLON 1E	37.9	8.7	23.3	-0.0	62	-10	1286	0	12	0.82	-0.29	73.9	12
CLIMAX	29.3	1.7	15.5	-2.9	56	-14	1529	0	7	2.06	-0.07	96.7	13
ASPEN 1SW	45.5	15.6	30.5	3.0	68	-2	1067	0	40	2.10	-0.10	95.5	12
TAYLOR PARK	36.5	-18.2	9.2	-3.0	58	-37	1723	0	4	1.25	-0.01	99.2	11
TELLURIDE	43.1	11.8	27.5	-0.9	60	-8	1156	0	18	2.53	0.58	129.7	11
PAGOSA SPRINGS	48.4	12.5	30.5	-1.8	64	-8	1063	0	46	1.40	-0.04	97.2	7
SILVERTON	40.8	-2.6	19.1	-0.9	60	-22	1414	0	14	2.70	0.79	141.4	14
WOLF CREEK PASS 1	35.9	8.2	22.0	0.8	61	-10	1325	0	18	3.58	-1.28	73.7	12

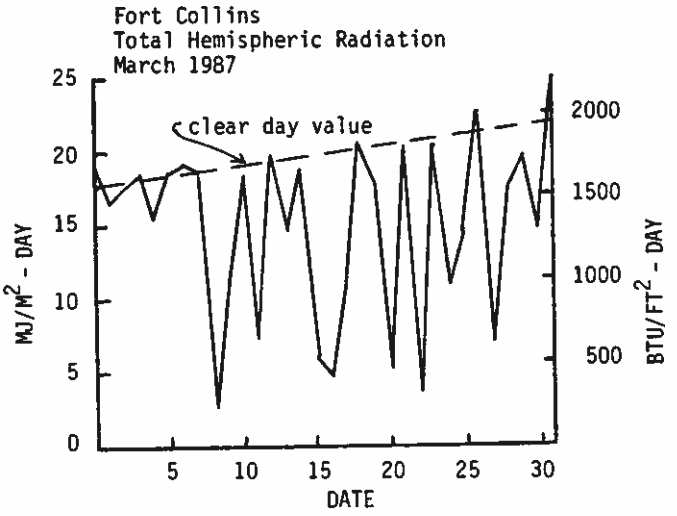
Western Valleys*

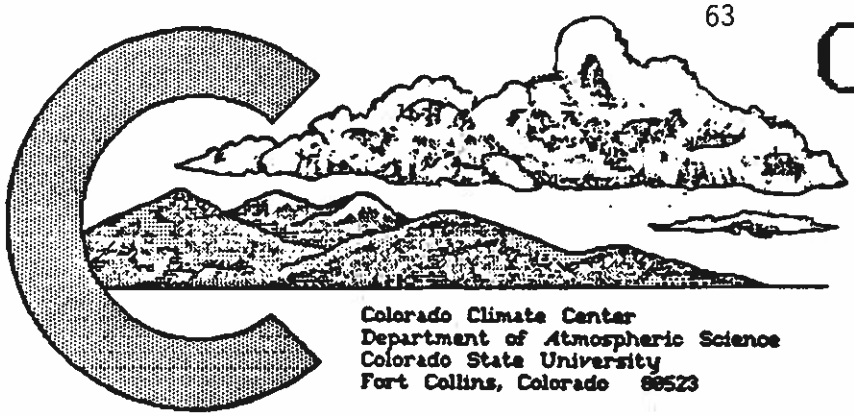
Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
CRAIG 4SW	42.7	18.7	30.7	0.3	58	2	1055	0	16	0.96	-0.59	61.9	9
HAYDEN	44.8	19.0	31.9	3.5	61	4	1019	0	22	1.03	-0.15	87.3	8
MEEKER NO. 2	47.4	17.8	32.6	-2.0	62	0	999	0	37	1.29	-0.03	97.7	5
RANGELY 1E	50.6	23.0	36.8	1.8	62	12	867	0	59	1.55	0.78	201.3	7
EAGLE FAA AP	49.4	20.3	34.8	1.9	66	5	927	0	55	0.64	-0.13	83.1	6
GLENWOOD SPRINGS	50.1	23.9	37.0	0.9	65	10	861	0	58	1.00	-0.24	80.6	4
RIFLE	54.1	22.0	38.1	0.4	71	9	826	0	92	0.84	-0.01	98.8	8
GRAND JUNCTION WS	51.6	28.5	40.0	-2.2	66	16	765	0	69	1.95	1.13	237.8	11
CEDAREDGE	50.6	23.6	37.1	-1.7	65	10	856	0	55	1.28	0.28	128.0	6
PAONIA 1SW	50.9	24.7	37.8	-1.1	65	11	838	0	64	0.83	-0.45	64.8	8
DELTA	57.2	23.5	40.3	-0.7	69	14	759	0	125	0.37	-0.11	77.1	6
GUNNISON	43.1	12.2	27.7	2.2	54	-8	1148	0	6	0.63	-0.06	91.3	8
MONTROSE NO. 2	50.0	24.3	37.1	-1.5	65	10	856	0	62	0.63	0.10	118.9	10
URAVAN	54.1	27.2	40.6	-2.6	70	16	747	0	86	1.39	0.42	143.3	9
NORWOOD	47.5	18.5	33.0	-0.8	58	2	987	0	27	0.82	-0.29	73.9	4
YELLOW JACKET 2W	47.0	22.1	34.5	-0.5	62	7	935	0	34	1.22	0.16	115.1	6
CORTEZ	48.7	19.5	34.1	-3.2	64	5	953	0	48	1.13	-0.21	84.3	9
DURANGO	50.4	20.7	35.5	-1.8	65	3	906	0	58	1.83	0.20	112.3	10
IGNACIO 1N	51.8	18.2	35.0	-0.2	65	-2	921	0	67	1.04	-0.16	86.7	8

* Data are received by the Colorado Climate Center for more locations than appear in these tables. Please contact the Colorado Climate Center if additional information is needed.

MARCH 1987 SUNSHINE AND SOLAR RADIATION

Station	Number of Days clear	partly cloudy	cloudy	% of possible sunshine	average % of possible
Colorado Springs	10	7	14	--	--
Denver	8	5	18	56%	71%
Fort Collins	3	14	14	--	--
Grand Junction	7	9	15	68%	64%
Pueblo	12	4	15	74%	75%





COLORADO CLIMATE

Colorado Climate Center
Department of Atmospheric Science
Colorado State University
Fort Collins, Colorado 80523

APRIL 1987

April in Review:

Mild and sunny conditions during the last half of April left the impression of lovely spring weather. Precipitation for the month was much below average over most of the state, and temperatures ended up considerably above normal.

A Look Ahead -- June 1987:

The traditional snowmelt runoff that normally peaks in June on Colorado's major mountain rivers won't be much to brag about this year. Peak flows are occurring early and total streamflow on most rivers will be less than in recent years.

June's major claim to climatological notoriety is severe weather. So far, 1987 has been a pretty calm year for the entire country in terms of tornadoes and severe thunderstorms. Colorado is not in our country's "tornado alley" but we do get our fair share on the Eastern Plains. During the past decade we have averaged more than a dozen confirmed tornadoes per year in June making June our most tornado-prone month. Statewide, June is also the month with the most damaging hailstorms with northeastern Colorado claiming the largest frequency of damaging storms. A very large percentage of strong thunderstorms produce some quantity of hail. If you happen to own an expensive new car and you like playing the odds, the period from June 8 to 18th is when you should be most conscientious about keeping your car in the garage.

Mountain weather is surprisingly pleasant in June. Snow is fairly common early in the month, and occasional afternoon thundershowers can be expected. Other than the water from melting snow, June is usually a dry and very sunny month with steadily rising temperatures. In southwestern Colorado, June is the driest month of the year. Monthly precipitation totals are usually well below 2 inches throughout the mountains. Temperatures at elevations above 10,000 feet normally climb into the 50s during the day but fall back to near or below freezing at night.

In the lower elevations, daytime temperatures average in the 70s early in June but rise into the 80s and 90s by the end of the month. Nighttime lows are typically in the 40s and 50s. Precipitation totals are normally greatest on the northeast plains, often exceeding 3.00". Amounts decrease towards the south and west with some western valleys averaging less than 0.50".

Which Comes First, the Flood or the Drought?

There is a cartoon by Ace Reid showing two cowboys "The original COWPOKES" clinging precariously to the crest of the roof of their ranch with rushing water lapping at their boots. One cowboy leans over and says to the other, "To think 6 hours ago we wuz in a heck of a drougth!" I suppose the reason I always remember that cartoon is that there is a fair amount of truth to it. It doesn't sound terribly logical, but who ever said climate is logical--at least from our meager human perspective.

Weather is almost always news, but this is especially true at this time of year here in Colorado. Severe weather--hail, lightning, tornadoes, downbursts (thunderstorm wind shear)--are most common in Colorado during late spring and summer. Right now in May and June is when mountain snowpack melts rapidly sometimes causing high water on our mountain rivers and streams. This is also the time of year when precipitation is normally the greatest at most lower elevation areas of the state, particularly east of the mountains. From now until early September is Colorado's flash flood season. But this is also the time of year when solar radiation is greatest, temperatures highest, humidities low, and as a result evaporation and water consumption reach their peak for the year. Without

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APRIL 1987 DAILY WEATHER

Date	Event
1-2	Arctic air slid southward across the state on the 1st. Snow developed primarily along the Front Range during the afternoon and evening. In some foothill locations 3-7" of snow fell. Then clearing and cold east but seasonal temperatures west of the mountains on the 2nd. Estes Park dropped to a -4°F on the morning of the 2nd.
3-5	Cool and breezy period. An upper level storm system passed south of Colorado 4-5th producing clouds and precipitation primarily over southern parts of the state. Heavier precipitation amounts from the storm included 0.72" at Durango (4" snow), 0.85" at Hamilton, and 1.40" at Wolf Creek Pass (16" snow).
6-10	Partly cloudy and dry with seasonal temperatures. A Pacific cold front zipped across the state on the 9th triggering brisk winds and some snowshowers in the northern and central mountains.
11-13	Dry, windy and warm on the 11th but with increasing clouds. A major winter storm developed over Colorado early on the 12th spreading snow and rain turning to snow over the entire state. Some locally heavy precipitation fell such as 0.60" at Walden, 0.78" at Breckenridge (12" of snow), 1.02" at Telluride (14" of snow), 1.16" at Boulder, and 2.07" on Mount Evans (26" of snow). At lower elevations, most snow melted as it fell, but the 4.5" snowfall at Denver was enough to disrupt air traffic in and out of Stapleton airport. Snows diminished quickly in northwestern Colorado but continued on the Eastern Plains on the 13th. Local convective snowshowers on the 13th were accompanied by strong gusty winds.
14-18	Sunny and dry statewide. Cool on the 14th but then much warmer with nearly summer-like temperatures 16-18th. Highs reached the 70s and 80s with many records tied or broken on the 17th and 18th. Temperatures even reached 60° in some high mountain areas. Sterling's high of 92° on the 18th surpassed their previous April record of 91° set back on 30 April 1934. Holly's 94° on the 18th was the warmest in the state.
19-21	A dramatic weather change occurred on Easter (19th). Clouds of dust and a rapid drop in temperature accompanied the passage of a strong cold front during the afternoon and evening. This was followed by scattered thundershowers which eventually turned to snow in northern Colorado. Wet snow continued on the 20th with some surprisingly heavy precipitation totals. Allenspark reported 1.06" (12" snow) from the brief storm. Hamilton (near Craig) totalled 1.00". Temperatures on the 21st stayed in the 30s and 40s over much of Colorado, but returned to more normal levels on the 21st as skies cleared across the state.
22-30	Large high pressure ridge dominated weather across the western U.S. Generally dry with much above average temperatures across all of Colorado. This prolonged heatwave produced premature melting of mountain snowpack even at very high elevations. Humidity levels increased through the period resulting in summer-like afternoon convection. Scattered showers and thunderstorms were reported over and near the mountains on each day 25-30th.

April 1987 Extremes

Highest Temperature	94°F	April 18	Holly
Lowest Temperature	-18°F	April 3	Antero Reservoir
Greatest Total Precipitation	5.50"		Mt. Evans Rsch Center
Least Total Precipitation	Trace		Brandon, and Otis 11 NE
Greatest Total Snowfall*	68.5"		Mt. Evans Rsch Center
Greatest Snowdepth**	92"		Wolf Creek Summit

* data derived only from those stations with complete daily snowfall records.
** from Soil Conservation Service Snowpack measurements.

1987 WATER YEAR PRECIPITION

Portions of Colorado with below average precipitation for the first 7 months of the 1987 water year spread slightly in April to include nearly all of the northern and central mountain areas. Even after a very dry April, the remainder of the state is still wetter than average for the year. Some areas in southeastern Colorado have had more than double their average winter season precipitation.

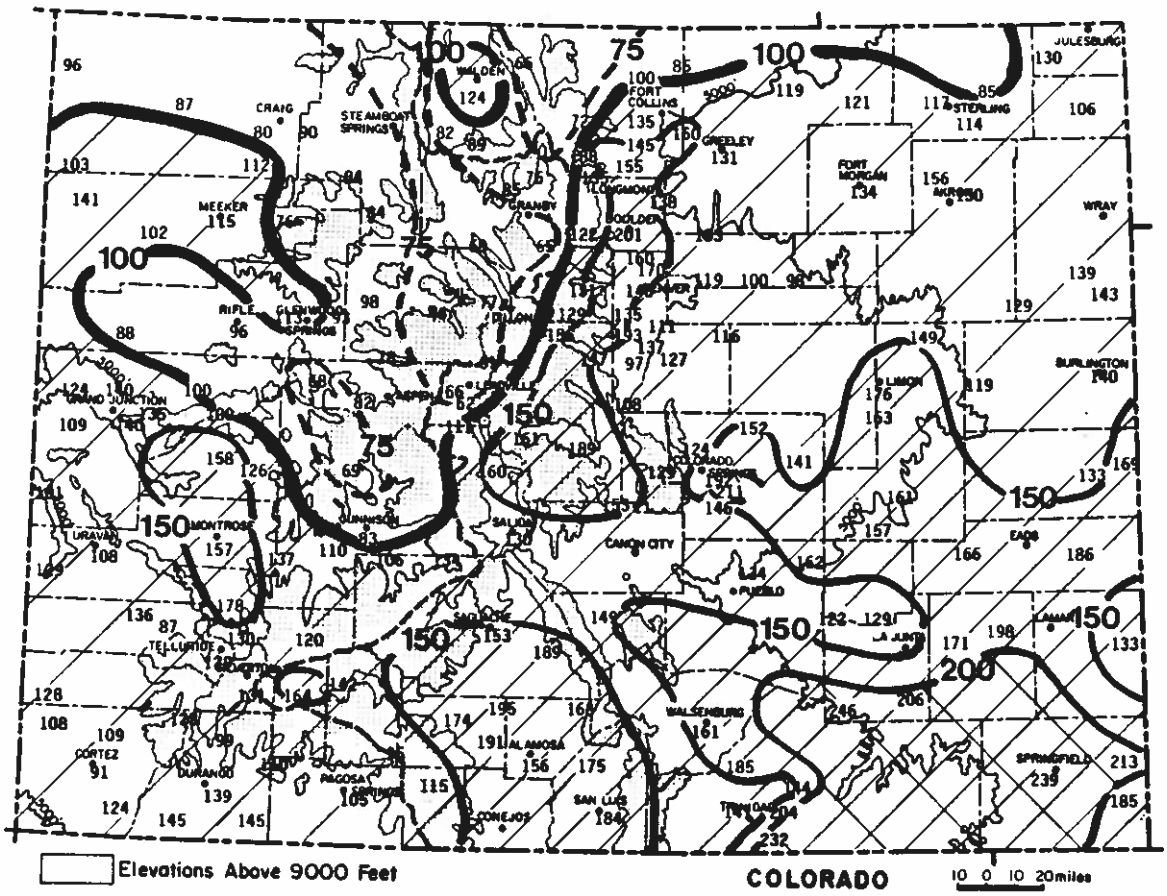
Comparison to Last Year

The accumulated precipitation pattern is nearly reversed from this time one year ago. Last year northwestern and north central parts of the state were unusually wet, while drier than average conditions prevailed throughout much of the southeastern quadrant of the state. The Rio Grande Valley has been wetter than average both years.

1987 Water Year to Date through April

Wettest (as % of average)			Driest (as % of average)		
Timpas 13 SW	246%	10.86"	Vail	46%	7.07"
Springfield 7 WSW	239%	11.51"	Winter Park	65%	10.58"
Wooton Ranch	232%	10.97"	Hohnholz Ranch	66%	5.81"

Wettest (total precipitation)			Driest (total precipitation)		
Wolf Creek Pass 1E	27.34"	95%	Fowler 1 SE	3.51"	122%
Mount Evans Research Center	24.72	131%	Nunn	4.11"	85%
Bonham Reservior	21.86"	100%	Gunnison	4.13"	83%

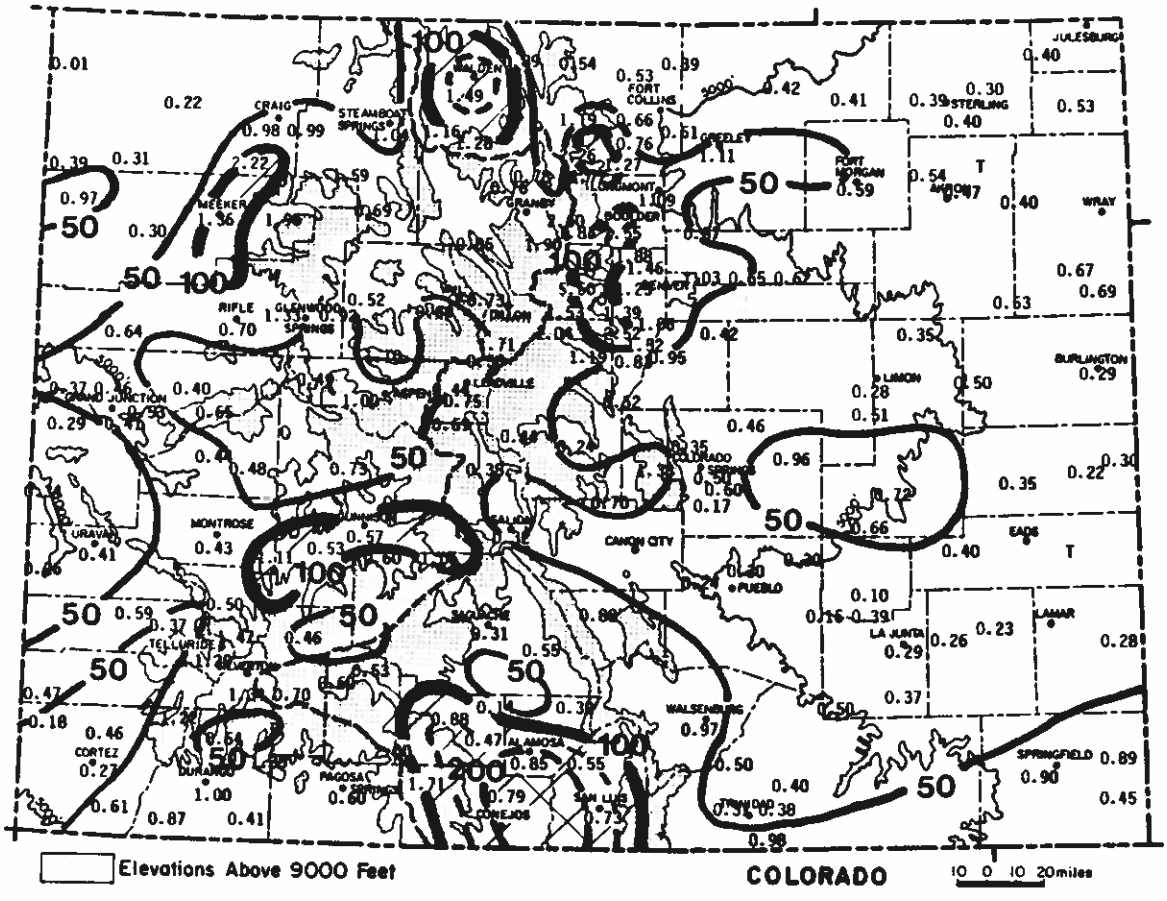


Precipitation for October 1986 through April 1987
as a percent of the 1961-1980 average.

APRIL 1987 PRECIPITATION

Four organized storm systems and a period of scattered showers were all we could muster at a time of year when widespread heavy precipitation often occurs. As a result, most of the state was much drier than average. Broad areas received less than half the normal April precipitation including most of the Eastern Plains, portions of the central mountains, and much of extreme western Colorado. Little or no moisture was reported at a few stations including Brandon and Otis 11 NE. As is often the case, a few small areas defied the prevailing pattern. Above average precipitation was measured along the Front Range from Estes Park and Boulder to the Mount Evans area. Other wet areas included a small region near Meeker, North Park including Walden, portions of the upper Gunnison Valley, and the southern half of the San Luis Valley. Alamosa and Manassa were the only two stations which reported double their April average.

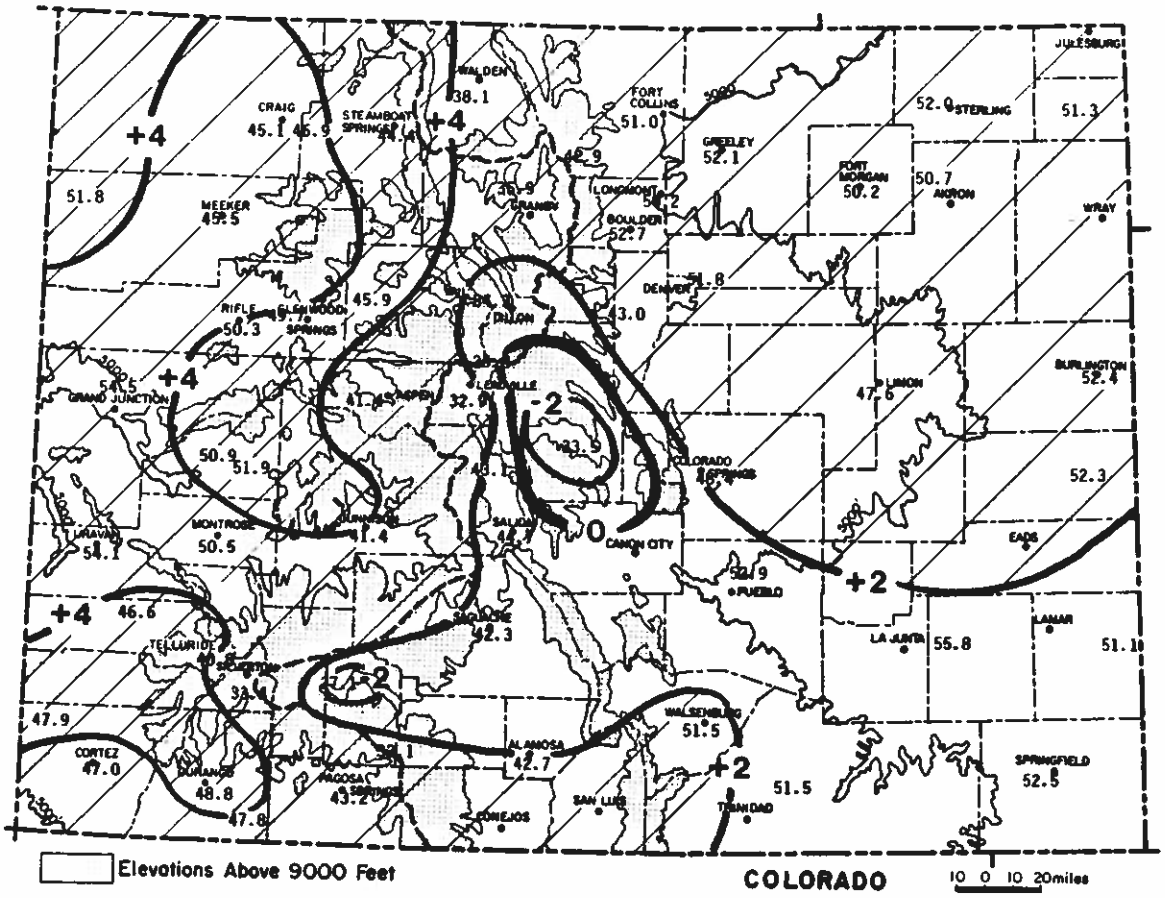
Greatest		Least	
Mount Evans Research Center	5.50"	Brandon	Trace
Silver Lake	2.60"	Otis 11 NE	Trace
Boulder	2.55"	Browns Park Refuge	0.01"
Inter Canyon	2.52"	Ordway 2 ENE	0.10"
Estes Park	2.26"	Center 4 SSW	0.14"



Precipitation amounts (inches) for April 1987 and contours of precipitation as a percent of the 1961-1980 average. The dashed line represents 150% of average.

APRIL 1987 TEMPERATURES AND DEGREE DAYS

April temperatures began on the cool side but ended up well above average over nearly the entire state. The majority of the state was 2 to 4 degrees Fahrenheit warmer than average. Steamboat Springs was the warmest Colorado city compared to average with a +6.4 degree anomally. The coolest areas, compared to average, included parts of the Rio Grande Valley and most of the Arkansas Valley. The unusual bowl of cold air that has existed all winter over South Park was still evident in April although much weaker than in previous months.



April 1987 temperatures (degrees Fahrenheit) and contours of departures from 1961-1980 averages.

APRIL 1987 SOIL TEMPERATURES

Soil temperatures rose at an unusually rapid rate due to abundant solar radiation and above average air temperatures. By the end of the month, soil temperatures were about 2 weeks ahead of average.

These soil temperature measurements were taken at Colorado State University beneath sparse unirrigated sod with a flat, open exposure. These data are not representative of all Colorado locations.

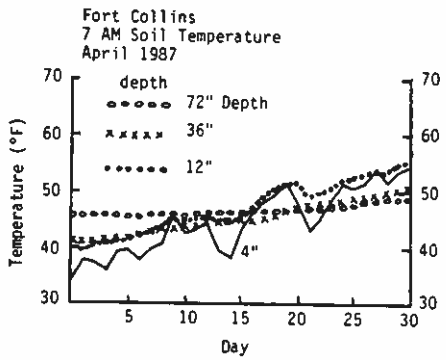


Table 1. Heating Degree Day Data for Colorado through April 1987.

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
ALAMOSA	AVE	40	100	303	657	1074	1457	1519	1182	1035	732	453	165	8717
	85-86	30	66	378	634	1045	1472	1231	983	864	638	446	138	7925
	86-87	63	75	366	728	1004	1377	1593	1160	1049	662			8077
ASPEN	AVE	95	150	348	651	1029	1339	1376	1162	1116	798	524	262	8850
	85-86	119	107	453	656	1066	1278	1175	1029	848	739	530	185	8185
	86-87	147	132	428	735	1009	1307	1398	1063	1067	701			7987
BOULDER	AVE	0	6	130	357	714	908	1004	804	775	483	220	59	5460
	85-86	0	0	222	400	982	1018	674	762	496	423	249	16	5242
	86-87	1	0	175	450	714	970	947	779	776	375			5187
BUENA VISTA	AVE	47	116	285	577	936	1184	1218	1025	983	720	459	184	7734
	85-86	63	54	405	597	938	1158	972	946	806	661	450	149	7199
	86-87	79	69	388	730	970	1316	1280	1011	1071	650			7564
BURLING-TON	AVE	6	5	108	364	762	1017	1110	871	803	459	200	38	5743
	85-86	0	5	206	405	977	1142	740	820	525	386	163	12	5381
	86-87	0	0	76	406	745	984	980	746	816	385			5138
CAMON CITY	AVE	0	9	81	301	639	831	911	734	707	411	179	33	4836
	85-86	0	6	186	397	886	1036	711	756	507	399	248	40	5172
	86-87	4	2	132	422	724	952	976	793	M	M			4005
COLORADO SPRINGS	AVE	8	25	162	440	819	1042	1122	910	880	564	296	78	6346
	85-86	5	8	253	487	978	1143	822	840	635	487	315	49	6022
	86-87	4	14	174	519	813	1081	1096	888	912	491			5992
CORTEZ	AVE	0	11	115	434	813	1132	1181	921	828	555	292	68	6350
	85-86		4	264	484	884	1081	978	805	711	572	321	58	6162
	86-87	10	6	214	541	813	1041	1224	888	953	534			6224
CRAIG	AVE	32	58	275	608	996	1342	1479	1193	1094	687	419	193	8376
	85-86	10	42	353	649	1043	1487	1362	1023	780	669	461	76	7955
	86-87	31	15	338	654	967	1234	1473	1059	1055	589			7415
DELTA	AVE	0	0	94	394	813	1135	1197	890	753	429	167	31	5903
	85-86	0	M	113	335	658	1026	948	684	530	365	174	6	4839
	86-87	0	0	145	414	M	984	M	764	759				3066
DENVER	AVE	0	0	135	414	789	1004	1101	879	837	528	253	74	6014
	85-86		1	241	435	1051	1094	758	802	548	456	260	22	5668
	86-87	0	0	145	477	775	1045	1012	804	805	392			5455
DILLON	AVE	273	332	513	806	1167	1435	1516	1305	1296	972	704	435	10754
	85-86	260	300	609	856	1183	1439	1380	1175	1072	915	716	388	10293
	86-87	322	318	580	883	1125	1473	1542	1244	1286	914			9687
DURANGO	AVE	9	34	193	493	837	1153	1218	958	862	600	366	125	6848
	85-86	3	8	274	476	916	1159	967	802	686	575	341	70	6277
	86-87	23	9	295	559	844	1055	1204	895	906	478			6268
EAGLE	AVE	33	80	288	626	1026	1407	1448	1148	1014	705	431	171	8377
	85-86	19	52	356	605	995	1352	1324	890	736	598	428	88	7443
	86-87	37		314	658	930	1283	1309	925	927	566			6949
EVER-GREEN	AVE	59	113	327	621	916	1135	1199	1011	1009	730	489	218	7827
	85-86	62	90	387	651	1039	1119	947	927	770	608	532	157	7289
	86-87	75	90	380	699	927	1186	1178	995	1009	652			7191
FORT COLLINS	AVE	5	11	171	468	846	1073	1181	930	877	558	281	82	6483
	85-86	1	8	243	499	1078	1199	883	816	568	470	261	22	6048
	86-87	0	0	178	500	809	1091	1042	830	850	413			5713
FORT MORGAN	AVE	0	6	140	438	867	1156	1283	969	874	516	224	47	6520
	85-86	0	2	239	548	1165	1425	1160	915	616	401	246	19	6736
	86-87	0	4	138	495	874	1193	1148	842	937	443			6074
GRAND JUNCTION	AVE	0	0	65	325	762	1138	1225	882	716	403	148	19	5683
	85-86	0	0	139	351	779	1018	949	685	489	366	168	3	4947
	86-87	0	0	130	414	718	1001	1159	785	765	314			5286

M = MISSING DATA

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
GRAND LAKE	AVE	214	264	468	775	1128	1473	1593	1369	1318	951	654	384	10591
	85-86	206	265	513	744	1115	1454	1494	1174	1083	896	651	304	9899
	86-87	245	242	488	777	1051	1450	1612	1265	1265	876			9271
GREELEY	AVE	0	0	149	450	861	1128	1240	946	856	522	238	52	6442
	85-86	0	6	249	501	1131	1311	1010	845	545	440	232	15	6285
	86-87	0	0	142	484	825	1085	1054	797	844	382			5613
GUNNISON	AVE	111	188	393	719	1119	1590	1714	1422	1231	816	543	276	10122
	85-86	84	152	433	678	1058	1648	1712	1084	952	711	517	204	9233
	86-87	123	146	420	734	1064	1430	1539	1187	1148	698			8489
LAS ANIMAS	AVE	0	0	45	296	729	998	1101	820	698	348	102	9	5146
	85-86	0	0	134	313	816	1106	737	715	409	220	77		4527
	86-87	0	0	32	280	668	991	937	685	700	295			4588
LEAD-VILLE	AVE	272	337	522	817	1173	1435	1473	1318	1320	1038	726	439	10870
	85-86	333	359	666	871	1258	1470	1328	1251	1168	994	760	441	10899
	86-87	372	369	626	920	1188	1482	1510	1276	1349	955			10047
LIMON	AVE	8	6	144	448	834	1070	1156	960	936	570	299	100	6531
	85-86	1	12	274	544	1078	1233	861	910	662	508	336	57	6476
	86-87	4	8	171	551	873	1190	1132	931	961	513			6334
LONGMONT	AVE	0	6	162	453	843	1082	1194	938	874	546	256	78	6432
	85-86	0	6	236	486	1095	1228	869	814	549	469	262	20	6034
	86-87		0	154	498	852	1135	1155	848	872	435			5949
MEEKER	AVE	28	56	261	564	927	1240	1345	1086	998	651	394	164	7714
	85-86	6	31	358	599	967	1249	1164	893	742	646	458	75	7188
	86-87	41	28	402	623	894	1147	1262	957	999	579			6932
MONTROSE	AVE	0	10	135	437	837	1159	1218	941	818	522	254	69	6400
	85-86	0	0	211	443	803	1106	1032	766	577	453	235	24	5650
	86-87	1	6	183	532	809	1085	1190	876	856	426			5964
PAGOSA SPRINGS	AVE	82	113	297	608	981	1305	1380	1123	1026	732	487	233	8367
	85-86	34	73	376	600	1000	1373	1191	952	803	668	481	183	7734
	86-87	98	45	385	668	927	1182	1326	1013	1063	648			7355
PUEBLO	AVE	0	0	89	346	744	998	1091	834	756	421	163	23	5465
	85-86	0	0	172	410	1012	1161	783	728	523	346	167	21	5323
	86-87	0	0	94	428	741	1069	1082	768	756	358			5296
RIFLE	AVE	6	24	177	499	876	1249	1321	1002	856	555	298	82	6945
	85-86	1	6	232	484	882	1147	1076	769	607	477	287	16	5984
	86-87	1	3	226	499	795	1081	1216	839	826	431			5917
STEAMBOAT SPRINGS	AVE	113	169	390	704	1101	1476	1541	1277	1184	810	533	297	9595
	85-86	57	130	434	729	1144	1554	1495	1097	915	688	533	185	8961
	86-87	120	119	M	M	M	M	M	M	1059	608			
STERLING	AVE	0	6	157	462	876	1163	1274	966	896	528	235	51	6614
	85-86	0	6	230	519	1161	1395	1155	990	594	439	279	22	6790
	86-87	0	4	105	427	847	1193	1072	762	974	395			5779
TELLURIDE	AVE	163	223	396	676	1026	1293	1339	1151	1141	849	589	318	9164
	85-86	121	152	463	648	1023	1270	1130	1011	892	740	585	257	8292
	86-87	200	129	434	716	1018	1297	1304	1091	1156	719			8064
TRINIDAD	AVE	0	0	86	359	738	973	1051	846	781	468	207	35	5544
	85-86	0	0	175	380	772	1046	738	764	529	365	194	32	4995
	86-87	1	0	90	421	719	1022	998	775	778	400			5204
WALDEN	AVE	198	285	501	822	1170	1457	1535	1313	1277	915	642	351	10466
	85-86	171	271	578	824	1224	1458	1381	1155	989	836	656	256	9799
	86-87	225	224	530	825	1126	1388	1449	1127	1162	800			8856
WALSEN-BURG	AVE	0	8	102	370	720	924	989	820	781	501	240	49	5504
	85-86	0	0	165	358	770	982	681	734	515	404	221	42	4872
	86-87	0	0	84	420	682	984	958	796	789	397			5110

M = MISSING DATA

APRIL 1987 CLIMATIC DATA

Eastern Plains*

Name	Temperature						Degree Days			Precipitation			
	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
STERLING	69.8	34.2	52.0	4.2	92	20	395	10	305	0.39	-0.89	30.5	4
FORT MORGAN	68.0	32.4	50.2	1.8	89	16	443	4	284	0.59	-0.58	50.4	4
AKRON FAA AP	65.8	35.6	50.7	4.0	87	17	428	6	254	0.54	-0.78	40.9	4
HOLYOKE	67.3	35.2	51.3	1.9	89	22	420	15	275	0.53	-0.99	34.9	2
BURLINGTON	67.2	37.6	52.4	2.1	88	22	385	15	276	0.29	-0.91	24.2	1
LIMON WSMO	63.4	31.8	47.6	2.5	83	16	513	0	229	0.28	-0.77	26.7	5
CHEYENNE WELLS	69.1	35.5	52.3	2.4	90	21	384	10	301	0.22	-0.66	25.0	3
LAS ANIMAS	74.6	37.0	55.8	2.0	93	20	295	27	367	0.26	-0.74	26.0	5
HOLLY	71.6	30.7	51.1	-1.4	94	15	412	1	317	0.28	-0.69	28.9	3
SPRINGFIELD 7WSW	69.2	35.8	52.5	0.9	89	22	372	3	297	0.90	-0.56	61.6	4

Foothills/Adjacent Plains*

Name	Temperature						Degree Days			Precipitation			
	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
FORT COLLINS	67.5	34.5	51.0	4.0	83	17	413	0	274	0.66	-1.13	36.9	5
GREELEY UNC	69.1	35.1	52.1	3.3	86	20	382	1	303	1.11	-0.83	57.2	3
ESTES PARK	58.2	27.6	42.9	3.2	74	-4	658	0	153	2.26	0.96	173.8	9
LONGMONT 2ESE	68.2	32.3	50.2	3.0	85	11	435	1	290	1.09	-0.83	56.8	4
BOULDER	68.0	37.4	52.7	3.9	84	16	375	10	286	2.55	0.39	118.1	9
DENVER WSFO AP	66.9	36.8	51.8	4.1	83	15	392	3	271	1.03	-0.79	56.6	5
EVERGREEN	60.8	25.2	43.0	2.6	75	7	652	0	189	1.39	-0.88	61.2	6
LAKE GEORGE 8SW	47.9	19.1	33.5	-3.0	65	-6	939	0	75	0.24	-0.68	26.1	4
COLORADO SPRINGS	63.0	33.9	48.4	2.1	80	19	491	0	223	0.50	-0.78	39.1	6
PUEBLO WSO AP	71.2	34.6	52.9	1.3	88	20	358	2	330	0.30	-0.64	31.9	4
WALSENBURG	67.9	35.2	51.5	3.2	81	21	397	0	278	0.97	-0.66	59.5	5
TRINIDAD FAA AP	68.0	35.0	51.5	1.8	83	22	400	1	282	0.40	-0.61	39.6	6

Mountains/Interior Valleys*

Name	Temperature						Degree Days			Precipitation			
	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
WALDEN	56.3	19.8	38.1	3.7	69	-5	800	0	131	1.49	0.70	188.6	7
LEADVILLE 2SW	48.3	17.4	32.9	3.9	61	1	955	0	45	0.75	-0.65	53.6	7
SALIDA	62.4	27.0	44.7	0.4	75	13	603	0	206	0.32	-0.93	25.6	3
BUENA VISTA	59.1	27.1	43.1	2.0	72	5	650	0	156	0.38	-0.32	54.3	5
SAGUACHE	57.9	26.7	42.3	1.1	71	17	672	0	151	0.31	-0.20	60.8	3
HERMIT 7ESE	41.3	12.9	27.1	-3.5	54	-8	1133	0	2	0.60	-0.56	51.7	2
ALAMOSA WSO AP	61.0	24.4	42.7	2.0	73	7	662	0	184	0.85	0.43	202.4	5
STEAMBOAT SPRINGS	63.3	25.5	44.4	6.4	75	9	608	0	210	1.04	-1.11	48.4	4
GRAND LAKE 6SSW	51.5	19.6	35.5	2.2	64	-9	876	0	74	0.76	-0.34	69.1	6
DILLON 1E	50.4	18.2	34.3	1.5	65	3	914	0	72	0.73	-0.39	65.2	7
CLIMAX	39.8	11.8	25.8	0.1	57	-10	1172	0	11	0.56	-1.84	23.3	7
ASPEN 1SW	56.1	26.8	41.4	3.4	70	12	701	0	129	1.00	-1.30	43.5	9
TELLURIDE	57.3	24.3	40.8	4.2	69	11	719	0	136	1.29	-0.61	67.9	7
PAGOSA SPRINGS	63.3	23.1	43.2	2.6	76	12	648	0	212	0.60	-0.43	58.3	3
SILVERTON	52.8	14.0	33.4	3.6	64	-3	939	0	79	1.34	-0.10	93.1	7
WOLF CREEK PASS 1	46.9	17.3	32.1	3.1	60	4	981	0	28	2.00	-0.95	67.8	7

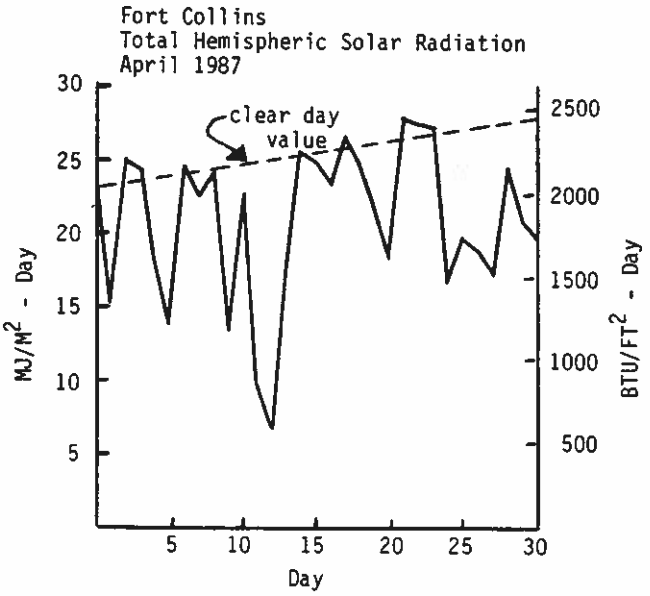
Western Valleys*

Name	Temperature						Degree Days			Precipitation			
	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
CRAIG 4SW	61.3	29.0	45.1	3.1	75	19	589	0	191	0.98	-0.82	54.4	5
HAYDEN	63.4	30.4	46.9	5.4	77	18	537	0	214	0.99	-0.50	66.4	5
MEEKER NO. 2	63.8	27.2	45.5	2.9	78	8	579	0	218	1.36	0.15	112.4	4
RANGELY 1E	68.9	34.7	51.8	5.0	92	20	284	0	211	0.97	0.03	103.2	4
EAGLE FAA AP	64.0	27.7	45.9	4.2	79	15	566	0	222	0.52	-0.15	77.6	2
GLENWOOD SPRINGS	66.3	33.1	49.7	4.4	82	24	455	0	255	1.33	-0.15	89.9	3
RIFLE	70.2	30.5	50.3	4.0	83	18	431	0	310	0.70	-0.06	92.1	5
GRAND JUNCTION WS	69.8	39.2	54.5	3.1	83	28	314	5	307	0.46	-0.28	62.2	4
CEDAREDGE	67.2	34.6	50.9	4.0	82	22	417	0	265	0.44	-0.37	54.3	2
PAONIA 1SW	68.3	35.5	51.9	4.7	83	22	386	0	282	0.48	-0.86	35.8	1
GUNNISON	60.4	22.5	41.4	4.0	71	9	698	0	170	0.57	0.01	101.8	4
MONTROSE NO. 2	66.4	34.6	50.5	3.3	81	24	426	0	262	0.43	-0.31	58.1	3
URAVAN	71.6	36.6	54.1	2.6	89	25	318	0	332	0.41	-0.64	39.0	3
NORWOOD	62.5	31.0	46.6	5.1	73	17	437	0	153	0.59	-0.37	61.5	2
YELLOW JACKET 2W	63.0	32.8	47.9	4.6	75	17	504	0	208	0.18	-0.67	21.2	4
CORTEZ	64.8	29.1	47.0	2.1	79	17	534	0	238	0.27	-0.47	36.5	5
DURANGO	66.3	31.3	48.8	4.0	78	21	478	0	251	1.00	-0.05	95.2	4
IGNACIO 1N	67.7	27.9	47.8	4.3	80	17	507	0	273	0.41	-0.38	51.9	3

* Data are received by the Colorado Climate Center for more locations than appear in these tables. Please contact the Colorado Climate Center if additional information is needed.

APRIL 1987 SUNSHINE AND SOLAR RADIATION

Station	Number of Days			% of possible sunshine	average % of possible
	clear	partly cloudy	cloudy		
Colorado Springs	8	11	11	--	--
Denver	7	14	9	70%	67%
Fort Collins	6	16	8	--	--
Grand Junction	8	9	13	79%	67%
Pueblo	9	14	7	77%	74%



irrigation or natural rainfall, vegetation can turn from green to a parched brown in a matter of days. It is possible to be having severe water shortages for dryland agricultural activities and rangeland; while a few miles away the river flowing out from the mountains is at flood stage. The opposite condition is also possible. These apparent contradictions baffle newcomers to Colorado and confuse even the news media. They, in turn, may be tempted to blame the confusion on us scientists and government agencies responsible for monitoring our water supplies and climatic conditions.

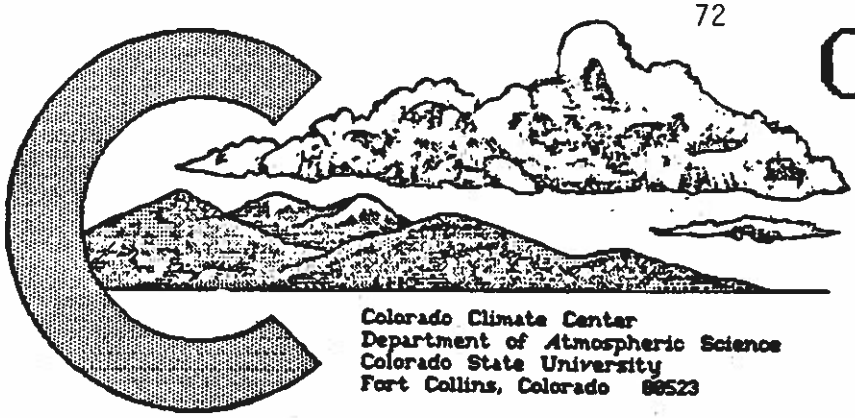
This is a volatile time of year for Colorado's water resources. During late spring and early summer we can make a rapid and sometimes unexpected transition from abundant water supplies to serious drought. A combination of hotter than average temperatures which can drive up the demand for water, lower than average mountain snowpack, and a scarcity of those cool, cloudy and rainy (or snowy) periods that so often characterize springtime here in Colorado and suddenly we can find ourselves crying for water. We are currently making this very transition in parts of Colorado. After five consecutive years of considerably wetter than average weather, we are rapidly moving into a potential water shortage situation. For much of the Rocky Mountain region north of Colorado, a drought of major proportions is already underway. The 1986-1987 winter snowfall was well below 50% of average over much of Idaho, Montana, and Wyoming. Northern Colorado is also feeling the impact of the dry winter. Fortunately, most areas have good reserves held in reservoirs to help us through the approaching summer.

What does this discussion of developing drought have to do with flooding? There is a natural tendency to think that when snowpack is low and surface water supplies are short that flooding is no longer a concern. A look in the historic records quickly points out the folly of such thinking. Severe floods in this state tend to be the flash flood variety caused by intense local convective storms. Most of Colorado's flood damage and nearly all loss of life has been a result of flash floods occurring primarily from May into late summer. Using the following list of notable Colorado floods and the prevailing regional climatic conditions prior to their occurrence, I want to discuss the relationship between floods and drought.

SELECTED COLORADO FLOODS

Antecedent Date	Location	Description	Climatic conditions (previous 8-12 months)
June 3-4, 1921	Eastern Colorado (Arkansas River and others)	Widespread heavy rains with local cloudbursts near Pikes Peak.	Predominantly drier and warmer than average during winter and spring; snowpack unknown.
May 30-31, 1935	Palmer Ridge (South Platte River)	Local cloudbursts.	Extremely abnormally warm and dry during previous 1+ year.
June 15-17, 1965	Palmer Ridge and Eastern Plains (South Platte, Arkansas River and others).	Widespread heavy rains with local cloudbursts.	Very dry and a bit warmer than average Eastern Plains but with above average mountain snowpack.
July 31, 1976	Big Thompson Canyon	Local cloudburst.	Drier and a little warmer than average. Below average snowpack.
August 1, 1985	Cheyenne, Wyoming	Local cloudburst.	Drier and a bit warmer than average. Below average snowpack.

If you put total faith in the information shown in the above table you would indeed conclude that major floods follow periods of dry weather. But please remember that this is a set of only five well-known floods. There have been many dozens of devastating floods over the past 100 years of reasonably well-recorded Colorado history. If I tried, I'm sure I could also put together a list of floods which occurred during cool and wet years. If we conducted an objective study of all known floods, we would likely find little correlation with antecedent weather and snowpack conditions. But even this would be useful information because it would tell us regardless of recent weather patterns, we must be prepared for the worst--either flood or drought. That conclusion is the water manager's nightmare and the enthusiastic weather watcher's joy. Like it or not, that is what climate in Colorado is all about.



COLORADO CLIMATE

Colorado Climate Center
Department of Atmospheric Science
Colorado State University
Fort Collins, Colorado 80523

MAY 1987

May in Review:

Heavy rains kept much of Colorado looking green in May. Temperatures were a bit warmer than average. Two weeks of consistently warm temperatures in mid-May accelerated mountain snowmelt and produced peak streamflows a few weeks earlier than usual. High water was not a problem except on Colorado's southernmost rivers such as the Rio Grande.

A Look Ahead -- July 1987:

If you like clear mornings, hot noons, partly cloudy and thundery afternoons, pretty sunsets and cool nights, you'll like July in Colorado. July weather tends to be very consistent and predictable with little change in temperatures from day to day. The classic and sometimes boring daily forecast of "20% chance of afternoon and evening thundershowers" may make the weather forecaster sound like a repetitive idiot, but in truth it is a good assessment. Rarely does a July day pass when all of Colorado remains dry, and it's almost impossible for the whole state to receive rain on the same day.

The daily pattern of convective activity holds true throughout the month, but the amount of precipitation that actually falls tends to change. Rainfall is normally spotty early in the month especially in the western 2/3 of the state. The chance of having your 4th of July picnic wiped out by rain is small. But as the month progresses storms become more numerous and rainfall amounts increase. The "Southwest Monsoon" (warm, moist wind moving northward across Mexico into the southwestern U.S.) usually strengthens in late July increasing the chances for heavy downpours and local flash floods such as the Big Thompson flood of 11 years ago. Total July precipitation is normally greatest near Pikes Peak with an average in excess of 4 inches. Totals decrease to only about 1 inch in most western valleys. Regardless of how much rain may fall, all Colorado thunderstorms deserve respect. Injuries and deaths from lightning occur almost every year and are most likely in July.

July is reliably the hottest month of the year and also the month with the most consistent relationship between temperature and elevation. Below 5,000 feet afternoon high temperatures average in the 90s but decrease to the 80s between 5,000 and 7,500 feet. From 7,500 to 10,000 feet highs are normally in the 70s, and from 10,000 to 12,000 feet 60s are common. The mountains are a great place to escape summer heat, but tourists are sometimes unprepared for the chill. Nighttime lows in the 30s are fairly common in the high mountains and 20s are a possibility. But don't forget the oppressive heat that can be occurring in the nearby valleys and plains. Temperatures in excess of 110° have occurred at a number of eastern Colorado locations.

More Stimulating Facts About Colorado Precipitation:

Precipitation is variable on a number of different scales. It varies from place to place (as has been colorfully depicted in our state map of average annual precipitation). It varies from day to day, week to week, month to month, year to year, decade to decade, and probably century to century. Since we only have about 100 years of measured precipitation data here in Colorado, we can only infer variations on longer time scales.

What I want to focus on now is the variation on the diurnal (24-hour) scale. To some degree you probably already have a strong intuitive feel for at least a part of this variation. In the summer most of us know that precipitation is much more likely to occur during the afternoon than during the morning. It is extremely rare to find it raining when you awake on a July or August morning. Wise golfers schedule their tee-times accordingly. Experienced mountain climbers certainly take this into consideration. But there are also distinctly different preferred times for precipitation at other times of the year. In Denver, the most likely time of the year to get wet is April evenings. In many mountain areas, January is the month with the most frequent precipitation. Unlike the summertime, winter precipitation is most likely at night. Up at Fremont Pass, measurable precipitation is most likely between 3 and 4 a.m. on January mornings with a probability of nearly 25%. This compares to Denver's wettest hour of 8 to 9 p.m. in April with a 9% chance of measurable precipitation.

(continued on last page)

MAY 1987 DAILY WEATHER

Date	Event
1-6	Warm summerlike weather on the 1st with scattered afternoon showers and thunderstorms especially over western Colorado. Gateway (south of Grand Junction) received 1.05" of rain on the 1st. Storms became more numerous and spread eastward on the 2nd as an upper level storm system developed over Colorado. A low pressure area formed over southeastern Colorado late on the 2nd and remained nearly stationary until finally dissipating by the 6th. Windy and much colder over the state, especially from the mountains eastward. Welcomed moderate rains fell over most of the Eastern Plains on the 3rd while some of the mountains received snow. Precipitation ended west of the mountains 4-5th and temperatures began to warm, but cool, stormy weather with some reports of small hail continued in eastern Colorado. By the time skies finally began to clear on the 6th some large rainfall totals had been logged. Most plains areas received well over 1" for the period with portions of northeast Colorado getting much more. Yuma measured 2.87" and more than 3" fell near Sedgwick. Parts of southern Colorado were also soaked. The Timpas 13SW station northeast of Trinidad totalled 3.83" for the storm including 2.47" in a 24-hour period.
7-16	A return to drier, warmer weather as the jet stream stayed far north of the state. Consistently above average temperatures throughout the period statewide with highs in the 70s and 80s at low elevations with 50s and 60s in the mountains. Rapid mountain snowmelt began, sending many rivers and streams to their peak flows for the season in mid-May -- a few weeks earlier than usual. Dry over most of Colorado 7-10th except for a few trace afternoon thundershowers. More active storms 11-15th from the mountains eastward. A few locally heavy rain and hail storms reported. A storm on the evening of the 14th dumped 2.12" of rain at the National Weather Service radar site near Limon. Aguilar reported 1.70" that same evening.
17-26	A steady flow of moist air from the south in combination with cooler, unstable air aloft triggered daily widespread shower and thunderstorm activity over much of Colorado, particularly the eastern half. Some areas had measurable rainfall on each day for 10 days in a row. Hail was reported somewhere in the state on each of these days, although the most hail was reported on the 20th when significant damage was reported in parts of the Arkansas Valley. There were also numerous reports of heavy rain 17-24th such as 1.22" at Sedgwick on the 17th, 1.40" at Lakewood on the 20th, 1.59" at Rush on the 21st, 2.04" at Brighton (and 3" northwest of Fort Collins) on the 22nd, 1.33" at Denver and 1.93" near Springfield on the 23rd, and 2.02" at Karval and 2.59" at Fort Morgan on the 24th. Scattered storms continued 25-26th, but the storms moved quicker and the air was drier resulting in much smaller rainfall totals. For the entire 10-day period, many eastern Colorado locations received from 2 to 4" of rainfall. Briggsdale totalled a whopping 5.11" which is 40% of their normal total for the entire year. Totals were much lower in the mountains and western valleys although several areas received more than 1".
27-31	Cool and much drier. Still a few afternoon thundershowers especially on the 28th and 29th. Chilly nighttime temperatures with some of the coldest temperatures of the month on the 27th and 28th. A few low elevation sites reported frost such as Cortez and Yellow Jacket. Even Canon City dipped to 34° on the 27th. Taylor Park dropped to 10° that morning. As the month ended much warmer temperatures returned.

May 1987 Extremes

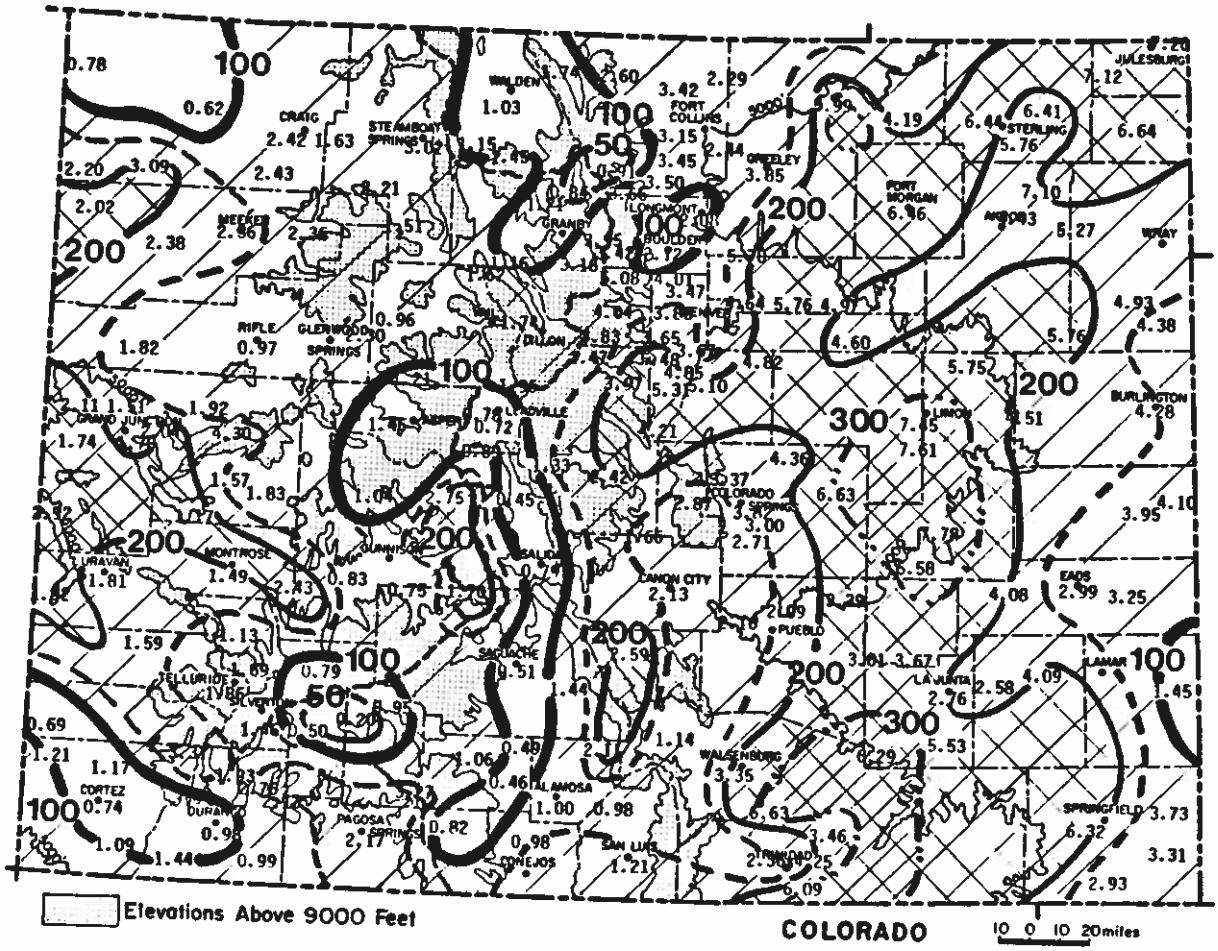
Highest Temperature	91°F	Several Occurrences	Holly, Julesburg, and Las Animas
Lowest Temperature	+8°F	May 4	Silverton
Greatest Total Precipitation	7.78"		Karval
Least Total Precipitation	0.20"		Hermit 7ESE
Greatest Total Snowfall*	33"		Mount Evans Research Center

* data derived only from those stations with complete daily snowfall records.

MAY 1987 PRECIPITATION

May lived up to its reputation for being the one month of the year when eastern Colorado can seem more like the humid Midwest than a semiarid region. Much of the state was wetter than average for the month, and widespread areas on the plains had more than double their average precipitation. Three to six inch rainfall totals were common on the plains with areas near Limon totalling more than 7" for the month. From the mountains westward a much more complex pattern was observed. Some areas were quite wet including the lower Gunnison Valley, the lower White River Valley and portions of the mountains. Other nearby areas were dry such as the upper Rio Grande, upper Arkansas and part of the upper Colorado River basin. As a whole, the May moisture was very beneficial and reduced the demand for irrigation water in many areas.

Greatest		Least	
Karval	7.78"	Hermit 7ESE	0.20"
Limon Hass Ranch	7.61"	Buena Vista	0.45"
Limon NWS	7.45"	Monte Vista 1E	0.46"
Julesburg	7.20"	Center 4SSW	0.49"
Sedgwick 5S	7.12"	Rio Grande Reservoir	0.51"



Precipitation amounts (inches) for May 1987 and contours of precipitation as a percent of the 1961-1980 average. The dashed line represents 150% of average.

1987 WATER YEAR PRECIPITATION

Little change in the basic pattern of precipitation over the state has occurred since last month. For the first 8 months of this water year precipitation has been well above average over most of eastern and southern Colorado. Despite improved May moisture, most of the Northern and Central Mountains and adjacent northwestern valleys remain drier than average.

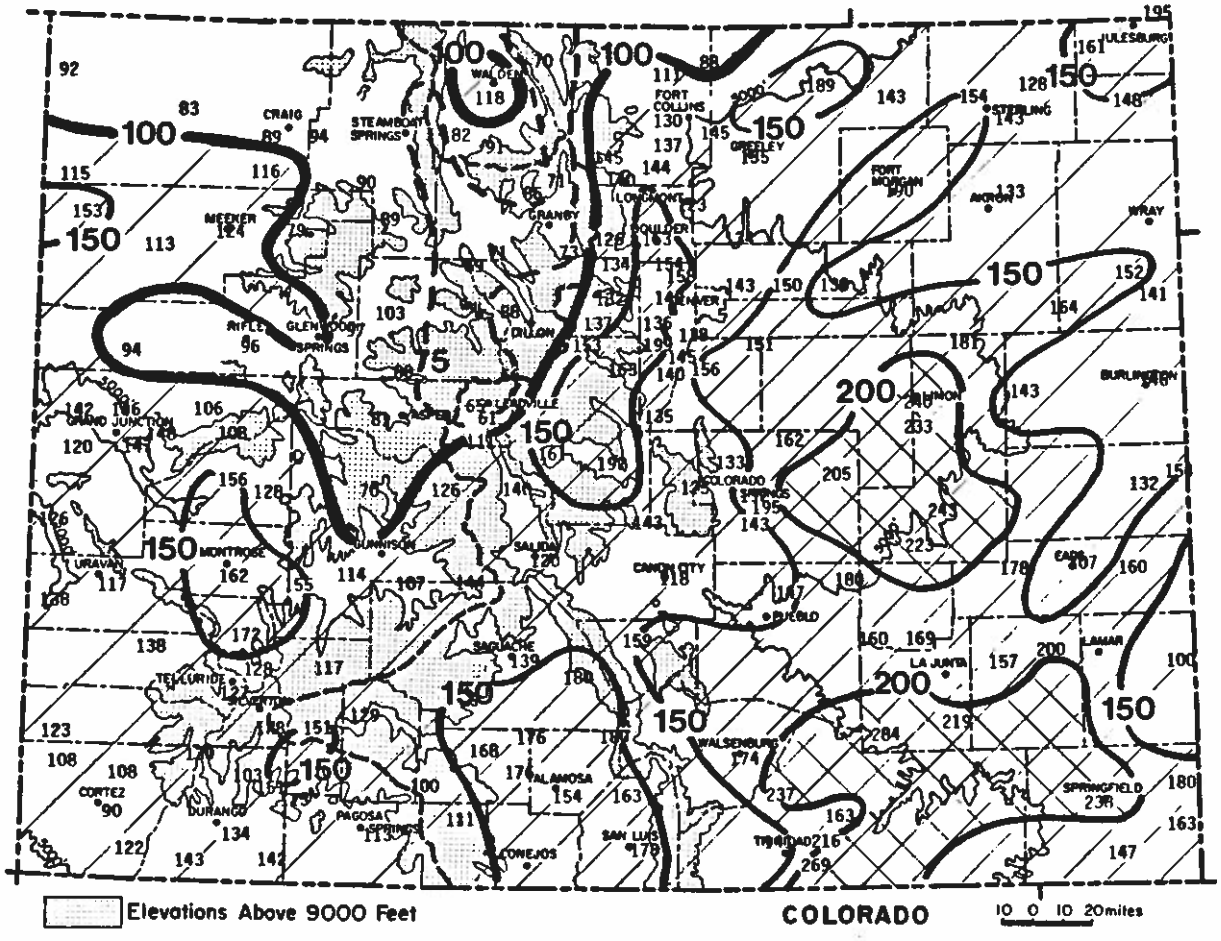
Comparison to Last Year

The moisture anomaly pattern is nearly reversed from what it was at this time last year. Most of southeastern Colorado was very dry last year while moisture was abundant in the Northern and Central Mountains. Only in southwestern Colorado are the conditions similar to last year.

1987 Water Year to Date through May

Wettest (as % of average)			Driest (as % of average)		
Timpas 13SW	284%	17.15"	Leadville 2SSW	61%	5.70"
Wootton Ranch	269%	17.06"	Sugarloaf Reservoir	65%	7.97"
Karval	243%	13.42"	Climax	66%	10.33"

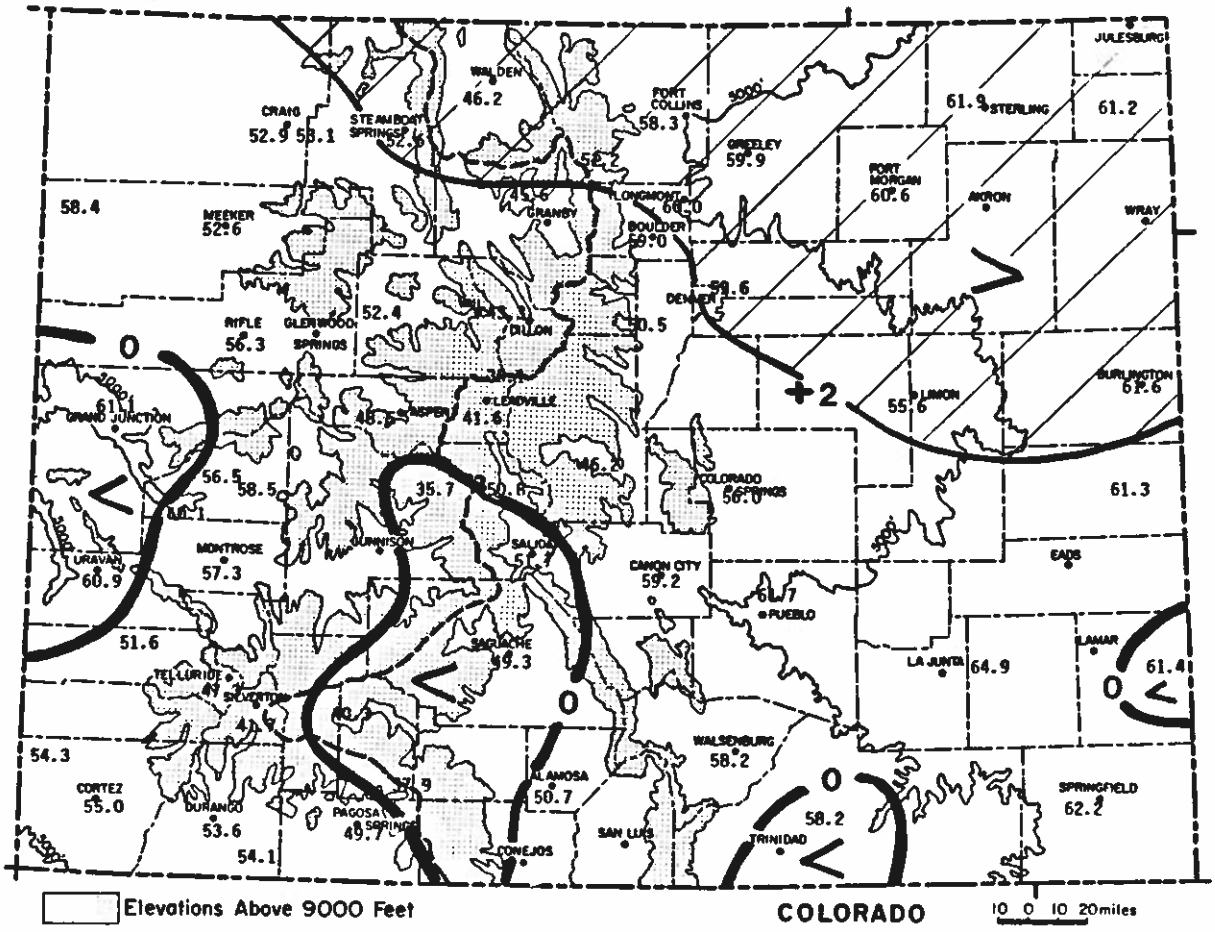
Wettest (total precipitation)			Driest (total precipitation)		
Wolf Creek Pass 1E	30.61"	100%	Browns Park Refuge	5.06"	92%
Mount Evans Research Center	28.76"	132%	Monte Vista 1E	5.16"	176%
Bonham Reservoir	26.16"	108%	Twin Lakes Reservoir	5.21"	111%



Precipitation for October 1986 through May 1987 as a percent of the 1961-1980 average.

MAY 1987 TEMPERATURES AND DEGREE DAYS

Despite cool weather late in May, most of the state ended up 1 to 3 degrees Fahrenheit warmer than average. The warmest areas, compared to average, were in northern Colorado. Southern portions of the state were near average to as much as 1 degree below average over the Rio Grande basin. Mild nighttime temperatures helped many agricultural areas to make it through the month without frost.



May 1987 temperatures (degrees Fahrenheit) and contours of departures from 1961-1980 averages.

MAY 1987 SOIL TEMPERATURES

Soil temperatures reflected the warm spring weather and mild nights that were prevalent in May. These temperatures were conducive to early germination and growth of warm-weather crops.

These soil temperature measurements were taken at Colorado State University beneath sparse unirrigated sod with a flat, open exposure. These data are not representative of all Colorado locations.

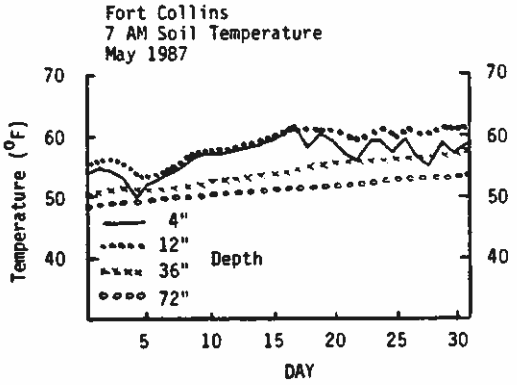


Table 1. Heating Degree Day Data for Colorado through May 1987.

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
ALAMOSA	AVE	40	100	303	657	1074	1457	1519	1182	1035	732	453	165	8717
	85-86	30	66	378	634	1045	1472	1231	983	864	638	446	138	7925
	86-87	63	75	366	728	1004	1377	1593	1160	1049	662	436		8513
ASPEN	AVE	95	150	348	651	1029	1339	1376	1162	1116	798	524	262	8850
	85-86	119	107	453	656	1066	1278	1175	1029	848	739	530	185	8185
	86-87	147	132	428	735	1009	1307	1398	1063	1067	701	508		8495
BOULDER	AVE	0	6	130	357	714	908	1004	804	775	483	220	59	5460
	85-86	0	0	222	400	982	1018	674	762	496	423	249	16	5242
	86-87	1	0	175	450	714	970	947	779	776	375	191		5378
BUENA VISTA	AVE	47	116	285	577	936	1184	1218	1025	983	720	459	184	7734
	85-86	63	54	405	597	938	1158	972	946	806	661	450	149	7199
	86-87	79	69	388	730	970	1316	1280	1011	1071	650	433		7997
BURLING-TON	AVE	6	5	108	364	762	1017	1110	871	803	459	200	38	5743
	85-86	0	5	206	405	977	1142	740	820	525	386	163	12	5381
	86-87	0	0	76	406	745	984	980	746	816	385	127		5265
CANON CITY	AVE	0	9	81	301	639	831	911	734	707	411	179	33	4836
	85-86	0	6	186	397	886	1036	721	756	507	399	248	40	5172
	86-87	4	2	132	422	724	952	976	793	M	M	177		4182
COLORADO SPRINGS	AVE	8	25	162	440	819	1042	1122	910	880	564	296	78	6346
	85-86	5	8	253	487	978	1143	822	840	635	487	315	49	6022
	86-87	4	14	174	519	813	1081	1096	888	912	491	271		6263
CORTEZ	AVE	0	11	115	434	813	1132	1181	921	828	555	292	68	6350
	85-86		4	264	484	884	1081	978	805	711	572	321	58	6162
	86-87	10	6	214	541	813	1041	1224	888	953	534	302		6526
CRAIG	AVE	32	58	275	608	996	1342	1479	1193	1094	687	419	193	8376
	85-86	10	42	353	649	1043	1487	1362	1023	780	669	461	76	7955
	86-87	31	15	338	654	967	1234	1473	1059	1055	589	368		7783
DELTA	AVE	0	0	94	394	813	1135	1197	890	753	429	167	31	5903
	85-86	0	M	113	335	658	1026	948	684	530	365	174	6	4839
	86-87	0	0	145	414	M	984	M	764	759	326	154		3546
DENVER	AVE	0	0	135	414	789	1004	1101	879	837	528	253	74	6014
	85-86		1	241	435	1051	1094	758	802	548	456	260	22	5668
	86-87	0	0	145	477	775	1045	1012	804	805	392	170		5625
DILLON	AVE	273	332	513	806	1167	1435	1516	1305	1296	972	704	435	10754
	85-86	260	300	609	856	1183	1439	1380	1175	1072	915	716	388	10293
	86-87	322	318	580	883	1125	1473	1542	1244	1286	914	667		10354
DURANGO	AVE	9	34	193	493	837	1153	1218	958	862	600	366	125	6848
	85-86	3	8	274	476	916	1159	967	802	686	575	341	70	6277
	86-87	23	9	295	559	844	1055	1204	895	906	478	346		6614
EAGLE	AVE	33	80	288	626	1026	1407	1448	1148	1014	705	431	171	8377
	85-86	19	52	356	605	995	1352	1324	890	736	598	428	88	7443
	86-87	37		314	658	930	1283	1309	925	927	566	384		7333
EVER-GREEN	AVE	59	113	327	621	916	1135	1199	1011	1009	730	489	218	7827
	85-86	62	90	387	651	1039	1119	947	927	770	608	532	157	7289
	86-87	75	90	380	699	927	1186	1178	995	1009	652	442		7633
FORT COLLINS	AVE	5	11	171	468	846	1073	1181	930	877	558	281	82	6483
	85-86	1	8	243	499	1078	1199	883	816	568	470	261	22	6048
	86-87	0	0	178	500	809	1091	1042	830	850	413	206		5919
FORT MORGAN	AVE	0	6	140	438	867	1156	1283	969	874	516	224	47	6520
	85-86	0	2	239	548	1165	1425	1160	915	616	401	246	19	6736
	86-87	0	4	138	495	874	1193	1148	842	937	443	150		6224
GRAND JUNCTION	AVE	0	0	65	325	762	1138	1225	882	716	403	148	19	5683
	85-86	0	0	139	351	779	1018	949	685	489	366	168	3	4947
	86-87	0	0	130	414	718	1001	1159	785	765	314	143		5429

M = MISSING DATA

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
GRAND LAKE	AVE	214	264	468	775	1128	1473	1593	1369	1318	951	654	384	10591
	85-86	206	265	513	744	1115	1454	1494	1174	1083	896	651	304	9899
	86-87	245	242	488	777	1051	1450	1612	1265	1265	876	593		9864
GREELEY	AVE	0	0	149	450	861	1128	1240	946	856	522	238	52	6442
	85-86	0	6	249	501	1131	1311	1010	845	545	440	232	15	6285
	86-87	0	0	142	484	825	1085	1054	797	844	382	163		5776
GUNNISON	AVE	111	188	393	719	1119	1590	1714	1422	1231	816	543	276	10122
	85-86	84	152	433	678	1058	1648	1712	1084	952	711	517	204	9233
	86-87	123	146	420	734	1064	1430	1539	1187	1148	698			8489
LAS ANIMAS	AVE	0	0	45	296	729	998	1101	820	698	348	102	9	5146
	85-86	0	0	134	313	816	1106	737	715	409	220	77		4527
	86-87	0	0	32	280	668	991	937	685	700	295	65		4653
LEAD-VILLE	AVE	272	337	522	817	1173	1435	1473	1318	1320	1038	726	439	10870
	85-86	333	359	666	871	1258	1470	1328	1251	1168	994	760	441	10899
	86-87	372	369	626	920	1188	1482	1510	1276	1349	955	719		10766
LIMON	AVE	8	6	144	448	834	1070	1156	960	936	570	299	100	6531
	85-86	1	12	274	544	1078	1233	861	910	662	508	336	57	6476
	86-87	4	8	171	551	873	1190	1132	931	961	513	284		6618
LONGMONT	AVE	0	6	162	453	843	1082	1194	938	874	546	256	78	6432
	85-86	0	6	236	486	1095	1228	869	814	549	469	262	20	6034
	86-87		0	154	498	852	1135	1155	848	872	435	165		6114
MEEKER	AVE	28	56	261	564	927	1240	1345	1086	998	651	394	164	7714
	85-86	6	31	358	599	967	1249	1164	893	742	646	458	75	7188
	86-87	41	28	402	623	894	1147	1262	957	999	579	376		7308
MONTROSE	AVE	0	10	135	437	837	1159	1218	941	818	522	254	69	6400
	85-86	0	0	211	443	803	1106	1032	766	577	453	235	24	5650
	86-87	1	6	183	532	809	1085	1190	876	856	426	233		6197
PAGOSA SPRINGS	AVE	82	113	297	608	981	1305	1380	1123	1026	732	487	233	8367
	85-86	34	73	376	600	1000	1373	1191	952	803	668	481	183	7734
	86-87	98	45	385	668	927	1182	1326	1013	1063	648	466		7821
PUEBLO	AVE	0	0	89	346	744	998	1091	834	756	421	163	23	5465
	85-86	0	0	172	410	1012	1161	783	728	523	346	167	21	5323
	86-87	0	0	94	428	741	1069	1082	768	756	358	119		5415
RIFLE	AVE	6	24	177	499	876	1249	1321	1002	856	555	298	82	6945
	85-86	1	6	232	484	882	1147	1076	769	607	477	287	16	5984
	86-87	1	3	226	499	795	1081	1216	839	826	431	243		6160
STEAMBOAT SPRINGS	AVE	113	169	390	704	1101	1476	1541	1277	1184	810	533	297	9595
	85-86	57	130	434	729	1144	1554	1495	1097	915	688	533	185	8961
	86-87	120	119	M	M	M	M	M	M	1059	608	377		
STERLING	AVE	0	6	157	462	876	1163	1274	966	896	528	235	51	6614
	85-86	0	6	230	519	1161	1395	1155	990	594	439	279	22	6790
	86-87	0	4	105	427	847	1193	1072	762	974	395	123		5902
TELLURIDE	AVE	163	223	396	676	1026	1293	1339	1151	1141	849	589	318	9164
	85-86	121	152	463	648	1023	1270	1130	1011	892	740	585	257	8292
	86-87	200	129	434	716	1018	1297	1304	1091	1156	719	540		8604
TRINIDAD	AVE	0	0	86	359	738	973	1051	846	781	468	207	35	5544
	85-86	0	0	175	380	772	1046	738	764	529	365	194	32	4995
	86-87	1	0	90	421	719	1022	998	775	778	400	206		5410
WALDEN	AVE	198	285	501	822	1170	1457	1535	1313	1277	915	642	351	10466
	85-86	171	271	578	824	1224	1458	1381	1155	989	836	656	256	9799
	86-87	225	224	530	825	1126	1388	1449	1127	1162	800	576		9432
WALSEN-BURG	AVE	0	8	102	370	720	924	989	820	781	501	240	49	5504
	85-86	0	0	165	358	770	982	681	734	515	404	221	42	4872
	86-87	0	0	84	420	682	984	958	796	789	397	207		5317

M = MISSING DATA

MAY 1987 CLIMATIC DATA

Eastern Plains*

	Temperature						Degree Days			Precipitation			
Name	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
STERLING	75.5	48.3	61.9	3.9	89	42	123	37	415	6.44	3.25	201.9	13
FORT MORGAN	73.4	47.8	60.6	2.3	86	38	150	21	391	6.46	4.00	262.6	15
HOLYOKE	72.5	49.9	61.2	2.1	85	40	146	36	388	6.64	3.60	218.4	14
BURLINGTON	73.1	50.2	61.6	2.2	86	43	127	28	392	4.28	1.52	155.1	14
LIMON WSMO	67.5	43.8	55.6	2.5	79	34	284	0	284	7.45	5.27	341.7	17
CHEYENNE WELLS	74.2	48.5	61.3	1.6	86	40	133	26	398	3.95	0.95	131.7	11
LAS ANIMAS	79.9	49.9	64.9	1.6	91	41	65	70	487	2.58	0.63	132.3	10
HOLLY	78.8	44.0	61.4	-0.8	91	37	131	27	452	1.45	-1.19	54.9	9
SPRINGFIELD 7WSW	76.5	47.9	62.2	1.9	86	40	105	27	435	6.32	3.63	234.9	14

Foothills/Adjacent Plains*

	Temperature						Degree Days			Precipitation			
Name	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
FORT COLLINS	70.8	45.8	58.3	2.0	83	39	206	5	332	3.15	0.52	119.8	17
GREELEY UNC	73.0	46.7	59.9	2.1	87	38	163	10	369	3.85	1.20	145.3	15
ESTES PARK	62.4	40.0	51.2	3.2	72	27	424	0	202	0.91	-1.06	46.2	17
LONGMONT 2ESE	73.3	46.8	60.0	2.9	86	40	165	20	381	2.08	-0.28	88.1	13
BOULDER	71.7	46.2	59.0	0.6	84	37	191	12	354	2.12	-0.92	69.7	15
DENVER WSFO AP	71.8	47.5	59.6	2.5	83	40	170	12	354	4.64	2.45	211.9	18
EVERGREEN	65.0	36.1	50.5	1.5	76	28	442	0	242	3.65	1.07	141.5	17
LAKE GEORGE 8SW	58.4	34.1	46.2	0.0	69	28	572	0	151	2.42	1.23	203.4	20
COLORADO SPRINGS	67.9	44.0	56.0	0.5	82	37	271	0	289	3.82	1.85	193.9	18
CANON CITY 2SE	72.3	46.1	59.2	0.9	9999	34	177	10	354	2.13	0.70	149.0	13
PUEBLO WSO AP	76.6	46.8	61.7	0.5	88	37	119	26	425	2.09	1.00	191.7	13
WALSENBURG	72.1	44.3	58.2	0.7	82	35	207	4	355	3.35	1.94	237.6	13
TRINIDAD FAA AP	72.7	43.7	58.2	-0.8	87	34	206	5	361	3.46	1.92	224.7	13

Mountains/Interior Valleys*

	Temperature						Degree Days			Precipitation			
Name	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
WALDEN	61.5	30.9	46.2	2.1	74	20	576	0	186	1.03	-0.09	92.0	12
LEADVILLE 2SW	55.7	27.5	41.6	2.1	65	21	719	0	104	0.72	-0.48	60.0	10
SALIDA	66.8	36.7	51.7	-0.6	77	28	403	0	269	0.79	-0.33	70.5	7
BUENA VISTA	65.4	36.2	50.8	0.9	81	27	433	0	250	0.45	-0.45	50.0	6
SAGUACHE	63.6	35.1	49.3	-1.0	72	27	478	0	219	0.51	-0.18	73.9	9
HERMIT 7ESE	54.2	26.4	40.3	-1.2	68	16	756	0	87	0.20	-0.81	19.8	3
ALAMOSA WSO AP	66.9	34.5	50.7	0.2	75	26	436	0	268	1.00	0.31	144.9	6
STEAMBOAT SPRINGS	67.7	37.5	52.6	5.1	80	30	377	0	279	3.02	1.01	150.2	14
GRAND LAKE 6SSW	58.7	32.5	45.6	1.9	69	25	593	0	148	1.21	-0.13	90.3	18
DILLON 1E	57.6	28.9	43.3	1.0	68	22	667	0	135	1.74	0.54	145.0	20
CLIMAX	46.6	25.6	36.1	0.5	57	11	888	0	15	1.96	0.11	105.9	12
ASPEN 1SW	61.5	35.5	48.5	1.5	74	26	508	0	188	1.45	-0.65	69.0	14
TAYLOR PARK	54.1	17.4	35.7	-0.6	63	10	900	0	80	2.75	1.59	237.1	12
TELLURIDE	62.2	32.4	47.3	1.2	72	25	540	0	198	1.86	0.23	114.1	16
PAGOSA SPRINGS	66.6	32.7	49.7	0.6	75	24	466	0	264	2.17	1.11	204.7	18
SILVERTON	57.2	26.3	41.7	0.8	67	8	713	0	128	1.46	0.08	105.8	12
WOLF CREEK PASS 1	49.4	26.5	37.9	-1.2	60	21	833	0	37	3.27	1.34	169.4	21

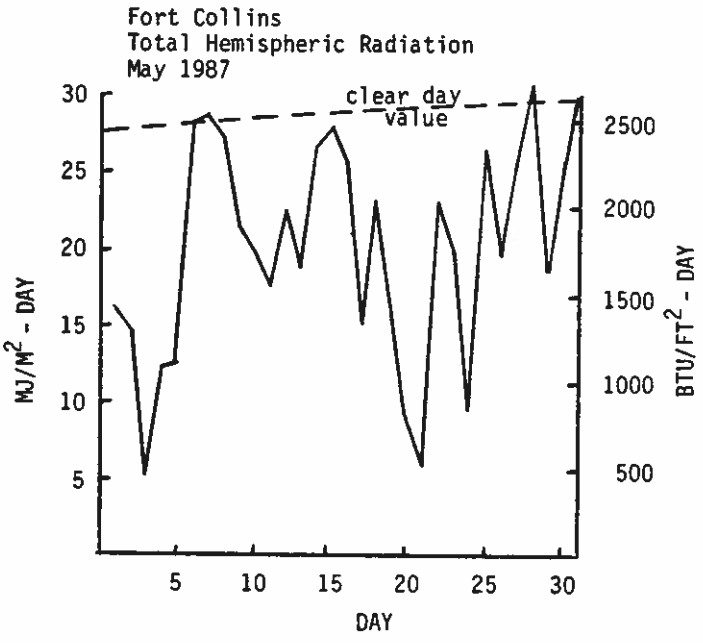
Western Valleys*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
CRAIG 4SW	66.9	39.0	52.9	1.4	80	30	368	0	269	2.42	0.77	146.7	21
HAYDEN	67.2	38.9	53.1	1.6	82	30	360	0	273	1.63	0.35	127.3	15
MEEKER NO. 2	68.6	36.6	52.6	1.2	81	27	376	0	296	2.36	0.99	172.3	10
RANGELY 1E	72.6	44.2	58.4	2.0	85	35	205	10	364	2.02	1.11	222.0	15
EAGLE FAA AP	69.3	35.5	52.4	1.3	81	24	384	0	305	0.96	0.29	143.3	12
RIFLE	73.6	39.9	56.3	0.9	86	29	243	0	346	0.97	0.01	101.0	9
GRAND JUNCTION WS	73.8	48.5	61.1	-0.9	88	38	143	30	396	1.51	0.69	184.1	13
CEDAREDGE	71.1	42.0	56.5	0.0	87	33	258	2	331	1.57	0.45	140.2	11
PAONIA 1SW	73.3	43.7	58.5	1.7	85	35	195	1	370	1.83	0.54	141.9	11
DELTA	77.0	43.2	60.1	0.6	88	30	154	11	425	1.17	0.61	208.9	14
MONTROSE NO. 2	71.1	43.5	57.3	0.5	81	36	233	1	336	1.49	0.73	196.1	17
URAVAN	75.7	46.0	60.9	-0.4	86	37	143	25	414	1.81	0.80	179.2	9
NORWOOD	65.6	38.0	51.6	0.5	74	28	378	0	226	1.59	0.58	157.4	6
YELLOW JACKET 2W	68.5	40.1	54.3	0.6	75	31	320	0	295	1.21	0.02	101.7	7
CORTEZ	70.0	40.0	55.0	1.6	78	31	302	0	317	0.74	-0.18	80.4	6
DURANGO	69.9	37.3	53.6	0.3	79	26	346	0	316	0.98	-0.14	87.5	15
IGNACIO 1N	71.9	36.4	54.1	1.7	80	26	328	0	349	0.99	0.13	115.1	9

* Data are received by the Colorado Climate Center for more locations than appear in these tables. Please contact the Colorado Climate Center if additional information is needed.

MAY 1987 SUNSHINE AND SOLAR RADIATION

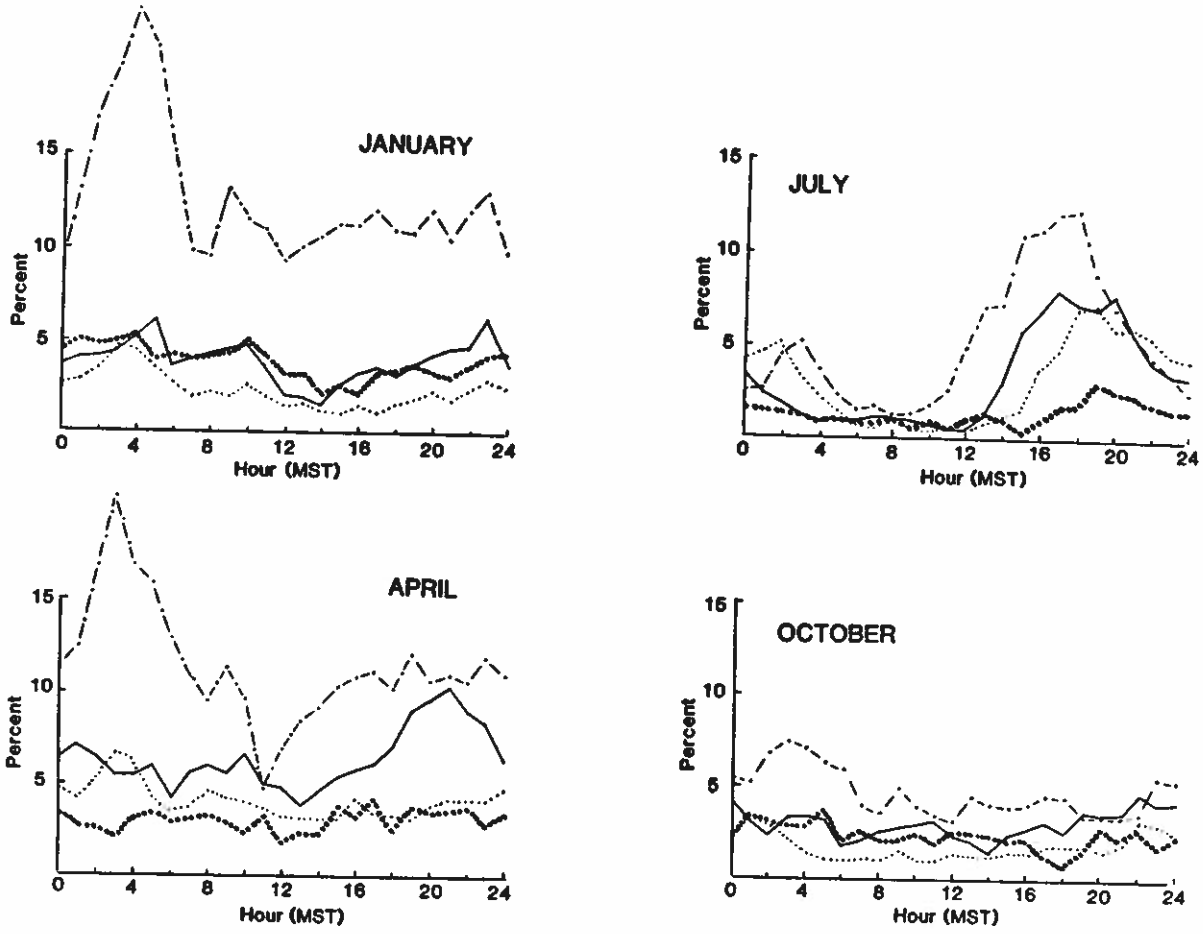
Station	Number of Days clear	partly cloudy	cloudy	% of possible sunshine	average % of possible
Colorado Springs	5	11	15	--	--
Denver	4	14	13	52%	65%
Fort Collins	4	14	13	--	--
Grand Junction	6	9	16	73%	71%
Pueblo	7	11	13	67%	73%



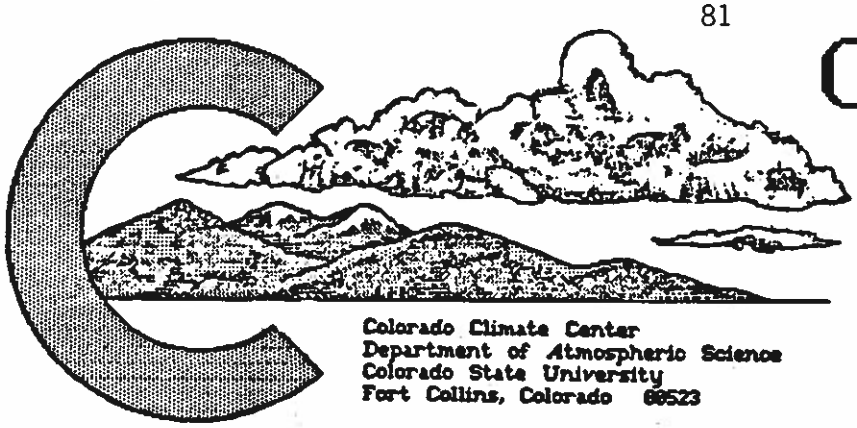
More Stimulating Facts About Colorado Precipitation: continued

In much of Colorado precipitation occurs least frequently in October. Afternoon convection terminates rapidly in September and winter storms don't become common until late October. As a result precipitation probabilities are low and tend to be evenly distributed throughout the day.

To help you visualize these variations, here are graphs of the diurnal distribution of precipitation throughout the year at 4 selected locations in Colorado. The locations chosen, Grand Junction, Climax (Fremont Pass), Denver and Akron give a representative east-west cross section of the state. North-south variations also occur along with other localized effects. There are interesting physical reasons for these variations which are related to upper level wind patterns, solar radiation and moisture sources. As usual, we could write a whole book on these subjects, but for now I challenge you to study these graphs and propose your own theories. We'll discuss these processes more in the future.



Probability of measurable (≥ 0.01") precipitation at selected Colorado locations as a function of time of day.



COLORADO CLIMATE

Colorado Climate Center
Department of Atmospheric Science
Colorado State University
Fort Collins, Colorado 80523

JUNE 1987

June in Review:

Temperatures were warmer than average in June across most of Colorado, but the heat was quite bearable. Precipitation was variable, which is usually the case during the summer. Areas east of the mountains were generally near to well above average. The majority of western Colorado was drier than average. As usual, June brought some severe weather to Colorado. An unusual mountain tornado did significant damage in an area west of Fort Collins.

A Look Ahead -- August 1987:

"More of the same" is a fairly accurate assessment of August climate. August is very much like July. Temperatures are similar, precipitation patterns are similar and the daily progression from clear mornings to afternoon showers is nearly identical. But there are some subtle differences that a sharp observer can notice.

In August, the flow of moisture into Colorado from the south, the Southwest Monsoon, is normally active early in the month and gradually retreats southward as the month progresses. Afternoon thundershower development is a common part of the daily weather sequence. However, the likelihood of large or severe thunderstorms is distinctly higher early in the month and diminishes noticeably later on. In general, August storms are less severe than their June and July cousins. Tornadoes occur only about 1/4 as often as they do in June. Rainfall patterns are also somewhat different. Total rainfall in August is heaviest in southern Colorado and decreases toward the north. The wettest parts of the state are the San Juan mountains where more than 4" of moisture may fall. The driest areas are the northwestern valleys where rainfall is normally less than 1.00". East of the mountains most areas average from 1.50" to 2.50" with the wettest locations extending along the Palmer Divide northeastward from Pikes Peak. The driest area is typically the Platte Valley. Less than 1.50" of moisture is common in northeastern Colorado in the valley areas from Fort Collins and Longmont eastward to Fort Morgan.

Temperatures are very similar to July's and are well correlated with elevation. Heatwaves driving daytime temperatures into the 90s and low 100s are possible at lower elevations, but tend not to be prolonged. Later in the month as the monsoon retreats, humidities drop, and days begin to shorten noticeably, the evening air becomes increasingly chilly. Travellers and hikers in the Colorado mountains need to beware. Nighttime temperatures in the 20s are not uncommon late in the month up in the mountains. Back on August 15, 1978 Climax (Fremont Pass) dipped to 18°F.

Special Climate Feature -- How Hot Can It Get In Colorado?:

Most record books show that the hottest temperature ever reported in Colorado was a sizzling 118°F in Bennett (east of Denver) on July 11, 1888. We at the Colorado Climate Center have always doubted that record. Thomas Bettge in an article in the April 1985 issue of WEATHERWISE entitled, "The Case of the Bennett, Colorado, Maximum Temperature," made a convincing argument that the Bennett reading is erroneous. Anyone familiar with Colorado's climate knows that the hottest temperatures occur at elevations well below 5,000 feet. Bennett is closer to 5,500 feet.

How hot can it get here in Colorado? It depends very much on the location and especially the elevation. Daily temperature records have been kept for many years at dozens of locations in the State. Statistics for a number of locations in Colorado are shown in the following table. The highest temperature ever recorded ranges from a mere 76°F at Berthoud Pass high in the Rocky Mountains to a toasty 114° at two low elevation locations in the State, Sedgwick in northeastern Colorado and Las Animas in the southeast. The highest temperatures are most likely to occur in early to mid July, but records have been set anytime from mid June well into August. The highest recorded temperature decreases with elevation at a rate of about 4 to 5 degrees F for each 1,000 feet.

(continued on last page)

JUNE 1987 DAILY WEATHER

Date	Event
1-6	A dry period with cool mornings but mild afternoons. Taylor Park saw low temperatures of 16°F on both the 2nd and 3rd, but Rio Grande Reservoir's 15° reading early on the 5th was the coldest in the state. A pocket of low clouds and light precipitation loitered in SE Colorado on the 3rd holding daytime temperatures in the 50s. Some afternoon cloud buildups 4-6th, but very little precipitation fell. Pagosa Springs did get hit by a storm on the 4th which dropped 0.55" of rain and hail.
7-10	Moist southerly winds aloft combined with a shallow cold front from the north to produce wet, stormy weather over much of Colorado. The heaviest storms developed over central Colorado on the 8th and drifted northward during the evening continuing on the 9th in some areas. The heaviest precipitation totals were 1.00" in 24 hours and 1.80" for the whole period at Aspen, 2.02" in downtown Denver late on the 8th and 3.13" in about 6 hours late on the 8th in north Boulder. Storms continued in northeast Colorado on the 9th. Brush reported 2.96" on the 9th and Fleming totalled 3.62 inches for the 8-9th combined. Winds aloft turned more westerly on the 10th and the air began to dry. Still some locally heavy storms with some hail were reported. Holyoke picked up 0.51" of rain and hail from one of these storms.
11-17	The heat of summer got a strong hold on Colorado. Daytime temperatures in the 80s and 90s were common each day at elevations below 7000 feet. Parts of the southeastern plains had a taste of 100-degree weather. Las Animas hit 105° on the 16th to claim the state's hottest temperature for the month. A few showers and thunderstorms formed each day during the afternoon, but precipitation was minimal, especially west of the mountains. Burlington got in the way of one of these storms late on the 14th and totalled nearly an inch of rain. An unexpected area of lively thunderstorms developed along the northern Front Range late on the 17th and dissipated early on the 18th. Areas such as Windsor, received more than 1/2 inch of rain, and there were several reports of hail.
18-27	Sunny, warm and dry in the mountains and western slope, but a little cooler and unsettled across eastern Colorado. Several episodes of severe weather were reported, the most unusual of which was a well-documented tornado in the mountains west of Fort Collins on the 18th which struck Colorado State University's Pingree Park campus. During that night, severe storms pounded southeastern Colorado. There were numerous hail and heavy rain reports. Hail was reported again on the 20th near Colorado Springs. Another round of strong storms developed on the 23rd and continued into the night out on the plains. There were many reports of hail from the Arkansas Valley.
28-30	Moist air from the south and cool air from the north collided over Colorado and produced widespread and locally heavy rains. Scattered and locally intense thunderstorms on the 28th gave way to low clouds, cold temperatures and steady rains on the 29th. Skies cleared on the 30th, but some showers and storms continued. Rainfall amounts for the period ranged from just a few hundredths in northwest, southwest, and extreme eastern Colorado to well over an inch in portions of central Colorado. Denver traffic was snarled on the 29th by steady moderate rains. The Boulder area was again hit hard with a total of 2.63". Ralston Reservoir surpassed that with 3.32".

June 1987 Extremes

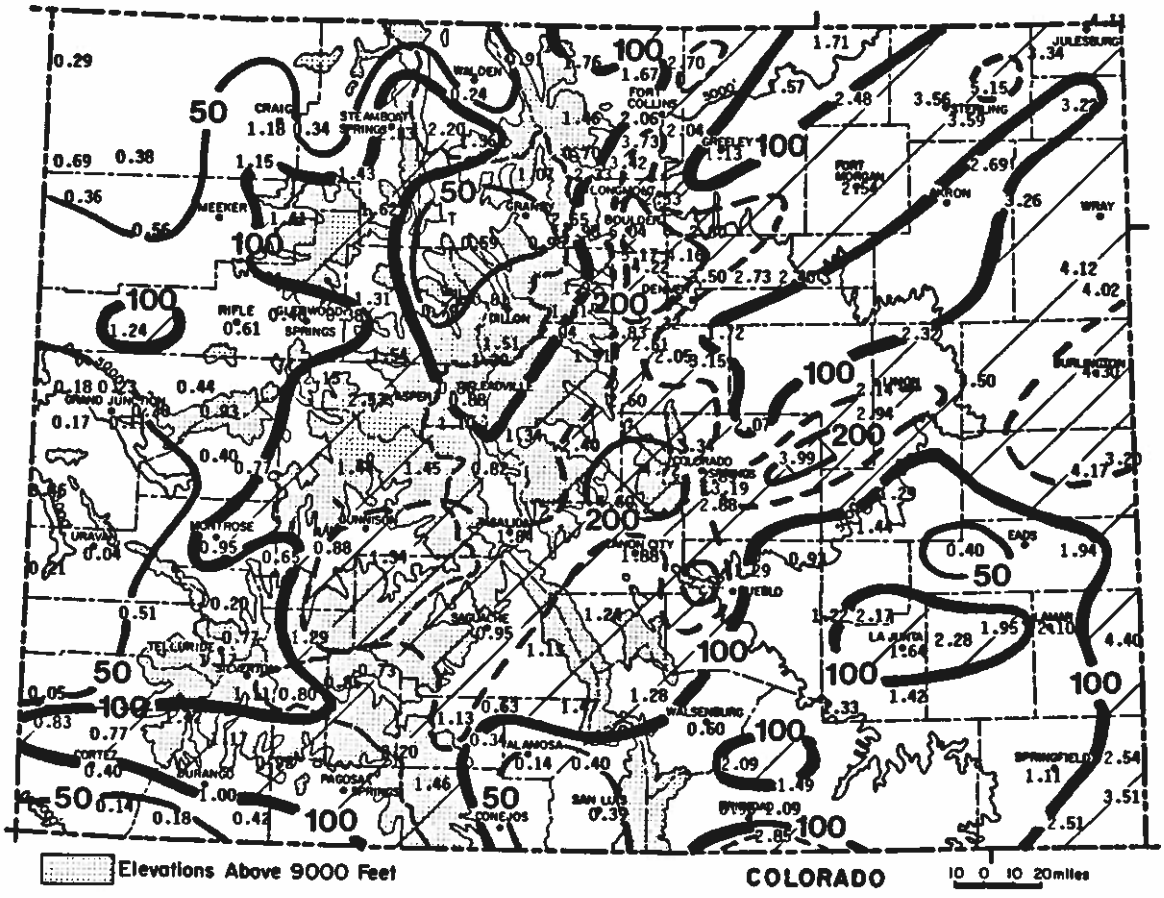
Highest Temperature	105°F	June 16	Las Animas
Lowest Temperature	15°F	June 5	Rio Grande Reservoir
Greatest Total Precipitation	6.04"		Boulder
Least Total Precipitation	Trace		Kremmling
Greatest Total Snowfall*	none reported		

* data derived only from those stations with complete daily snowfall records.

JUNE 1987 PRECIPITATION

Widespread rains from organized storm systems June 8-9 and again on the 29th produced the majority of the month's moisture. Scattered thunderstorms throughout the month dropped spotty rains to help complicate the state's precipitation pattern. In general, precipitation was above average from the Upper Rio Grande Valley and the central mountain area (Aspen-Crested Butte) northeastward to the Front Range and across much of the northeastern plains. Especially wet areas were observed from Denver to Boulder and near Pikes Peak where nearly 3 times the normal June rainfall occurred. Dry areas included parts of the Upper Colorado River basin from Breckenridge to Grand Lake, much to the western quarter of the state, southern portions of the San Luis Valley and portions of the southeastern plains. There were a number of areas where less than half the normal June precipitation fell.

Greatest		Least	
Boulder	6.04"	Kremmling	Trace
Gross Reservoir	5.33"	Uravan	0.04"
Ralston Reservoir	5.17"	Northdale	0.05"
Fleming 1S	5.15"	Grand Junction 6ESE	0.11"
Marston Treatment Plant	4.74"	Mesa Verde Natl Park	0.14"



Precipitation amounts (inches) for June 1987 and contours of precipitation as a percent of the 1961-1980 average. The dashed line represents 150% of average.

1987 WATER YEAR PRECIPITATION

The June 1987 Water Year is now 3/4 complete and the basic pattern remains quite stable. Drier than average conditions are limited to the northern mountains and portions of the central mountains and northwestern valleys. The rest of the state continues to be moist with much of the eastern half of the state at least 40% wetter than average.

Comparison to Last Year

At this time last year, most of the mountains and Western Slope areas were wetter than usual. The Eastern Plains were near average to well below average in some areas. For comparison, the Rush station east of Colorado Springs had received just 4.45" of moisture at this time last year. This year's 9-month total is 15.41".

1987 Water Year to Date through June

Wettest (as % of average)

Wootton Ranch	252%	19.91"
Timpas 13SW	246%	18.48"
Aguilar 1SE	224%	19.73"

Driest (as % of average)

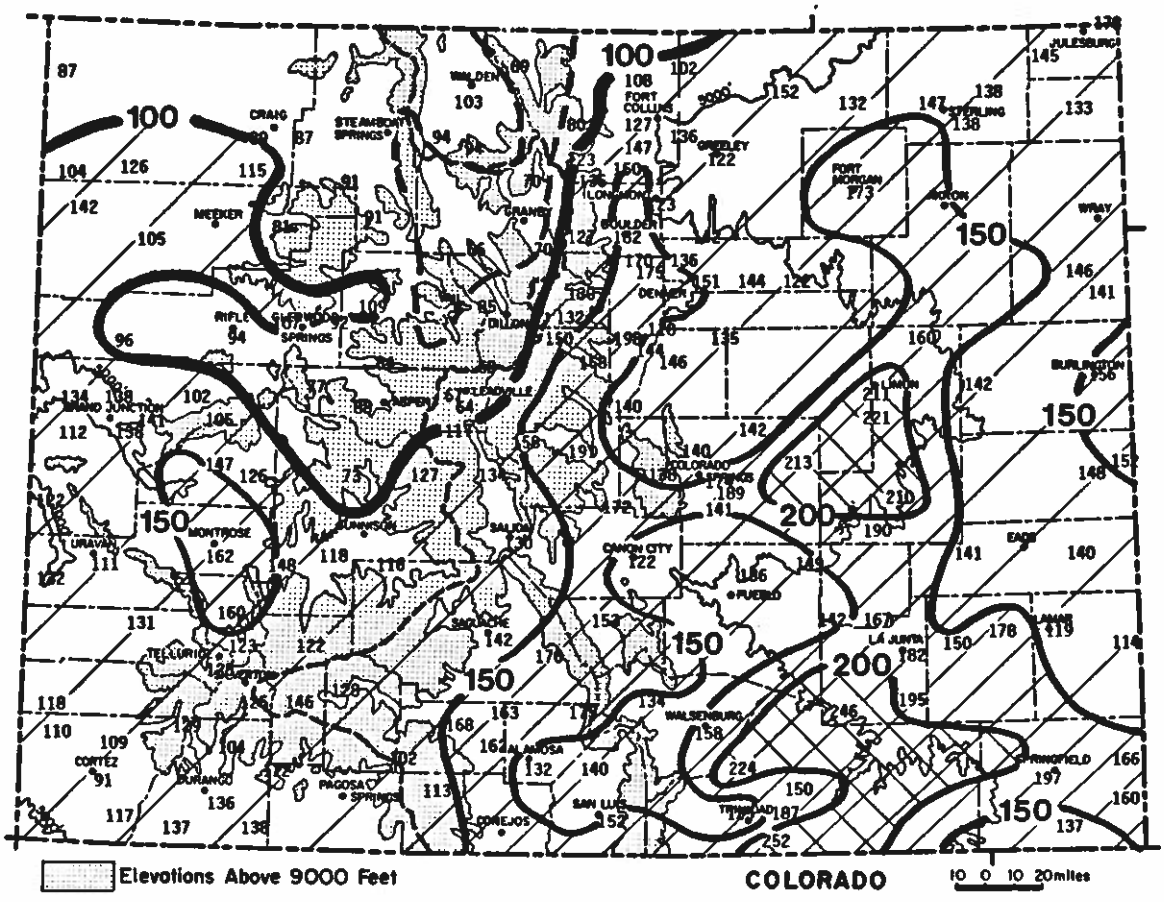
Leadville 2SW	64%	6.58"
Williams Fork Resvr	66%	7.48"
Sugarloaf Reservoir	67%	8.83"

Wettest (total precipitation)

Wolf Creek Pass 1E	32.81"	102%
Mount Evans Research Center	30.68"	130%
Bonham Reservoir	27.09"	105%

Driest (total precipitation)

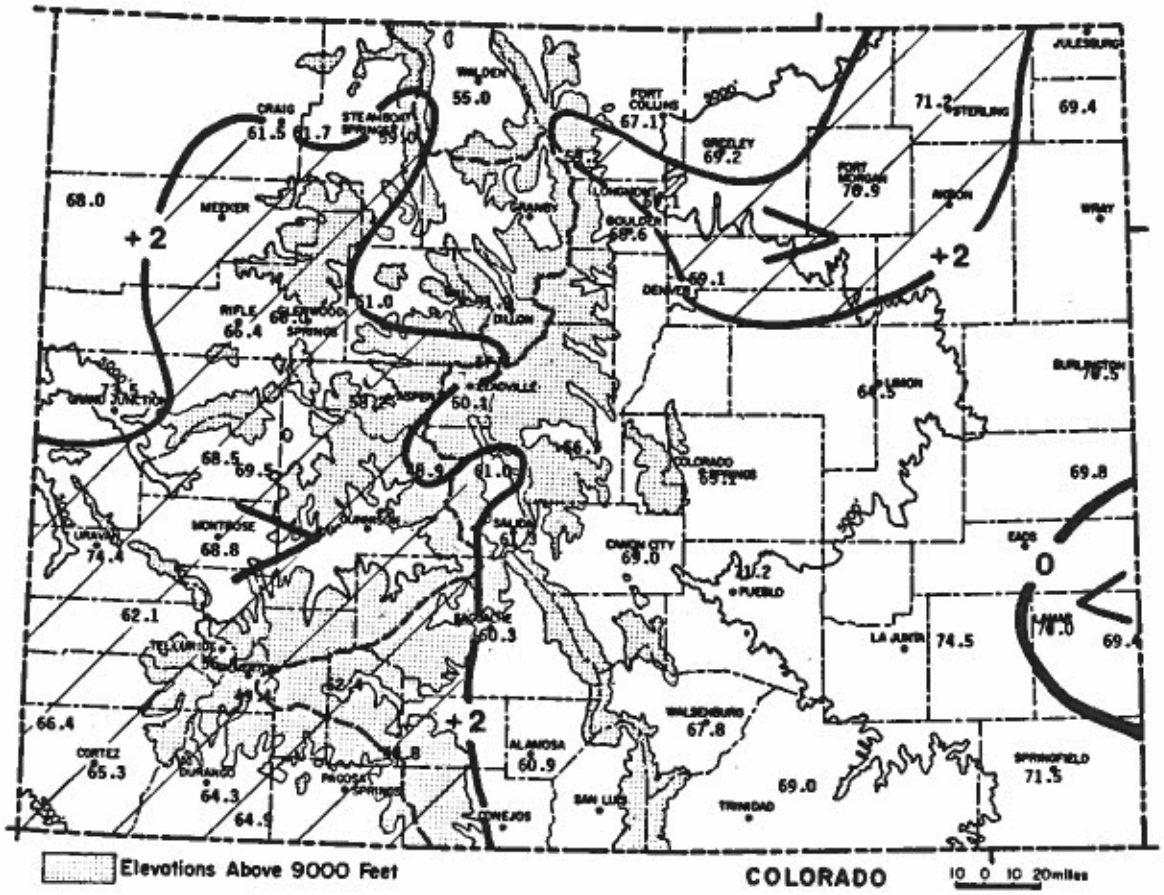
Brown's Park Refuge	5.35"	87%
Monte Vista 1E	5.50"	162%
Blanca	5.72"	140%



Precipitation for October 1986 through June 1987 as a percent of the 1961-1980 average.

JUNE 1987 TEMPERATURES AND DEGREE DAYS

Hot temperatures in June were a long way from the records shown in this month's special feature story. Temperatures were quite warm but pleasant in most areas. Conditions for the month as a whole ranged from near average in the southeast to 3 degrees above average in parts of the Platte Valley and 2 to 4 degrees above average in Western Colorado.



June 1987 temperatures (degrees Fahrenheit) and contours of departures from 1961-1980 averages.

JUNE 1987 SOIL TEMPERATURES

Observerd soil temperatures were very typical for June.

These soil temperature measurements were taken at Colorado State University beneath sparse unirrigated sod with a flat, open exposure. These data are not representative of all Colorado locations.

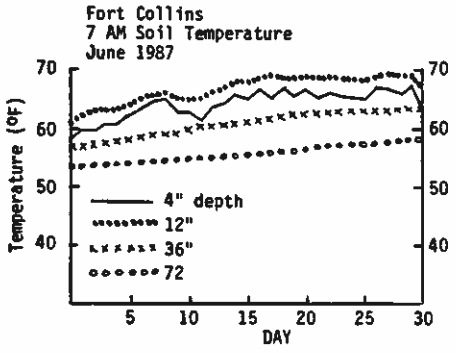


Table 1. Colorado Heating Degree Day Data through June 1987.

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
ALAMOSA	AVE	40	100	303	657	1074	1457	1519	1182	1035	732	453	165	8717
	85-86	30	66	378	634	1045	1472	1231	983	864	638	446	138	7925
	86-87	63	75	366	728	1004	1377	1593	1160	1049	662	436	115	8628
ASPEN	AVE	95	150	348	651	1029	1339	1376	1162	1116	798	524	262	8850
	85-86	119	107	453	656	1066	1278	1175	1029	848	739	530	185	8185
	86-87	147	132	428	735	1009	1307	1398	1063	1067	701	508	202	8697
BOULDER	AVE	0	6	130	357	714	908	1004	804	775	483	220	59	5460
	85-86	0	0	222	400	982	1018	674	762	496	423	249	16	5242
	86-87	1	0	175	450	714	970	947	779	776	375	191	10	5388
BUENA VISTA	AVE	47	116	285	577	936	1184	1218	1025	983	720	459	184	7734
	85-86	63	54	405	597	938	1158	972	946	806	661	450	149	7199
	86-87	79	69	388	730	970	1316	1280	1011	1071	650	433	113	8110
BURLING-TON	AVE	6	5	108	364	762	1017	1110	871	803	459	200	38	5743
	85-86	0	5	206	405	977	1142	740	820	525	386	163	12	5381
	86-87	0	0	76	406	745	984	980	746	816	385	127	10	5275
CANON CITY	AVE	0	9	81	301	639	831	911	734	707	411	179	33	4836
	85-86	0	6	186	397	886	1036	711	756	507	399	248	40	5172
	86-87	4	2	132	422	724	952	976	793	M	M	177	15	4197
COLORADO SPRINGS	AVE	8	25	162	440	819	1042	1122	910	880	564	296	78	6346
	85-86	5	8	253	487	978	1143	822	840	635	487	315	49	6022
	86-87	4	14	174	519	813	1081	1096	888	912	491	271	50	6313
CORTEZ	AVE	0	11	115	434	813	1132	1181	921	828	555	292	68	6350
	85-86		4	264	484	884	1081	978	805	711	572	321	58	6162
	86-87	10	6	214	541	813	1041	1224	888	953	534	302	36	6562
CRAIG	AVE	32	58	275	608	996	1342	1479	1193	1094	687	419	193	8376
	85-86	10	42	353	649	1043	1487	1362	1023	780	669	461	76	7955
	86-87	31	15	338	654	967	1234	1473	1059	1055	589	368	107	7890
DELTA	AVE	0	0	94	394	813	1135	1197	890	753	429	167	31	5903
	85-86	0	M	113	335	658	1026	948	684	530	365	174	6	4839
	86-87	0	0	145	414	M	984	M	764	759	326	154	M	3546
DENVER	AVE	0	0	135	414	789	1004	1101	879	837	528	253	74	6014
	85-86		1	241	435	1051	1094	758	802	548	456	260	22	5668
	86-87	0	0	145	477	775	1045	1012	804	805	392	170	22	5647
DILLON	AVE	273	332	513	806	1167	1435	1516	1305	1296	972	704	435	10754
	85-86	260	300	609	856	1183	1439	1380	1175	1072	915	716	388	10293
	86-87	322	318	580	883	1125	1473	1542	1244	1286	914	667	387	10741
DURANGO	AVE	9	34	193	493	837	1153	1218	958	862	600	366	125	6848
	85-86	3	8	274	476	916	1159	967	802	686	575	341	70	6277
	86-87	23	9	295	559	844	1055	1204	895	906	478	346	36	6650
EAGLE	AVE	33	80	288	626	1026	1407	1448	1148	1014	705	431	171	8377
	85-86	19	52	356	605	995	1352	1324	890	736	598	428	88	7443
	86-87	37		314	658	930	1283	1309	925	927	566	384	111	7444
EVER-GREEN	AVE	59	113	327	621	916	1135	1199	1011	1009	730	489	218	7827
	85-86	62	90	387	651	1039	1119	947	927	770	608	532	157	7289
	86-87	75	90	380	699	927	1186	1178	995	1009	652	442	168	7801
FORT COLLINS	AVE	5	11	171	468	846	1073	1181	930	877	558	281	82	6483
	85-86	1	8	243	499	1078	1199	883	816	568	470	261	22	6048
	86-87	0	0	178	500	809	1091	1042	830	850	413	206	21	5940
FORT MORGAN	AVE	0	6	140	438	867	1156	1283	969	874	516	224	47	6520
	85-86	0	2	239	548	1165	1425	1160	915	616	401	246	19	6736
	86-87	0	4	138	495	874	1193	1148	842	937	443	150	14	6238
GRAND JUNCTION	AVE	0	0	65	325	762	1138	1225	882	716	403	148	19	5683
	85-86	0	0	139	351	779	1018	949	685	489	366	168	3	4947
	86-87	0	0	130	414	718	1001	1159	785	765	314	143	0	5429

M = MISSING DATA

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
GRAND LAKE	AVE	214	264	468	775	1128	1473	1593	1369	1318	951	654	384	10591
	85-86	206	265	513	744	1115	1454	1494	1174	1083	896	651	304	9899
	86-87	245	242	488	777	1051	1450	1612	1265	1265	876	593	M	9864
GREELEY	AVE	0	0	149	450	861	1128	1240	946	856	522	238	52	6442
	85-86	0	6	249	501	1131	1311	1010	845	545	440	232	15	6285
	86-87	0	0	142	484	825	1085	1054	797	844	382	163	13	5789
GUNNISON	AVE	111	188	393	719	1119	1590	1714	1422	1231	816	543	276	10122
	85-86	84	152	433	678	1058	1648	1712	1084	952	711	517	204	9233
	86-87	123	146	420	734	1064	1430	1539	1187	1148	698	M	M	8489
LAS ANIMAS	AVE	0	0	45	296	729	998	1101	820	698	348	102	9	5146
	85-86	0	0	134	313	816	1106	737	715	409	220	77		4527
	86-87	0	0	32	280	668	991	937	685	700	295	65	0	4653
LEAD-VILLE	AVE	272	337	522	817	1173	1435	1473	1318	1320	1038	726	439	10870
	85-86	333	359	666	871	1258	1470	1328	1251	1168	994	760	441	10899
	86-87	372	369	626	920	1188	1482	1510	1276	1349	955	719	440	11206
LIMON	AVE	8	6	144	448	834	1070	1156	960	936	570	299	100	6531
	85-86	1	12	274	544	1078	1233	861	910	662	508	336	57	6476
	86-87	4	8	171	551	873	1190	1132	931	961	513	284	62	6680
LONGMONT	AVE	0	6	162	453	843	1082	1194	938	874	546	256	78	6432
	85-86	0	6	236	486	1095	1228	869	814	549	469	262	20	6034
	86-87		0	154	498	852	1135	1155	848	872	435	165	20	6134
MEEKER	AVE	28	56	261	564	927	1240	1345	1086	998	651	394	164	7714
	85-86	6	31	358	599	967	1249	1164	893	742	646	458	75	7188
	86-87	41	28	402	623	894	1147	1262	957	999	579	376	M	7308
MONTROSE	AVE	0	10	135	437	837	1159	1218	941	818	522	254	69	6400
	85-86	0	0	211	443	803	1106	1032	766	577	453	235	24	5650
	86-87	1	6	183	532	809	1085	1190	876	856	426	233	12	6209
PAGOSA SPRINGS	AVE	82	113	297	608	981	1305	1380	1123	1026	732	487	233	8367
	85-86	34	73	376	600	1000	1373	1191	952	803	668	481	183	7734
	86-87	98	45	385	668	927	1182	1326	1013	1063	648	466	163	7984
PUEBLO	AVE	0	0	89	346	744	998	1091	834	756	421	163	23	5465
	85-86	0	0	172	410	1012	1161	783	728	523	346	167	21	5323
	86-87	0	0	94	428	741	1069	1082	768	756	358	119	10	5425
RIFLE	AVE	6	24	177	499	876	1249	1321	1002	856	555	298	82	6945
	85-86	1	6	232	484	882	1147	1076	769	607	477	287	16	5984
	86-87	1	3	226	499	795	1081	1216	839	826	431	243	27	6187
STEAMBOAT SPRINGS	AVE	113	169	390	704	1101	1476	1541	1277	1184	810	533	297	9595
	85-86	57	130	434	729	1144	1554	1495	1097	915	688	533	185	8961
	86-87	120	119	M	M	M	M	M	M	1059	608	377	171	
STERLING	AVE	0	6	157	462	876	1163	1274	966	896	528	235	51	6614
	85-86	0	6	230	519	1161	1395	1155	990	594	439	279	22	6790
	86-87	0	4	105	427	847	1193	1072	762	974	395	123	15	5917
TELLURIDE	AVE	163	223	396	676	1026	1293	1339	1151	1141	849	589	318	9164
	85-86	121	152	463	648	1023	1270	1130	1011	892	740	585	257	8292
	86-87	200	129	434	716	1018	1297	1304	1091	1156	719	540	250	8854
TRINIDAD	AVE	0	0	86	359	738	973	1051	846	781	468	207	35	5544
	85-86	0	0	175	380	772	1046	738	764	529	365	194	32	4995
	86-87	1	0	90	421	719	1022	998	775	778	400	206	8	5418
WALDEN	AVE	198	285	501	822	1170	1457	1535	1313	1277	915	642	351	10466
	85-86	171	271	578	824	1224	1458	1381	1155	989	836	656	256	9799
	86-87	225	224	530	825	1126	1388	1449	1127	1162	800	576	293	9725
WALSEN-BURG	AVE	0	8	102	370	720	924	989	820	781	501	240	49	5504
	85-86	0	0	165	358	770	982	681	734	515	404	221	42	4872
	86-87	0	0	84	420	682	984	958	796	789	397	207	6	5323

M = MISSING DATA

JUNE 1987 CLIMATIC DATA

Eastern Plains*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
STERLING	87.6	54.9	71.2	3.1	99	46	15	210	588	3.56	0.83	130.4	10
FORT MORGAN	85.4	56.3	70.9	2.5	95	47	14	199	594	2.54	0.52	125.7	6
HOLYOKE	82.6	56.3	69.4	0.4	94	48	17	159	573	3.22	-0.14	95.8	11
BURLINGTON	84.5	56.6	70.5	0.8	95	47	10	183	601	4.30	1.98	185.3	9
LIMON WSMO	78.7	50.4	64.5	0.6	93	41	62	55	458	2.14	0.34	118.9	12
CHEYENNE WELLS	86.7	52.9	69.8	0.3	98	45	14	166	556	4.17	2.02	194.0	8
LAMAR	89.2	56.8	73.0	-0.2	100	47	2	250	627	2.10	-0.22	90.5	10
LAS ANIMAS	91.3	57.6	74.5	1.1	105	45	0	294	653	2.28	0.54	131.0	7
HOLLY	91.8	47.1	69.4	-3.1	103	38	11	153	558	4.40	1.33	143.3	12
SPRINGFIELD 7WSW	87.5	55.6	71.5	1.5	98	43	5	209	613	1.11	-1.00	52.6	9

Foothills/Adjacent Plains*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
FORT COLLINS	81.2	53.0	67.1	1.7	90	44	21	93	519	2.06	0.22	112.0	7
GREELEY UNC	84.7	53.8	69.2	1.4	95	44	13	147	549	1.13	-0.68	62.4	7
ESTES PARK	75.3	43.2	59.2	2.7	84	32	168	0	386	0.70	-1.06	39.8	10
LONGMONT 2ESE	84.6	53.5	69.1	3.1	95	45	20	148	547	2.53	0.53	126.5	6
BOULDER	83.7	53.5	68.6	1.4	92	44	10	124	556	6.04	3.78	267.3	9
DENVER WSFO AP	83.3	55.0	69.1	2.8	93	46	22	153	559	3.50	1.63	187.2	7
EVERGREEN	76.5	41.8	59.1	1.5	85	34	168	2	407	2.69	0.58	127.5	12
LAKE GEORGE 8SW	71.5	42.0	56.7	1.7	79	34	239	0	331	2.40	1.12	187.5	7
COLORADO SPRINGS	78.7	51.5	65.1	-0.1	89	41	50	62	470	2.89	0.57	124.6	11
CANON CITY 2SE	83.9	54.0	69.0	1.3	93	48	15	141	558	1.88	0.58	144.6	7
PUEBLO WSO AP	88.7	53.6	71.2	0.3	98	45	10	203	574	1.29	-0.03	97.7	7
WALSENBURG	84.6	51.1	67.8	1.3	92	41	6	100	540	0.60	-0.62	49.2	4
TRINIDAD FAA AP	84.4	53.6	69.0	0.5	93	47	8	136	559	1.49	-0.04	97.4	8

Mountains/Interior Valleys*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
WALDEN	74.7	35.3	55.0	1.8	81	26	293	0	378	0.24	-0.78	23.5	5
LEADVILLE 2SW	68.7	31.6	50.1	1.7	75	25	440	0	288	0.88	-0.12	88.0	8
SALIDA	79.5	43.0	61.3	0.8	86	31	112	6	451	1.84	0.93	202.2	5
BUENA VISTA	78.3	43.6	61.0	2.3	84	36	113	1	433	0.82	0.01	101.2	6
SAGUACHE	76.8	43.7	60.3	1.9	82	38	136	0	407	0.95	0.38	166.7	6
HERMIT 7ESE	73.4	31.4	52.4	3.0	80	26	371	0	362	0.85	0.13	118.1	2
ALAMOSA WSO AP	80.4	41.5	60.9	1.7	87	34	115	0	463	0.14	-0.58	19.4	3
STEAMBOAT SPRINGS	78.5	39.5	59.0	4.2	86	31	171	0	436	2.33	0.88	160.7	8
DILLON 1E	70.0	33.7	51.9	1.3	78	25	387	0	308	0.81	-0.35	69.8	8
CLIMAX	59.3	35.9	47.6	2.5	65	26	515	0	149	1.29	-0.19	87.2	6
ASPEN 1SW	74.5	41.9	58.2	3.2	82	33	202	0	368	2.66	1.25	188.7	9
TAYLOR PARK	68.4	29.4	48.9	1.9	74	16	475	0	283	1.45	0.39	136.8	8
TELLURIDE	75.7	37.1	56.4	2.3	84	29	250	0	395	1.17	-0.05	95.9	8
PAGOSA SPRINGS	80.7	38.0	59.3	2.2	86	31	163	0	468	1.40	0.63	181.8	5
SILVERTON	70.8	27.9	49.4	1.4	77	21	462	0	320	1.11	-0.14	88.8	6
WOLF CREEK PASS 1	64.4	35.2	49.8	2.4	72	28	450	0	221	2.20	0.56	134.1	9

Western Valleys*

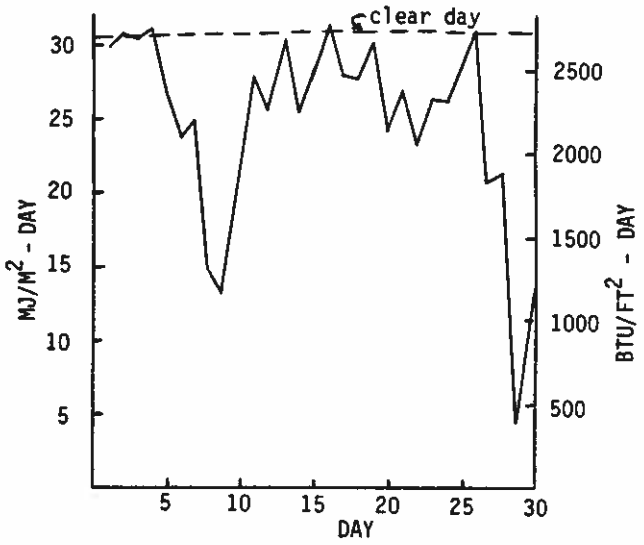
Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
CRAIG 4SW	78.5	44.5	61.5	2.1	88	34	107	12	437	1.18	-0.17	87.4	5
HAYDEN	79.5	43.9	61.7	1.8	86	31	102	12	454	0.34	-0.88	27.9	3
RANGELY 1E	85.1	50.8	68.0	1.9	94	43	0	43	232	0.36	-0.37	49.3	2
EAGLE FAA AP	82.0	40.0	61.0	1.5	88	27	111	0	483	1.31	0.46	154.1	5
GLENWOOD SPRINGS	84.0	48.0	66.0	2.9	91	37	28	62	516	0.46	-0.85	35.1	5
RIFLE	86.0	46.7	66.4	2.8	93	36	27	76	522	0.61	-0.22	73.5	5
GRAND JUNCTION WS	89.2	57.8	73.5	1.5	96	47	0	262	647	0.23	-0.27	46.0	3
CEDAREDGE	85.4	51.5	68.5	3.0	93	40	15	126	547	0.40	-0.33	54.8	4
PAONIA 1SW	87.4	51.7	69.5	4.1	96	43	7	149	564	0.77	-0.03	96.2	3
MONTROSE NO. 2	85.2	52.4	68.8	2.9	91	43	12	133	557	0.95	0.34	155.7	4
URAVAN	92.0	56.9	74.4	4.2	98	44	0	291	654	0.04	-0.38	9.5	3
NORWOOD	79.5	44.6	62.1	2.0	85	31	92	11	456	0.51	-0.35	59.3	4
YELLOW JACKET 2W	83.3	49.4	66.4	3.1	89	40	17	70	517	0.83	0.34	169.4	4
CORTEZ	84.7	45.9	65.3	2.7	91	37	36	52	512	0.40	-0.01	97.6	4
DURANGO	84.6	43.9	64.3	2.9	91	37	36	23	514	1.00	0.43	175.4	6
IGNACIO 1N	87.8	41.9	64.9	3.7	92	33	34	38	449	0.42	-0.11	79.2	4

* Data are received by the Colorado Climate Center for more locations than appear in these tables. Please contact the Colorado Climate Center if additional information is needed.

JUNE 1987 SUNSHINE AND SOLAR RADIATION

Station	Number of Days clear	partly cloudy	cloudy	% of possible sunshine	average % of possible
Colorado Springs	11	12	7	--	--
Denver	12	12	6	69%	71%
Fort Collins	8	18	4	--	--
Grand Junction	17	6	7	85%	79%
Pueblo	17	6	7	77%	79%

Fort Collins
Total Hemispheric Radiation
June 1987



Special Climate Feature -- How Hot Can It Get In Colorado?: continued

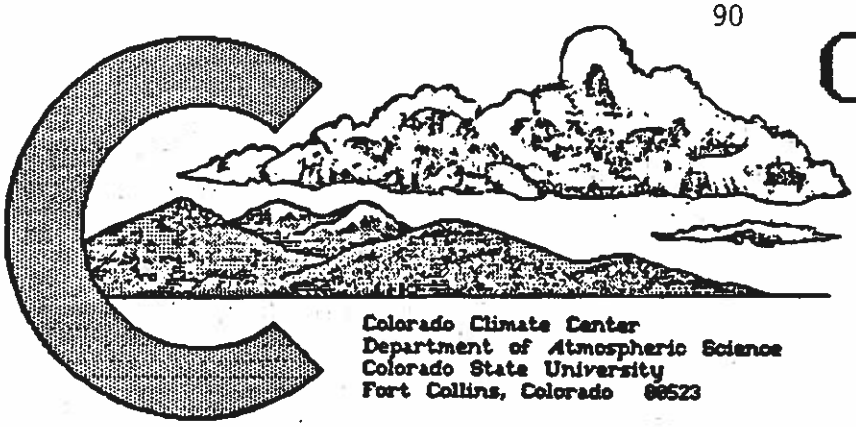
There are a couple of dates that stand out as real record breakers. July 11, 1954 was the hottest day ever recorded in numerous areas of Colorado. June 23rd of the same year wasn't far behind. There wasn't much data back then, but August 1-2, 1902 was a real scorcher in western Colorado and the only time the mercury ever reached 100° in Salida.

There is surprisingly little variation from year to year in the highest temperature recorded at a particular location. Based on 100 years of data in Fort Collins, the highest temperature of the year has ranged from 94° to 98°F, 73% of the years. It has only exceeded 98° 12 years and has failed to reach 94° only 16 years since 1887. Thus, the highest temperature of the year is quite stable and predictable. We will be using extreme annual tempertures to look for possible long term trends and variations in our climate here in Colorado. We should have more to report on this in the months ahead.

Colorado Hot Temperature Analysis

Location	Elevation (feet)	Record Highest Temp (°F)	Date	Length of Record	Average Number of days with Tmax > 90°F
Aspen	7930	94	7/27/1917	1899-1986	< 1
Berthoud Pass	11310	76	7/28/1978	1963-1985	0
Boulder	5420	104	7/11/1954*	1894-1986	34
Burlington	4170	112	6/15/1952	1904-1986	54
Canon City	5340	107	7/11/1954	1889-1986	41
Cheyenne Wells	4250	110	6/18/1936	1890-1986	59
Colorado Springs	6090	101	6/??/1874	1873-1986	18
Del Norte	7880	91	7/07/1951*	1893-1986	< 1
Denver	5280	105	8/??/1878	1873-1986	33
Dillon	9070	89	7/12/1939	1910-1986	0
Durango	6600	99	8/02/1902	1894-1986	18
Eagle	6500	99	6/23/1954	1942-1986	16
Estes Park	7530	98	7/??/1925	1916-1986	< 1
Fort Collins	5000	102	7/11/1954*	1887-1986	21
Glenwood Springs	5820	102	6/23/1954	1902-1986	33
Grand Junction	4850	105	7/10/1976*	1899-1986	63
Greeley	4650	107	7/23/1936	1889-1986	45
Gunnison	7660	99	6/05/1913	1888-1986	1
Lamar	3620	111	7/13/1934	1890-1986	75
Las Animas	3890	114	7/01/1933	1882-1986	88
Leadville	10050	86	6/2ɔ/1954	1931-1986	0
Limon	5560	104	7/11/1954	1931-1986	26
Meeker	6240	103	7/??/1900	1894-1986	11
Montrose	5830	106	8/01/1947	1885-1986	33
Pueblo	4680	106	7/21/1981*	1888-1986	64
Salida	7060	100	8/01/1902	1897-1986	3
Sedgwick	3580	114	7/11/1954	1909-1986	51
Silverton	9320	96	6/26/1929	1906-1986	0
Steamboat Springs	6770	99	7/??/1897	1893-1986	2
Sterling	3940	107	7/10/1976	1910-1986	45
Telluride	8800	96	7/15/1922	1904-1986	0
Trinidad	6030	99	7/12/1971*	1900-1986	18
Wray	3560	112	7/11/1954	1892-1986	65

* and previous occurrences



COLORADO CLIMATE

Colorado Climate Center
Department of Atmospheric Science
Colorado State University
Fort Collins, Colorado 80523

JULY 1987

July in Review:

Thunderstorms in early July produced near to slightly above average monthly precipitation over the northeastern plains of Colorado. Monsoon-related thunderstorms late in the month brought heavier than average rainfall to north central and extreme western portions of the state. The remaining areas were unusually dry. Cool weather in early July compensated for the heat wave later in the month. Eastern Colorado ended up with near average temperatures while the Western Slope was cooler than normal.

A Look Ahead -- September 1987:

Over this century there have been occurrences of horrendous weather in September. Flood-producing heavy rains have occurred in the San Juan mountains such as the September 3-6 storm of 1909 which dropped more than 5" of rain in some areas. Even more rain fell in 1970 on those same dates. Tree-snapping heavy, wet snows such as the Front Range storm of September 17, 1971 have occurred sporadically. Premature cold waves, such as what hit eastern Colorado in late September 1985, have clobbered gardens and tested residents' sense of humor. Fortunately, these events occur infrequently. Under "normal" conditions September is a delightful month with lots of sunshine, not much precipitation, mild temperatures and spectacular scenery.

September marks the end of summer in Colorado. Daylength shortens rapidly -- faster than any other month. Colder temperatures accompany the lengthening periods of darkness, but bright sunshine helps keep daytime temperatures quite warm. Highs in the 70s and 80s are common at elevations below about 7,000 feet with cooler temperatures above. Low elevation nighttime temperatures normally are in the 40s and 50s but occasionally drop into the 30s later in the month. Frost becomes a good possibility in many areas of Colorado by the end of September (see special feature on frost trends in this issue).

September precipitation tends to be an "all or nothing" proposition. Sometimes little or no precipitation occurs but there have also been some extremely wet Septembers. On the average, September precipitation totals about 1.00" to 1.50" across the majority of the state and is surprisingly uniformly distributed. The San Juan mountain area is the region most likely to be wet. Lingering monsoon moisture and an occasional dying hurricane can pump much moisture into the area. Totals for the month average 2" to 4" there but have exceeded 10" in particularly wet years.

Are Our Fall Frosts Coming Earlier:

I almost hate to do this. I seems like an insult to summer to start talking about frost already, but anyone who has lived here in Colorado for more than 3 years knows that about the time we are certain that summer is finally here -- it's over. By the time this story is published, some areas may already have had frost. Maybe we can feel a little better this year since most agricultural areas escaped any damaging late spring freezes, and for once we got a head start on a long growing season.

In recent years there have been several severe September freezes which brought an early demise to garden produce. Any time there are eye-catching anomalies such as that, there is a human tendency to say, "The climate is changing!" Such perceptions are usually based on short-term recollections and may contain little or no factual information.

(continued on last page)

JULY 1987 DAILY WEATHER

Date	Event
1-8	Scattered light thundershowers across the state on the 1st. Then sunny and dry over western Colorado for the rest of the period with warm days but cool nights. Temperatures dropped into the 30s in the mountains (even a few 20s in some mountain valleys). Much more exciting weather east of the mountains with several occurrences of local severe weather. A large tornado was clearly visible from Denver on the 2nd. The Parker area received more than 3" of rain and melted hail later that evening. Several reports of heavy rain and hail again late on the 3rd. Briggsdale measured 1.51" of moisture the following morning. Despite more thunderstorms out on the plains on the 4th of July, most areas had good weather to celebrate with a pleasant evening for fireworks. Thunderstorm activity become more isolated 5-8th but there were more reports of severe weather on the plains 7-8th.
9-10	Hot and dry but with increasing cloudiness on the 10th. Temperatures soared to 108°F at Las Animas on the 10th.
11-12	An unusually cold summer airmass dropped into Colorado from the north. Primarily the northern and eastern portions of the state were affected. Thunderstorms on the 11th gave way to steady cold rain. Snow accumulated in many mountain areas above 11,000 feet, a rare event for mid July. The Research Center near Mount Evans officially measured 3" of snow. Temperatures remained in the 50s during the day on the 12th over much of northeastern Colorado shattering previous records. Significant moisture fell in several areas. Evergreen and Craig both reported a total of 1.00" from the storm.
13-15	Clearing but chilly on the 13th in NE Colorado with some record lows. Akron reported 42°F and it was 47° at Denver. Then sunny and warmer. A few thunderstorms developed over the plains on the 15th.
16-19	A strong winter-like storm system over the Oregon-California-Nevada area affected weather in western Colorado. A wave of thunderstorms on the 17th dropped light to moderate rain over most of the mountains and western valleys. Lemon Dam recorded 1.19" of rain from the storm. Then clearing and delightfully cool. The temperature dropped to 27° at Creede the morning of the 18th. Warm weather continued east to the mountains with just a few thundershowers.
20-24	A heat wave developed as a large high pressure ridge east of Colorado put the state in dry southwesterly winds aloft. Low elevation temperatures were in the 90s and 100s each day with 80s reaching to above 9,000 feet. Pueblo hit 105° on the 23rd. A few thunderstorms developed, mostly on the 22nd and 24th.
25-31	Moist tropical air began moving northward (southwest monsoon) but only affected areas from the mountains westward. A total of 1" to 2" of rain was fairly common in the western quarter of the state. Telluride totalled 2.25" for the period -- one of the wetter locations. Some hail and flood-producing storms were reported. Some of the heavier official 1-day rainfall amounts were 1.14" at Hayden, 1.20" at Winter Park and 1.22" at Pyramid all recorded on the 30th. Meanwhile hot, dry weather continued east of the mountains. Las Animas' 109° reading on the 31st was the state's hottest temperature.

July 1987 Extremes

Highest Temperature	109°F	July 31	Las Animas
Lowest Temperature	22°F	July 5	Silverton
Greatest Total Precipitation	3.62"		Parker 6E
Least Total Precipitation	0.03"		Alamosa NWS
Greatest Total Snowfall*	3"		Mount Evans Research Center

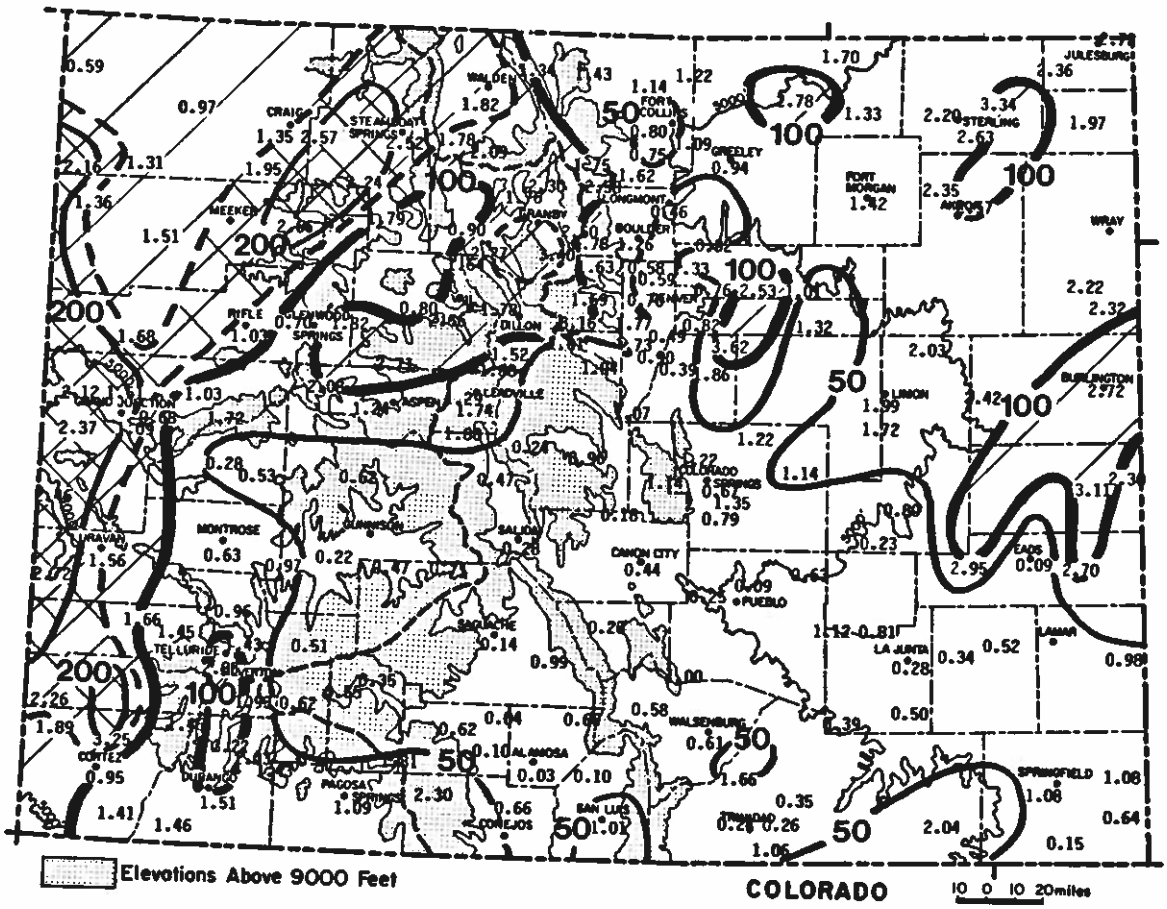
* data derived only from those stations with complete daily snowfall records.

JULY 1987 PRECIPITATION

Drier than average conditions were prevalent across Colorado in July. Large portions of south central and southeastern Colorado received less than half of the July average. At least 20 stations reported less than 25% of average. Less than 0.10" of rainfall was measured in portions of the San Luis Valley and in the Pueblo area.

Locally heavy thunderstorms early in July caused areas of northeastern Colorado to be near or above average for the month. A surge of moisture into western Colorado later in the month produced significantly above average rainfall in extreme western areas and also in some north central counties. Hayden, Grand Junction, Fruita, Gateway and Paradox all had more than double their July average.

Greatest		Least	
Parker	3.62"	Alamosa WSO AP	0.03"
Winter Park	3.40"	Center	0.04"
Fleming 1S	3.34"	Eads	0.09"
Dolores	3.25"	Pueblo WSO AP	0.09"
Pyramid	3.24"	Monte Vista 1E	0.10"



Precipitation amounts (inches) for July 1987 and contours of precipitation as a percent of the 1961-1980 average. The dashed line represents 150% of average.

1987 WATER YEAR PRECIPITATION

Ten months into the 1987 water year, large monthly precipitation anomalies are having little effect on the overall pattern of accumulated precipitation as a percent of average. The driest areas continue to be the northern and central mountain areas while average or above average moisture has fallen over the remainder of the state.

Comparison to Last Year

This year's pattern is much different from last year when nearly all mountain areas were wetter than average and dry conditions were most prevalent east of the mountains.

1987 Water Year to Date through July

Wettest (as % of average)

Wootton Ranch	206%	20.97"
Timpas 13 SW	205%	18.87"
Aguilar 1 SE	189%	19.73"

Driest (as % of average)

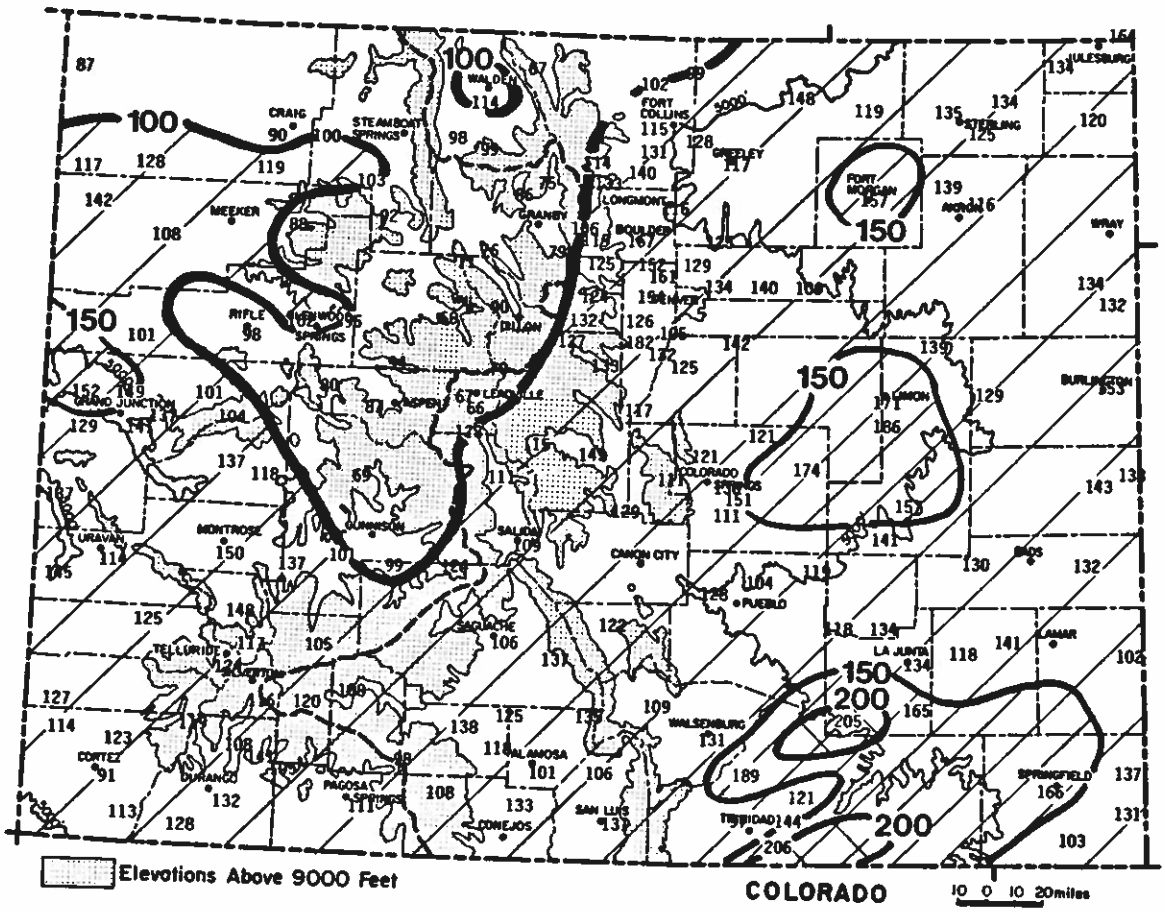
Vail	60%	12.44"
Crested Butte	69%	14.07"
Green Mountain Dam	71%	8.66"

Wettest (total precipitation)

Wolf Creek Pass 1E	34.62"	98%
Mount Evans Research Center	32.37"	124%
Lemon Dam	29.01"	141%

Driest (total precipitation)

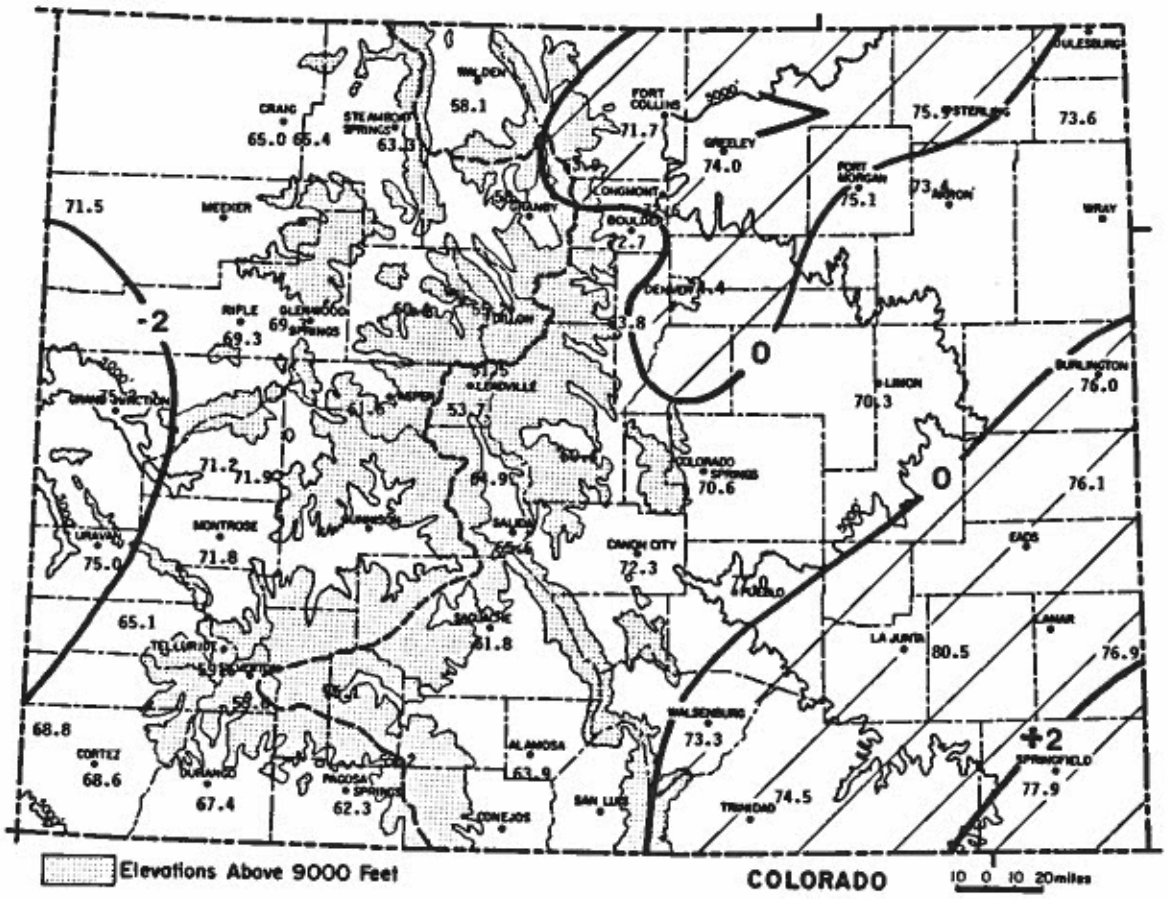
Monte Vista 1E	5.60"	118%
Alamosa WSO	5.76"	101%
Blanca	5.82"	106%



Precipitation for October 1985 through July 1987 as a percent of the 1961-1980 average.

JULY 1987 TEMPERATURES AND DEGREE DAYS

Temperatures were generally near average or slightly above average in eastern Colorado. In the western half of the state readings were mostly one or two degrees cooler than average. This temperature pattern was consistent with the larger scale weather patterns across the U.S. in July. Throughout much of the month, a trough of cooler air aloft lingered over the far western portion of the country while a huge high pressure ridge lay over the eastern U.S. pumping hot air into our nation's midsection.



July 1987 temperatures (degrees Fahrenheit) and contours of departures from 1961-1980 averages.

JULY 1987 SOIL TEMPERATURES

Soil temperatures continued to warm in response to the prolonged late July heat wave.

These soil temperature measurements were taken at Colorado State University beneath sparse unirrigated sod with a flat, open exposure. These data are not representative of all Colorado locations.

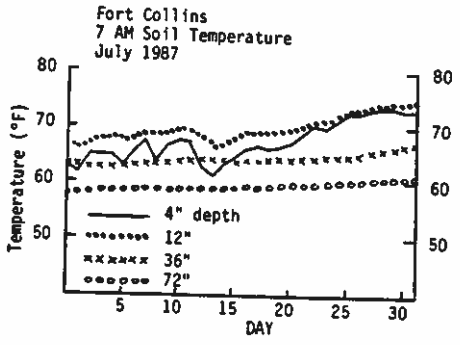


Table 1. Colorado Heating Degree Day Data through July 1987.

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
ALAMOSA	AVE	40	100	303	657	1074	1457	1519	1182	1035	732	453	165	8717
	86-87	63	75	366	728	1004	1377	1593	1160	1049	662	436	115	8628
	87-88	66												66
ASPEN	AVE	95	150	348	651	1029	1339	1376	1162	1116	798	524	262	8850
	86-87	147	132	428	735	1009	1307	1398	1063	1067	701	508	202	8697
	87-88	112												112
BOULDER	AVE	0	6	130	357	714	908	1004	804	775	483	220	59	5460
	86-87	1	0	175	450	714	970	947	779	776	375	191	10	5388
	87-88	7												7
BUENA VISTA	AVE	47	116	285	577	936	1184	1218	1025	983	720	459	184	7734
	86-87	79	69	388	730	970	1316	1280	1011	1071	650	433	113	8110
	87-88	49												49
BURLING-TON	AVE	6	5	108	364	762	1017	1110	871	803	459	200	38	5743
	86-87	0	0	76	406	745	984	980	746	816	385	127	10	5275
	87-88	5												5
CANON CITY	AVE	0	9	81	301	639	831	911	734	707	411	179	33	4836
	86-87	4	2	132	422	724	952	976	793	M	M	177	15	4197
	87-88	11												11
COLORADO SPRINGS	AVE	8	25	162	440	819	1042	1122	910	880	564	296	78	6346
	86-87	4	14	174	519	813	1081	1096	888	912	491	271	50	6313
	87-88	17												17
CORTEZ	AVE	0	11	115	434	813	1132	1181	921*	828	555	292	68	6350
	86-87	10	6	214	541	813	1041	1224	888	953	534	302	36	6562
	87-88	6												6
CRAIG	AVE	32	58	275	608	996	1342	1479	1193	1094	687	419	193	8376
	86-87	31	15	338	654	967	1234	1473	1059	1055	589	368	107	7890
	87-88	55												55
DELTA	AVE	0	0	94	394	813	1135	1197	890	753	429	167	31	5903
	86-87	0	0	145	414	M	984	M	764	759	326	154	5	3551
	87-88													
DENVER	AVE	0	0	135	414	789	1004	1101	879	837	528	253	74	6014
	86-87	0	0	145	477	775	1045	1012	804	805	392	170	22	5647
	87-88	11												11
DILLON	AVE	273	332	513	806	1167	1435	1516	1305	1296	972	704	435	10754
	86-87	322	318	580	883	1125	1473	1542	1244	1286	914	667	387	10741
	87-88	296												296
DURANGO	AVE	9	34	193	493	837	1153	1218	958	862	600	366	125	6848
	86-87	23	9	295	559	844	1055	1204	895	906	478	346	36	6650
	87-88	14												14
EAGLE	AVE	33	80	288	626	1026	1407	1448	1148	1014	705	431	171	8377
	86-87	37		314	658	930	1283	1309	925	927	566	384	111	7444
	87-88													
EVER-GREEN	AVE	59	113	327	621	916	1135	1199	1011	1009	730	489	218	7827
	86-87	75	90	380	699	927	1186	1178	995	1009	652	442	168	7801
	87-88	69												69
FORT COLLINS	AVE	5	11	171	468	846	1073	1181	930	877	558	281	82	6483
	86-87	0	0	178	500	809	1091	1042	830	850	413	206	21	5940
	87-88	12												12
FORT MORGAN	AVE	0	6	140	438	867	1156	1283	969	874	516	224	47	6520
	86-87	0	4	138	495	874	1193	1148	842	937	443	150	14	6238
	87-88	12												12
GRAND JUNCTION	AVE	0	0	65	325	762	1138	1225	882	716	403	148	19	5683
	86-87	0	0	130	414	718	1001	1159	785	765	314	143	0	5429
	87-88	0												0

M = MISSING DATA

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
GRAND LAKE	AVE	214	264	468	775	1128	1473	1593	1369	1318	951	654	384	10591
	86-87	245	242	488	777	1051	1450	1612	1265	1265	876	593	328	10192
	87-88	207												207
GREELEY	AVE	0	0	149	450	861	1128	1240	946	856	522	238	52	6442
	86-87	0	0	142	484	825	1085	1054	797	844	382	163	13	5789
	87-88	10												10
GUNNISON	AVE	111	188	393	719	1119	1590	1714	1422	1231	816	543	276	10122
	86-87	123	146	420	734	1064	1430	1539	1187	1148	698	502	M	8991
	87-88													
LAS ANIMAS	AVE	0	0	45	296	729	998	1101	820	698	348	102	9	5146
	86-87	0	0	32	280	668	991	937	685	700	295	65	0	4653
	87-88	0												0
LEAD-VILLE	AVE	272	337	522	817	1173	1435	1473	1318	1320	1038	726	439	10870
	86-87	372	369	626	920	1188	1482	1510	1276	1349	955	719	440	11206
	87-88	346												346
LIMON	AVE	8	6	144	448	834	1070	1156	960	936	570	299	100	6531
	86-87	4	8	171	551	873	1190	1132	931	961	513	284	62	6680
	87-88	21												21
LONGMONT	AVE	0	6	162	453	843	1082	1194	938	874	546	256	78	6432
	86-87		0	154	498	852	1135	1155	848	872	435	165	20	6134
	87-88	12												12
MEEKER	AVE	28	56	261	564	927	1240	1345	1086	998	651	394	164	7714
	86-87	41	28	402	623	894	1147	1262	957	999	579	376	M	7308
	87-88													0
MONTROSE	AVE	0	10	135	437	837	1159	1218	941	818	522	254	69	6400
	86-87	1	6	183	532	809	1085	1190	876	856	426	233	12	6209
	87-88	5												5
PAGOSA SPRINGS	AVE	82	113	297	608	981	1305	1380	1123	1026	732	487	233	8367
	86-87	98	45	385	668	927	1182	1326	1013	1063	648	466	163	7984
	87-88	104												104
PUEBLO	AVE	0	0	89	346	744	998	1091	834	756	421	163	23	5465
	86-87	0	0	94	428	741	1069	1082	768	756	358	119	10	5425
	87-88	4												4
RIFLE	AVE	6	24	177	499	876	1249	1321	1002	856	555	298	82	6945
	86-87	1	3	226	499	795	1081	1216	839	826	431	243	27	6187
	87-88	9												9
STEAMBOAT SPRINGS	AVE	113	169	390	704	1101	1476	1541	1277	1184	810	533	297	9595
	86-87	120	119	M	M	M	M	M	M	1059	608	377	171	2454
	87-88	77												
STERLING	AVE	0	6	157	462	876	1163	1274	966	896	528	235	51	6614
	86-87	0	4	105	427	847	1193	1072	762	974	395	123	15	5917
	87-88	12												12
TELLURIDE	AVE	163	223	396	676	1026	1293	1339	1151	1141	849	589	318	9164
	86-87	200	129	434	716	1018	1297	1304	1091	1156	719	540	250	8854
	87-88	161												161
TRINIDAD	AVE	0	0	86	359	738	973	1051	846	781	468	207	35	5544
	86-87	1	0	90	421	719	1022	998	775	778	400	206	8	5418
	87-88	4												4
WALDEN	AVE	198	285	501	822	1170	1457	1535	1313	1277	915	642	351	10466
	86-87	225	224	530	825	1126	1388	1449	1127	1162	800	576	293	9725
	87-88	215												215
WALSEN-BURG	AVE	0	8	102	370	720	924	989	820	781	501	240	49	5504
	86-87	0	0	84	420	682	984	958	796	789	397	207	6	5323
	87-88	3												3

M = MISSING DATA

JULY 1987 CLIMATIC DATA

Eastern Plains*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
STERLING	92.8	59.1	75.9	1.2	105	44	12	361	687	2.20	-0.37	85.6	9
FORT MORGAN	90.0	60.3	75.1	-0.1	98	47	12	334	699	1.42	-0.28	83.5	7
AKRON FAA AP	89.5	57.4	73.4	-0.2	99	42	15	285	657	2.35	-0.28	89.4	8
HOLYOKE	87.3	60.0	73.6	-1.4	98	46	16	292	674	1.97	-0.81	70.9	9
BURLINGTON	91.3	60.6	76.0	0.2	100	46	5	352	718	2.72	0.75	138.1	7
LIMON WSMO	86.7	53.9	70.3	-0.4	96	43	21	194	589	1.99	-0.91	68.6	6
CHEYENNE WELLS	92.3	59.9	76.1	0.7	103	45	7	360	707	3.11	0.64	125.9	4
LAS ANIMAS	98.5	62.4	80.5	1.2	109	47	0	488	756	0.34	-1.91	15.1	4
HOLLY	94.5	59.3	76.9	-1.8	104	40	10	384	703	0.98	-1.09	47.3	5
SPRINGFIELD 7WSW	95.3	60.5	77.9	2.6	103	45	2	408	728	1.08	-1.36	44.3	10

Foothills/Adjacent Plains*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
FORT COLLINS	86.9	56.5	71.7	0.2	94	47	12	229	636	0.80	-0.97	45.2	7
GREELEY UNC	90.8	57.3	74.0	0.5	98	48	10	297	660	0.94	-0.27	77.7	5
ESTES PARK	80.1	47.6	63.9	1.6	87	40	67	37	499	1.75	-0.42	80.6	8
LONGMONT 2ESE	90.0	55.3	72.6	0.2	97	46	12	256	627	0.46	-0.60	43.4	3
BOULDER	88.6	56.8	72.7	-0.8	95	44	7	257	658	1.26	-0.63	66.7	10
DENVER WSFO AP	90.2	58.5	74.4	1.1	97	47	11	309	680	0.76	-1.14	40.0	6
EVERGREEN	81.5	46.1	63.8	-0.0	89	35	69	39	495	1.77	-0.48	78.7	6
LAKE GEORGE 8SW	76.1	44.8	60.4	-0.9	84	36	143	9	418	0.96	-1.57	37.9	10
COLORADO SPRINGS	85.9	55.4	70.6	-0.6	95	48	17	199	604	0.67	-2.23	23.1	10
CANON CITY 2SE	88.1	56.5	72.3	-1.3	97	48	11	245	641	0.44	-1.47	23.0	4
PUEBLO WSO AP	95.8	58.2	77.0	-0.2	105	51	4	385	682	0.09	-1.85	4.6	2
WALSENBURG	89.6	56.9	73.3	1.1	96	44	3	266	670	0.61	-1.79	25.4	5
TRINIDAD FAA AP	89.8	59.1	74.5	0.5	98	45	4	306	692	0.35	-1.82	16.1	3

Mountains/Interior Valleys*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
WALDEN	78.1	38.1	58.1	-0.8	91	30	215	6	435	1.82	0.89	195.7	9
LEADVILLE 2SW	72.5	34.8	53.7	-0.8	82	28	346	0	359	1.74	-0.56	75.7	11
SALIDA	84.9	46.3	65.6	-0.1	91	37	34	62	556	0.28	-1.41	16.6	3
BUENA VISTA	83.6	46.1	64.9	-0.0	92	39	49	53	527	0.47	-1.10	29.9	8
SAGUACHE	79.2	44.3	61.8	-2.2	85	37	107	15	463	0.14	-1.47	8.7	2
HERMIT 7ESE	75.8	34.5	55.1	-0.7	85	27	300	0	408	0.55	-1.77	23.7	3
ALAMOSA WSO AP	84.3	43.5	63.9	-1.2	91	35	66	39	536	0.03	-1.31	2.2	2
STEAMBOAT SPRINGS	83.1	43.6	63.3	1.7	93	35	77	35	515	2.52	1.24	196.9	11
GRAND LAKE 6SSW	74.2	42.1	58.1	0.0	82	36	207	0	382	1.76	0.41	130.4	11
DILLON 1E	73.3	37.1	55.2	-1.7	82	28	296	0	369	1.78	0.23	114.8	10
AVON	80.8	40.0	60.4	-3.6	92	26	140	1	479	0.80	-0.50	61.5	7
CLIMAX	63.8	39.3	51.5	-0.2	74	30	412	0	223	1.88	-0.20	90.4	9
ASPEN 1SW	77.6	45.4	61.5	-0.5	86	38	112	9	437	1.24	-0.46	72.9	9
TELLURIDE	77.8	41.4	59.6	-0.4	84	34	161	0	441	2.85	0.43	117.8	10
PAGOSA SPRINGS	83.6	41.1	62.3	-1.8	92	32	104	29	524	1.09	-0.65	62.6	5
SILVERTON	75.0	32.2	53.6	-0.3	85	22	348	0	397	1.93	-0.80	70.7	9
WOLF CREEK PASS 1	67.6	38.8	53.2	0.1	75	33	355	0	281	1.81	-1.42	56.0	9

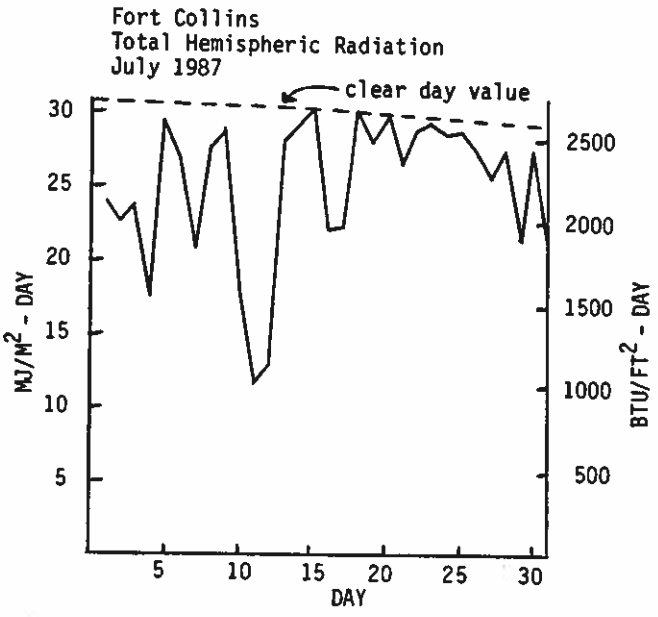
Western Valleys*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
CRAIG 4SW	82.8	47.1	65.0	-1.7	93	34	55	62	518	1.35	0.05	103.8	7
HAYDEN	82.8	48.0	65.4	-1.4	92	41	36	55	527	2.57	1.49	238.0	12
RANGELY 1E	88.0	55.0	71.5	-1.8	98	46	3	211	625	1.36	0.42	144.7	8
GLENWOOD SPRINGS	87.6	51.1	69.3	-0.6	98	46	4	144	584	0.70	-0.57	55.1	1
RIFLE	88.1	50.6	69.3	-1.0	100	43	9	152	568	1.03	0.34	149.3	9
GRAND JUNCTION WS	89.9	60.5	75.2	-3.9	100	54	0	324	701	1.51	0.95	269.6	11
CEDAREDGE	88.4	53.9	71.2	-0.7	98	46	2	201	612	0.28	-0.56	33.3	4
PAONIA 1SW	89.5	54.3	71.9	-0.5	98	48	5	227	619	0.53	-0.60	46.9	5
MONTROSE NO. 2	87.2	56.3	71.8	-0.5	97	49	5	224	642	0.63	-0.25	71.6	6
URAVAN	94.3	55.8	75.0	-2.2	102	47	0	319	653	1.56	0.40	134.5	8
NORWOOD	80.9	49.3	65.1	-1.2	88	40	32	41	490	1.66	-0.10	94.3	7
YELLOW JACKET 2W	84.2	53.4	68.8	-1.8	95	47	7	130	579	1.84	0.54	141.5	7
CORTEZ	86.5	50.6	68.6	-0.2	95	44	6	123	576	0.95	-0.08	92.2	6
DURANGO	87.5	47.3	67.4	-1.4	94	39	14	98	571	1.51	-0.00	100.0	6

* Data are received by the Colorado Climate Center for more locations than appear in these tables. Please contact the Colorado Climate Center if additional information is needed.

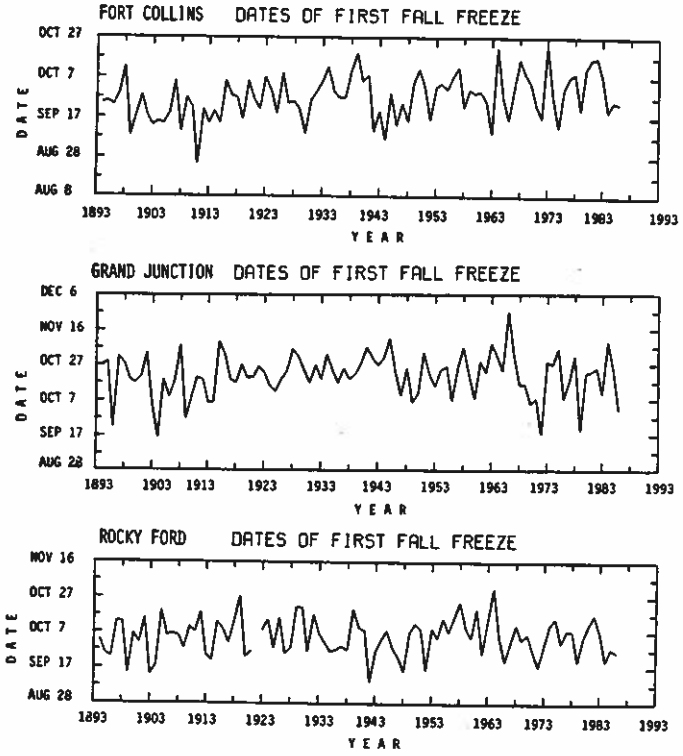
JULY 1987 SUNSHINE AND SOLAR RADIATION

Station	Number of Days clear	partly cloudy	cloudy	% of possible sunshine	average % of possible
Colorado Springs	16	13	2	--	--
Denver	12	16	3	81%	71%
Fort Collins	9	20	2	--	--
Grand Junction	13	11	7	77%	78%
Pueblo	18	12	1	86%	78%



Are Our Fall Frosts Coming Earlier: continued

In an attempt to set the record straight we have examined records of autumn freeze dates at a few locations in Colorado where records have been kept without interruption since the late 1800s. Time series graphs are shown here for 3 locations: Fort Collins, Grand Junction, and Rocky Ford. If freezes are truly coming earlier, we would expect to see a downward slope in the data.

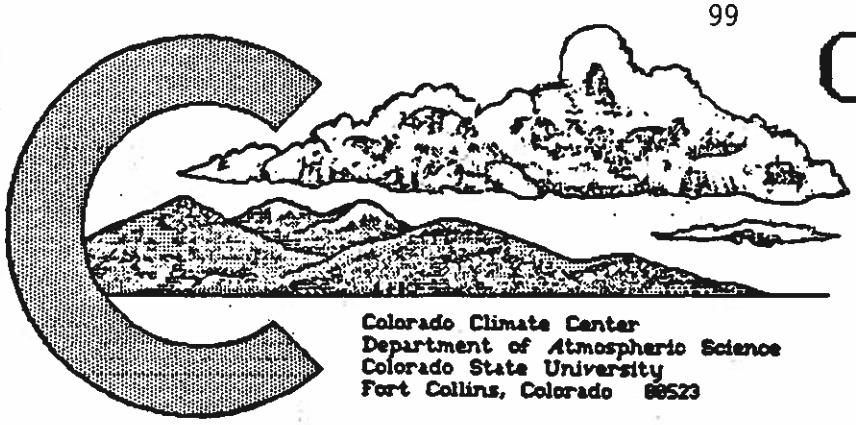


History of occurrences of the first autumn freezes in Colorado (minimum temperature $\leq$ 32°F) 1893-1986.

No sharp trends are observed at any of the sites, but differences between the 3 locations are noticeable. The Fort Collins history suggests a tendency toward later first autumn freezes. At Rocky Ford freezes have been coming a little earlier. At Grand Junction little change is apparent but year to year variability has been much greater in the past 20 years than at any time in the previous half century.

An examination of the first occurrence of temperatures of 28°F or below was then performed to look for consistent patterns. This analysis did produce similar results. During the past 30 years hard freezes in Fort Collins have been occurring 6 to 10 days later than they were earlier in this century. The more rural stations did not exhibit this same behavior. It is possible that changes at Fort Collins are associated with the rapid growth and urbanization around the weather station during the past 3 decades. This effect, known as the "urban heat island" has been well documented for many major cities throughout the world. By causing milder temperatures, urbanization increases the length of the local growing season. In cool climates such as ours, this can be a real boom to gardeners.

In conclusion, it is not apparent from existing information that changes in the climate are occurring which are influencing the length of the growing season in Colorado on a regional scale. If there have been any statewide changes they are still masked in the natural variability that is so much a part of our climate. Local changes are possible, however, such as we showed here for Fort Collins. Changes could be a result of local urbanization and modifications in land use that affect climate on a local scale. But they could also be caused by relocation of weather stations, changing instrumentation or instrument exposure, or changing observing procedures; all of which are unrelated to actual climate change.



COLORADO CLIMATE

Colorado Climate Center
Department of Atmospheric Science
Colorado State University
Fort Collins, Colorado 80523

AUGUST 1987

August in Review:

A week of cool, wet weather late in August caused most of Colorado to end up both cooler and damper than average for the month.

A Look Ahead -- October 1987:

Whether or not you like snow, the chances are good that you will see some in October. In the mountains it is quite common to experience a major snowstorm in mid-month. For hunters the snow may come as either a delight or a detriment, depending on how well prepared they are. By Halloween, even the lower elevations, particularly along the Front Range, are likely to see a wet snow. October starts the new water year, and while we're often not ready for winter, it is reassuring to see next summer's water supply begin to accumulate. As in September, any given October tends to be either dry or wet -- it's rarely average. But just so you know what average is, it is in the range of 0.50"-0.75" across the Eastern Plains, 1" along the Front Range urban corridor and in many western valleys, 1"-2" in the northern and central mountains and 2"-4" in the southwestern mountains. A few intrusions of moist air from tropical storms off the west cost of Mexico have produced very heavy rains in southern Colorado in October.

Temperatures continue to drop throughout the month, but remain quite pleasant at lower elevations. Daytime readings in the 70s are typical early in the month with nighttime readings above freezing. But by mid-October all but the warmest parts of the state (Grand Junction and parts of the Arkansas Valley) have normally had a killing freeze. By the end of the month freezing nighttime temperatures are common statewide and daytime temperatures are normally below 60°F. Mountain temperatures, of course, are colder. Above 11,000 feet, highs by the end of the month may stay in the 30s with lows in the teens or colder.

Despite dropping temperatures and an occasional bout with snowflakes, October weather is often delightful. Light winds, deep blue skies, low humidity and bright sunshine can be invigorating both for work and play.

The Elusive First Snow:

Many a human being in this and other states has been lured to participate in some form of a "First Snowfall" contest. By the time you read this report you've probably already had to make your guess -- and maybe even some snow has fallen. What you read here may not help you win the contest this year, but at least it should help you appreciate how much variability there is from year to year and from place to place in Colorado. This may give you an advantage in later years. The following table shows comparative "first snow" statistics for selected locations in the state. The 50% probability dates correspond closely with the average date of the first snow. This date varies from as early as September 12 up at Berthoud Pass to November 16 at Durango. At any given site, there has been a two to three month difference between the earliest and latest first snow. The latest reported "first snow" occurred at Grand Junction. There, in the winter of 1980-81, the first snow didn't hit until January 5.

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AUGUST 1987 DAILY WEATHER

Date	Event
1-5	Generally hot and dry west of the mountains but scattered showers over and near the higher terrain. East of the mountains, hot weather on the 1st and 2nd was interrupted by an intrusion of damp, cooler air 3-4th. A severe hailstorm struck Cheyenne, Wyoming, on the 3rd. A related storm complex crossed the northeastern plains of Colorado early on the 4th with localized heavy rains, high winds and hail. East of Akron 2.12" of precipitation was reported including 4" of accumulated hail. Storms, some of them severe, developed again in southeast Colorado on the 4th. Hot weather returned statewide on the 5th.
6-11	A Pacific cold front crossed the state bringing cooler but unsettled conditions. An upper air disturbance on the 7th triggered widespread precipitation especially over the western half of the state. Blue Mesa Reservoir reported 1.40" of rain on the 7th and Mesa Verde National Park totalled 1.80". Steady rains diminished but scattered storms developed again on the 8th and 9th. The weather station near Rush reported 2.34" on the 8th. Heavy rains continued early on the 9th in parts of the southern Front Range. Aguilar measured 3.10" of rain from the unusual morning storms. Later on the 9th, the town of Nunn was inundated by a 3.30" rain in less than 2 hours. Temperatures rose again on the 10th and 11th and a few, mostly light, showers developed accompanied by strong, dry winds.
12-13	A cold front pushed southward across the state bringing scattered showers to western Colorado and low clouds and fog east of the mountains. Some heavy thunderstorms developed in southern Colorado. A large hailstorm was reported near Guffey on the 13th. Stations in the Trinidad area received from 1.50" to 2.40" of rain.
14-20	Strengthening winds aloft brought drier air into Colorado. Many areas received no moisture during this period although some showers were observed over northwestern counties 14-16th and northeastern counties 16-17th. Very clear, dry air on the 17th and 18th allowed unusually cold low temperatures to occur in the mountains. On the 18th, many mountain weather stations fell below freezing. The coldest temperature in the state occurred at Hohnholz Ranch on the 18th, a 22°F reading. Then temperatures soared on the 19th and 20th setting some new record highs for the date. Examples included 88° at Evergreen, 98° at Denver and 109° at Las Animas all on the 20th.
21-27	Increasing clouds and showers on the 21st as a cold front approached from the north and monsoon moisture returned to Colorado from the south. Much cooler statewide as low clouds, fog, rain and scattered thunderstorms covered almost the entire state for several days. High temperatures stayed in the 50s in parts of eastern Colorado on the 23rd. Substantial precipitation fell in some areas, especially 22-24th. Westcliffe reported 2.77" on the 22nd. Crestone was clobbered by 1.67" of rain and hail on the 22nd only to get another 1.76" on the 24th. Paradox totalled 2.02" from the storm while Rico and Grant picked up 3.10" and 3.39", respectively. Rains diminished somewhat 25-27th but showers and cool weather persisted. As clouds lifted a dusting of snow was visible in the higher mountains. Pueblo received another 1.14" of rain on the 26th.
28-31	Skies cleared and daytime temperatures began to moderate. Chilly nights continued. Many areas in the mountains dipped well below freezing again. Walden and Marvine Ranch both hit 25° on the morning of the 28th.

August 1987 Extremes

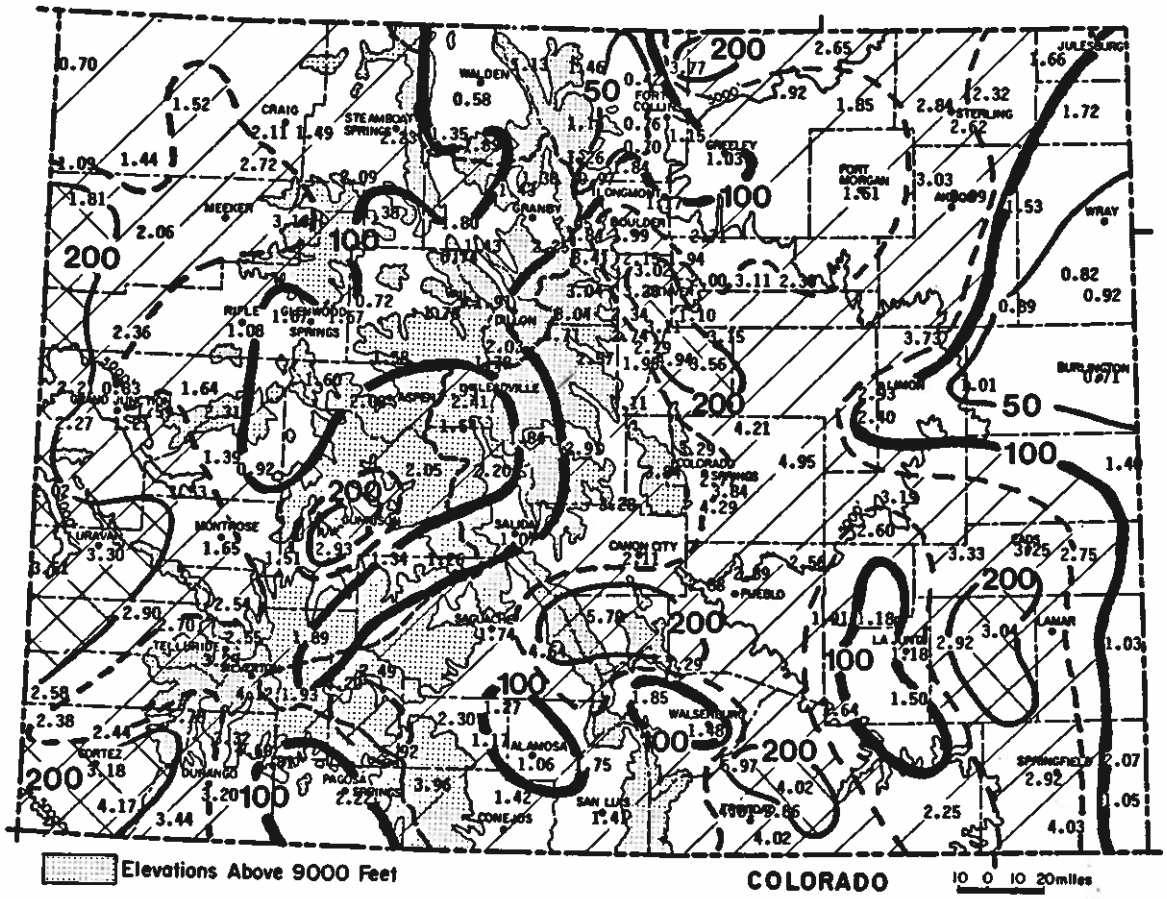
Highest Temperature	109°F	Aug 20	Las Animas
Lowest Temperature	22°F	Aug 18	Hohnholz Ranch
Greatest Total Precipitation	7.29"		Rye
Least Total Precipitation	0.42"		Wellington 5W
Greatest Total Snowfall*	none reported at official stations		

* data derived only from those stations with complete daily snowfall records.

AUGUST 1987 PRECIPITATION

August was wetter than average over large areas of Colorado. About 10% of the reporting stations received more than double the average August rainfall. These wet areas included parts of extreme western Colorado, locations just west and south of Denver, and localized areas in southeastern Colorado. As is normally the case, not everyone was drenched by the late summer rains. Dry areas with less than 80% of average precipitation included the east central plains and a band in central Colorado from the northeast side of the San Juan mountains northward to Vail, Breckenridge, Grand Lake, and much of Larimer and Jackson counties. About 5% of the cooperative weather stations had less than half of their average August moisture.

Greatest		Least	
Rye	7.29"	Wellington 5W	0.42"
Aguilar 1SE	6.97"	Walden	0.58"
Wolf Creek Pass 1E	5.92"	Waterdale	0.70"
Westcliffe	5.79"	Browns Park Refuge	0.70"
Rico	5.78"	Burlington	0.71"



Precipitation amounts (inches) for August 1987 and contours of precipitation as a percent of the 1961-1980 average. The dashed line represents 150% of average.

1987 WATER YEAR PRECIPITATION

With only one month to go in this water year, most of the state remains wetter than average. The persistent dryness over portions of north central Colorado has produced a few spotty water shortages, but for the most part water supplies have remained in good shape.

Comparison to Last Year

This year's moisture anomaly pattern has remained quite different than last year. A year ago the eastern plains were fairly dry with nearly all of western Colorado wetter than average.

1987 Water Year to Date through August

Wettest (as % of average)

Aguilar 1 SE	210%	28.36"
Wootton Ranch	203%	24.99"
Timpas 13 SW	189%	20.51"

Driest (as % of average)

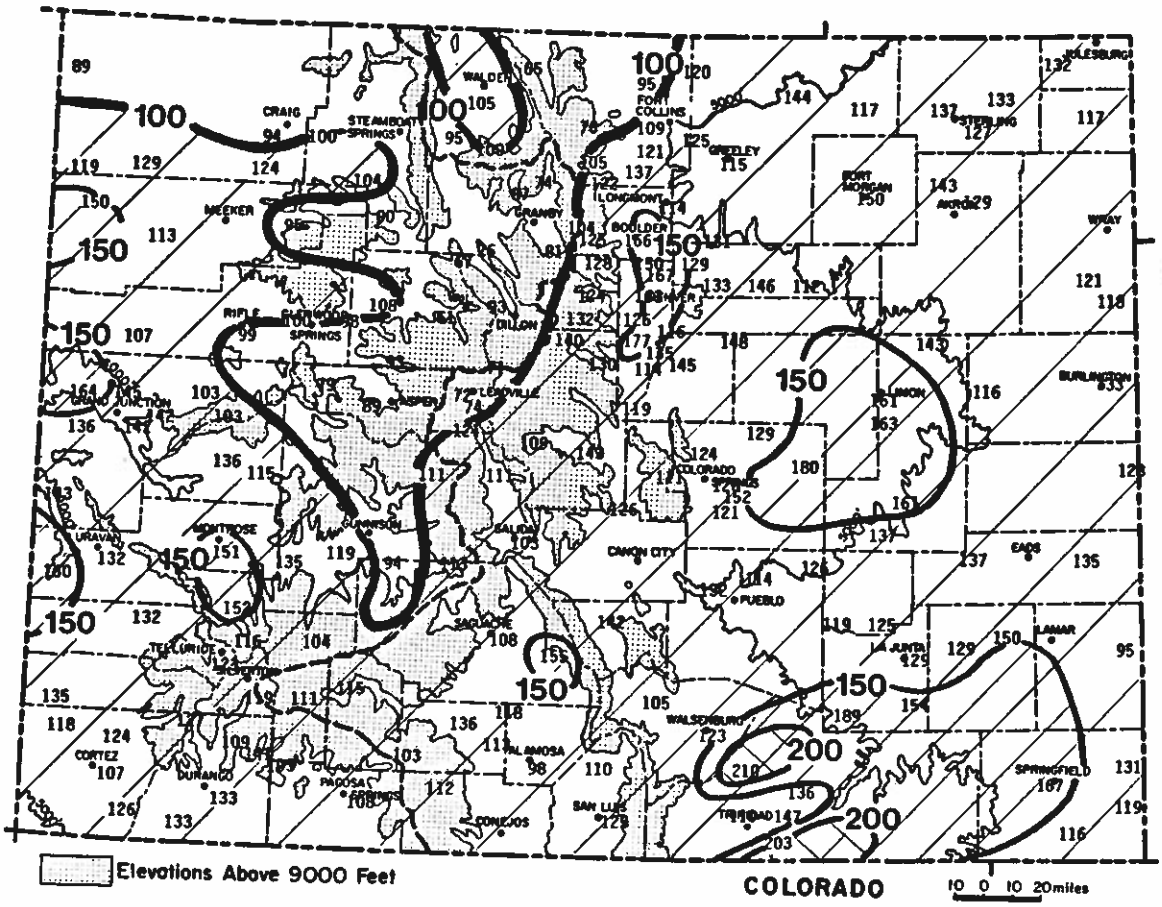
Vail	61%	14.22"
Hohnholz Ranch	65%	10.93"
Green Mountain Dam	67%	13.83"

Wettest (total precipitation)

Wolf Creek Pass 1E	40.54"	103%
Mount Evans Research Center	35.41"	124%
Lemon Dam	33.61"	141%

Driest (total precipitation)

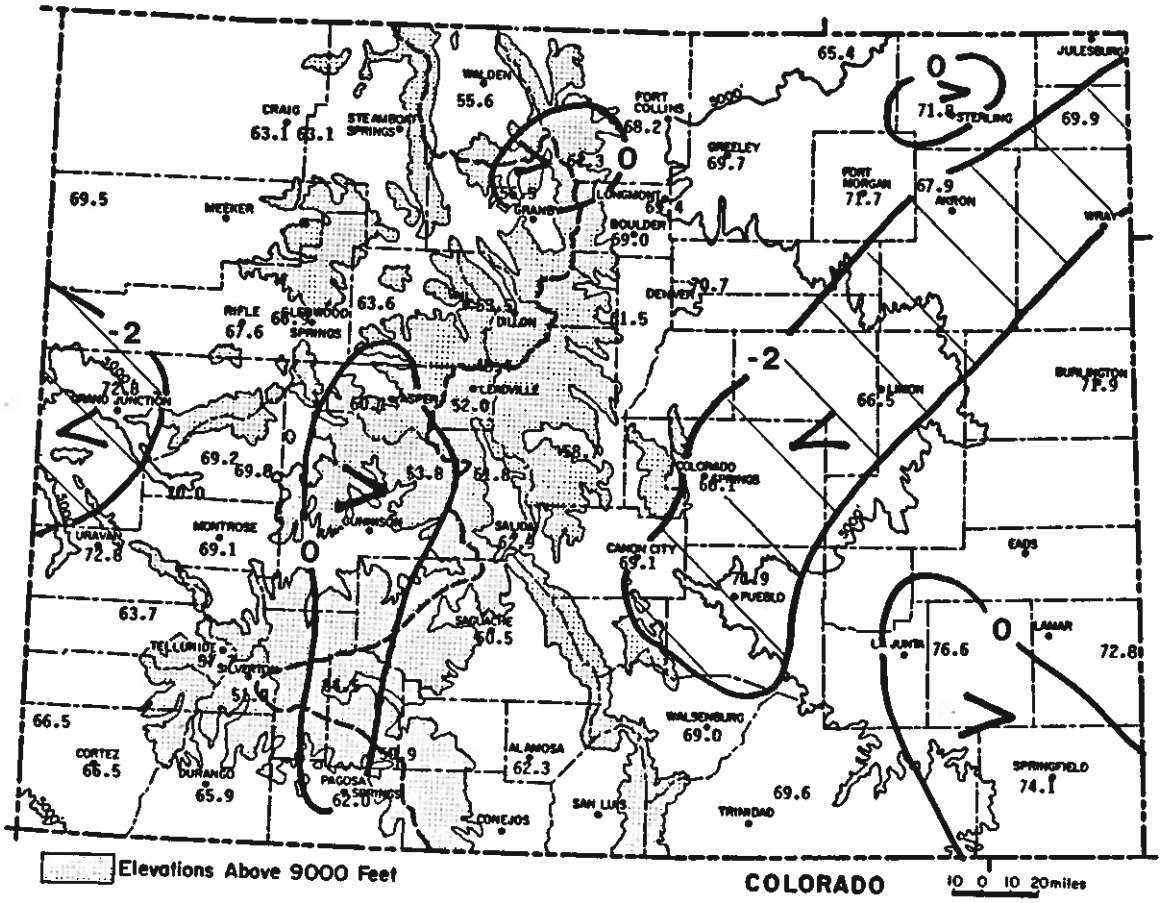
Browns Park Refuge	6.64"	89%
Monte Vista 1E	6.77"	113%
Alamosa	6.82"	98%



Precipitation for October 1986 through August 1987 as a percent of the 1961-1980 average.

AUGUST 1987 TEMPERATURES AND DEGREE DAYS

The period of cool, damp weather on late August had enough influence on the monthly temperatures to produce values 0 to 3 degrees F below average over nearly the entire state. The coolest areas compared to average occurred near Grand Junction and in a band from Pueblo and Colorado Springs northeastward toward Nebraska. In the center of the state temperatures ended up close to normal.



August 1987 temperatures (degrees Fahrenheit) and contours of departures from 1961-1980 averages.

AUGUST 1987 SOIL TEMPERATURES

Near surface soil temperatures reached their peak for the summer in early August. They dropped sharply late in the month and ended up cooler than normal for this time of year. Deep soil temperatures continue close to average.

These soil temperature measurements were taken at Colorado State University beneath sparse unirrigated sod with a flat, open exposure. These data are not representative of all Colorado locations.

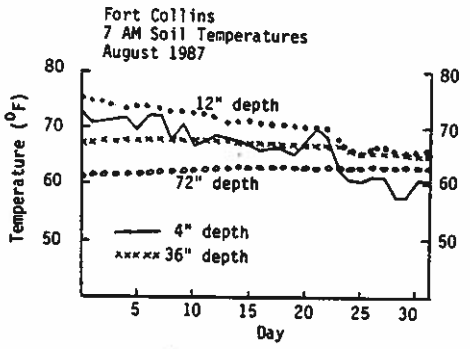


Table 1. Colorado Heating Degree Day Data through August 1987.

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
ALAMOSA	AVE	40	100	303	657	1074	1457	1519	1182	1035	732	453	165	8717
	86-87	63	75	366	728	1004	1377	1593	1160	1049	662	436	115	8628
	87-88	66	96											162
ASPEN	AVE	95	150	348	651	1029	1339	1376	1162	1116	798	524	262	8850
	86-87	147	132	428	735	1009	1307	1398	1063	1067	701	508	202	8697
	87-88	112	152											264
BOULDER	AVE	0	6	130	357	714	908	1004	804	775	483	220	59	5460
	86-87	1	0	175	450	714	970	947	779	776	375	191	10	5388
	87-88	7	33											40
BUENA VISTA	AVE	47	116	285	577	936	1184	1218	1025	983	720	459	184	7734
	86-87	79	69	388	730	970	1316	1280	1011	1071	650	433	113	8110
	87-88	49	117											166
BURLING-TON	AVE	6	5	108	364	762	1017	1110	871	803	459	200	38	5743
	86-87	0	0	76	406	745	984	980	746	816	385	127	10	5275
	87-88	5	20											25
CANON CITY	AVE	0	9	81	301	639	831	911	734	707	411	179	33	4836
	86-87	4	2	132	422	724	952	976	793	M	M	177	15	4197
	87-88	11	36											47
COLORADO SPRINGS	AVE	8	25	162	440	819	1042	1122	910	880	564	296	78	6346
	86-87	4	14	174	519	813	1081	1096	888	912	491	271	50	6313
	87-88	17	74											91
CORTEZ	AVE	0	11	115	434	813	1132	1181	921	828	555	292	68	6350
	86-87	10	6	214	541	813	1041	1224	888	953	534	302	36	6562
	87-88	6	35											41
CRAIG	AVE	32	58	275	608	996	1342	1479	1193	1094	687	419	193	8376
	86-87	31	15	338	654	967	1234	1473	1059	1055	589	368	107	7890
	87-88	55	96											151
DELTA	AVE	0	0	94	394	813	1135	1197	890	753	429	167	31	5903
	86-87	0	0	145	414	M	984	M	764	759	326	154	5	3551
	87-88		11											11
DENVER	AVE	0	0	135	414	789	1004	1101	879	837	528	253	74	6014
	86-87	0	0	145	477	775	1045	1012	804	805	392	170	22	5647
	87-88	11	21											32
DILLON	AVE	273	332	513	806	1167	1435	1516	1305	1296	972	704	435	10754
	86-87	322	318	580	883	1125	1473	1542	1244	1286	914	667	387	10741
	87-88	296	346											642
DURANGO	AVE	9	34	193	493	837	1153	1218	958	862	600	366	125	6848
	86-87	23	9	295	559	844	1055	1204	895	906	478	346	36	6650
	87-88	14	44											58
EAGLE	AVE	33	80	288	626	1026	1407	1448	1148	1014	705	431	171	8377
	86-87	37		314	658	930	1283	1309	925	927	566	384	111	7444
	87-88		75											75
EVER-GREEN	AVE	59	113	327	621	916	1135	1199	1011	1009	730	489	218	7827
	86-87	75	90	380	699	927	1186	1178	995	1009	652	442	168	7801
	87-88	69	118											187
FORT COLLINS	AVE	5	11	171	468	846	1073	1181	930	877	558	281	82	6483
	86-87	0	0	178	500	809	1091	1042	830	850	413	206	21	5940
	87-88	12	37											49
FORT MORGAN	AVE	0	6	140	438	867	1156	1283	969	874	516	224	47	6520
	86-87	0	4	138	495	874	1193	1148	842	937	443	150	14	6238
	87-88	12	29											41
GRAND JUNCTION	AVE	0	0	65	325	762	1138	1225	882	716	403	148	19	5683
	86-87	0	0	130	414	718	1001	1159	785	765	314	143	0	5429
	87-88	0	6											6

M = Missing Data

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
GRAND LAKE	AVE	214	264	468	775	1128	1473	1593	1369	1318	951	654	384	10591
	86-87	245	242	488	777	1051	1450	1612	1265	1265	876	593	328	10192
	87-88	207	257											464
GREELEY	AVE	0	0	149	450	861	1128	1240	946	856	522	238	52	6442
	86-87	0	0	142	484	825	1085	1054	797	844	382	163	13	5789
	87-88	10	26											36
GUNNISON	AVE	111	188	393	719	1119	1590	1714	1422	1231	816	543	276	10122
	86-87	123	146	420	734	1064	1430	1539	1187	1148	698	502	M	8991
	87-88													0
LAS ANIMAS	AVE	0	0	45	296	729	998	1101	820	698	348	102	9	5146
	86-87	0	0	32	280	668	991	937	685	700	295	65	0	4653
	87-88	0	3											3
LEAD-VILLE	AVE	272	337	522	817	1173	1435	1473	1318	1320	1038	726	439	10870
	86-87	372	369	626	920	1188	1482	1510	1276	1349	955	719	440	11206
	87-88	346	393											739
LIMON	AVE	8	6	144	448	834	1070	1156	960	936	570	299	100	6531
	86-87	4	8	171	551	873	1190	1132	931	961	513	284	62	6680
	87-88	21	66											87
LONGMONT	AVE	0	6	162	453	843	1082	1194	938	874	546	256	78	6432
	86-87		0	154	498	852	1135	1155	848	872	435	165	20	6134
	87-88	12	33											45
MEEKER	AVE	28	56	261	564	927	1240	1345	1086	998	651	394	164	7714
	86-87	41	28	402	623	894	1147	1262	957	999	579	376	M	7308
	87-88													0
MONTROSE	AVE	0	10	135	437	837	1159	1218	941	818	522	254	69	6400
	86-87	1	6	183	532	809	1085	1190	876	856	426	233	12	6209
	87-88	5	30											35
PAGOSA SPRINGS	AVE	82	113	297	608	981	1305	1380	1123	1026	732	487	233	8367
	86-87	98	45	385	668	927	1182	1326	1013	1063	648	466	163	7984
	87-88	104	105											209
PUEBLO	AVE	0	0	89	346	744	998	1091	834	756	421	163	23	5465
	86-87	0	0	94	428	741	1069	1082	768	756	358	119	10	5425
	87-88	4	17											21
RIFLE	AVE	6	24	177	499	876	1249	1321	1002	856	555	298	82	6945
	86-87	1	3	226	499	795	1081	1216	839	826	431	243	27	6187
	87-88	9	24											33
STEAMBOAT SPRINGS	AVE	113	169	390	704	1101	1476	1541	1277	1184	810	533	297	9595
	86-87	120	119	M	M	M	M	M	M	1059	608	377	171	2454
	87-88	77												
STERLING	AVE	0	6	157	462	876	1163	1274	966	896	528	235	51	6614
	86-87	0	4	105	427	847	1193	1072	762	974	395	123	15	5917
	87-88	12	31											43
TELLURIDE	AVE	163	223	396	676	1026	1293	1339	1151	1141	849	589	318	9164
	86-87	200	129	434	716	1018	1297	1304	1091	1156	719	540	250	8854
	87-88	161	222											383
TRINIDAD	AVE	0	0	86	359	738	973	1051	846	781	468	207	35	5544
	86-87	1	0	90	421	719	1022	998	775	778	400	206	8	5418
	87-88	4	25											29
WALDEN	AVE	198	285	501	822	1170	1457	1535	1313	1277	915	642	351	10466
	86-87	225	224	530	825	1126	1388	1449	1127	1162	800	576	293	9725
	87-88	215	281											496
WALSEN-BURG	AVE	0	8	102	370	720	924	989	820	781	501	240	49	5504
	86-87	0	0	84	420	682	984	958	796	789	397	207	6	5323
	87-88	3	30											33

M = Missing Data

AUGUST 1987 CLIMATIC DATA

Eastern Plains*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
KAUFFMAN 4SSE	79.8	51.0	65.4	-3.2	98	43	83	103	481	2.65	1.19	181.5	10
STERLING	86.7	56.8	71.8	0.3	105	48	31	249	607	2.84	1.01	155.2	10
FORT MORGAN	85.0	58.5	71.7	-0.2	102	48	29	248	622	1.61	0.11	107.3	8
AKRON FAA AP	80.8	55.1	67.9	-3.2	97	42	56	156	542	3.03	1.25	170.2	10
HOLYOKE	81.9	57.8	69.9	-2.5	100	49	45	201	577	1.72	-0.21	89.1	9
BURLINGTON	85.0	58.7	71.9	-0.8	101	48	20	241	640	0.71	-1.48	32.4	4
LIMON WSMO	79.4	53.6	66.5	-2.0	96	43	66	122	511	2.93	0.48	119.6	15
CHEYENNE WELLS	87.1	58.1	72.6	-0.1	102	46	5	251	652	1.35	-0.57	70.3	9
LAS ANIMAS	92.2	61.0	76.6	0.6	109	48	3	372	717	2.92	1.49	204.2	7
HOLLY	91.5	54.1	72.8	-2.4	107	44	10	259	610	1.03	-0.84	55.1	6
SPRINGFIELD 7WSW	89.1	59.1	74.1	1.3	102	48	11	300	663	2.92	1.24	173.8	11

Foothills/Adjacent Plains*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
FORT COLLINS	81.1	55.3	68.2	-0.5	93	45	37	144	559	0.76	-0.61	55.5	11
GREELEY UNC	84.0	55.4	69.7	-1.2	97	46	26	177	579	1.03	-0.12	89.6	6
ESTES PARK	75.9	46.6	61.3	1.1	85	33	134	24	431	1.26	-0.80	61.2	13
LONGMONT 2ESE	85.0	53.8	69.4	-0.3	102	45	33	175	560	1.17	-0.00	100.0	9
BOULDER	82.9	55.0	69.0	-2.0	95	46	33	162	570	1.99	0.73	157.9	13
DENVER WSFO AP	84.4	56.9	70.7	-0.3	98	50	21	205	600	2.00	0.47	130.7	9
EVERGREEN	77.0	46.0	61.5	0.0	89	36	118	17	434	2.34	0.34	117.0	10
LAKE GEORGE 8SW	72.2	45.3	58.7	-0.1	82	37	191	3	356	2.91	0.72	132.9	14
COLORADO SPRINGS	78.6	53.5	66.1	-2.5	93	44	74	113	501	2.77	-0.04	98.6	15
CANON CITY 2SE	82.4	55.8	69.1	-2.0	94	48	36	172	575	2.11	0.40	123.4	11
PUEBLO WSO AP	87.0	56.9	71.9	-2.3	102	48	17	240	617	2.89	1.09	160.6	14
WALSENBURG	83.4	54.6	69.0	-0.4	93	43	30	162	583	1.48	-0.55	72.9	13
TRINIDAD FAA AP	83.5	55.6	69.6	-1.9	95	45	25	172	582	4.02	2.17	217.3	13

Mountains/Interior Valleys*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
WALDEN	74.8	36.5	55.6	-0.3	83	25	281	0	395	0.58	-0.62	48.3	9
LEADVILLE 2SW	66.8	37.2	52.0	-0.5	76	28	393	0	270	2.41	0.41	120.5	16
SALIDA	79.2	46.6	62.9	-1.1	87	36	85	29	471	1.07	-0.45	70.4	6
BUENA VISTA	77.6	45.9	61.8	-0.3	87	37	117	24	447	2.20	0.22	111.1	9
SAGUACHE	74.8	46.2	60.5	-0.8	84	38	107	9	298	1.74	0.20	113.0	11
HERMIT 7ESE	71.3	37.7	54.5	0.7	80	27	317	0	338	3.20	1.08	150.9	8
ALAMOSA WSO AP	79.3	45.3	62.3	0.0	88	34	96	22	466	1.06	-0.18	85.5	10
GRAND LAKE 6SSW	72.4	40.5	56.5	0.3	85	31	257	0	356	1.43	-0.16	89.9	14
DILLON 1E	69.5	37.6	53.5	-1.2	76	28	346	0	307	1.91	0.27	116.5	16
CLIMAX	58.6	38.1	48.4	-0.9	66	29	508	0	142	1.78	-0.53	77.1	12
ASPEN 1SW	75.0	45.2	60.1	0.6	83	36	152	5	393	2.08	0.18	109.5	11
TAYLOR PARK	68.0	39.5	53.8	2.4	76	32	341	0	289	2.05	0.20	110.8	10
TELLURIDE	73.1	42.2	57.7	-0.2	82	32	222	0	365	3.25	0.55	120.4	12
PAGOSA SPRINGS	80.4	43.6	62.0	0.1	88	33	105	20	479	2.22	-0.27	89.2	9
SILVERTON	69.9	33.9	51.9	-0.6	79	23	397	0	314	4.12	1.14	138.3	19
WOLF CREEK PASS 1	64.3	37.5	50.9	-0.3	74	31	432	0	229	5.92	2.00	151.0	16

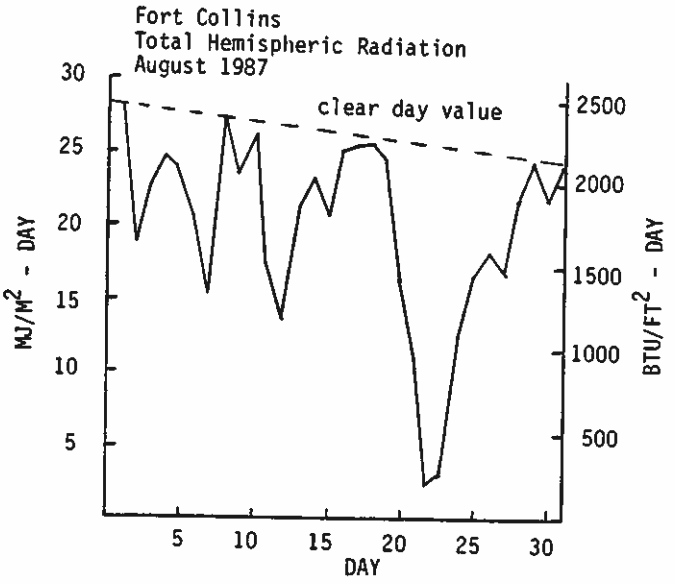
Western Valleys*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
CRAIG 4SW	79.5	46.6	63.1	-1.8	90	39	96	45	465	2.11	0.51	131.9	12
HAYDEN	80.0	46.2	63.1	-1.1	89	35	77	27	478	1.49	-0.00	100.0	10
RANGELY 1E	85.8	53.1	69.5	-0.5	94	45	11	158	591	1.81	1.00	223.5	7
EAGLE FAA AP	81.5	45.6	63.6	-0.2	90	35	75	37	502	0.72	-0.16	81.8	8
GLENWOOD SPRINGS	83.1	50.7	66.9	-0.4	92	42	32	101	541	1.07	-0.26	80.5	7
RIFLE	85.4	49.7	67.6	-0.4	95	41	24	113	552	1.08	0.04	103.8	6
GRAND JUNCTION WS	86.8	58.9	72.8	-3.2	98	49	6	256	663	0.83	0.07	109.2	7
CEDAREDGE	85.5	52.8	69.2	-0.2	94	40	22	160	591	1.39	0.32	129.9	5
PAONIA 1SW	85.5	54.1	69.8	-0.1	97	46	16	170	590	0.92	-0.30	75.4	9
DELTA	88.5	51.5	70.0	-1.0	97	43	11	175	585	1.53	0.67	177.9	9
MONTROSE NO. 2	83.5	54.7	69.1	-0.5	93	44	30	163	583	1.65	0.61	158.7	10
URAVAN	89.0	56.6	72.8	-1.8	99	48	7	256	637	3.30	2.11	277.3	9
NORWOOD	78.2	49.2	63.7	-0.3	86	38	71	37	473	2.90	1.27	177.9	7
YELLOW JACKET 2W	80.6	52.5	66.5	-1.3	89	43	35	92	529	2.38	0.68	140.0	6
CORTEZ	82.6	50.5	66.5	-0.9	91	41	35	89	539	3.18	1.83	235.6	9
DURANGO	82.8	49.0	65.9	-0.2	92	39	44	76	532	3.20	0.89	138.5	9

* Data are received by the Colorado Climate Center for more locations than appear in these tables. Please contact the Colorado Climate Center if additional information is needed.

AUGUST 1987 SUNSHINE AND SOLAR RADIATION

Station	Number of Days clear	partly cloudy	cloudy	% of possible sunshine	average % of possible
Colorado Springs	10	7	14	--	--
Denver	11	6	14	73%	73%
Fort Collins	8	13	10	--	--
Grand Junction	16	6	9	75%	76%
Pueblo	14	7	10	69%	78%

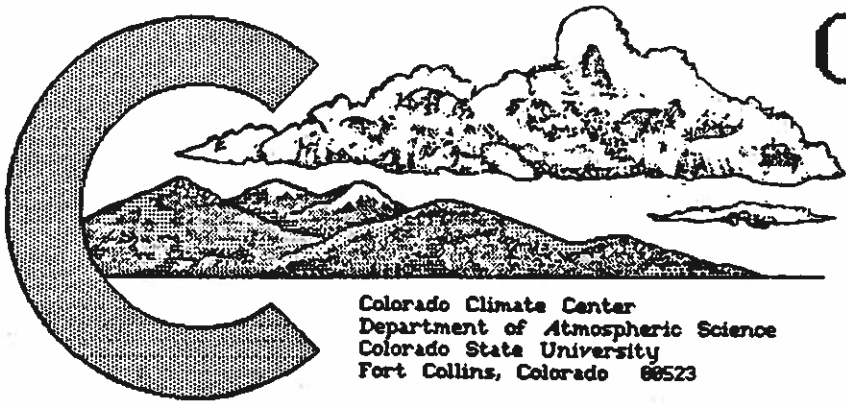


The Elusive First Snow: continued

First Measurable (≥ 0.1") Snow Statistics for Colorado
(based on 1951-1986 data)

Station	Elevation (feet)	Earliest First Snow	Probability that the first snow will occur on or before this date 20%	50%	80%	Latest First Snow
Akron	4,663	9/17	10/7	10/24	11/7	12/12
Alamosa	7,536	9/3	10/11	10/27	11/3	11/20
Berthoud Pass	11,314	8/15	8/27	9/12	9/22	10/21
Boulder	5,420	9/12	9/29	10/24	10/31	11/26
Climax	11,300	8/12	9/4	9/22	9/29	10/20
Colorado Springs	6,090	9/3	9/28	10/23	10/31	11/18
Crested Butte	8,860	9/3	9/25	10/14	10/25	11/29
Denver	5,286	9/3	9/25	10/22	10/28	11/14
Dillon	9,065	9/3	9/22	10/3	10/20	11/15
Durango	6,600	10/12	10/29	11/16	11/25	12/31
Eagle	6,497	9/2	10/8	10/28	11/13	11/29
Fort Collins	5,004	9/12	10/11	10/27	11/16	12/13
Grand Junction	4,849	9/18	10/24	11/13	11/19	1/5
Lamar	3,620	9/28	10/29	11/14	12/5	12/26
Limon	5,562	9/21	10/8	10/26	11/2	12/14
Meeker	6,347	9/2	10/8	10/26	11/11	12/19
Pueblo	4,640	9/17	10/24	11/8	11/18	12/10
Springfield	4,580	9/17	10/21	11/2	11/14	12/27
Steamboat Springs	6,770	9/2	9/26	10/13	10/25	11/18
Telluride	8,800	9/3	9/24	10/14	10/25	11/13
Trinidad	5,746	9/17	10/11	10/29	11/11	12/13

Does the date of the first snow mean anything? Not really. There is no significant correlation with the date of the first snow and the severity of the winter that follows. Furthermore, the first snow is usually not a trouble-maker in terms of disrupting normal activities. There have been some exceptions, such as the huge Front Range snow of September 17, 1971. But for the most part, the first snow usually comes in the evening and is gone the next morning causing no harm enroute. So why does the first snow raise such a ruckus? It's understandably a special event for skiers and little kids, but for the rest of us it seems to trigger some instinctive response way down inside that helps us psychologically get ready for winter. That's not such a bad thing.



COLORADO CLIMATE

Colorado Climate Center
Department of Atmospheric Science
Colorado State University
Fort Collins, Colorado 80523

SEPTEMBER 1987

September in Review:

Sunshine was plentiful but precipitation was scant during September. Except for a few areas on the Eastern Plains, most of Colorado was much drier than average. Along with the dry weather came warmer than average days but cool, crisp nights. Temperatures for the month ended up near average. There were no widespread early freezes in sensitive agricultural areas.

A Look Ahead -- November 1987:

The climate in Colorado in November tends to divide the population into two groups: those who like it and those who don't. The group that seems to like November's climate is composed primarily of skiers, other winter sports enthusiasts and indoor hobbiests. These folks don't seem to mind the long nights, dropping temperatures, increased storminess, and reports of deepening snowpack in the mountains. Then there is the other group -- those who get depressed realizing that indeed winter has arrived and is likely going to stick around for many months. These people don't appreciate the early sunsets, plummetting temperatures, thickening pollution and occasional icy roads.

Compared to other months of the year here in Colorado, November doesn't have too many comforts to offer. Temperatures fall off more rapidly than during any other time of year. Air pollution problems develop in some mountain valleys and over some of the Front Range cities. The strengthening jet stream brings an increase in clouds and moisture to the mountains and western valleys. At the same time, dry weather with occasional episodes of strong, gusty winds becomes prevalent east of the Continental Divide. The likelihood for snow increases in all parts of the state but especially the mountains. However, there is no guarantee that ski areas will have tons of natural snow by the Thanksgiving weekend. Skiers have been spoiled in recent years by heavy early season snows. But long term records show that mountain snows often don't really begin to pile up until a little later in the winter. The general precipitation pattern in a typical November (if there is such a thing) brings 2 to 4" of liquid water to the higher mountain areas. Moisture decreases to 1 to 2" in most areas west of the Divide. On the east side, most areas receive less than 1" with the driest area of the state being the southeastern plains. Throughout the state, most November precipitation falls as snow.

November temperatures do tend to drop steadily throughout the month, but they really aren't too cold. Highs are still in the 50s at lower elevations early in the month with usually a few days up in the 60s and 70s. But by the end of the month 30s and 40s are more common. Nighttime lows typically start in the 20s but drop to the teens. Colder temperatures are expected for most mountain areas. Subzero readings become fairly likely in many mountain valleys by the end of the month. Extreme cold is also a possibility east of the mountains, but only about one year in three brings subzero cold to the Eastern Plains.

1987 Water Year Wrap-Up:

(Special Feature)

See pages 4 and 5 for a summary of Colorado's climate for the water year, October 1, 1986 - September 30, 1987.

This report has been prepared each month since January 1977 with the support of the Colorado Agricultural Experiment Station and the College of Engineering.

SEPTEMBER 1987 DAILY WEATHER

Date	Event
1-3	Warm and dry summer weather continued as high pressure dominated the region. The hottest temperatures of the month were observed with most low elevation areas in the 80s and 90s. Holly claimed the high for the state with 100°F on the 3rd. Mostly light thundershowers developed each day over and near the mountains although the Sugarloaf weather station near Leadville did report 0.72" of rain from a storm on the 1st. Some local damage from wind gusts were reported on the 2nd along the Front Range.
4-8	Smoke from California-Oregon forest fires visible across Colorado. Some light precipitation on the 4th, especially in and near the mountains, as a cold front passed the state. Akron had one of the heaviest rainfall totals with 0.64". Cooler 5-6th as a weak low pressure trough aloft crossed the Rockies. Some scattered thundershower activity was reported mostly east of the mountains. Another cold front crossed the state on the 7th. Showers and thunderstorms developed, heaviest over southeastern Colorado late on the 7th. A number of locations reported at least an inch of rain including Eads (1.05") and Walsh (1.55"). Generally dry and mild on the 8th.
9-12	Northwesterly flow aloft over Colorado. Dry and seasonally warm in western parts of the state, but cool and a bit unsettled east of the mountains with some scattered showers and thundershowers each day. Rainfall was mostly light except in southeastern areas where several stations reported at least 0.50" for the period. Stonington, in the extreme southeast, received 1.18" on the 12th.
13-17	An upper level disturbance over southern California drifted slowly across Colorado. Showers developed on the 13th in western Colorado while eastern parts of the state enjoyed a warm, summer day. Rains spread northeastward on the 14th and 15th and turned to snow in the higher mountains. Despite copious moisture from a decayed hurricane, precipitation was quite light. Modest rains of a quarter inch or greater were limited to the mountains and the Front Range. Brief clearing and then increasing clouds and light showers again on the 16th in advance of a fairly strong Pacific cold front. While western Colorado barely noticed a change, northeastern Colorado was socked in by fog, low clouds and chilling temperatures on the 17th. As the front slowed, large thundershowers developed in southeast Colorado. A storm near Campo dropped 1.38" of rain and melted hail.
18-21	Clear statewide with mild days but cold nights. The first freeze of the fall was observed the morning of the 18th in portions of northeast Colorado, while temperatures in the mountains dipped into the upper teens and lower 20s.
22-26	Warm statewide with highs in the 80s at low elevations. Increased clouds 25-26th with some showers mostly in southern Colorado as a weak upper level disturbance passed south of the state.
27-30	A few light showers on the 27th as a rapid moving Pacific cold front crossed the state. Then clear and seasonally cool on the last 3 days of the month with some local frost in the low spots at lower elevations. Nighttime temperatures in the mountains were quite cold with many locations in the teens. Hohnholz Ranch on the Laramie River had the coldest readings in the state with 11 degrees on the 28th and 29th.

September 1987 Extremes

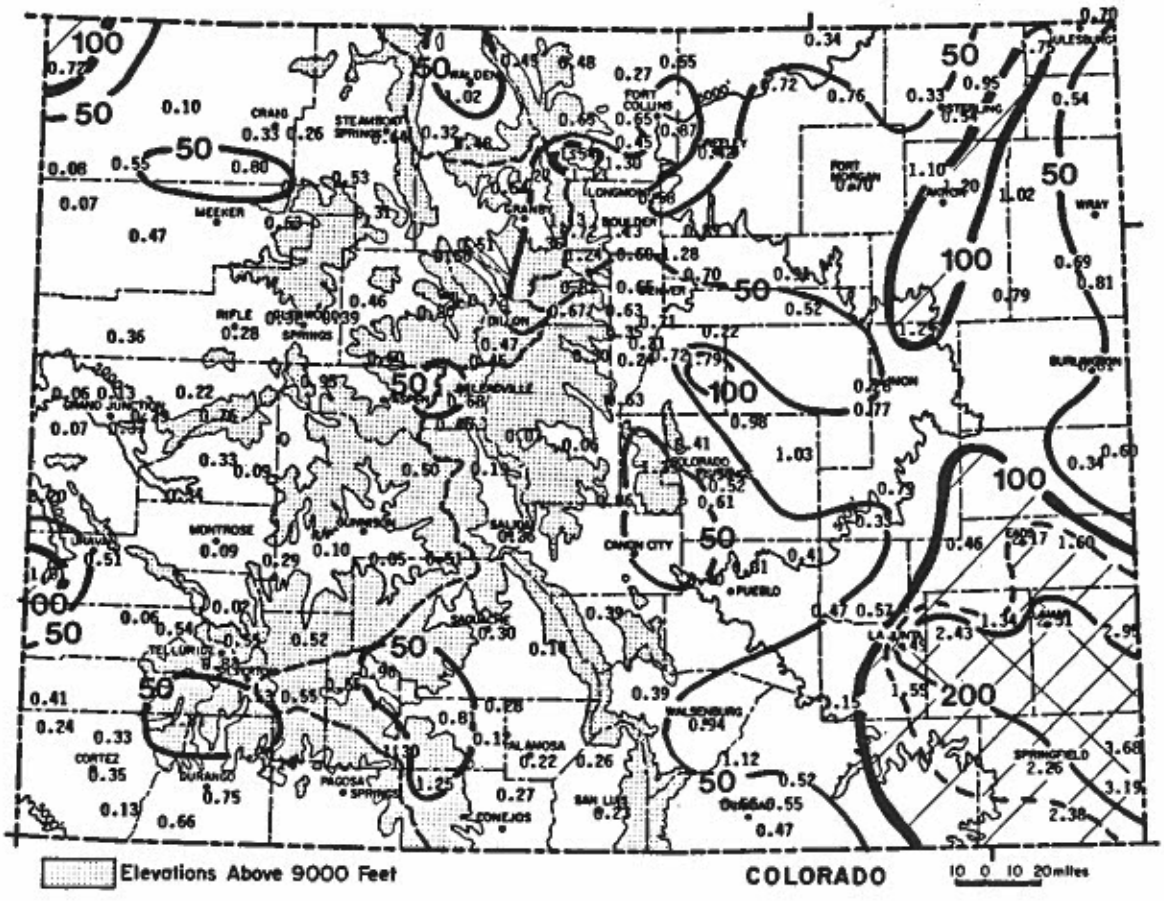
Highest Temperature	100°F	Sept 3	Holly
Lowest Temperature	11°F	Sept 28, 29	Hohnholz Ranch
Greatest Total Precipitation	3.68"		Walsh 1W
Least Total Precipitation	0.02"		Ridgway
Greatest Total Snowfall*	1.5"		Mount Evans Research Center

* data derived only from those stations with complete daily snowfall records.

SEPTEMBER 1987 PRECIPITATION

Despite frequent shower activity in the first half of September, precipitation totals were very low. Nearly all of Colorado ended up much drier than average. The western half of the state, including the mountains, was driest with most areas below 50% of their September average. At least 10 stations reported less than 10% of average. Moisture was a little more abundant east of the mountains with most areas reporting 40 to 80% of average. Above average rainfall was limited to the southeastern plains and a narrow strip in northeast Colorado from Sedgwick south through Akron to Shaw. A number of locations in the southeast had more than double their average rainfall with almost all the rain falling from storms on three days: the 7th, 11th and 17th.

Greatest		Least	
Walsh 1W	3.68"	Ridgway	0.02"
Stonington	3.19"	Antero Reservoir	0.03"
Holly	2.95"	Cochetopa Creek	0.05"
Lamar	2.51"	Norwood	0.06"
La Junta 1S	2.49"	Fruita	0.06"
Las Animas	2.43"	Lake George 8SW	0.06"



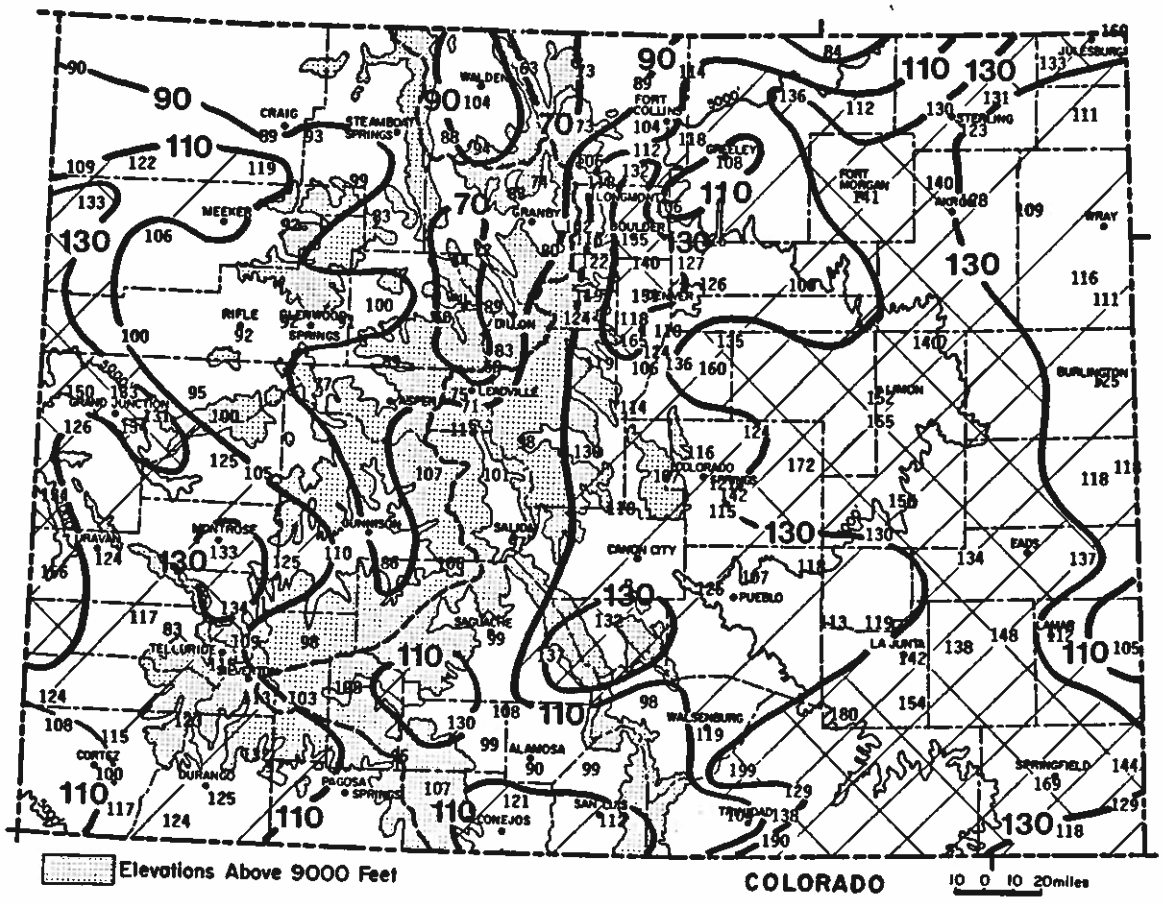
Precipitation amounts (inches) for September 1987 and contours of precipitation as a percent of the 1961-1980 average. The dashed line represents 150% of average.

1987 WATER YEAR WRAP-UP

For Colorado as a whole, the 1987 water year was again wetter than average making this the 6th consecutive wet year (and 8 years out of the past 9) for the state. However, for the first time since 1981, substantial portions of the mountains were drier than average. In fact, in a few locations such as Vail, Climax and Grand Lake, precipitation was much below average -- 75% of average or less. Precipitation in these areas was quite similar to what fell during the infamous drought year of 1977. Fortunately, with excellent reservoir storage from previous wet years, most water districts came through the year in good shape. From a broader perspective, Colorado was the dividing line in the western U.S. between an emerging serious drought situation north and west of us to abundant water supplies to our south.

The wettest portions of Colorado, compared to average, were western fringes of the state (including Grand Junction, Fruita, Rangely and Paradox), a band along the eastern foothills from near Loveland southward to the Conifer vicinity, and substantial areas of the eastern plains. There were at least 15 official weather stations which received 150% or more of their average annual precipitation. This extra moisture, along with mild temperatures and a long growing season, was very helpful in producing excellent crop yields in many agricultural areas. In parts of southeastern Colorado, including much of Otero, Baca, Bent and Las Animas counties, this was the wettest water year in about 2 decades. The Springfield 7WSW weather station totalled 25.20", more than 10" above average and the greatest in the 30 year history of the station (eclipsing their previous record of 21.68" set in the 1965 water year).

The precipitation pattern during the 1987 growing season (May through September) indicated above average rainfall over most areas east of the mountains and also on the Western Slope. The wettest portions of the state, compared to average, with at least 150% of their summer average, included a small area in extreme west central Colorado, an area south of Limon on the eastern plains, and portions of Las Animas

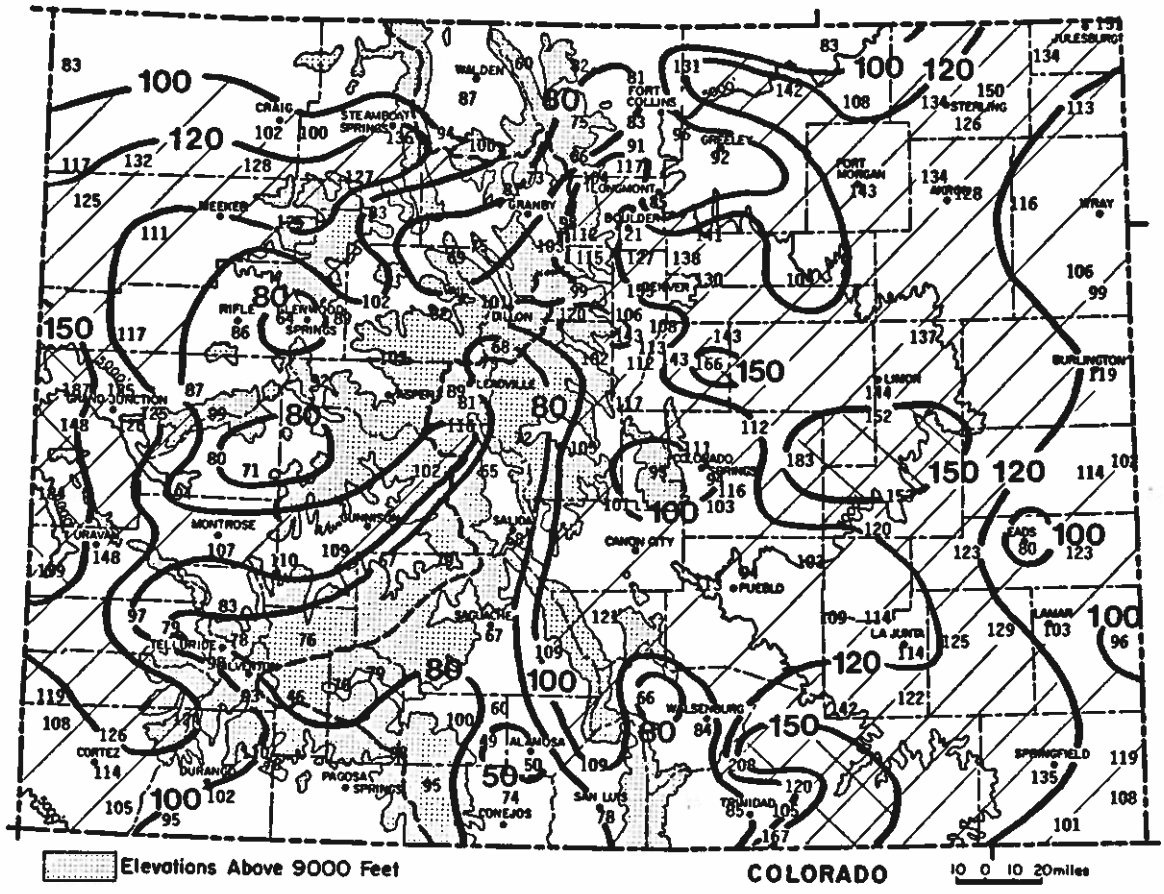


Precipitation for Water Year (October 1986 through September 1987) as a percent of the 1961-1980 average.

1987 Water Year Wrap-Up (continued)

county. The weather station near Aguilar totalled 18.47" for the summer, the wettest in the state. Meanwhile, most areas in or near the mountains were drier than average. Significant portions of the mountains received less than 80% of the summer average. By far the driest area in the state was the center of the San Luis Valley. Monte Vista, for example, received just 2.19" for the period, 49% of average.

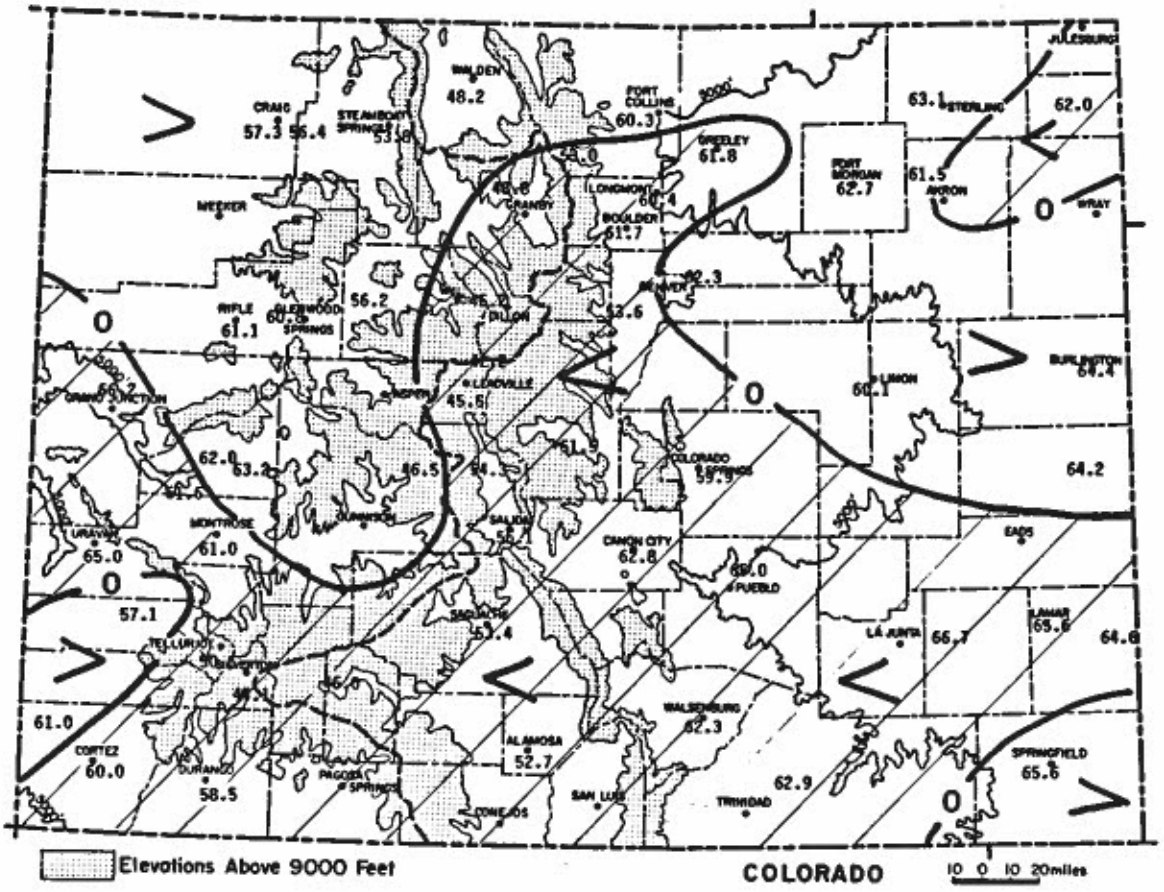
Quickly skimming the past year, the year began with normal temperatures in October and November. Several major storm systems got the year off to a wet start with plenty of early snow in the mountains. December was remarkably tranquil with very little moisture -- almost none in the mountains. January was also dry except for one whopping storm in midmonth that clobbered south central Colorado with up to 4 feet of snow in about 24 hours. Midwinter temperatures were relatively mild across the state except for a persistent cold anomaly in the vicinity of South Park. February brought record shattering heavy precipitation to much of eastern Colorado, but the northern and central mountains continued dry. March was more normal with a couple of strong blizzards on the plains, rapid temperature fluctuations and good mountain snows, but once again the northern and central mountains missed the brunt of the storms. April was warm and dry over most of the state and, with the help of a period of unusually warm weather in mid-May, the snow melt from mountain snowpack got off to a very early start. May precipitation was quite heavy, especially east of the mountains. Except for two consecutive weeks of hot, dry weather in late July and about 3 brief intrusions of unusually cold airmasses, the June-August summer months fell into the category of "normal." The summer monsoon was less organized than in recent years which left many mountain areas with less rainfall than average. However, there were still plenty of thunderstorms with a fair share of severe weather. Hailstorms seemed to target the Arkansas Valley during the summer. The convective season ended on schedule in mid September. Persistent warm and dry weather during the last 2 weeks of September began to raise concern over the potential for drought in the year ahead.



Growing season (May-September 1987) precipitation as a percent of the 1961-1980 average.

SEPTEMBER 1987 TEMPERATURES AND DEGREE DAYS

Statewide temperatures in September were very close to the long term average. Across the northern half of the state many cities were slightly above average. Steamboat Springs and Glenwood Springs were both about 2 degrees F warmer than average. In the southern part of the state the majority of stations were slightly cooler than average. Alamosa was the coolest, compared to average, with a departure of -2.0 degrees.



September 1987 temperatures (degrees Fahrenheit) and contours of departures from 1961-1980 averages.

SEPTEMBER 1987 SOIL TEMPERATURES

A fairly normal progression of soil temperature changes occurred during September. The fall reversal in temperature gradient has occurred with deep soil temperatures now warmer than those nearer to the surface.

These soil temperature measurements were taken at Colorado State University beneath sparse unirrigated sod with a flat, open exposure. These data are not representative of all Colorado locations.

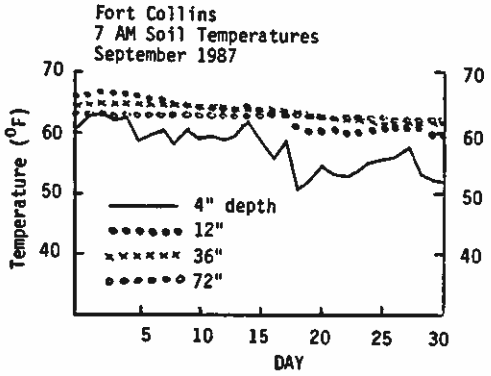


Table 1. Colorado Heating Degree Day Data through September 1987.

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
ALAMOSA	AVE	40	100	303	657	1074	1457	1519	1182	1035	732	453	165	8717
	86-87	63	75	366	728	1004	1377	1593	1160	1049	662	436	115	8628
	87-88	66	96	364										526
ASPEN	AVE	95	150	348	651	1029	1339	1376	1162	1116	798	524	262	8850
	86-87	147	132	428	735	1009	1307	1398	1063	1067	701	508	202	8697
	87-88	112	152	355										619
BOULDER	AVE	0	6	130	357	714	908	1004	804	775	483	220	59	5460
	86-87	1	0	175	450	714	970	947	779	776	375	191	10	5388
	87-88	7	33	122										162
BUENA VISTA	AVE	47	116	285	577	936	1184	1218	1025	983	720	459	184	7734
	86-87	79	69	388	730	970	1316	1280	1011	1071	650	433	113	8110
	87-88	49	117	313										479
BURLING-TON	AVE	6	5	108	364	762	1017	1110	871	803	459	200	38	5743
	86-87	0	0	76	406	745	984	980	746	816	385	127	10	5275
	87-88	5	20	72										97
CANON CITY	AVE	0	9	81	301	639	831	911	734	707	411	179	33	4836
	86-87	4	2	132	422	724	952	976	793	M	M	177	15	4197
	87-88	11	36	87										134
COLORADO SPRINGS	AVE	8	25	162	440	819	1042	1122	910	880	564	296	78	6346
	86-87	4	14	174	519	813	1081	1096	888	912	491	271	50	6313
	87-88	17	74	150										241
CORTEZ	AVE	0	11	115	434	813	1132	1181	921	828	555	292	68	6350
	86-87	10	6	214	541	813	1041	1224	888	953	534	302	36	6562
	87-88	6	35	154										195
CRAIG	AVE	32	58	275	608	996	1342	1479	1193	1094	687	419	193	8376
	86-87	31	15	338	654	967	1234	1473	1059	1055	589	368	107	7890
	87-88	55	96	227										378
DELTA	AVE	0	0	94	394	813	1135	1197	890	753	429	167	31	5903
	86-87	0	0	145	414	M	984	M	764	759	326	154	5	3551
	87-88	0	11	108										119
DENVER	AVE	0	0	135	414	789	1004	1101	879	837	528	253	74	6014
	86-87	0	0	145	477	775	1045	1012	804	805	392	170	22	5647
	87-88	11	21	110										142
DILLON	AVE	273	332	513	806	1167	1435	1516	1305	1296	972	704	435	10754
	86-87	322	318	580	883	1125	1473	1542	1244	1286	914	667	387	10741
	87-88	296	346	556										1198
DURANGO	AVE	9	34	193	493	837	1153	1218	958	862	600	366	125	6848
	86-87	23	9	295	559	844	1055	1204	895	906	478	346	36	6650
	87-88	14	44	188										246
EAGLE	AVE	33	80	288	626	1026	1407	1448	1148	1014	705	431	171	8377
	86-87	37		314	658	930	1283	1309	925	927	566	384	111	7444
	87-88		75	254										329
EVER-GREEN	AVE	59	113	327	621	916	1135	1199	1011	1009	730	489	218	7827
	86-87	75	90	380	699	927	1186	1178	995	1009	652	442	168	7801
	87-88	69	118	333										520
FORT COLLINS	AVE	5	11	171	468	846	1073	1181	930	877	558	281	82	6483
	86-87	0	0	178	500	809	1091	1042	830	850	413	206	21	5940
	87-88	12	37	146										195
FORT MORGAN	AVE	0	6	140	438	867	1156	1283	969	874	516	224	47	6520
	86-87	0	4	138	495	874	1193	1148	842	937	443	150	14	6238
	87-88	12	29	110										151
GRAND JUNCTION	AVE	0	0	65	325	762	1138	1225	882	716	403	148	19	5683
	86-87	0	0	130	414	718	1001	1159	785	765	314	143	0	5429
	87-88	0	6	34										40

M = MISSING DATA

Heating Degree Data — Colorado Climate Center (303) 491-8545

STATION		JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	ANN
GRAND LAKE	AVE	214	264	468	775	1128	1473	1593	1369	1318	951	654	384	10591
	86-87	245	242	488	777	1051	1450	1612	1265	1265	876	593	328	10192
	87-88	207	257	480										944
GREELEY	AVE	0	0	149	450	861	1128	1240	946	856	522	238	52	6442
	86-87	0	0	142	484	825	1085	1054	797	844	382	163	13	5789
	87-88	10	26	119										155
GUNNISON	AVE	111	188	393	719	1119	1590	1714	1422	1231	816	543	276	10122
	86-87	123	146	420	734	1064	1430	1539	1187	1148	698	502	M	8991
	87-88													0
LAS ANIMAS	AVE	0	0	45	296	729	998	1101	820	698	348	102	9	5146
	86-87	0	0	32	280	668	991	937	685	700	295	65	0	4653
	87-88	0	3	35										38
LEAD-VILLE	AVE	272	337	522	817	1173	1435	1473	1318	1320	1038	726	439	10870
	86-87	372	369	626	920	1188	1482	1510	1276	1349	955	719	440	11206
	87-88	346	393	578										1317
LIMON	AVE	8	6	144	448	834	1070	1156	960	936	570	299	100	6531
	86-87	4	8	171	551	873	1190	1132	931	961	513	284	62	6680
	87-88	21	66	158										245
LONGMONT	AVE	0	6	162	453	843	1082	1194	938	874	546	256	78	6432
	86-87		0	154	498	852	1135	1155	848	872	435	165	20	6134
	87-88	12	33	159										204
MEEKER	AVE	28	56	261	564	927	1240	1345	1086	998	651	394	164	7714
	86-87	41	28	402	623	894	1147	1262	957	999	579	376	M	7308
	87-88													0
MONTROSE	AVE	0	10	135	437	837	1159	1218	941	818	522	254	69	6400
	86-87	1	6	183	532	809	1085	1190	876	856	426	233	12	6209
	87-88	5	30	129										164
PAGOSA SPRINGS	AVE	82	113	297	608	981	1305	1380	1123	1026	732	487	233	8367
	86-87	98	45	385	668	927	1182	1326	1013	1063	648	466	163	7984
	87-88	104	105	347										556
PUEBLO	AVE	0	0	89	346	744	998	1091	834	756	421	163	23	5465
	86-87	0	0	94	428	741	1069	1082	768	756	358	119	10	5425
	87-88	4	17	43										64
RIFLE	AVE	6	24	177	499	876	1249	1321	1002	856	555	298	82	6945
	86-87	1	3	226	499	795	1081	1216	839	826	431	243	27	6187
	87-88	9	24	125										158
STEAMBOAT SPRINGS	AVE	113	169	390	704	1101	1476	1541	1277	1184	810	533	297	9595
	86-87	120	119	M	M	M	M	M	M	1059	608	377	171	2454
	87-88	77		330										
STERLING	AVE	0	6	157	462	876	1163	1274	966	896	528	235	51	6614
	86-87	0	4	105	427	847	1193	1072	762	974	395	123	15	5917
	87-88	12	31	108										151
TELLURIDE	AVE	163	223	396	676	1026	1293	1339	1151	1141	849	589	318	9164
	86-87	200	129	434	716	1018	1297	1304	1091	1156	719	540	250	8854
	87-88	161	222	426										809
TRINIDAD	AVE	0	0	86	359	738	973	1051	846	781	468	207	35	5544
	86-87	1	0	90	421	719	1022	998	775	778	400	206	8	5418
	87-88	4	25	80										109
WALDEN	AVE	198	285	501	822	1170	1457	1535	1313	1277	915	642	351	10466
	86-87	225	224	530	825	1126	1388	1449	1127	1162	800	576	293	9725
	87-88	215	281	495										991
WALSEN-BURG	AVE	0	8	102	370	720	924	989	820	781	501	240	49	5504
	86-87	0	0	84	420	682	984	958	796	789	397	207	6	5323
	87-88	3	30	101										134

M = MISSING DATA

S E P T E M B E R 1 9 8 7 C L I M A T I C D A T A

Eastern Plains*

	Temperature						Degree Days			Precipitation			
Name	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
STERLING	81.1	45.2	63.1	2.1	97	34	108	60	469	0.33	-0.77	30.0	6
FORT MORGAN	79.0	46.3	62.7	0.5	93	35	110	48	450	0.70	-0.48	59.3	6
AKRON FAA AP	75.6	47.5	61.5	-0.2	90	35	136	37	409	1.10	0.02	101.9	4
HOLYOKE	77.2	46.9	62.0	-0.7	92	36	120	38	430	0.54	-0.75	41.9	5
BURLINGTON	78.4	50.4	64.4	0.3	92	40	72	62	465	0.81	-0.69	54.0	4
LIMON WSMO	75.6	44.7	60.1	0.4	88	35	158	17	396	0.28	-0.62	31.1	5
CHEYENNE WELLS	80.8	47.7	64.2	0.3	94	39	62	48	472	0.34	-1.45	19.0	5
LAMAR	83.2	48.1	65.6	-1.2	98	35	42	70	507	2.51	1.38	222.1	10
LAS ANIMAS	83.6	49.8	66.7	-0.6	96	37	35	92	516	2.43	1.39	233.7	7
HOLLY	85.2	44.1	64.6	-0.8	100	32	66	64	511	2.95	1.40	190.3	8
SPRINGFIELD 7WSW	80.7	50.5	65.6	0.3	92	43	42	69	484	2.26	1.09	193.2	4

Foothills/Adjacent Plains*

	Temperature						Degree Days			Precipitation			
Name	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
FORT COLLINS	75.1	45.4	60.3	0.3	88	35	146	12	395	0.65	-0.59	52.4	6
GREELEY UNC	78.0	45.7	61.8	-0.4	90	36	119	30	436	0.42	-0.71	37.2	5
ESTES PARK	69.1	37.0	53.0	-0.3	79	25	355	2	296	1.54	0.19	114.1	10
LONGMONT 2ESE	77.0	43.8	60.4	-0.2	92	33	159	26	411	0.58	-0.85	40.6	3
BOULDER	77.1	46.2	61.7	-0.9	90	35	122	29	430	1.13	-0.73	60.8	9
DENVER WSFO AP	76.8	47.9	62.3	0.5	89	39	110	36	428	0.70	-0.68	50.7	8
EVERGREEN	70.7	36.5	53.6	-0.3	81	28	333	0	318	0.63	-0.82	43.4	6
LAKE GEORGE 8SW	66.9	36.1	51.5	-0.3	74	29	398	0	261	0.06	-1.02	5.6	1
COLORADO SPRINGS	73.7	46.2	59.9	-0.4	85	39	150	6	371	0.55	-0.81	40.4	7
CANON CITY 2SE	77.7	47.9	62.8	0.1	88	40	87	30	440	0.61	-0.48	56.0	6
PUEBLO WSO AP	82.0	48.0	65.0	-0.6	94	38	43	50	496	0.31	-0.58	34.8	7
WALSENBURG	78.2	46.5	62.3	-0.1	87	39	101	27	439	0.94	-0.28	77.0	8
TRINIDAD FAA AP	79.1	46.8	62.9	-0.7	87	40	80	24	450	0.52	-0.55	48.6	9

Mountains/Interior Valleys*

	Temperature						Degree Days			Precipitation			
Name	Max	Min	Mean	Dep	High	Low	Heat	Cool	Grow	Total	Dep	%Norm	# days
WALDEN	69.9	26.6	48.2	0.2	84	15	495	0	305	1.02	-0.10	91.1	6
LEADVILLE 2SW	63.0	28.0	45.5	-1.0	72	20	578	0	202	0.68	-0.72	48.6	7
SALIDA	75.1	37.1	56.1	-0.8	86	29	261	2	385	0.26	-0.66	28.3	2
BUENA VISTA	72.2	36.4	54.3	-0.8	80	31	313	0	342	0.19	-0.86	18.1	2
SAGUACHE	69.7	37.2	53.4	-0.7	77	31	340	0	301	0.30	-0.65	31.6	4
HERMIT 7ESE	66.4	25.7	46.0	-1.3	77	17	560	0	254	0.55	-0.88	38.5	2
ALAMOSA WSO AP	73.7	31.7	52.7	-2.0	81	24	364	0	365	0.22	-0.61	26.5	3
STEAMBOAT SPRINGS	75.0	32.6	53.8	2.2	84	22	330	0	381	0.64	-0.96	40.0	4
GRAND LAKE 6SSW	65.6	31.9	48.8	-0.2	75	24	480	0	242	0.54	-0.70	43.5	6
DILLON 1E	64.8	27.5	46.2	-1.7	75	18	556	0	233	0.72	-0.62	53.7	7
CLIMAX	54.2	30.2	42.2	-0.7	64	20	678	0	76	0.45	-1.11	28.8	8
ASPEN 1SW	69.4	36.4	52.9	0.4	78	27	355	0	295	0.62	-1.18	34.4	7
TAYLOR PARK	62.7	30.3	46.5	2.6	71	23	548	0	201	0.50	-1.04	32.5	5
TELLURIDE	68.1	33.0	50.6	-0.9	77	26	426	0	281	0.83	-1.31	38.8	11
PAGOSA SPRINGS	73.9	32.3	53.1	-1.5	82	25	347	0	367	0.46	-1.64	21.9	3
SILVERTON	64.6	23.7	44.1	-1.3	75	17	617	0	230	1.53	-1.01	60.2	15
WOLF CREEK PASS 1	58.3	30.3	44.3	-0.9	66	25	613	0	132	1.30	-2.69	32.6	7

Western Valleys*

Name	Temperature Max	Min	Mean	Dep	High	Low	Degree Days Heat	Cool	Grow	Precipitation Total	Dep	%Norm	# days
CRAIG 4SW	76.0	38.7	57.3	1.2	87	29	227	5	398	0.33	-0.97	25.4	3
HAYDEN	75.4	37.3	56.4	0.8	86	25	254	2	392	0.26	-0.95	21.5	5
RANGELY 1E	79.8	42.7	61.3	1.0	90	32	123	20	454	0.07	-1.02	6.4	2
EAGLE FAA AP	76.8	35.6	56.2	0.9	87	24	254	0	410	0.46	-0.72	39.0	6
GLENWOOD SPRINGS	78.9	42.7	60.8	2.1	90	34	133	15	441	0.32	-1.27	20.1	5
RIFLE	81.9	40.2	61.1	1.9	93	31	125	15	481	0.28	-0.80	25.9	3
GRAND JUNCTION WS	81.6	50.8	66.2	-0.5	92	40	34	76	513	0.13	-0.59	18.1	3
CEDAREDGE	79.7	44.4	62.0	0.8	89	35	98	17	452	0.33	-0.86	27.7	6
PAONIA 1SW	80.4	46.1	63.2	1.2	90	39	75	27	469	0.09	-1.26	6.7	2
DELTA	82.8	40.4	61.6	-0.7	93	30	108	13	491	0.34	-0.65	34.3	5
MONTROSE NO. 2	77.2	44.9	61.0	-0.1	89	37	129	17	423	0.09	-1.08	7.7	4
URAVAN	84.7	45.3	65.0	-0.7	95	36	45	52	515	0.51	-0.56	47.7	4
NORWOOD	73.6	40.7	57.1	0.7	82	31	229	0	369	0.06	-1.54	3.7	1
YELLOW JACKET 2W	76.2	45.8	61.0	0.7	84	36	124	9	405	0.24	-1.14	17.4	1
CORTEZ	78.3	41.7	60.0	-0.2	86	33	154	10	431	0.35	-0.85	29.2	2
DURANGO	77.6	39.5	58.5	0.0	86	31	188	1	422	0.75	-0.98	43.4	4

* Data are received by the Colorado Climate Center for more locations than appear in these tables. Please contact the Colorado Climate Center if additional information is needed.

SEPTEMBER 1987 SUNSHINE AND SOLAR RADIATION

Station	Number of Days clear	partly cloudy	cloudy	% of possible sunshine	average % of possible
Colorado Springs	13	11	6	--	--
Denver	15	9	6	82%	75%
Fort Collins	10	15	5	--	--
Grand Junction	19	9	2	83%	76%
Pueblo	18	7	5	81%	80%