U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data,
and Information Service

Climatography of the United States No. 20 1971-2000

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801
www.ncdc.noaa.gov

Station: GAS HILLS 4 E, WY **COOP ID: 483801**

Climate Division: WY 9 **NWS Call Sign:** **Elevation: 6,470 Feet** **Lat: 42˚50N** **Lon: 107˚31W**

Temperature (˚F)

Mean (1)				Extremes										Degree Days (1) Base Temp 65		Mean Number of Days (3)					
Month	Daily Max	Daily Min	Mean	Highest Daily(2)	Year	Day	Highest Month(1) Mean	Year	Lowest Daily(2)	Year	Day	Lowest Month(1) Mean	Year	Heating	Cooling	Max >= 100	Max >= 90	Max >= 50	Max <= 32	Min <= 32	Min <= 0
Jan	27.7	11.1	19.4	55	1981	22	27.1	1986	-34	1963	11	5.9	1979	1414	0	.0	.0	.3	17.2	30.8	5.3
Feb	31.7	14.7	23.2	57	1963	5	30.6	1992	-32	1989	4	11.6	1989	1171	0	.0	.0	.6	11.9	28.0	3.7
Mar	40.8	20.9	30.9	70	1986	28	37.9	1986	-17	1965	18	24.8	1973	1058	0	.0	.0	7.4	3.9	28.5	.8
Apr	50.7	28.7	39.7	79	1987	28	46.7	1992	-7	1963	2	31.1	1973	759	0	.0	.0	18.8	1.3	20.0	.1
May	61.0	37.2	49.1	85	1984	30	56.4	1994	10	1967	1	42.7	1995	495	2	.0	.0	27.6	@	8.1	.0
Jun	72.6	46.7	59.7	95	1963	29	68.5	1988	23	1969	13	54.3	1975	203	43	@	.6	29.6	.0	1.2	.0
Jul	80.4	53.8	67.1	96+	1975	6	71.0	1989	33	1972	3	60.8	1993	53	117	.0	3.1	31.0	.0	.0	.0
Aug	78.8	53.0	65.9	95+	1986	18	70.4	2000	30	1985	17	62.3	1977	66	95	.0	1.4	31.0	.0	.1	.0
Sep	68.5	42.9	55.7	90	1983	1	62.2	1998	13	1985	29	48.4	1985	297	18	.0	.3	28.3	.1	4.2	.0
Oct	55.7	32.9	44.3	80	2001	2	51.2	1988	-1	1991	30	38.3	1971	641	0	.0	.0	23.6	.9	15.0	@
Nov	37.4	19.6	28.5	64	1981	3	38.5	1999	-15	1976	27	18.1	1985	1094	0	.0	.0	6.7	8.3	26.5	1.2
Dec	28.8	13.0	20.9	57	1973	1	29.5	1980	-34	1990	21	9.4	1983	1368	0	.0	.0	.9	15.6	30.6	3.7
Ann	52.8	31.2	42.0	96+	Jul 1975	6	71.0	Jul 1989	-34+	Dec 1990	21	5.9	Jan 1979	8619	275	@	5.4	205.8	59.2	193.0	14.8

\+ Also occurred on an earlier date(s)

@ Denotes mean number of days greater than 0 but less than .05

Complete documentation available from: www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

(1) From the 1971-2000 Monthly Normals

(2) Derived from station's available digital record: 1962-2001

(3) Derived from 1971-2000 serially complete daily data

Issue Date: February 2004

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Precipitation (inches)

Precipitation Totals

Month	Means/ Medians(1) Mean	Means/ Medians(1) Median	Extremes Highest Daily(2)	Year	Day	Highest Monthly(1)	Year	Lowest Monthly(1)	Year
Jan	.35	.26	.69	1995	16	.93+	1995	.02	1989
Feb	.42	.39	.74	1977	22	1.26	1977	.02	1981
Mar	.83	.67	1.50	1975	23	3.65	1975	.03	1999
Apr	1.31	.94	3.20	1974	20	6.30	1974	.30	1987
May	1.83	1.33	2.18	1978	18	7.01	1995	.12	1974
Jun	1.19	.99	2.60	1963	15	2.92	1995	.04	1978
Jul	.90	.79	1.25	1997	19	2.80	1974	.06	1972
Aug	.70	.50	1.32	1972	2	2.01	1972	.00+	1998
Sep	.78	.56	1.80	1973	2	2.62	1973	.00+	1983
Oct	.71	.51	1.38	1998	5	3.37	1998	.00+	1992
Nov	.45	.37	.88	1992	23	1.23	1975	.00	1971
Dec	.34	.31	.50	1975	14	.98	1973	.00+	1999
Ann	9.81	10.03	3.20	Apr 1974	20	7.01	May 1995	.00+	Dec 1999

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	3.1	1.4	.1	.0
Feb	3.2	1.5	.1	.0
Mar	4.1	2.3	.5	.1
Apr	5.4	3.6	.8	.2
May	5.9	4.0	1.1	.3
Jun	5.1	3.1	.6	.1
Jul	3.4	2.0	.5	.1
Aug	3.5	2.0	.2	.1
Sep	3.6	2.4	.3	.1
Oct	3.5	2.0	.4	@
Nov	3.4	1.5	.2	@
Dec	3.4	1.6	@	.0
Ann	47.6	27.4	4.8	1.0

Precipitation Probabilities (1)

Probability that the monthly/annual precipitation will be equal to or less than the indicated amount

Monthly/Annual Precipitation vs Probability Levels
These values were determined from the incomplete gamma distribution

Month	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
Jan	.06	.09	.14	.19	.24	.29	.36	.43	.53	.70	.86
Feb	.06	.10	.16	.22	.28	.35	.42	.52	.64	.85	1.05
Mar	.10	.16	.28	.39	.52	.66	.82	1.02	1.29	1.73	2.17
Apr	.15	.25	.43	.61	.81	1.03	1.28	1.60	2.03	2.75	3.44
May	.26	.41	.68	.93	1.20	1.49	1.82	2.23	2.79	3.70	4.57
Jun	.14	.23	.40	.56	.74	.94	1.17	1.45	1.84	2.48	3.10
Jul	.09	.16	.28	.41	.54	.69	.87	1.10	1.41	1.92	2.42
Aug	.00	.00	.17	.29	.41	.54	.70	.88	1.13	1.54	1.93
Sep	.00	.00	.18	.31	.45	.60	.77	.99	1.27	1.75	2.21
Oct	.00	.04	.14	.24	.36	.50	.66	.87	1.16	1.66	2.15
Nov	.02	.07	.13	.20	.27	.35	.44	.55	.71	.96	1.21
Dec	.00	.03	.09	.15	.20	.27	.34	.42	.54	.73	.92
Ann	5.63	6.37	7.36	8.14	8.84	9.54	10.27	11.09	12.11	13.62	14.95

\+ Also occurred on an earlier date(s)
\# Denotes amounts of a trace
@ Denotes mean number of days greater than 0 but less than .05
****** Statistics not computed because less than six years out of thirty had measurable precipitation

(1) From the 1971-2000 Monthly Normals
(2) Derived from station's available digital record: 1962-2001
(3) Derived from 1971-2000 serially complete daily data

Complete documentation available from:
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Climate Division: WY 9 **NWS Call Sign:** **Elevation: 6,470 Feet** **Lat: 42°50N** **Lon: 107°31W**

Snow (inches)

Snow Totals

Means/Medians (1)

Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median
Jan	7.0	6.3	3	2
Feb	8.8	8.0	2	2
Mar	10.2	9.8	2	1
Apr	13.5	6.8	1	#
May	2.9	1.3	#	#
Jun	.4	.0	#	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.3	.0	#	0
Oct	6.2	4.9	#	#
Nov	5.5	6.0	1	1
Dec	6.0	5.7	2	2
Ann	60.8	48.8	N/A	N/A

Extremes (2)

Month	Highest Daily Snow Fall	Year	Day	Highest Monthly Snow Fall	Year	Highest Daily Snow Depth	Year	Day	Highest Monthly Mean Snow Depth	Year
Jan	12.0	1995	16	15.0	1995	12+	1995	16	9	1972
Feb	8.0	1977	22	17.8	1987	12	1987	27	6	1989
Mar	22.0	1988	10	27.8	1977	30	1988	11	9	1988
Apr	27.0	1974	20	49.2	1974	32	1973	20	10	1973
May	14.0	1997	2	14.0	1997	28	1973	1	7	1978
Jun	5.0	1998	4	5.0	1998	4	1976	14	#+	1998
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	.0	0	0	.0	0	0	0	0	0	0
Sep	4.0	1999	27	7.0	1996	6	1982	15	#+	2000
Oct	12.0	1994	16	25.4	1994	16+	1998	17	2	1998
Nov	8.0	1992	23	13.0	1993	12+	1979	21	5+	2000
Dec	8.0	1982	2	14.0	1988	11	1972	9	7	1978
Ann	27.0	Apr 1974	20	49.2	Apr 1974	32	Apr 1973	20	10	Apr 1973

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	2.5	1.9	.9	.3	@
Feb	2.9	2.5	1.0	.4	.0
Mar	3.1	2.4	.9	.5	.1
Apr	2.5	2.2	1.4	.7	.1
May	1.0	1.0	.3	.1	@
Jun	.1	.1	.1	@	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	.2	.2	.1	.0	.0
Oct	1.7	1.5	.9	.4	.1
Nov	2.2	2.0	.8	.3	.0
Dec	2.9	2.4	.9	.2	.0
Ann	19.1	16.2	7.3	2.9	.3

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	15.9	11.1	7.1	1.0
Feb	16.5	10.3	4.8	.3
Mar	8.8	4.7	3.0	.8
Apr	3.5	2.1	1.6	.8
May	.5	.2	.1	.1
Jun	@	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.1	.0	.0	.0
Oct	1.7	1.2	.7	.3
Nov	7.1	4.0	1.9	.3
Dec	10.1	5.5	3.1	.5
Ann	64.2	39.1	22.3	4.1

+ Also occurred on an earlier date(s) #Denotes trace amounts

@ Denotes mean number of days greater than 0 but less than .05

-9/-9.9 represents missing values
Annual statistics for Mean/Median snow depths are not appropriate

(1) Derived from Snow Climatology and 1971-2000 daily data

(2) Derived from 1971-2000 daily data

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Freeze Data

Spring Freeze Dates (Month/Day)

Temp (F)	Probability of later date in spring (thru Jul 31) than indicated(*)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	6/27	6/21	6/17	6/14	6/10	6/07	6/04	5/30	5/25
32	6/21	6/14	6/09	6/04	5/31	5/27	5/23	5/17	5/10
28	6/04	5/29	5/25	5/21	5/18	5/15	5/11	5/07	5/01
24	5/22	5/16	5/12	5/09	5/05	5/02	4/29	4/25	4/19
20	5/11	5/06	5/01	4/28	4/25	4/22	4/18	4/14	4/08
16	5/08	4/29	4/23	4/18	4/14	4/09	4/04	3/29	3/21

Fall Freeze Dates (Month/Day)

Temp (F)	Probability of earlier date in fall (beginning Aug 1) than indicated(*)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	8/26	8/31	9/04	9/07	9/09	9/12	9/15	9/19	9/24
32	8/30	9/05	9/09	9/12	9/15	9/18	9/22	9/26	10/02
28	9/08	9/14	9/18	9/21	9/25	9/28	10/01	10/05	10/11
24	9/19	9/25	9/29	10/03	10/06	10/09	10/13	10/17	10/23
20	9/29	10/06	10/10	10/14	10/18	10/22	10/26	10/30	11/06
16	10/11	10/17	10/22	10/26	10/29	11/02	11/06	11/11	11/17

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	116	107	101	95	90	85	80	73	65
32	137	126	119	112	106	100	94	86	76
28	153	145	139	134	129	124	119	113	105
24	178	169	163	158	153	148	143	137	128
20	201	193	186	181	175	170	165	158	149
16	233	221	212	205	198	191	184	175	164

***** Probability of observing a temperature as cold, or colder, later in the spring or earlier in the fall than the indicated date.

0/00 Indicates that the probability of occurrence of threshold temperature is less than the indicated probability.

Derived from 1971-2000 serially complete daily data

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Degree Days to Selected Base Temperatures (˚F)

Heating Degree Days (1)

Base Below	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
65	1414	1171	1058	759	495	203	53	66	297	641	1094	1368	8619
60	1259	1031	903	609	350	112	14	20	182	487	944	1213	7124
57	1166	947	810	524	269	71	5	8	127	397	854	1120	6298
55	1104	891	748	467	221	50	2	4	96	339	794	1058	5774
50	949	751	594	334	123	17	0	0	40	211	646	903	4568
32	416	275	138	41	2	0	0	0	0	9	204	376	1461

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	25	28	103	271	532	829	1087	1052	711	391	100	31	5160
55	0	0	0	8	38	189	376	343	117	9	0	0	1080
57	0	0	0	5	24	150	317	284	88	4	0	0	872
60	0	0	0	0	12	101	233	204	53	1	0	0	604
65	0	0	0	0	2	43	117	95	18	0	0	0	275
70	0	0	0	0	0	13	41	29	4	0	0	0	87

Growing Degree Units (2)

Base	Growing Degree Units (Monthly)												Growing Degree Units (Accumulated Monthly)											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
40	0	0	24	128	339	626	883	848	519	214	29	0	0	0	24	152	491	1117	2000	2848	3367	3581	3610	3610
45	0	0	3	63	215	479	728	693	383	116	8	0	0	0	3	66	281	760	1488	2181	2564	2680	2688	2688
50	0	0	0	23	114	340	573	539	257	49	0	0	0	0	0	23	137	477	1050	1589	1846	1895	1895	1895
55	0	0	0	5	45	209	418	385	149	14	0	0	0	0	0	5	50	259	677	1062	1211	1225	1225	1225
60	0	0	0	0	8	107	269	237	67	1	0	0	0	0	0	0	8	115	384	621	688	689	689	689
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	19	95	223	397	570	548	339	148	22	0	0	0	19	114	337	734	1304	1852	2191	2339	2361	2361

(1) Derived from the 1971-2000 Monthly Normals
(2) Derived from 1971-2000 serially complete daily data
Note: For corn, temperatures below 50 are set to 50, and temperatures above 86 are set to 86

Complete documentation available from:
www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

Notes

a. The monthly means are simple arithmetic averages computed by summing the monthly values for the period 1971-2000 and dividing by thirty. Prior to averaging, the data are adjusted if necessary to compensate for data quality issues, station moves or changes in station reporting practices. Missing months are replaced by estimates based on neighboring stations.

b. The median is defined as the middle value in an ordered set of values. The median is being provided for the snow and precipitation elements because the mean can be a misleading value for precipitation normals.

c. Only observed validated values were used to select the extreme daily values.

d. Extreme monthly temperature/precipitation means were selected from the monthly normals data.
Monthly snow extremes were calculated from daily values quality controlled to be consistent with the Snow Climatology.

e. Degree Days were derived using the same techniques as the 1971-2000 normals.
Compete documentation for the 1971-2000 Normals is available on the internet from:
www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

f. Mean "number of days statistics" for temperature and precipitation were calculated from a serially complete daily data set .
Documentation of the serially complete data set is available from the link below:

g. Snowfall and snow depth statistics were derived from the Snow Climatology.
Documentation for the Snow Climatology project is available from the link under references.

Data Sources for Tables

Several different data sources were used to create the Clim20 climate summaries. In some cases the daily extremes appear inconsistent with the monthly extremes and or the mean number of days statistics. For example, a high daily extreme value may not be reflected in the highest monthly value or the mean number of days threshold that is less than and equal to the extreme value. Some of these difference are caused by different periods of record. Daily extremes are derived from the station's entire period of record while the serial data and normals data were are for the 1971-2000 period. Therefore extremes observed before 1971 would not be included in the 1971-2000 normals or the 1971-2000 serial daily data set. Inconsistencies can also occur when monthly values are adjusted to reflect the current observing conditions or were replaced during the 1971-2000 Monthly Normals processing and are not reconciled with the Summary of the Day data.

a. Temperature/ Precipitation Tables
   1. 1971-2000 Monthly Normals
   2. Cooperative Summary of the Day
   3. National Weather Service station records
   4. 1971-2000 serially complete daily data

b. Degree Day Table
   1. Monthly and Annual Heating and Cooling Degree Days Normals to Selected Bases derived from 1971-2000 Monthly Normals
   2. Daily Normal Growing Degree Units to Selected Base Temperatures derived from 1971-2000 serially complete daily data

c. Snow Tables
   1. Snow Climatology
   2. Cooperative Summary of the Day

d. Freeze Data Table
   1971-2000 serially complete daily data

References

U.S. Climate Normals 1971-2000, www.ncdc.noaa.gov/normals.html
U.S. Climate Normals 1971-2000-Products Clim20, www.ncdc.noaa.gov/oa/climate/normals/usnormalsprods.html
Snow Climatology Project Description, www.ncdc.noaa.gov/oa/climate/monitoring/snowclim/mainpage.html
Eischeid, J. K., P. Pasteris, H. F. Diaz, M. Plantico, and N. Lott, 2000: Creating a serially complete, national daily time series of temperature and precipitation for the Western United States. J. Appl. Meteorol., 39, 1580-1591,
www1.ncdc.noaa.gov/pub/data/special/ serialcomplete_jam_0900.pdf