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: PALMER 3 ESE, WA **COOP ID: 456295**

Climate Division: WA 4 **NWS Call Sign:** **Elevation: 920 Feet** **Lat: 47˚18N** **Lon: 121˚51W**

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	43.0	32.2	37.6	66	1931	30	44.8	1981	0+	1950	25	30.4	1979	849	0	.0	.0	5.7	2.0	14.7	.0
Feb	46.7	33.5	40.1	69+	1968	29	45.9	1992	-3	1989	4	31.2	1989	697	0	.0	.0	9.3	.8	11.5	.1
Mar	50.7	35.1	42.9	78	1947	16	48.1	1992	12	1955	4	37.1	1971	685	0	.0	.0	16.9	@	8.6	.0
Apr	55.9	37.8	46.9	88	1934	19	50.2	1992	22	1936	1	41.8	1975	545	0	.0	.0	23.2	.0	3.1	.0
May	61.8	42.9	52.4	100	1983	29	56.8	1993	30+	1954	1	48.6	1974	392	0	@	.1	29.8	.0	.1	.0
Jun	66.7	47.5	57.1	100	1942	30	61.2	1992	32	1933	1	53.1	1971	244	6	.0	.3	29.9	.0	.0	.0
Jul	72.7	51.3	62.0	101	1941	16	66.7	1985	38	1955	1	57.6	1993	124	31	.0	1.3	31.0	.0	.0	.0
Aug	73.7	51.6	62.7	101	1960	10	66.5	1981	38+	1937	28	58.7	1973	109	37	.0	1.1	31.0	.0	.0	.0
Sep	68.8	48.0	58.4	97	1988	3	63.0	1974	32+	1984	25	54.3	1972	211	13	.0	.2	30.0	.0	@	.0
Oct	59.1	41.9	50.5	90	1987	2	54.0	1987	21	1935	31	47.2	1990	450	0	.0	@	28.6	.0	1.1	.0
Nov	47.8	36.3	42.1	74+	1949	4	47.5	1997	6	1955	15	32.1	1985	689	0	.0	.0	12.1	.6	7.6	.0
Dec	42.7	32.4	37.6	64	1935	1	41.6	1999	-1+	1968	31	30.3	1983	852	0	.0	.0	4.9	1.7	14.7	.0
Ann	57.5	40.9	49.2	101+	Aug 1960	10	66.7	Jul 1985	-3	Feb 1989	4	30.3	Dec 1983	5847	87	@	3.0	252.4	5.1	61.4	.1

+ 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: 1931-2001

(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	10.86	10.82	5.30	1982	23	18.05	1971	1.13	1985
Feb	9.01	9.14	4.74	1951	9	16.34	1996	.41	1993
Mar	8.69	8.56	4.00	1932	5	15.36	1997	3.91	1992
Apr	7.41	7.21	3.15	1991	5	12.21	1991	2.85	1998
May	6.03	5.76	3.44	1969	30	11.63	1984	2.51	1992
Jun	5.12	5.01	3.60	1968	2	10.23	1981	1.63	1996
Jul	2.96	2.43	3.50	1972	13	8.67	1983	.08+	1985
Aug	2.69	1.86	2.91	1950	15	8.48	1975	.58	1998
Sep	4.28	4.63	3.82	1959	27	9.90	1972	.42	1975
Oct	6.76	6.10	4.55	1934	25	14.50	1975	.59	1987
Nov	12.01	12.58	4.80	1986	24	22.59	1990	2.51	1976
Dec	10.99	10.06	4.50	1933	9	21.20	1975	2.68	1985
Ann	86.81	85.91	5.30	Jan 1982	23	22.59	Nov 1990	.08+	Jul 1985

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	19.5	16.0	7.6	3.2
Feb	17.4	13.7	6.5	2.7
Mar	20.9	16.2	6.6	1.8
Apr	19.3	14.6	5.7	1.3
May	17.9	12.8	4.6	.9
Jun	14.7	10.2	3.5	.9
Jul	9.4	5.8	1.9	.6
Aug	8.6	5.2	1.8	.7
Sep	11.5	8.1	3.3	1.0
Oct	15.2	11.6	5.1	1.7
Nov	20.9	17.1	9.0	3.7
Dec	20.4	17.0	8.4	3.3
Ann	195.7	148.3	64.0	21.8

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	3.67	4.70	6.20	7.47	8.69	9.95	11.33	12.93	14.99	18.18	21.12
Feb	2.56	3.42	4.71	5.83	6.93	8.08	9.34	10.84	12.78	15.82	18.66
Mar	4.45	5.17	6.15	6.92	7.64	8.35	9.11	9.97	11.04	12.64	14.07
Apr	3.62	4.25	5.12	5.81	6.45	7.09	7.77	8.54	9.51	10.97	12.28
May	2.91	3.43	4.14	4.71	5.24	5.77	6.33	6.97	7.77	8.99	10.07
Jun	1.78	2.26	2.97	3.56	4.13	4.71	5.35	6.09	7.04	8.51	9.86
Jul	.32	.55	.96	1.37	1.81	2.31	2.89	3.62	4.61	6.24	7.84
Aug	.42	.65	1.04	1.41	1.79	2.21	2.69	3.28	4.08	5.36	6.59
Sep	.60	.95	1.56	2.16	2.78	3.47	4.26	5.23	6.55	8.69	10.76
Oct	1.69	2.32	3.31	4.18	5.04	5.95	6.97	8.17	9.75	12.25	14.58
Nov	4.20	5.34	6.98	8.37	9.70	11.06	12.55	14.28	16.50	19.93	23.08
Dec	4.97	5.94	7.29	8.38	9.40	10.43	11.53	12.79	14.37	16.77	18.94
Ann	65.75	69.93	75.23	79.21	82.73	86.11	89.58	93.40	98.00	104.62	110.30

\+ 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: 1931-2001
(3) Derived from 1971-2000 serially complete daily data

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Snow (inches)

Snow Totals

Means/Medians (1)

Extremes (2)

Mean Number of Days (1)

Snow Fall >= Thresholds

Snow Depth >= Thresholds

Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median	Highest Daily Snow Fall	Year	Day	Highest Monthly Snow Fall	Year	Highest Daily Snow Depth	Year	Day	Highest Monthly Mean Snow Depth	Year	0.1	1.0	3.0	5.0	10.0	1	3	5	10
Jan	7.1	5.0	1	#	9.0	1973	5	27.0	1980	17	1996	30	6	1982	3.0	2.4	1.2	.4	.0	6.0	3.0	1.3	.4
Feb	4.4	1.0	1	#	10.5	1975	16	22.0	1990	18	1985	10	6	1985	2.0	1.7	.7	.2	@	2.8	1.5	.8	.2
Mar	2.7	.0	#	#	12.0	1989	2	28.5	1971	19	1971	5	4	1971	1.1	1.1	.3	.1	.1	1.6	.9	.6	.2
Apr	.5	.0	#	0	2.5	1972	16	5.5	1972	2	1972	16	#+	1999	.4	.3	.0	.0	.0	.3	.0	.0	.0
May	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Jun	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Jul	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Aug	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Sep	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Oct	.2	.0	#	0	3.0	1971	27	3.5	1971	3	1971	27	#+	1991	.1	.1	@	.0	.0	.1	@	.0	.0
Nov	1.4	.0	#	0	5.0	1985	18	9.0	1977	21	1985	25	7	1985	1.0	.9	.3	@	.0	1.3	.3	.0	.0
Dec	6.1	2.0	1	#	13.0	1974	27	31.5	1971	19	1985	1	3	1971	2.6	2.2	.8	.4	.1	4.7	2.4	1.5	.2
Ann	22.4	8.0	N/A	N/A	13.0	Dec 1974	27	31.5	Dec 1971	21	Nov 1985	25	7	Nov 1985	10.2	8.7	3.3	1.1	.2	16.8	8.1	4.2	1.0

+ 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	5/28	5/22	5/18	5/14	5/11	5/07	5/03	4/29	4/23
32	5/02	4/25	4/19	4/15	4/11	4/07	4/02	3/28	3/21
28	3/18	3/07	2/27	2/20	2/14	2/08	2/01	1/24	1/13
24	3/06	2/24	2/16	2/09	2/03	1/28	1/21	1/13	12/31
20	3/02	2/17	2/08	1/30	1/22	1/13	1/02	12/12	0/00
16	2/15	1/30	1/17	1/03	12/15	0/00	0/00	0/00	0/00

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	9/29	10/04	10/08	10/11	10/14	10/17	10/21	10/25	10/30
32	10/11	10/19	10/25	10/30	11/03	11/08	11/13	11/19	11/27
28	10/30	11/09	11/16	11/22	11/27	12/03	12/09	12/16	12/26
24	11/20	11/30	12/06	12/12	12/17	12/23	12/29	1/06	1/21
20	11/30	12/11	12/20	12/28	1/04	1/13	1/24	0/00	0/00
16	12/11	12/26	1/09	1/23	2/16	0/00	0/00	0/00	0/00

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	178	171	165	160	156	152	147	142	134
32	236	226	218	212	206	200	193	186	175
28	329	312	301	292	283	275	266	256	242
24	>365	349	334	324	315	307	299	290	277
20	>365	>365	>365	>365	354	339	328	316	302
16	>365	>365	>365	>365	>365	>365	>365	346	323

***** 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	849	697	685	545	392	244	124	109	211	450	689	852	5847
60	694	557	530	395	245	122	43	33	102	296	539	697	4253
57	601	473	437	305	166	71	16	12	56	210	451	604	3402
55	539	417	375	248	122	44	8	6	34	158	395	542	2888
50	392	288	233	122	43	9	0	0	6	62	261	393	1809
32	37	18	4	0	0	0	0	0	0	0	15	35	109

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	211	245	343	446	631	752	930	951	792	573	316	206	6396
55	0	0	0	4	40	106	225	244	135	19	6	0	779
57	0	0	0	1	22	73	171	188	98	9	2	0	564
60	0	0	0	0	8	35	105	117	54	2	0	0	321
65	0	0	0	0	0	6	31	37	13	0	0	0	87
70	0	0	0	0	0	0	5	6	2	0	0	0	13

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	51	84	130	227	403	534	697	718	565	338	115	43	51	135	265	492	895	1429	2126	2844	3409	3747	3862	3905
45	6	28	45	109	250	384	542	563	415	191	45	4	6	34	79	188	438	822	1364	1927	2342	2533	2578	2582
50	0	2	8	46	130	235	387	408	266	84	7	0	0	2	10	56	186	421	808	1216	1482	1566	1573	1573
55	0	0	0	11	59	112	236	254	139	27	0	0	0	0	0	11	70	182	418	672	811	838	838	838
60	0	0	0	2	24	46	116	120	58	8	0	0	0	0	0	2	26	72	188	308	366	374	374	374
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	4	31	61	118	205	281	399	411	307	158	30	1	4	35	96	214	419	700	1099	1510	1817	1975	2005	2006

(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:
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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