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: CHELAN, WA **COOP ID: 451350**

Climate Division: WA 7 **NWS Call Sign:** **Elevation: 1,120 Feet** **Lat: 47˚50N** **Lon: 120˚03W**

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	32.7	21.9	27.3	62	1989	31	35.1	1981	-6	1969	29	16.7	1979	1168	0	.0	.0	1.1	14.2	28.4	.5
Feb	39.8	26.1	33.0	63	1977	17	39.2	1991	-2	1996	1	24.0	1985	897	0	.0	.0	2.9	5.3	22.4	.1
Mar	51.1	32.7	41.9	72	1994	29	45.3	1992	9	1960	4	36.5	1971	716	0	.0	.0	19.6	.3	14.5	.0
Apr	61.4	40.3	50.9	88	1977	25	55.0	1990	26+	1982	1	47.3	1972	425	0	.0	.0	29.0	.0	2.8	.0
May	70.3	48.4	59.4	96	1985	19	64.3	1993	32+	1982	4	55.8	1996	191	16	.0	.2	31.0	.0	.1	.0
Jun	77.2	55.6	66.4	102	1958	22	72.2	1992	33	1983	24	61.9	1991	73	115	.0	2.6	30.0	.0	.0	.0
Jul	84.4	60.6	72.5	106	1985	22	79.4	1985	37+	1983	3	66.8	1993	16	248	.8	9.1	31.0	.0	.0	.0
Aug	84.9	60.3	72.6	105+	1998	5	77.2	1986	42	1960	22	67.3	1995	12	247	.6	9.2	31.0	.0	.0	.0
Sep	74.9	51.2	63.1	97+	1987	1	69.2	1998	26	1983	29	58.4	1972	125	67	.0	.6	30.0	.0	.2	.0
Oct	61.2	40.5	50.9	80+	1993	1	55.9	1988	13	1984	31	47.5	1984	439	0	.0	.0	29.1	.1	3.0	.0
Nov	43.9	31.9	37.9	72+	1989	10	43.4	1999	-3+	1985	30	25.1	1985	813	0	.0	.0	8.0	2.3	15.8	.2
Dec	33.6	24.0	28.8	59+	1975	3	36.6	1999	-18	1968	30	19.4	1984	1122	0	.0	.0	1.0	12.8	26.6	.4
Ann	59.6	41.1	50.4	106	Jul 1985	22	79.4	Jul 1985	-18	Dec 1968	30	16.7	Jan 1979	5997	693	1.4	21.7	243.7	35.0	113.8	1.2

\+ 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: 1890-2001

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

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Climate Division: WA 7 **NWS Call Sign:** **Elevation: 1,120 Feet** **Lat: 47°50N** **Lon: 120°03W**

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	1.57	1.44	1.40	2000	11	3.98	1995	.10	1977
Feb	1.23	1.17	1.07	1981	25	2.63	1981	.05	1988
Mar	.99	.97	.73	1984	21	3.28	1983	.13	1976
Apr	.70	.68	1.10	1991	15	1.91	1975	.00+	2000
May	.82	.67	1.27	1991	18	2.86	1998	.04	1992
Jun	.81	.59	1.88	1984	21	3.17	1984	.07	1976
Jul	.38	.16	1.23	1998	3	1.56	1998	.00+	1994
Aug	.44	.16	1.49	1975	19	2.39	1975	.00+	2000
Sep	.46	.32	1.17	1973	23	2.39	1986	.00+	1994
Oct	.59	.48	.88	1967	3	1.96	1997	.00	1978
Nov	1.61	1.56	1.30	1983	11	6.20	1983	.12	1993
Dec	1.74	1.52	1.50	1996	31	4.65	1996	.21	1989
Ann	11.34	10.93	1.88	Jun 1984	21	6.20	Nov 1983	.00+	Aug 2000

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	9.1	4.7	.7	.1
Feb	7.7	4.0	.5	@
Mar	6.8	3.2	.3	.0
Apr	4.8	2.2	.2	@
May	5.5	2.5	.3	.1
Jun	4.4	2.0	.4	.1
Jul	2.8	1.1	.1	.1
Aug	2.8	1.2	.2	@
Sep	3.3	1.5	.2	@
Oct	4.5	1.8	.3	.0
Nov	8.9	5.1	.6	.1
Dec	9.9	5.3	.7	.1
Ann	70.5	34.6	4.5	.6

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	.26	.39	.62	.84	1.06	1.30	1.58	1.91	2.36	3.09	3.78
Feb	.20	.30	.48	.65	.82	1.01	1.23	1.50	1.86	2.44	2.99
Mar	.11	.18	.32	.46	.61	.77	.97	1.21	1.54	2.08	2.61
Apr	.00	.00	.14	.28	.41	.54	.70	.89	1.15	1.55	1.95
May	.06	.12	.23	.34	.46	.61	.78	.99	1.29	1.79	2.28
Jun	.06	.11	.21	.32	.44	.59	.76	.98	1.29	1.81	2.33
Jul	.00	.00	.02	.07	.13	.21	.31	.45	.65	1.00	1.36
Aug	.00	.00	.01	.05	.12	.21	.33	.50	.74	1.19	1.66
Sep	.00	.00	.00	.04	.12	.23	.37	.55	.81	1.27	1.74
Oct	.01	.04	.11	.19	.28	.39	.53	.71	.96	1.40	1.84
Nov	.23	.37	.60	.82	1.05	1.31	1.60	1.96	2.44	3.23	3.99
Dec	.24	.39	.64	.88	1.13	1.41	1.73	2.12	2.65	3.52	4.35
Ann	6.12	7.02	8.24	9.19	10.07	10.94	11.86	12.89	14.18	16.10	17.80

\+ 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: 1890-2001
(3) Derived from 1971-2000 serially complete daily data

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Snow (inches)

Snow Totals

Means/Medians (1)

Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median
Jan	8.8	6.6	4	2
Feb	5.2	3.8	2	#
Mar	1.3	.0	#	0
Apr	.0	.0	#	0
May	.0	.0	0	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.0	.0	0	0
Oct	.0	.0	#	0
Nov	2.2	1.0	#	0
Dec	12.1	9.3	2	1
Ann	29.6	20.7	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	15.0	1971	15	25.0	1980	32	1971	15	19	1971
Feb	9.0	1979	7	18.0	1975	17	1980	2	12	1980
Mar	5.0	1972	2	9.0	1972	6	1975	1	1	1980
Apr	1.0	1975	5	1.0	1975	1	1975	5	#	1975
May	.0	0	0	.0	0	0	0	0	0	0
Jun	.0	0	0	.0	0	0	0	0	0	0
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	.0	0	0	.0	0	0	0	0	0	0
Sep	.0	0	0	.0	0	0	0	0	0	0
Oct	.3	1971	30	.3	1971	#+	1999	28	#+	1999
Nov	7.5	1994	25	13.0	1973	6	1979	23	1	1982
Dec	16.0	1971	9	44.5	1971	23	1971	14	15	1971
Ann	16.0	Dec 1971	9	44.5	Dec 1971	32	Jan 1971	15	19	Jan 1971

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	4.5	3.4	1.0	.3	.1
Feb	2.4	1.8	.7	.2	.0
Mar	1.0	.6	.1	@	.0
Apr	@	@	.0	.0	.0
May	.0	.0	.0	.0	.0
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	.0	.0	.0	.0	.0
Oct	@	.0	.0	.0	.0
Nov	1.5	1.2	.3	.1	.0
Dec	5.0	3.5	1.6	.6	.1
Ann	14.4	10.5	3.7	1.2	.2

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	18.6	13.3	9.1	3.8
Feb	9.9	7.3	6.0	3.0
Mar	1.8	.5	.2	.0
Apr	.1	.0	.0	.0
May	.0	.0	.0	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.0	.0	.0	.0
Oct	.0	.0	.0	.0
Nov	3.4	.8	.0	.0
Dec	13.5	9.6	5.8	2.5
Ann	47.3	31.5	21.1	9.3

+ 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	5/21	5/14	5/09	5/05	5/01	4/27	4/23	4/18	4/11
32	4/25	4/20	4/16	4/13	4/10	4/07	4/04	4/01	3/27
28	4/04	3/29	3/25	3/21	3/18	3/14	3/10	3/06	2/28
24	3/19	3/11	3/05	2/28	2/24	2/19	2/14	2/09	2/01
20	3/08	3/01	2/24	2/20	2/16	2/12	2/07	2/02	1/26
16	2/25	2/17	2/11	2/06	2/01	1/27	1/22	1/15	1/01

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	10/03	10/07	10/09	10/12	10/14	10/17	10/20	10/25
32	10/07	10/13	10/17	10/20	10/23	10/26	10/30	11/03	11/08
28	10/14	10/22	10/28	11/02	11/07	11/11	11/16	11/22	11/30
24	11/01	11/09	11/15	11/19	11/24	11/28	12/03	12/08	12/16
20	11/11	11/20	11/27	12/02	12/08	12/13	12/18	12/25	1/03
16	11/17	11/26	12/03	12/10	12/15	12/21	12/28	1/05	1/21

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	192	182	175	169	163	158	152	145	135
32	221	212	206	200	195	190	185	178	170
28	264	254	246	239	233	227	221	213	203
24	307	295	287	279	272	265	258	249	237
20	332	319	309	302	294	287	279	270	257
16	>365	345	332	323	316	309	302	293	282

***** 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)

Base — Heating Degree Days (1)

Below	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
65	1168	897	716	425	191	73	16	12	125	439	813	1122	5997
60	1013	757	561	278	83	23	3	2	52	287	663	967	4689
57	920	673	468	197	41	10	0	0	25	203	573	874	3984
55	858	617	407	150	22	5	0	0	14	153	516	812	3554
50	703	478	261	60	2	0	0	0	2	60	377	659	2602
32	225	98	8	0	0	0	0	0	0	0	59	198	588

Base — Cooling Degree Days (1)

Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	80	125	314	565	848	1032	1255	1258	932	584	236	100	7329
55	0	0	0	25	157	347	542	545	255	24	3	0	1898
57	0	0	0	13	114	292	480	483	207	12	0	0	1601
60	0	0	0	4	63	215	389	391	143	3	0	0	1208
65	0	0	0	0	16	115	248	247	67	0	0	0	693
70	0	0	0	0	2	48	133	128	23	0	0	0	334

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	11	107	327	596	787	998	1005	682	341	62	2	0	11	118	445	1041	1828	2826	3831	4513	4854	4916	4918
45	0	0	27	184	441	637	843	850	532	195	14	0	0	0	27	211	652	1289	2132	2982	3514	3709	3723	3723
50	0	0	2	81	289	487	688	695	382	89	1	0	0	0	2	83	372	859	1547	2242	2624	2713	2714	2714
55	0	0	0	21	160	340	533	540	245	26	0	0	0	0	0	21	181	521	1054	1594	1839	1865	1865	1865
60	0	0	0	3	68	200	383	385	128	4	0	0	0	0	0	3	71	271	654	1039	1167	1171	1171	1171
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	1	59	183	342	489	654	658	414	187	17	0	0	1	60	243	585	1074	1728	2386	2800	2987	3004	3004

(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

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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