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: MALHEUR REFUGE HDQ, OR **COOP ID: 355162**

Climate Division: OR 7 **NWS Call Sign:** **Elevation: 4,109 Feet** **Lat: 43˚16N** **Lon: 118˚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	37.2	17.7	27.5	61	1992	29	35.8	1998	-33	1962	22	17.3	1979	1164	0	.0	.0	2.6	8.1	28.8	2.2
Feb	43.2	22.2	32.7	67	1995	19	39.7	1995	-16	1985	4	21.8	1989	904	0	.0	.0	7.2	3.2	25.2	1.0
Mar	50.0	26.6	38.3	76	1966	30	43.7	1978	-9	1993	1	32.3	1985	827	0	.0	.0	17.1	.4	24.8	@
Apr	57.8	31.3	44.6	86	1977	24	51.4	1990	7	1968	13	36.4	1975	614	0	.0	.0	24.4	.0	19.2	.0
May	66.2	38.6	52.4	93+	1983	28	58.3	1992	19+	1988	2	46.8	1977	393	1	.0	.2	30.1	.0	7.1	.0
Jun	74.2	44.5	59.4	100	1961	22	64.7	1977	19	1987	1	54.9	1976	198	28	.0	1.4	29.9	.0	1.3	.0
Jul	82.7	49.7	66.2	102	1967	12	71.4	1985	29	1968	20	57.4	1993	79	117	@	6.3	31.0	.0	@	.0
Aug	81.6	48.3	65.0	104	1961	4	69.2	1986	27+	1992	26	60.5	1976	74	72	.1	5.6	31.0	.0	.4	.0
Sep	73.5	39.3	56.4	95	1967	1	62.1	1990	16+	1972	25	50.1	1985	273	16	.0	.6	29.8	.0	5.8	.0
Oct	61.8	30.7	46.3	97	1996	9	52.1	1988	3	1971	29	42.7	1984	582	0	.0	@	28.1	.1	18.8	.0
Nov	46.1	24.6	35.4	73	1975	4	42.9	1995	-9+	1993	25	26.8	1985	889	0	.0	.0	11.7	1.5	24.5	.5
Dec	37.2	18.4	27.8	63	1979	17	34.2	1975	-30	1972	10	10.1	1985	1161	0	.0	.0	2.5	7.5	29.0	2.5
Ann	59.3	32.7	46.0	104	Aug 1961	4	71.4	Jul 1985	-33	Jan 1962	22	10.1	Dec 1985	7158	234	.1	14.1	245.4	20.8	184.9	6.2

\+ 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: 1959-2001

(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	.98	.77	1.53	1969	20	2.93	1997	.07	1985
Feb	.75	.54	.77	1960	8	1.64	2000	.13	1977
Mar	1.11	1.09	1.19	1978	31	3.84	1983	.05	1988
Apr	.94	.91	1.57	1998	8	2.23	1978	.00	1977
May	1.17	.95	1.23	1964	28	3.73	1991	.17	1992
Jun	.83	.67	1.50	1991	18	2.40	1991	.07	1974
Jul	.44	.34	1.22	1984	23	1.27	1974	.00+	1996
Aug	.59	.31	1.55	1976	3	4.00	1976	.00+	2000
Sep	.55	.48	1.05	1966	14	1.40	1998	.00+	1999
Oct	.73	.51	1.49	2000	19	2.47	2000	.00+	1988
Nov	1.11	.87	1.25	1998	7	3.04	1998	.10	1974
Dec	.94	.64	1.14	1964	23	2.90	1995	.05	1990
Ann	10.14	10.23	1.57	Apr 1998	8	4.00	Aug 1976	.00+	Aug 2000

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	8.7	3.1	.2	.0
Feb	8.2	2.8	.1	.0
Mar	8.7	3.4	.3	@
Apr	7.3	2.8	.2	@
May	7.7	4.1	.3	@
Jun	5.2	2.2	.4	@
Jul	2.7	1.5	.1	@
Aug	3.2	1.7	.3	.1
Sep	4.0	1.7	.3	@
Oct	5.3	2.4	.3	.1
Nov	8.3	3.3	.3	.1
Dec	8.7	3.4	.1	.0
Ann	78.0	32.4	2.9	.3

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	.14	.22	.36	.50	.64	.80	.98	1.20	1.50	1.99	2.47
Feb	.14	.20	.31	.42	.52	.63	.76	.92	1.13	1.46	1.78
Mar	.13	.22	.38	.53	.69	.88	1.09	1.35	1.71	2.30	2.88
Apr	.17	.30	.46	.59	.71	.84	.99	1.15	1.37	1.71	2.03
May	.19	.29	.46	.63	.79	.97	1.18	1.43	1.77	2.31	2.83
Jun	.09	.15	.27	.39	.51	.65	.81	1.02	1.29	1.75	2.20
Jul	.00	.00	.08	.18	.27	.36	.46	.57	.73	.97	1.21
Aug	.00	.00	.02	.08	.16	.28	.44	.66	.99	1.59	2.21
Sep	.00	.00	.03	.13	.23	.35	.49	.68	.94	1.37	1.81
Oct	.00	.00	.21	.34	.46	.59	.74	.93	1.16	1.56	1.93
Nov	.17	.27	.43	.58	.74	.91	1.11	1.35	1.67	2.20	2.71
Dec	.10	.17	.30	.44	.58	.73	.92	1.15	1.46	1.98	2.48
Ann	6.08	6.82	7.79	8.54	9.22	9.89	10.59	11.38	12.35	13.78	15.04

\+ 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: 1959-2001
(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	5.5	2	#	7.0	1997	25	22.5	1996	21	1982	1	13	1982	4.0	2.3	.7	.3	.0	9.2	7.1	5.5	1.3
Feb	3.4	3.2	1	#	6.3	1999	9	12.7	1993	13	1996	4	6	1993	2.6	1.8	.4	.1	.0	5.6	3.7	2.3	.1
Mar	2.6	1.5	#	0	10.0	1982	18	14.9	1982	10	1993	1	3	1993	1.7	1.0	.2	@	@	1.5	.8	.4	@
Apr	1.1	.0	#	0	5.0	1978	6	7.0	1978	1	1982	14	#+	1996	.9	.6	.2	@	.0	@	.0	.0	.0
May	.3	.0	#	0	6.0	1981	6	6.0	1981	#	2000	11	#	2000	.2	.1	@	@	.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	1.0	1971	29	1.0	1971	0	0	0	0	0	@	@	.0	.0	.0	.0	.0	.0	.0
Oct	.2	.0	#	0	1.5	1980	26	1.8	1971	5	1991	29	#+	1991	.2	.1	.0	.0	.0	.1	.0	.0	.0
Nov	3.9	1.8	#	#	14.0	1977	21	14.5	1983	14	1977	21	1	1994	1.9	1.2	.3	.2	@	1.7	.4	.1	@
Dec	7.9	7.0	1	#	9.5	1981	29	24.6	1983	16	1981	31	7	1983	4.4	3.0	1.0	.4	.0	10.4	5.1	2.8	.4
Ann	26.5	19.0	N/A	N/A	14.0	Nov 1977	21	24.6	Dec 1983	21	Jan 1982	1	13	Jan 1982	15.9	10.1	2.8	1.0	@	28.5	17.1	11.1	1.8

+ 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	7/18	7/12	7/07	7/04	6/30	6/26	6/22	6/18	6/11
32	6/28	6/21	6/16	6/12	6/08	6/05	6/01	5/27	5/20
28	6/10	6/03	5/29	5/24	5/20	5/16	5/12	5/07	4/29
24	5/20	5/14	5/09	5/04	5/01	4/27	4/22	4/17	4/11
20	5/03	4/25	4/19	4/14	4/09	4/04	3/30	3/24	3/16
16	4/20	4/09	3/31	3/24	3/18	3/11	3/04	2/24	2/12

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	8/14	8/20	8/24	8/28	8/31	9/04	9/07	9/12	9/18
32	8/21	8/27	9/01	9/04	9/08	9/11	9/15	9/20	9/26
28	9/02	9/08	9/13	9/17	9/21	9/24	9/28	10/03	10/09
24	9/13	9/21	9/26	9/30	10/05	10/09	10/13	10/18	10/26
20	9/27	10/04	10/10	10/14	10/19	10/23	10/28	11/02	11/10
16	10/03	10/12	10/18	10/23	10/28	11/02	11/07	11/13	11/21

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	92	81	74	68	62	56	49	42	31
32	121	111	103	97	91	85	78	71	60
28	150	141	134	128	123	117	112	105	95
24	187	176	169	162	156	150	144	136	126
20	224	213	205	199	192	186	180	172	161
16	267	252	241	232	223	215	205	195	179

***** 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	1164	904	827	614	393	198	79	74	273	582	889	1161	7158
60	1009	764	672	467	249	100	26	20	159	427	739	1006	5638
57	916	680	579	382	175	58	12	6	106	336	649	913	4812
55	854	624	517	328	133	37	7	3	77	277	589	851	4297
50	704	489	369	207	56	9	0	0	27	148	445	696	3150
32	246	110	28	8	0	0	0	0	0	1	76	234	703

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	105	130	224	384	632	821	1061	1021	733	442	177	97	5827
55	0	0	0	14	52	167	355	311	119	6	0	0	1024
57	0	0	0	8	31	128	298	252	88	3	0	0	808
60	0	0	0	3	13	80	219	173	52	1	0	0	541
65	0	0	0	0	1	28	117	72	16	0	0	0	234
70	0	0	0	0	0	7	46	17	3	0	0	0	73

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	4	20	70	179	396	593	826	786	505	242	47	6	4	24	94	273	669	1262	2088	2874	3379	3621	3668	3674
45	0	0	20	89	255	445	671	631	358	125	14	0	0	0	20	109	364	809	1480	2111	2469	2594	2608	2608
50	0	0	0	35	138	299	516	477	228	52	1	0	0	0	0	35	173	472	988	1465	1693	1745	1746	1746
55	0	0	0	7	64	179	363	325	120	14	0	0	0	0	0	7	71	250	613	938	1058	1072	1072	1072
60	0	0	0	0	23	87	223	186	47	1	0	0	0	0	0	0	23	110	333	519	566	567	567	567
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	1	18	66	151	273	387	537	511	376	218	37	1	1	19	85	236	509	896	1433	1944	2320	2538	2575	2576

(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