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: SENEY WILDLIFE REFUGE, MI **COOP ID: 207515**

Climate Division: MI 2 **NWS Call Sign:** **Elevation: 710 Feet** **Lat: 46˚17N** **Lon: 85˚57W**

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	25.5	7.5	16.5	46	1996	18	27.2	1990	-30	1963	26	6.9	1994	1504	0	.0	.0	.0	24.4	30.9	10.1
Feb	29.1	8.6	18.9	56+	2000	24	32.0	1998	-41	1979	17	10.6	1994	1292	0	.0	.0	.3	18.6	27.6	9.2
Mar	38.3	17.3	27.8	68	1987	7	36.7	2000	-31	1972	3	19.4	1989	1152	0	.0	.0	2.9	7.9	28.2	4.3
Apr	51.7	31.2	41.5	83	1990	26	47.5	1986	-1	1972	5	35.1	1982	708	0	.0	.0	16.7	.9	18.9	.1
May	67.2	42.6	54.9	95	1986	29	61.6	1977	14+	1966	7	47.3	1997	340	26	.0	.3	29.1	.0	5.2	.0
Jun	75.1	50.7	62.9	93	1975	30	67.4	1987	24	1989	5	57.2	1982	123	60	.0	.6	30.0	.0	.4	.0
Jul	80.0	55.8	67.9	100	1975	30	73.3	1983	35+	1965	6	60.8	1992	40	131	@	2.2	31.0	.0	.0	.0
Aug	77.7	54.6	66.2	96+	1969	17	70.9	1983	30	1976	30	61.3	1977	68	104	.0	.7	31.0	.0	@	.0
Sep	68.5	47.4	58.0	91	1976	8	62.1	1998	25+	1965	27	53.8	1974	221	9	.0	.1	29.7	.0	1.4	.0
Oct	56.3	37.8	47.1	82	1971	1	54.3	1971	17	1981	24	41.6	1981	556	0	.0	.0	23.2	@	9.9	.0
Nov	41.0	27.5	34.3	70	1990	5	41.1	1999	-9	1976	29	27.1	1995	923	0	.0	.0	5.7	5.0	22.9	.1
Dec	29.6	15.0	22.3	58	1982	3	29.9	1997	-33	1976	30	11.8	1989	1323	0	.0	.0	.3	17.9	30.0	4.0
Ann	53.3	33.0	43.2	100	Jul 1975	30	73.3	Jul 1983	-41	Feb 1979	17	6.9	Jan 1994	8250	330	@	3.9	199.9	74.7	175.4	27.8

\+ 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: 1961-2001

(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	2.05	1.62	1.40+	1982	9	4.67	1996	.66	1998
Feb	1.19	1.12	1.53	1994	19	3.25	1971	.00	1997
Mar	1.92	1.60	1.57	1977	12	5.65	1977	.18	1993
Apr	1.94	1.96	1.95	1972	13	3.91	1993	.35	1992
May	2.50	2.34	3.15	1970	31	4.78	1971	.58	1986
Jun	3.10	3.09	3.14	1969	27	5.89	1974	.84	1983
Jul	3.69	3.58	4.40	1975	19	6.01	1993	1.09	1998
Aug	3.20	3.01	2.68	1978	16	7.27	1988	.46	2000
Sep	3.40	3.31	4.29	1970	21	6.71	1990	1.21	1976
Oct	3.16	2.87	1.94	1966	15	6.31	1995	.78	1975
Nov	2.66	2.28	1.85	1977	3	6.66	1977	.79	1994
Dec	1.95	1.78	1.63	1975	14	4.31	1985	.06	2000
Ann	30.76	31.04	4.40	Jul 1975	19	7.27	Aug 1988	.00	Feb 1997

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	16.8	6.5	.7	.1
Feb	12.5	3.7	.2	.1
Mar	11.6	4.8	.9	.2
Apr	9.9	5.0	1.0	.2
May	10.5	5.7	1.6	.3
Jun	11.3	6.5	1.9	.6
Jul	11.5	6.4	2.1	.6
Aug	11.4	6.1	1.8	.6
Sep	13.0	7.1	2.1	.5
Oct	13.7	7.0	1.8	.4
Nov	14.8	6.6	1.0	.3
Dec	16.3	6.2	.6	.1
Ann	153.3	71.6	15.7	4.0

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	.65	.84	1.13	1.38	1.62	1.87	2.14	2.46	2.87	3.51	4.11
Feb	.20	.36	.56	.72	.88	1.05	1.24	1.45	1.74	2.19	2.61
Mar	.43	.61	.89	1.14	1.39	1.66	1.96	2.32	2.80	3.55	4.26
Apr	.51	.69	.97	1.22	1.46	1.72	2.00	2.34	2.77	3.47	4.11
May	.74	.97	1.33	1.64	1.94	2.25	2.59	3.00	3.53	4.35	5.11
Jun	1.03	1.32	1.75	2.12	2.47	2.83	3.23	3.69	4.29	5.21	6.06
Jul	1.45	1.79	2.28	2.68	3.06	3.45	3.87	4.35	4.97	5.91	6.77
Aug	.92	1.22	1.68	2.08	2.46	2.87	3.32	3.85	4.53	5.60	6.60
Sep	1.44	1.75	2.18	2.53	2.86	3.20	3.56	3.97	4.50	5.29	6.01
Oct	1.31	1.60	2.00	2.34	2.65	2.97	3.31	3.70	4.20	4.97	5.66
Nov	.92	1.17	1.54	1.85	2.14	2.45	2.78	3.17	3.66	4.43	5.14
Dec	.31	.48	.76	1.03	1.31	1.61	1.96	2.38	2.95	3.86	4.74
Ann	22.59	24.19	26.22	27.76	29.12	30.44	31.79	33.28	35.08	37.68	39.93

+ 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: 1961-2001
(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	32.7	32.8	16	16	12.1	1978	26	53.2	1978	36	1978	31	27+	1982	16.8	9.9	3.3	.9	.1	26.8	26.3	26.1	22.6
Feb	21.6	21.7	20	20	7.7	1976	4	35.5	1972	39	1978	6	35	1978	10.9	5.9	1.8	.4	.0	-9.9	-9.9	-9.9	-9.9
Mar	17.4	15.0	17	18	14.0	1985	3	33.3	1975	42	1977	6	33	1978	7.8	5.0	1.8	.5	.2	-9.9	-9.9	-9.9	-9.9
Apr	4.0	.5	4	1	12.0	1977	5	13.7	1979	28	1975	5	16	1975	2.1	1.1	.3	.2	@	8.7	7.9	6.9	4.8
May	.3	.0	#	0	2.0	1984	1	2.5	1984	2	1984	1	#+	1984	.3	.2	.0	.0	.0	.1	.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	1989	23	.1	1989	0	0	0	0	0	@	.0	.0	.0	.0	.0	.0	.0	.0
Oct	1.3	.0	#	0	4.5	1989	20	10.7	1976	5	1989	20	#+	1997	.9	.5	.2	.0	.0	.5	.1	@	.0
Nov	14.6	16.9	1	1	12.0	1989	16	25.7	1976	14	1977	26	5	1976	6.3	3.7	.9	.5	.1	7.4	4.3	2.2	.2
Dec	34.3	39.2	7	6	10.5	1972	16	51.5	1972	24+	1995	13	17	1976	12.9	8.1	3.0	.6	.1	-9.9	-9.9	-9.9	-9.9
Ann	126.2	126.1	N/A	N/A	14.0	Mar 1985	3	53.2	Jan 1978	42	Mar 1977	6	35	Feb 1978	58.0	34.4	11.3	3.1	.5	-9.9	-9.9	-9.9	-9.9

+ 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	6/29	6/22	6/17	6/13	6/09	6/05	6/01	5/27	5/21
32	6/12	6/06	6/01	5/28	5/25	5/21	5/17	5/13	5/06
28	5/24	5/18	5/14	5/10	5/07	5/04	4/30	4/26	4/21
24	5/06	4/30	4/26	4/22	4/19	4/15	4/12	4/08	4/02
20	4/24	4/19	4/16	4/13	4/11	4/08	4/06	4/02	3/29
16	4/17	4/12	4/08	4/05	4/02	3/30	3/27	3/23	3/18

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	8/22	8/28	9/01	9/05	9/08	9/11	9/15	9/19	9/25
32	9/10	9/15	9/19	9/22	9/26	9/29	10/02	10/06	10/12
28	9/23	9/29	10/04	10/08	10/11	10/15	10/19	10/24	10/30
24	10/11	10/18	10/22	10/26	10/30	11/02	11/06	11/11	11/17
20	10/27	11/01	11/05	11/08	11/11	11/14	11/17	11/21	11/26
16	11/04	11/09	11/13	11/16	11/19	11/22	11/25	11/29	12/04

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	79	73	64
32	146	138	133	128	123	119	114	108	100
28	184	174	168	162	157	151	145	139	129
24	222	212	205	199	193	187	181	174	164
20	238	230	223	218	213	209	203	197	189
16	254	246	240	235	230	226	221	215	207

***** 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	1504	1292	1152	708	340	123	40	68	221	556	923	1323	8250
60	1349	1152	997	560	224	52	8	19	108	408	773	1168	6818
57	1256	1068	904	474	167	26	1	7	60	324	683	1075	6045
55	1194	1012	842	418	133	16	0	3	39	272	623	1013	5565
50	1039	872	688	290	68	3	0	0	9	162	475	858	4464
32	494	395	219	27	0	0	0	0	0	4	79	353	1571

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	13	27	90	310	709	927	1114	1059	778	471	147	53	5698
55	0	0	0	11	130	252	401	349	127	26	0	0	1296
57	0	0	0	6	101	203	340	291	89	15	0	0	1045
60	0	0	0	3	65	139	254	210	46	6	0	0	723
65	0	0	0	0	26	60	131	104	9	0	0	0	330
70	0	0	0	0	8	16	50	37	1	0	0	0	112

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	12	116	435	672	852	802	529	231	37	2	0	0	12	128	563	1235	2087	2889	3418	3649	3686	3688
45	0	0	0	51	293	522	697	647	382	124	11	0	0	0	0	51	344	866	1563	2210	2592	2716	2727	2727
50	0	0	0	23	180	374	542	493	246	57	2	0	0	0	0	23	203	577	1119	1612	1858	1915	1917	1917
55	0	0	0	5	94	239	387	340	132	16	0	0	0	0	0	5	99	338	725	1065	1197	1213	1213	1213
60	0	0	0	1	44	125	244	197	61	2	0	0	0	0	0	1	45	170	414	611	672	674	674	674
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	0	8	83	272	425	552	512	313	123	13	0	0	0	8	91	363	788	1340	1852	2165	2288	2301	2301

(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