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: WILLOW SPRG RADIO KUKU, MO **COOP ID: 238995**

Climate Division: MO 5 **NWS Call Sign:** **Elevation: 1,310 Feet** **Lat: 36˚59N** **Lon: 91˚59W**

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	42.9	23.7	33.3	77+	1952	26	45.1	1990	-17	1963	24	21.8	1977	983	0	.0	.0	9.3	7.3	25.8	1.5
Feb	49.7	28.5	39.1	85	1962	13	48.2	1976	-24	1951	2	27.8	1978	726	0	.0	.0	13.4	3.8	19.2	.7
Mar	59.7	36.7	48.2	87	1967	13	54.2	1977	-2+	1967	7	40.5	1996	525	4	.0	.0	23.7	.6	13.3	.0
Apr	69.9	45.7	57.8	92+	1963	21	64.9	1977	17+	1973	11	51.2	1983	247	31	.0	.1	28.8	.0	4.3	.0
May	77.1	54.2	65.7	94	1953	26	72.1	1977	24	1980	7	61.0	1981	97	118	.0	.2	31.0	.0	.4	.0
Jun	84.2	62.7	73.5	105	1952	29	78.1	1977	36	1972	1	69.3	1992	6	259	@	3.5	30.0	.0	.0	.0
Jul	89.7	67.2	78.5	108	1954	14	84.6	1980	43	1972	6	75.1	1994	0	417	.7	13.7	31.0	.0	.0	.0
Aug	89.4	65.6	77.5	106	1962	6	84.0	1980	41	1967	28	70.7	1992	4	392	.5	13.5	31.0	.0	.0	.0
Sep	81.1	58.3	69.7	104	2000	1	74.7	1977	28	1967	29	64.9	1993	46	187	.2	3.4	30.0	.0	.1	.0
Oct	70.9	46.7	58.8	93+	1963	10	65.0	1971	18	1952	29	52.6	1987	219	27	.0	.1	30.4	.0	3.0	.0
Nov	56.7	36.6	46.7	83	1980	7	56.5	1999	1	1958	29	40.0	1996	552	1	.0	.0	20.6	.5	13.0	.0
Dec	46.0	27.5	36.8	78	1951	31	44.7	1971	-16	1983	25	23.5	1983	876	0	.0	.0	10.7	4.0	23.1	.6
Ann	68.1	46.1	57.1	108	Jul 1954	14	84.6	Jul 1980	-24	Feb 1951	2	21.8	Jan 1977	4281	1436	1.4	34.5	289.9	16.2	102.2	2.8

\+ 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: 1948-2001

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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	2.21	1.88	3.82	1975	10	7.02	1982	.00	1986
Feb	2.41	2.17	4.07	1966	9	6.44	1990	.00	1996
Mar	4.21	4.46	3.99	1977	28	8.54	1977	.79	1972
Apr	4.54	4.12	3.79	1974	22	9.25	1972	1.33	1980
May	4.85	4.59	5.25	1956	15	8.34	1990	1.72	1975
Jun	3.98	3.48	5.00	2000	17	8.55	1985	.00+	1998
Jul	3.35	2.65	3.50	1954	25	9.30	1979	.86	1990
Aug	2.94	3.24	2.93	1994	31	5.68	1977	.00	1998
Sep	3.42	3.07	4.22	1993	25	12.84	1993	.00	1998
Oct	3.71	3.06	5.00	1999	10	12.93	1984	.60	1992
Nov	4.32	3.92	3.75	1985	19	10.70	1985	.43	1976
Dec	3.50	2.54	6.01	1982	3	14.37	1982	.53	1994
Ann	43.44	43.21	6.01	Dec 1982	3	14.37	Dec 1982	.00+	Sep 1998

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	6.3	4.4	1.1	.4
Feb	5.6	4.0	1.7	.6
Mar	8.4	7.1	3.2	1.2
Apr	8.6	6.4	3.2	1.5
May	10.2	7.8	3.3	1.3
Jun	7.5	5.9	2.7	1.3
Jul	6.5	5.2	2.3	1.2
Aug	6.2	4.8	2.1	1.0
Sep	7.0	5.2	2.2	1.1
Oct	6.2	5.0	2.5	1.1
Nov	7.2	5.8	3.0	1.4
Dec	6.8	4.8	2.4	1.0
Ann	86.5	66.4	29.7	13.1

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	.15	.38	.73	1.05	1.39	1.77	2.20	2.73	3.45	4.62	5.75
Feb	.52	.86	1.26	1.58	1.89	2.20	2.54	2.94	3.45	4.24	4.98
Mar	1.06	1.46	2.07	2.62	3.15	3.72	4.35	5.09	6.07	7.62	9.06
Apr	1.47	1.90	2.54	3.08	3.60	4.14	4.73	5.42	6.31	7.69	8.97
May	2.02	2.46	3.08	3.59	4.07	4.56	5.08	5.68	6.45	7.61	8.67
Jun	.00	1.39	2.21	2.77	3.27	3.77	4.31	4.92	5.70	6.89	7.98
Jul	.74	1.05	1.55	1.99	2.43	2.90	3.43	4.07	4.90	6.23	7.49
Aug	.44	.83	1.33	1.74	2.15	2.58	3.05	3.62	4.35	5.52	6.62
Sep	.29	.67	1.23	1.73	2.24	2.80	3.44	4.22	5.27	6.96	8.59
Oct	.90	1.25	1.79	2.28	2.75	3.26	3.82	4.50	5.37	6.77	8.07
Nov	.86	1.25	1.89	2.47	3.06	3.68	4.40	5.25	6.39	8.20	9.93
Dec	.58	.88	1.39	1.87	2.37	2.90	3.52	4.27	5.27	6.89	8.45
Ann	28.81	31.56	35.14	37.88	40.33	42.72	45.19	47.95	51.31	56.23	60.51

\+ 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: 1948-2001
(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	4.5	2.1	1	#
Feb	1.9	.0	1	#
Mar	1.0	.0	#	0
Apr	.4	.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	.8	.0	#	0
Dec	1.0	.0	#	0
Ann	9.6	2.1	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	7.0	1978	17	21.0	1977	12	1977	12	5	1977
Feb	7.0	1993	16	14.3	1993	18	1980	8	4	1980
Mar	13.0	1994	9	13.0	1994	8	1975	10	1	1975
Apr	3.0	1980	14	3.0+	1980	3	1980	14	#+	1993
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	1.0	1993	30	1.0	1993	1	1993	30	#	1993
Nov	5.0	1975	27	6.0	1975	6	1975	27	#+	1993
Dec	5.0	1975	26	6.0	1975	6+	2000	24	2	2000
Ann	13.0	Mar 1994	9	21.0	Jan 1977	18	Feb 1980	8	5	Jan 1977

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	2.0	1.6	.3	.2	.0
Feb	.8	.7	.3	.1	.0
Mar	.3	.3	.1	.1	@
Apr	.2	.2	@	.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
Nov	.3	.3	.2	@	.0
Dec	.4	.3	.2	@	.0
Ann	4.0	3.4	1.1	.4	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	4.9	3.3	2.0	.3
Feb	3.0	1.1	.4	.0
Mar	.7	.2	.1	.0
Apr	.2	@	.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
Dec	.6	.3	.1	.0
Ann	9.6	5.1	2.7	.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	5/17	5/12	5/07	5/04	5/01	4/27	4/24	4/20	4/14
32	5/07	4/30	4/26	4/22	4/18	4/14	4/10	4/05	3/30
28	4/20	4/15	4/11	4/08	4/05	4/02	3/30	3/26	3/21
24	4/17	4/09	4/04	3/30	3/26	3/22	3/17	3/11	3/04
20	4/03	3/27	3/22	3/17	3/13	3/09	3/05	2/28	2/21
16	3/23	3/15	3/09	3/04	2/27	2/23	2/18	2/12	2/04

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	9/26	9/30	10/03	10/05	10/07	10/10	10/12	10/15	10/19
32	9/29	10/05	10/09	10/12	10/16	10/19	10/23	10/27	11/02
28	10/11	10/17	10/21	10/25	10/28	10/31	11/03	11/08	11/13
24	10/21	10/28	11/02	11/06	11/10	11/14	11/18	11/23	11/30
20	10/30	11/06	11/12	11/16	11/20	11/24	11/29	12/04	12/11
16	11/09	11/16	11/21	11/25	11/29	12/03	12/07	12/12	12/19

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	176	170	166	162	159	156	152	148	142
32	204	196	190	185	180	176	171	165	156
28	227	220	214	209	205	201	196	190	183
24	259	248	241	234	228	222	216	209	198
20	281	271	263	257	251	245	239	232	221
16	301	292	285	279	274	269	263	256	247

***** 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	983	726	525	247	97	6	0	4	46	219	552	876	4281
60	828	590	383	146	40	1	0	0	14	114	412	723	3251
57	737	512	305	99	21	0	0	0	6	69	333	637	2719
55	682	460	258	73	13	0	0	0	3	47	284	579	2399
50	538	339	160	28	3	0	0	0	0	14	181	441	1704
32	156	62	8	0	0	0	0	0	0	0	12	101	339

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	196	261	510	774	1043	1243	1440	1412	1131	831	451	248	9540
55	9	15	47	156	343	553	727	699	444	165	33	13	3204
57	3	11	32	122	289	493	665	637	387	125	22	9	2795
60	0	5	17	80	215	404	572	544	305	77	12	2	2233
65	0	0	4	31	118	259	417	392	187	27	1	0	1436
70	0	0	0	9	50	134	267	252	99	6	0	0	817

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	56	116	264	493	759	970	1161	1131	860	556	224	76	56	172	436	929	1688	2658	3819	4950	5810	6366	6590	6666
45	25	60	165	352	604	820	1006	976	710	406	134	38	25	85	250	602	1206	2026	3032	4008	4718	5124	5258	5296
50	3	24	89	232	450	670	851	821	560	271	74	12	3	27	116	348	798	1468	2319	3140	3700	3971	4045	4057
55	0	6	44	132	301	520	696	666	414	155	31	3	0	6	50	182	483	1003	1699	2365	2779	2934	2965	2968
60	0	0	17	65	173	370	541	511	279	71	7	0	0	0	17	82	255	625	1166	1677	1956	2027	2034	2034
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	39	81	175	307	485	656	793	764	565	349	136	48	39	120	295	602	1087	1743	2536	3300	3865	4214	4350	4398

(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