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: TOWANDA 1 ESE, PA **COOP ID: 368905**

Climate Division: PA 6 **NWS Call Sign:** **Elevation: 750 Feet** **Lat: 41˚45N** **Lon: 76˚26W**

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	33.7	15.0	24.4	70	1932	13	33.9	1990	-27+	1994	21	13.6	1977	1260	0	.0	.0	2.5	14.0	28.6	3.7
Feb	36.3	15.7	26.0	74	1954	16	33.3	1998	-27	1934	28	15.4	1979	1092	0	.0	.0	3.7	10.5	25.0	2.8
Mar	46.0	24.7	35.4	85+	1986	31	41.8	1973	-13	1967	19	28.3	1984	920	0	.0	.0	11.6	3.2	23.0	.5
Apr	58.3	34.7	46.5	90+	1941	20	51.9	1985	13	1982	7	40.9	1975	555	0	.0	.1	23.5	.2	12.7	.0
May	69.9	44.9	57.4	96	1996	21	63.6	1991	24	1966	10	52.7	1997	254	18	.0	.3	30.6	.0	1.7	.0
Jun	77.8	54.0	65.9	100	1952	26	69.3	1991	34+	1929	3	61.8	1985	57	83	.0	1.3	30.0	.0	.0	.0
Jul	82.2	58.4	70.3	104	1936	9	74.8	1988	38	1963	9	66.8	2000	10	175	.1	3.6	31.0	.0	.0	.0
Aug	80.6	57.1	68.9	101	2001	10	72.8	1980	33	1940	25	64.9	1982	21	140	.0	2.3	31.0	.0	.0	.0
Sep	72.9	49.4	61.2	101	1953	2	64.5	1971	25+	1947	28	58.2	1984	136	20	.0	.6	30.0	.0	.3	.0
Oct	61.9	38.3	50.1	92	1927	2	56.3	1971	16	1940	29	46.0	1972	463	1	.0	.0	28.1	.0	7.8	.0
Nov	49.3	30.5	39.9	83	1950	2	45.5	1975	-7	1938	26	33.7	1976	753	0	.0	.0	13.5	.9	17.7	.0
Dec	38.5	21.9	30.2	70	1984	29	36.8	1982	-17	1989	25	15.9	1989	1079	0	.0	.0	3.8	7.8	25.9	1.0
Ann	59.0	37.1	48.0	104	Jul 1936	9	74.8	Jul 1988	-27+	Jan 1994	21	13.6	Jan 1977	6600	437	.1	8.2	239.3	36.6	142.7	8.0

\+ 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: 1926-2001

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

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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	2.14	1.85	1.39	1978	9	6.11	1978	.26	1985
Feb	2.10	1.63	1.78	1958	28	4.91	1981	.47	1987
Mar	2.60	2.57	1.93+	1964	10	4.88	1994	.44	1981
Apr	3.17	2.64	5.40	1937	9	8.30	1983	.79	1997
May	3.25	3.18	2.52	1944	7	6.71	1989	1.00	1993
Jun	3.69	3.19	3.81	1972	23	9.98	1972	.77	1991
Jul	3.29	3.30	2.25	1933	16	5.00	1984	.60	1983
Aug	2.93	2.69	2.79	1954	31	6.95	1994	.56	1998
Sep	3.39	2.96	4.52	1975	26	10.93	1975	.93	1998
Oct	2.71	2.33	3.14	1937	23	6.65	1995	.60	1982
Nov	2.89	2.66	2.77	1926	16	6.62	1972	.77	1998
Dec	2.39	1.94	3.07	1983	14	6.78	1983	.56	1989
Ann	34.55	34.45	5.40	Apr 1937	9	10.93	Sep 1975	.26	Jan 1985

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	10.7	5.4	1.3	.4
Feb	9.1	4.8	1.4	.3
Mar	10.6	5.6	1.8	.5
Apr	12.0	6.8	2.2	.7
May	13.2	7.6	2.0	.4
Jun	12.7	7.9	2.2	.6
Jul	11.7	7.3	2.1	.7
Aug	10.5	6.4	1.8	.6
Sep	10.4	6.3	2.2	.6
Oct	10.4	5.3	1.5	.7
Nov	11.0	5.7	1.9	.6
Dec	10.2	5.5	1.4	.4
Ann	132.5	74.6	21.8	6.5

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	.37	.56	.87	1.16	1.46	1.79	2.16	2.61	3.21	4.19	5.12
Feb	.53	.72	1.03	1.30	1.57	1.85	2.16	2.53	3.02	3.79	4.51
Mar	.77	1.02	1.39	1.71	2.02	2.34	2.70	3.12	3.66	4.51	5.29
Apr	.90	1.21	1.66	2.05	2.44	2.84	3.28	3.81	4.49	5.55	6.54
May	1.16	1.47	1.91	2.29	2.64	3.00	3.40	3.86	4.45	5.36	6.19
Jun	1.12	1.47	1.99	2.44	2.88	3.34	3.84	4.43	5.19	6.38	7.49
Jul	1.39	1.69	2.10	2.45	2.77	3.10	3.45	3.85	4.36	5.14	5.85
Aug	.83	1.11	1.53	1.89	2.25	2.62	3.04	3.52	4.15	5.14	6.06
Sep	1.03	1.35	1.83	2.25	2.65	3.07	3.53	4.07	4.77	5.86	6.87
Oct	.75	1.00	1.39	1.73	2.07	2.42	2.81	3.26	3.86	4.79	5.67
Nov	1.08	1.35	1.73	2.06	2.36	2.68	3.02	3.42	3.92	4.70	5.41
Dec	.53	.75	1.10	1.42	1.73	2.07	2.44	2.89	3.49	4.43	5.33
Ann	25.84	27.56	29.74	31.39	32.84	34.23	35.67	37.25	39.16	41.91	44.27

\+ 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: 1926-2001
(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	9.8	9.0	3	2
Feb	9.9	8.6	3	2
Mar	7.7	5.5	2	#
Apr	1.8	.4	#	#
May	#	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.0	.0	0	0
Oct	.2	.0	#	0
Nov	2.5	1.0	#	#
Dec	6.5	5.0	1	1
Ann	38.4	29.5	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	13.5	1994	5	32.5	1978	24	1996	13	14	1994
Feb	18.0	1972	20	38.8	1972	30	1972	20	13	1994
Mar	17.3	1993	14	30.3	1993	31	1994	4	16	1994
Apr	6.5	1983	20	11.5	1983	11	1983	20	1	1984
May	#	1977	9	#+	1977	#	1977	9	#	1977
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	3.0	1993	31	3.0	1993	3	1993	31	#+	1997
Nov	10.0	1980	18	10.0	1980	10	1980	18	2	1980
Dec	9.0	1995	20	20.5	1973	10	1978	26	4	1995
Ann	18.0	Feb 1972	20	38.8	Feb 1972	31	Mar 1994	4	16	Mar 1994

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	6.1	3.3	1.2	.5	.1
Feb	5.5	3.1	1.0	.4	.1
Mar	3.4	2.2	.9	.4	.1
Apr	1.0	.5	.3	.1	.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	.1	.1	@	.0	.0
Nov	1.7	.9	.3	.2	@
Dec	3.9	2.1	.7	.2	.0
Ann	21.7	12.2	4.4	1.8	.3

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	17.0	7.8	4.5	1.3
Feb	15.0	9.2	5.3	2.1
Mar	7.7	4.6	2.8	1.5
Apr	1.3	.5	.3	.1
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	.1	@	.0	.0
Nov	2.2	.9	.5	@
Dec	8.3	3.5	1.1	@
Ann	51.6	26.5	14.5	5.0

+ 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	6/03	5/29	5/26	5/23	5/20	5/17	5/14	5/11	5/06
32	5/17	5/14	5/11	5/09	5/07	5/05	5/02	4/30	4/26
28	5/05	5/01	4/28	4/25	4/23	4/20	4/18	4/15	4/11
24	4/22	4/17	4/14	4/11	4/09	4/06	4/03	3/31	3/27
20	4/08	4/05	4/02	3/30	3/28	3/26	3/24	3/21	3/17
16	3/29	3/26	3/23	3/21	3/19	3/17	3/15	3/12	3/09

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	9/11	9/15	9/18	9/21	9/23	9/25	9/28	10/01	10/05
32	9/27	10/02	10/05	10/08	10/11	10/14	10/17	10/20	10/25
28	10/06	10/11	10/15	10/18	10/20	10/23	10/26	10/30	11/04
24	10/22	10/26	10/28	10/31	11/02	11/04	11/06	11/09	11/13
20	10/30	11/05	11/09	11/13	11/17	11/20	11/24	11/28	12/05
16	11/13	11/19	11/23	11/26	11/30	12/03	12/06	12/10	12/16

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	143	137	133	129	125	122	118	114	108
32	171	166	162	159	156	153	150	146	141
28	199	192	188	184	180	176	172	168	161
24	225	219	214	210	207	203	199	194	188
20	255	247	242	237	233	229	224	218	211
16	274	267	263	259	255	251	247	242	236

***** 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	1260	1092	920	555	254	57	10	21	136	463	753	1079	6600
60	1105	952	765	407	141	14	0	2	48	317	603	924	5278
57	1012	868	672	322	90	5	0	0	21	238	513	831	4572
55	950	812	610	268	63	2	0	0	11	191	454	769	4130
50	795	672	463	153	20	0	0	0	1	97	313	621	3135
32	301	234	84	2	0	0	0	0	0	0	22	187	830

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	63	67	187	437	788	1016	1188	1142	875	561	259	131	6714
55	0	0	0	13	138	328	475	429	196	39	1	0	1619
57	0	0	0	7	102	271	413	367	146	24	0	0	1330
60	0	0	0	2	61	190	320	276	83	10	0	0	942
65	0	0	0	0	18	83	175	140	20	1	0	0	437
70	0	0	0	0	3	22	69	50	2	0	0	0	146

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	12	19	79	248	565	795	953	908	653	337	116	28	12	31	110	358	923	1718	2671	3579	4232	4569	4685	4713
45	2	3	40	141	412	645	798	753	503	213	58	8	2	5	45	186	598	1243	2041	2794	3297	3510	3568	3576
50	0	0	14	74	269	496	643	598	360	111	27	3	0	0	14	88	357	853	1496	2094	2454	2565	2592	2595
55	0	0	4	37	154	350	488	443	227	50	6	0	0	0	4	41	195	545	1033	1476	1703	1753	1759	1759
60	0	0	1	12	79	213	333	292	122	16	1	0	0	0	1	13	92	305	638	930	1052	1068	1069	1069
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	3	12	57	165	349	512	630	597	406	210	66	9	3	15	72	237	586	1098	1728	2325	2731	2941	3007	3016

(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