

U. S. DEPARTMENT OF COMMERCE WEATHER BUREAU
 IN COOPERATION WITH NW SCHOOL AND EXPERIMENT STATION
 University of Minnesota
 CLIMATOGRAPHY OF THE UNITED STATES NO. 20 - 21

LATITUDE 47°48'
 LONGITUDE 96°36'
 ELEV. (GROUND) 888 Feet

CLIMATOLOGICAL SUMMARY

STATION
 CROOKSTON NW SCHOOL, MINNESOTA

MEANS AND EXTREMES FOR PERIOD 1931-1960

| Month | Temperature (°F) | | | | | | | | | ** Mean degree days | Precipitation Totals (Inches) | | | | | | Mean number of days | | | | | Month | |
|-------|------------------|---------------|---------|----------------|-------|---------------|-------|----------------|-------|------------------------|-------------------------------|------|-----------------|--------------------------|--------------|----------------|---------------------|---------------|---------------|---------------|--------------|-------|--------------|
| | Means | | | Extremes | | | Mean | Greatest daily | Year | | Snow, Sleet | | | Precip. .10 inch or more | Temperatures | | | | | | | | |
| | Daily maximum | Daily minimum | Monthly | Record highest | Year | Record lowest | | | | | Year | Mean | Maximum monthly | | Year | Greatest daily | Year | 90° and above | Max. | | Min. | | |
| | | | | | | | | | | | | | | | | | | | 32° and below | 32° and below | 0° and below | | 0° and below |
| (a) | 30 | 30 | 30 | 30 | | 30 | | 10 | 30 | 30 | | 30 | 30 | | 30 | 30 | 30 | 30 | 30 | | | | |
| Jan. | 15.1 | -4.7 | 5.2 | 47 | 1944+ | -41 | 1954 | 1872 | 0.57 | 0.54 | 1950 | 8.4 | 21.5 | 1949 | 7.0 | 1950+ | 2 | 0 | 28 | 31 | 20 | Jan. | |
| Feb. | 19.7 | -1.3 | 9.2 | 49 | 1932 | -51 | 1936 | 1511 | 0.55 | 1.28 | 1946 | 6.8 | 16.5 | 1943 | 8.0 | 1946 | 2 | 0 | 23 | 28 | 16 | Feb. | |
| Mar. | 32.9 | 13.3 | 23.1 | 78 | 1946 | -39 | 1948 | 1320 | 0.89 | 1.42 | 1941 | 8.1 | 21.3 | 1941 | 13.5 | 1943 | 3 | 0 | 15 | 29 | 6 | Mar. | |
| Apr. | 52.3 | 29.8 | 41.1 | 92 | 1952 | -9 | 1936 | 700 | 1.36 | 1.79 | 1945 | 3.2 | 17.9 | 1950 | 8.8 | 1946 | 1 | * | 19 | * | * | Apr. | |
| May | 68.2 | 41.7 | 55.0 | 101 | 1939 | 16 | 1958 | 306 | 2.50 | 3.82 | 1941 | 0.3 | 4.0 | 1954 | 3.0 | 1954 | 6 | 1 | 2 | 6 | 0 | May | |
| June | 75.8 | 52.2 | 64.0 | 101 | 1933 | 30 | 1953+ | 97 | 3.59 | 3.81 | 1941 | 0 | 0 | | 0 | | 7 | 1 | 0 | * | 0 | June | |
| July | 82.8 | 57.5 | 70.2 | 105 | 1936 | 39 | 1954+ | 25 | 2.95 | 1.65 | 1943 | 0 | 0 | | 0 | | 6 | 5 | 0 | 0 | 0 | July | |
| Aug. | 80.8 | 55.2 | 68.0 | 100 | 1958+ | 33 | 1935+ | 33 | 3.24 | 3.00 | 1944 | 0 | 0 | | 0 | | 6 | 1 | 0 | 0 | 0 | Aug. | |
| Sept. | 69.6 | 45.0 | 57.3 | 99 | 1931 | 21 | 1945+ | 259 | 1.86 | 3.12 | 1953 | 7 | 0.6 | 1942 | 0.6 | 1942 | 1 | 1 | 0 | 3 | 0 | Sept. | |
| Oct. | 58.8 | 35.6 | 47.3 | 85 | 1953+ | 1 | 1936 | 583 | 1.31 | 2.50 | 1949 | 0.6 | 5.1 | 1933 | 2.0 | 1938 | 3 | 0 | 1 | 19 | 0 | Oct. | |
| Nov. | 35.4 | 18.2 | 26.8 | 69 | 1931 | -27 | 1947 | 1134 | 0.94 | 1.28 | 1956 | 7.5 | 32.5 | 1947 | 9.0 | 1943 | 3 | 0 | 12 | 27 | 0 | Nov. | |
| Dec. | 21.7 | 3.3 | 12.5 | 56 | 1939 | -38 | 1933 | 1590 | 0.58 | 1.10 | 1945 | 7.2 | 17.4 | 1945 | 12.0 | 1945 | 2 | 0 | 24 | 31 | 13 | Dec. | |
| Year | 51.1 | 28.8 | 40.0 | 105 | 1936 | -51 | 1936 | 9430 | 20.34 | 3.82 | 1941 | 42.1 | 32.5 | 1947 | 13.5 | 1943 | 47 | 12 | 105 | 187 | 58 | Year | |

(a) Average length of record, years. + Also on earlier dates, months, or years.
 † Trace, an amount too small to measure. * Less than one half.

** Base 65°F

CLIMATE OF CROOKSTON, MINNESOTA

Crookston, county seat of Polk County, is located in northwestern Minnesota, 16 miles east of the North Dakota state line and about 90 miles south of the Canadian border.

The surrounding terrain is a smooth, level, nearly featureless plain. The most notable topographic feature is the valley of the Red Lake River entrenched 30 to 40 feet below the surrounding plain.

The location of Crookston in the center of the great land mass of the North American continent determines its continental climate. There is a large range of temperature, both daily and annually. This land mass heating under a sun that shines for long hours and at a fairly high altitude brings warm summers. This is also the season of greatest precipitation as southerly winds bring in warm moist air from the Gulf of Mexico. Winters are in sharp contrast as the land cools rapidly since the days are short and the sun low on the horizon. Northerly winds, sweeping unrestricted from Canada, funnel in frigid air which has low moisture content. November through February precipitation averages less than three inches.

A little over 44.0 inches of precipitation, or about 70 per cent of the annual total, falls during the months May through September. Precipitation of 0.01 inch or more can be expected on 100 days per year, 47 of which will have 0.10 inch or more and 3 with 1.00 inches or more. Rainfall intensities of 1.10 inch in one hour and 1.90 in 24 hours can be expected to recur about once in two years. There has been considerable variation from the annual average with the least 9.99 inches in 1936 and the most 32.87 inches in 1941. The greatest precipitation in any one month was 9.56 inches in June of 1895. On the average, 35 thunderstorms occur a year, some with hail and damaging winds. Only 6 tornadoes have been reported in Polk County during the period 1916-1960.

The mean temperature of the winter months of December, January and February is 9.0 degrees. The temperature drops to zero or lower on about 58 days a year. Most winters register at least one reading of 30 degrees below zero or lower. The winter of 1935-1936 was very cold with an average of 4.3 degrees below zero. The first measurable snowfall occurs in October about one year in three and the last in mid-April. Snow has fallen in May with the most notable a 4.0 inch fall the first 3 days of May 1954. Annual snowfall has ranged from 14.2 inches, 1910 to 69.8 inches, 1947.

The summers are pleasant with a mean temperature of 67.4 degrees for June, July and August. Temperatures of 100 degrees or higher are infrequent with only 17 occurrences in the last 30 years.

Wind, humidity and cloud observations have not been made at Crookston but are recorded for Fargo, North Dakota, 60 miles south. The following information based on the Fargo record can be considered as fairly representative of conditions at Crookston. The average wind speed is about 13 miles per hour with the highest average 15.2 mph in April. November through May the prevailing wind direction is north northwest and the remaining months south southeast. Noon time humidity for the year averages 62 per cent, ranging from 54 per cent in August to 73 per cent in December. During a typical year 88 clear, 115 partly cloudy and 162 cloudy days can be expected.

The following table gives the probability that the temperature indicated will occur on or after a given date in the spring; on or before a given date in the fall.

| Temperature | Probability | | | Days Between 50% Probability |
|-------------|-------------|------------|------------|------------------------------|
| | 20% | 50% | 80% | |
| 32°F | 5/28- 9/13 | 5/19- 9/21 | 5/10- 9/29 | 125 |
| 24 | 5/10- 9/29 | 4/28-10/10 | 4/16-10/21 | 165 |
| 16 | 4/16-10/20 | 4/ 6-10/31 | 3/28-11/12 | 208 |
| 40 | 6/16- 8/ 4 | 6/ 9- 8/23 | 6/ 2- 9/11 | 75 |
| 50 | | 6/25- 7/11 | | 16 |

The latest occurrence of a temperature of 32°F is June 7 and the earliest in the fall September 9.

The Red Lake River flows through Crookston and causes local flooding. Flood stage is 18 feet. Flooding is most frequent during April and is generally a combination of snow melt and rainfall complicated with ice jams. Flooding has occurred in March, May, June and July. The following table describes flood occurrence.

| Station | Flood Stage (Feet) | Historical Floods | | Occurrence of High Water (in years) | |
|----------------|--------------------|-------------------|---------|-------------------------------------|-------------|
| | | Stage | Date | 4' below FS | 2' above FS |
| Crookston | 18.0 | 25.7 | 5- 7-50 | 3 | 10 |
| Red Lake River | | 23.3 | 3-25-20 | | 30 |
| | | 21.8 | 4-17-16 | | |
| | | 21.0 | 4-15-06 | | |
| | | 19.8 | 4-20-56 | | |

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Total Precipitation (Inches)

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ann'l |
|------|------|------|------|------|------|------|------|------|-------|------|------|------|-------|
| 1931 | 0.06 | 0.09 | 0.70 | 0.05 | 2.09 | 2.64 | 3.06 | 1.07 | 2.33 | 2.59 | 1.51 | 0.10 | 17.29 |
| 1932 | 0.22 | 0.54 | 0.36 | 1.46 | 2.23 | 1.80 | 1.09 | 3.60 | 1.04 | 0.52 | 0.13 | 0.13 | 15.21 |
| 1933 | 0.24 | 0.02 | 0.75 | 1.23 | 3.05 | 3.00 | 1.50 | 2.43 | 2.26 | 0.75 | 0.05 | 1.37 | 17.47 |
| 1934 | 0.18 | 0.12 | 0.46 | 0.68 | 2.78 | 4.95 | 2.32 | 0.97 | 1.28 | 2.55 | 0.57 | 0.59 | 17.45 |
| 1935 | 0.68 | 0.05 | 1.04 | 1.77 | 1.20 | 2.90 | 4.47 | 3.80 | 0.68 | 0.30 | 0.87 | 0.36 | 18.12 |
| 1936 | 0.65 | 0.93 | 1.24 | 1.77 | 1.41 | 1.80 | 0.52 | 0.92 | 1.42 | 0.16 | 0.32 | 0.35 | 9.99 |
| 1937 | 0.91 | 0.20 | 0.22 | 4.26 | 4.13 | 1.41 | 3.95 | 1.79 | 0.37 | 0.48 | 0.25 | 0.66 | 16.78 |
| 1938 | 0.32 | 0.90 | 0.37 | 1.77 | 4.66 | 1.20 | 2.96 | 1.40 | 0.43 | 0.42 | 0.98 | 0.41 | 15.82 |
| 1939 | 0.16 | 1.28 | 0.69 | 0.66 | 0.69 | 3.35 | 1.92 | 4.71 | 3.70 | 2.45 | 0.05 | 0.36 | 20.32 |
| 1940 | 0.10 | 0.63 | 0.91 | 2.08 | 1.30 | 1.02 | 4.24 | 2.14 | 1.51 | 2.26 | 2.55 | 1.06 | 19.80 |
| 1941 | 0.75 | 0.39 | 2.26 | 2.34 | 5.29 | 7.44 | 1.12 | 8.62 | 4.44 | 0.83 | 0.14 | 0.15 | 32.87 |
| 1942 | 0.21 | 0.20 | 2.21 | 1.73 | 2.67 | 1.18 | 2.73 | 5.60 | 1.22 | 0.17 | 0.53 | 1.03 | 19.48 |
| 1943 | 0.51 | 1.51 | 1.39 | 1.83 | 2.87 | 2.50 | 3.33 | 2.62 | 0.81 | 0.78 | 0.22 | 0.22 | 19.81 |
| 1944 | 0.42 | 0.08 | 1.63 | 0.32 | 2.46 | 4.54 | 1.41 | 8.24 | 0.69 | 0.36 | 2.51 | 0.20 | 22.86 |
| 1945 | 0.62 | 0.23 | 1.13 | 2.86 | 0.78 | 2.60 | 2.66 | 2.57 | 4.11 | 0.52 | 0.23 | 1.64 | 19.95 |
| 1946 | 0.45 | 1.76 | 0.92 | 1.14 | 2.21 | 5.14 | 1.24 | 3.22 | 1.72 | 1.72 | 0.52 | 0.81 | 22.02 |
| 1947 | 0.38 | 1.05 | 0.63 | 2.33 | 3.26 | 7.17 | 3.46 | 3.06 | 2.53 | 1.27 | 2.19 | 0.49 | 27.82 |
| 1948 | 0.62 | 1.11 | 1.27 | 1.47 | 1.29 | 4.67 | 5.73 | 4.19 | 0.52 | 0.63 | 1.34 | 0.98 | 23.82 |
| 1949 | 1.96 | 0.80 | 0.84 | 0.12 | 5.48 | 5.16 | 3.72 | 0.91 | 0.60 | 4.33 | 0.68 | 1.08 | 25.88 |
| 1950 | 1.40 | 0.19 | 2.29 | 2.30 | 4.60 | 3.76 | 1.25 | 1.39 | 4.72 | 1.99 | 0.90 | 0.45 | 25.24 |
| 1951 | 0.53 | 0.58 | 1.16 | 1.13 | 0.92 | 1.55 | 0.65 | 7.04 | 1.37 | 0.50 | 0.60 | 1.12 | 17.45 |
| 1952 | 0.66 | 0.19 | 0.34 | 0.69 | 0.36 | 4.77 | 5.75 | 2.44 | 0.45 | 0.17 | 1.52 | 0.30 | 17.64 |
| 1953 | 0.67 | 0.41 | 0.77 | 1.91 | 3.02 | 3.02 | 2.08 | 4.32 | 1.26 | 1.92 | 0.62 | 0.82 | 22.13 |
| 1954 | 0.96 | 0.23 | 0.66 | 1.57 | 1.88 | 3.74 | 2.76 | 2.11 | 2.04 | 0.59 | 0.74 | 0.26 | 17.54 |
| 1955 | 0.37 | 0.77 | 1.05 | 1.27 | 3.46 | 3.29 | 5.18 | 2.55 | 1.58 | 0.45 | 1.40 | 0.44 | 21.81 |
| 1956 | 1.15 | 0.27 | 0.94 | 0.81 | 3.10 | 4.09 | 2.70 | 5.08 | 0.25 | 1.62 | 1.44 | 0.51 | 22.46 |
| 1957 | 0.32 | 0.43 | 0.14 | 0.97 | 1.58 | 4.97 | 1.81 | 3.63 | 3.95 | 1.86 | 0.24 | 0.74 | 20.67 |
| 1958 | 0.21 | 0.09 | 0.17 | 0.46 | 0.46 | 3.69 | 5.91 | 0.96 | 0.85 | 2.04 | 1.95 | 0.41 | 17.20 |
| 1959 | 0.20 | 0.37 | 0.21 | 0.44 | 2.48 | 2.10 | 3.56 | 6.13 | 1.20 | 2.75 | 0.58 | 0.34 | 20.76 |
| 1960 | 0.34 | 0.38 | 0.28 | 0.81 | 2.23 | 7.08 | 4.32 | 3.10 | 1.38 | 1.80 | 0.42 | 0.82 | 22.96 |

Average Temperature (°F)

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ann'l |
|------|------|-------|------|------|------|------|------|------|-------|------|------|------|-------|
| 1931 | 17.0 | 25.6 | 27.4 | 44.6 | 53.2 | 67.8 | 70.9 | 67.6 | 63.5 | 49.5 | 32.4 | 19.2 | 44.9 |
| 1932 | 11.6 | 10.7 | 18.0 | 43.4 | 57.2 | 69.2 | 71.6 | 69.9 | 57.8 | 40.3 | 23.2 | 9.6 | 40.2 |
| 1933 | 9.8 | 5.6 | 26.5 | 40.4 | 57.1 | 71.6 | 72.2 | 69.3 | 64.4 | 48.8 | 33.4 | 4.4 | 40.2 |
| 1934 | 11.4 | 10.6 | 23.0 | 42.7 | 63.0 | 64.2 | 69.5 | 66.6 | 53.6 | 48.8 | 33.4 | 9.5 | 41.4 |
| 1935 | -1.9 | 21.8 | 26.7 | 39.2 | 51.4 | 60.7 | 74.2 | 67.2 | 56.0 | 45.2 | 15.8 | 9.8 | 38.8 |
| 1936 | -9.0 | -13.9 | 21.0 | 33.2 | 61.4 | 64.4 | 78.7 | 69.4 | 60.2 | 40.9 | 23.5 | 13.4 | 38.8 |
| 1937 | 5.1 | 5.1 | 20.0 | 40.0 | 57.4 | 63.8 | 70.2 | 72.6 | 58.5 | 43.0 | 26.0 | 9.2 | 38.1 |
| 1938 | 3.6 | 8.3 | 34.0 | 42.4 | 52.1 | 63.4 | 68.9 | 70.6 | 60.8 | 51.6 | 22.8 | 14.0 | 39.2 |
| 1939 | 8.2 | -3.6 | 19.8 | 40.0 | 62.2 | 64.6 | 72.8 | 71.0 | 59.3 | 41.6 | 34.6 | 24.5 | 41.2 |
| 1940 | 3.8 | 13.8 | 18.9 | 38.0 | 54.0 | 62.0 | 70.6 | 66.5 | 62.8 | 51.0 | 23.6 | 16.4 | 40.1 |
| 1941 | 9.0 | 6.5 | 21.5 | 45.5 | 59.0 | 66.1 | 72.0 | 67.6 | 56.8 | 45.8 | 30.2 | 18.8 | 41.6 |
| 1942 | 15.8 | 12.0 | 32.2 | 46.2 | 50.8 | 61.2 | 66.8 | 66.0 | 52.5 | 47.5 | 27.2 | 6.6 | 40.4 |
| 1943 | -2.2 | 11.0 | 17.2 | 42.6 | 50.2 | 62.7 | 72.0 | 67.2 | 53.8 | 48.4 | 28.4 | 19.1 | 39.2 |
| 1944 | 19.3 | 11.4 | 19.3 | 39.8 | 57.0 | 63.7 | 68.8 | 66.0 | 56.1 | 47.2 | 32.4 | 15.0 | 41.2 |
| 1945 | 9.5 | 13.2 | 34.6 | 39.2 | 47.3 | 59.2 | 66.9 | 66.6 | 53.4 | 43.3 | 26.0 | 6.0 | 38.8 |
| 1946 | 6.0 | 5.8 | 33.5 | 46.4 | 51.4 | 63.0 | 70.3 | 65.7 | 55.7 | 42.0 | 26.6 | 10.2 | 39.7 |
| 1947 | 12.4 | 6.6 | 22.2 | 38.2 | 49.3 | 60.5 | 70.0 | 70.4 | 54.6 | 52.4 | 20.8 | 9.4 | 38.9 |
| 1948 | 1.8 | 4.4 | 16.8 | 40.5 | 51.6 | 62.6 | 69.3 | 68.0 | 44.1 | 47.4 | 29.1 | 9.6 | 38.6 |
| 1949 | 3.4 | 1.2 | 20.2 | 44.1 | 55.2 | 64.0 | 69.5 | 71.1 | 54.3 | 45.1 | 33.0 | 9.0 | 39.1 |
| 1950 | 9.5 | 5.0 | 17.9 | 30.1 | 49.3 | 59.2 | 66.9 | 66.6 | 58.9 | 46.3 | 22.0 | 6.3 | 34.8 |
| 1951 | 1.8 | 12.7 | 18.4 | 39.2 | 58.5 | 60.4 | 68.3 | 64.4 | 53.7 | 43.3 | 19.3 | 6.8 | 37.2 |
| 1952 | 0.9 | 17.6 | 23.0 | 47.3 | 55.9 | 69.1 | 67.9 | 66.2 | 59.6 | 41.7 | 31.2 | 19.1 | 41.3 |
| 1953 | 10.6 | 21.9 | 27.1 | 38.1 | 53.2 | 63.0 | 70.6 | 70.6 | 56.1 | 51.5 | 13.5 | 13.5 | 41.6 |
| 1954 | -4.6 | 23.4 | 23.2 | 37.6 | 48.7 | 63.3 | 70.0 | 65.6 | 55.7 | 44.3 | 32.9 | 18.6 | 39.9 |
| 1955 | 6.4 | 4.4 | 12.3 | 47.7 | 58.2 | 64.4 | 71.9 | 70.9 | 56.5 | 47.3 | 18.5 | 4.2 | 38.5 |
| 1956 | 5.6 | 3.1 | 17.2 | 34.8 | 53.7 | 69.5 | 66.5 | 67.2 | 54.2 | 45.5 | 14.1 | 19.0 | 39.0 |
| 1957 | 0.6 | 10.2 | 26.0 | 42.1 | 56.3 | 61.9 | 73.9 | 68.2 | 55.3 | 45.5 | 28.2 | 19.8 | 40.6 |
| 1958 | 16.7 | 11.9 | 30.4 | 45.7 | 58.5 | 60.3 | 67.1 | 67.9 | 59.3 | 48.5 | 28.3 | 7.5 | 41.8 |
| 1959 | 0.0 | 5.6 | 28.4 | 42.0 | 55.1 | 66.9 | 70.1 | 70.3 | 57.7 | 40.2 | 19.0 | 23.1 | 39.9 |
| 1960 | 7.8 | 11.4 | 16.5 | 41.2 | 55.5 | 63.5 | 70.2 | 70.8 | 60.1 | 47.1 | 29.0 | 8.9 | 40.2 |

The equipment at the station includes self registering maximum and minimum thermometers housed in a standard instrument shelter and a standard rain gage.

The first observations were taken at Crookston in 1885 by H. A. Mason who continued until 1886. The observer from 1889 to 1893 was J. Ross. From 1893 to 1921 K. G. Anderson served and N. C. Schreier from 1921 to 1923. The exact location of the station during these years is not known. This station was discontinued April 30, 1923. A similar type station began operation in June of 1915 at the Northwest School and Experiment Station, located 2 miles north of Crookston, and is the present location of the station. Observers have been state employees at the School. Olaf C. Soine has taken the observations since October 1945.

All records for the station are on file at the Weather Bureau Office, U. S. Court House, Minneapolis, Minnesota. Daily values of temperature extremes and precipitation have been published in "Climatological Data, Minnesota" since records began. Records prior to 1948 included amount of cloudiness and prevailing wind direction. Summarized climatological data for Crookston is found in "Climatic Summary of the United States, Section 4-Northern Minnesota" for years prior to 1931, for the years 1931-1955 in "Climatic Summary of the United States, Minnesota No. 17".