U. S. DEPARTMENT OF COMMERCE, WEATHER BUREAU
IN COOPERATION WITH Michigan Weather Service
CLIMATOGRAPHY OF THE UNITED STATES NO. 20 — 20

# CLIMATOLOGICAL SUMMARY

LATITUDE 42° 24'
LONGITUDE 85° 23'
ELEV. (GROUND) 934 Feet

STATION Gull Lake, Michigan

MEANS AND EXTREMES FOR PERIOD 1935 - 1964

| Month | Temperature (°F) Means: Daily maximum | Daily minimum | Monthly | Extremes: Record highest | Year | Record lowest | Year | ** Mean degree days | Precipitation Totals (Inches): Mean | Greatest daily | Year | Snow, Sleet: Mean | Maximum monthly | Year | Greatest daily | Year | Mean number of days: Precip. .10 inch or more | Temperatures: Max. 90° and above | Max. 32° and below | Min. 32° and below | Min. 0° and below | Month |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (a) | 30 | 30 | 30 | 30 | | 30 | | 30 | 30 | 30 | | 30 | 30 | | 30 | | 30 | 30 | 30 | 30 | 30 | |
| JANUARY | 31.2 | 15.9 | 23.6 | 66 | 1950 | -20 | 1948 | 1260 | 1.90 | 1.80 | 1960 | 10.6 | 27.5 | 1959 | 10.0 | 1957 | 5 | 0 | 17 | 29 | 4 | JANUARY |
| FEBRUARY | 33.8 | 16.3 | 25.2 | 65 | 1951 | -15 | 1936 | 1160 | 1.67 | 1.66 | 1939 | 9.7 | 27.0 | 1960 | 8.0+ | 1961 | 5 | 0 | 12 | 27 | 2 | FEBRUARY |
| MARCH | 43.8 | 25.2 | 34.4 | 79 | 1938 | -15 | 1943 | 930 | 2.27 | 2.56 | 1948 | 6.2 | 18.0 | 1944 | 7.0 | 1956 | 6 | 0 | 5 | 25 | * | MARCH |
| APRIL | 58.1 | 35.6 | 46.8 | 87 | 1942 | 12 | 1964 | 550 | 3.26 | 2.83 | 1947 | 1.5 | 10.0 | 1961 | 7.0 | 1961 | 7 | 0 | * | 13 | 0 | APRIL |
| MAY | 69.9 | 46.0 | 58.0 | 91 | 1953 | 22 | 1947 | 250 | 3.66 | 2.73 | 1948 | 0.3 | 1.0 | 1940 | 1.0 | 1940 | 8 | * | 0 | 2 | 0 | MAY |
| JUNE | 79.5 | 56.0 | 67.8 | 99 | 1953 | 34 | 1945 | 80 | 4.15 | 2.80 | 1959 | 0.0 | | | | | 8 | 3 | 0 | 0 | 0 | JUNE |
| JULY | 84.6 | 59.8 | 72.2 | 108 | 1936. | 41 | 1941 | 20 | 2.99 | 2.54 | 1943 | 0.0 | | | | | 6 | 6 | 0 | 0 | 0 | JULY |
| AUGUST | 83.3 | 58.6 | 71.0 | 103 | 1947 | 37 | 1964 | 30 | 3.74 | 5.47 | 1939 | 0.0 | | | | | 6 | 5 | 0 | 0 | 0 | AUGUST |
| SEPTEMBER | 74.9 | 50.9 | 62.9 | 100 | 1953+ | 25 | 1942 | 140 | 3.15 | 3.27 | 1943 | T | T | 1942 | T | 1942 | 6 | 1 | 0 | 1 | 0 | SEPTEMBER |
| OCTOBER | 63.7 | 41.2 | 52.5 | 90 | 1963 | 19 | 1960 | 390 | 2.81 | 3.03 | 1941 | 1.2 | 2.0 | 1962 | 2.0 | 1962 | 5 | * | 0 | 6 | 0 | OCTOBER |
| NOVEMBER | 47.1 | 30.3 | 38.7 | 79 | 1950 | -7 | 1950 | 790 | 2.34 | 1.53 | 1946 | 5.2 | 14.0 | 1959 | 8.0 | 1949 | 6 | 0 | 3 | 19 | * | NOVEMBER |
| DECEMBER | 34.5 | 20.3 | 27.4 | 61 | 1949 | -11 | 1963 | 1140 | 1.65 | 1.48 | 1946 | 9.3 | 37.0 | 1962 | 8.0 | 1964 | 5 | 0 | 13 | 27 | 1 | DECEMBER |
| Year | 58.7 | 38.0 | 48.4 | 108 | JULY 1936 | -20 | JAN. 1948 | 6740 | 33.59 | 5.47 | AUG. 1939 | 44.0 | 37.0 | DEC. 1962 | 10.0 | JAN. 1957 | 73 | 15 | 50 | 149 | 7 | Year |

(a) Average length of record, years.

T Trace, an amount too small to measure.

** Base 65°F

+ Also on earlier dates, months, or years.

* Less than one half.

## CLIMATE OF GULL LAKE, MICHIGAN

Gull Lake is in the southwest section of Lower Michigan, about forty miles north of the Indiana line and sixty miles east of Lake Michigan. The surface of the ground in the area is rolling, and the soil is sandy loam.

Although Gull Lake is too far east to be in the main fruit belt which stretches along Lake Michigan, the climate is still influenced considerably by the Lake. Prevailing westerly winds crossing Lake Michigan are warmed in the winter and cooled in the summer, resulting in a more moderate climate than exists to the west of Lake Michigan. This effect, though diminishing with increased distance from the Lake, nevertheless is noticeable in the Gull Lake area. The climate alternates between Continental and Semi-Marine, with changing meteorological conditions. When there is little or no wind, the climate becomes Continental. A strong wind from the Lake transforms the weather into a Semi-Marine type.

Since the Lake water is cool in the spring, it tends to retard the temperatures, thus holding back the development of vegetation until there is less chance of frost, while in the fall, the water, warmed by the summer sun, tempers the first outbreak of cold air moving toward the area.

The available weather data for the Gull Lake area shows that the highest temperature ever recorded here was 108° in July, 1936, and the lowest was -20° in January, 1948. Occasionally, there are winters in which the temperature never falls to zero. At the other temperature extreme, the 100° mark is rarely surpassed. Days with 90° or above, average fifteen per summer. On the basis of mean temperature, February, 1936 with a mean temperature of 13.5°, is the coldest month, and August, 1947, with a mean temperature of 78.9°, is the warmest month. The average dates of the first freezing temperature in the fall and last in the spring are May 8th and October 6th respectively.

Precipitation is heaviest during the growing months, or "crop season", averaging 62% of the annual total during the six months April - September. The rainfall is heaviest in June. Variation is from a high of 4.15 inches in June to an average of 1.65 inches in December. The greatest monthly rainfall of record is 9.87 inches in August, 1940, and the driest month of record is October, 1922, when only .22 inch occurred during the entire month.

Snowfall totals 44.0 inches during an average winter in Gull Lake. Snowfall is heavier nearer Lake Michigan, increasing to 60 inches annually at Grand Haven. To the east of Gull Lake, there is not much change in snowfall amounts except that the average decreases to around 30 inches annually in the extreme southeast corner of the state. The season's first snowfall usually occurs in November, and the last in the spring, in April. January has the greatest monthly average, and the heaviest recorded for a single day is 10.0 inches on January 10th in 1957.

Long-term sunshine and humidity records are not available at Gull Lake, but records at Grand Rapids and Lansing, which should be similar, are representative of conditions at Gull Lake. These records indicate that November - January sunshine is about 30% of the possible, while in the June - August period, sunshine is about 70% of the possible. Relative humidity measurements at the above mentioned locations indicate early morning averages of 78% to 85% and early afternoon averages of 50% to 75%.

Degree day data is provided as an index of heating requirements for buildings. For example; December averages 1140 degree days and April, 550 degree days, which means that during an average December, fuel necessary for heating will be over twice that required for April. Degree days for a single day are obtained by subtracting the mean temperature from 65. On the days having an average temperature of 65° or higher, there is usually no necessity to furnish heat.

LIBRARY
JUL 1 5 1965
WEATHER BUREAU

A. H. Eichmeier
State Climatologist
Weather Bureau Office
East Lansing, Michigan

Average Temperature (°F)

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ann'l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1935 | 24.3 | 25.3 | 40.8 | 44.3 | 52.2 | 64.1 | 74.8 | 70.7 | 61.4 | 50.5 | 39.2 | 22.7 | 47.5 |
| 1936 | 19.1 | 13.5 | 36.6 | 41.8 | 62.3 | 67.5 | 76.7 | 74.4 | 65.3 | 50.1 | 33.2 | 30.7 | 47.6 |
| 1937 | 27.1 | 26.2 | 29.5 | 45.1 | 57.9 | 66.5 | 72.3 | 73.5 | 62.1 | 47.9 | 37.5 | 24.4 | 47.5 |
| 1938 | 22.8 | 30.6 | 41.4 | 47.6 | 57.8 | 66.1 | 72.0 | 73.4 | 62.2 | 56.1 | 41.4 | 28.2 | 50.0 |
| 1939 | 27.1 | 25.1 | 34.1 | 42.5 | 61.1 | 68.2 | 71.3 | 69.7 | 63.9 | 50.6 | 36.4 | 31.0 | 48.4 |
| 1940 | 15.4 | 23.8 | 25.8 | 41.5 | 53.0 | 65.5 | 69.8 | 67.6 | 58.9 | 48.6 | 33.5 | 28.7 | 44.3 |
| 1941 | 23.7 | 21.5 | 27.8 | 50.5 | 59.6 | 67.6 | 71.4 | 68.8 | 64.1 | 51.3 | 38.1 | 32.2 | 48.1 |
| 1942 | 23.6 | 19.6 | 36.9 | 52.4 | 60.2 | 68.9 | 72.4 | 69.3 | 60.6 | 51.0 | 39.2 | 23.4 | 48.1 |
| 1943 | 19.8 | 26.2 | 31.5 | 42.7 | 55.4 | 71.2 | 71.6 | 70.3 | 59.7 | 49.1 | 35.5 | 25.3 | 46.5 |
| 1944 | 29.0 | 26.7 | 29.2 | 42.8 | 60.9 | 71.0 | 72.6 | 73.2 | 64.1 | 50.5 | 40.4 | 22.8 | 48.6 |
| 1945 | 17.6 | 26.5 | 46.8 | 49.1 | 51.3 | 64.0 | 69.7 | 70.2 | 62.9 | 49.1 | 40.8 | 23.1 | 47.6 |
| 1946 | 26.1 | 25.7 | 46.5 | 48.6 | 55.8 | 66.4 | 73.7 | 69.1 | 64.5 | 56.7 | 42.9 | 31.1 | 50.6 |
| 1947 | 27.2 | 20.5 | 28.2 | 45.8 | 52.9 | 65.0 | 70.0 | 78.9 | 64.1 | 59.8 | 35.4 | 27.6 | 48.0 |
| 1948 | 17.3 | 23.5 | 33.9 | 51.3 | 55.5 | 66.9 | 73.0 | 72.7 | 66.6 | 49.6 | 43.9 | 30.3 | 48.7 |
| 1949 | 28.9 | 28.6 | 35.6 | 47.7 | 60.4 | 72.8 | 76.1 | 72.2 | 60.0 | 56.6 | 37.7 | 31.6 | 50.7 |
| 1950 | 31.3 | 24.9 | 30.2 | 41.4 | 58.9 | 67.6 | 69.4 | 69.2 | 62.0 | 55.7 | 33.8 | 22.6 | 47.3 |
| 1951 | 25.1 | 26.5 | 35.4 | 44.8 | 60.8 | 66.2 | 70.3 | 67.3 | 60.4 | 54.2 | 30.7 | 25.5 | 47.3 |
| 1952 | 28.0 | 29.4 | 32.7 | 48.3 | 55.8 | 70.5 | 73.4 | 69.5 | 63.0 | 46.2 | 40.1 | 31.2 | 49.0 |
| 1953 | 28.6 | 30.7 | 37.0 | 44.4 | 60.6 | 70.3 | 74.2 | 72.1 | 63.1 | 55.5 | 43.0 | 31.2 | 50.9 |
| 1954 | 24.6 | 33.7 | 32.9 | 50.8 | 53.8 | 70.3 | 71.1 | 69.1 | 65.0 | 52.6 | 40.1 | 28.9 | 49.4 |
| 1955 | 24.3 | 27.0 | 35.1 | 54.5 | 60.7 | 66.1 | 77.1 | 75.6 | 64.4 | 54.3 | 36.2 | 25.7 | 50.1 |
| 1956 | 24.7 | 26.6 | 31.4 | 44.9 | 57.9 | 70.5 | 70.0 | 70.6 | 61.9 | 57.9 | 40.2 | 32.3 | 49.1 |
| 1957 | 20.0 | 29.4 | 36.1 | 48.3 | 57.5 | 68.3 | 72.6 | 70.0 | 61.3 | 49.8 | 39.3 | 33.2 | 48.8 |
| 1958 | 24.4 | 21.0 | 34.4 | 49.0 | 58.9 | 62.5 | 70.4 | 69.9 | 62.8 | 54.2 | 41.5 | 21.2 | 47.5 |
| 1959 | 18.8 | 23.3 | 34.0 | 47.1 | 63.7 | 70.0 | 72.6 | 75.6 | 66.5 | 50.4 | 34.8 | 33.6 | 49.2 |
| 1960 | 27.0 | 25.2 | 24.0 | 50.6 | 56.9 | 65.2 | 70.1 | 70.9 | 66.0 | 51.5 | 42.5 | 24.3 | 47.9 |
| 1961 | 21.3 | 29.7 | 38.5 | 43.3 | 54.9 | 66.1 | 72.3 | 70.3 | 67.0 | 53.7 | 40.1 | 27.3 | 48.7 |
| 1962 | 19.2 | 23.1 | 32.6 | 46.0 | 63.6 | 68.4 | 69.2 | 71.3 | 61.4 | 54.0 | 38.9 | 24.4 | 47.7 |
| 1963 | 14.8 | 18.0 | 37.4 | 49.0 | 55.9 | 68.9 | 71.9 | 67.0 | 61.6 | 59.6 | 43.8 | 20.5 | 47.4 |
| 1964 | 27.4 | 25.3 | 34.7 | 48.4 | 62.3 | 69.6 | 72.8 | 67.0 | 61.3 | 47.2 | 41.0 | 26.1 | 48.6 |

Total Precipitation (Inches)

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Ann'l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1935 | 2.30 | 1.38 | 3.28 | 1.55 | 4.66 | 4.86 | 2.72 | 7.42 | 3.11 | 1.25 | 6.10 | 1.08 | 39.71 |
| 1936 | 1.41 | 1.18 | 0.62 | 3.11 | 0.99 | 3.76 | 0.78 | 3.06 | 6.06 | 4.87 | 1.37 | 2.79 | 30.00 |
| 1937 | 2.63 | 1.57 | 0.95 | 5.23 | 3.31 | 6.67 | 2.11 | 5.24 | 1.89 | 1.87 | 1.45 | 2.29 | 35.21 |
| 1938 | 1.70 | 4.38 | 3.68 | 1.85 | 5.50 | 3.66 | 4.26 | 3.90 | 2.77 | 0.23 | 1.79 | 2.23 | 35.95 |
| 1939 | 2.38 | 4.59 | 1.71 | 4.27 | 1.29 | 5.45 | 1.90 | 9.13 | 1.88 | 4.15 | 0.99 | 1.52 | 39.26 |
| 1940 | 1.96 | 0.40 | 1.40 | 1.82 | 4.85 | 7.31 | 2.22 | 9.87 | 1.11 | 4.02 | 2.47 | 2.13 | 39.56 |
| 1941 | 2.11 | 0.85 | 1.37 | 2.11 | 2.96 | 3.78 | 3.22 | 1.54 | 3.75 | 9.80 | 3.32 | 1.59 | 36.40 |
| 1942 | 1.92 | 0.88 | 5.08 | 0.90 | 4.03 | 5.48 | 5.38 | 5.66 | 3.38 | 3.98 | 3.18 | 2.97 | 42.84 |
| 1943 | 2.13 | 2.08 | 3.28 | 3.12 | 8.76 | 3.13 | 5.30 | 1.86 | 4.97 | 1.70 | 2.94 | 0.33 | 39.60 |
| 1944 | 1.35 | 2.38 | 4.47 | 3.40 | 3.71 | 3.53 | 0.83 | 3.87 | 3.09 | 1.56 | 2.41 | 0.99 | 31.59 |
| 1945 | 0.61 | 1.23 | 2.54 | 3.15 | 7.69 | 3.70 | 2.14 | 2.06 | 5.49 | 2.18 | 2.61 | 1.67 | 35.07 |
| 1946 | 1.77 | 1.65 | 3.19 | 1.27 | 4.92 | 1.59 | 0.25 | 1.62 | 4.45 | 3.53 | 3.16 | 2.96 | 30.36 |
| 1947 | 2.87 | 1.09 | 2.01 | 7.71 | 4.79 | 3.83 | 2.53 | 4.94 | 4.91 | 1.23 | 2.77 | 1.76 | 40.44 |
| 1948 | 1.33 | 2.30 | 5.09 | 3.97 | 5.79 | 2.41 | 2.67 | 1.22 | 3.20 | 0.51 | 2.85 | 2.89 | 34.23 |
| 1949 | 3.61 | 2.71 | 3.39 | 2.32 | 2.69 | 4.12 | 2.61 | 3.58 | 2.83 | 2.73 | 1.87 | 2.77 | 35.23 |
| 1950 | 4.02 | 3.52 | 3.28 | 7.93 | 0.92 | 4.90 | 4.70 | 1.57 | 5.90 | 0.66 | 2.29 | 2.55 | 42.24 |
| 1951 | 2.61 | 1.64 | 1.92 | 3.83 | 2.89 | 4.02 | 3.14 | 4.01 | 3.67 | 4.60 | 3.25 | 2.54 | 38.12 |
| 1952 | 2.05 | 1.58 | 1.61 | 3.23 | 5.51 | 2.26 | 4.76 | 3.04 | 1.23 | 0.22 | 2.95 | 1.79 | 30.23 |
| 1953 | 1.53 | 0.75 | 2.14 | 2.73 | 3.20 | 4.39 | 2.79 | 2.90 | 1.38 | 1.89 | 1.46 | 1.07 | 26.23 |
| 1954 | 1.66 | 2.66 | 2.65 | 3.38 | 0.94 | 8.34 | 2.70 | 3.31 | 2.98 | 8.67 | 2.51 | 1.73 | 41.53 |
| 1955 | 1.37 | 1.65 | 1.72 | 2.81 | 1.91 | 4.75 | 3.48 | 3.28 | 1.53 | 5.24 | 2.70 | 0.44 | 30.88 |
| 1956 | 1.10 | 1.63 | 1.90 | 4.63 | 3.75 | 3.67 | 2.43 | 1.87 | 0.62 | 0.24 | 1.13 | 0.81 | 23.78 |
| 1957 | 2.39 | 1.23 | 1.59 | 4.66 | 4.29 | 3.01 | 4.62 | 3.05 | 1.82 | 4.42 | 2.87 | 1.56 | 35.51 |
| 1958 | 1.13 | 1.18 | 0.56 | 2.03 | 1.39 | 6.26 | 3.28 | 4.29 | 2.44 | 1.75 | 2.64 | 0.43 | 27.38 |
| 1959 | 2.31 | 2.08 | 1.49 | 2.52 | 2.53 | 4.38 | 3.88 | 4.39 | 3.10 | 4.62 | 1.86 | 1.68 | 34.84 |
| 1960 | 2.94 | 1.98 | 0.56 | 2.88 | 5.12 | 4.78 | 3.19 | 2.57 | 1.58 | 1.23 | 1.65 | 0.72 | 29.20 |
| 1961 | 0.28 | 0.51 | 1.88 | 3.73 | 1.73 | 3.27 | 2.50 | 5.15 | 6.24 | 2.45 | 1.37 | 0.76 | 29.87 |
| 1962 | 2.35 | 0.43 | 0.77 | 1.77 | 3.19 | 3.79 | 2.79 | 1.26 | 3.54 | 2.70 | 0.39 | 1.51 | 24.49 |
| 1963 | 0.82 | 0.37 | 2.05 | 2.28 | 4.25 | 1.54 | 4.05 | 1.81 | 1.02 | 0.84 | 1.20 | 0.48 | 20.71 |
| 1964 | 0.50 | 0.32 | 2.01 | 3.69 | 2.44 | 2.13 | 2.61 | 4.93 | 4.72 | 1.19 | 2.74 | 1.43 | 28.71 |

DATES OF FREEZING TEMPERATURES IN THE SPRING AND FALL (1929-1950)

| | Spring | | | Fall | | |
|---|---|---|---|---|---|---|
| Minimum Temperature | Earliest | Average | Latest | Earliest | Average | Latest |
| 32° or lower | 4/21/42 | 5/08 | 5/20/29 | 09/20/37 | 10/06 | 10/26/50 |
| 28° or lower | 4/13/39 | 4/28 | 5/13/46 | 09/28/42 | 10/21 | 11/17/46 |
| 24° or lower | 3/23/31 | 4/14 | 5/09/47 | 10/14/37 | 11/07 | 12/02/31* |
| 20° or lower | 3/04/42 | 3/30 | 4/16/35 | 10/27/36 | 11/16 | 12/10/48 |
| 16° or lower | 2/19/45 | 3/19 | 4/06/43 | 11/07/30 | 11/27 | 12/25/48 |

* also on 12/02/48

Example in using table: The average date of the last temperature of 32° or colder in the spring is May 8th. The earliest date of this event in all springs of the 1929-1950 period was April 21st in 1942. The latest date was May 20th in 1929. In the fall, 32° or colder occurred for the first time as early as September 20th in 1937 and as late as October 26th in 1950. The average date is October 6th.

STATION HISTORY

The Gull Lake station was established on April 6, 1929 at the W. K. Kellogg Experiment Farm 3 miles north and 2 miles west of the Augusta Post Office. In February, 1954, the station was moved 2500 feet south southwest of the former location with no observer change. Location of station now (1965) described as 3.4 miles south of Hickory Corners, Michigan.