

Fargo, North Dakota Climate

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FARGO, NORTH DAKOTA CLIMATE

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I. PREFACE

The purpose of this publication is to provide an updated look at the climate of Fargo, North Dakota. Ray E. Jensen, a former State Climatologist for North Dakota, wrote a publication called the "Climate of North Dakota" in 1972. Jensen's publication contained an extensive look at many weather statistics across the entire state of North Dakota, including Fargo. In contrast, this publication focuses strictly on Fargo, and looks at many statistics since 1972.

Units used in the paper are those still in use by the National Weather Service (NWS). Temperature is shown in degrees Fahrenheit (°F) and precipitation is measured in relation to inches. The latest National Climatic Data Center (NCDC) 30-year climate normals are used, which are the normals from 1971-2000. Most data begins in 1881, although daily snowfall data begins in 1893.

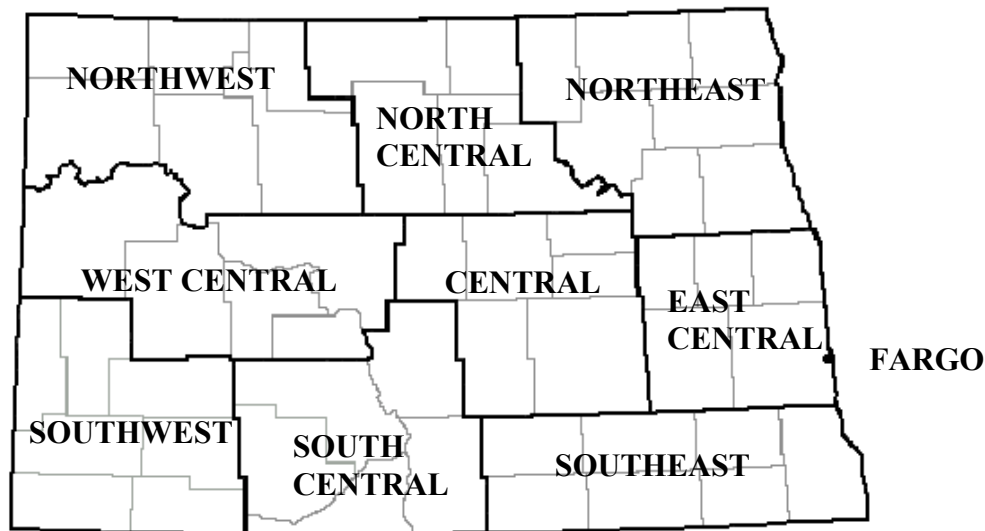


Figure 1. Climate Divisions in North Dakota. (Adapted from: Jensen 1972)

II. INTRODUCTION

Fargo is located near the geographical center of North America and lies within the east central climate division in the state of North Dakota (Figure 1). Fargo is the largest city in the state of North Dakota, while Moorhead is the largest city in the northwestern quarter of Minnesota. These co-located cities are simply separated by the Red River of the North. Fargo is in eastern Cass county in North Dakota, while Moorhead is in western Clay county, Minnesota. It must be stressed that the data used for this publication is actually a combination of data from Moorhead and Fargo.

The major geomorphological feature surrounding the Fargo-Moorhead area is called the Red River Valley of the North (hereafter called the Red River Valley). The Red River Valley is “a lake plain formed by glacial melt waters ponded along the southern edge of a massive, glacial ice lobe that occupied the area some 10,000 to 15,000 years ago” (Miller and Frink 1982). Sediment from tributary streams settled in Lake Agassiz (Figure 2), forming a flat valley floor approximately 15 miles wide at the southern end, and about 70 miles wide at the northern end (Miller and Frink 1982).

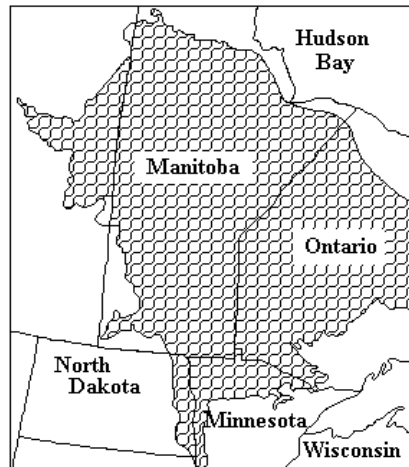


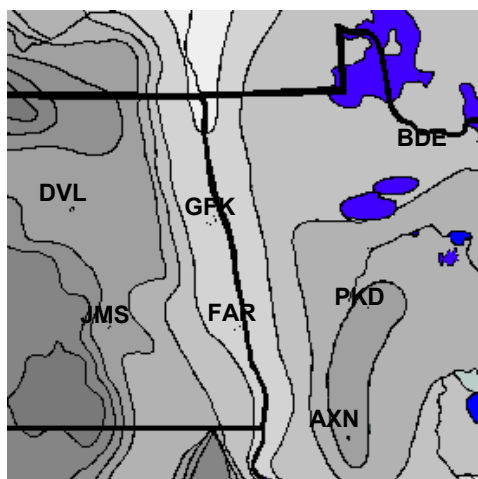
Figure 2. Areal coverage of glacial Lake Agassiz. (Adapted from: Bluemle 1988)

At the bottom of the Red River Valley lies the Red River of the North, a northward flowing river. The Red River of the North begins at the confluence of the Bois de Sioux and Ottertail Rivers (near Wahpeton, North Dakota and Breckenridge, Minnesota), and flows north until draining into Lake Winnipeg in Manitoba, Canada. In North Dakota, the airport elevation in Wahpeton is 967 feet above mean sea level and the airport elevation in Pembina (near the Canadian border) is 795 feet above mean sea level. When considering that the linear distance between Wahpeton and Pembina is 195 miles, this equates to a drop of 0.88 feet per mile.

The flatness of the Red River Valley is the main topographic feature which influences the weather in Fargo-Moorhead (Figure 3). The Red River Valley promotes a predominant south-southeast and north-northwest wind direction. Therefore, straight north or straight south winds are often the strongest winds. Temperature regimes are also influenced by the Red River Valley. There are many times in the winter when warm air overrides the Fargo-Moorhead area while colder air holds in the Red River Valley. Temperatures can warm easily in Jamestown, North Dakota and Detroit Lakes, Minnesota, but hold steady in Fargo. Fog has also been known to advect up and down the valley, and can be tough to dissipate.

The vegetation of the Red River Valley also has an affect on Fargo's climate. The glacial lake deposits of sorted and stratified clay and silt in the Red River Valley have created what is commonly recognized as some of the richest and most productive farmland in the world (Miller and Frink 1982). As a result, farming is widespread and intensive in the Red River Valley. Crops such as sugar beets, wheat, pinto beans, soybeans, and potatoes are mainly grown. In addition, native trees are rare in the Red River Valley. The majority of trees are found in the metropolitan areas of Wahpeton-Breckenridge, Fargo-

Moorhead, and Grand Forks-East Grand Forks. There are times during the winter when blizzards cause near-zero visibility outside these cities, while the sheltering effect of the trees makes the visibility considerably better within the city borders.



Lightest Gray Shade = 800 feet MSL or less
 Second Lightest Gray = 800 to 1000 feet MSL

Figure 3. Topography of the Red River Valley and surrounding areas.

The United States Army Signal Corps (predecessor to the NWS) established an observing station in Moorhead on January 1, 1881, at the Merchants State Bank (Figure 4a). The bank changed its name to the First National Bank on July 1, 1890. This was the same year the U.S. Weather Bureau (USWB) replaced the Signal Corps as the nation's weather service. Records continued at this location until October 1, 1904, when the station moved to the Lamb Cottage (Figure 4b) in Moorhead. Continuous records were kept at the Lamb Cottage for 16 years. On October 1, 1920, the station moved to the Moorhead Post Office (Figure 4c), where records were kept until February 2, 1942.

The Moorhead Post Office was the location where the highest temperature (114 °F on July 6, 1936) for the Fargo-Moorhead area was measured. The instruments at that time were mounted on the roof of the Moorhead Post Office (Figure 5). This rooftop location would never be allowed with the instrument siting regulations in place today. As this demonstrates, no climate data set is immune to change. Instruments that were once mounted on top of buildings are now located near the touchdown zone of airport runways. As airports were being built outside of city limits, this usually involved a move from an urban area to a rural location. This move in itself is a climate change, as cities have been shown to be urban heat islands. In addition, the accuracy and precision of weather instruments have improved over time. As a result, weather observations today have little dependence on human intervention.

The move to an airport location for the Fargo-Moorhead data set came on February 2, 1942, when the Moorhead Post Office station moved to the Fargo airport (Hector International Airport). For several simultaneous years, there were actually two separate USWB stations operating, one in Moorhead and one in Fargo. The Moorhead station closed in 1942 and all operations moved to the station at the Fargo airport.



a) Merchants State Bank, Moorhead, MN



b) P.H. Lamb Cottage, Moorhead, MN



c) U.S. Post Office, Moorhead, MN



d) Airport Administration Building, Fargo, ND



e) New Airport Administration Building, Fargo, ND

Figure 4. Historic Locations of Fargo-Moorhead Weather Observations.



Figure 5. Instruments on roof at the Moorhead Post Office.

Records were kept at the Fargo Airport, Administration Building (Figure 4d), from February 2, 1942 until November 1, 1953, when they moved to the new Administration Building (Figure 4e). Meanwhile, in 1970, the USWB became the NWS. The weather office in the new Administration Building kept records until November 1, 1995, when the era of automation arrived at the Fargo airport. The Automated Surface Observing System (ASOS) was commissioned on this date, with most of the observing equipment installed on the north end of the airport (Figure 6).

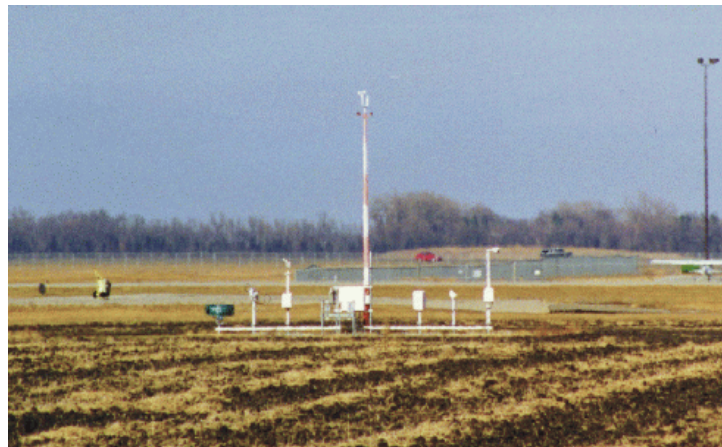


Figure 6. Current location of Fargo ASOS at Hector International Airport.

The siting of ASOS equipment corresponds to national standards, which state that the ASOS equipment should be located near the touchdown zone of the primary runway (U.S. Department of Commerce 1998). The Fargo ASOS is located in a farm field near the touchdown zone for runway 17 at the Fargo airport. Having the ASOS in a more rural airport location can help with the urban heat island biases, but other problems can occur. The farm field location can contaminate the visibility observations with dust and other particulates from farming operations. The Grand Forks NWS electronics personnel have noted that this location is well used by hawks and other birds. These birds like the tall perches to sit on, which are heated during the winter (Figure 7). Finally, jet aircraft do engine run-ups in this vicinity, with jet blasts reaching the ASOS site.

All in all, the Fargo-Moorhead area is well known for extreme weather. Winters can bring freezing rain, blizzards, and temperatures well below zero. Spring is synonymous with frequent flooding along the Red River of the North. Summer can bring intense heat, thunderstorms, high wind, tornados, hail, and flooding rains. Lastly, fall can bring early or late freezes, late season rain, or early season snow.

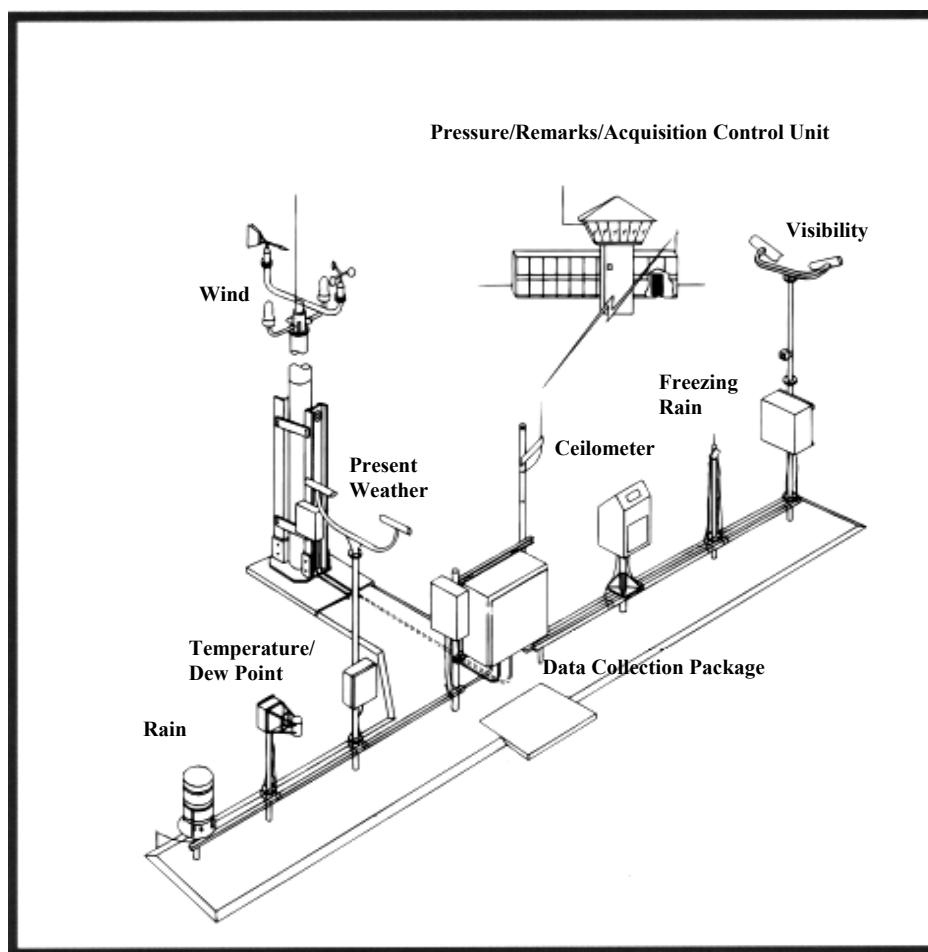


Figure 7. Standard Automated Surface Observing System (ASOS)
(Adapted from: ASOS User's Guide 1998)

ANNUAL CLIMATE OF FARGO

Fargo has a continental climate, with warm summers and cold winters. The average annual temperature is 41.5 °F. July is the warmest month with an average temperature of 70.6 °F, while January is the coldest month with an average temperature of 6.8 °F. The warmest yearly average temperature is 46.4 °F in 1987, and the coldest yearly average temperature is 34.2 °F in 1883.

The average yearly precipitation for Fargo is 21.19 inches. The greatest yearly precipitation is 34.75 inches in 2000, while the least yearly precipitation is 8.84 inches in 1976. The wettest months of the year are May through August, averaging over 2.50 inches per month. The driest months of the year are December through February, all of which average 0.76 inches per month or less.

The average yearly snowfall for Fargo is 40.0 inches. The snowfall season typically runs from October into May, with January being the snowiest month. Measurable snow has been observed in September, with the earliest measurable snow of 2.0 inches occurring on September 25, 1912. Measurable snow has been observed in May, with the latest measurable snow of 0.1 inch occurring on May 21, 1963. The earliest trace of snow fell on September 14, 1956, and the latest trace of snow fell on June 4, 1935.

The highest seasonal snowfall total for Fargo is 117.0 inches in 1996-1997. The record monthly snowfall of 31.5 inches occurred in January 1989, and the greatest daily snowfall of 16.3 inches occurred on January 22, 1982. The lowest seasonal snowfall total is 9.3 inches in 1957-1958.

A. Seasonal Definitions

When describing the seasonal climate data for Fargo, the meteorological seasons are defined as follows: winter (December, January, and February), spring (March, April, and May), summer (June, July, and August), and fall (September, October, and November).

B. Winter Weather

Although the meteorological winter season is defined as December, January and February, winter weather typically arrives in the middle to late part of November and lasts through March.

The typical winter season average temperature is 11.1 °F. The warmest winter season average temperature of 22.2 °F occurred in 1986-1987, and the coldest winter season average temperature of -4.5 °F occurred in 1886-1887. The normal high temperature for Fargo drops to 32 degrees by November 20, and stays at or below freezing through March 9. In an average winter, there will be about 44 days with a low temperature of zero or colder, with 19 of these days occurring in January.

The typical winter season precipitation is 1.92 inches, which is 9 percent of the average annual precipitation. The wettest winter season of 3.81 inches occurred in 1896-1897, and the driest winter season of 0.36 inches occurred in 1957-1958. 22.6 inches of snow fall during an average winter season. The snowiest winter season of 57.0 inches occurred in 1996-1997, while the winter season with the least snow, 5.7 inches, occurred in 1930-1931.

On average, winter is the cloudiest season. 55 percent of the days are cloudy during the winter season. The least amount of sunshine occurs around December 21, with about eight and one-half hours of sunshine.

The mean wind direction and speed during the winter are from the south at 12-13 mph for December and

January, and from the north at 12 mph in February. For the ASOS era (1996-2001), the winter season had 30 percent of the daily average wind speeds greater than or equal to 20 mph. For the same six-year period (1996-2001), the winter season had 25 percent of the peak daily wind speeds greater than or equal to 40 mph.

C. Spring Weather

Although the meteorological spring season is defined as March, April and May, spring-like weather usually holds off until April and lasts through May.

The typical spring season average temperature is 42.7 °F. The warmest spring season average temperature of 49.3 °F occurred in 1977, and the coldest spring season average temperature of 32.7 °F occurred in 1888 and 1893. In a normal spring season, there will be about one day above 90 °F, and about 5 days with thunderstorms. In a usual year, the growing season starts around May 14, when low temperatures typically stop dropping below 32 °F.

The typical spring season precipitation is 5.15 inches, which is 24 percent of the average annual precipitation. The wettest spring season of 11.44 inches occurred in 1902, and the driest spring season of 1.28 inches occurred in 1980. 10.7 inches of snow fall during an average spring. The snowiest spring season of 33.6 inches occurred in 1997, and the spring season with the least snow, 0.3 inches, occurred in 1895 and 1981.

On average, spring is tied with fall for the second cloudiest season. 49 percent of the days are cloudy during the spring season.

The mean wind direction and speed during the spring is from the north at about 13 mph. For the ASOS era (1996-2001), the spring season had the greatest number (43 percent) of the daily average wind speeds greater than or equal to 20 mph. For the same six-year period (1996-2001), the spring season had the greatest number (30 percent) of the peak daily wind speeds greater than or equal to 40 mph. April is usually the windiest month of the year.

D. Summer Weather

Summer is the only season in Fargo where the meteorological summer season and typical summer weather match.

The typical summer season average temperature is 68.5 °F. The warmest summer season average temperature of 73.9 °F occurred in 1988, and the coldest summer season average temperature of 63.3 °F occurred in 1915. In an average summer, there will be about 12 days with a high temperature of 90 °F or warmer.

The summer season is the wettest season of the year, with normal precipitation at 8.91 inches and about 23 days with thunderstorms. The wettest summer for Fargo was 18.88 inches in 1944, and the driest summer occurred in 1936 with 1.86 inches. No measurable snow has ever been recorded during the summer in Fargo.

On average, summer is the sunniest season. 29 percent of the days are clear during the summer season. The longest day of the year is around June 21, with nearly 16 hours of sunshine.

The mean wind direction and speed during the summer is from the south-southeast at about 11 mph.

For the ASOS era (1996-2001), the summer season recorded only one occurrence of the daily average wind speed greater than or equal to 20 mph. For the same six-year period (1996-2001), the summer season also had the least (18 percent) of the peak daily wind speeds greater than or equal to 40 mph.

E. Fall Weather

Although the meteorological fall season is defined as September, October and November, fall weather is typically brief in duration, as summer weather can extend into the middle of September, and winter weather can arrive in late October.

The typical fall season average temperature is 43.5 °F. The warmest fall season average temperature of 51.4 °F occurred in 1963, and the coldest fall season average temperature of 35.0 °F occurred in 1896. In an average fall, there will be about 11 days with a high temperature of 32 °F or colder, and 2 days with a low temperature of 0 °F or colder. The majority of these colder days occur in November. The first frost typically occurs by September 24, effectively ending the growing season.

The typical fall season precipitation is 5.21 inches, with about 4 days with thunderstorms. The wettest fall season of 10.25 inches occurred in 1977, and the driest fall season of 0.97 inches occurred in 1976. 6.7 inches of snow occur during an average fall. The snowiest fall season of 35.3 inches occurred in 1896. The fall seasons of 1888, 1901, and 1999 were the only ones without measurable snow. The earliest trace of snow recorded in Fargo occurred on September 14, 1956, and the earliest measurable snow was 2.0 inches on September 25, 1912.

On average, fall is tied with spring for the second cloudiest season. 49 percent of the days are cloudy during the fall season.

The mean wind direction and speed during the fall is from the south-southeast at about 12 mph. For the ASOS era (1996-2001), the fall season had 26 percent of the daily average wind speeds greater than or equal to 20 mph. For the same six-year period (1996-2001), the fall season had the second greatest number (27 percent) of the peak daily wind speeds greater than or equal to 40 mph.

IV. MONTHLY CLIMATOLOGY

A. January Climatology

January is the coldest month of the year in Fargo. The average monthly temperature is 6.8 °F, with an average daily high of 15.9 °F and an average daily low of -2.3 °F. The warmest January occurred in 1990, with an average monthly temperature of 21.8 °F. The coldest January, and also the all-time coldest month occurred in 1887, with an average monthly temperature of -10.3 °F. The coldest daily temperature ever recorded for January is -48 °F on the 8th in 1887, which is also the all-time lowest temperature. By contrast, the warmest temperature ever recorded for January is 54 °F on the 20th in 1908. January also averages 19 days with a minimum temperature of zero or below.

January is normally the third driest month of the year, with 0.76 inches of water equivalent precipitation. The wettest January occurred in 1989 with 1.85 inches, and the driest occurred in 1885 with 0.02 inches. The record daily precipitation of 1.06 inches occurred on the 17th in 1906 and on the 1st in 1921. In a typical January, 9 days will have at least 0.01 inches of precipitation.

On average, January has 9.4 inches of snow, which makes it the snowiest month of the year. The snowiest January occurred in 1989 with 31.5 inches, and the least snowiest occurred in 1942 and 1990

with 0.8 inches. The record daily snowfall of 16.3 inches occurred on the 22nd in 1982, which is also the all-time daily snowfall record. In a typical January, 3 days will have at least one inch of snow.

The mean wind direction and speed during January is from the south-southeast at about 13 mph. For the ASOS era (1996-2001), January had 9 percent of the daily average wind speeds greater than or equal to 20 mph. For the same six-year period (1996-2001), January had 7 percent of the peak daily wind speeds greater than or equal to 40 mph.

B. February Climatology

February is the third coldest month of the year in Fargo. The average monthly temperature is 14.1 °F, with an average daily high of 22.8 °F and an average daily low of 5.4 °F. The warmest February occurred in 1998, with an average monthly temperature of 28.0 °F. The coldest February occurred in 1936, with an average monthly temperature of -9.8 °F. The coldest temperature ever recorded for February is -47 °F on the 9th in 1888. By contrast, the warmest temperature ever recorded for February is 66 °F on the 25th in 1958.

February is normally the second driest month of the year, with 0.59 inches of water equivalent precipitation. The wettest February occurred in 1908 with 2.18 inches, and the driest occurred in 1954 with 0.03 inches. The record daily precipitation of 1.10 inches occurred on the 13th in 1915. In a typical February, 7 days will have at least 0.01 inches of precipitation.

On average, February has 6.0 inches of snow. The snowiest February occurred in 1979 with 19.5 inches, and the least snowiest occurred in 1954 with 0.3 inches. The record daily snowfall of 10.8 inches occurred on the 28th in 1951. In a typical February, 2 days will have at least one inch of snow.

The mean wind direction and speed during February is from the north at about 12 mph. For the ASOS era (1996-2001), February had 10 percent of the daily average wind speeds greater than or equal to 20 mph. For the same six-year period (1996-2001), February had 7 percent of the peak daily wind speeds greater than or equal to 40 mph.

C. March Climatology

March is the fifth coldest month of the year in Fargo. The average monthly temperature is 27.2 °F, with an average daily high of 35.3 °F and an average daily low of 19.0 °F. The warmest March occurred in 1910, with an average monthly temperature of 40.9 °F. The coldest March occurred in 1899, with an average monthly temperature of 11.1 °F. The coldest temperature ever recorded for March is -34 °F on the 10th in 1948. By contrast, the warmest temperature ever recorded for March is 80 °F on the 23rd in 1910.

March averages 1.17 inches of water equivalent precipitation. The wettest March occurred in 1882 with 2.83 inches, and the driest occurred in 1895 and 1958 with 0.03 inches. The record daily precipitation of 1.12 inches occurred on the 8th in 2000. In a typical March, 8 days will have at least 0.01 inches of precipitation.

On average, March has 7.4 inches of snow, which makes it the second snowiest month of the year. The snowiest March occurred in 1997 with 26.2 inches, and the least snowiest occurred in 1905 and 1961 with only a trace of snow. The record daily snowfall of 12.0 inches occurred on the 3rd in 1997. In a typical March, 2 days will have at least one inch of snow.

The mean wind direction and speed during March is from the north at about 13 mph. For the ASOS era (1996-2001), March was tied with November for the second greatest number (14 percent) of the daily average wind speeds greater than or equal to 20 mph. For the same six-year period (1996-2001), March had 6 percent of the peak daily wind speeds greater than or equal to 40 mph.

D. April Climatology

April is typically the first month of spring-like weather. The average monthly temperature is 43.5 °F, with an average daily high of 54.5 °F and an average daily low of 32.4 °F. The warmest April occurred in 1915, with an average monthly temperature of 51.6 °F. The coldest April occurred in 1893, with an average monthly temperature of 33.0 °F. The coldest temperature ever recorded for April is -13 °F on the 1st in 1881. By contrast, the warmest temperature ever recorded for April is 100 °F on the 21st in 1980. The earliest thaw and start of a growing season occurred on the 20th in 1904.

April averages 1.37 inches of water equivalent precipitation. The wettest April occurred in 1886 with 5.49 inches, and the driest occurred in 1988 with 0.01 inches. The record daily precipitation of 2.10 inches occurred on the 8th in 1904. In a typical April, 8 days will have at least 0.01 inches of precipitation, with thunderstorms on one day.

On average, April has 3.2 inches of snow. The snowiest April occurred in 1904 with 17.4 inches, and the least snowiest occurred in 1891, 1895, 1915, and 1925, when no snow fell. The record daily snowfall of 13.2 inches occurred on the 8th in 1904. In a typical April, 1 day will have at least one inch of snow.

The mean wind direction and speed during April is from the north at about 14 mph, which is the highest of the year. For the ASOS era (1996-2001), April had 17 percent of the daily average wind speeds greater than or equal to 20 mph (the highest for the year). For the same six-year period (1996-2001), April had 10 percent of the peak daily wind speeds greater than or equal to 40 mph.

E. May Climatology

Spring weather is typically in full swing by early May. The average monthly temperature is 57.4 °F, with an average daily high of 69.5 °F and an average daily low of 45.3 °F. The warmest May occurred in 1977, with an average monthly temperature of 66.5 °F. The coldest May occurred in 1907, with an average monthly temperature of 44.8 °F. The coldest temperature ever recorded for May is 14 °F on the 1st in 1890. By contrast, the warmest temperature ever recorded for May is 104 °F on the 30th in 1934. On average, there will be 1 day above 90 °F in May.

May is the third wettest month of the year, with an average of 2.61 inches of water equivalent precipitation. The wettest May occurred in 1998 with 7.34 inches, and the driest occurred in 1917 with 0.38 inches. The record daily precipitation of 4.02 inches occurred on the 4th in 1977. In a typical May, 10 days will have at least 0.01 inches of precipitation, with thunderstorms on 4 days.

On average, May has 0.1 inches of snow. The snowiest May occurred in 1935 with 5.1 inches. The record daily snowfall of 5.1 inches occurred on the 2nd in 1935. In a typical May, no days receive at least an inch of snow.

The mean wind direction and speed during May is from the north at about 13 mph. For the ASOS era (1996-2001), May had 11 percent of the daily average wind speeds greater than or equal to 20 mph. For the same six-year period (1996-2001), May had the greatest number (13 percent) of the peak daily wind speeds greater than or equal to 40 mph.

F. June Climatology

June is typically the first month of summer, and the third warmest month of the year. The average monthly temperature is 66.0 °F, with an average daily high of 77.4 °F and an average daily low of 54.5 °F. The warmest June occurred in 1988, with an average monthly temperature of 73.8 °F. The coldest June occurred in 1969, with an average monthly temperature of 57.3 °F. The coldest temperature ever recorded for June is 28 °F on the 1st in 1888. By contrast, the warmest temperature ever recorded for June is 104 °F on the 18th in 1933. On average, there will be 2 days above 90 °F in June. The latest frost and latest start of a growing season occurred on the 20th in 1969.

June is the wettest month of the year, with an average of 3.51 inches of precipitation. The wettest June and also the all-time wettest month occurred in 2000 with 11.71 inches, and the driest occurred in 1929 with 0.30 inches. The record daily precipitation of 4.64 inches occurred on the 19th in 2000. In a typical June, 11 days will have at least 0.01 inches of precipitation, with thunderstorms on 7 days.

No measurable snow has been recorded in June, although a trace fell on the 4th in 1935. This is the latest recorded snowfall for Fargo.

The mean wind direction and speed during June is from the south-southeast at about 12 mph. For the ASOS era (1996-2001), June had the second lowest number (1 percent) of the daily average wind speeds greater than or equal to 20 mph. For the same six-year period (1996-2001), June was tied with December for the third greatest number (10 percent) of the peak daily wind speeds greater than or equal to 40 mph.

G. July Climatology

July is the warmest month of the year. The average monthly temperature is 70.6 °F, with an average daily high of 82.2 °F and an average daily low of 59.0 °F. The warmest July and also the all-time warmest month occurred in 1936, with an average monthly temperature of 80.2 °F. The coldest July occurred in 1891, with an average monthly temperature of 63.4 °F. The coldest temperature ever recorded for July is 36 °F on the 3rd in 1967. By contrast, the warmest temperature ever recorded for July is 114 °F on the 6th in 1936, which is also the all-time highest temperature. On average, there will be 5 days above 90 °F in July.

July is the second wettest month of the year, with an average of 2.88 inches of precipitation. The wettest July occurred in 1952 with 8.42 inches, and the driest occurred in 1936 and 1950 with 0.42 inches. The record daily precipitation of 4.50 inches occurred on the 3rd in 1886. In a typical July, 10 days will have at least 0.01 inches of precipitation, with thunderstorms on 8 days.

No snowfall has ever been recorded in July.

The mean wind direction and speed during July is from the south at about 11 mph, which is the lowest speed for the year. For the ASOS era (1996-2001), July was tied with August for the least (0 percent) of the daily average wind speeds greater than or equal to 20 mph. For the same six-year period (1996-2001), July was tied for the second lowest number (6 percent) of the peak daily wind speeds greater than or equal to 40 mph.

H. August Climatology

August is the second warmest month of the year. The average monthly temperature is 69.0 °F, with an

average daily high of 81.0 °F and an average daily low of 57.0 °F. The warmest August occurred in 1937, with an average monthly temperature of 74.2 °F. The coldest August occurred in 1885, with an average monthly temperature of 61.6 °F. The coldest temperature ever recorded for August is 32 °F on the 25th in 1885 and the 31st in 1886. By contrast, the warmest temperature ever recorded for August is 106 °F on the 18th in 1976. On average, there will be 5 days above 90 °F in August. The earliest frost and earliest end of a growing season occurred on the 25th in 1885.

August is the fourth wettest month of the year, with an average of 2.52 inches of precipitation. The wettest August occurred in 1900 with 9.58 inches, and the driest occurred in 1984 with 0.18 inches. The record daily precipitation of 4.72 inches occurred on the 8th in 1943, which is also the all-time record daily precipitation. In a typical August, 9 days will have at least 0.01 inches of precipitation, with thunderstorms on 7 days.

No snowfall has ever been recorded in August.

The mean wind direction and speed during August is from the south-southeast at about 11 mph, which is the second lowest speed of the year. For the ASOS era (1996-2001), August was tied with July for the least number (0 percent) of the daily average wind speeds greater than or equal to 20 mph. For the same six-year period (1996-2001), August also had the least number (3 percent) of the peak daily wind speeds greater than or equal to 40 mph.

I. September Climatology

September is the fourth warmest month of the year. The average monthly temperature is 58.0 °F, with an average daily high of 69.9 °F and an average daily low of 46.1 °F. The warmest September occurred in 1897, with an average monthly temperature of 65.6 °F. The coldest September occurred in 1965, with an average monthly temperature of 48.9 °F. The coldest temperature ever recorded in September is 17 °F on the 30th in 1883. By contrast, the warmest temperature ever recorded in September is 102 °F on the 8th in 1959. On average, there will be 1 day above 90 °F in September.

September averages 2.18 inches of water equivalent precipitation. The wettest September occurred in 1999 with 6.50 inches, and the driest occurred in 1974 with 0.13 inches. The record daily precipitation of 3.80 inches occurred on the 13th in 1889. In a typical September, 8 days will have at least 0.01 inches of precipitation, with thunderstorms on 3 days.

On average, September has no measurable snow. The snowiest September occurred in 1912 with 2.0 inches. The record daily snowfall of 2.0 inches occurred on the 25th in 1912. In a typical September, no days receive at least an inch of snow.

The mean wind direction and speed during September is from the south-southeast at about 12 mph. For the ASOS era (1996-2001), September had 2 percent of the daily average wind speeds greater than or equal to 20 mph. For the same six-year period (1996-2001), September had 7 percent of the peak daily wind speeds greater than or equal to 40 mph.

J. October Climatology

Fall is in full swing by October. The average monthly temperature is 45.3 °F, with an average daily high of 56.1 °F and an average daily low of 34.4 °F. The warmest October occurred in 1963, with an average monthly temperature of 57.3 °F. The coldest October occurred in 1925, with an average monthly temperature of 34.6 °F. The coldest temperature ever recorded in October is -4 °F on the 26th in 1919.

By contrast, the warmest temperature ever recorded in October is 93 °F on the 3rd in 1922 and on the 5th in 1963. On average, October has no 90 °F days. The latest frost and latest end of a growing season occurred on the 24th in 1994.

October averages 1.97 inches of water equivalent precipitation. The wettest October occurred in 1982 with 7.03 inches, and the driest occurred in 1986 with 0.05 inches. The record daily precipitation of 3.10 inches occurred on the 9th in 1982. In a typical October, 6 days will have at least 0.01 inches of precipitation, with thunderstorms on 1 day.

On average, October has 0.6 inches of snow. The snowiest October occurred in 1951 with 8.1 inches. The record daily snowfall of 7.0 inches occurred on the 30th in 1951. In a typical October, no days receive at least an inch of snow.

The mean wind direction and speed during October is from the south-southeast at about 13 mph. For the ASOS era (1996-2001), October had 10 percent of the daily average wind speeds greater than or equal to 20 mph. For the same six-year period (1996-2001), October had the second greatest number (12 percent) of the peak daily wind speeds greater than or equal to 40 mph.

K. November Climatology

Fall quickly ends and the transition to winter typically occurs in November. The average monthly temperature is 27.0 °F, with an average daily high of 35.2 °F and an average daily low of 18.7 °F. The warmest November occurred in 2001, with an average monthly temperature of 39.7 °F. The coldest November occurred in 1896, with an average monthly temperature of 10.2 °F. The coldest temperature ever recorded in November is -27 °F on the 30th in 1905. By contrast, the warmest temperature ever recorded in November is 74 °F on the 1st in 1990.

November is the fourth driest month of the year, with an average of 1.06 inches of water equivalent precipitation. The wettest November occurred in 1977 with 4.58 inches, and the driest occurred in 1901 and 1999 with just a trace of precipitation. The record daily precipitation of 2.10 inches occurred on the 24th in 1908. In a typical November, 6 days will have at least 0.01 inches of precipitation, with no thunderstorms.

On average, November has 6.1 inches of snow, which makes it the fourth snowiest month of the year. The snowiest November occurred in 1896 with 30.4 inches, and the least snowiest occurred in 1888 and 1999 when no snow fell. The record daily snowfall of 14.0 inches occurred on the 14th in 1909. In a typical November, there are 2 days which receive at least an inch of snow.

The mean wind direction and speed during November is from the south at about 13 mph. For the ASOS era (1996-2001), November had 14 percent of the daily average wind speeds greater than or equal to 20 mph. For the same six-year period (1996-2001), November had 9 percent of the peak daily wind speeds greater than or equal to 40 mph.

L. December Climatology

December is the second coldest month of the year. The average monthly temperature is 12.5 °F, with an average daily high of 20.8 °F and an average daily low of 4.2 °F. The warmest December occurred in 1959, with an average monthly temperature of 25.9 °F. The coldest December occurred in 1886, with an average monthly temperature of -0.5 °F. The coldest temperature ever recorded in December is -36 °F on the 29th in 1887. By contrast, the warmest temperature ever recorded in December is 65 °F on the 6st

in 1939.

December is the driest month of the year, with an average of 0.57 inches of water equivalent precipitation. The wettest December occurred in 1927 with 2.28 inches, and the driest occurred in 1913 with 0.02 inches. The record daily precipitation of 1.23 inches occurred on the 14th in 1927. In a typical December, 8 days will have at least 0.01 inches of precipitation.

On average, December has 7.2 inches of snow, which makes it the third snowiest month of the year. The snowiest December occurred in 1927 with 29.2 inches, and the least snowiest was in 1913, when a trace of snow fell. The record daily snowfall of 14.3 inches occurred on the 14th in 1927. In a typical December, there are 2 days which receive at least an inch of snow.

The mean wind direction and speed during December is from the south at about 12 mph. For the ASOS era (1996-2001), December had 10 percent of the daily average wind speeds greater than or equal to 20 mph. For the same six-year period (1996-2001), December was tied with April and June for the third greatest number (10 percent) of the peak daily wind speeds greater than or equal to 40 mph.

V. ACKNOWLEDGMENTS

We would to thank Dr. John Enz, the North Dakota State Climatologist, who provided data to fill in several holes in our on-station climate records. After the NWS office closed in Fargo, he willingly accepted many volumes of data that might have been discarded or lost.

Continuing thanks go to Keith Malakowsky, a NWS cooperative observer in Moorhead, who has become a one-man weather service representing the Fargo-Moorhead area. His excellent reports fill in the gaps that occur due to the automation of surface observations (ASOS). He provides the official precipitation, snowfall, and snow depth measurement for Fargo-Moorhead during the winter season. Without this information, a nearly complete 120-year data set would come to an end.

Also, a thank you to the Minnesota State Climatologist's office, who provided direction to find the microfilm containing the United States Signal Corps data from the early days at Moorhead. They were also quite helpful in data exchanges to fill in gaps in the Moorhead data set.

Finally, a thank you to Brad Bramer, NWS Eastern North Dakota Science and Operations Officer, for his review and comments.

VI. SOURCES

Most of the data, figures, and photographs used in this publication were compiled from records in storage at the NWS office in Grand Forks. A special effort was made to verify the early records (1881-1940), by cross-checking them with as many of the original forms as possible.

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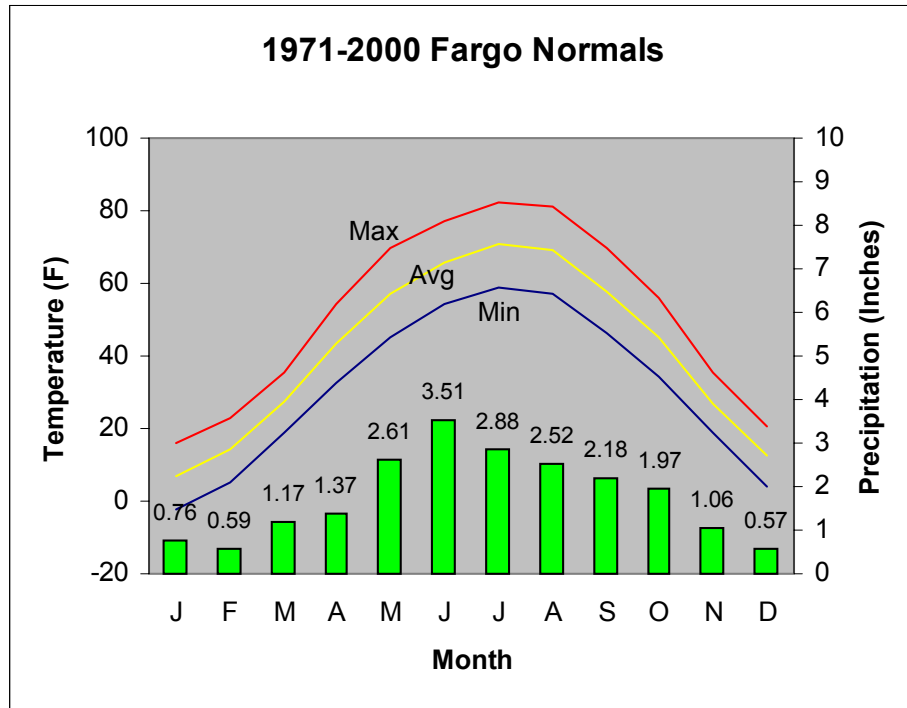
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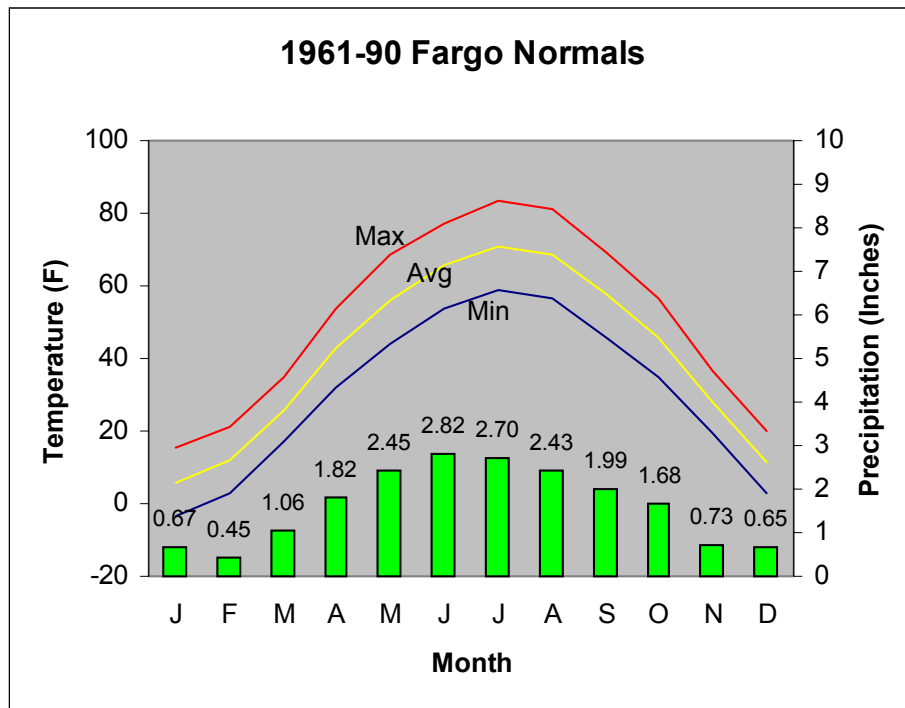
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Fargo Normals



1971-2000						
Month	Max	Min	Ave	Pcpn	HDD	CDD
J	15.9	-2.3	6.8	0.76	1808	0
F	22.8	5.4	14.1	0.59	1446	0
M	35.3	19.0	27.2	1.17	1185	0
A	54.5	32.4	43.5	1.37	652	3
M	69.5	45.3	57.4	2.61	271	33
J	77.4	54.5	66.0	3.51	73	104
J	82.2	59.0	70.6	2.88	17	191
A	81.0	57.0	69.0	2.52	37	162
S	69.9	46.1	58.0	2.18	245	38
O	56.1	34.4	45.3	1.97	614	2
N	35.2	18.7	27.0	1.06	1137	0
D	20.8	4.2	12.5	0.57	1610	0
Year	51.7	31.1	41.5	21.19	9095	533

Prior Sets of Fargo Normals



1961-90						
Month	MaxT	MinT	AvgT	Pcpn	HDD	CDD
J	15.4	-3.6	5.9	0.67	1832	0
F	21.1	2.7	12.0	0.45	1484	0
M	34.6	17.3	25.9	1.06	1212	0
A	53.8	32.1	43.0	1.82	660	0
M	68.5	43.8	56.2	2.45	307	35
J	77.4	53.6	65.5	2.82	93	108
J	83.4	58.8	71.1	2.70	19	209
A	81.3	56.4	68.8	2.43	48	165
S	69.4	45.9	57.7	1.99	239	20
O	56.7	34.6	45.7	1.68	598	0
N	36.8	19.4	28.1	0.73	1107	0
D	20.1	3.1	11.6	0.65	1655	0
Year	51.5	30.3	41.0	19.45	9254	537

1951-80				
Month	MaxT	MinT	AvgT	Pcpn
J	13.7	-5.1	4.3	0.55
F	20.5	1.5	11.0	0.42
M	33.2	14.8	24.0	0.83
A	52.5	31.6	42.1	1.90
M	68.1	43.0	55.6	2.24
J	76.9	53.5	65.2	3.06
J	82.7	58.4	70.6	3.34
A	81.1	56.4	68.8	2.67
S	69.8	45.7	57.8	1.87
O	57.7	34.9	46.3	1.29
N	37.0	19.4	28.2	0.79
D	21.3	4.0	12.7	0.63
Year	51.2	29.8	40.5	19.59

1941-70				
Month	MaxT	MinT	AvgT	Pcpn
J	15.4	-3.6	5.9	0.50
F	20.6	0.8	10.7	0.44
M	33.5	14.9	24.2	0.83
A	52.6	31.9	42.3	2.08
M	66.8	42.3	54.6	2.29
J	75.9	53.4	64.7	3.20
J	82.8	58.6	70.7	3.16
A	81.6	56.8	69.2	2.85
S	69.6	46.2	57.9	1.84
O	58.4	35.5	47.0	1.09
N	37.2	20.0	28.6	0.72
D	21.9	4.1	13.0	0.62
Year	51.4	30.1	40.8	19.62

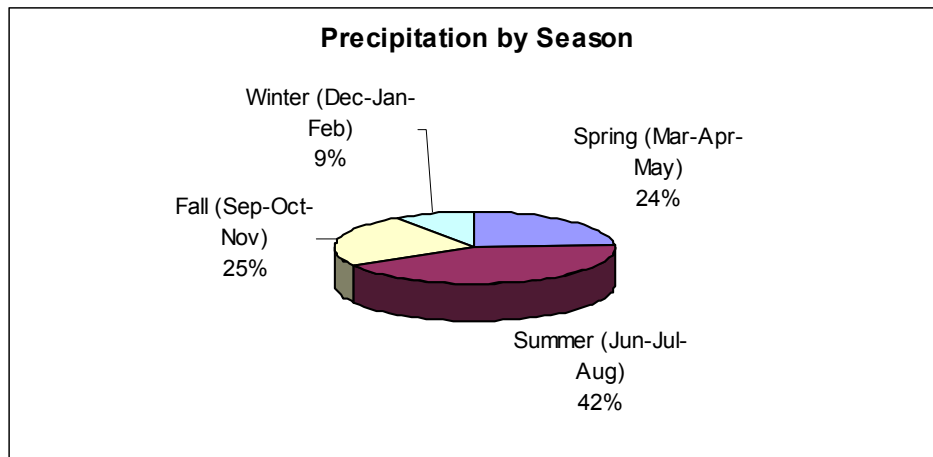
1931-60				
Month	MaxT	MinT	AvgT	Pcpn
J	17.3	-2.8	7.3	0.53
F	20.5	0.9	10.7	0.51
M	33.4	15.1	24.3	0.75
A	52.7	31.3	42.0	1.72
M	67.8	43.0	55.4	2.03
J	76.3	53.3	64.8	3.04
J	83.8	59.0	71.4	2.91
A	81.9	57.0	69.5	2.95
S	71.0	46.5	58.8	1.48
O	58.0	35.0	46.5	1.11
N	37.3	18.8	28.1	0.84
D	23.9	4.8	15.0	0.58
Year	52.0	30.2	41.1	18.45

1921-50				
Month	MaxT	MinT	AvgT	Pcpn
J	16.9	-2.8	7.1	0.60
F	20.8	0.7	10.8	0.66
M	34.6	15.9	25.3	0.89
A	53.1	31.1	42.1	1.88
M	67.4	42.5	55.0	2.17
J	76.7	52.5	64.6	3.04
J	84.2	58.3	71.3	2.31
A	82.0	56.1	69.1	2.73
S	71.2	46.5	58.9	1.72
O	57.4	34.8	46.1	1.26
N	36.4	18.8	27.6	0.87
D	22.0	3.7	12.9	0.60
Year	51.9	29.8	40.9	18.73

Seasonal Normals (1971-2000)

<u>Season</u>	<u>MaxT</u>	<u>MinT</u>	<u>AvgT</u>
Spring (Mar-Apr-May)	53.1	32.2	42.7
Summer (Jun-Jul-Aug)	80.2	56.8	68.5
Fall (Sep-Oct-Nov)	53.7	33.1	43.5
Winter (Dec-Jan-Feb)	19.8	2.4	11.1

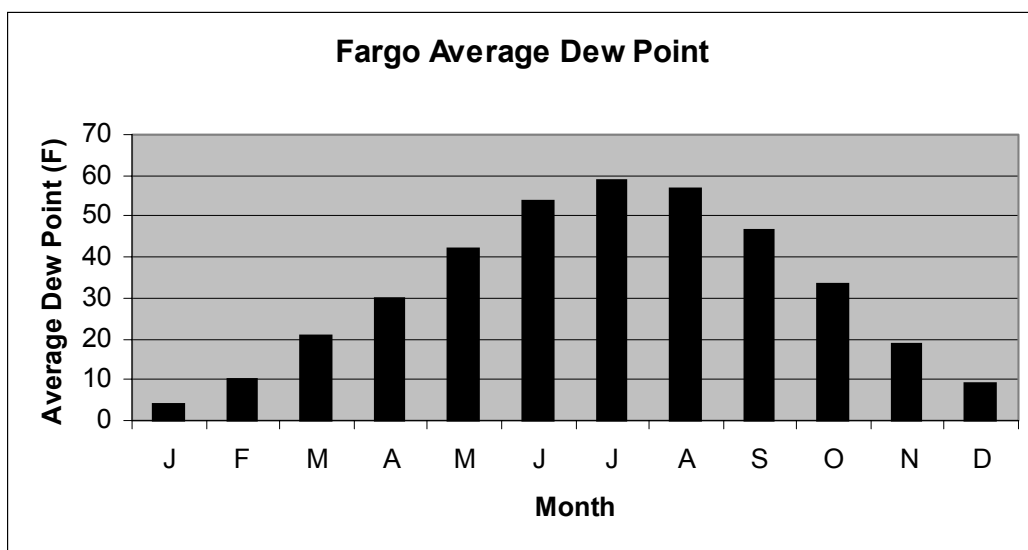
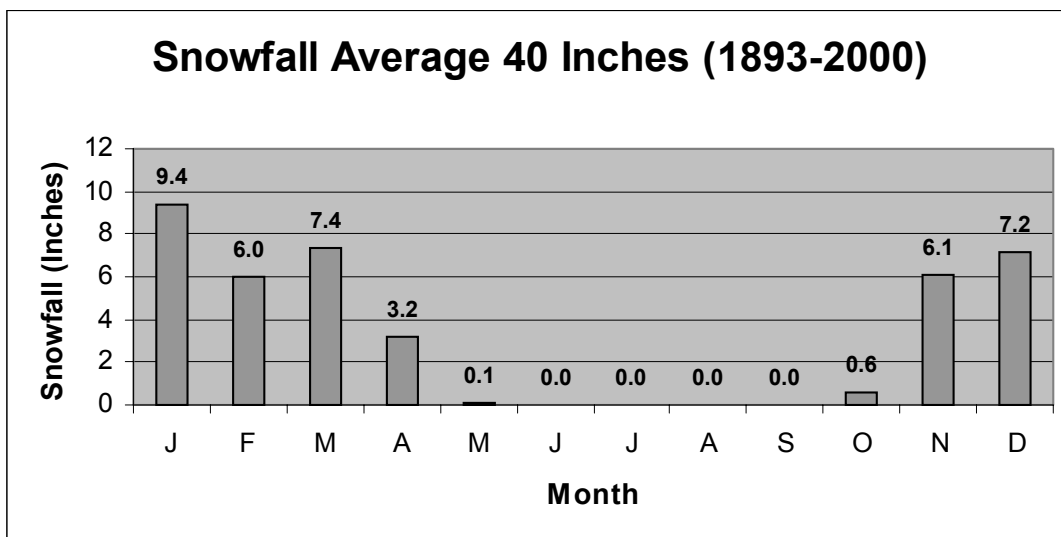
<u>Season</u>	<u>Pcpn</u>
Spring (Mar-Apr-May)	5.15
Summer (Jun-Jul-Aug)	8.91
Fall (Sep-Oct-Nov)	5.21
Winter (Dec-Jan-Feb)	1.92



Miscellaneous Normals

(Source: U.S. Department of Commerce 1994)

	Mean Number of Days:												
	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Year</u>
	<u>Cloud Cover</u>												
Clear	6.7	6.3	5.5	6.6	7.0	6.4	10.1	10.4	8.7	8.7	5.5	6.1	88.0
Partly Cloudy	7.5	7.2	9.0	8.8	9.8	10.9	13.4	11.9	9.2	8.3	6.3	7.3	109.5
Cloudy	16.8	14.8	16.6	14.6	14.2	12.6	7.5	8.7	12.1	14.0	18.2	17.5	167.7
	<u>Precipitation</u>												
0.01 Inches or More	8.6	7.0	7.7	8.2	10.0	10.7	9.7	9.0	8.0	6.3	6.3	8.1	99.6
	<u>Snow</u>												
1 Inch or More	2.5	1.7	2.1	1.1	0.0	0.0	0.0	0.0	0.0	0.3	1.9	2.3	11.8
	<u>Thunderstorms</u>												
Number	0.0	0.0	0.2	1.3	3.8	7.3	8.4	7.0	3.0	0.9	0.1	0.0	32.1
	<u>Maximum Temperature</u>												
90 Degrees or Greater	0.0	0.0	0.0	0.1	0.7	2.2	5.0	5.2	1.0	0.1	0.0	0.0	14.3
32 Degrees or Below	27.1	21.3	12.1	1.1	0.0	0.0	0.0	0.0	0.0	0.5	10.7	24.8	97.7
	<u>Minimum Temperature</u>												
32 Degrees or Below	31.0	28.1	27.5	16.4	4.0	0.0	0.0	0.0	1.8	12.9	26.9	30.9	179.5
0 or Below	18.6	12.6	4.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	2.1	13.1	50.7
	<u>Wind</u>												
Mean Speed	12.7	12.4	13.1	13.9	12.9	11.6	10.5	11.0	11.9	12.6	12.8	12.2	12.3
Mean Direction	SSE	N	N	N	N	SSE	S	SSE	SSE	SSE	S	S	SSE
	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Year</u>



Average Dew Point by Month (F)

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
3.9	10.3	20.9	30.0	42.0	53.8	58.7	56.7	46.7	33.5	18.8	9.1

Dew Point defined on page 157

Sunrise/Sunset and Average Temperature

January					February				March			
Day	Rise	Set	Hours	AvgT	Rise	Set	Hours	AvgT	Rise	Set	Hours	AvgT
1	8:12	16:49	8:37	7	7:52	17:30	9:38	10	7:07	18:13	11:06	20
2	8:12	16:50	8:38	7	7:51	17:32	9:41	10	7:05	18:14	11:09	20
3	8:12	16:51	8:39	7	7:49	17:33	9:44	10	7:03	18:16	11:13	21
4	8:12	16:52	8:40	7	7:48	17:35	9:47	10	7:01	18:17	11:16	21
5	<u>8:12</u>	<u>16:53</u>	<u>8:41</u>	<u>7</u>	<u>7:47</u>	<u>17:36</u>	<u>9:49</u>	<u>11</u>	<u>7:00</u>	<u>18:19</u>	<u>11:19</u>	<u>22</u>
6	8:12	16:54	8:42	7	7:45	17:38	9:53	11	6:58	18:20	11:22	22
7	8:12	16:56	8:44	7	7:44	17:40	9:56	11	6:56	18:21	11:25	23
8	8:11	16:57	8:46	6	7:42	17:41	9:59	11	6:54	18:23	11:29	23
9	8:11	16:58	8:47	6	7:41	17:43	10:02	12	6:52	18:24	11:32	24
10	<u>8:11</u>	<u>16:59</u>	<u>8:48</u>	<u>6</u>	<u>7:39</u>	<u>17:44</u>	<u>10:05</u>	<u>12</u>	<u>6:50</u>	<u>18:26</u>	<u>11:36</u>	<u>24</u>
11	8:10	17:00	8:50	6	7:38	17:46	10:08	13	6:48	18:27	11:39	24
12	8:10	17:02	8:52	6	7:36	17:47	10:11	13	6:46	18:29	11:43	25
13	8:09	17:03	8:54	6	7:35	17:49	10:14	13	6:44	18:30	11:46	25
14	8:09	17:04	8:55	6	7:33	17:50	10:17	14	6:42	18:31	11:49	26
15	<u>8:08</u>	<u>17:06</u>	<u>8:58</u>	<u>6</u>	<u>7:31</u>	<u>17:52</u>	<u>10:21</u>	<u>14</u>	<u>6:40</u>	<u>18:33</u>	<u>11:53</u>	<u>26</u>
16	8:07	17:07	9:00	6	7:30	17:53	10:23	14	6:38	18:34	11:56	27
17	8:07	17:08	9:01	6	7:28	17:55	10:27	15	6:36	18:36	12:00	28
18	8:06	17:10	9:04	6	7:27	17:56	10:29	15	6:34	18:37	12:03	28
19	8:05	17:11	9:06	6	7:25	17:58	10:33	16	6:32	18:38	12:06	29
20	<u>8:04</u>	<u>17:12</u>	<u>9:08</u>	<u>6</u>	<u>7:23</u>	<u>17:59</u>	<u>10:36</u>	<u>16</u>	<u>6:30</u>	<u>18:40</u>	<u>12:10</u>	<u>29</u>
21	8:04	17:14	9:10	6	7:21	18:01	10:40	17	6:28	18:41	12:13	30
22	8:03	17:15	9:12	7	7:20	18:02	10:42	17	6:26	18:43	12:17	30
23	8:02	17:17	9:15	7	7:18	18:04	10:46	17	6:24	18:44	12:20	31
24	8:01	17:18	9:17	7	7:16	18:05	10:49	18	6:22	18:45	12:23	31
25	<u>8:00</u>	<u>17:20</u>	<u>9:20</u>	<u>7</u>	<u>7:14</u>	<u>18:07</u>	<u>10:53</u>	<u>18</u>	<u>6:20</u>	<u>18:47</u>	<u>12:27</u>	<u>32</u>
26	7:59	17:21	9:22	7	7:12	18:08	10:56	18	6:18	18:48	12:30	32
27	7:58	17:23	9:25	8	7:11	18:10	10:59	19	6:16	18:49	12:33	33
28	7:57	17:24	9:27	8	7:09	18:11	11:02	19	6:14	18:51	12:37	33
29	7:55	17:26	9:31	8					6:12	18:52	12:40	34
30	<u>7:54</u>	<u>17:27</u>	<u>9:33</u>	<u>9</u>					<u>6:10</u>	<u>18:54</u>	<u>12:44</u>	<u>34</u>
31	7:53	17:29	9:36	9					6:08	18:55	12:47	35

Sunshine data from the U.S. Naval Observatory for the year 2002, with times listed in CST (add one hour for CDT). Hours refers to the length of the daylight period (hours of sunshine).

April					May				June			
Day	Rise	Set	Hours	AvgT	Rise	Set	Hours	AvgT	Rise	Set	Hours	AvgT
1	6:07	18:56	12:49	36	5:12	19:37	14:25	51	4:37	20:14	15:37	63
2	6:05	18:58	12:53	36	5:10	19:39	14:29	52	4:36	20:15	15:39	63
3	6:03	18:59	12:56	37	5:09	19:40	14:31	52	4:35	20:16	15:41	63
4	6:01	19:00	12:59	37	5:07	19:41	14:34	53	4:35	20:16	15:41	63
5	<u>5:59</u>	<u>19:02</u>	<u>13:03</u>	<u>38</u>	<u>5:06</u>	<u>19:43</u>	<u>14:37</u>	<u>53</u>	<u>4:34</u>	<u>20:17</u>	<u>15:43</u>	<u>63</u>
6	5:57	19:03	13:06	39	5:04	19:44	14:40	54	4:34	20:18	15:44	63
7	5:55	19:05	13:10	39	5:03	19:45	14:42	54	4:34	20:19	15:45	64
8	5:53	19:06	13:13	40	5:02	19:47	14:45	55	4:33	20:19	15:46	64
9	5:51	19:07	13:16	40	5:00	19:48	14:48	55	4:33	20:20	15:47	65
10	<u>5:49</u>	<u>19:09</u>	<u>13:20</u>	<u>41</u>	<u>4:59</u>	<u>19:49</u>	<u>14:50</u>	<u>55</u>	<u>4:33</u>	<u>20:21</u>	<u>15:48</u>	<u>65</u>
11	5:47	19:10	13:23	41	4:57	19:50	14:53	56	4:33	20:21	15:48	65
12	5:45	19:11	13:26	42	4:56	19:52	14:56	56	4:32	20:22	15:50	65
13	5:43	19:13	13:30	42	4:55	19:53	14:58	57	4:32	20:22	15:50	66
14	5:42	19:14	13:32	43	4:54	19:54	15:00	57	4:32	20:23	15:51	66
15	<u>5:40</u>	<u>19:15</u>	<u>13:35</u>	<u>43</u>	<u>4:52</u>	<u>19:55</u>	<u>15:03</u>	<u>57</u>	<u>4:32</u>	<u>20:23</u>	<u>15:51</u>	<u>66</u>
16	5:38	19:17	13:39	44	4:51	19:57	15:06	58	4:32	20:24	15:52	66
17	5:36	19:18	13:42	44	4:50	19:58	15:08	58	4:32	20:24	15:52	67
18	5:34	19:20	13:46	45	4:49	19:59	15:10	58	4:32	20:24	15:52	67
19	5:32	19:21	13:49	45	4:48	20:00	15:12	59	4:32	20:25	15:53	67
20	<u>5:31</u>	<u>19:22</u>	<u>13:51</u>	<u>46</u>	<u>4:47</u>	<u>20:01</u>	<u>15:14</u>	<u>59</u>	<u>4:32</u>	<u>20:25</u>	<u>15:53</u>	<u>67</u>
21	5:29	19:24	13:55	46	4:46	20:03	15:17	59	4:33	20:25	15:52	67
22	5:27	19:25	13:58	47	4:45	20:04	15:19	60	4:33	20:25	15:52	67
23	5:25	19:26	14:01	48	4:44	20:05	15:21	60	4:33	20:26	15:53	68
24	5:24	19:28	14:04	48	4:43	20:06	15:23	60	4:33	20:26	15:53	68
25	<u>5:22</u>	<u>19:29</u>	<u>14:07</u>	<u>49</u>	<u>4:42</u>	<u>20:07</u>	<u>15:25</u>	<u>61</u>	<u>4:34</u>	<u>20:26</u>	<u>15:52</u>	<u>68</u>
26	5:20	19:31	14:11	49	4:41	20:08	15:27	61	4:34	20:26	15:52	69
27	5:19	19:32	14:13	49	4:40	20:09	15:29	61	4:35	20:26	15:51	69
28	5:17	19:33	14:16	50	4:39	20:10	15:31	62	4:35	20:26	15:51	69
29	5:15	19:35	14:20	51	4:39	20:11	15:32	62	4:36	20:25	15:49	69
30	<u>5:14</u>	<u>19:36</u>	<u>14:22</u>	<u>51</u>	<u>4:38</u>	<u>20:12</u>	<u>15:34</u>	<u>62</u>	<u>4:36</u>	<u>20:25</u>	<u>15:49</u>	<u>69</u>
31					4:37	20:13	15:36	62				

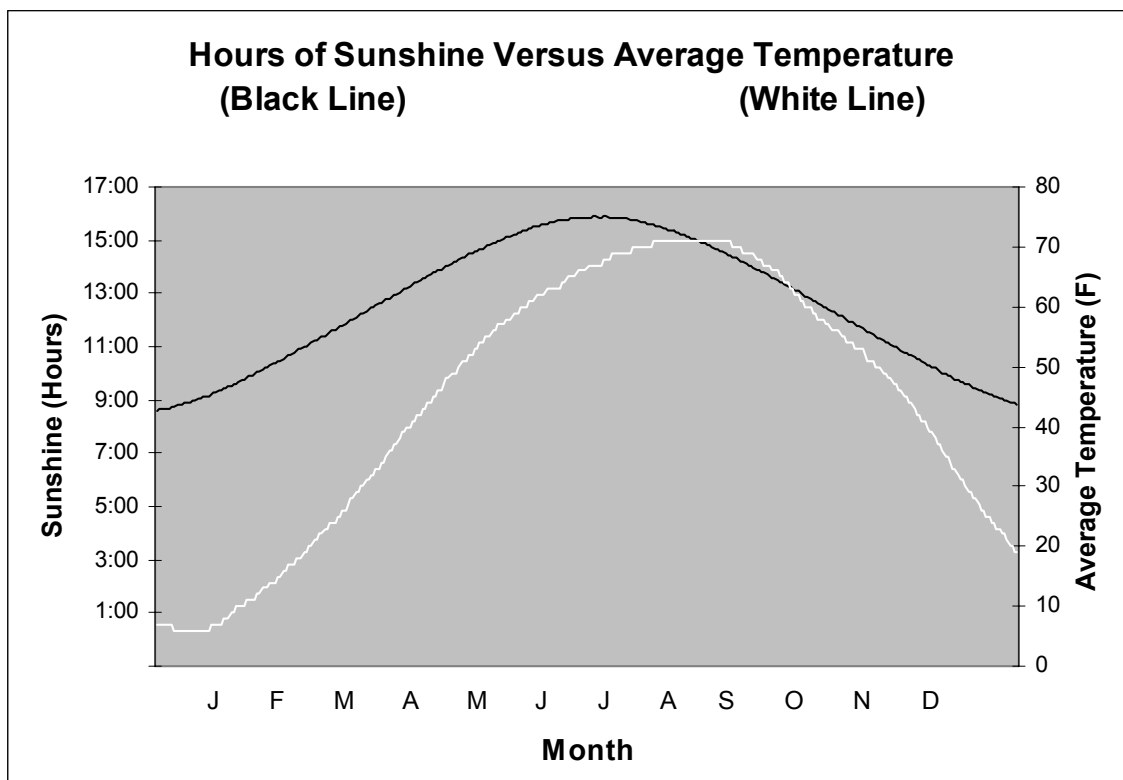
Sunshine data from the U.S. Naval Observatory for the year 2002, with times listed in CST (add one hour for CDT). Hours refers to the length of the daylight period (hours of sunshine).

July					August				September			
Day	Rise	Set	Hours	AvgT	Rise	Set	Hours	AvgT	Rise	Set	Hours	AvgT
1	4:37	20:25	15:48	69	5:07	19:59	14:52	71	5:47	19:07	13:20	64
2	4:37	20:25	15:48	69	5:08	19:58	14:50	71	5:48	19:05	13:17	64
3	4:38	20:25	15:47	69	5:09	19:56	14:47	71	5:49	19:03	13:14	63
4	4:39	20:24	15:45	70	5:11	19:55	14:44	71	5:51	19:01	13:10	63
5	4:39	20:24	15:45	70	5:12	19:54	14:42	71	5:52	18:59	13:07	62
6	4:40	20:23	15:43	70	5:13	19:52	14:39	71	5:53	18:57	13:04	62
7	4:41	20:23	15:42	70	5:14	19:51	14:37	71	5:54	18:55	13:01	61
8	4:42	20:23	15:41	70	5:16	19:49	14:33	71	5:56	18:53	12:57	61
9	4:42	20:22	15:40	70	5:17	19:48	14:31	71	5:57	18:51	12:54	60
10	4:43	20:21	15:38	70	5:18	19:46	14:28	71	5:58	18:49	12:51	60
11	4:44	20:21	15:37	70	5:19	19:44	14:25	71	6:00	18:47	12:47	60
12	4:45	20:20	15:35	71	5:21	19:43	14:22	70	6:01	18:45	12:44	59
13	4:46	20:19	15:33	71	5:22	19:41	14:19	70	6:02	18:43	12:41	59
14	4:47	20:19	15:32	71	5:23	19:39	14:16	70	6:03	18:41	12:38	58
15	4:48	20:18	15:30	71	5:25	19:38	14:13	70	6:05	18:39	12:34	58
16	4:49	20:17	15:28	71	5:26	19:36	14:10	69	6:06	18:37	12:31	58
17	4:50	20:16	15:26	71	5:27	19:34	14:07	69	6:07	18:35	12:28	57
18	4:51	20:15	15:24	71	5:29	19:33	14:04	69	6:09	18:33	12:24	57
19	4:52	20:14	15:22	71	5:30	19:31	14:01	69	6:10	18:31	12:21	56
20	4:53	20:13	15:20	71	5:31	19:29	13:58	69	6:11	18:29	12:18	56
21	4:54	20:12	15:18	71	5:32	19:27	13:55	68	6:13	18:27	12:14	56
22	4:55	20:11	15:16	71	5:34	19:25	13:51	68	6:14	18:25	12:11	56
23	4:56	20:10	15:14	71	5:35	19:24	13:49	68	6:15	18:23	12:08	55
24	4:57	20:09	15:12	71	5:36	19:22	13:46	67	6:17	18:21	12:04	55
25	4:59	20:08	15:09	71	5:38	19:20	13:42	67	6:18	18:19	12:01	54
26	5:00	20:07	15:07	71	5:39	19:18	13:39	67	6:19	18:17	11:58	54
27	5:01	20:06	15:05	71	5:40	19:16	13:36	66	6:20	18:15	11:55	54
28	5:02	20:04	15:02	71	5:41	19:14	13:33	66	6:22	18:13	11:51	53
29	5:03	20:03	15:00	71	5:43	19:12	13:29	66	6:23	18:11	11:48	53
30	5:04	20:02	14:58	71	5:44	19:11	13:27	65	6:24	18:09	11:45	53
31	5:06	20:01	14:55	71	5:45	19:09	13:24	65				

Sunshine data from the U.S. Naval Observatory for the year 2002, with times listed in CST (add one hour for CDT). Hours refers to the length of the daylight period (hours of sunshine).

October					November				December			
Day	Rise	Set	Hours	AvgT	Rise	Set	Hours	AvgT	Rise	Set	Hours	AvgT
1	6:26	18:07	11:41	53	7:10	17:11	10:01	36	7:52	16:41	8:49	18
2	6:27	18:05	11:38	52	7:11	17:10	9:59	35	7:53	16:40	8:47	18
3	6:29	18:03	11:34	51	7:12	17:08	9:56	35	7:54	16:40	8:46	18
4	6:30	18:01	11:31	51	7:14	17:07	9:53	34	7:55	16:39	8:44	17
5	6:31	17:59	11:28	51	7:15	17:06	9:51	33	7:56	16:39	8:43	17
6	6:33	17:57	11:24	50	7:17	17:04	9:47	33	7:57	16:39	8:42	16
7	6:34	17:55	11:21	50	7:18	17:03	9:45	32	7:58	16:39	8:41	16
8	6:35	17:53	11:18	50	7:20	17:01	9:41	31	7:59	16:39	8:40	15
9	6:37	17:51	11:14	49	7:21	17:00	9:39	31	8:00	16:39	8:39	15
10	6:38	17:49	11:11	49	7:23	16:59	9:36	30	8:01	16:38	8:37	15
11	6:39	17:48	11:09	48	7:24	16:58	9:34	29	8:02	16:38	8:36	14
12	6:41	17:46	11:05	48	7:26	16:56	9:30	29	8:03	16:39	8:36	14
13	6:42	17:44	11:02	47	7:27	16:55	9:28	28	8:04	16:39	8:35	13
14	6:44	17:42	10:58	47	7:29	16:54	9:25	28	8:05	16:39	8:34	13
15	6:45	17:40	10:55	46	7:30	16:53	9:23	27	8:06	16:39	8:33	13
16	6:46	17:38	10:52	46	7:32	16:52	9:20	26	8:06	16:39	8:33	12
17	6:48	17:36	10:48	45	7:33	16:51	9:18	26	8:07	16:40	8:33	12
18	6:49	17:35	10:46	45	7:34	16:50	9:16	25	8:08	16:40	8:32	11
19	6:51	17:33	10:42	44	7:36	16:49	9:13	25	8:08	16:40	8:32	11
20	6:52	17:31	10:39	44	7:37	16:48	9:11	24	8:09	16:41	8:32	11
21	6:54	17:29	10:35	43	7:39	16:47	9:08	24	8:10	16:41	8:31	10
22	6:55	17:28	10:33	42	7:40	16:46	9:06	23	8:10	16:42	8:32	10
23	6:56	17:26	10:30	42	7:41	16:45	9:04	23	8:10	16:42	8:32	10
24	6:58	17:24	10:26	41	7:43	16:45	9:02	22	8:11	16:43	8:32	10
25	6:59	17:22	10:23	41	7:44	16:44	9:00	22	8:11	16:43	8:32	9
26	7:01	17:21	10:20	40	7:45	16:43	8:58	21	8:12	16:44	8:32	9
27	7:02	17:19	10:17	39	7:47	16:43	8:56	20	8:12	16:45	8:33	9
28	7:04	17:18	10:14	39	7:48	16:42	8:54	20	8:12	16:46	8:34	8
29	7:05	17:16	10:11	38	7:49	16:42	8:53	19	8:12	16:46	8:34	8
30	7:07	17:14	10:07	37	7:50	16:41	8:51	19	8:12	16:47	8:35	8
31	7:08	17:13	10:05	37					8:12	16:48	8:36	8

Sunshine data from the U.S. Naval Observatory for the year 2002, with times listed in CST (add one hour for CDT). Hours refers to the length of the daylight period (hours of sunshine).



Maximum Hours of Sun = June 21st
Minimum Hours of Sun = December 21st

Maximum Average Temperature = July 31st
Minimum Average Temperature = January 15th

IMPORTANT NOTE

(applies to the next 12 pages)

NCDC computed monthly degree day totals from the daily average temperatures for the 1971-2000 normals period. As a result, the sum of the daily degree days may not match the listed monthly total. This discrepancy is limited to degree days.

January Daily Normals

(1971-2000)

Day	Temperature			Precipitation			HDD	CDD
	Max	Min	Avg	Day	Month	Year	Day	Day
1	16	-1	7	0.02	0.02	0.02	58	0
2	16	-2	7	0.02	0.04	0.04	58	0
3	16	-2	7	0.02	0.06	0.06	58	0
4	16	-2	7	0.02	0.08	0.08	58	0
5	16	-2	7	0.02	0.10	0.10	58	0
6	16	-3	7	0.02	0.12	0.12	58	0
7	16	-3	7	0.02	0.14	0.14	58	0
8	16	-3	6	0.02	0.16	0.16	59	0
9	16	-3	6	0.02	0.18	0.18	59	0
10	16	-3	6	0.03	0.21	0.21	59	0
11	15	-3	6	0.03	0.24	0.24	59	0
12	15	-3	6	0.03	0.27	0.27	59	0
13	15	-3	6	0.03	0.30	0.30	59	0
14	15	-3	6	0.03	0.33	0.33	59	0
15	15	-3	6	0.03	0.36	0.36	59	0
16	15	-3	6	0.03	0.39	0.39	59	0
17	15	-3	6	0.03	0.42	0.42	59	0
18	15	-3	6	0.03	0.45	0.45	59	0
19	15	-3	6	0.03	0.48	0.48	59	0
20	15	-3	6	0.03	0.51	0.51	59	0
21	15	-3	6	0.03	0.54	0.54	59	0
22	16	-3	7	0.03	0.57	0.57	58	0
23	16	-2	7	0.03	0.60	0.60	58	0
24	16	-2	7	0.02	0.62	0.62	58	0
25	16	-2	7	0.02	0.64	0.64	58	0
26	16	-2	7	0.02	0.66	0.66	58	0
27	17	-1	8	0.02	0.68	0.68	57	0
28	17	-1	8	0.02	0.70	0.70	57	0
29	17	-1	8	0.02	0.72	0.72	57	0
30	18	-1	9	0.02	0.74	0.74	56	0
31	18	0	9	0.02	0.76	0.76	56	0
Month	15.9	-2.3	6.8	0.76			1808	0

February Daily Normals (1971-2000)

Day	Temperature			Precipitation			HDD	CDD
	<u>Max</u>	<u>Min</u>	<u>Avg</u>	<u>Day</u>	<u>Month</u>	<u>Year</u>	<u>Day</u>	<u>Day</u>
1	19	0	10	0.02	0.02	0.78	55	0
2	19	0	10	0.02	0.04	0.80	55	0
3	19	1	10	0.02	0.06	0.82	55	0
4	19	1	10	0.02	0.08	0.84	55	0
5	20	1	11	0.02	0.10	0.86	54	0
6	20	3	11	0.02	0.12	0.88	54	0
7	20	3	11	0.02	0.14	0.90	54	0
8	20	3	11	0.02	0.16	0.92	54	0
9	21	3	12	0.02	0.18	0.94	53	0
10	21	4	12	0.02	0.20	0.96	53	0
11	22	4	13	0.02	0.22	0.98	52	0
12	22	4	13	0.02	0.24	1.00	52	0
13	22	4	13	0.02	0.26	1.02	52	0
14	23	5	14	0.02	0.28	1.04	51	0
15	23	5	14	0.02	0.30	1.06	51	0
16	23	5	14	0.02	0.32	1.08	51	0
17	24	6	15	0.02	0.34	1.10	50	0
18	24	6	15	0.02	0.36	1.12	50	0
19	24	7	16	0.02	0.38	1.14	49	0
20	25	7	16	0.02	0.40	1.16	49	0
21	25	8	17	0.02	0.42	1.18	48	0
22	25	9	17	0.02	0.44	1.20	48	0
23	25	9	17	0.02	0.46	1.22	48	0
24	26	10	18	0.02	0.48	1.24	47	0
25	26	10	18	0.02	0.50	1.26	47	0
26	26	10	18	0.03	0.53	1.29	47	0
27	27	11	19	0.03	0.56	1.32	46	0
28	27	11	19	0.03	0.59	1.35	46	0
29	<u>27</u>	<u>11</u>	<u>19</u>	<u>0.03</u>	<u>0.59</u>	<u>1.35</u>	<u>46</u>	<u>0</u>
Month	22.8	5.4	14.1	0.59			1446	0

March Daily Normals

(1971-2000)

Day	Temperature			Precipitation			HDD	CDD
	<u>Max</u>	<u>Min</u>	<u>Avg</u>	<u>Day</u>	<u>Month</u>	<u>Year</u>	<u>Day</u>	<u>Day</u>
1	28	13	20	0.03	0.03	1.38	45	0
2	28	13	20	0.03	0.06	1.41	45	0
3	29	14	21	0.03	0.09	1.44	44	0
4	29	14	21	0.03	0.12	1.47	44	0
5	29	14	22	0.03	0.15	1.50	43	0
6	30	14	22	0.03	0.18	1.53	43	0
7	30	15	23	0.03	0.21	1.56	42	0
8	31	15	23	0.04	0.25	1.60	42	0
9	31	16	24	0.04	0.29	1.64	41	0
10	32	16	24	0.04	0.33	1.68	41	0
11	32	16	24	0.04	0.37	1.72	41	0
12	33	17	25	0.04	0.41	1.76	40	0
13	33	17	25	0.04	0.45	1.80	40	0
14	34	18	26	0.04	0.49	1.84	39	0
15	34	18	26	0.04	0.53	1.88	39	0
16	35	19	27	0.04	0.57	1.92	38	0
17	35	20	28	0.04	0.61	1.96	37	0
18	36	20	28	0.04	0.65	2.00	37	0
19	37	21	29	0.04	0.69	2.04	36	0
20	37	21	29	0.04	0.73	2.08	36	0
21	38	21	30	0.04	0.77	2.12	35	0
22	38	22	30	0.04	0.81	2.16	35	0
23	39	22	31	0.04	0.85	2.20	34	0
24	40	22	31	0.04	0.89	2.24	34	0
25	40	23	32	0.04	0.93	2.28	33	0
26	41	23	32	0.04	0.97	2.32	33	0
27	42	24	33	0.04	1.01	2.36	32	0
28	42	24	33	0.04	1.05	2.40	32	0
29	43	25	34	0.04	1.09	2.44	31	0
30	43	25	34	0.04	1.13	2.48	31	0
31	44	26	35	0.04	1.17	2.52	30	0
Month	35.3	19.0	27.2	1.17			1185	0

April Daily Normals

(1971-2000)

Day	Temperature			Precipitation			HDD	CDD
	<u>Max</u>	<u>Min</u>	<u>Avg</u>	<u>Day</u>	<u>Month</u>	<u>Year</u>	<u>Day</u>	<u>Day</u>
1	45	26	36	0.04	0.04	2.56	29	0
2	46	27	36	0.04	0.08	2.60	29	0
3	47	27	37	0.04	0.12	2.64	28	0
4	47	28	37	0.04	0.16	2.68	28	0
5	48	28	38	0.04	0.20	2.72	27	0
6	49	28	39	0.04	0.24	2.76	26	0
7	49	29	39	0.04	0.28	2.80	26	0
8	50	29	40	0.04	0.32	2.84	25	0
9	51	29	40	0.04	0.36	2.88	25	0
10	51	30	41	0.04	0.40	2.92	24	0
11	52	30	41	0.04	0.44	2.96	24	0
12	53	31	42	0.04	0.48	3.00	23	0
13	53	31	42	0.04	0.52	3.04	23	0
14	54	32	43	0.04	0.56	3.08	22	0
15	54	32	43	0.04	0.60	3.12	22	0
16	55	33	44	0.04	0.64	3.16	21	0
17	55	33	44	0.04	0.68	3.20	21	0
18	56	33	45	0.05	0.73	3.25	20	0
19	57	33	45	0.05	0.78	3.30	20	0
20	57	34	46	0.05	0.83	3.35	19	0
21	58	34	46	0.05	0.88	3.40	19	0
22	59	35	47	0.05	0.93	3.45	18	0
23	59	36	48	0.05	0.98	3.50	17	0
24	60	36	48	0.05	1.03	3.55	17	0
25	60	37	49	0.05	1.08	3.60	16	0
26	61	37	49	0.05	1.13	3.65	16	0
27	61	37	49	0.06	1.19	3.71	16	0
28	62	38	50	0.06	1.25	3.77	16	1
29	62	39	51	0.06	1.31	3.83	16	2
30	63	39	51	0.06	1.37	3.89	15	1
Month	54.5	32.4	43.5	1.37			652	3

May Daily Normals (1971-2000)

Day	Temperature			Precipitation			HDD	CDD
	<u>Max</u>	<u>Min</u>	<u>Avg</u>	<u>Day</u>	<u>Month</u>	<u>Year</u>	<u>Day</u>	<u>Day</u>
1	64	39	51	0.06	0.06	3.95	14	0
2	64	40	52	0.06	0.12	4.01	13	0
3	65	40	52	0.06	0.18	4.07	13	0
4	65	41	53	0.07	0.25	4.14	12	0
5	65	41	53	0.07	0.32	4.21	12	0
6	66	41	54	0.07	0.39	4.28	12	1
7	66	42	54	0.07	0.46	4.35	12	1
8	67	42	55	0.07	0.53	4.42	11	1
9	67	43	55	0.07	0.60	4.49	11	1
10	67	43	55	0.07	0.67	4.56	11	1
11	68	44	56	0.08	0.75	4.64	10	1
12	68	44	56	0.08	0.83	4.72	10	1
13	69	44	57	0.08	0.91	4.80	9	1
14	69	45	57	0.08	0.99	4.88	9	1
15	69	45	57	0.08	1.07	4.96	9	1
16	70	45	58	0.08	1.15	5.04	8	1
17	70	46	58	0.09	1.24	5.13	8	1
18	70	46	58	0.09	1.33	5.22	8	1
19	71	47	59	0.09	1.42	5.31	7	1
20	71	47	59	0.09	1.51	5.40	7	1
21	71	47	59	0.09	1.60	5.49	7	1
22	72	48	60	0.09	1.69	5.58	6	1
23	72	48	60	0.10	1.79	5.68	6	1
24	72	48	60	0.10	1.89	5.78	6	1
25	73	49	61	0.10	1.99	5.88	6	2
26	73	49	61	0.10	2.09	5.98	6	2
27	73	49	61	0.10	2.19	6.08	6	2
28	74	50	62	0.10	2.29	6.18	5	2
29	74	50	62	0.10	2.39	6.28	5	2
30	74	50	62	0.11	2.50	6.39	5	2
<u>31</u>	<u>74</u>	<u>50</u>	<u>62</u>	<u>0.11</u>	<u>2.61</u>	<u>6.50</u>	<u>5</u>	<u>2</u>
Month	69.5	45.3	57.4	2.61			271	33

June Daily Normals

(1971-2000)

Day	Temperature			Precipitation			HDD	CDD
	<u>Max</u>	<u>Min</u>	<u>Avg</u>	<u>Day</u>	<u>Month</u>	<u>Year</u>	<u>Day</u>	<u>Day</u>
1	75	52	63	0.11	0.11	6.61	4	2
2	75	52	63	0.11	0.22	6.72	4	2
3	75	52	63	0.11	0.33	6.83	4	2
4	75	52	63	0.11	0.44	6.94	4	2
5	75	52	63	0.11	0.55	7.05	4	2
6	75	52	63	0.12	0.67	7.17	4	2
7	76	52	64	0.12	0.79	7.29	4	3
8	76	53	64	0.12	0.91	7.41	4	3
9	76	53	65	0.12	1.03	7.53	3	3
10	76	53	65	0.12	1.15	7.65	3	3
11	77	53	65	0.12	1.27	7.77	3	3
12	77	53	65	0.12	1.39	7.89	3	3
13	77	54	66	0.12	1.51	8.01	2	3
14	77	54	66	0.12	1.63	8.13	2	3
15	77	55	66	0.12	1.75	8.25	2	3
16	77	55	66	0.12	1.87	8.37	2	3
17	78	55	67	0.12	1.99	8.49	2	4
18	78	55	67	0.12	2.11	8.61	2	4
19	78	55	67	0.12	2.23	8.73	2	4
20	78	56	67	0.12	2.35	8.85	2	4
21	78	56	67	0.12	2.47	8.97	2	4
22	78	56	67	0.12	2.59	9.09	2	4
23	79	56	68	0.12	2.71	9.21	1	4
24	79	56	68	0.12	2.83	9.33	1	4
25	79	57	68	0.12	2.95	9.45	1	4
26	80	57	69	0.12	3.07	9.57	1	5
27	80	57	69	0.11	3.18	9.68	1	5
28	80	57	69	0.11	3.29	9.79	1	5
29	80	57	69	0.11	3.40	9.90	1	5
30	<u>80</u>	<u>57</u>	<u>69</u>	<u>0.11</u>	<u>3.51</u>	<u>10.01</u>	<u>1</u>	<u>5</u>
Month	77.4	54.5	66.0	3.51			73	104

July Daily Normals

(1971-2000)

Day	Temperature			Precipitation			HDD	CDD
	<u>Max</u>	<u>Min</u>	<u>Avg</u>	<u>Day</u>	<u>Month</u>	<u>Year</u>	<u>Day</u>	<u>Day</u>
1	80	58	69	0.11	0.11	10.12	1	5
2	80	58	69	0.11	0.22	10.23	1	5
3	81	58	69	0.11	0.33	10.34	1	5
4	81	59	70	0.10	0.43	10.44	1	6
5	81	59	70	0.10	0.53	10.54	1	6
6	81	59	70	0.10	0.63	10.64	1	6
7	81	59	70	0.10	0.73	10.74	1	6
8	81	59	70	0.10	0.83	10.84	1	6
9	82	59	70	0.10	0.93	10.94	1	6
10	82	59	70	0.10	1.03	11.04	1	6
11	82	59	70	0.10	1.13	11.14	1	6
12	82	59	71	0.09	1.22	11.23	0	6
13	82	59	71	0.09	1.31	11.32	0	6
14	82	59	71	0.09	1.40	11.41	0	6
15	82	60	71	0.09	1.49	11.50	0	6
16	82	60	71	0.09	1.58	11.59	0	6
17	83	60	71	0.09	1.67	11.68	0	6
18	83	59	71	0.09	1.76	11.77	0	6
19	83	59	71	0.09	1.85	11.86	0	6
20	83	59	71	0.09	1.94	11.95	0	6
21	83	59	71	0.09	2.03	12.04	0	6
22	83	59	71	0.09	2.12	12.13	0	6
23	83	59	71	0.09	2.21	12.22	0	6
24	83	59	71	0.09	2.30	12.31	0	6
25	83	59	71	0.09	2.39	12.40	0	6
26	83	59	71	0.09	2.48	12.49	0	6
27	83	59	71	0.08	2.56	12.57	0	6
28	83	59	71	0.08	2.64	12.65	0	6
29	83	59	71	0.08	2.72	12.73	0	6
30	83	59	71	0.08	2.80	12.81	0	6
<u>31</u>	<u>83</u>	<u>59</u>	<u>71</u>	<u>0.08</u>	<u>2.88</u>	<u>12.89</u>	<u>0</u>	<u>6</u>
Month	82.2	59.0	70.6	2.88			17	191

August Daily Normals

(1971-2000)

Day	Temperature			Precipitation			HDD	CDD
	<u>Max</u>	<u>Min</u>	<u>Avg</u>	<u>Day</u>	<u>Month</u>	<u>Year</u>	<u>Day</u>	<u>Day</u>
1	83	59	71	0.09	0.09	12.98	0	6
2	83	59	71	0.09	0.18	13.07	0	6
3	83	59	71	0.09	0.27	13.16	0	6
4	83	59	71	0.09	0.36	13.25	0	6
5	83	59	71	0.08	0.44	13.33	0	6
6	83	59	71	0.08	0.52	13.41	0	6
7	83	59	71	0.08	0.60	13.49	0	6
8	83	59	71	0.08	0.68	13.57	0	6
9	83	59	71	0.08	0.76	13.65	0	6
10	83	59	71	0.08	0.84	13.73	0	6
11	83	59	71	0.08	0.92	13.81	0	6
12	82	59	70	0.08	1.00	13.89	1	6
13	82	58	70	0.08	1.08	13.97	1	6
14	82	58	70	0.08	1.16	14.05	1	6
15	82	58	70	0.08	1.24	14.13	1	6
16	81	57	69	0.08	1.32	14.21	1	5
17	81	57	69	0.08	1.40	14.29	1	5
18	81	57	69	0.08	1.48	14.37	1	5
19	81	57	69	0.08	1.56	14.45	1	5
20	81	57	69	0.08	1.64	14.53	1	5
21	80	56	68	0.08	1.72	14.61	2	5
22	80	56	68	0.08	1.80	14.69	2	5
23	80	56	68	0.08	1.88	14.77	2	5
24	79	55	67	0.08	1.96	14.85	2	4
25	79	55	67	0.08	2.04	14.93	2	4
26	79	54	67	0.08	2.12	15.01	2	4
27	78	54	66	0.08	2.20	15.09	3	4
28	78	54	66	0.08	2.28	15.17	3	4
29	77	54	66	0.08	2.36	15.25	3	4
30	77	53	65	0.08	2.44	15.33	3	3
31	<u>77</u>	<u>52</u>	<u>65</u>	<u>0.08</u>	<u>2.52</u>	<u>15.41</u>	<u>3</u>	<u>3</u>
Month	81.0	57.0	69.0	2.52			37	162

September Daily Normals

(1971-2000)

Day	Temperature			Precipitation			HDD	CDD
	<u>Max</u>	<u>Min</u>	<u>Avg</u>	<u>Day</u>	<u>Month</u>	<u>Year</u>	<u>Day</u>	<u>Day</u>
1	76	52	64	0.08	0.08	15.49	4	3
2	76	52	64	0.08	0.16	15.57	4	3
3	75	51	63	0.08	0.24	15.65	5	3
4	75	51	63	0.08	0.32	15.73	5	3
5	74	50	62	0.08	0.40	15.81	5	2
6	74	50	62	0.08	0.48	15.89	5	2
7	73	49	61	0.08	0.56	15.97	6	2
8	73	49	61	0.08	0.64	16.05	6	2
9	72	48	60	0.07	0.71	16.12	7	2
10	72	48	60	0.07	0.78	16.19	7	2
11	72	48	60	0.07	0.85	16.26	7	2
12	71	47	59	0.07	0.92	16.33	7	1
13	71	47	59	0.07	0.99	16.40	7	1
14	70	46	58	0.07	1.06	16.47	8	1
15	70	46	58	0.07	1.13	16.54	8	1
16	70	46	58	0.07	1.20	16.61	8	1
17	69	45	57	0.07	1.27	16.68	9	1
18	69	45	57	0.07	1.34	16.75	9	1
19	68	44	56	0.07	1.41	16.82	10	1
20	68	44	56	0.07	1.48	16.89	10	1
21	68	44	56	0.07	1.55	16.96	10	1
22	67	44	56	0.07	1.62	17.03	10	1
23	67	44	55	0.07	1.69	17.10	10	0
24	66	43	55	0.07	1.76	17.17	10	0
25	66	42	54	0.07	1.83	17.24	11	0
26	66	42	54	0.07	1.90	17.31	11	0
27	65	42	54	0.07	1.97	17.38	11	0
28	65	41	53	0.07	2.04	17.45	12	0
29	65	41	53	0.07	2.11	17.52	12	0
30	<u>64</u>	<u>41</u>	<u>53</u>	<u>0.07</u>	<u>2.18</u>	<u>17.59</u>	<u>12</u>	<u>0</u>
Month	69.9	46.1	58.0	2.18			245	38

October Daily Normals

(1971-2000)

Day	Temperature			Precipitation			HDD	CDD
	<u>Max</u>	<u>Min</u>	<u>Avg</u>	<u>Day</u>	<u>Month</u>	<u>Year</u>	<u>Day</u>	<u>Day</u>
1	64	41	53	0.07	0.07	17.66	13	1
2	63	40	52	0.07	0.14	17.73	14	1
3	63	40	51	0.07	0.21	17.80	14	0
4	63	40	51	0.07	0.28	17.87	14	0
5	62	39	51	0.07	0.35	17.94	14	0
6	62	39	50	0.07	0.42	18.01	15	0
7	61	38	50	0.07	0.49	18.08	15	0
8	61	38	50	0.07	0.56	18.15	15	0
9	60	38	49	0.07	0.63	18.22	16	0
10	60	37	49	0.07	0.70	18.29	16	0
11	59	37	48	0.07	0.77	18.36	17	0
12	59	36	48	0.07	0.84	18.43	17	0
13	58	36	47	0.07	0.91	18.50	18	0
14	58	36	47	0.07	0.98	18.57	18	0
15	57	36	46	0.07	1.05	18.64	19	0
16	57	36	46	0.06	1.11	18.70	19	0
17	56	35	45	0.06	1.17	18.76	20	0
18	56	34	45	0.06	1.23	18.82	20	0
19	55	33	44	0.06	1.29	18.88	21	0
20	54	33	44	0.06	1.35	18.94	21	0
21	54	32	43	0.06	1.41	19.00	22	0
22	53	31	42	0.06	1.47	19.06	23	0
23	52	31	42	0.06	1.53	19.12	23	0
24	52	30	41	0.06	1.59	19.18	24	0
25	51	30	41	0.06	1.65	19.24	24	0
26	50	30	40	0.06	1.71	19.30	25	0
27	49	29	39	0.06	1.77	19.36	26	0
28	49	29	39	0.05	1.82	19.41	26	0
29	48	28	38	0.05	1.87	19.46	27	0
30	47	27	37	0.05	1.92	19.51	28	0
31	46	27	37	0.05	1.97	19.56	28	0
Month	56.1	34.4	45.3	1.97			614	2

November Daily Normals

(1971-2000)

Day	Temperature			Precipitation			HDD	CDD
	<u>Max</u>	<u>Min</u>	<u>Avg</u>	<u>Day</u>	<u>Month</u>	<u>Year</u>	<u>Day</u>	<u>Day</u>
1	46	27	36	0.05	0.05	19.61	29	0
2	45	26	35	0.05	0.10	19.66	30	0
3	44	25	35	0.05	0.15	19.71	30	0
4	43	25	34	0.05	0.20	19.76	31	0
5	42	25	33	0.05	0.25	19.81	32	0
6	41	24	33	0.04	0.29	19.85	32	0
7	41	24	32	0.04	0.33	19.89	33	0
8	40	23	31	0.04	0.37	19.93	34	0
9	39	22	31	0.04	0.41	19.97	34	0
10	38	22	30	0.04	0.45	20.01	35	0
11	37	21	29	0.04	0.49	20.05	36	0
12	37	20	29	0.04	0.53	20.09	36	0
13	36	20	28	0.04	0.57	20.13	37	0
14	36	19	28	0.04	0.61	20.17	37	0
15	35	19	27	0.04	0.65	20.21	38	0
16	34	18	26	0.03	0.68	20.24	39	0
17	34	18	26	0.03	0.71	20.27	39	0
18	33	17	25	0.03	0.74	20.30	40	0
19	33	17	25	0.03	0.77	20.33	40	0
20	32	16	24	0.03	0.80	20.36	41	0
21	31	16	24	0.03	0.83	20.39	41	0
22	31	15	23	0.03	0.86	20.42	42	0
23	30	15	23	0.03	0.89	20.45	42	0
24	30	14	22	0.03	0.92	20.48	43	0
25	29	14	22	0.03	0.95	20.51	43	0
26	29	13	21	0.03	0.98	20.54	44	0
27	28	12	20	0.02	1.00	20.56	45	0
28	28	12	20	0.02	1.02	20.58	45	0
29	27	11	19	0.02	1.04	20.60	46	0
30	<u>27</u>	<u>11</u>	<u>19</u>	<u>0.02</u>	<u>1.06</u>	<u>20.62</u>	<u>46</u>	<u>0</u>
Month	35.2	18.7	27.0	1.06			1137	0

December Daily Normals

(1971-2000)

Day	Temperature			Precipitation			HDD	CDD
	<u>Max</u>	<u>Min</u>	<u>Avg</u>	<u>Day</u>	<u>Month</u>	<u>Year</u>	<u>Day</u>	<u>Day</u>
1	26	11	18	0.02	0.02	20.64	47	0
2	26	11	18	0.02	0.04	20.66	47	0
3	25	10	18	0.02	0.06	20.68	47	0
4	25	10	17	0.02	0.08	20.70	48	0
5	25	10	17	0.02	0.10	20.72	48	0
6	24	9	16	0.02	0.12	20.74	49	0
7	24	8	16	0.02	0.14	20.76	49	0
8	23	7	15	0.02	0.16	20.78	50	0
9	23	7	15	0.02	0.18	20.80	50	0
10	23	6	15	0.02	0.20	20.82	50	0
11	22	6	14	0.02	0.22	20.84	51	0
12	22	6	14	0.02	0.24	20.86	51	0
13	21	5	13	0.02	0.26	20.88	52	0
14	21	5	13	0.02	0.28	20.90	52	0
15	21	4	13	0.01	0.29	20.91	52	0
16	20	4	12	0.01	0.30	20.92	53	0
17	20	4	12	0.01	0.31	20.93	53	0
18	20	3	11	0.01	0.32	20.94	54	0
19	20	2	11	0.01	0.33	20.95	54	0
20	19	2	11	0.02	0.35	20.97	54	0
21	19	1	10	0.02	0.37	20.99	55	0
22	19	1	10	0.02	0.39	21.01	55	0
23	18	1	10	0.02	0.41	21.03	55	0
24	18	1	10	0.02	0.43	21.05	55	0
25	18	0	9	0.02	0.45	21.07	56	0
26	18	0	9	0.02	0.47	21.09	56	0
27	17	0	9	0.02	0.49	21.11	56	0
28	17	-1	8	0.02	0.51	21.13	57	0
29	17	-1	8	0.02	0.53	21.15	57	0
30	17	-1	8	0.02	0.55	21.17	57	0
31	16	-1	8	0.02	0.57	21.19	57	0
Month	20.8	4.2	12.5	0.57			1610	0

January Daily Record Temperatures

<u>Day</u>	<u>Record</u>		<u>Record</u>		<u>Lowest</u>		<u>Highest</u>	
	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>
1	43	1964	-35	1885	-22	1885	31	1964
2	46	1964	-32	1885	-13	1911	33	1964
3	40	1927	-35	1919	-18	1884	33	1927
4	41	2001	-43	1884	-25	1884	27	1927
5	40	1984	-37	1883	-22	1912	30	1984
6	42	1928	-43	1887	-26	1887	31	1928
7	44	1963	-39	1887	-23	1887	28	1963
8	50	1900	-48*	1887	-21	1887	31	2002
9	49	1958	-38	1887	-24	1886	33	2002
10	47	1990	-34	1886	-18	1912	27	1928
11	46	1987	-44	1888	-23	1912	29	1928
12	49	1987	-38	1912	-17	1916	36	1928
13	48	1987	-37	1916	-18	1916	32	1928
14	42	1914	-32	1888	-25	1888	27	1906
15	40	1942	-36	1888	-18	1888	29	1980
16	47	1942	-35	1977	-16	1982	30	1894
17	43	1926	-32	1977	-18	1943	24	1942
18	48	1908	-42	1887	-23	1892	33	1944
19	52	1900	-37	1892	-18	1996	28	1908
20	54	1908	-42	1883	-23	1888	30	1919
21	52	1900	-41	1888	-21	1883	29	1900
22	51	1942	-37	1936	-29*	1936	30	1909
23	52	1942	-36	1883	-21	1936	30	1990
24	52	1981	-36	1904	-24	1904	34	1944
25	51	2002	-34	1883	-16	1950	31	1947
26	46	1947	-32	1950	-16	1918	30	1947
27	41	1892	-31	1915	-15	1966	21	1998
28	41	1927	-33	1966	-23	1966	30	1892
29	52	1931	-36	1951	-18	1918	29	1924
30	45	1931	-34	1916	-27	1887	28	1931
31	41	1993	-34	1887	-18	1887	28	1992

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed

February Daily Record Temperatures

<u>Day</u>	<u>Record</u>		<u>Record</u>		<u>Lowest</u>		<u>Highest</u>	
	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>
1	45	1931	-39	1996	-28	1996	31	1992
2	47	2000	-37	1893	-21	1996	33	1935
3	48	1991	-36	1893	-21	1887	30	1962
4	51	1925	-35	1886	-21	1895	28	1991
5	51	1963	-35	1889	-19	1936	27	1953
6	50	1925	-35	1936	-20	1893	31	1925
7	51	1991	-32	1893	-18	1933	26	1996
8	51	1898	-38	1888	-24	1899	32	1966
9	42	1918	-47	1888	-16	1885	30	1976
10	45	1924	-29	1899	-16	1899	28	1928
11	55	2002	-35	1899	-12	1914	33	1908
12	43	1935	-30	1905	-13	1936	31	1984
13	50	1983	-30	1916	-5	1900	33	1935
14	43	2002	-33	1881	-17	1936	33	1935
15	53	1931	-37	1936	-16	1936	34	1984
16	53	1981	-34	1936	-15	1936	35	1998
17	48	2002	-30	1979	-11	1966	33	1998
18	52	1981	-31	1966	-13	1966	35	1930
19	52	1930	-29	1929	-10	1889	35	1899
20	49	1931	-30	1889	-8	1939	33	1899
21	49	1981	-26	1956	-6	1956	38	1930
22	49	1958	-30	1891	-20	1889	36	1998
23	56	1958	-35	1889	-13	1889	32	1984
24	51	1976	-28	1889	-8	1950	36	2000
25	66	1958	-30	1950	-8	1897	40	2000
26	59	1896	-30	1897	-10	1890	40	1958
27	57	1895	-28	1962	-9	1962	36	1902
28	58	1905	-35	1891	-11	1962	36	2000
29	55	1992	-26	1980	-4	1980	34	2000

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed

March Daily Record Temperatures

<u>Day</u>	<u>Record</u>		<u>Record</u>		<u>Lowest</u>		<u>Highest</u>	
	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>
1	58	1990	-23	1980	-2	1943	34	1882
2	56	1905	-24	1916	1	1991	35	1983
3	61	2000	-23	1884	2	1917	34	1983
4	55	2000	-27	1917	3	1890	35	1992
5	67	2000	-22	1997	3	1955	40	1983
6	63	2000	-20	1884	-1	1996	40	1987
7	62	2000	-22	1883	1	1996	36	1992
8	54	1911	-20	1891	5	1995	37	1968
9	55	1902	-26	1948	-4	1948	36	1902
10	58	1911	-34	1948	-7	1948	37	1988
11	59	1981	-28	1948	0	1956	39	1990
12	62	1910	-25	1896	-1	1896	40	1995
13	64	1911	-28	1896	-2	1897	38	1995
14	66	1981	-28	1897	0	1897	35	1971
15	61	1927	-32	1897	-2	1897	38	1927
16	64	1968	-16	1885	2	1885	35	1995
17	73	1968	-17	1923	2	1902	43	1968
18	72	1910	-19	1923	-3	1883	41	1995
19	66	1910	-14	1883	12	1883	37	1987
20	62	1911	-12	1965	11	1930	41	1987
21	76	1910	-12	1965	6	1940	40	1938
22	72	1945	-17	1888	9	1940	40	1985
23	80	1910	-16	1965	-1	1974	48	1910
24	70	1945	-20	1882	11	1923	48	1945
25	71	1925	-11	1894	9	1894	48	1945
26	68	1946	-12	1996	12	1996	43	1945
27	78	1946	-7	1964	11	1921	43	1946
28	78	1946	-9	1964	10	1969	45	1946
29	76	1986	-15	1969	9	1969	44	1986
30	78	1967	-14	1969	11	1923	41	1967
31	77	1963	0	1881	15	1975	43	1963

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed

April Daily Record Temperatures

<u>Day</u>	<u>Record</u>		<u>Record</u>		<u>Lowest</u>		<u>Highest</u>	
	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>
1	70	1925	-13	1881	17	1936	42	1958
2	77	1928	-2	1899	15	1954	42	1928
3	79	1910	-1	1975	20	1982	46	1910
4	82	1912	-2	1881	21	1881	45	1921
5	80	1991	0	1881	22	1979	50	1991
6	82	1991	0	1979	23	1881	52	1991
7	80	1988	2	1936	13	1997	47	1991
8	86	1887	6	1942	17	1997	45	1941
9	86	1887	7	1997	24	1997	47	1887
10	85	1910	9	1973	26	1997	48	1930
11	85	1968	7	2000	22	1881	50	1941
12	76	1954	1	1881	22	1950	54	1998
13	83	1976	5	1881	23	1893	49	1886
14	84	1942	12	1981	29	1962	51	1954
15	87	1913	15	1935	27	1904	50	1963
16	82	1913	13	1973	24	1907	51	1976
17	82	1987	9	1953	31	1910	54	1977
18	90	1987	12	1988	34	1966	56	1987
19	86	1987	11	1928	30	1966	62	1987
20	94	1980	11	1966	32	1893	53	1985
21	100	1980	20	1988	29	1893	51	1946
22	89	1990	19	1988	28	1967	56	1990
23	91	1990	14	1918	34	1967	67	1990
24	87	1990	19	1909	36	1937	57	1990
25	91	1891	14	1909	32	1937	57	1906
26	89	1952	18	1909	28	1950	56	1901
27	92	1910	12	1909	30	1950	57	1974
28	88	1952	16	1956	31	1893	57	2001
29	88	1934	14	1958	34	1903	57	2001
30	94	1992	20	1905	34	1940	57	1955

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed

May Daily Record Temperatures

<u>Day</u>	<u>Record</u>		<u>Record</u>		<u>Lowest</u>		<u>Highest</u>	
	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>
1	97	1959	14	1890	34	1909	60	1988
2	95	1959	17	1907	29	1967	57	1941
3	92	1952	18	1926	36	1967	60	1999
4	93	1926	22	1967	37	1944	61	1952
5	96	2000	22	1891	32	1931	60	2000
6	88	1896	21	1976	35	1885	68	1896
7	91	1992	21	1885	38	1885	66	1896
8	92	1934	22	1955	38	1885	64	1934
9	90	1992	20	1966	40	1902	63	1992
10	96	1887	22	1990	36	1946	63	1991
11	93	1906	19	1946	35	1946	62	1991
12	96	1900	17	1946	40	1953	66	1991
13	95	1894	20	1888	40	1924	61	1977
14	93	1932	20	1888	45	1921	64	1977
15	94	1931	26	1946	42	1916	63	1977
16	94	1987	22	1888	40	1930	64	1918
17	92	1911	22	1890	36	1890	62	1903
18	92	1988	27	1990	44	1890	66	1977
19	93	1992	29	1888	45	1931	64	1972
20	91	1955	25	1969	38	1931	64	1992
21	98	1964	25	1963	38	1882	67	1964
22	93	1980	21	1963	45	1882	66	1991
23	92	1928	31	1924	45	1924	62	1944
24	88	1980	26	1897	50	1938	63	1944
25	92	1959	30	1983	45	1943	68	1977
26	93	1931	29	1970	46	1965	67	1977
27	95	1969	29	1907	40	1965	68	1929
28	97	1934	26	1947	47	1947	67	1988
29	95	1939	32	1961	55	1947	66	1988
30	104	1934	29	1947	51	1887	69	1988
31	96	1939	29	1897	52	1962	71	1988

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed

June Daily Record Temperatures

<u>Day</u>	<u>Record</u>		<u>Record</u>		<u>Lowest</u>		<u>Highest</u>	
	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>
1	93	1933	28	1888	46	1969	66	1988
2	94	1948	32	1910	47	1951	65	1948
3	97	1968	32	1883	48	1891	65	1963
4	95	1959	34	1964	43	1935	68	1995
5	95	1939	33	1886	47	1935	69	1988
6	99	1959	32	1897	46	1901	68	1932
7	99	1959	32	1901	53	1941	71	1959
8	92	1972	30	1885	55	1915	67	1959
9	95	1976	32	1915	53	1908	68	1970
10	97	1956	36	1908	55	1939	67	1959
11	96	1988	36	1903	53	1985	72	1892
12	101	1893	38	1927	55	1941	73	1893
13	96	1987	37	1942	56	1989	70	1894
14	95	1979	36	1908	58	1968	72	1979
15	98	1933	36	1917	58	1976	70	1995
16	100	1933	38	1972	58	1915	73	1995
17	100	1995	39	2000	56	1915	73	1995
18	104	1933	40	1926	59	1944	72	1888
19	101	1933	37	1969	54	1902	75	1888
20	98	1910	30	1969	57	1902	71	1995
21	98	1911	36	1902	57	1885	71	1966
22	97	1950	37	1889	56	1942	69	1987
23	96	1898	36	1967	60	1892	69	1943
24	99	1936	39	1942	61	1881	70	1963
25	96	1936	40	1897	61	1958	76	2001
26	96	1933	41	1992	60	1898	72	1996
27	96	1910	42	1925	59	1985	74	1996
28	99	1883	38	1895	60	1985	78	1996
29	100	1931	42	1992	57	1918	73	1931
30	102	1931	42	1918	55	1992	74	1921

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed

July Daily Record Temperatures

<u>Day</u>	<u>Record</u>		<u>Record</u>		<u>Lowest</u>		<u>Highest</u>	
	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>
1	99	1911	39	2001	59	1968	73	1921
2	98	1949	40	1945	57	1967	74	1975
3	95	1949	36	1967	55	1997	71	1975
4	97	1989	37	1967	64	1915	72	1938
5	106	1988	40	1983	63	1884	78	1988
6	114*	1936	42	1997	65	1993	77	1988
7	103	1936	41	1908	59	1997	75	1974
8	103	1936	44	1905	63	1958	78	1936
9	104	1936	42	1968	65	1958	75	1936
10	110	1936	41	1945	70	1992	82*	1936
11	106	1936	45	1951	70	1993	80	1936
12	106	1936	41	1926	63	1882	76	1936
13	105	1936	42	1967	62	1993	73	1936
14	99	1936	42	1967	67	1906	72	1983
15	102	1931	41	1912	64	1906	77	1931
16	104	1936	43	1976	63	1937	73	1975
17	99	1932	43	1885	64	1915	76	1936
18	102	1932	42	1891	64	2000	76	1934
19	104	1932	45	1882	62	1912	76	1932
20	100	1960	40	1898	63	1927	72	1901
21	100	1900	41	1947	67	1948	72	1955
22	106	1934	42	1887	65	1897	72	1940
23	97	1894	45	1889	61	1891	72	1934
24	99	1940	44	1891	66	1891	75	1963
25	105	1931	46	1900	69	1981	75	1963
26	103	1929	45	1962	68	1923	77	1931
27	105	1988	46	1971	67	1944	73	1987
28	110	1917	44	1973	68	1925	75	1917
29	100	1975	44	1899	64	1971	75	1975
30	98	1929	39	1971	64	1925	76	1975
31	101	1987	44	1903	68	1906	78	1987

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed

August Daily Record Temperatures

<u>Day</u>	<u>Record</u>		<u>Record</u>		<u>Lowest</u>		<u>Highest</u>	
	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>
1	98	1937	42	1927	60	1903	74	1936
2	102	1982	41	1971	64	1911	72	1959
3	100	1989	38	1972	62	1911	76	1989
4	105	1947	38	1889	65	1888	75	1947
5	99	1968	43	1883	71	1924	74	2001
6	100	1941	42	1886	65	1921	73	1941
7	101	1949	42	1904	65	1888	71	1937
8	101	1958	41	1964	61	1888	72	1949
9	101	1958	40	1890	62	1888	70	1958
10	98	1988	41	1967	61	1902	75	1947
11	96	1936	39	1902	59	1964	73	2000
12	101	1984	40	1964	60	1899	74	1969
13	102	1984	33	1964	62	1881	74	1978
14	100	1935	35	1968	60	1908	73	1972
15	102	1935	43	1979	62	1897	74	1937
16	104	1988	40	1896	64	1924	74	1988
17	98	1945	33	1888	63	1935	72	1995
18	106	1976	41	1887	65	1956	75	1976
19	105	1976	40	1895	64	1950	80	1976
20	104	1976	37	1950	58	1966	75	1976
21	103	1947	40	1920	55	1966	72	1947
22	101	1947	36	1890	56	1891	78	1947
23	99	1948	34	1891	57	1940	69	1990
24	100	1976	38	1887	57	1992	72	1976
25	100	1886	32	1885	55	1914	72	1991
26	98	1953	36	1915	58	1885	73	1953
27	100	1984	33	1982	52	1885	72	1953
28	100	1984	36	1965	58	1903	73	1991
29	99	1961	39	1915	58	1892	73	1969
30	97	1961	36	1931	58	1958	75	1961
31	95	1953	32	1886	55	1944	72	1953

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed

September Daily Record Temperatures

<u>Day</u>	<u>Record</u>		<u>Record</u>		<u>Lowest</u>		<u>Highest</u>	
	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>
1	98	1894	34	1885	57	1977	70	1921
2	99	1976	34	1946	57	1974	71	1960
3	98	1925	31	1885	58	1902	71	1897
4	98	1979	32	1885	54	1885	70	1912
5	99	1947	26	1885	56	1986	73	1996
6	99	1978	30	1885	50	1911	71	1970
7	101	1931	31	1885	53	1992	73	1931
8	102	1959	29	1883	52	1941	69	1897
9	94	1931	30	1898	52	1941	68	1906
10	97	1998	27	1917	55	1962	67	1994
11	100	1931	28	1964	50	1983	72	1931
12	90	1952	27	1910	48	1923	69	1952
13	94	1927	27	1923	44	1903	66	1939
14	95	1939	27	1956	47	1889	70	1939
15	91	1948	29	1887	42	1903	66	1968
16	93	1979	26	1973	45	1881	66	1948
17	92	1998	25	1918	44	1901	70	1891
18	95	1998	23	1886	48	1991	64	1940
19	96	1984	27	1896	47	1983	70	1941
20	90	1941	22	1918	45	1983	65	1914
21	96	1937	24	1882	46	1974	67	1892
22	101	1936	23	1995	45	1895	63	1929
23	89	1937	23	1887	42	1913	66	1930
24	87	1990	25	1951	41	1984	61	1923
25	92	1885	22	1965	41	1942	61	1986
26	90	1979	19	1965	40	1934	58	1950
27	95	1952	21	1893	42	1965	61	1987
28	89	1905	20	1942	38	1899	62	1905
29	96	1897	22	1899	44	1959	63	1905
30	90	1976	17	1883	39	1886	58	1989

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed

October Daily Record Temperatures

<u>Day</u>	<u>Record</u>		<u>Record</u>		<u>Lowest</u>		<u>Highest</u>	
	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>
1	90	1992	10	1886	43	1950	57	1949
2	90	1897	18	1883	42	1989	59	1939
3	93	1922	16	1883	39	1935	63	1914
4	87	1975	23	1988	39	1885	60	1937
5	93	1963	18	1885	41	1891	58	1963
6	90	1993	19	2001	38	2000	58	1984
7	87	1975	19	1952	38	2000	59	1975
8	84	1936	16	1917	37	1925	61	1973
9	85	1938	16	1897	35	1985	58	1886
10	86	1955	16	1935	36	1935	59	1938
11	85	1943	20	1917	34	1959	62	1997
12	84	1956	13	1919	32	1909	62	1984
13	84	1934	17	1979	33	1939	57	1984
14	86	1962	16	1937	35	1909	64	1962
15	83	1958	18	1952	37	1881	55	1994
16	83	1910	17	1952	33	1952	58	1947
17	90	1910	13	1976	30	1930	56	1910
18	79	1953	10	1972	27	1930	53	1963
19	83	1953	12	1917	30	1930	54	1958
20	82	1953	13	1913	28	1913	59	1953
21	87	1947	11	1913	31	1981	62	1953
22	82	1901	10	1936	27	1936	55	1914
23	80	1963	5	1917	29	1887	49	1886
24	78	1989	7	1887	18	1887	52	1970
25	83	1989	6	1887	21	1919	61	2000
26	79	1989	-4	1919	22	1919	65	1989
27	75	1983	6	1919	22	1919	48	1982
28	74	1937	-3	1919	18	1925	49	1974
29	78	1950	3	1895	25	1917	52	1977
30	75	1950	10	1991	24	1991	50	1977
31	76	1933	5	1951	23	1935	50	2000

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed

November Daily Record Temperatures

<u>Day</u>	<u>Record</u>		<u>Record</u>		<u>Lowest</u>		<u>Highest</u>	
	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>
1	74	1990	0	1951	17	1951	50	1964
2	73	1978	-7	1951	16	1935	47	1947
3	70	1903	0	1991	15	1991	47	1956
4	70	1975	-3	1919	16	1919	48	1948
5	70	1975	-6	1951	17	1935	42	2001
6	70	1887	-4	1991	14	1991	50	1977
7	70	1999	-3	1936	13	1936	51	1977
8	71	1999	-10	1892	15	1892	48	1969
9	65	1937	-1	1979	15	1986	41	1964
10	70	1909	-4	1979	10	1911	45	1964
11	61	1905	-4	1986	8	1911	43	1964
12	65	1981	-7	1919	5	1986	45	1923
13	65	1999	-11	1919	8	1940	44	1923
14	66	1939	-9	1919	9	1919	40	2001
15	64	1953	-14	1881	8	1911	44	1931
16	68	1934	-6	1959	12	1989	42	1918
17	73	1953	-9	1891	6	1891	46	2001
18	60	1908	-13	1881	5	1881	37	1954
19	67	1917	-17	1896	-3	1896	40	1982
20	63	1890	-16	1921	1	1896	45	1990
21	58	2001	-14	1896	1	1896	34	1966
22	55	1939	-20	1896	4	1898	34	1919
23	54	1984	-15	1985	-2	1950	37	1954
24	56	1984	-20	1893	2	1985	33	1984
25	57	1984	-22	1886	1	1996	42	1984
26	54	1962	-19	1996	3	1996	36	1962
27	54	1899	-24	1985	-4	1887	44	1962
28	55	1901	-24	1985	-9	1896	39	1962
29	51	1914	-26	1896	-12	1896	36	1962
30	53	1990	-27	1905	-10	1896	35	1932

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed

December Daily Record Temperatures

<u>Day</u>	<u>Record</u>		<u>Record</u>		<u>Lowest</u>		<u>Highest</u>	
	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>	<u>High</u>	<u>Year</u>	<u>Low</u>	<u>Year</u>
1	57	1962	-27	1896	-12	1886	36	1962
2	55	1982	-30	1886	-19	1886	34	1982
3	55	1941	-33	1886	-15	1886	39	1941
4	53	1916	-35	1886	-2	1964	33	1941
5	54	1939	-18	1972	0	1937	31	1951
6	65	1939	-26	1972	-11	1972	31	1987
7	53	1918	-29	1882	-10	1882	31	1987
8	53	1990	-21	1972	-11	1927	32	1946
9	56	1990	-26	1977	-13	1977	33	1939
10	46	1974	-26	1977	-8	1893	31	1921
11	54	1939	-21	1945	-11	1995	30	1965
12	55	1883	-23	1893	-15	1893	28	1921
13	49	1913	-28	1917	-10	1901	32	1921
14	48	1998	-32	1901	-18	1901	35	1928
15	53	1939	-29	1901	-8	1951	34	2001
16	57	1962	-27	1953	-11	1953	33	1895
17	47	1890	-25	1884	-12	1983	33	1957
18	50	1923	-29	1884	-14	1983	32	1957
19	46	1923	-32	1883	-17	1916	28	1931
20	46	1890	-28	1916	-18	1989	29	1979
21	42	1979	-31	1916	-16	1990	28	1931
22	43	1899	-28	1884	-17	1983	32	1931
23	46	1899	-31	1983	-18	1983	26	1958
24	45	1957	-27	1884	-15	1884	26	1963
25	47	1999	-31	1933	-14	1996	32	1994
26	45	1959	-32	1886	-14	1886	33	1959
27	46	1928	-34	1883	-13	1924	31	1959
28	50	1898	-30	1924	-18	1917	30	1999
29	52	1999	-36	1887	-11	1946	31	1991
30	42	1929	-29	1976	-13	1973	30	1991
31	44	1904	-32	1967	-18	1973	32	1991

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed

January Daily Record Precipitation/Snowfall

<u>Day</u>	<u>Record Pcpn</u>	<u>Year</u>	<u>Record Snowfall</u>	<u>Year</u>
1	1.06	1921	9.0	1921
2	0.33	1976	5.5	1937
3	0.22	1897	2.5	1897
4	0.91	1997	10.7	1997
5	0.34	1998	6.2	1994
6	0.78	1980	13.6	1989
7	0.73	1989	10.7	1989
8	0.35	1992	3.1	1964
9	0.25	1939	4.5	1997
10	0.25	1929	3.0	1997
11	0.38	1988	5.3	1988
12	0.47	1988	6.7	1988
13	0.28	1962	3.0	1971
14	0.25	1948	2.5	1948
15	0.48	1889	4.0	1920
16	0.52	1889	4.6	1994
17	1.06	1906	14.0	1996
18	0.25	1996	4.0	1996
19	0.15	1977	2.3	1979
20	0.41	1937	8.6	1937
21	0.57	1952	6.1	1952
22	0.47	1982	16.3*	1982
23	0.30	1909	5.4	1988
24	0.57	1972	7.0	1972
25	0.39	1971	4.7	1971
26	0.41	1916	4.3	1916
27	0.50	1903	5.0	1903
28	0.29	1996	6.0	1996
29	0.32	1887	4.1	1916
30	0.27	1896	2.9	1988
31	0.12	1926	1.9	1986

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed
HAIL events not included, **T** = TRACE

February Daily Record Precipitation/Snowfall

<u>Day</u>	<u>Record Pcpn</u>	<u>Year</u>	<u>Record Snowfall</u>	<u>Year</u>
1	0.33	1939	5.5	1922
2	0.48	1887	2.1	1974
3	0.43	1943	5.0	1976
4	0.54	1908	3.7	1955
5	0.88	1946	7.5	1946
6	0.35	1881	3.2	1946
7	0.43	1937	8.2	1937
8	0.18	1926	3.0	1936
9	0.24	1894	3.0	1939
10	0.24	1886	3.1	1953
11	0.32	1979	4.4	1994
12	0.63	1908	4.0	1908
13	1.10	1915	9.0	1897
14	0.36	1915	6.2	1995
15	0.34	1910	5.1	2000
16	0.32	1883	2.8	1938
17	0.34	1904	3.4	1904
18	0.55	1991	5.6	1991
19	0.32	1948	3.7	1986
20	0.74	1891	4.2	1955
21	0.32	1927	2.4	1945
22	0.41	1979	6.4	1979
23	0.73	1977	6.3	1991
24	0.42	1930	5.1	1982
25	0.57	1998	2.0	2001
26	0.66	1936	7.4	1936
27	0.42	1903	4.4	1996
28	0.57	1951	10.8	1951
29	0.51	1896	6.0	1896

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed
HAIL events not included, **T** = TRACE

March Daily Record Precipitation/Snowfall

<u>Day</u>	<u>Record Pcpn</u>	<u>Year</u>	<u>Record Snowfall</u>	<u>Year</u>
1	0.32	1908	6.0	1908
2	0.67	1966	6.4	1966
3	0.85	1997	12.0	1997
4	0.54	1966	5.4	1966
5	0.77	1992	4.5	1896
6	0.51	1944	4.9	1944
7	0.59	1983	4.8	1897
8	1.12	2000	5.2	1999
9	0.50	1898	6.1	1993
10	0.48	1904	5.0	1921
11	0.54	1884	4.0	1976
12	0.70	1977	5.1	1928
13	0.45	1997	7.0	1997
14	0.82	1973	5.0	1899
15	0.82	1902	11.2	1990
16	0.40	1945	5.2	1943
17	0.60	1965	4.8	1965
18	0.64	1968	3.7	1932
19	0.59	1979	4.4	1903
20	0.44	1935	4.0	1982
21	0.67	1882	2.2	1898
22	0.86	1894	8.6	1894
23	0.64	1994	9.3	1994
24	0.75	1914	7.1	1936
25	0.98	1927	10.1	1927
26	1.07	1950	3.4	1972
27	0.64	1995	6.7	1995
28	0.65	1999	2.0	1940
29	0.73	1989	4.0	1940
30	0.54	1916	2.8	1977
31	0.37	1934	3.4	1962

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed
HAIL events not included, **T** = TRACE

April Daily Record Precipitation/Snowfall

<u>Day</u>	<u>Record Pcpn</u>	<u>Year</u>	<u>Record Snowfall</u>	<u>Year</u>
1	0.67	1960	6.0	1908
2	0.90	1905	2.2	1978
3	1.69	1963	7.4	1946
4	1.03	1892	2.5	1933
5	1.39	1997	4.6	1947
6	1.55	1885	7.0	1997
7	1.88	1904	4.9	1916
8	2.10	1904	13.2	1904
9	0.41	1933	3.0	1933
10	2.00	1902	6.0	2000
11	1.00	1974	3.8	1995
12	0.98	1893	2.0	1924
13	1.38	1912	3.3	1964
14	1.78	1986	3.7	1986
15	1.00	1910	2.9	1910
16	0.96	1967	2.5	1945
17	1.00	1930	3.8	1910
18	1.16	1896	1.6	1928
19	1.02	1970	8.6	1970
20	0.83	1885	2.5	1920
21	1.46	1964	2.3	1992
22	1.40	1902	10.0	1902
23	1.61	1960	4.3	2001
24	0.72	1917	5.2	1937
25	0.76	1986	3.5	1937
26	1.74	1924	7.5	1994
27	1.79	1942	2.0	1966
28	1.72	1918	3.2	1994
29	1.86	1886	3.8	1990
30	1.43	1898	3.3	1991

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed
HAIL events not included, **T** = TRACE

May Daily Record Precipitation/Snowfall

<u>Day</u>	<u>Record Pcpn</u>	<u>Year</u>	<u>Record Snowfall</u>	<u>Year</u>
1	1.22	1902	1.0	1909
2	0.91	1927	5.1	1935
3	1.24	1905	T	1991
4	4.02	1977	0.3	1944
5	0.86	1950	0.8	1979
6	1.06	1919	2.0	1915
7	0.96	1904	T	1945
8	1.66	1882	0.4	1938
9	1.08	1882	0.6	1902
10	1.52	1905	T	1979
11	1.69	1944	0.5	1946
12	1.88	1998	0.2	1911
13	1.38	1972	0.5	1924
14	1.12	1896	2.5	1907
15	1.42	1998	T	1983
16	0.84	1969	T	1968
17	2.10	1996	0.4	1968
18	1.45	1883	T	1968
19	1.02	1950	0.1	1907
20	1.36	1908	1.2	1931
21	1.06	1905	0.1	1963
22	1.63	1981	T	1949
23	1.50	1962	T	1924
24	1.16	1981		
25	1.28	1906		
26	1.26	1932		
27	1.16	1963	T	1965
28	1.35	1926		
29	3.12	1909		
30	1.29	1985		
31	1.44	1916		

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed
HAIL events not included, **T** = TRACE

June Daily Record Precipitation/Snowfall

<u>Day</u>	<u>Record Pcpn</u>	<u>Year</u>	<u>Record Snowfall</u>	<u>Year</u>
1	1.70	1990		
2	2.41	1943		
3	1.69	1948		
4	1.16	1958	T	1935
5	1.72	1883		
6	2.22	1941		
7	1.60	1984		
8	3.48	1914		
9	1.42	1904		
10	1.94	1907		
11	2.15	1881		
12	2.08	1915		
13	1.40	1890		
14	2.60	1885		
15	2.41	1978		
16	1.48	1909		
17	1.85	1986		
18	3.03	1998		
19	4.64	2000		
20	2.95	1923		
21	1.56	1927		
22	2.77	1957		
23	1.27	1997		
24	1.53	1935		
25	0.99	1969		
26	2.86	1915		
27	1.36	1899		
28	3.60	1897		
29	1.36	1887		
30	2.33	1991		

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed
HAIL events not included, **T** = TRACE

July Daily Record Precipitation/Snowfall

<u>Day</u>	<u>Record Pcpn</u>	<u>Year</u>	<u>Record Snowfall</u>	<u>Year</u>
1	3.93	1952		
2	2.32	1952		
3	4.50	1886		
4	3.06	1977		
5	2.94	1925		
6	1.36	1899		
7	2.18	1959		
8	1.15	1994		
9	1.03	1973		
10	1.59	1944		
11	1.71	1931		
12	2.00	1891		
13	1.52	1919		
14	2.85	1969		
15	4.42	1993		
16	1.74	1928		
17	1.47	1983		
18	1.79	1892		
19	1.82	1919		
20	3.78	1897		
21	1.33	1987		
22	2.12	1969		
23	2.03	1979		
24	1.05	1993		
25	1.01	1957		
26	1.50	1986		
27	1.52	1908		
28	1.60	1901		
29	1.53	1926		
30	0.81	1890		
31	1.55	1966		

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed
HAIL events not included, **T** = TRACE

August Daily Record Precipitation/Snowfall

<u>Day</u>	<u>Record Pcpn</u>	<u>Year</u>	<u>Record Snowfall</u>	<u>Year</u>
1	1.53	1951		
2	3.07	1944		
3	1.57	1881		
4	2.02	1996		
5	1.40	1923		
6	0.82	1973		
7	1.61	1931		
8	4.72*	1943		
9	1.56	1900		
10	2.78	1974		
11	2.10	1963		
12	2.20	1999		
13	1.36	1988		
14	2.30	1905		
15	1.57	1881		
16	2.33	1912		
17	1.00	1961		
18	2.20	1884		
19	3.41	1935		
20	1.81	1980		
21	1.51	1964		
22	1.94	1978		
23	1.21	1992		
24	1.41	1995		
25	2.35	1921		
26	3.05	1928		
27	0.70	1927		
28	1.61	1892		
29	2.71	1942		
30	1.73	1952		
31	1.92	1989		

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed
HAIL events not included, **T** = TRACE

September Daily Record Precipitation/Snowfall

<u>Day</u>	<u>Record Pcpn</u>	<u>Year</u>	<u>Record Snowfall</u>	<u>Year</u>
1	2.32	1999		
2	3.37	1957		
3	2.15	1971		
4	2.57	1881		
5	0.84	1969		
6	1.04	1937		
7	2.28	1903		
8	1.13	1954		
9	1.73	1946		
10	1.34	1913		
11	1.34	1891		
12	1.58	1903		
13	3.80	1889		
14	1.02	1889	T	1956
15	0.90	1896		
16	0.99	1992		
17	0.88	1908		
18	1.67	1988	T	1991
19	1.18	1907		
20	2.86	1970	T	1983
21	0.99	1883	T	1995
22	1.39	2000		
23	1.07	1920	T	1984
24	2.07	1973	T	1942
25	1.72	1901	2.0	1912
26	1.19	1998	0.3	1942
27	0.77	1996	T	1965
28	0.64	1904	1.4	1899
29	1.55	1995		
30	1.48	1971	T	1981

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed
HAIL events not included, **T** = TRACE

October Daily Record Precipitation/Snowfall

<u>Day</u>	<u>Record Pcpn</u>	<u>Year</u>	<u>Record Snowfall</u>	<u>Year</u>
1	1.04	1907	T	1996
2	0.80	1941	1.0	1950
3	1.80	1903		
4	1.84	1913	0.6	1903
5	2.39	1884	T	2000
6	1.43	1982	0.4	1974
7	1.88	1901	3.3	1894
8	0.98	1997	0.7	1927
9	3.10	1982	0.9	1970
10	1.19	1949	2.5	1935
11	1.05	1924	T	1983
12	0.84	1997	T	1986
13	1.50	1984	0.1	1997
14	0.82	1984	0.6	1909
15	1.79	1984	1.4	1992
16	1.37	1971	0.3	1922
17	1.25	1883	1.3	1990
18	1.00	1984	2.1	1917
19	1.26	1934	0.4	1913
20	0.44	1949	1.1	1917
21	1.10	1900	3.4	1906
22	0.71	1966	1.0	1966
23	1.80	1902	1.5	1936
24	0.78	1975	4.9	2001
25	2.30	1902	1.6	1942
26	0.84	1996	1.2	1925
27	0.60	1931	1.2	1895
28	0.78	1940	1.6	1932
29	1.31	1996	4.5	1929
30	1.02	1971	7.0	1951
31	1.73	1979	2.0	1935

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed
HAIL events not included, **T** = TRACE

November Daily Record Precipitation/Snowfall

<u>Day</u>	<u>Record Pcpn</u>	<u>Year</u>	<u>Record Snowfall</u>	<u>Year</u>
1	1.12	2000	2.3	1936
2	0.59	1992	5.5	1992
3	0.83	1925	2.4	1951
4	0.54	1956	4.3	1933
5	0.80	1882	1.7	1933
6	0.95	2000	2.8	1962
7	0.58	1915	1.8	1927
8	1.10	1977	4.0	1986
9	1.50	1977	5.6	1977
10	1.18	1919	12.4	1919
11	0.39	1911	4.2	1911
12	0.39	1938	5.0	1948
13	0.42	1906	3.6	1906
14	1.26	1909	14.0	1909
15	0.52	1958	3.2	1947
16	1.48	1930	6.0	1906
17	1.25	1952	8.5	1996
18	0.70	1998	5.6	1998
19	0.40	1983	4.6	1992
20	1.43	1977	12.0	1977
21	1.05	1893	10.5	1893
22	1.40	1886	6.1	1985
23	0.64	1905	3.0	1993
24	2.10	1908	5.0	1896
25	0.51	1993	7.8	1993
26	0.92	1896	9.0	1896
27	0.70	1905	5.3	2001
28	1.62	1960	10.9	1960
29	0.23	1927	2.1	1942
30	0.54	1908	5.0	1908

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed
HAIL events not included, **T** = TRACE

December Daily Record Precipitation/Snowfall

<u>Day</u>	<u>Record Pcpn</u>	<u>Year</u>	<u>Record Snowfall</u>	<u>Year</u>
1	0.48	1909	2.8	1985
2	0.34	1901	3.4	1901
3	0.70	1891	4.1	1927
4	0.43	1926	4.3	1926
5	0.73	1960	5.8	1909
6	0.62	1901	6.2	1901
7	0.30	1916	3.0	1916
8	0.70	1889	4.1	1995
9	0.24	1918	2.4	1936
10	0.16	1986	1.9	1986
11	0.67	1949	5.7	1949
12	0.42	1973	4.4	1973
13	0.35	1995	5.2	1995
14	1.23	1927	14.3	1927
15	1.14	1893	11.4	1893
16	0.59	1984	5.3	1946
17	0.49	1977	5.0	1993
18	0.34	1939	2.9	1992
19	0.29	1990	3.6	1990
20	0.57	1967	5.4	1967
21	0.30	1967	3.0	1967
22	0.28	1988	3.7	1964
23	0.45	1945	6.0	1933
24	0.42	1912	4.0	1907
25	0.21	1916	3.6	1912
26	0.53	1988	8.5	1988
27	0.13	1959	3.0	1923
28	0.40	2000	8.0	2000
29	0.42	1972	4.4	1972
30	0.63	1972	7.2	1972
31	0.52	1951	5.2	1951

BOX = monthly record, **STAR** = all-time record, **BOLD** = tie with most recent year listed
HAIL events not included, **T** = TRACE

January Top Tens

Monthly Average Temperature

Monthly Precipitation

	<u>Warmest</u>	<u>Year</u>	<u>Coldest</u>	<u>Year</u>		<u>Wettest</u>	<u>Year</u>	<u>Driest</u>	<u>Year</u>
1	21.8	1990	-10.3*	1887	1	1.85	1989	0.02	1885
2	21.1	1944	-10.0	1883	2	1.82	1996	0.07	1942
3	19.6	1931	-8.7	1888	3	1.79	1997	0.07	1931
4	18.2	1987	-7.1	1950	4	1.62	1988	0.09	1961
5	18.0	1942	-7.0	1982	5	1.62	1906	0.10	1970
6	17.4	1958	-7.0	1886	6	1.56	1897	0.10	1965
7	17.3	1992	-6.4	1966	7	1.55	1937	0.11	1981
8	16.5	2002	-6.3	1912	8	1.50	1907	0.12	1973
9	16.1	1983	-6.2	1936	9	1.49	1916	0.13	1990
10	16.1	1947	-6.1	1937	10	1.44	1893	0.13	1963

Monthly Snowfall

	<u>Most</u>	<u>Year</u>	<u>Least</u>	<u>Year</u>
1	31.5*	1989	0.8	1990
2	30.0	1982	0.8	1942
3	28.6	1997	0.9	1931
4	27.3	1937	1.2	1965
5	27.2	1996	1.3	1963
6	24.3	1988	1.5	1934
7	20.8	1933	1.5	1898
8	19.7	1999	1.6	1961
9	18.4	1893	1.6	1928
10	18.3	1975	1.6	1908

STAR = all-time record, **BOLD** = tie with most recent year listed first
HAIL events not included, **T** = TRACE

February Top Tens

Monthly Average Temperature

	<u>Warmest</u>	<u>Year</u>	<u>Coldest</u>	<u>Year</u>
1	28.0	1998	-9.8	1936
2	27.5	1987	-3.8	1884
3	26.5	1954	-2.7	1887
4	26.2	1931	-1.5	1979
5	24.9	1984	-1.3	1893
6	24.0	2002	-0.9	1939
7	23.9	1935	-0.5	1914
8	23.5	1992	-0.4	1917
9	23.1	1930	-0.2	1904
10	22.5	1999	0.7	1889

Monthly Precipitation

	<u>Wettest</u>	<u>Year</u>	<u>Driest</u>	<u>Year</u>
1	2.18	1908	0.03	1954
2	2.13	1881	0.06	1960
3	2.03	1930	0.06	1934
4	1.88	1915	0.06	1913
5	1.74	1979	0.06	1912
6	1.60	1948	0.08	1885
7	1.52	1897	0.12	2002
8	1.51	1998	0.13	1973
9	1.44	1946	0.14	1965
10	1.38	1936	0.15	1958

Monthly Snowfall

	<u>Most</u>	<u>Year</u>	<u>Least</u>	<u>Year</u>
1	19.5	1979	0.3	1954
2	18.0	1936	0.6	1913
3	16.5	1915	0.7	1934
4	15.8	1948	1.0	1912
5	15.8	1908	1.1	1966
6	15.7	1937	1.2	1960
7	15.3	1991	1.4	1973
8	14.7	1893	1.7	1965
9	13.6	1897	1.8	1956
10	13.0	1946	1.9	2002

STAR = all-time record, **BOLD** = tie with most recent year listed first
HAIL events not included, **T** = TRACE

March Top Tens

Monthly Average Temperature

	<u>Warmest</u>	<u>Year</u>	<u>Coldest</u>	<u>Year</u>
1	40.9	1910	11.1	1899
2	36.2	1918	12.6	1888
3	36.0	1973	13.0	1893
4	35.2	2000	13.7	1965
5	35.1	1945	13.9	1891
6	34.8	1938	13.9	1883
7	34.7	1946	14.4	1896
8	34.5	1961	15.1	1884
9	34.1	1968	15.2	1897
10	33.8	1942	15.3	1969

Monthly Precipitation

	<u>Wettest</u>	<u>Year</u>	<u>Driest</u>	<u>Year</u>
1	2.83	1882	0.03	1958
2	2.62	1995	0.03	1895
3	2.56	1901	0.08	1959
4	2.27	1983	0.08	1957
5	2.26	1902	0.11	1960
6	2.21	1950	0.14	1886
7	2.00	1979	0.19	1986
8	1.92	1966	0.21	1912
9	1.90	1904	0.23	1939
10	1.89	1997	0.23	1911

Monthly Snowfall

	<u>Most</u>	<u>Year</u>	<u>Least</u>	<u>Year</u>
1	26.2	1997	T	1961
2	19.0	1995	T	1905
3	18.7	1975	0.1	1910
4	17.5	1927	0.2	1992
5	15.7	2002	0.2	1959
6	15.5	1894	0.3	1981
7	15.4	1966	0.3	1895
8	15.3	1908	0.7	1986
9	15.0	1996	0.7	1957
10	14.6	1940	0.7	1938

STAR = all-time record, **BOLD** = tie with most recent year listed first
HAIL events not included, **T** = TRACE

April Top Tens

Monthly Average Temperature

	<u>Warmest</u>	<u>Year</u>	<u>Coldest</u>	<u>Year</u>
1	51.6	1915	33.0	1893
2	51.5	1987	33.1	1907
3	50.8	1955	33.3	1881
4	50.4	1900	33.5	1950
5	50.3	1895	34.5	1920
6	49.6	1925	35.0	1956
7	49.5	1977	35.2	1909
8	49.2	1998	35.9	1975
9	49.0	1980	35.9	1936
10	48.0	1991	36.0	1979

Monthly Precipitation

	<u>Wettest</u>	<u>Year</u>	<u>Driest</u>	<u>Year</u>
1	5.49	1886	0.01	1988
2	5.28	1986	0.02	1980
3	4.69	1937	0.02	1949
4	4.62	1904	0.08	1926
5	4.48	1896	0.12	1987
6	4.24	1942	0.19	1890
7	4.14	1967	0.21	1996
8	4.09	1968	0.24	1952
9	4.01	1924	0.42	1983
10	3.76	1964	0.45	1982

Monthly Snowfall

	<u>Most</u>	<u>Year</u>	<u>Least</u>	<u>Year</u>
1	17.4	1904	0.0	1925
2	16.8	1937	0.0	1915
3	14.0	1893	0.0	1895
4	12.8	1970	0.0	1891
5	12.4	1950	T	1999
6	11.6	1968	T	1993
7	11.2	1902	T	1988
8	10.9	1994	T	1987
9	10.8	1935	T	1985
10	9.2	1964	T	1981

STAR = all-time record, **BOLD** = tie with most recent year listed first
HAIL events not included, **T** = TRACE

May Top Tens

Monthly Average Temperature

	<u>Warmest</u>	<u>Year</u>	<u>Coldest</u>	<u>Year</u>
1	66.5	1977	44.8	1907
2	63.9	1988	46.8	1924
3	63.7	1934	47.2	1892
4	62.2	1939	47.4	1888
5	62.2	1936	48.0	1890
6	61.7	1987	48.0	1883
7	61.5	1991	48.4	1945
8	61.4	1980	49.7	1967
9	61.1	1964	49.9	1927
10	60.9	1998	50.1	1947

Monthly Precipitation

	<u>Wettest</u>	<u>Year</u>	<u>Driest</u>	<u>Year</u>
1	7.34	1998	0.38	1917
2	7.30	1977	0.46	1976
3	7.24	1905	0.46	1928
4	5.95	1962	0.47	1952
5	5.56	1902	0.48	1939
6	5.32	1882	0.61	1984
7	5.06	1892	0.64	1980
8	5.03	1985	0.76	1901
9	5.02	1909	0.78	1924
10	4.99	1950	0.80	1897

Monthly Snowfall

	<u>Most</u>	<u>Year</u>	<u>Least</u>	<u>Year</u>
1	5.1	1935	0.0	
2	4.2	1907		
3	3.4	1890		
4	2.3	1915		
5	1.2	1931		
6	1.0	1950		
7	1.0	1909		
8	1.0	1892		
9	0.9	1954		
10	0.8	1979		

STAR = all-time record, **BOLD** = tie with most recent year listed first
HAIL events not included, **T** = TRACE

June Top Tens

Monthly Average Temperature

	<u>Warmest</u>	<u>Year</u>	<u>Coldest</u>	<u>Year</u>
1	73.8	1988	57.3	1969
2	72.8	1933	59.1	1982
3	71.4	1995	59.3	1915
4	70.7	1956	59.7	1958
5	70.5	1921	59.8	1902
6	70.1	1991	60.0	1985
7	69.7	1884	60.2	1926
8	69.3	1893	60.3	1945
9	69.2	1911	60.3	1928
10	69.2	1894	60.4	1916

Monthly Precipitation

	<u>Wettest</u>	<u>Year</u>	<u>Driest</u>	<u>Year</u>
1	11.71*	2000	0.30	1929
2	9.40	1975	0.48	1936
3	9.13	1915	0.58	1972
4	8.92	1914	0.66	1987
5	7.92	1885	0.76	1945
6	7.70	1894	0.80	1903
7	7.42	1897	0.83	1910
8	6.73	1923	0.90	1974
9	6.62	1998	0.96	1889
10	6.60	1890	1.04	1938

Monthly Snowfall

	<u>Most</u>	<u>Year</u>	<u>Least</u>	<u>Year</u>
1	T	1935	0.0	
2				
3				
4				
5				
6				
7				
8				
9				
10				

STAR = all-time record, **BOLD** = tie with most recent year listed first
HAIL events not included, **T** = TRACE

July Top Tens

Monthly Average Temperature

	<u>Warmest</u>	<u>Year</u>	<u>Coldest</u>	<u>Year</u>
1	80.2*	1936	63.4	1891
2	75.9	1989	64.3	1992
3	75.9	1916	64.3	1884
4	75.8	1988	64.9	1904
5	75.6	1935	65.1	1971
6	75.4	1957	65.2	1915
7	74.5	1955	65.4	1883
8	74.3	1975	65.4	1882
9	74.0	1987	65.5	1895
10	74.0	1964	66.1	1927

Monthly Precipitation

	<u>Wettest</u>	<u>Year</u>	<u>Driest</u>	<u>Year</u>
1	8.42	1952	0.42	1950
2	8.02	1897	0.42	1936
3	7.94	1901	0.43	1970
4	7.71	1993	0.43	1939
5	7.32	1884	0.46	1988
6	7.17	1928	0.48	1930
7	6.95	1944	0.60	1967
8	6.86	1955	0.62	1989
9	6.40	1887	0.63	1976
10	5.92	1969	0.64	1984

Monthly Snowfall

	<u>Most</u>	<u>Year</u>	<u>Least</u>	<u>Year</u>
1	0.0		0.0	
2				
3				
4				
5				
6				
7				
8				
9				
10				

STAR = all-time record, **BOLD** = tie with most recent year listed first
HAIL events not included, **T** = TRACE

August Top Tens

Monthly Average Temperature

	<u>Warmest</u>	<u>Year</u>	<u>Coldest</u>	<u>Year</u>
1	74.2	1937	61.6	1885
2	73.9	1947	62.5	1977
3	73.6	1976	62.7	1890
4	73.5	1961	62.9	1887
5	73.5	1900	63.2	1883
6	73.3	1984	63.3	1888
7	72.9	1983	63.7	1903
8	72.7	1998	63.9	1923
9	72.7	1991	63.9	1904
10	72.7	1949	64.3	1974

Monthly Precipitation

	<u>Wettest</u>	<u>Year</u>	<u>Driest</u>	<u>Year</u>
1	9.58	1900	0.18	1984
2	8.52	1944	0.25	1925
3	6.81	1943	0.38	1969
4	6.71	1942	0.41	1976
5	6.46	1974	0.41	1967
6	6.42	1928	0.42	1950
7	6.17	1884	0.74	1922
8	6.08	1905	0.75	1929
9	6.07	1989	0.77	1917
10	5.89	1881	0.79	1948

Monthly Snowfall

	<u>Most</u>	<u>Year</u>	<u>Least</u>	<u>Year</u>
1	0.0		0.0	
2				
3				
4				
5				
6				
7				
8				
9				
10				

STAR = all-time record, **BOLD** = tie with most recent year listed first
HAIL events not included, **T** = TRACE

September Top Tens

Monthly Average Temperature

	<u>Warmest</u>	<u>Year</u>	<u>Coldest</u>	<u>Year</u>
1	65.6	1897	48.9	1965
2	64.9	1931	52.3	1918
3	64.7	1948	53.1	1907
4	63.9	1998	53.4	1974
5	63.8	1940	53.5	1934
6	63.6	1978	53.5	1903
7	63.3	1906	53.7	1881
8	63.2	1933	53.8	1926
9	63.1	1908	53.8	1896
10	62.4	1952	53.9	1985

Monthly Precipitation

	<u>Wettest</u>	<u>Year</u>	<u>Driest</u>	<u>Year</u>
1	6.50	1999	0.13	1974
2	6.27	1889	0.15	1952
3	6.13	1957	0.22	1940
4	5.60	1903	0.26	1936
5	4.98	1973	0.29	1918
6	4.75	1881	0.30	1887
7	4.44	1961	0.31	1979
8	4.35	1921	0.31	1967
9	4.30	1971	0.33	1892
10	4.24	1904	0.36	1949

Monthly Snowfall

	<u>Most</u>	<u>Year</u>	<u>Least</u>	<u>Year</u>
1	2.0	1912	0.0	
2	1.4	1899		
3	0.6	1942		
4	0.5	1890		
5	T	1995		
6	T	1991		
7	T	1984		
8	T	1983		
9	T	1981		
10	T	1972		

STAR = all-time record, **BOLD** = tie with most recent year listed first
HAIL events not included, **T** = TRACE

October Top Tens

Monthly Average Temperature

	<u>Warmest</u>	<u>Year</u>	<u>Coldest</u>	<u>Year</u>
1	57.3	1963	34.6	1925
2	53.5	1953	35.1	1917
3	53.2	1947	36.5	1919
4	53.1	1924	38.2	1887
5	52.8	1914	39.5	1976
6	52.1	1938	40.1	1898
7	52.0	1940	40.3	1969
8	51.7	1956	40.5	1883
9	51.7	1900	40.6	1913
10	51.3	1920	40.7	1959

Monthly Precipitation

	<u>Wettest</u>	<u>Year</u>	<u>Driest</u>	<u>Year</u>
1	7.03	1982	0.05	1986
2	6.76	1984	0.07	1889
3	4.74	1902	0.08	1952
4	4.73	1998	0.10	1964
5	4.42	1971	0.11	1937
6	4.04	1882	0.13	1978
7	3.70	1884	0.13	1912
8	3.66	1903	0.15	1938
9	3.42	1901	0.16	1976
10	3.22	1883	0.16	1922

Monthly Snowfall

	<u>Most</u>	<u>Year</u>	<u>Least</u>	<u>Year</u>
1	8.1	1951	0.0	
2	5.4	2001		
3	4.9	1896		
4	4.8	1929		
5	4.5	1935		
6	4.4	1906		
7	4.1	1919		
8	3.8	1972		
9	3.8	1971		
10	3.8	1917		

STAR = all-time record, **BOLD** = tie with most recent year listed first
HAIL events not included, **T** = TRACE

November Top Tens

Monthly Average Temperature

	<u>Warmest</u>	<u>Year</u>	<u>Coldest</u>	<u>Year</u>
1	39.7	2001	10.2	1896
2	37.9	1899	15.4	1985
3	37.1	1999	17.2	1911
4	36.1	1917	17.5	1919
5	35.9	1923	17.7	1996
6	35.4	1981	17.7	1935
7	35.3	1904	18.9	1955
8	35.1	1953	19.3	1881
9	35.0	1962	20.5	1959
10	34.9	1939	20.7	1891

Monthly Precipitation

	<u>Wettest</u>	<u>Year</u>	<u>Driest</u>	<u>Year</u>
1	4.58	1977	T*	1999
2	4.13	2000	T*	1901
3	3.09	1896	0.02	1990
4	3.02	1906	0.04	1967
5	2.83	1922	0.05	1912
6	2.81	1908	0.06	1961
7	2.56	1930	0.08	1904
8	2.54	1882	0.08	1888
9	2.42	1886	0.09	1941
10	2.38	1996	0.09	1939

Monthly Snowfall

	<u>Most</u>	<u>Year</u>	<u>Least</u>	<u>Year</u>
1	30.4	1896	0.0	1999
2	26.4	1996	0.0	1888
3	24.3	1985	T	1901
4	24.2	1977	0.1	1939
5	21.5	1993	0.1	1928
6	20.8	1886	0.2	1990
7	19.0	1947	0.2	1899
8	18.4	1919	0.4	1963
9	16.4	1992	0.4	1920
10	16.3	1989	0.4	1912

STAR = all-time record, **BOLD** = tie with most recent year listed first
HAIL events not included, **T** = TRACE

December Top Tens

Monthly Average Temperature

	<u>Warmest</u>	<u>Year</u>	<u>Coldest</u>	<u>Year</u>
1	25.9	1959	-0.5	1886
2	25.2	1939	-0.3	2000
3	23.5	1997	-0.3	1983
4	22.9	1999	0.6	1927
5	22.6	1923	2.1	1924
6	22.5	1913	2.5	1893
7	22.2	1928	2.7	1917
8	21.5	1957	3.8	1972
9	21.3	1931	3.8	1964
10	21.0	1941	3.9	1985

Monthly Precipitation

	<u>Wettest</u>	<u>Year</u>	<u>Driest</u>	<u>Year</u>
1	2.28	1927	0.02	1913
2	2.19	1951	0.04	1958
3	1.74	1909	0.05	1957
4	1.74	1887	0.05	1890
5	1.70	1933	0.09	1888
6	1.62	1893	0.10	1943
7	1.51	1972	0.10	1930
8	1.47	1883	0.14	1979
9	1.37	1882	0.14	1932
10	1.36	1967	0.15	1895

Monthly Snowfall

	<u>Most</u>	<u>Year</u>	<u>Least</u>	<u>Year</u>
1	29.2	1927	T	1913
2	21.9	1933	0.3	1982
3	20.4	1996	0.9	1958
4	20.3	1951	0.9	1943
5	20.2	1887	1.0	1889
6	18.5	1972	1.2	1957
7	16.6	1937	1.2	1930
8	16.1	1893	1.2	1888
9	14.9	1988	1.5	1979
10	14.4	1909	1.5	1959

STAR = all-time record, **BOLD** = tie with most recent year listed first
HAIL events not included, **T** = TRACE

Spring Top Tens

(March-April-May)

Spring Average Temperature

	<u>Warmest</u>	<u>Year</u>		<u>Coldest</u>	<u>Year</u>
1	49.3	1977	1	32.7	1893
2	48.2	1987	2	32.7	1888
3	46.6	1991	3	33.9	1883
4	46.6	1985	4	34.1	1907
5	46.3	1910	5	35.1	1950
6	46.0	1988	6	35.5	1899
7	45.6	1998	7	35.6	1979
8	45.0	2000	8	35.9	1956
9	44.9	1981	9	36.3	1996
10	44.8	1999	10	36.4	1882

Spring Precipitation

	<u>Wettest</u>	<u>Year</u>		<u>Driest</u>	<u>Year</u>
1	11.44	1902	1	1.28	1980
2	10.16	1896	2	1.39	1952
3	9.92	1892	3	1.62	1939
4	9.86	1977	4	2.17	1890
5	9.84	1882	5	2.54	1928
6	9.24	1905	6	2.59	1954
7	8.99	1950	7	2.62	1959
8	8.91	1998	8	2.64	1934
9	8.74	1904	9	2.65	1976
10	8.54	1962	10	2.68	1917

Spring Snowfall

	<u>Most</u>	<u>Year</u>		<u>Least</u>	<u>Year</u>
1	33.6	1997	1	0.3	1981
2	29.6	1904	2	0.3	1895
3	27.0	1893	3	0.8	1905
4	23.6	1950	4	1.2	1987
5	23.0	1995	5	1.3	1959
6	23.0	1994	6	1.3	1938
7	22.4	1975	7	1.8	1958
8	21.9	1970	8	2.1	1949
9	21.6	1927	9	2.4	1912
10	21.3	1908	10	2.6	1889

BOLD = tie with most recent year listed first, **HAIL** events not included, **T** = TRACE

Summer Top Tens

(June-July-August)

Summer Average Temperature

Summer Precipitation

	<u>Warmest</u>	<u>Year</u>		<u>Coldest</u>	<u>Year</u>		<u>Wettest</u>	<u>Year</u>		<u>Driest</u>	<u>Year</u>
1	73.9	1988	1	63.3	1915	1	18.88	1944	1	1.86	1936
2	72.5	1936	2	63.5	1891	2	17.22	2000	2	1.99	1929
3	72.0	1933	3	63.5	1883	3	16.76	1905	3	3.05	1910
4	71.3	1976	4	63.7	1992	4	16.72	1928	4	3.10	1917
5	71.1	1995	5	63.9	1904	5	16.32	1897	5	3.13	1950
6	71.0	1991	6	64.0	1895	6	15.98	1901	6	3.38	1976
7	71.0	1959	7	64.5	1985	7	15.46	1914	7	3.55	1967
8	70.9	1963	8	64.5	1927	8	15.33	1884	8	3.84	1988
9	70.9	1961	9	64.5	1902	9	15.24	1900	9	4.10	1930
10	70.8	1983	10	64.5	1885	10	14.97	1943	10	4.30	1970

Summer Snowfall

	<u>Most</u>	<u>Year</u>	<u>Least</u>	<u>Year</u>
1	T	1935	0.0	
2				
3				
4				
5				
6				
7				
8				
9				
10				

BOLD = tie with most recent year listed first, **HAIL** events not included, **T** = TRACE

Fall Top Tens

(September-October-November)

Fall Average Temperature

	<u>Warmest</u>	<u>Year</u>		<u>Coldest</u>	<u>Year</u>
1	51.4	1963	1	35.0	1896
2	49.5	1931	2	37.9	1881
3	49.2	1953	3	38.0	1985
4	48.8	1994	4	38.2	1919
5	48.2	1914	5	38.9	1911
6	47.9	1962	6	39.5	1926
7	47.8	2001	7	39.5	1883
8	47.8	1922	8	39.7	1951
9	47.4	1920	9	40.0	1959
10	47.3	1948	10	40.1	1935

Fall Precipitation

	<u>Wettest</u>	<u>Year</u>		<u>Driest</u>	<u>Year</u>
1	10.25	1977	1	0.97	1976
2	9.73	2000	2	1.20	1936
3	9.55	1971	3	1.41	1967
4	9.50	1903	4	1.54	1963
5	9.28	1982	5	1.58	1892
6	8.92	1998	6	1.84	1953
7	8.91	1881	7	1.90	1952
8	8.59	1957	8	2.11	1939
9	8.34	1896	9	2.11	1937
10	8.33	1996	10	2.11	1917

Fall Snowfall

	<u>Most</u>	<u>Year</u>		<u>Least</u>	<u>Year</u>
1	35.3	1896	1	0.0	1999
2	26.4	1996	2	0.0	1901
3	24.3	1985	3	0.0	1888
4	24.2	1977	4	0.1	1928
5	22.5	1919	5	0.4	1963
6	21.5	1993	6	0.4	1920
7	20.8	1886	7	0.4	1904
8	19.0	1947	8	0.5	1961
9	19.0	1906	9	0.5	1956
10	18.2	1992	10	0.6	1934

BOLD = tie with most recent year listed first, **HAIL** events not included, **T** = TRACE

Winter Top Tens

(December-January-February)

Winter Average Temperature

<u>Warmest</u>			<u>Coldest</u>			<u>Wettest</u>			<u>Driest</u>		
		<u>Year</u>			<u>Year</u>			<u>Year</u>			<u>Year</u>
1	22.2	1986-87	1	-4.5	1886-87	1	3.81	1896-97	1	0.36	1957-58
2	21.9	1930-31	2	-1.3	1935-36	2	3.65	1996-97	2	0.37	1958-59
3	20.9	1997-98	3	-0.6	1882-83	3	3.55	1951-52	3	0.47	1930-31
4	20.2	2001-02	4	0.0	1883-84	4	3.49	1995-96	4	0.51	1941-42
5	19.9	1991-92	5	0.5	1978-79	5	3.34	1883-84	5	0.76	1962-63
6	19.6	1982-83	6	0.5	1887-88	6	3.31	1929-30	6	0.76	1959-60
7	18.1	1999-00	7	0.7	1892-93	7	3.30	1882-83	7	0.84	1982-83
8	17.6	1943-44	8	1.1	1916-17	8	3.25	1887-88	8	0.85	1956-57
9	17.5	1941-42	9	2.8	1977-78	9	3.20	1892-93	9	0.85	1943-44
10	17.3	1920-21	10	2.9	1884-85	10	3.17	1988-89	10	0.86	1943-44

Winter Precipitation

Winter Snowfall

	<u>Most</u>	<u>Year</u>		<u>Least</u>	<u>Year</u>
1	57.0	1996-97	1	5.7	1930-31
2	54.9	1936-37	2	5.9	1957-58
3	50.8	1981-82	3	6.1	1982-83
4	48.8	1995-96	4	6.4	1958-59
5	48.7	1988-89	5	6.5	1889-90
6	44.6	1993-94	6	6.7	1941-42
7	39.0	1978-79	7	7.5	1960-61
8	38.6	1892-93	8	7.7	1962-63
9	37.4	1971-72	9	8.2	1913-14
10	36.2	1896-97	10	8.6	1943-44

BOLD = tie with most recent year listed first, **HAIL** events not included, **T** = TRACE

Extreme Temperature Records

(Annual, Monthly, and Daily)

Warmest			Coldest		
	<u>Average</u>	<u>Year</u>		<u>Average</u>	<u>Year</u>
1	46.4	1987	1	34.2	1883
2	45.9	1931	2	35.2	1893
3	45.2	1998	3	36.4	1887
4	44.1	1999	4	36.5	1884
5	44.1	1990	5	36.7	1950
6	43.5	1991	6	36.7	1888
7	43.3	1988	7	37.4	1917
8	43.1	2001	8	37.5	1951
9	43.1	1941	9	37.7	1996
10	43.1	1921	10	37.7	1916

Warmest			Coldest		
	<u>Average</u>	<u>Month & Year</u>		<u>Average</u>	<u>Month & Year</u>
1	80.2	Jul 1936	1	-10.3	Jan 1887
2	75.9	Jul 1989	2	-10.0	Jan 1883
3	75.9	Jul 1916	3	-9.8	Feb 1936
4	75.8	Jul 1988	4	-8.7	Jan 1888
5	75.6	Jul 1935	5	-7.1	Jan 1950
6	75.4	Jul 1957	6	-7.0	Jan 1982
7	74.5	Jul 1955	7	-7.0	Jan 1886
8	74.3	Jul 1975	8	-6.4	Jan 1966
9	74.2	Aug 1937	9	-6.3	Jan 1912
10	74.0	Jul 1987	10	-6.2	Jan 1936

Warmest			Coldest		
	<u>Daily</u>	<u>Date</u>		<u>Daily</u>	<u>Date</u>
1	114	Jul 06, 1936	1	-48	Jan 08, 1887
2	110	Jul 10, 1936	2	-47	Feb 09, 1888
3	110	Jul 28, 1917	3	-44	Jan 11, 1888
4	106	Jul 05, 1988	4	-43	Jan 06, 1887
5	106	Aug 18, 1976	5	-43	Jan 04, 1884
6	106	Jul 12, 1936	6	-42	Jan 18, 1887
7	106	Jul 11, 1936	7	-42	Jan 20, 1883
8	106	Jul 22, 1934	8	-41	Jan 21, 1888
9	105	Jul 27, 1988	9	-39	Feb 01, 1996
10	105	Aug 19, 1976	10	-39	Feb 01, 1893

BOLD = tie with most recent year listed first

Extreme Precipitation Records

(Annual, Monthly, and Daily)

Greatest			Least		
	<u>Yearly</u>	<u>Year</u>		<u>Yearly</u>	<u>Year</u>
1	34.75	2000	1	8.84	1976
2	34.01	1882	2	8.87	1936
3	32.28	1977	3	9.94	1917
4	31.85	1998	4	10.50	1910
5	31.48	1905	5	11.23	1939
6	30.38	1944	6	13.04	1967
7	30.16	1901	7	13.18	1954
8	29.48	1881	8	13.89	1929
9	29.12	1902	9	13.97	1934
10	28.50	1884	10	14.53	1988

Greatest			Least		
	<u>Monthly</u>	<u>Month & Year</u>		<u>Monthly</u>	<u>Month & Year</u>
1	11.71	Jun 2000	1	T	Nov 1999
2	9.58	Aug 1900	2	T	Nov 1901
3	9.40	Jun 1975	3	0.01	Apr 1988
4	9.13	Jun 1915	4	0.02	Nov 1990
5	8.92	Jun 1914	5	0.02	Apr 1980
6	8.52	Aug 1944	6	0.02	Apr 1949
7	8.42	Jul 1952	7	0.02	Dec 1913
8	8.02	Jul 1897	8	0.02	Jan 1885
9	7.94	Jul 1901	9	0.03	Mar 1958
10	7.92	Jun 1885	10	0.03	Feb 1954

Greatest		
	<u>Daily</u>	<u>Date</u>
1	4.72	Aug 08, 1943
2	4.64	Jun 19, 2000
3	4.50	Jul 03, 1886
4	4.42	Jul 15, 1993
5	4.02	May 04, 1977
6	3.93	Jul 01, 1952
7	3.80	Sep 13, 1889
8	3.78	Jul 20, 1897
9	3.60	Jun 28, 1897
10	3.48	Jun 08, 1914

BOLD = tie with most recent year listed first

Extreme Snowfall Records

(Seasonal, Monthly, and Daily)

Greatest			Least		
	<u>Seasonal</u>	<u>Season</u>		<u>Seasonal</u>	<u>Season</u>
1	117.0	1996-97	1	9.3	1957-58
2	89.1	1993-94	2	13.1	1980-81
3	82.3	1936-37	3	14.1	1894-95
4	79.0	1896-97	4	14.2	1958-59
5	74.6	1995-96	5	14.8	1956-57
6	73.6	1988-89	6	15.2	1904-05
7	71.1	1892-93	7	15.6	1923-24
8	69.5	1981-82	8	17.3	1941-42
9	66.6	1906-07	9	17.5	1889-90
10	62.4	1951-52	10	18.5	1930-31

Greatest		<u>Month & Year</u>
	<u>Monthly</u>	
1	31.5	Jan 1989
2	30.4	Nov 1896
3	30.0	Jan 1982
4	29.2	Dec 1927
5	28.6	Jan 1997
6	27.3	Jan 1937
7	27.2	Jan 1996
8	26.4	Nov 1996
9	26.2	Mar 1997
10	24.3	Jan 1988

Greatest		<u>Date</u>
	<u>Daily</u>	
1	16.3	Jan 22, 1982
2	14.3	Dec 14, 1927
3	14.0	Jan 17, 1996
4	14.0	Nov 14, 1909
5	13.6	Jan 06, 1989
6	13.2	Apr 08, 1904
7	12.4	Nov 10, 1919
8	12.0	Mar 03, 1997
9	12.0	Nov 20, 1977
10	11.4	Dec 15, 1893

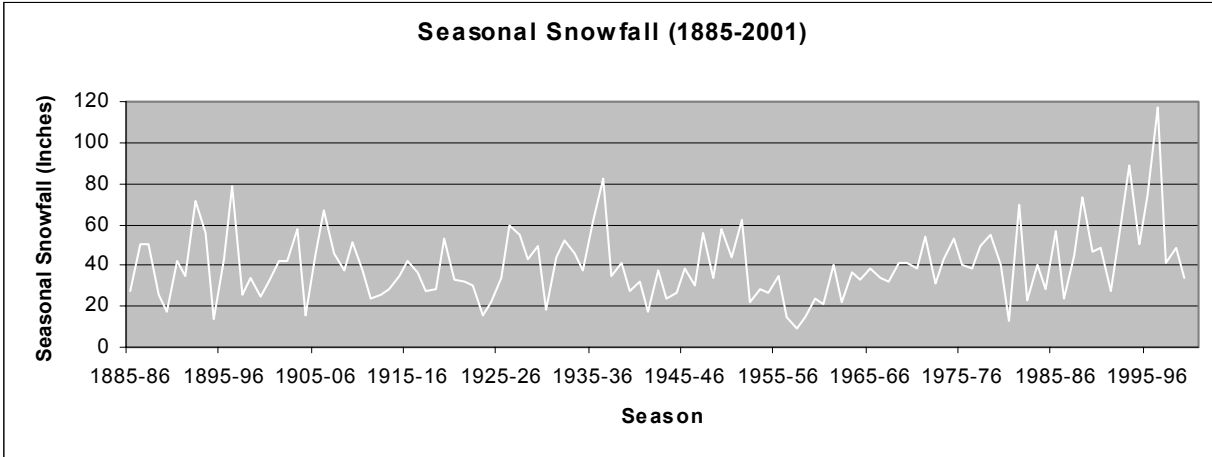
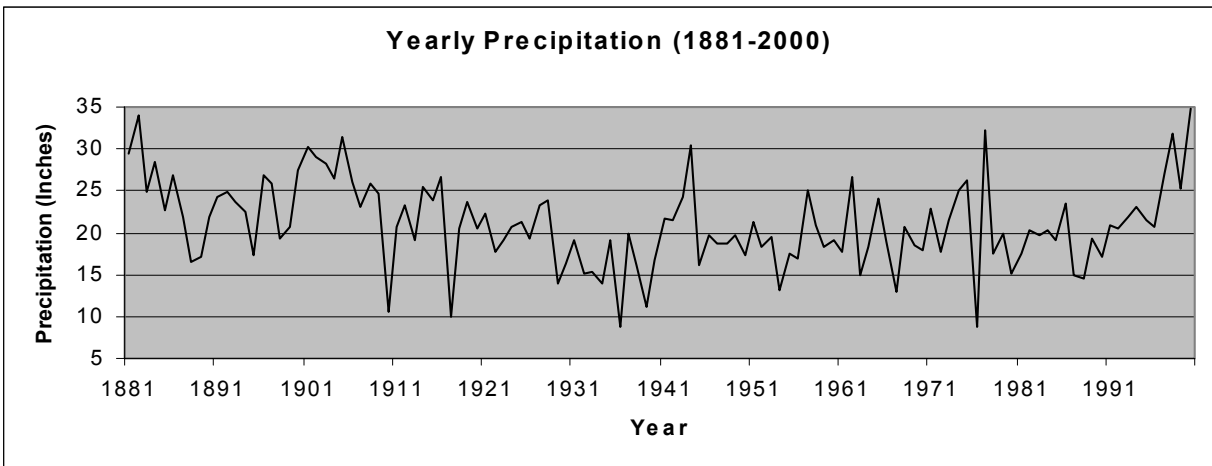
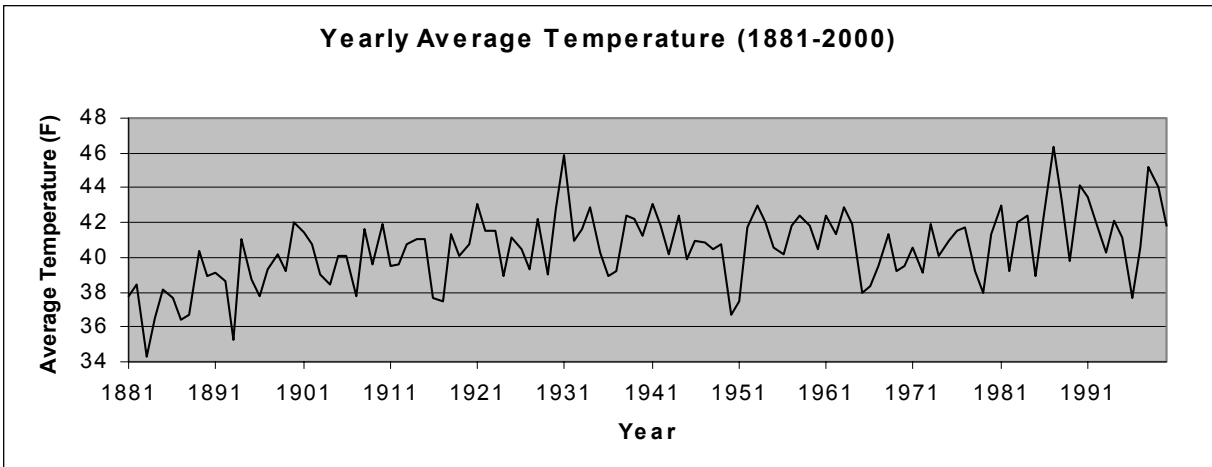
BOLD = tie with most recent year listed first

Yearly Average Temperature (1881-2001)

1881	37.7	1921	43.1	1961	42.4
1882	38.4	1922	41.5	1962	41.4
1883	34.2*	1923	41.5	1963	42.9
1884	36.5	1924	39.0	1964	41.9
1885	38.2	1925	41.2	1965	38.0
1886	37.7	1926	40.4	1966	38.4
1887	36.4	1927	39.4	1967	39.5
1888	36.7	1928	42.2	1968	41.4
1889	40.3	1929	39.1	1969	39.2
1890	39.0	1930	42.8	1970	39.5
1891	39.2	1931	45.9	1971	40.6
1892	38.7	1932	41.0	1972	39.1
1893	35.2	1933	41.7	1973	41.9
1894	41.1	1934	42.9	1974	40.1
1895	38.7	1935	40.3	1975	41.0
1896	37.8	1936	38.9	1976	41.5
1897	39.3	1937	39.2	1977	41.7
1898	40.2	1938	42.4	1978	39.2
1899	39.2	1939	42.2	1979	38.0
1900	42.0	1940	41.3	1980	41.4
1901	41.5	1941	43.1	1981	43.0
1902	40.7	1942	41.8	1982	39.2
1903	39.0	1943	40.2	1983	42.1
1904	38.4	1944	42.4	1984	42.4
1905	40.1	1945	39.9	1985	38.9
1906	40.1	1946	40.9	1986	42.3
1907	37.8	1947	40.8	1987	46.4*
1908	41.7	1948	40.4	1988	43.3
1909	39.6	1949	40.8	1989	39.8
1910	42.0	1950	36.7	1990	44.1
1911	39.5	1951	37.5	1991	43.5
1912	39.6	1952	41.8	1992	42.0
1913	40.7	1953	43.0	1993	40.3
1914	41.1	1954	42.0	1994	42.2
1915	41.1	1955	40.6	1995	41.2
1916	37.7	1956	40.1	1996	37.7
1917	37.4	1957	41.8	1997	40.6
1918	41.4	1958	42.4	1998	45.2
1919	40.1	1959	41.8	1999	44.1
1920	40.8	1960	40.4	2000	41.8

STAR = all-time record high and low

(2001 = 43.1)



Yearly Precipitation (1881-2001)

1881	29.48	1921	22.28	1961	17.78
1882	34.01	1922	17.80	1962	26.65
1883	24.96	1923	19.06	1963	14.94
1884	28.50	1924	20.76	1964	18.26
1885	22.68	1925	21.32	1965	24.01
1886	26.76	1926	19.22	1966	18.97
1887	21.97	1927	23.36	1967	13.04
1888	16.50	1928	23.95	1968	20.60
1889	17.07	1929	13.89	1969	18.52
1890	21.79	1930	16.25	1970	17.90
1891	24.31	1931	19.18	1971	22.86
1892	24.94	1932	15.05	1972	17.78
1893	23.58	1933	15.25	1973	21.52
1894	22.43	1934	13.97	1974	24.99
1895	17.38	1935	19.07	1975	26.30
1896	26.80	1936	8.87	1976	8.84*
1897	25.80	1937	19.89	1977	32.28
1898	19.33	1938	16.21	1978	17.44
1899	20.64	1939	11.23	1979	19.97
1900	27.50	1940	16.64	1980	15.11
1901	30.16	1941	21.68	1981	17.59
1902	29.12	1942	21.51	1982	20.20
1903	28.29	1943	24.22	1983	19.67
1904	26.36	1944	30.38	1984	20.37
1905	31.48	1945	16.16	1985	19.17
1906	26.00	1946	19.72	1986	23.51
1907	23.02	1947	18.63	1987	15.00
1908	25.93	1948	18.70	1988	14.53
1909	24.67	1949	19.76	1989	19.21
1910	10.50	1950	17.37	1990	17.13
1911	20.61	1951	21.25	1991	20.87
1912	23.20	1952	18.26	1992	20.41
1913	19.04	1953	19.57	1993	21.90
1914	25.49	1954	13.18	1994	23.10
1915	23.94	1955	17.44	1995	21.53
1916	26.58	1956	16.95	1996	20.77
1917	9.94	1957	25.03	1997	27.04
1918	20.42	1958	20.94	1998	31.85
1919	23.75	1959	18.23	1999	25.32
1920	20.41	1960	19.04	2000	34.75*

STAR = all-time record high and low

(2001 = 20.31)

Seasonal Snowfall (1885-2001)

1885-86	27.3	1925-26	33.5	1965-66	38.7
1886-87	50.1	1926-27	59.1	1966-67	33.5
1887-88	50.7	1927-28	54.8	1967-68	32.1
1888-89	25.8	1928-29	42.7	1968-69	41.4
1889-90	17.5	1929-30	49.7	1969-70	41.2
1890-91	41.7	1930-31	18.5	1970-71	38.3
1891-92	34.6	1931-32	43.6	1971-72	53.7
1892-93	71.1	1932-33	52.6	1972-73	30.9
1893-94	55.5	1933-34	46.1	1973-74	42.6
1894-95	14.1	1934-35	37.1	1974-75	53.1
1895-96	43.0	1935-36	61.5	1975-76	40.4
1896-97	79.0	1936-37	82.3	1976-77	38.3
1897-98	25.4	1937-38	35.0	1977-78	49.8
1898-99	33.8	1938-39	40.8	1978-79	55.3
1899-00	24.9	1939-40	27.9	1979-80	39.9
1900-01	32.3	1940-41	32.3	1980-81	13.1
1901-02	42.4	1941-42	17.3	1981-82	69.5
1902-03	41.7	1942-43	37.1	1982-83	23.2
1903-04	57.6	1943-44	23.8	1983-84	39.9
1904-05	15.2	1944-45	26.5	1984-85	28.2
1905-06	45.9	1945-46	38.3	1985-86	57.0
1906-07	66.6	1946-47	30.3	1986-87	23.5
1907-08	46.1	1947-48	55.9	1987-88	44.5
1908-09	37.7	1948-49	34.3	1988-89	73.6
1909-10	51.2	1949-50	57.3	1989-90	46.3
1910-11	37.9	1950-51	44.4	1990-91	48.3
1911-12	23.9	1951-52	62.4	1991-92	27.5
1912-13	26.0	1952-53	22.3	1992-93	53.8
1913-14	28.0	1953-54	28.7	1993-94	89.1
1914-15	34.7	1954-55	26.9	1994-95	50.3
1915-16	42.5	1955-56	34.5	1995-96	74.6
1916-17	36.4	1956-57	14.8	1996-97	117.0*
1917-18	27.8	1957-58	9.3*	1997-98	41.1
1918-19	28.8	1958-59	14.2	1998-99	48.6
1919-20	53.0	1959-60	23.7	1999-00	34.0
1920-21	33.4	1960-61	21.3	2000-01	52.5
1921-22	32.5	1961-62	40.7		
1922-23	30.5	1962-63	22.4		
1923-24	15.6	1963-64	36.9		
1924-25	21.7	1964-65	33.1		

STAR = all-time record high and low

Top 3 Record Heat Events

Consecutive Days with a High Temperature of 90 Degrees or Greater:

- | | | |
|---|---------------|---|
| 1 | 15 Days | July 4-18, 1936
* All-time record high of 114 degrees on July 6
* All-time record high low of 82 degrees on July 10
* 10 record high temperatures
* Over 100 degrees nine times
* Precipitation on 4 days totaling 0.02 inches |
| 2 | 9 Days | August 18-26, 1976
* 4 record high temperatures
* Over 100 degrees four times
* Precipitation on 2 days totaling 0.03 inches |
| 3 | 8 Days | June 14-21, 1995
* 1 record high temperature
* Over 100 degrees once
* Precipitation on 2 days totaling 0.04 inches |
| | 8 Days | July 31-August 7, 1930
* Precipitation on 3 days totaling a trace |
| | 8 Days | June 25-July 2, 1921
* Over 100 degrees once
* Precipitation on 2 days totaling 0.18 inches |

Consecutive Days with a High Temperature of 100 Degrees or Greater:

- | | | |
|---|--------|--------------------|
| 1 | 8 Days | July 6-13, 1936 |
| 2 | 4 Days | June 16-19, 1933 |
| 3 | 3 Days | August 18-20, 1976 |

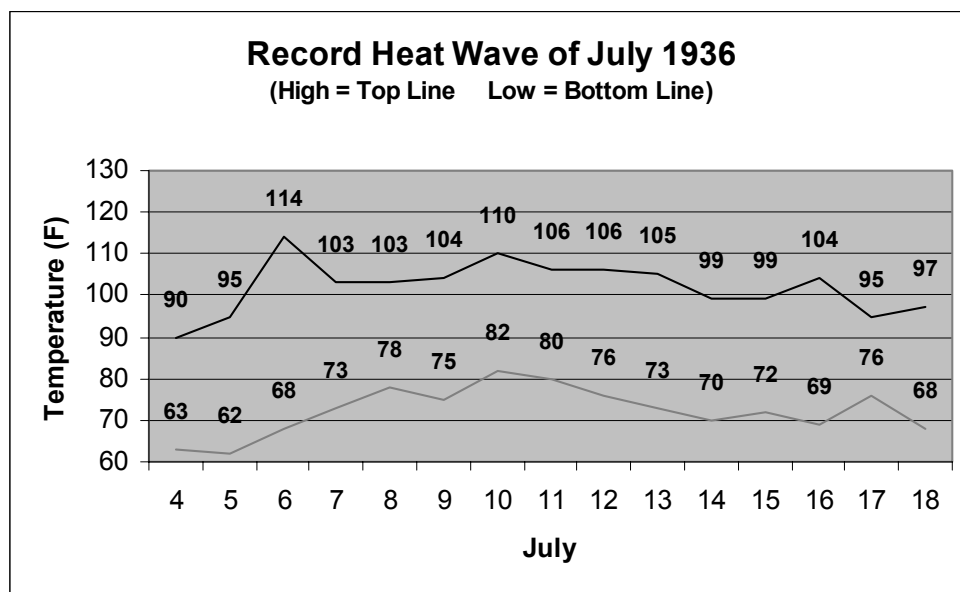
BOLD = tie with most recent year listed first

Total Number of Days with a High Temperature of 90 Degrees or Greater:

1	39 Days	1988
2	38 Days	1936
3	30 Days	1910

Total Number of Days with a High Temperature of 100 Degrees or Greater:

1	10 Days	1936
2	8 Days	1931
3	5 Days	1976
	5 Days	1933



BOLD =

tie with most recent year listed first

July 1936

	<u>MaxT</u>	<u>MinT</u>	<u>AvgT</u>	<u>Pcpn</u>
1	76	57	67	
2	81	53	67	T
3	83	54	69	
4	90	63	77	
5	95	62	79	
6	114	68	91	
7	103	73	88	
8	103	78	91	
9	104	75	90	
10	110	82	96	
11	106	80	93	
12	106	76	91	T
13	105	73	89	0.02
14	99	70	85	
15	99	72	86	
16	104	69	87	T
17	95	76	86	T
18	97	68	83	
19	84	67	76	0.19
20	85	63	74	
21	93	61	77	
22	92	72	82	0.01
23	84	59	72	T
24	93	66	80	
25	93	66	80	
26	84	66	75	0.20
27	90	68	79	
28	78	58	68	
29	81	49	65	
30	91	52	72	
31	96	63	80	
Total	2914	2059	2487	0.42
MAvg	94.0	66.4	80.2	

T = TRACE

Top 3 Record Cold Events

Consecutive Days with a High Temperature of Zero Degrees or Less:

- | | | |
|---|----------------|--|
| 1 | 37 Days | January 15-February 20, 1936
* All-time record low high of -29 degrees on January 22
* 4 record low temperatures
* High temperature below -20 degrees two times |
| 2 | 11 Days | January 24-February 3, 1996
* 1 record low temperature
* High temperature below -20 degrees two times |
| 3 | 11 Days | February 1-11, 1899
* 2 record low temperatures
* High temperature below -20 degrees one time |

Consecutive Days with a High Temperature of 32 Degrees or Less:

- | | | |
|---|---------|-------------------------------------|
| 1 | 86 Days | November 26, 1964-February 19, 1965 |
| 2 | 80 Days | December 19, 1977-March 8, 1978 |
| 3 | 79 Days | December 5, 1968-February 21, 1969 |

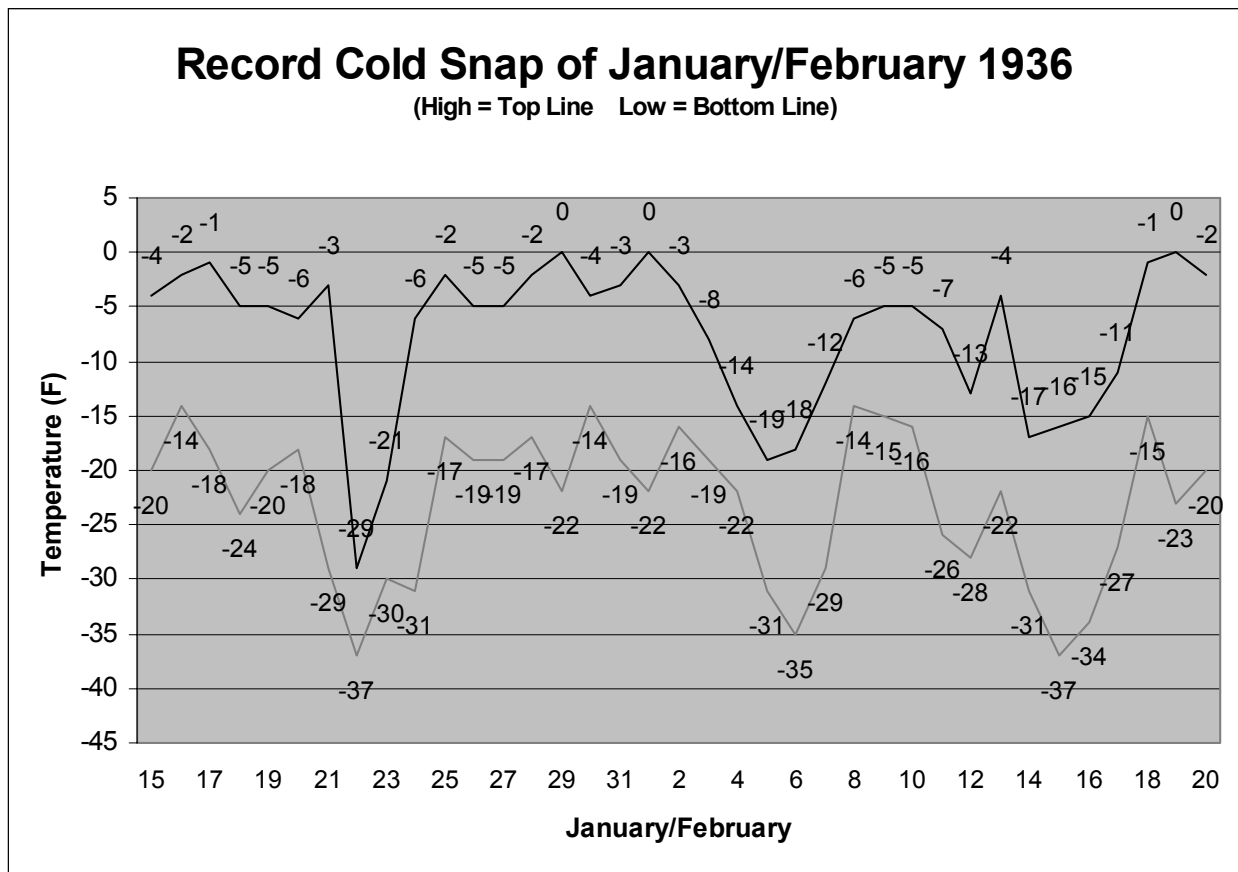
Total Number of Days in a Year with a High Temperature of Zero Degrees or Less:

- | | | |
|---|---------|------|
| 1 | 39 Days | 1936 |
| 2 | 33 Days | 1884 |
| 3 | 32 Days | 1883 |

BOLD = tie with most recent year listed first

**Total Number of Days in a Year with a High Temperature
of 32 Degrees or Less:**

1	128 Days	1893
2	127 Days	1950
3	125 Days	1996



Record Cold Snap of January/February 1936

	<u>MaxT</u>	<u>MinT</u>	<u>AvgT</u>	<u>Pcpn</u>	<u>Snow</u>	<u>Depth</u>
15	-4	-20	-12	0.03		9
16	-2	-14	-8	0.01	1.0	9
17	-1	-18	-10			9
18	-5	-24	-15	0.01	T	9
19	-5	-20	-13	0.01	0.3	9
20	-6	-18	-12	T	T	9
21	-3	-29	-16	T	0.1	8
22	-29	-37	-33		T	8
23	-21	-30	-26	T	T	8
24	-6	-31	-19	0.01	T	8
25	-2	-17	-10	T	0.2	8
26	-5	-19	-12		T	8
27	-5	-19	-12			8
28	-2	-17	-10	0.02	0.4	8
29	0	-22	-11	T	T	8
30	-4	-14	-9		T	8
31	-3	-19	-11	T	T	8
1	0	-22	-11		T	8
2	-3	-16	-10			7
3	-8	-19	-14			7
4	-14	-22	-18	0.01	0.2	7
5	-19	-31	-25			7
6	-18	-35	-27			7
7	-12	-29	-21	0.09	0.5	7
8	-6	-14	-10	0.17	3.0	10
9	-5	-15	-10	0.06	1.8	12
10	-5	-16	-11	0.01	T	12
11	-7	-26	-17	0.01	T	12
12	-13	-28	-21	T	0.2	12
13	-4	-22	-13	0.09	1.6	13
14	-17	-31	-24		0.1	13
15	-16	-37	-27			13
16	-15	-34	-25			13
17	-11	-27	-19	T	T	12
18	-1	-15	-8	T	T	12
19	0	-23	-12			12
20	-2	-20	-11			12

In 1936, precipitation was measured from midnight to midnight while
snowfall was measured from 7 pm to 7 pm. T = TRACE

Top 3 Record Wet and Dry Periods

Consecutive Number of Days During a Year with No Precipitation:

- | | | |
|---|----------------|-------------------------------|
| 1 | 30 Days | September 12-October 11, 1892 |
| 2 | 29 Days | October 17-November 14, 1903 |
| 3 | 29 Days | January 1-January 29, 1885 |

No Precipitation means a 0.00 inch daily precipitation amount

Consecutive Number of Days During a Year with a Trace or More of Precipitation:

- | | | |
|---|----------------|--|
| 1 | 22 Days | February 22-March 15, 1947
Total of 0.13 Inches |
| 2 | 22 Days | December 1-December 22, 1942
Total of 0.45 Inches |
| 3 | 19 Days | January 16-February 3, 1979
Total of 0.45 Inches |
| | 19 Days | January 28-February 15, 1975
Total of 0.43 Inches |

BOLD = tie with most recent year listed first

Frost/Freeze Data

LS32D = Last Spring Day the Temperature was 32 Degrees or Less

FF32D = First Fall Day the Temperature was 32 Degrees or Less

DB32 = Number of Growing Season Days Between Frost Dates

Average Growing Season May 14 to September 24 (133 Days)

<u>YEAR</u>	<u>LS32D</u>	<u>FF32D</u>	<u>DB32</u>	<u>YEAR</u>	<u>LS32D</u>	<u>FF32D</u>	<u>DB32</u>
1881	5/03	9/15	135	1910	6/02	9/09	99
1882	5/22	9/20	121	1911	5/12	10/20	161
1883	6/03	9/08	97	1912	4/29	9/16	140
1884	5/02	10/08	159	1913	5/18	9/21	126
1885	6/08	8/25	78	1914	5/14	10/13	152
1886	5/16	8/31	107	1915	6/09	10/04	117
1887	5/17	9/15	121	1916	5/19	9/28	132
1888	6/01	9/12	103	1917	5/27	9/10	106
1889	5/30	9/15	108	1918	5/20	9/17	120
1890	5/20	9/12	115	1919	5/09	9/25	139
1891	5/25	9/03	101	1920	5/01	9/30	152
1892	5/20	10/08	141	1921	5/16	10/03	140
1893	4/29	9/16	140	1922	4/26	10/09	166
1894	5/08	9/11	126	1923	5/16	9/13	120
1895	5/22	9/23	124	1924	5/25	10/10	138
1896	4/21	9/11	143	1925	5/17	9/21	127
1897	6/07	9/17	102	1926	5/22	9/22	123
1898	5/16	9/08	115	1927	5/14	9/23	132
1899	5/14	9/25	134	1928	5/05	9/23	141
1900	5/09	9/17	131	1929	5/20	9/18	121
1901	6/07	9/18	103	1930	5/24	9/28	127
1902	5/09	9/11	125	1931	5/22	9/24	125
1903	5/06	9/13	130	1932	5/01	10/05	157
1904	4/20	9/20	153	1933	5/10	9/26	139
1905	5/25	10/10	138	1934	5/11	9/21	133
1906	5/09	10/06	150	1935	5/10	9/26	139
1907	5/27	9/25	121	1936	4/29	9/29	153
1908	5/07	9/28	144	1937	4/27	10/07	163
1909	5/10	10/11	154	1938	5/08	10/19	164

BOX denotes longest and shortest growing seasons

<u>YEAR</u>	<u>LS32D</u>	<u>FF32D</u>	<u>DB32</u>
1939	5/11	9/25	137
1940	5/02	9/25	146
1941	5/09	9/29	143
1942	5/14	9/19	128
1943	5/13	9/20	130
1944	5/08	10/09	154
1945	5/17	9/28	134
1946	5/15	9/29	137
1947	5/30	9/21	114
1948	5/28	10/01	126
1949	5/24	9/14	113
1950	5/02	10/02	153
1951	5/10	9/23	136
1952	5/12	10/02	143
1953	5/16	9/21	128
1954	5/19	9/22	126
1955	5/10	9/11	124
1956	5/07	9/06	122
1957	5/09	9/23	137
1958	5/06	10/01	148
1959	5/22	9/10	111
1960	5/11	9/30	142
1961	5/29	9/27	121
1962	5/06	9/20	137
1963	5/22	10/11	142
1964	5/31	9/11	103
1965	5/28	9/24	119

<u>YEAR</u>	<u>LS32D</u>	<u>FF32D</u>	<u>DB32</u>
1976	5/17	9/21	127
1977	5/07	10/02	148
1978	4/25	10/07	165
1979	5/15	10/04	142
1980	5/15	9/23	131
1981	5/10	9/28	141
1982	5/08	9/20	135
1983	5/25	9/22	120
1984	5/09	9/25	139
1985	4/26	9/24	151
1986	5/02	9/13	134
1987	4/22	10/02	163
1988	5/13	10/03	143
1989	5/06	9/22	139
1990	5/18	9/23	128
1991	5/05	9/26	144
1992	5/24	9/22	121
1993	5/15	9/23	131
1994	5/07	10/24	170
1995	5/17	9/20	126
1996	5/11	10/02	144
1997	5/13	10/13	153
1998	4/22	10/01	162
1999	4/23	9/29	159
2000	5/14	9/24	133
2001	4/24	9/24	153

1966	5/10	9/25	138
1967	5/21	9/27	129
1968	5/05	10/03	151
1969	6/20	10/08	110
1970	5/26	9/13	110
1971	5/20	9/18	121
1972	5/07	9/27	143
1973	5/17	9/16	122
1974	5/15	9/21	129
1975	5/03	10/01	151

BOX denotes longest and shortest growing seasons

Record Sea Level Pressure

	<u>Highest</u>	<u>Date</u>	<u>Year</u>	<u>Lowest</u>	<u>Date</u>	<u>Year</u>
JAN	31.15	25	1905	29.02	14	1947
FEB	31.22	17	1989	28.89	16	1917
MAR	31.02	1	1980	28.54	15	1920
APR	30.80	8	1918	28.86	16	1963
MAY	30.64	9	1913	28.73	5	1950
JUN	30.55	5	1958	28.79	7	1954
JUL	30.46	4	1972	29.23	8	1926
AUG	30.52	23	1987	29.22	3	1980
SEP	30.69	10	1917	29.14	19	1895
OCT	30.83	18	1989	28.69	10	1949
NOV	30.97	20	1978	28.86	16	1930
DEC	31.18	28	1917	28.80	17	1967

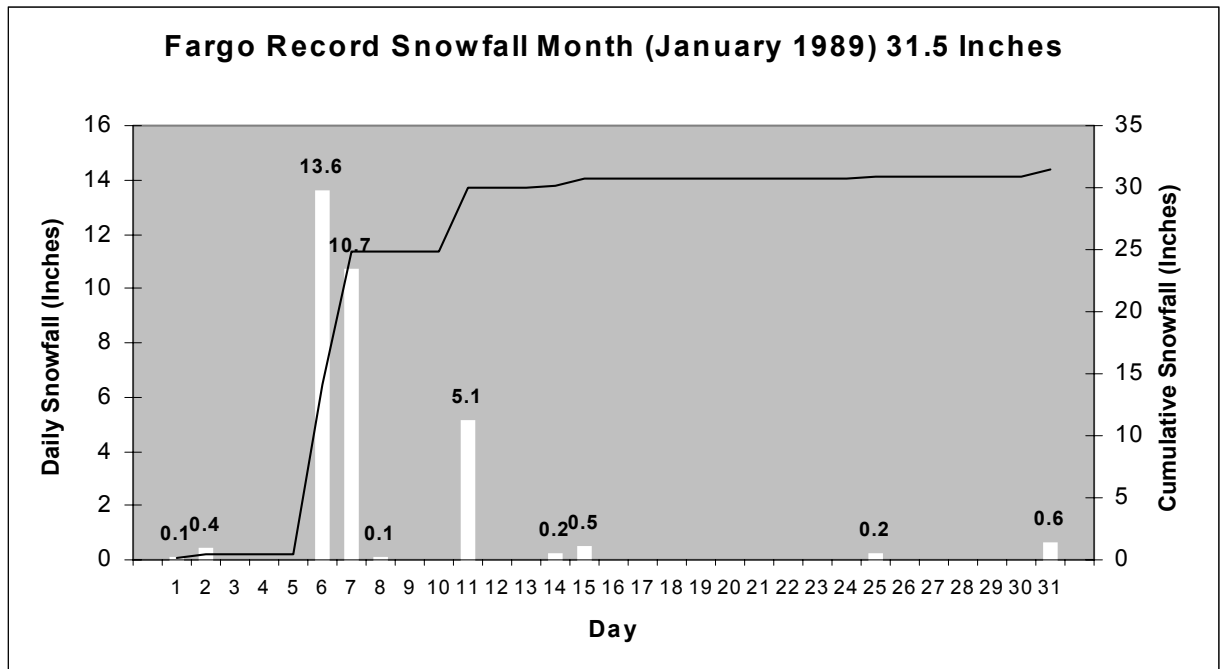
BOX denotes all-time highest and lowest pressure. Sea Level Pressures are in Inches of Mercury.

Record Monthly Snowfall

(January 1989)

Date	Daily Snowfall	Running Total	Date	Daily Snowfall	Running Total	Date	Daily Snowfall	Running Total
1	0.1	0.1	11	5.1	30.0	21		30.7
2	0.4	0.5	12		30.0	22		30.7
3		0.5	13		30.0	23		30.7
4		0.5	14	0.2	30.2	24		30.7
5		0.5	15	0.5	30.7	25	0.2	30.9
6	13.6	14.1	16		30.7	26		30.9
7	10.7	24.8	17		30.7	27		30.9
8	0.1	24.9	18		30.7	28		30.9
9		24.9	19		30.7	29		30.9
10		24.9	20		30.7	30		30.9
						31	0.6	31.5

Only **measurable** amounts shown



Record Seasonal Snowfall (1996-1997)

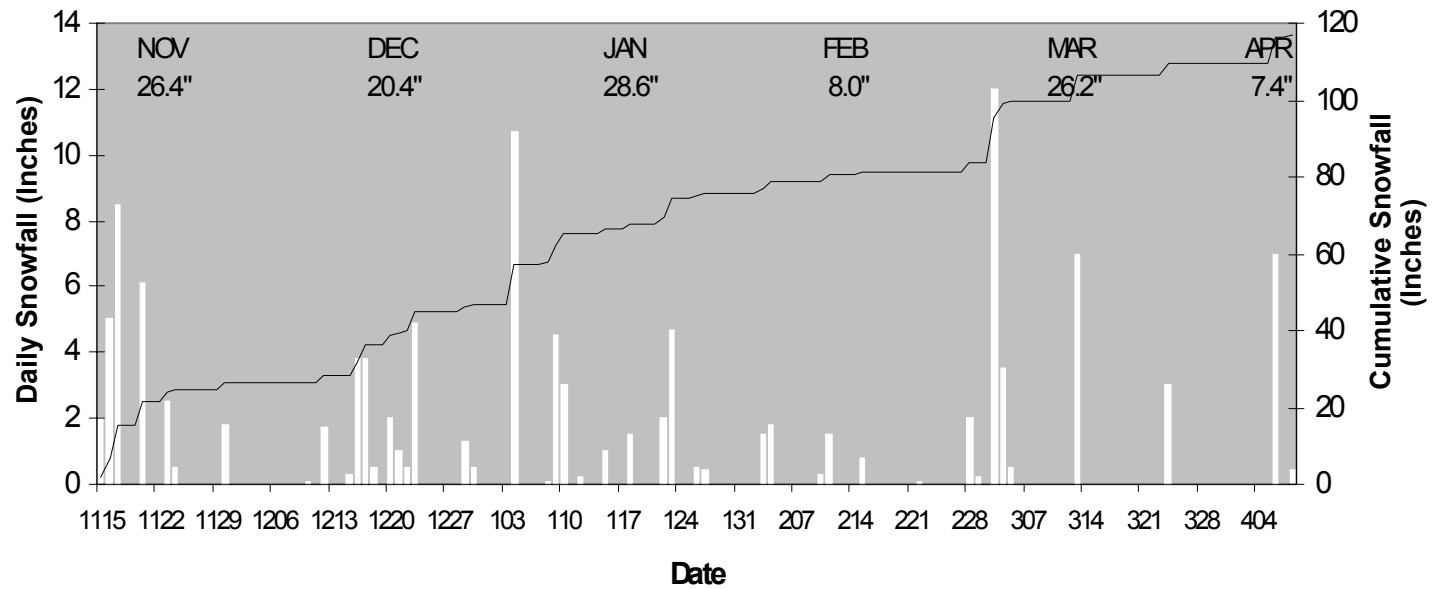
Date	Daily Snowfall	Running Total	Date	Daily Snowfall	Running Total	Date	Daily Snowfall	Running Total
11/15	2.0	2.0	1/02		46.8	2/19		81.3
11/16	5.0	7.0	1/03		46.8	2/20		81.3
11/17	8.5	15.5	1/04	10.7	57.5	2/21		81.3
11/18		15.5	1/05		57.5	2/22	0.1	81.4
11/19		15.5	1/06		57.5	2/23		81.4
11/20	6.1	21.6	1/07		57.5	2/24		81.4
11/21		21.6	1/08	0.1	57.6	2/25		81.4
11/22		21.6	1/09	4.5	62.1	2/26		81.4
11/23	2.5	24.1	1/10	3.0	65.1	2/27		81.4
11/24	0.5	24.6	1/11		65.1	2/28	2.0	83.4
11/25		24.6	1/12	0.2	65.3	3/01	0.2	83.6
11/26		24.6	1/13		65.3	3/02		83.6
11/27		24.6	1/14		65.3	3/03	12.0	95.6
11/28		24.6	1/15	1.0	66.3	3/04	3.5	99.1
11/29		24.6	1/16		66.3	3/05	0.5	99.6
11/30	1.8	26.4	1/17		66.3	3/06		99.6
12/01		26.4	1/18	1.5	67.8	3/07		99.6
12/02		26.4	1/19		67.8	3/08		99.6
12/03		26.4	1/20		67.8	3/09		99.6
12/04		26.4	1/21		67.8	3/10		99.6
12/05		26.4	1/22	2.0	69.8	3/11		99.6
12/06		26.4	1/23	4.7	74.5	3/12		99.6
12/07		26.4	1/24		74.5	3/13	7.0	106.6
12/08		26.4	1/25		74.5	3/14		106.6
12/09		26.4	1/26	0.5	75.0	3/15		106.6
12/10	0.1	26.5	1/27	0.4	75.4	3/16		106.6
12/11		26.5	1/28		75.4	3/17		106.6
12/12	1.7	28.2	1/29		75.4	3/18		106.6
12/13		28.2	1/30		75.4	3/19		106.6
12/14		28.2	1/31		75.4	3/20		106.6
12/15	0.3	28.5	2/01		75.4	3/21		106.6
12/16	3.8	32.3	2/02		75.4	3/22		106.6
12/17	3.8	36.1	2/03	1.5	76.9	3/23		106.6
12/18	0.5	36.6	2/04	1.8	78.7	3/24	3.0	109.6
12/19		36.6	2/05		78.7	3/25		109.6

12/20	2.0	38.6	2/06		78.7	3/26		109.6
12/21	1.0	39.6	2/07		78.7	3/27		109.6
12/22	0.5	40.1	2/08		78.7	3/28		109.6
12/23	4.9	45.0	2/09		78.7	3/29		109.6
12/24		45.0	2/10	0.3	79.0	3/30		109.6
12/25		45.0	2/11	1.5	80.5	3/31		109.6
12/26		45.0	2/12		80.5	4/01		109.6
12/27		45.0	2/13		80.5	4/02		109.6
12/28		45.0	2/14		80.5	4/03		109.6
12/29	1.3	46.3	2/15	0.8	81.3	4/04		109.6
12/30	0.5	46.8	2/16		81.3	4/05		109.6
12/31		46.8	2/17		81.3	4/06	7.0	116.6
1/01		46.8	2/18		81.3	4/07		116.6
						4/08	0.4	117.0

Only **measurable** amounts shown

Fargo Record Snowfall (Winter 1996-97) 117 Inches

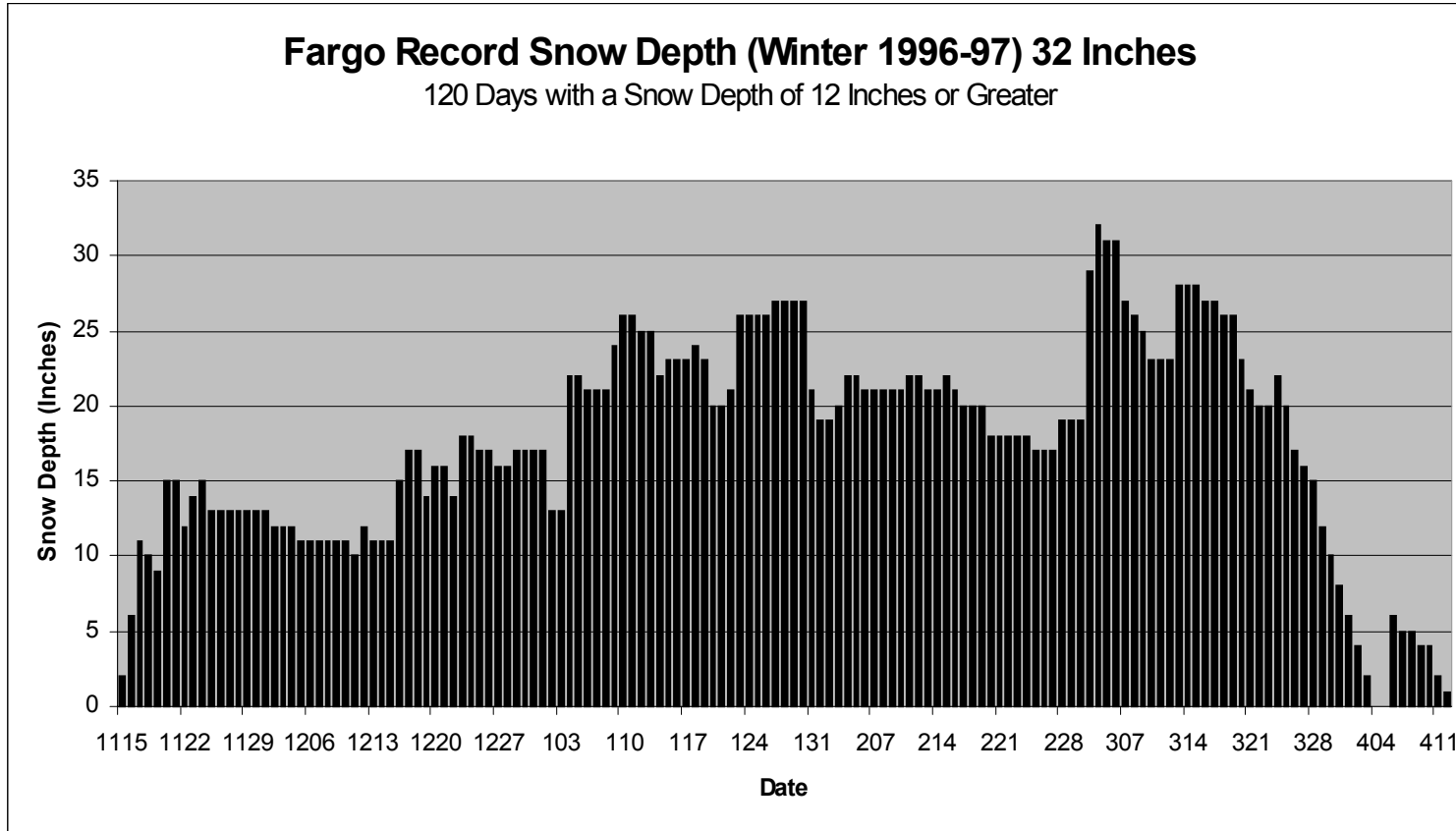
First Measurable Snowfall 11/15/96 & Last Measurable Snowfall 4/8/97



Record Snow Depth (Winter 1996-97)

<u>Date</u>	<u>Depth</u>	<u>Date</u>	<u>Depth</u>	<u>Date</u>	<u>Depth</u>	<u>Date</u>	<u>Depth</u>
11/15	2	12/23	18	1/30	27	3/09	25
11/16	6	12/24	18	1/31	21	3/10	23
11/17	11	12/25	17	2/01	19	3/11	23
11/18	10	12/26	17	2/02	19	3/12	23
11/19	9	12/27	16	2/03	20	3/13	28
11/20	15	12/28	16	2/04	22	3/14	28
11/21	15	12/29	17	2/05	22	3/15	28
11/22	12	12/30	17	2/06	21	3/16	27
11/23	14	12/31	17	2/07	21	3/17	27
11/24	15	1/01	17	2/08	21	3/18	26
11/25	13	1/02	13	2/09	21	3/19	26
11/26	13	1/03	13	2/10	21	3/20	23
11/27	13	1/04	22	2/11	22	3/21	21
11/28	13	1/05	22	2/12	22	3/22	20
11/29	13	1/06	21	2/13	21	3/23	20
11/30	13	1/07	21	2/14	21	3/24	22
12/01	13	1/08	21	2/15	22	3/25	20
12/02	12	1/09	24	2/16	21	3/26	17
12/03	12	1/10	26	2/17	20	3/27	16
12/04	12	1/11	26	2/18	20	3/28	15
12/05	11	1/12	25	2/19	20	3/29	12
12/06	11	1/13	25	2/20	18	3/30	10
12/07	11	1/14	22	2/21	18	3/31	8
12/08	11	1/15	23	2/22	18	4/01	6
12/09	11	1/16	23	2/23	18	4/02	4
12/10	11	1/17	23	2/24	18	4/03	2
12/11	10	1/18	24	2/25	17	4/04	0
12/12	12	1/19	23	2/26	17	4/05	0
12/13	11	1/20	20	2/27	17	4/06	6
12/14	11	1/21	20	2/28	19	4/07	5
12/15	11	1/22	21	3/01	19	4/08	5
12/16	15	1/23	26	3/02	19	4/09	4
12/17	17	1/24	26	3/03	29	4/10	4
12/18	17	1/25	26	3/04	32	4/11	2
12/19	14	1/26	26	3/05	31	4/12	1
12/20	16	1/27	27	3/06	31		
12/21	16	1/28	27	3/07	27		
12/22	14	1/29	27	3/08	26		

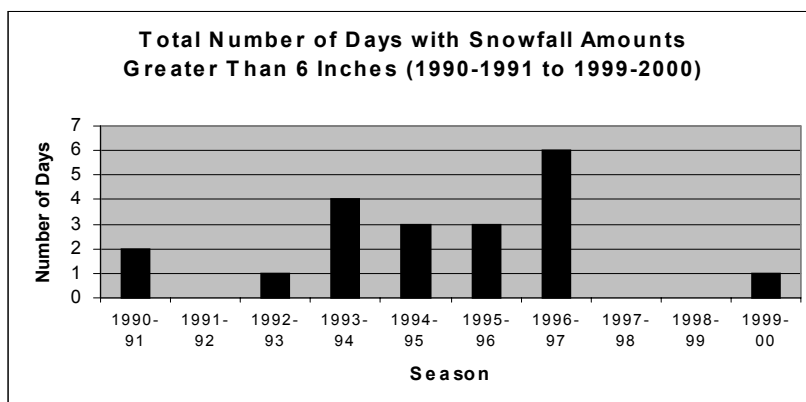
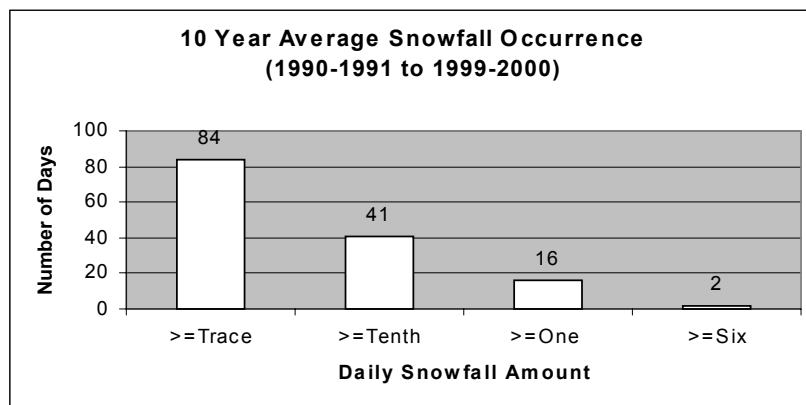
BOX denotes highest snow depth



10 Year Average Snowfall (1990-1991 to 1999-2000)

Number of Days with Snowfall Amount Shown

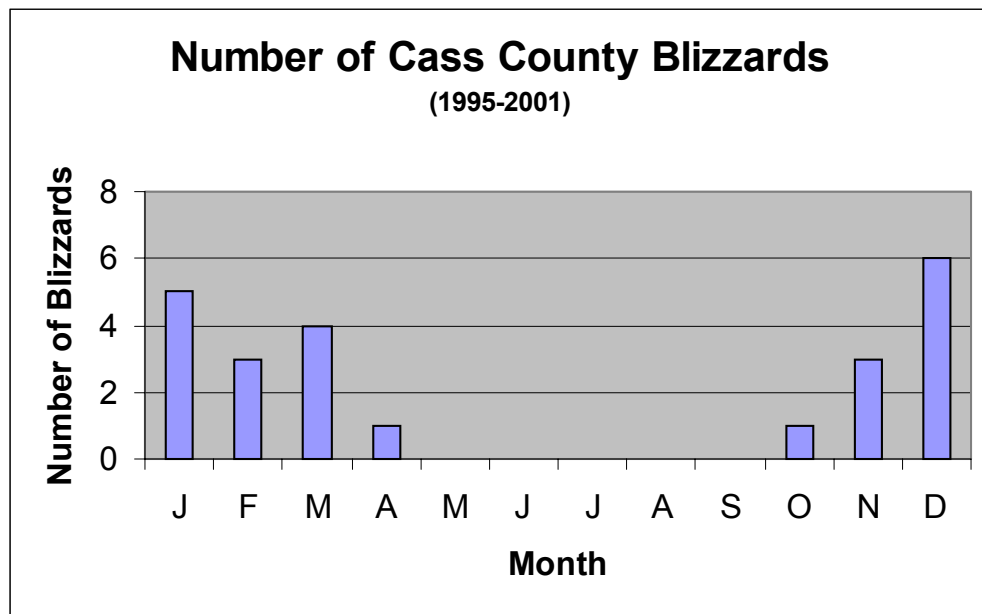
	<u>>=Trace</u>	<u>>=Tenth</u>	<u>>=One</u>	<u>>=Six</u>
1990-91	77	37	13	2
1991-92	91	35	9	0
1992-93	106	44	14	1
1993-94	102	56	25	4
1994-95	79	35	11	3
1995-96	96	35	18	3
1996-97	85	45	29	6
1997-98	87	44	15	0
1998-99	65	44	16	0
1999-00	52	30	11	1
10 Year Average	84	41	16	2



Cass County Blizzards (1995-2001)

Month	1995	1996	1997	1998	1999	2000	2001	Total
J		1	4					5
F		2					1	3
M		1	1	1		1		4
A			1					1
M								0
J								0
J								0
A								0
S								0
O							1	1
N		1		1		1		3
D	1	2				2	1	6

Compiled from NWS Storm Data



Blizzard Comparison

March 1966 vs. January 1996

Blizzards are one of the most dangerous winter weather occurrences in the northern plains.

The NWS issues a blizzard warning when the following two conditions are expected to occur for 3 hours or more:

1. Wind speeds of 35 mph or greater (sustained or frequent gusts),
2. Considerable falling or blowing snow (visibilities frequently less than 1/4 mile).

As this definition says, only thresholds of wind speed and visibility must be met for a blizzard warning to be issued. Snow does not have to fall to create a blizzard. "Ground blizzards" are the term for blizzards that occur without falling snow, as they just blow around the snow already on the ground.

The blizzard that occurred during March of 1966 is remembered as the longest duration blizzard, lasting portions of 4 days. In 1996, a January blizzard brought another relatively long duration event to the Fargo area.

In order to get a sense of the individual elements that make up a blizzard, graphs of wind speed, pressure, visibility, and temperature are compared for these two events on the following pages. Strong pressure gradients are required to generate strong wind speeds. These strong pressure gradients are usually found between

areas of low and high pressure. The graphs show that some of the highest wind speeds are found as the pressure increases behind the departing low pressure system.

Temperature was chosen to show that there is variability among events. The 1966 blizzard was a relatively mild event, with the temperature only falling into the single digits above zero on the last day. In 1996, the temperature was much colder, falling well below zero.

Although snowfall is not required during a

blizzard, snow was measured for both of these blizzard events. 15.4 inches of snow fell during the 1966 event and 18.0 inches fell during the 1996 event. Peak wind speeds were not recorded in 1966, but the highest wind gust found in the hourly observations was 55 mph on March 4th. In 1996, a maximum 5-second average wind speed of 55 mph was recorded on January 18th.

Sunday, after the blizzard had passed. This lack of severely low temperatures, which usually

Due to the record duration of the March 1966 blizzard, much has been written about the event. The following account, written by H. G. Stommel (the Weather Bureau State Climatologist), was published in the March 1966 North Dakota Climatological Data.

"Snow began over the southern half of the state Wednesday morning, March 2, and spread northward by Thursday to all of North Dakota except the extreme northwest and north-central portions. By Friday, all parts of the state were under the influence of a severe blizzard except the three extreme northwestern counties which experienced high winds and dust storms, but no snowfall.

In some respects, this blizzard of 1966 can be considered one of the most severe in the history of the state. The legendary January 12, 1888, blizzard, which left at least 112 persons dead, lasted for 14 hours. The unusually severe blizzard of March 15, 1941, with 70 mph winds, crossed the state from northwest to southeast in only 7 hours, leaving 39 dead in eastern North Dakota, where the storm was most severe.

In the 1966 storm, winds reported over 70 mph continued unabated for up to 4 days in some areas. Snowfall, reported as much as 38 inches in the northeastern part of the state, was piled into mountainous drifts 30 to 40 feet in many places over the state. For the first time in the history of many towns, schools were closed, all business was suspended, newspapers failed to publish, and all forms of traffic came to a

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complete halt.

Minimum temperatures during the blizzard were, in general, in the teens, with below zero temperatures not reported until Saturday and

accompany such severe North Dakota blizzards, undoubtedly, was partly responsible for the relatively few deaths which occurred directly as a result of the storm. Timely warnings, at least a day in advance of the storm, good dissemination, and modern communications, undoubtedly, all helped to keep the number of deaths to a minimum. No deaths could be ascribed to lack of warnings or forecasts, the cause of many deaths in earlier days.

Five persons in North Dakota died due to some related effect of the storm. A six-year old girl, of Strasburg, fully clothed for the outdoors, became separated from her two brothers when the children went from their home to a barn 60 feet away. She was found 2 days later a quarter of a mile from home, frozen to death.

Another girl, age 12, of Woodworth, slipped out of the house to close a chicken-coop door. She was never again seen alive after she started back to the house about 100 feet away. Her frozen body was found the next day, half-a-mile from home.

Three elderly men died as a result of heart attacks, probably brought on by overexertion. A 60-year-old man in Linton died in his car after vainly trying to extricate it from a ditch into which it had skidded. A janitor was found inside a school where he had collapsed after shoveling snow from the walks. The third man, age 73, a farmer from Driscoll, was found frozen to death in his farm yard only a few yards from his home. Many minor injuries, directly related to the storm, occurred but none proved fatal.

The loss in livestock was serious, with an estimated loss of 18,500 cattle, 7,500 sheep, and 600 hogs. On a farm in eastern North Dakota, 7,000 turkeys perished. Many cattle suffocated in barns which became completely sealed in by huge snowdrifts. Pole barns, in which stock were herded before the storm struck, collapsed, resulting in many dead and injured animals. The total loss of livestock was estimated at near \$4 million.

The continual high winds piled snow in corrals and feed lots. Cattle, in their milling around, tramped down and compacted the snow until the level of the snow became higher than the fence.

The cattle then wandered off and perished in open fields.

All transportation ceased by the second day of the storm. Three transcontinental trains were trapped in railway cuts and within a short time were nearly covered with rock-hard snow, which defeated all efforts to free the trains until after the storm ended. Five hundred passengers were trapped for a time. Automobile travel, even early in the storm, was prevented by the huge drifts and by near zero visibility, which in Bismarck continued for 42 hours without any let-up.

Power and telephone service were interrupted for up to several days in many areas, by the high winds and driven snow. Heavy drifts crushed sheds and aircraft hangers, and many store windows were blown in. Snow was driven into attics and chimney vents were frozen, resulting in a number of cases of gas poisoning.

Many all-time records for monthly snowfall, for snowfall during one storm and for 24-hour snowfall were broken. Then length of duration of the blizzard, particularly in the southern half of the state, set many records, as did the length of zero and near-zero visibility conditions. The snow, which carried large quantities of dirt, was dubbed "snirt."

The 1966 blizzard can, therefore, be considered as an all-time record blizzard for North Dakota for sustained severity, low visibilities, and amount of snowfall" (U.S. Department of Commerce 1966).

By comparison, the January 1996 blizzard was a much shorter event. The following was written in Storm Data for this blizzard event:

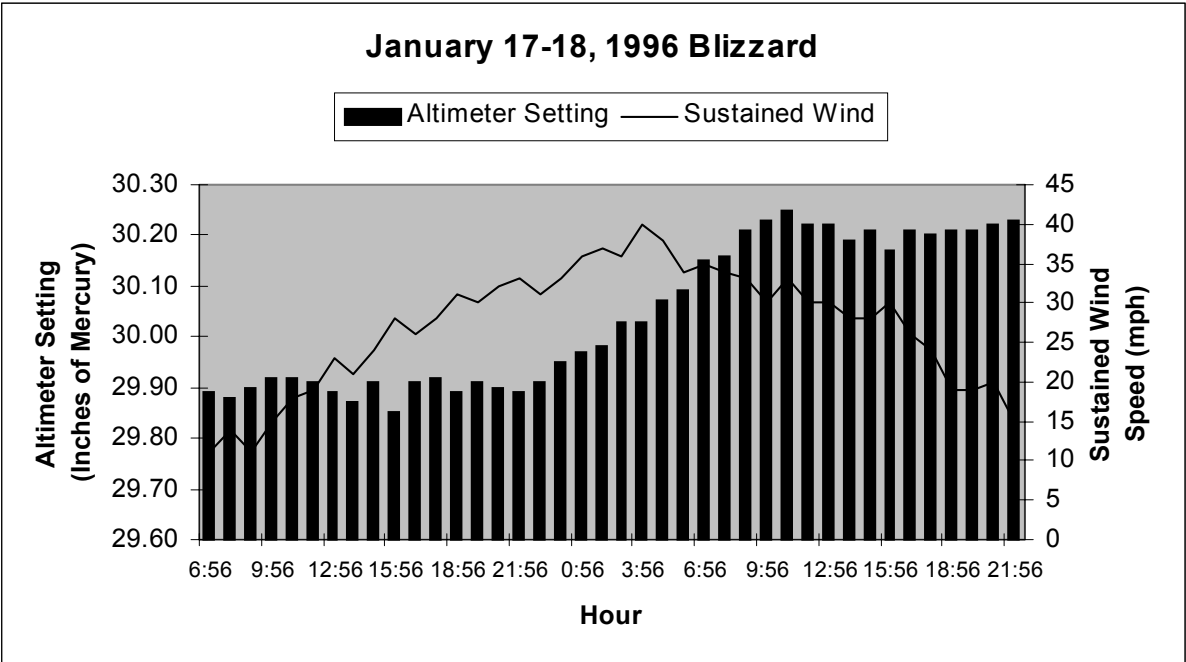
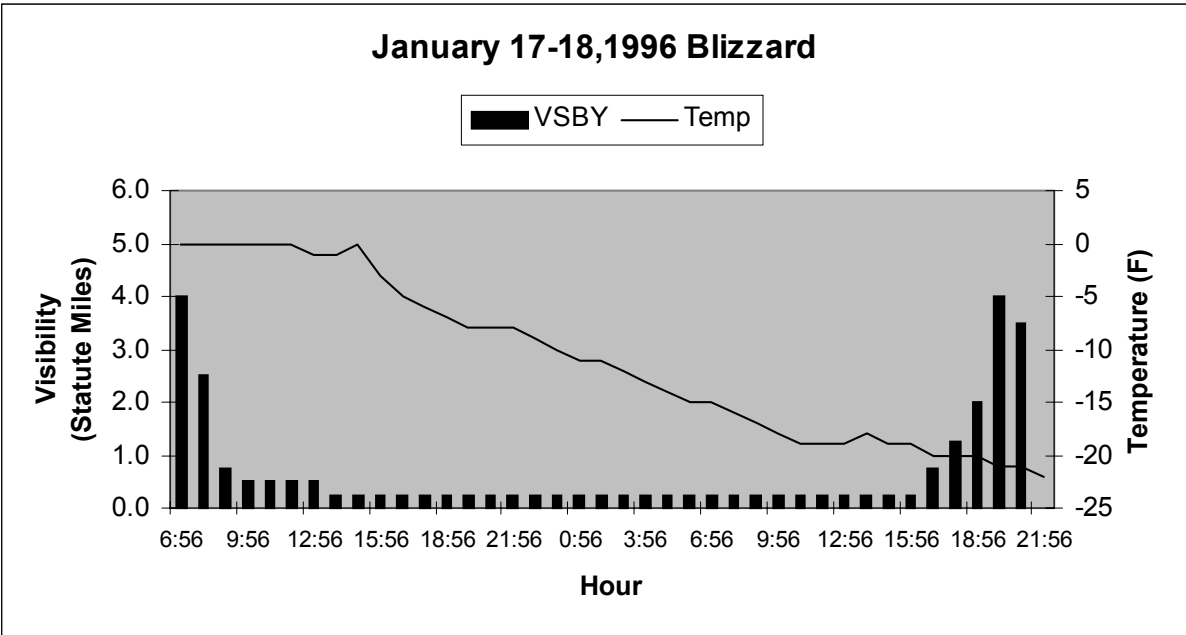
"A strong low pressure system located over the central plains brought a combination of heavy snow, strong wind, and subzero temperatures to eastern North Dakota. 20 inches of snow fell in Wahpeton, 18 inches fell in Fargo, and amounts of 8 to 13 inches were common over the rest of the area. A north wind gusting up to 55 mph created drifts up to 10 feet high. The wind tore a large siding panel off the west side of the Radisson Hotel in Fargo.

Law enforcement officials advised no travel and closed Interstate 29 in North Dakota, Interstate 94 from Fargo to Bismarck, and US Highway 2 from Grand Forks to Devils Lake. 3 people in 2 vehicles who did attempt to travel were stranded for several hours until they were rescued. Many schools closed at noon on the 17th and did not re-open until the 22nd. Temperatures dropped to 10 to 20 below zero and compounded the snow removal process. Many plows broke down because their hydraulic and cooling systems froze. The cold also caused several water main breaks and minor power outages” (U.S. Department of Commerce 1996).

Blizzard Comparison (1966 vs 1996)

1996	TIME	VSBY	TEMP	WIND	SUST	WIND	ALT
	<u>(LST)</u>	<u>(SM)</u>	<u>(F)</u>	<u>DIR</u>	<u>WIND</u>	<u>GUST</u>	<u>SET</u>
Jan 17	6:56	4.00	0	20	11		29.89
	7:56	2.50	0	20	14		29.88
	8:56	0.75	0	10	11		29.90
	9:56	0.50	0	10	15		29.92
	10:56	0.50	0	10	18		29.92
	11:56	0.50	0	10	19		29.91
	12:56	0.50	-1	10	23	29	29.89
	13:56	0.25	-1	10	21	31	29.87
	14:56	0.25	0	10	24	27	29.91
	15:56	0.25	-3	360	28	34	29.85
	16:56	0.25	-5	10	26	31	29.91
	17:56	0.25	-6	360	28	34	29.92
	18:56	0.25	-7	360	31	38	29.89
	19:56	0.25	-8	10	30	40	29.91
	20:56	0.25	-8	350	32	38	29.90
	21:56	0.25	-8	10	33	43	29.89
	22:56	0.25	-9	360	31	40	29.91
	23:56	0.25	-10	350	33	42	29.95
Jan 18	0:56	0.25	-11	350	36	43	29.97
	1:56	0.25	-11	350	37	45	29.98
	2:56	0.25	-12	350	36	45	30.03
	3:56	0.25	-13	350	40	45	30.03
	4:56	0.25	-14	350	38	43	30.07
	5:56	0.25	-15	350	34	41	30.09
	6:56	0.25	-15	350	35	39	30.15
	7:56	0.25	-16	350	34	39	30.16
	8:56	0.25	-17	360	33	39	30.21
	9:56	0.25	-18	350	30	34	30.23
	10:56	0.25	-19	350	33	40	30.25
	11:56	0.25	-19	350	30	37	30.22
	12:56	0.25	-19	350	30	38	30.22
	13:56	0.25	-18	350	28		30.19
	14:56	0.25	-19	350	28	35	30.21
	15:56	0.25	-19	340	30	36	30.17
	16:56	0.75	-20	350	26	31	30.21
	17:56	1.25	-20	340	24		30.20
	18:56	2.00	-20	340	19		30.21
	19:56	4.00	-21	340	19		30.21
	20:56	3.50	-21	340	20		30.22
	21:56		-22	320	15		30.23

WIND is in mph and **ALT SET** is in inches of Mercury

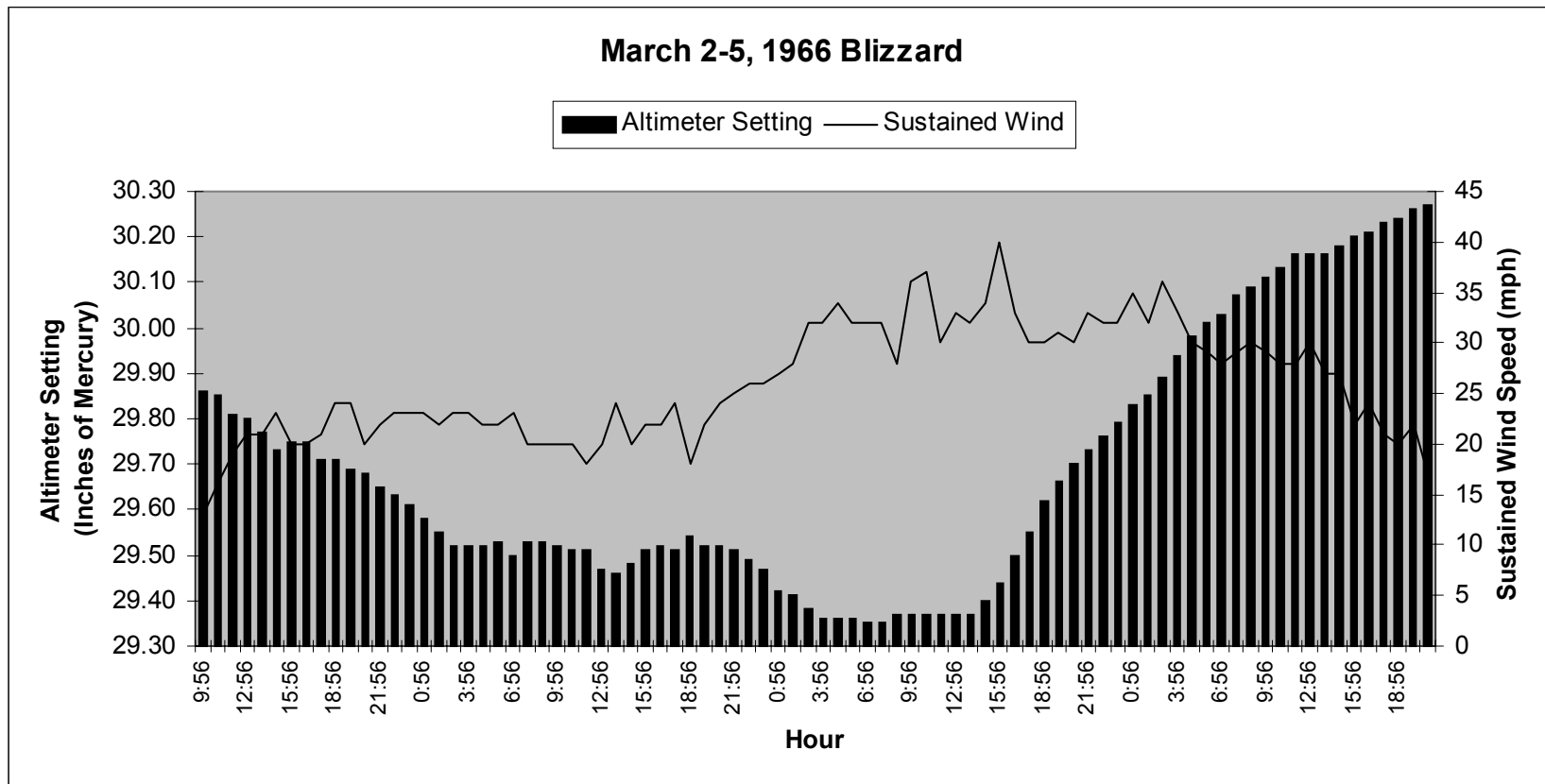


1966	TIME	VSBY	TEMP	WIND	SUST	WIND	ALT
	<u>(LST)</u>	<u>(SM)</u>	<u>(F)</u>	<u>DIR</u>	<u>WIND</u>	<u>GUST</u>	<u>SET</u>
Mar 02	9:56		28	80	13		29.86
	10:56	0.75	28	80	16		29.85
	11:56	0.50	27	60	19		29.81
	12:56	0.25	27	60	21		29.80
	13:56	0.25	26	50	21	25	29.77
	14:56	0.25	26	50	23		29.73
	15:56	0.25	26	50	20	26	29.75
	16:56	0.38	26	60	20	27	29.75
	17:56	0.31	27	60	21	26	29.71
	18:56	0.25	27	60	24	31	29.71
	19:56	0.50	27	60	24	30	29.69
	20:56	0.38	27	60	20	28	29.68
	21:56	0.38	27	60	22	31	29.65
	22:56	0.50	27	60	23	28	29.63
Mar 03	23:56	0.50	28	50	23	29	29.61
	0:56	0.38	28	50	23	30	29.58
	1:56	0.38	28	50	22	28	29.55
	2:56	0.38	27	60	23	30	29.52
	3:56	1.00	28	60	23	29	29.52
	4:56	4.00	28	60	22	28	29.52
	5:56	5.00	28	60	22	28	29.53
	6:56	5.00	28	60	23	29	29.50
	7:56	3.00	28	60	20	25	29.53
	8:56		28	60	20	25	29.53
	9:56		29	60	20	26	29.52
	10:56		29	60	20	25	29.51
	11:56	4.00	27	60	18	25	29.51
	12:56	2.00	30	50	20		29.47
	13:56	4.00	29	50	24	29	29.46
	14:56	2.00	29	40	20		29.48
	15:56	2.00	28	40	22	26	29.51
	16:56	1.00	27	30	22	27	29.52
	17:56	1.00	26	20	24	32	29.51
	18:56	1.50	26	20	18	26	29.54
	19:56	3.00	24	20	22	28	29.52
	20:56	3.00	24	10	24	32	29.52
	21:56	0.50	23	10	25	33	29.51
	22:56	0.25	21	10	26	36	29.49
	23:56	0.25	21	10	26	34	29.47

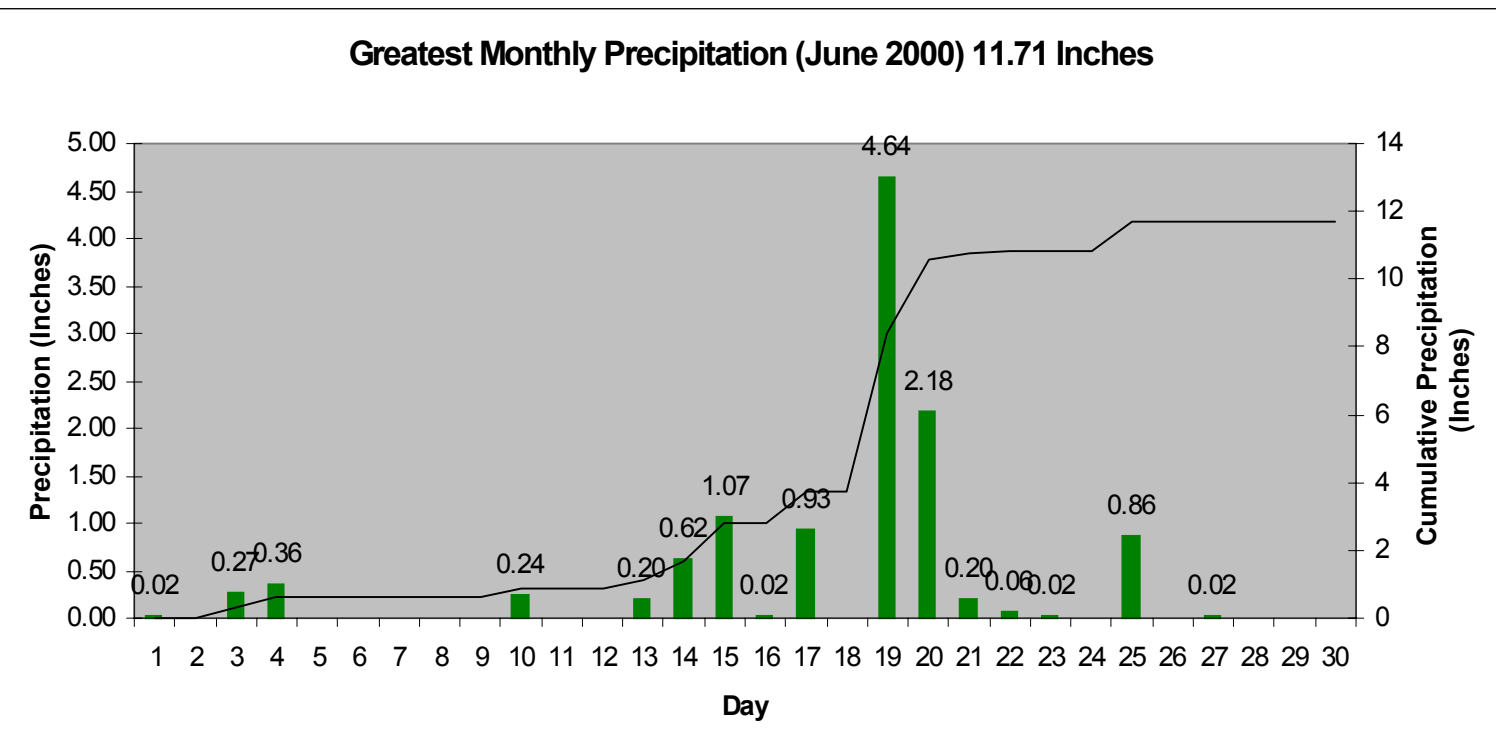
WIND is in mph and **ALT SET** is in inches of Mercury

1966	TIME	VSBY	TEMP	WIND	SUST	WIND	ALT
	<u>(LST)</u>	<u>(SM)</u>	<u>(F)</u>	<u>DIR</u>	<u>WIND</u>	<u>GUST</u>	<u>SET</u>
Mar 04	0:56	0.25	20	360	27	34	29.42
	1:56	0.25	19	360	28	36	29.41
	2:56	0.25	18	360	32	43	29.38
	3:56	0.25	18	360	32	38	29.36
	4:56	0.25	18	360	34	41	29.36
	5:56	0.25	17	360	32	40	29.36
	6:56	0.25	16	360	32	39	29.35
	7:56	0.25	16	360	32	39	29.35
	8:56	0.25	17	360	28	43	29.37
	9:56	0.25	16	360	36	44	29.37
	10:56	0.25	17	360	37	45	29.37
	11:56	0.25	18	360	30	37	29.37
	12:56	0.25	19	360	33	41	29.37
	13:56	0.25	19	360	32	40	29.37
	14:56	0.25	19	360	34	40	29.40
	15:56	0.25	20	360	40	48	29.44
	16:56	0.25	20	360	33	40	29.50
	17:56	0.25	20	360	30	40	29.55
	18:56	0.25	20	360	30	38	29.62
	19:56	0.25	19	360	31	38	29.66
	20:56	0.25	18	360	30	37	29.70
	21:56	0.25	17	360	33	42	29.73
	22:56	0.25	17	360	32	40	29.76
	23:56	0.25	16	360	32	39	29.79
Mar 05	0:56	0.25	16	360	35	44	29.83
	1:56	0.25	14	360	32	42	29.85
	2:56	0.25	13	360	36	44	29.89
	3:56	0.25	11	360	33	40	29.94
	4:56	0.25	10	360	30	36	29.98
	5:56	0.38	8	360	29	37	30.01
	6:56	0.38	6	360	28	35	30.03
	7:56	0.38	5	360	29	36	30.07
	8:56	0.38	5	360	30	35	30.09
	9:56	0.25	5	360	29	36	30.11
	10:56	0.25	5	350	28	34	30.13
	11:56	0.25	6	350	28	36	30.16
	12:56	0.25	7	360	30	38	30.16
	13:56	0.50	9	350	27	33	30.16
	14:56	0.50	10	360	27	35	30.18
	15:56	1.00	9	360	22	28	30.20
	16:56	0.25	9	360	24	30	30.21
	17:56	0.25	6	350	21	27	30.23

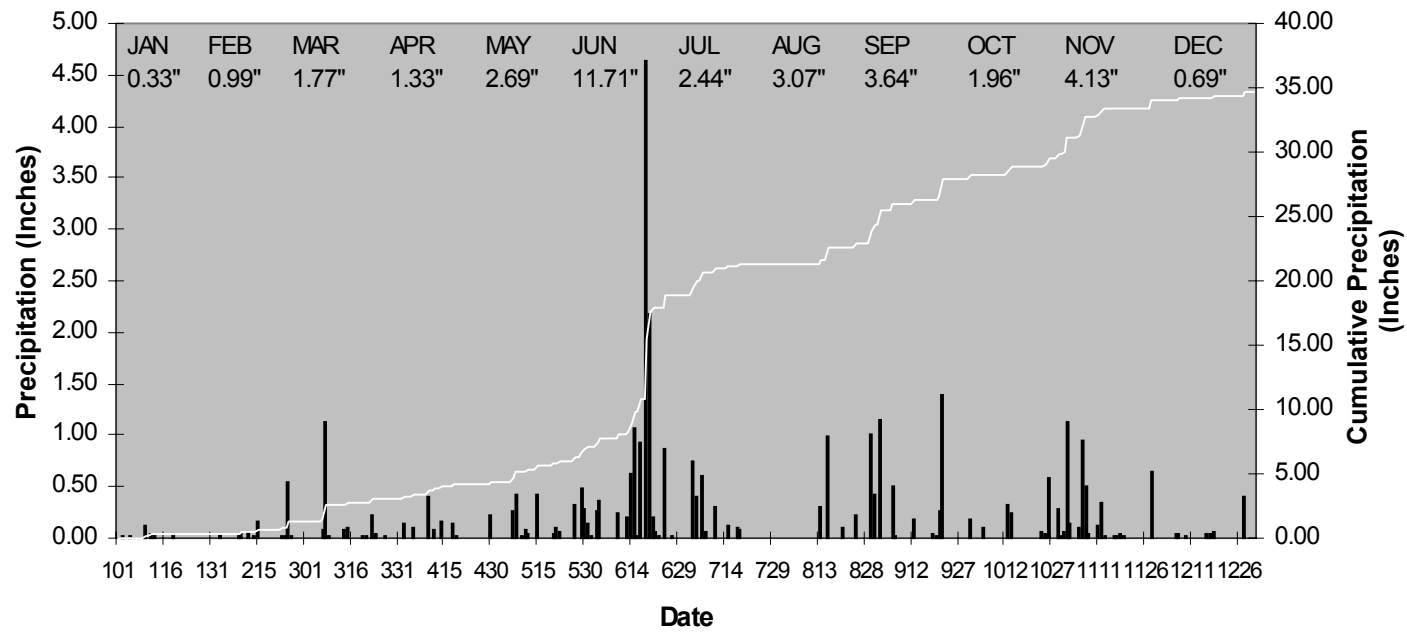
WIND is in mph and **ALT SET** is in inches of Mercury



Greatest Monthly Precipitation

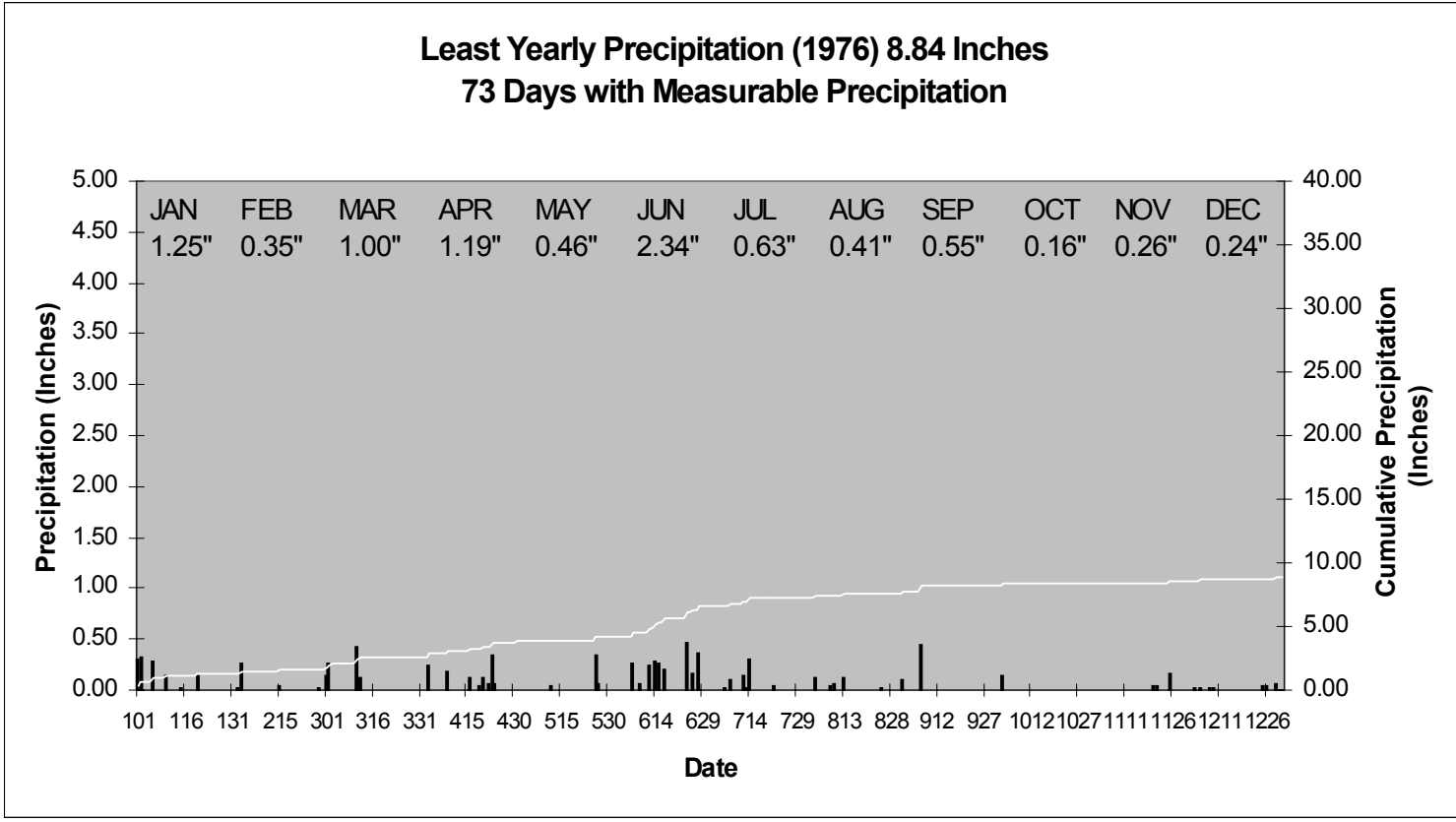


Greatest Yearly Precipitation (2000) 34.75 Inches
131 Days with Measurable Precipitation



Greatest Yearly Precipitation

Least Yearly Precipitation



Major Floods Comparison

April 1897 vs April 1997

River flooding occurs frequently along the Red River of the North. Flooding can occur any season of the year, with the exception of winter, when freeze-up occurs. The NWS has established 17 feet as the flood stage in Fargo.

The floods of April 1897 and April 1997 were picked because they are two of the top floods in Fargo history. Both were spring snowmelt floods, which normally occur in March or April. Spring snowmelt flooding is caused by a variety of factors such as frost depth, liquid equivalent of the snow pack, temperature, fall soil moisture, ice jams, and runoff rate.

Little information remains about the flood of 1897. There is even some uncertainty in how high the water actually rose, because the standards of measurement today are different than those used in 1897. The NWS archives list the 1897 crest as 40.1 feet on April 7, 1897. When adjusting this crest to compare to today's standards, it was lowered to 39.1 feet.

The following account was written in the annual summary of the Climate and Crop Bulletin (Minnesota Section) of the U.S. Department of Agriculture (a predecessor agency to the NWS) in 1897.

"The month opened with the snow about all gone from the southern half of the state, and that remaining in the northern portion, melting so rapidly, that by the 9th, there was not much left that was not turned into water, causing one of the greatest floods ever known in the Red River Valley. The crest of the flood reached Moorhead on the 5th, and from there to the state boundary, the usual time of three weeks was required. The level country extending from 12 to 20 miles from the river was inundated, causing great suffering and damage" (U.S. Department of Agriculture 1897).

The flood of 1997, being much more recent, still remains vibrant in the minds of many residents of the Red River Valley. The winter of 1996-97 brought a record amount of snow to the Fargo-Moorhead area (117 inches). This record

snowpack produced an incredible amount of liquid equivalent in the snow by spring. NWS observers reported 5 to 8 inches of water equivalent in the snowpack, especially across the headwaters area of the Red River.

As the snow melted, the initial crest occurred in the Wahpeton-Breckenridge area. During this crest, a blizzard hit and dropped more rain and snow across the area. This brought a second crest to the Wahpeton-Breckenridge area, and a prolonged period of high river flow into the Fargo-Moorhead area. This put a tremendous amount of pressure on the permanent and temporary dike system around the Fargo-Moorhead area.

The melting snow also caused entire fields to fill with water all across the Red River Valley. Many breakouts occurred, where water ran across areas it did not in normal years. Water actually flowed over both Interstates 29 and 94, and closed 29 north of Fargo. Due to the long duration of high water levels, many fields in the Red River Valley were not planted.

The following account appears in the NWS Storm Data report for April 1997.

"The cresting Red River caused numerous problems to the Hickson and Fargo areas. Numerous homes along the river were flooded, as the river rose to a new record for the century on the 18th, at 39.72 feet. Overland flooding caused problems along the south and southwest sides of Fargo, as water from the Wild Rice River broke out of its banks and headed overland toward Fargo. The water flowed over Interstate 29 near the Horace exit. A clay dike was built along the south side of the city to prevent this water from flooding thousands of homes. A section was also cut out of U.S. Highway 81 to relieve the water level along the south side of Fargo. The Red River broke through a dike along South Terrace Drive in Fargo, flooding 30 homes and the Oak Grove High School. 270 students and their teachers and parents had sandbagged at the high school for three weeks to try to save the school" (U.S. Department of Commerce 1997). The damage estimate included in Storm Data for Cass county was listed at \$150 million.

Major Floods Comparison (1897 vs 1997)

1897 Data

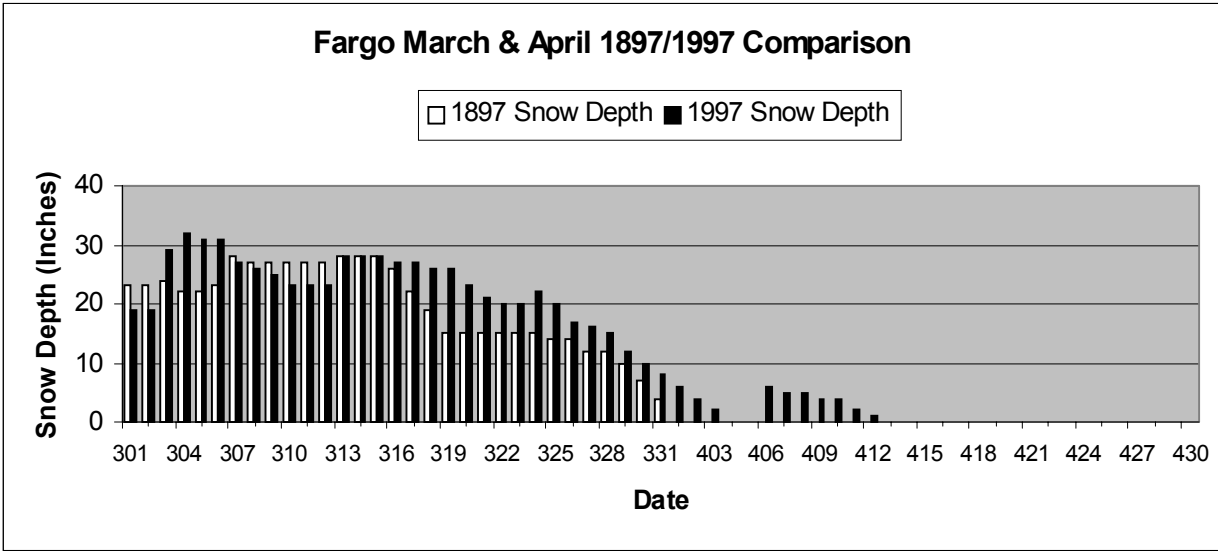
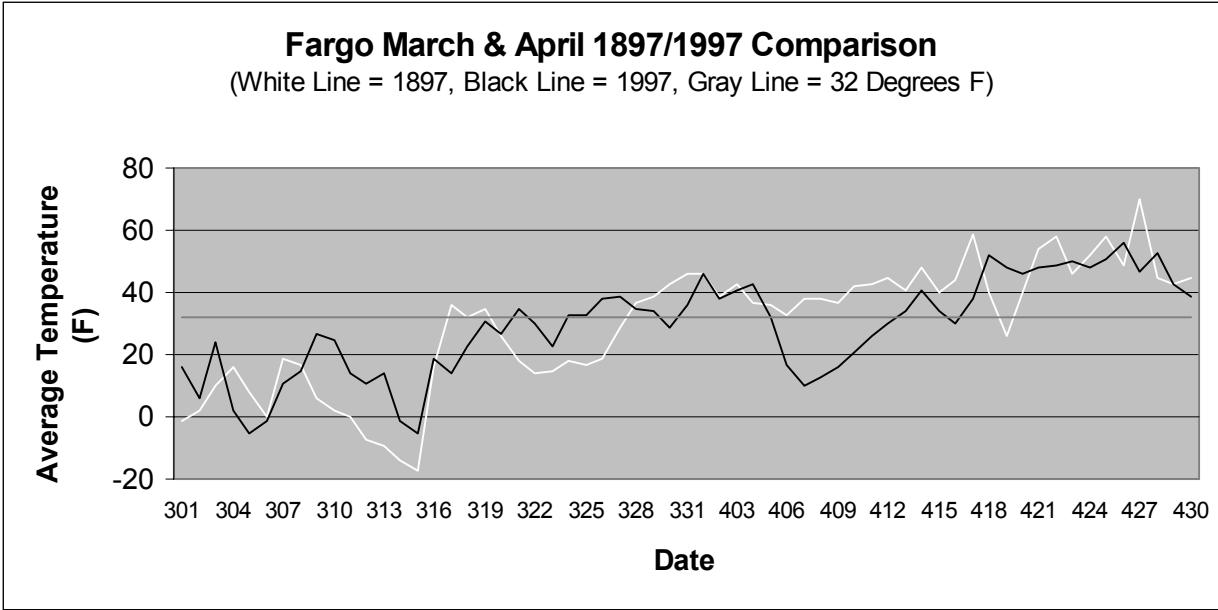
<u>Date</u>	<u>MaxT</u>	<u>MinT</u>	<u>AvgT</u>	<u>Depth</u>	<u>Date</u>	<u>MaxT</u>	<u>MinT</u>	<u>AvgT</u>	<u>Depth</u>
3/01	8	-10	-1	23	4/01	54	38	46	0
3/02	14	-10	2	23	4/02	41	36	39	
3/03	17	2	10	24	4/03	50	35	43	
3/04	30	2	16	22	4/04	40	34	37	
3/05	28	-12	8	22	4/05	38	34	36	
3/06	14	-14	0	23	4/06	34	31	33	
3/07	24	14	19	28	4/07	46	30	38	
3/08	28	6	17	27	4/08	47	28	38	
3/09	16	-4	6	27	4/09	40	34	37	
3/10	13	-9	2	27	4/10	50	34	42	
3/11	8	-8	0	27	4/11	51	34	43	
3/12	0	-14	-7	27	4/12	50	39	45	
3/13	-2	-16	-9	28	4/13	47	34	41	
3/14	0	-28	-14	28	4/14	61	34	48	
3/15	-2	-32	-17	28	4/15	46	34	40	
3/16	35	-4	16	26	4/16	56	32	44	
3/17	38	34	36	22	4/17	72	46	59	
3/18	40	23	32	19	4/18	58	22	40	
3/19	37	33	35	15	4/19	35	16	26	
3/20	33	18	26	15	4/20	52	28	40	
3/21	28	8	18	15	4/21	72	35	54	
3/22	24	3	14	15	4/22	68	48	58	
3/23	27	3	15	15	4/23	54	37	46	
3/24	26	10	18	15	4/24	67	36	52	
3/25	24	10	17	14	4/25	76	40	58	
3/26	30	8	19	14	4/26	64	34	49	
3/27	37	20	29	12	4/27	90	50	70	
3/28	40	34	37	12	4/28	55	35	45	
3/29	42	36	39	10	4/29	58	28	43	
3/30	47	38	43	7	4/30	60	29	45	
3/31	54	38	46	4					

Depth refers to Snow Depth

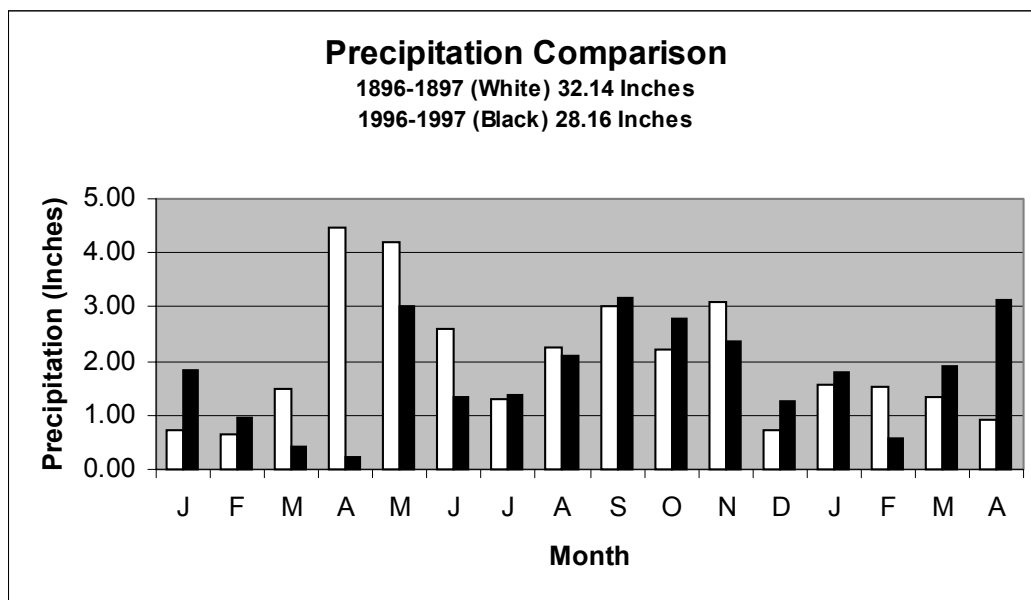
1997 Data

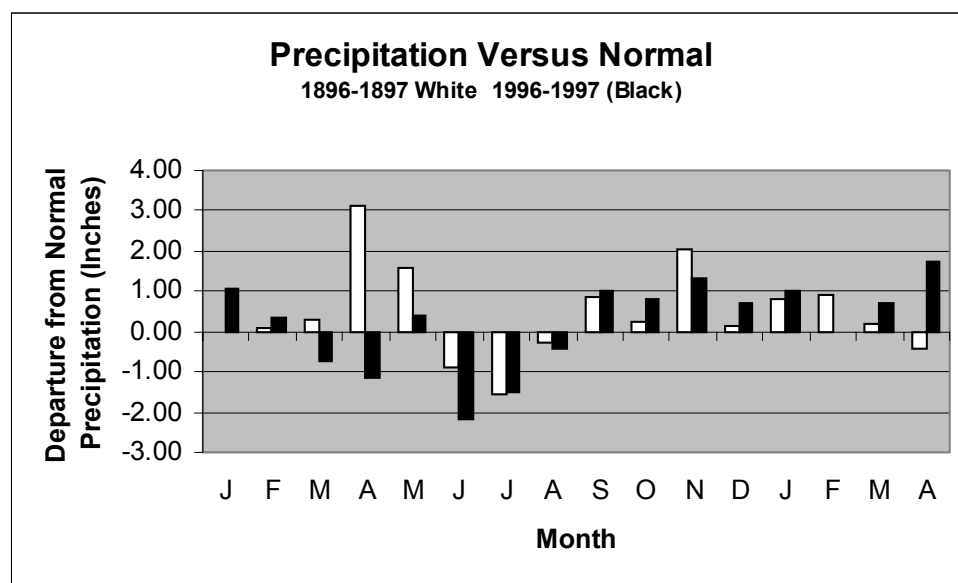
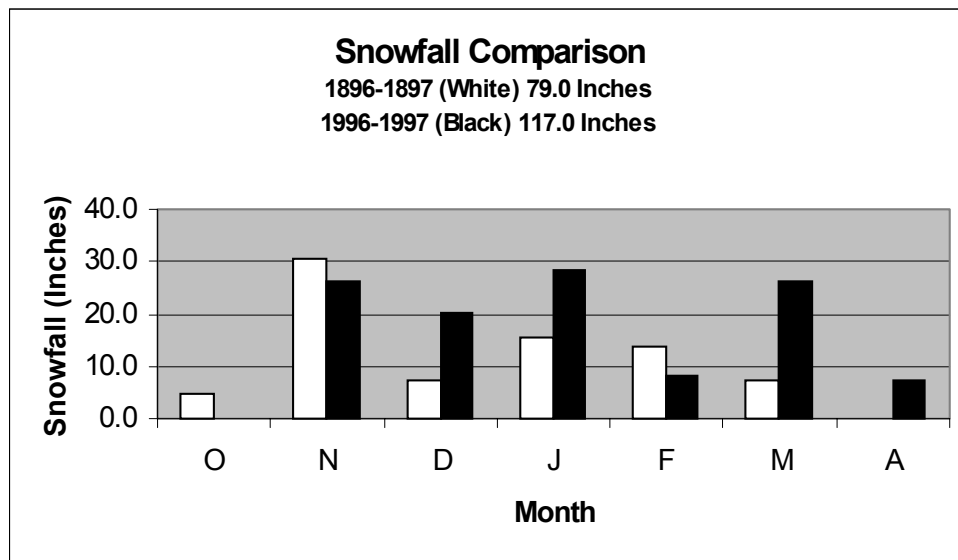
<u>Date</u>	<u>MaxT</u>	<u>MinT</u>	<u>AvgT</u>	<u>Depth</u>	<u>Date</u>	<u>MaxT</u>	<u>MinT</u>	<u>AvgT</u>	<u>Depth</u>
3/01	29	2	16	19	4/01	54	38	46	6
3/02	19	-7	6	19	4/02	44	32	38	4
3/03	33	15	24	29	4/03	52	30	41	2
3/04	20	-17	2	32	4/04	48	37	43	T
3/05	12	-22	-5	31	4/05	38	25	32	T
3/06	10	-12	-1	31	4/06	25	9	17	6
3/07	21	1	11	27	4/07	13	7	10	5
3/08	34	-5	15	26	4/08	17	8	13	5
3/09	35	18	27	25	4/09	24	7	16	4
3/10	36	13	25	23	4/10	26	16	21	4
3/11	30	-2	14	23	4/11	36	15	26	2
3/12	20	1	11	23	4/12	38	21	30	1
3/13	18	10	14	28	4/13	44	24	34	T
3/14	10	-12	-1	28	4/14	50	32	41	T
3/15	9	-18	-5	28	4/15	40	27	34	T
3/16	38	0	19	27	4/16	36	24	30	T
3/17	20	7	14	27	4/17	51	24	38	T
3/18	33	13	23	26	4/18	63	41	52	0
3/19	43	19	31	26	4/19	59	37	48	
3/20	39	14	27	23	4/20	52	40	46	
3/21	37	32	35	21	4/21	61	35	48	
3/22	37	23	30	20	4/22	58	40	49	
3/23	35	10	23	20	4/23	58	41	50	
3/24	35	30	33	22	4/24	61	34	48	
3/25	37	28	33	20	4/25	63	38	51	
3/26	47	28	38	17	4/26	66	46	56	
3/27	47	30	39	16	4/27	55	39	47	
3/28	39	30	35	15	4/28	69	37	53	
3/29	44	24	34	12	4/29	53	32	43	
3/30	34	23	29	10	4/30	47	31	39	
3/31	46	26	36	8					

Depth refers to Snow Depth

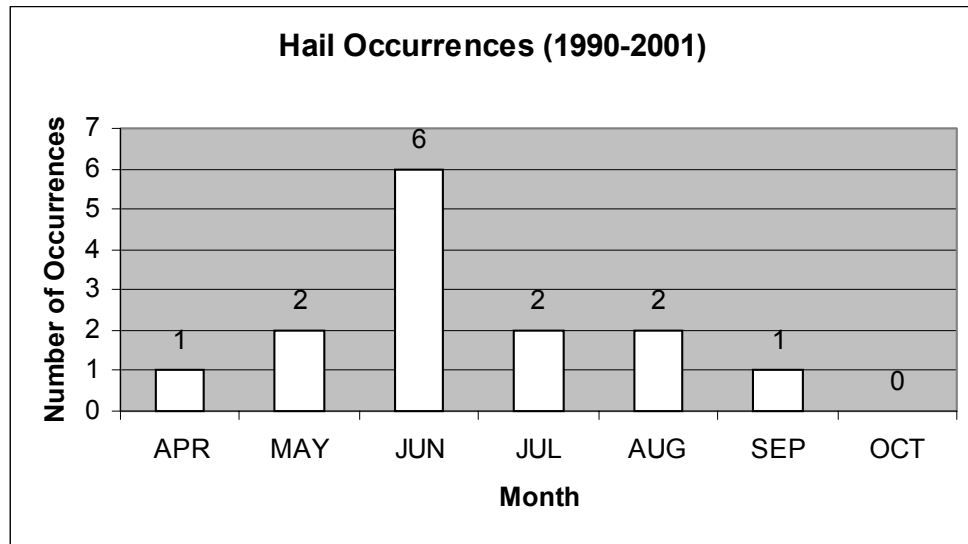


Month	Precipitation Amounts		Normal Pcpn	Departure from Normal Precipitation		Snowfall Amounts	
	1896-1897	1996-1997	1971-2000	1896-1897	1996-1997	1896-1897	1996-1997
J	0.74	1.82	0.76	-0.02	1.06		
F	0.66	0.94	0.59	0.07	0.35		
M	1.48	0.41	1.17	0.31	-0.76		
A	4.48	0.21	1.37	3.11	-1.16		
M	4.20	3.00	2.61	1.59	0.39		
J	2.61	1.33	3.51	-0.90	-2.18		
J	1.30	1.36	2.88	-1.58	-1.52		
A	2.26	2.10	2.52	-0.26	-0.42		
S	3.02	3.17	2.18	0.84	0.99		
O	2.23	2.78	1.97	0.26	0.81	4.9	0.0
N	3.09	2.38	1.06	2.03	1.32	30.4	26.4
D	0.73	1.27	0.57	0.16	0.70	7.1	20.4
J	1.56	1.79	0.76	0.80	1.03	15.5	28.6
F	1.52	0.59	0.59	0.93	0.00	13.6	8.0
M	1.34	1.89	1.17	0.17	0.72	7.3	26.2
A	0.92	3.12	1.37	-0.45	1.75	0.2	7.4
Total	32.14	28.16	25.08	7.06	3.08	79.0	117.0





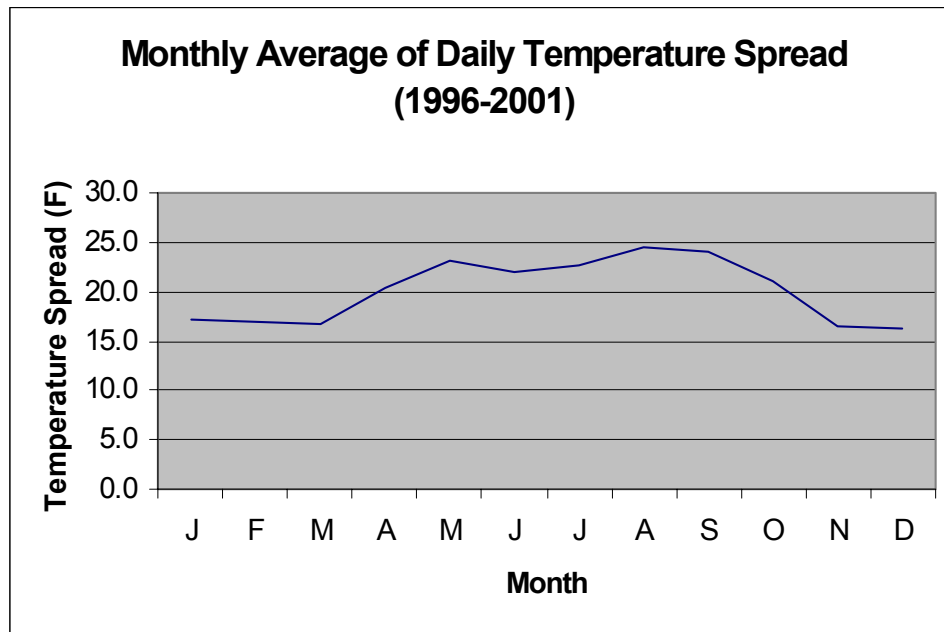
Hail Occurrences (1990-2001)



Includes all hail occurrences regardless of size

Monthly Average of Daily Temperature Spread (1996-2001)

<u>Month</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>Mavg</u>
J	17.2	18.9	13.1	17.1	18.1	18.3	17.1
F	17.9	21.4	10.1	15.9	18.0	19.0	17.1
M	15.9	20.8	11.8	16.4	19.0	15.9	16.6
A	17.7	17.8	25.9	19.2	23.8	18.2	20.4
M	23.1	25.6	22.8	20.2	24.6	22.6	23.2
J	24.7	24.1	19.1	21.7	20.4	21.3	21.9
J	24.9	19.9	23.3	23.1	22.3	22.6	22.7
A	26.2	24.6	24.8	22.4	24.2	24.7	24.5
S	23.0	25.4	28.4	20.2	25.1	22.2	24.1
O	22.0	22.3	17.6	23.5	19.6	20.9	21.0
N	16.1	12.6	13.1	23.9	14.1	19.8	16.6
D	13.6	13.0	17.3	20.1	18.5	14.9	16.2

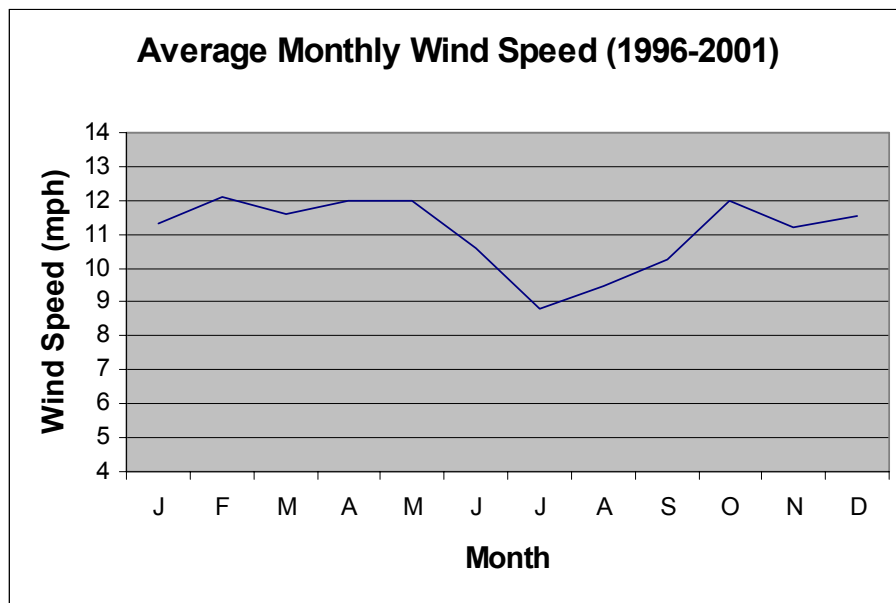


Temperature spread is the difference between the daily high and low. Utilized ASOS era time frame for similar instrumentation.

Monthly Average Wind Speed (1996-2001)

Month	1996	1997	1998	1999	2000	2001	MAvg
J	10.5	13.0	10.1	12.1	11.0	11.3	11.3
F	14.4	11.5	10.7	13.7	10.6	11.7	12.1
M	11.9	12.4	11.8	11.6	11.1	10.8	11.6
A	12.4	10.9	10.8	11.5	12.8	13.6	12.0
M	11.1	13.3	10.6	13.2	11.2	12.7	12.0
J	10.3	10.6	10.3	11.2	11.0	10.1	10.6
J	9.3	9.3	8.1	8.8	8.0	9.3	8.8
A	11.4	8.3	8.4	9.4	10.1	9.3	9.5
S	9.6	10.9	10.1	10.9	10.7	9.2	10.2
O	13.6	12.7	10.9	11.1	11.0	12.7	12.0
N	11.2	11.9	10.4	10.5	11.7	11.6	11.2
D	12.6	11.1	10.5	11.9	11.3	11.8	11.5

Average Yearly Wind Speed = 11.1 mph



Used ASOS era time frame for similar instrumentation

Monthly Average Wind Directions (1996-2001)

Hourly occurrences of wind direction from METAR reports:

<u>JAN</u>		<u>FEB</u>		<u>MAR</u>		<u>APR</u>		<u>MAY</u>		<u>JUN</u>	
N	623	N	524	N	685	N	668	N	536	N	397
NNE	182	NNE	152	NNE	222	NNE	325	NNE	217	NNE	184
NE	89	NE	57	NE	98	NE	189	NE	190	NE	91
ENE	61	ENE	44	ENE	87	ENE	173	ENE	165	ENE	102
E	78	E	55	E	85	E	157	E	251	E	215
ESE	62	ESE	91	ESE	79	ESE	198	ESE	218	ESE	223
SE	140	SE	152	SE	178	SE	236	SE	281	SE	292
SSE	424	SSE	483	SSE	517	SSE	358	SSE	367	SSE	427
S	659	S	635	S	559	S	403	S	463	S	521
SSW	193	SSW	219	SSW	168	SSW	155	SSW	161	SSW	211
SW	156	SW	147	SW	112	SW	141	SW	115	SW	156
WSW	112	WSW	165	WSW	108	WSW	102	WSW	90	WSW	205
W	239	W	245	W	256	W	134	W	272	W	305
WNW	205	WNW	181	WNW	170	WNW	141	WNW	132	WNW	183
NW	215	NW	265	NW	258	NW	194	NW	177	NW	180
NNW	562	NNW	380	NNW	539	NNW	399	NNW	373	NNW	245
CALM	209	CALM	167	CALM	235	CALM	159	CALM	172	CALM	152
MSG	255	MSG	118	MSG	108	MSG	188	MSG	284	MSG	231
TOTAL	4464		4080		4464		4320		4464		4320

<u>JUL</u>		<u>AUG</u>		<u>SEP</u>		<u>OCT</u>		<u>NOV</u>		<u>DEC</u>	
N	350	N	387	N	409	N	349	N	557	N	620
NNE	222	NNE	166	NNE	192	NNE	135	NNE	306	NNE	176
NE	113	NE	96	NE	123	NE	89	NE	129	NE	76
ENE	115	ENE	97	ENE	102	ENE	71	ENE	106	ENE	77
E	163	E	143	E	174	E	117	E	95	E	86
ESE	184	ESE	167	ESE	157	ESE	137	ESE	78	ESE	71
SE	325	SE	280	SE	273	SE	272	SE	156	SE	156
SSE	410	SSE	613	SSE	460	SSE	556	SSE	440	SSE	451
S	502	S	689	S	553	S	743	S	732	S	700
SSW	196	SSW	224	SSW	219	SSW	196	SSW	265	SSW	289
SW	153	SW	155	SW	140	SW	139	SW	185	SW	208
WSW	110	WSW	88	WSW	148	WSW	106	WSW	192	WSW	190
W	236	W	185	W	294	W	282	W	359	W	352
WNW	216	WNW	150	WNW	209	WNW	315	WNW	279	WNW	322
NW	260	NW	189	NW	192	NW	344	NW	348	NW	426
NNW	285	NNW	257	NNW	252	NNW	330	NNW	442	NNW	588
CALM	302	CALM	276	CALM	210	CALM	161	CALM	189	CALM	226
MSG	322	MSG	302	MSG	213	MSG	122	MSG	182	MSG	194
TOTAL	4464		4464		4320		4464		5040		5208

Hourly percentages of wind direction from METAR reports:

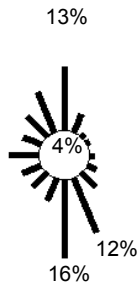
<u>JAN</u>		<u>FEB</u>		<u>MAR</u>		<u>APR</u>		<u>MAY</u>		<u>JUN</u>	
N	14	N	13	N	15	N	15	N	12	N	9
NNE	4	NNE	4	NNE	5	NNE	8	NNE	5	NNE	4
NE	2	NE	1	NE	2	NE	4	NE	4	NE	2
ENE	1	ENE	1	ENE	2	ENE	4	ENE	4	ENE	2
E	2	E	1	E	2	E	4	E	6	E	5
ESE	1	ESE	2	ESE	2	ESE	5	ESE	5	ESE	5
SE	3	SE	4	SE	4	SE	5	SE	6	SE	7
SSE	9	SSE	12	SSE	12	SSE	8	SSE	8	SSE	10
S	15	S	16	S	13	S	9	S	10	S	12
SSW	4	SSW	5	SSW	4	SSW	4	SSW	4	SSW	5
SW	3	SW	4	SW	3	SW	3	SW	3	SW	4
WSW	3	WSW	4	WSW	2	WSW	2	WSW	2	WSW	5
W	5	W	6	W	6	W	3	W	6	W	7
WNW	5	WNW	4	WNW	4	WNW	3	WNW	3	WNW	4
NW	5	NW	6	NW	6	NW	4	NW	4	NW	4
NNW	13	NNW	9	NNW	12	NNW	9	NNW	8	NNW	6
CALM	5	CALM	4	CALM	5	CALM	4	CALM	4	CALM	4
MSG	6	MSG	3	MSG	2	MSG	4	MSG	6	MSG	5
Total	100		100		100		100		100		100

<u>JUL</u>		<u>AUG</u>		<u>SEP</u>		<u>OCT</u>		<u>NOV</u>		<u>DEC</u>	
N	8	N	9	N	9	N	8	N	11	N	12
NNE	5	NNE	4	NNE	4	NNE	3	NNE	6	NNE	3
NE	3	NE	2	NE	3	NE	2	NE	3	NE	1
ENE	3	ENE	2	ENE	2	ENE	2	ENE	2	ENE	1
E	4	E	3	E	4	E	3	E	2	E	2
ESE	4	ESE	4	ESE	4	ESE	3	ESE	2	ESE	1
SE	7	SE	6	SE	6	SE	6	SE	3	SE	3
SSE	9	SSE	14	SSE	11	SSE	12	SSE	9	SSE	9
S	11	S	15	S	13	S	17	S	15	S	13
SSW	4	SSW	5	SSW	5	SSW	4	SSW	5	SSW	6
SW	3	SW	3	SW	3	SW	3	SW	4	SW	4
WSW	2	WSW	2	WSW	3	WSW	2	WSW	4	WSW	4
W	5	W	4	W	7	W	6	W	7	W	7
WNW	5	WNW	3	WNW	5	WNW	7	WNW	6	WNW	6
NW	6	NW	4	NW	4	NW	8	NW	7	NW	8
NNW	6	NNW	6	NNW	6	NNW	7	NNW	9	NNW	11
CALM	7	CALM	6	CALM	5	CALM	4	CALM	4	CALM	4
MSG	7	MSG	7	MSG	5	MSG	3	MSG	4	MSG	4
Total	100		100		100		100		100		100

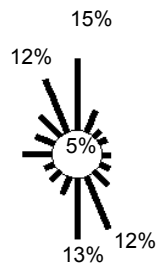
Monthly Wind Roses (1996-2001)



JANUARY



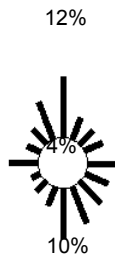
FEBRUARY



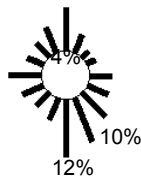
MARCH



APRIL



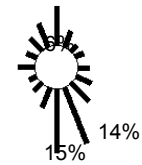
MAY



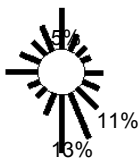
JUNE



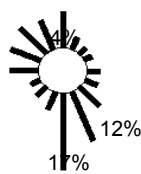
JULY



AUGUST



SEPTEMBER



OCTOBER



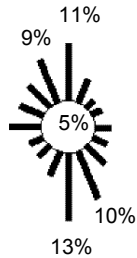
NOVEMBER



DECEMBER

The percentage of calm wind occurrence is listed in the center of wind rose. All directions are referenced from true north.

Yearly Wind Rose (1996-2001)



Yearly Average (%)

Key

N	11	N = 350, 360, 010
NNE	5	NNE = 020, 030
NE	2	NE = 040, 050
ENE	2	ENE = 060, 070
E	3	E = 080, 090, 100
ESE	3	ESE = 110, 120
SE	5	SE = 130, 140
SSE	10	SSE = 150, 160
S	13	S = 170, 180, 190
SSW	5	SSW = 200, 210
SW	3	SW = 220, 230
WSW	3	WSW = 240, 250
W	6	W = 260, 270, 280
WNW	5	WNW = 290, 300
NW	6	NW = 310, 320
NNW	9	NNW = 330, 340
CALM	5	
MSG	4	

Total 100

The percentage of calm wind occurrence is listed in the center of wind rose. All directions are referenced from true north.

Calm Wind Occurrences for 1999

<u>1999</u>	<u>Calm</u> <u>Occ</u>	<u>Wind</u> <u>Occ</u>	<u>Total</u>	<u>Poss</u>	<u>MSG</u> <u>Wind</u>	<u>%</u> <u>MSG</u>	<u>%</u> <u>Calm</u>	<u>FOG</u> <u>OCC</u>
J	23	721	744	744	0	0%	3%	25
F	31	634	665	672	7	1%	5%	9
M	63	681	744	744	0	0%	8%	38
A	26	694	720	720	0	0%	4%	3
M	34	710	744	744	0	0%	5%	11
J	31	593	624	720	96	13%	4%	14
J	73	621	694	744	50	7%	10%	2
A	74	669	743	744	1	0%	10%	14
S	30	685	715	720	5	1%	4%	9
O	31	712	743	744	1	0%	4%	5
N	43	677	720	720	0	0%	6%	8
D	29	713	742	744	2	0%	4%	28

Key

Calm Occ = calm wind occurrences reported on hourly METAR observations.

Wind Occ = measurable wind occurrences reported on hourly METAR observations.

Total = total number of calm and measurable wind occurrences.

Poss = total number of hourly METAR observations.

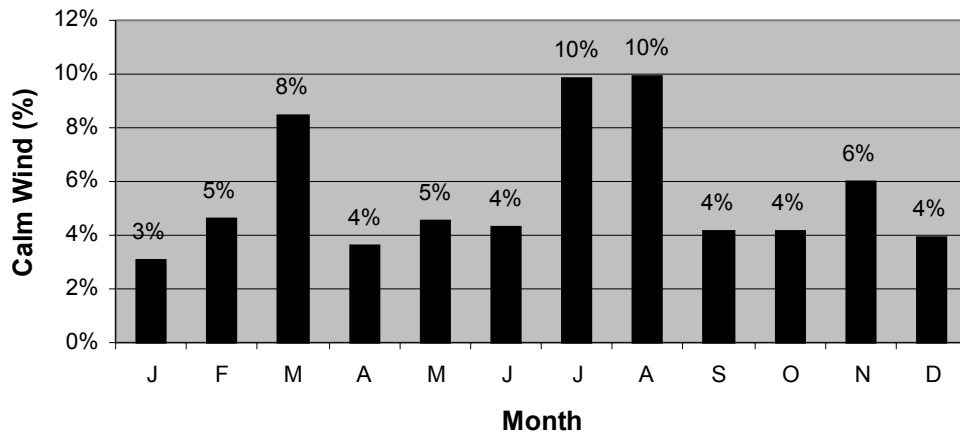
MSG Wind = missing number of hourly METAR observations.

% MSG = percent of missing hourly METAR observations.

% Calm = percent of calm hourly METAR observations.

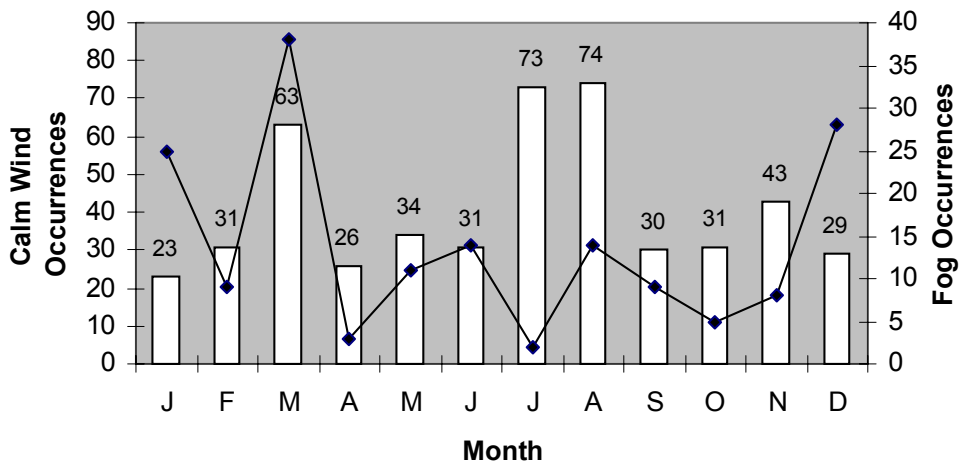
FOG OCC = number of hourly METAR observations with a reduction in visibility of less than 6 miles due to fog.

Percent of Hourly METAR's with Calm Wind (1999)



Calm Wind Versus Fog Occurrences (1999)

(White = Calm Black = Fog)



Tornadoes

Although tornadoes are rare weather events, the Fargo-Moorhead area does have a history of tornadic events. The most damaging tornado occurred on June 20, 1957. The following account of the June 20, 1957 tornado, was published as a special event summary in the North Dakota Climatological Data for June 1957, written by M. Oliver Asp.

"The most devastating tornado of record for North Dakota struck Fargo at 6:40 p.m., June 20, 1957. Ten persons were killed including seven children, six from one family. At least 103 persons were injured, of which 18 were seriously hurt and remained hospitalized five days after the tornado.

Property losses were estimated in the millions of dollars. The tornado destroyed or damaged 1364 homes, 4 churches, 3 schools, and at least 15 commercial buildings. There were 329 dwellings completely destroyed. The American Red Cross estimated that 1300 to 1400 persons were homeless.

The tornado was first observed near Wheatland, 30 miles west of Fargo. As the storm moved eastward, funnel clouds touching the ground were reported near Casselton at 5:40 p.m., and near Mapleton at 6:15 p.m. The tornado was reported west of Fargo at 6:28 p.m. As the tornado funnel approached the city it traveled in an east-southeasterly direction striking the western edge of Fargo in the Golden Ridge Addition, a low-cost housing area. Everything was demolished in the Addition as the tornado swept a complete path of destruction about 800 yards wide. All of the deaths and most of the injuries occurred in this area. From there the tornado path narrowed to about 400 yards as it gradually changed its direction to move east-northeastward through a well-built residential section in the northern part of the city. Damage in this area varied from minor loss to complete destruction. The tornado moved forward slowly at a rate of about 15 to 18 miles per hour.

The path became wider soon after the tornado changed direction; as it crossed North Broadway Street about one-half mile north of the main

business section, the path was 1000 yards wide. From there the path narrowed again, and became less than 400 yards wide as it crossed the Red River into Minnesota. In Minnesota, the path of destruction continued for about three miles in north Moorhead and adjacent farming areas.

The total length of the tornado path was about 56 miles, 30 miles in North Dakota, and 26 miles in Minnesota. Damage was severe in a continuous path about nine miles long from west of Fargo to east of Moorhead. Objects were carried for miles. A letter from the western part of Fargo was found north of Detroit Lakes, Minnesota, a distance of about 50 miles. A refrigerator from a home in the Golden Ridge area was found in Moorhead about three miles away.

Weather Bureau forecasts and warnings were given widespread distribution by radio and television. Many lives were spared, and injuries prevented because most residents either took shelter in basements or drove away from the area in automobiles.

Rainfall, following the tornado, amounted to 0.30 inch at the airport. Hail was reported in some areas in the northern part of the City. Continuous rain on the 22nd, totaling 2.77 inches caused additional loss to unprotected property damaged by the tornado.

Tornadoes are of infrequent occurrence in North Dakota. Mr. F. J. Bavendick, State Climatologist for North Dakota, in his publication "Climate and Weather in North Dakota," stated about 50 tornadoes have been reported in the State during the 25-year period ending in 1952.

Only one tornado has been reported in Fargo previously and that occurred in the west section of Fargo, less than a year ago, on August 30, 1956. One of the buildings destroyed by the tornado in 1956 was being rebuilt on the same site when it was struck again and demolished by the tornado of June 20, 1957" (U.S. Department of Commerce 1957).

The August 30, 1956 tornado, noted above, was described as *"a small twister which damaged buildings, trees and service lines in an area 150 feet wide and about 8 blocks long in the northwest part of Fargo at about 3:25 p.m. on the 30th. Estimates of damage, not complete, will run into 6 figures"* (U.S. Department of Commerce 1956).

A third tornado hit north Fargo nearly three years later, in 1959. *"Severe weather occurred on the 9th [June] when a funnel cloud in connection with a severe thunderstorm, touched the ground one half mile north of the Fargo Airport. The tornado moved a short distance through an open field. Winds up to 115 m.p.h., large hail and heavy rain caused extensive damage in the Fargo-Moorhead area"* (U.S. Department of Commerce 1959). This 115 mph wind gust measured at the Fargo Airport is a record which still stands today.

These three tornadoes, all occurring in the late 1950s, are the only tornadoes known to have touched down and caused damage in the immediate Fargo-Moorhead vicinity.

The June 20, 1957 tornado received the most attention, as it was the most devastating. It garnered national media attention. Several members of the U.S. Weather Bureau Headquarters staff visited the Fargo-Moorhead area and toured the destruction.

Ironically, Mr. Ferguson Hall, one of the people from the U.S. Weather Bureau Headquarters who toured the Fargo-Moorhead area, visited the University of Chicago and showed his pictures to several professors (U.S. Department of

Commerce 1960). Dr. Tetsuya Fujita was one of these professors. Dr. Fujita was impressed with the photographs, and decided to study the Fargo tornado in finer detail.

Dr. Fujita spent some time in Fargo, acquiring numerous camera photographs of the tornado from local residents, as well as motion picture film. His research on the 1957 Fargo tornado produced the first detailed photogrammetric analysis of tornadoes, and launched his famous meteorology career. Dr. Fujita invented the F-scale, which is still in use today as a damage scale to help determine the intensity of tornadoes.

Tornadoes, as mentioned before, are a rare weather phenomena. Tornadoes are often confused with damaging straight-line winds, which occur much more frequently during severe thunderstorms. Tornadoes send debris in a swirling path, while straight-line winds send debris in a more uniform direction.

Damaging straight-line winds can be produced by thunderstorms, or during powerful winter storms. Straight-line winds have produced much more damage in the Fargo-Moorhead area in recent years. On July 4, 1999, one such wind storm hit the Fargo-Moorhead area. The wind equipment at Fargo Hector Airport measured a peak wind gust of 91 mph. This storm produced nearly \$85 million in damages to the Fargo, Moorhead, and West Fargo areas (U.S. Department of Commerce 1999).

Some statistics on high wind events will be presented on the following pages.

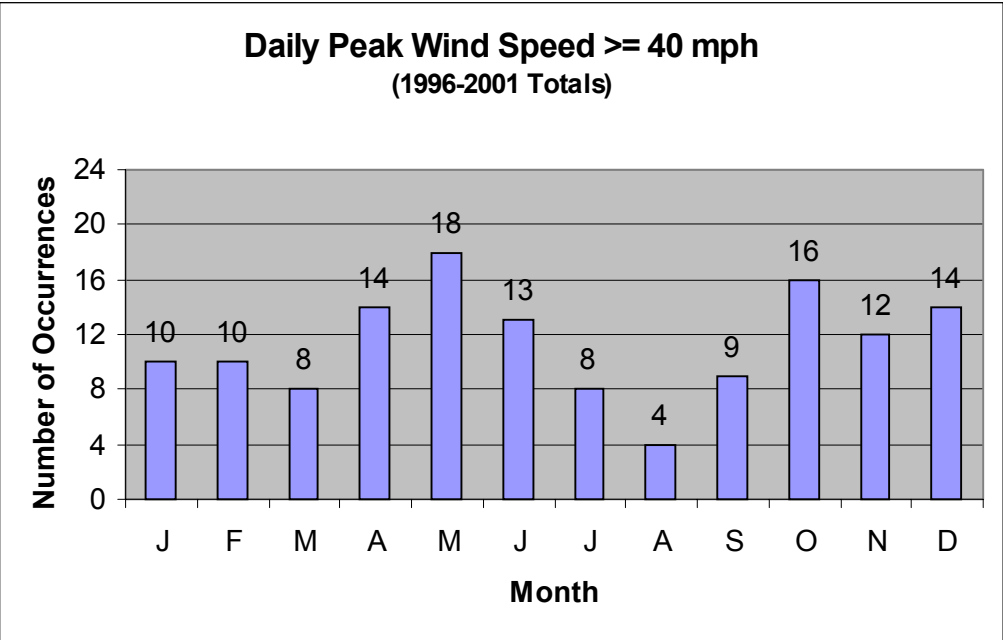
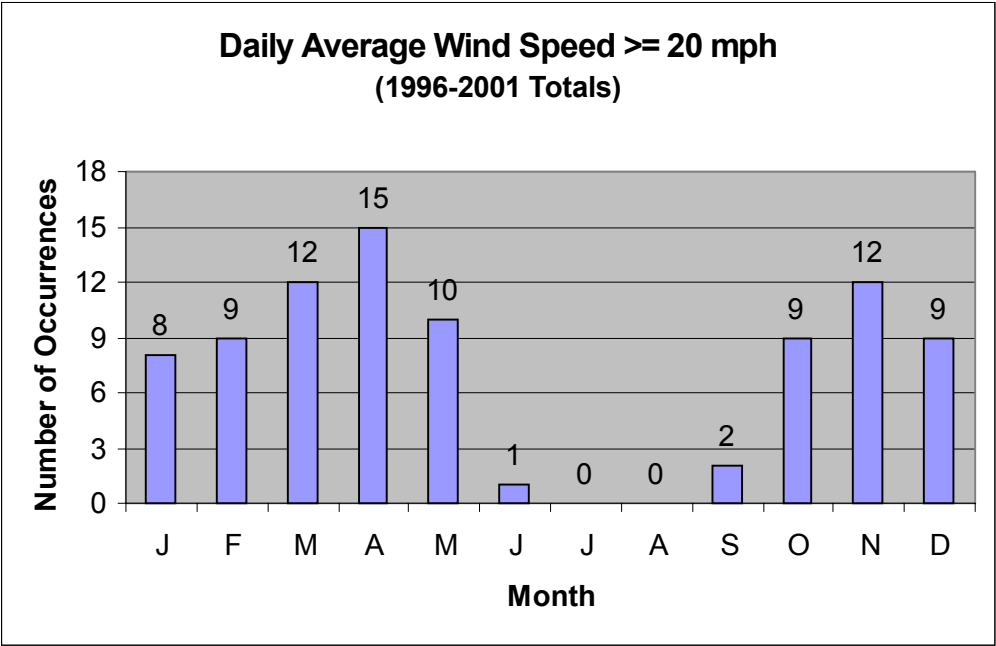
High Wind Occurrences for 1996-2001

Total Number of Daily Average Wind Speeds Greater Than or Equal to 20 Mph:

<u>Month</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>Total</u>
J	2	5	0	1	0	0	8
F	3	0	1	4	1	0	9
M	2	3	2	3	2	0	12
A	3	0	1	1	3	7	15
M	0	4	0	3	1	2	10
J	0	0	0	0	1	0	1
J	0	0	0	0	0	0	0
A	0	0	0	0	0	0	0
S	1	0	1	0	0	0	2
O	3	2	2	0	0	2	9
N	2	2	1	1	2	4	12
D	<u>3</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>2</u>	<u>0</u>	<u>9</u>
Total	19	17	9	15	12	15	87

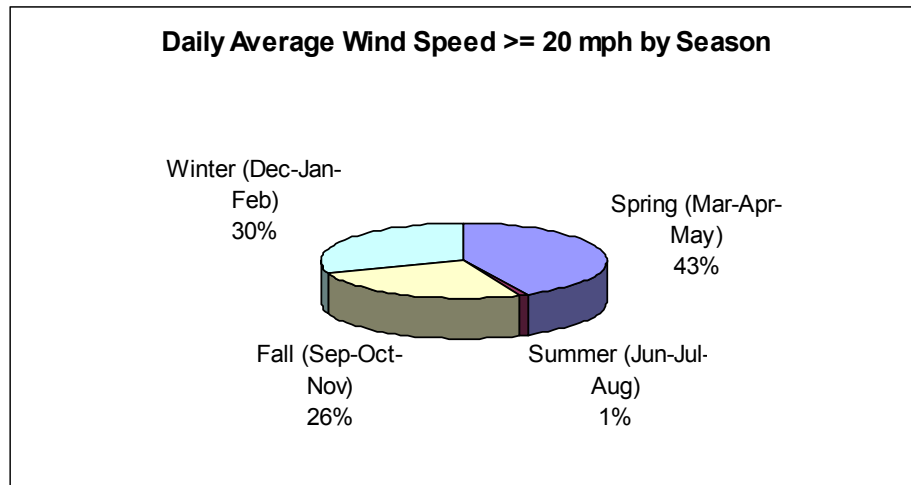
Total Number of Daily Peak Wind Speeds Greater Than or Equal to 40 Mph:

<u>Month</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>Total</u>
J	2	5	0	2	1	0	10
F	3	0	3	2	1	1	10
M	1	0	1	3	3	0	8
A	2	2	1	0	2	7	14
M	2	3	3	4	2	4	18
J	2	3	1	4	2	1	13
J	1	1	0	2	2	2	8
A	0	1	0	1	1	1	4
S	2	4	0	1	1	1	9
O	4	5	3	2	0	2	16
N	4	2	2	1	1	2	12
D	<u>4</u>	<u>0</u>	<u>3</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>14</u>
Total	27	26	17	25	18	23	136



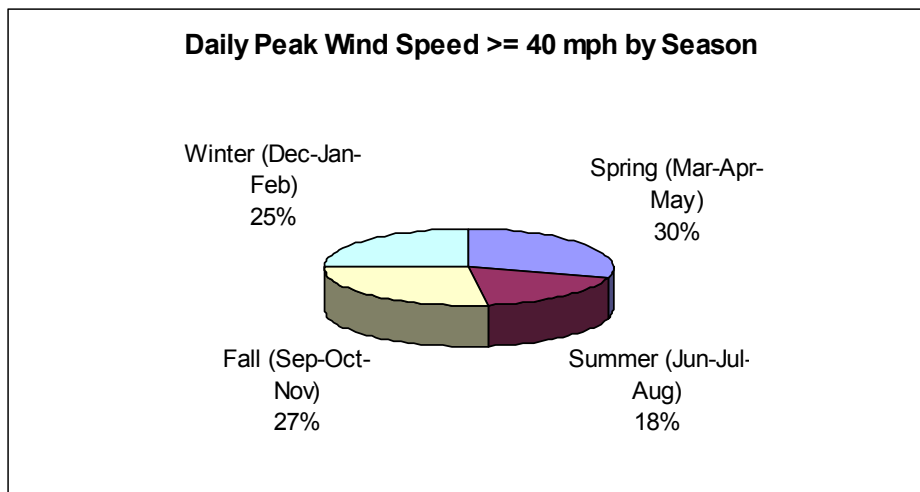
Number of Daily Average Wind Speeds Greater Than or Equal to 20 Mph by Season:

Spring (Mar-Apr-May)	37
Summer (Jun-Jul-Aug)	1
Fall (Sep-Oct-Nov)	23
Winter (Dec-Jan-Feb)	26

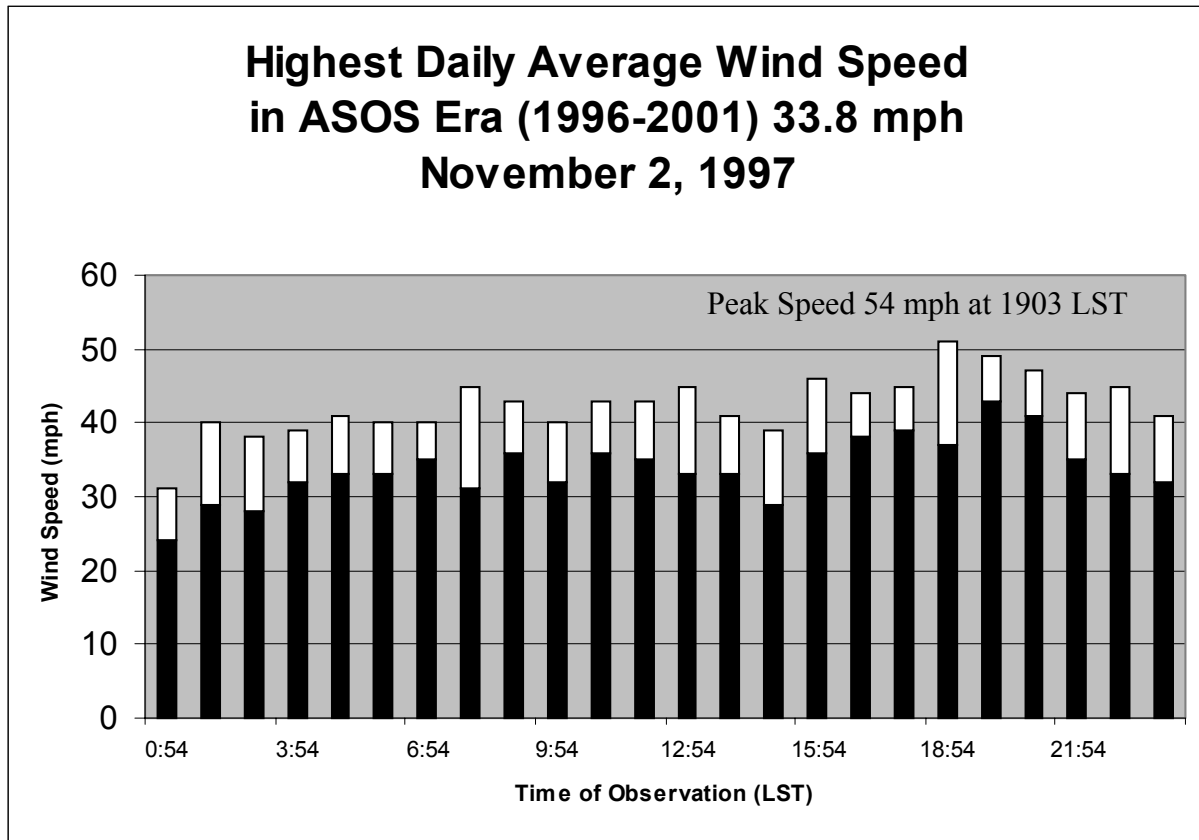


Number of Daily Peak Wind Speeds Greater Than or Equal to 40 Mph by Season:

Spring (Mar-Apr-May)	40
Summer (Jun-Jul-Aug)	25
Fall (Sep-Oct-Nov)	37
Winter (Dec-Jan-Feb)	34



Highest Daily Average Wind Speed in ASOS Era (1996-2001)



Black columns denote sustained wind speed, and white columns denote wind gust speed.

Hourly Observations from November 2, 1997

<u>Time</u> <u>(LST)</u>	<u>Wind</u> <u>Dir</u>	<u>Sust</u> <u>Wind</u>	<u>Wind</u> <u>Gust</u>
0:54	320	24	31
1:54	340	29	40
2:54	340	28	38
3:54	340	32	39
4:54	340	33	41
5:54	340	33	40
6:54	340	35	40
7:54	350	31	45
8:54	340	36	43
9:54	350	32	40
10:54	340	36	43
11:54	340	35	43
12:54	350	33	45
13:54	340	33	41
14:54	340	29	39
15:54	340	36	46
16:54	340	38	44
17:54	340	39	45
18:54	340	37	51
19:54	350	43	49
20:54	350	41	47
21:54	350	35	44
22:54	340	33	45
23:54	340	32	41

Aviation Weather - Visibility

(1996-2001)

Raw Data

<u>2001</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
LIFR	23	9	31	14	3	4	10	2	1	9	16	8	130
IFR	45	68	45	26	6	7	6	3	3	22	39	23	293
MVFR	73	48	78	29	13	18	17	8	33	19	38	74	448
VFR	603	547	590	651	722	691	711	731	683	694	627	639	7889
POSS	744	672	744	720	744	720	744	744	720	744	720	744	8760
<VFR	141	125	154	69	22	29	33	13	37	50	93	105	871

<u>2000</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
LIFR	7	24	25	14	6	6	15	2	0	14	12	35	160
IFR	26	63	38	7	8	9	7	4	3	10	61	66	302
MVFR	50	64	63	17	31	13	19	16	15	46	62	44	440
VFR	661	545	618	682	699	692	703	722	702	674	585	599	7882
POSS	744	696	744	720	744	720	744	744	720	744	720	744	8784
<VFR	83	151	126	38	45	28	41	22	18	70	135	145	902

<u>1999</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
LIFR	25	0	15	0	0	0	1	7	2	2	2	3	57
IFR	85	24	44	17	7	3	2	11	7	2	0	32	234
MVFR	89	24	48	14	18	18	6	12	22	7	10	31	299
VFR	545	624	637	689	719	699	735	714	689	733	708	678	8170
POSS	744	672	744	720	744	720	744	744	720	744	720	744	8760
<VFR	199	48	107	31	25	21	9	30	31	11	12	66	590

<u>1998</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
LIFR	27	30	29	1	0	0	12	0	5	23	21	11	159
IFR	69	75	38	9	4	3	3	8	3	23	41	25	301
MVFR	118	117	73	10	38	15	6	16	12	46	48	40	539
VFR	530	450	604	700	702	702	723	720	700	652	610	668	7761
POSS	744	672	744	720	744	720	744	744	720	744	720	744	8760
<VFR	214	222	140	20	42	18	21	24	20	92	110	76	999

Number of LIFR, IFR, MVFR, or VFR occurrences on hourly METAR reports. Covers ASOS era of computerized observations (1996-2001). LIFR, IFR, MVFR, and VFR defined on page 157.

<u>1997</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
LIFR	82	6	33	23	0	0	1	12	6	6	44	3	216
IFR	55	52	40	30	11	0	9	10	1	6	39	23	276
MVFR	77	63	44	19	10	4	23	19	3	9	59	52	382
VFR	530	551	627	648	723	716	711	703	710	723	578	666	7886
POSS	744	672	744	720	744	720	744	744	720	744	720	744	8760
<VFR	214	121	117	72	21	4	33	41	10	21	142	78	874

<u>1996</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
LIFR	55	39	37	2	4	3	4	1	0	0	33	64	242
IFR	47	45	46	7	13	6	1	4	7	6	52	71	305
MVFR	59	39	53	26	53	16	9	7	19	21	47	72	421
VFR	583	573	608	685	674	695	730	732	694	717	588	537	7816
POSS	744	696	744	720	744	720	744	744	720	744	720	744	8784
<VFR	161	123	136	35	70	25	14	12	26	27	132	207	968

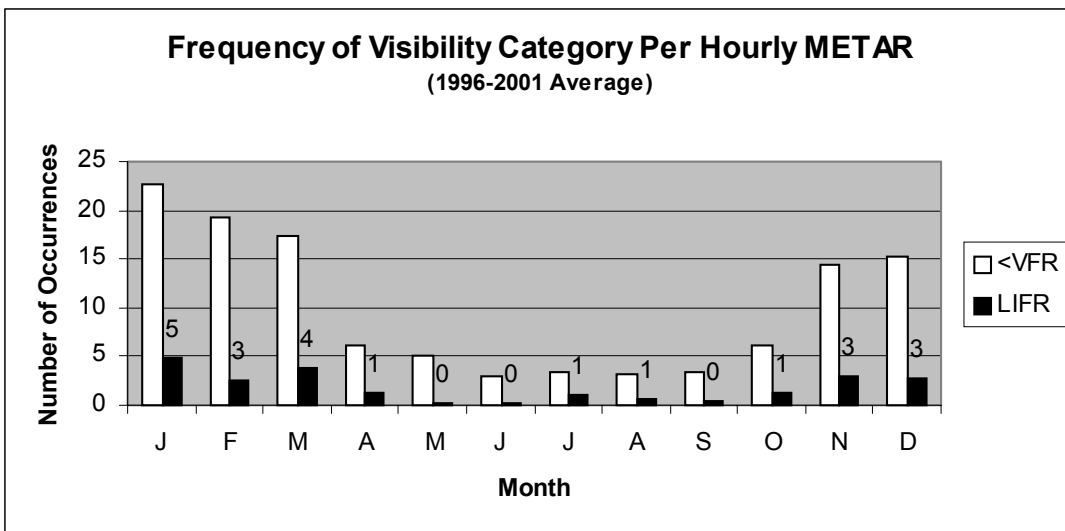
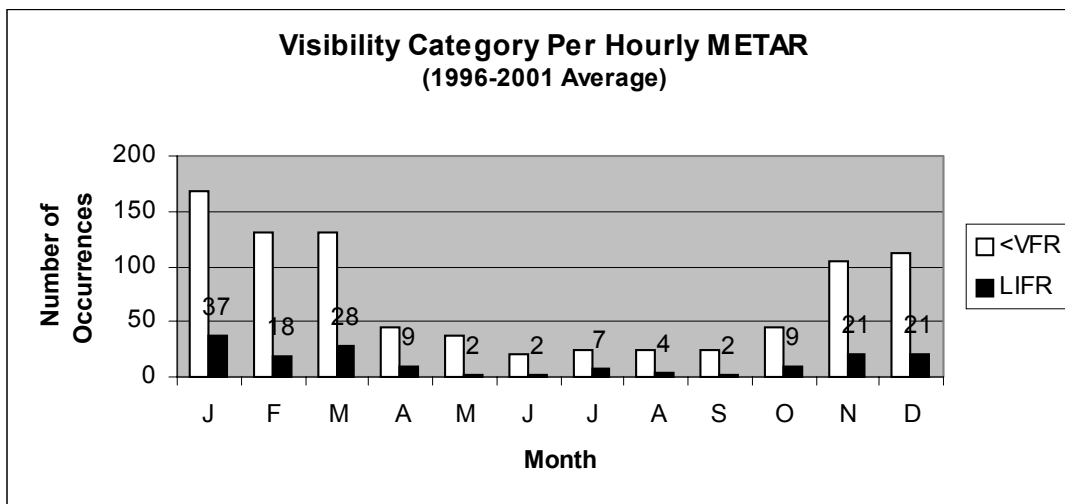
Raw Data Converted into Totals, Averages, and Frequencies:

<u>6YrTotal</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>6YrTotal</u>
LIFR	219	108	170	54	13	13	43	24	14	54	128	124	964
IFR	327	327	251	96	49	28	28	40	24	69	232	240	1711
MVFR	465	355	359	115	163	84	80	78	104	148	264	313	2528
VFR	3453	3290	3684	4055	4239	4195	4313	4322	4178	4193	3696	3787	47405
POSS	4464	4080	4464	4320	4464	4320	4464	4464	4320	4464	4320	4464	52608
<VFR	1011	790	780	265	225	125	151	142	142	271	624	677	5203

<u>6YrAvg</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>6YrAvg</u>
LIFR	37	18	28	9	2	2	7	4	2	9	21	21	161
IFR	55	55	42	16	8	5	5	7	4	12	39	40	285
MVFR	78	59	60	19	27	14	13	13	17	25	44	52	421
VFR	576	548	614	676	707	699	719	720	696	699	616	631	7901
POSS	744	680	744	720	744	720	744	744	720	744	720	744	8768
<VFR	169	132	130	44	38	21	25	24	24	45	104	113	867

Number of LIFR, IFR, MVFR, or VFR occurrences on hourly METAR reports. Covers ASOS era of computerized observations (1996-2001). LIFR, IFR, MVFR, and VFR defined on page 157.

6YrFreq	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	6YrFreq
LIFR	5	3	4	1	0	0	1	1	0	1	3	3	2
IFR	7	8	6	2	1	1	1	1	1	2	5	5	3
MVFR	10	9	8	3	4	2	2	2	2	3	6	7	5
VFR	77	81	83	94	95	97	97	97	97	94	86	85	90
POSS	100	100	100	100	100	100	100	100	100	100	100	100	100
<VFR	23	19	17	6	5	3	3	3	3	6	14	15	10

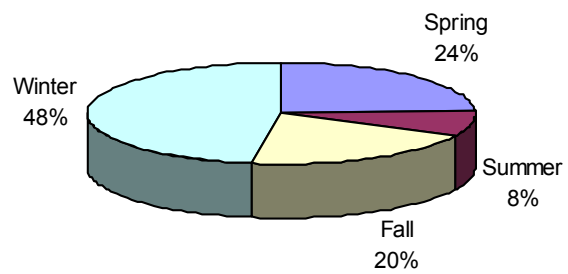


Number of LIFR, IFR, MVFR, or VFR occurrences on hourly METAR reports. Covers ASOS era of computerized observations (1996-2001). LIFR, IFR, MVFR, and VFR defined on page 157.

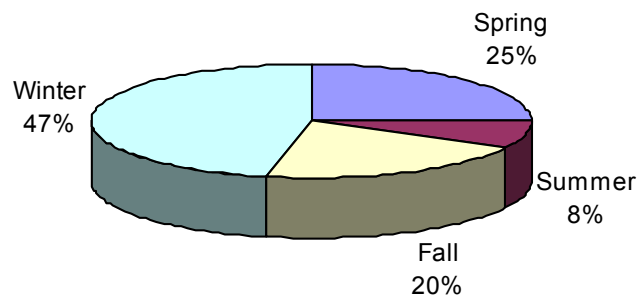
Average of 1996-2001 Visibility Data by Season

	<u><VFR</u>	<u>LIFR</u>
Spring (Mar-Apr-May)	212	40
Summer (Jun-Jul-Aug)	70	13
Fall (Sep-Oct-Nov)	173	33
Winter (Dec-Jan-Feb)	413	75

<VFR Visibilities by Season (1996-2001 Average)



LIFR Visibilities by Season (1996-2001 Average)



Obstructions to Visibility (1996-2001)

Raw Data

<u>2001</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
RA	0	0	0	9	7	6	8	1	6	7	1	1	46
FG	92	20	127	43	14	23	25	12	31	14	33	49	483
HZ	0	1	0	1	1	0	0	0	0	2	1	0	6
SN	15	38	22	7	0	0	0	0	0	0	21	33	136
S/BS	33	66	2	9	0	0	0	0	0	27	38	22	197
FZRA	1	0	3	0	0	0	0	0	0	0	0	0	4
POSS	744	672	744	720	744	720	744	744	720	744	720	744	8760
SUM	141	125	154	69	22	29	33	13	37	50	94	105	872
<u>2000</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
RA	0	13	12	8	19	19	5	6	10	17	22	0	131
FG	28	76	78	12	25	9	34	15	7	52	21	12	369
HZ	1	3	2	0	0	0	2	1	1	0	0	2	12
SN	25	38	15	11	0	0	0	0	0	0	54	45	188
S/BS	28	21	15	6	1	0	0	0	0	1	35	86	193
FZRA	1	0	4	1	0	0	0	0	0	0	1	0	7
POSS	744	696	744	720	744	720	744	744	720	744	720	744	8784
SUM	83	151	126	38	45	28	41	22	18	70	133	145	900
<u>1999</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
RA	0	0	21	18	14	6	6	16	22	5	1	0	109
FG	25	9	38	3	11	14	2	14	9	5	8	28	166
HZ	2	1	1	0	0	1	1	0	0	1	3	0	10
SN	101	5	28	0	0	0	0	0	0	0	0	6	140
S/BS	71	28	19	10	0	0	0	0	0	0	0	30	158
FZRA	0	5	0	0	0	0	0	0	0	0	0	2	7
POSS	744	672	744	720	744	720	744	744	720	744	720	744	8760
SUM	199	48	107	31	25	21	9	30	31	11	12	66	590

Obstructions to visibility (as used above) are conditions which cause a reduction in visibility to less than 6 miles on an hourly METAR report (this helps to match the LIFR, IFR, MVFR, and VFR definitions).

<u>1998</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
RA	0	24	4	7	26	15	5	8	5	35	0	0	129
FG	108	144	72	12	9	2	16	15	9	57	51	15	510
HZ	8	10	2	0	7	1	0	1	6	0	1	1	37
SN	62	25	43	0	0	0	0	0	0	0	25	19	174
S/BS	34	18	19	1	0	0	0	0	0	0	32	37	141
FZRA	2	1	0	0	0	0	0	0	0	0	1	4	8
POSS	744	672	744	720	744	720	744	744	720	744	720	744	8760
SUM	214	222	140	20	42	18	21	24	20	92	110	76	999
<u>1997</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
RA	0	0	1	18	14	3	16	11	2	9	0	0	74
FG	54	24	42	16	1	0	17	30	8	11	63	29	295
HZ	1	5	1	0	5	1	0	0	0	0	0	0	13
SN	41	54	21	10	1	0	0	0	0	1	36	22	186
S/BS	117	38	52	22	0	0	0	0	0	0	43	27	299
FZRA	1	1	0	6	0	0	0	0	0	0	0	0	8
POSS	744	672	744	720	744	720	744	744	720	744	720	744	8760
SUM	214	122	117	72	21	4	33	41	10	21	142	78	875
<u>1996</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
RA	2	15	4	1	21	8	7	6	9	12	10	2	97
FG	39	17	26	21	31	11	7	6	6	12	32	35	243
HZ	12	8	1	7	20	6	0	0	11	2	7	0	74
SN	46	4	43	2	0	0	0	0	0	0	28	33	156
S/BS	60	78	62	4	0	0	0	0	0	1	55	135	395
FZRA	2	2	0	0	0	0	0	0	0	0	0	2	6
POSS	744	696	744	720	744	720	744	744	720	744	720	744	8784
SUM	161	124	136	35	72	25	14	12	26	27	132	207	971

Key

RA = Rain or any occurrence of liquid precipitation.

FG = Fog when temperature/dew point spread is 3 degrees or less.

HZ = Haze when temperature/dew point spread is greater than 3 degrees.

SN = Snow or any occurrence of frozen precipitation.

S/BS = Snow and blowing snow when accompanied by wind speeds greater than or equal to 17 mph (15 knots).

FZRA = Freezing rain or any freezing precipitation.

Obstructions to visibility (as used above) are conditions which cause a reduction in visibility to less than 6 miles on an hourly METAR report (this helps to match the LIFR, IFR, MVFR, and VFR definitions).

Raw Data Converted into Totals, Averages, and Frequencies:

<u>6YrTotal</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>6YrTotal</u>
RA	2	52	42	61	101	57	47	48	54	85	34	3	586
FG	346	290	383	107	91	59	101	92	70	151	208	168	2066
HZ	24	28	7	8	33	9	3	2	18	5	12	3	152
SN	290	164	172	30	1	0	0	0	0	1	164	158	980
S/BS	343	249	169	52	1	0	0	0	0	29	203	337	1383
FZRA	7	9	7	7	0	0	0	0	0	0	2	8	40
POSS	4464	4080	4464	4320	4464	4320	4464	4464	4320	4464	4320	4464	52608
SUM	1012	792	780	265	227	125	151	142	142	271	623	677	5207

<u>6YrAvg</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>6YrAvg</u>
RA	0	9	7	10	17	10	8	8	9	14	6	1	98
FG	58	48	64	18	15	10	17	15	12	25	35	28	344
HZ	4	5	1	1	6	2	1	0	3	1	2	1	25
SN	48	27	29	5	0	0	0	0	0	0	27	26	163
S/BS	57	42	28	9	0	0	0	0	0	5	34	56	231
FZRA	1	2	1	1	0	0	0	0	0	0	0	1	7
POSS	744	680	744	720	744	720	744	744	720	744	720	744	8768
SUM	169	132	130	44	38	21	25	24	24	45	104	113	868

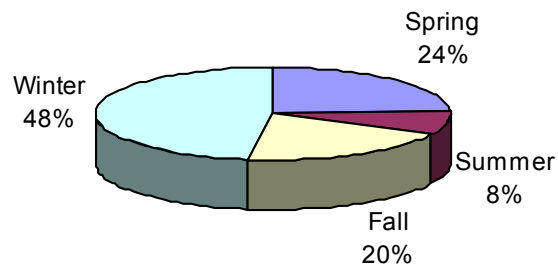
<u>6YrFreq</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>6YrFreq</u>
RA	0	1	1	1	2	1	1	1	1	2	1	0	1
FG	8	7	9	2	2	1	2	2	2	3	5	4	4
HZ	1	1	0	0	1	0	0	0	0	0	0	0	0
SN	6	4	4	1	0	0	0	0	0	0	4	4	2
S/BS	8	6	4	1	0	0	0	0	0	1	5	8	3
FZRA	0	0	0	0	0	0	0	0	0	0	0	0	0
POSS	100	100	100	100	100	100	100	100	100	100	100	100	100
SUM	23	19	17	6	5	3	3	3	3	6	14	15	10

Obstructions to visibility (as used above) are conditions which cause a reduction in visibility to less than 6 miles on an hourly METAR report. **6YrFreq** values are in percent.

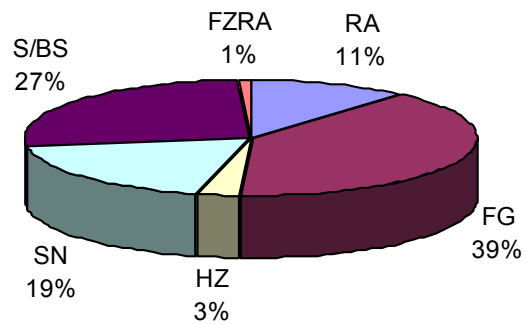
Average of 1996-2001 Obstructions to Visibility Data by Season

Spring (Mar-Apr-May)	212
Summer (Jun-Jul-Aug)	70
Fall (Sep-Oct-Nov)	173
Winter (Dec-Jan-Feb)	414

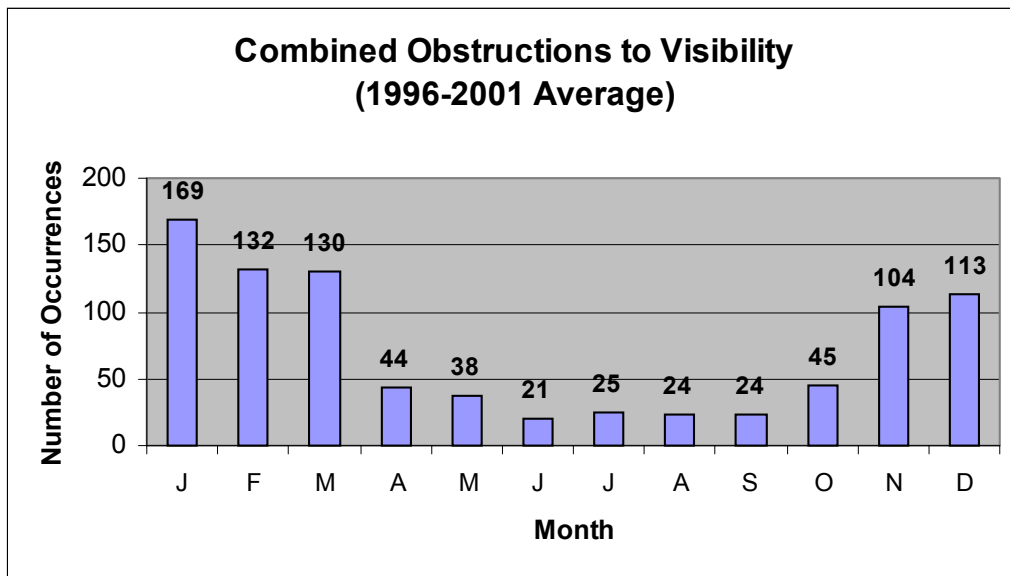
**Obstructions to Visibility by Season
(1996-2001 Average)**



Obstructions to Visibility (1996-2001 Average)



Obstructions to visibility (as used above) are conditions which cause a reduction in visibility to less than 6 miles on an hourly METAR report.



Definitions of LIFR, IFR, MVFR, and VFR

	<u>Ceiling</u>	<u>Visibility</u>
LIFR	<500 feet	<1 mile
IFR	500-900 feet	1-<3 miles
MVFR	1000-3000 feet	3-5 miles
VFR	>3000 feet	>5 miles

LIFR = Low Instrument Flight Rules
IFR = Instrument Flight Rules
MVFR = Marginal Visual Flight Rules
VFR = Visual Flight Rules

Ceiling and Visibility are defined on page 157

Near Zero Visibility (1996-2001)

Raw Data

<u>2001</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
FG	11	1	16	4	1	0	8	1	0	1	3	0	46
S/BS	0	0	0	0	0	0	0	0	0	1	0	1	2
RA	0	0	0	0	0	0	0	0	0	0	0	0	0
POSS	744	672	744	720	744	720	744	744	720	744	720	744	8760
SUM	11	1	16	4	1	0	8	1	0	2	3	1	48

<u>2000</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
FG	5	7	8	2	5	3	12	1	0	11	1	0	55
S/BS	0	0	6	3	0	0	0	0	0	0	3	20	32
RA	0	0	0	0	0	0	0	0	0	0	0	0	0
POSS	744	696	744	720	744	720	744	744	720	744	720	744	8784
SUM	5	7	14	5	5	3	12	1	0	11	4	20	87

<u>1999</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
FG	0	0	8	0	0	0	0	3	1	0	0	0	12
S/BS	0	0	0	0	0	0	0	0	0	0	0	0	0
RA	0	0	0	0	0	0	0	0	1	0	0	0	1
POSS	744	672	744	720	744	720	744	744	720	744	720	744	8760
SUM	0	0	8	0	0	0	0	3	2	0	0	0	13

<u>1998</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
FG	6	15	25	0	0	0	11	0	4	18	5	0	84
S/BS	0	0	0	0	0	0	0	0	0	0	4	0	4
RA	0	0	0	0	0	0	0	0	0	0	0	0	0
POSS	744	672	744	720	744	720	744	744	720	744	720	744	8760
SUM	6	15	25	0	0	0	11	0	4	18	9	0	88

Number of visibility occurrences of 1/4 mile or less which occur on the hourly METAR report. Covers the ASOS era of computerized observations (1996-2001).

<u>1997</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
FG	2	1	3	3	0	0	0	6	5	2	10	0	32
S/BS	43	0	4	12	0	0	0	0	0	0	2	0	61
RA	0	0	0	0	0	0	0	0	0	0	0	0	0
POSS	744	672	744	720	744	720	744	744	720	744	720	744	8760
SUM	45	1	7	15	0	0	0	6	5	2	12	0	93

<u>1996</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
FG	11	2	6	1	2	1	3	0	0	0	2	0	28
S/BS	27	16	11	0	0	0	0	0	0	0	5	26	85
RA	0	0	0	0	0	0	0	0	0	0	0	0	0
POSS	744	696	744	720	744	720	744	744	720	744	720	744	8784
SUM	38	18	17	1	2	1	3	0	0	0	7	26	113

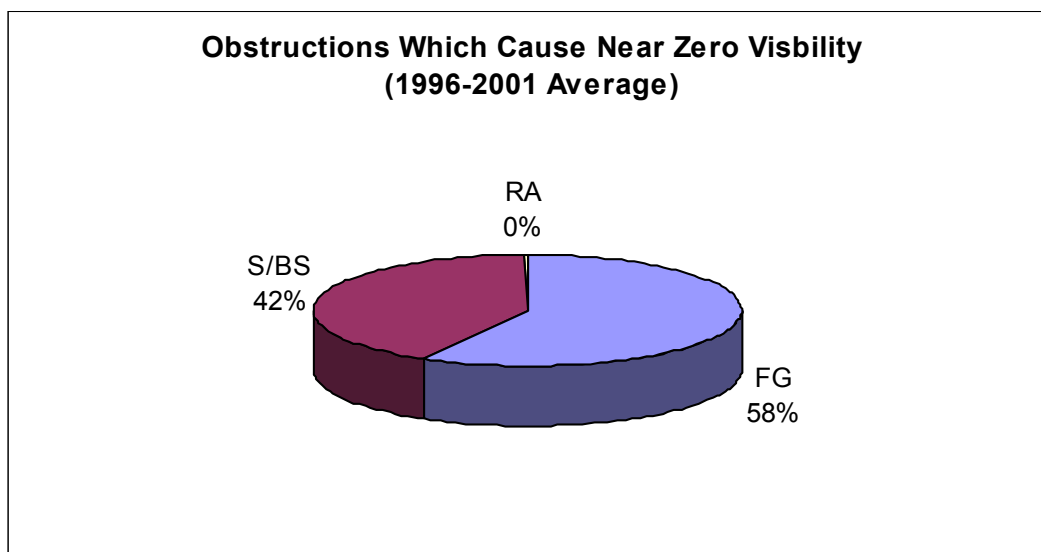
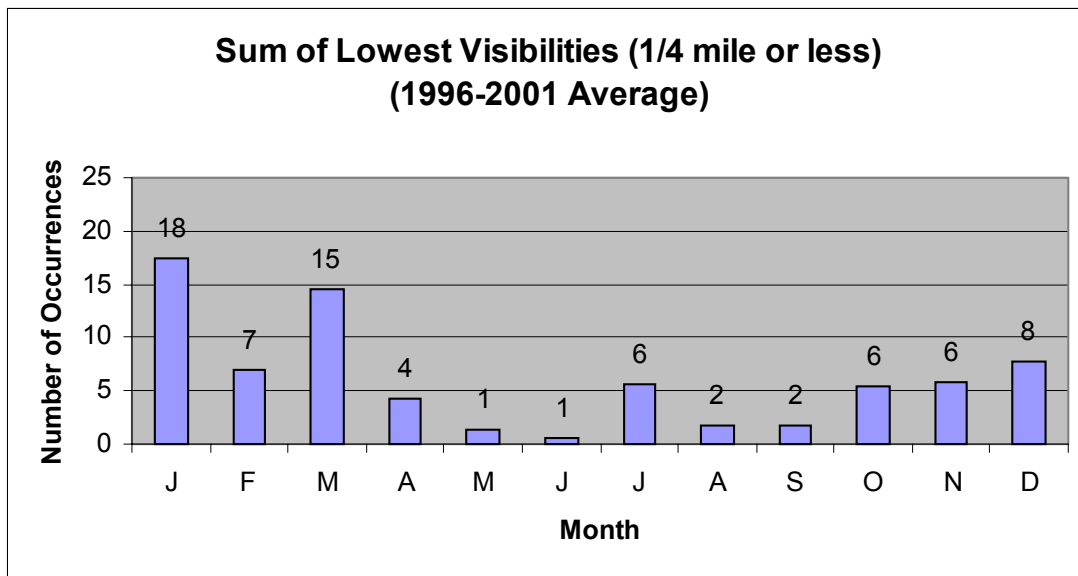
Raw Data Converted into Totals, Averages, and Frequencies

<u>6YrTotal</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>6YrTotal</u>
FG	35	26	66	10	8	4	34	11	10	32	21	0	257
S/BS	70	16	21	15	0	0	0	0	0	1	14	47	184
RA	0	0	0	0	0	0	0	0	1	0	0	0	1
POSS	4464	4080	4464	4320	4464	4320	4464	4464	4320	4464	4320	4464	52608
SUM	105	42	87	25	8	4	34	11	11	33	35	47	442

<u>6YrAvg</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>6YrAvg</u>
FG	6	4	11	2	1	1	6	2	2	5	4	0	43
S/BS	12	3	4	3	0	0	0	0	0	0	2	8	31
RA	0	0	0	0	0	0	0	0	0	0	0	0	0
POSS	744	680	744	720	744	720	744	744	720	744	720	744	8768
SUM	18	7	15	4	1	1	6	2	2	6	6	8	74

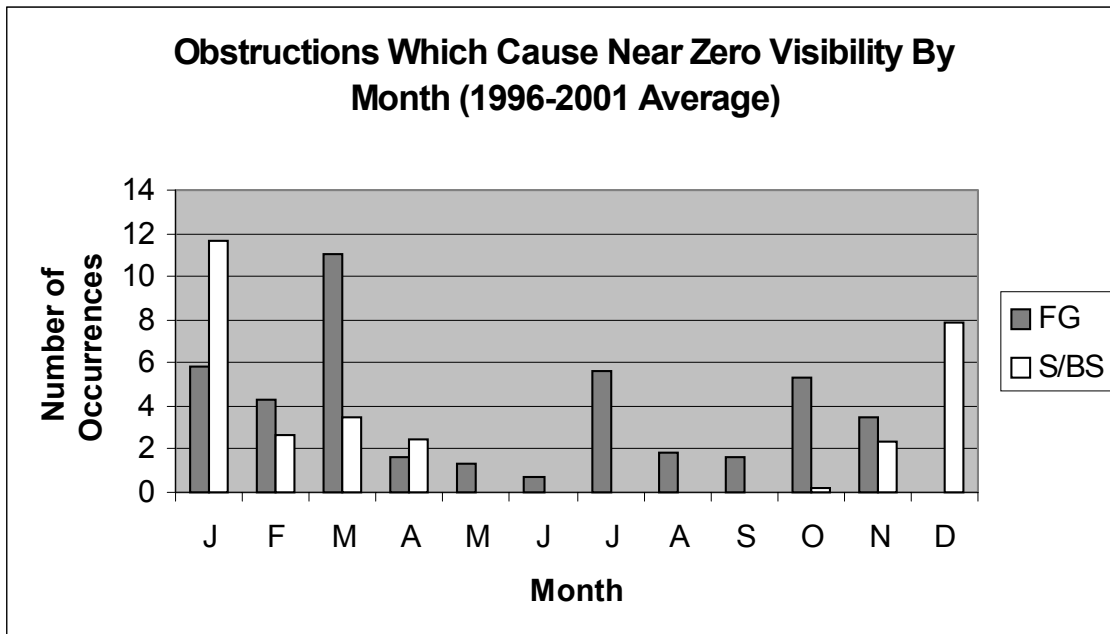
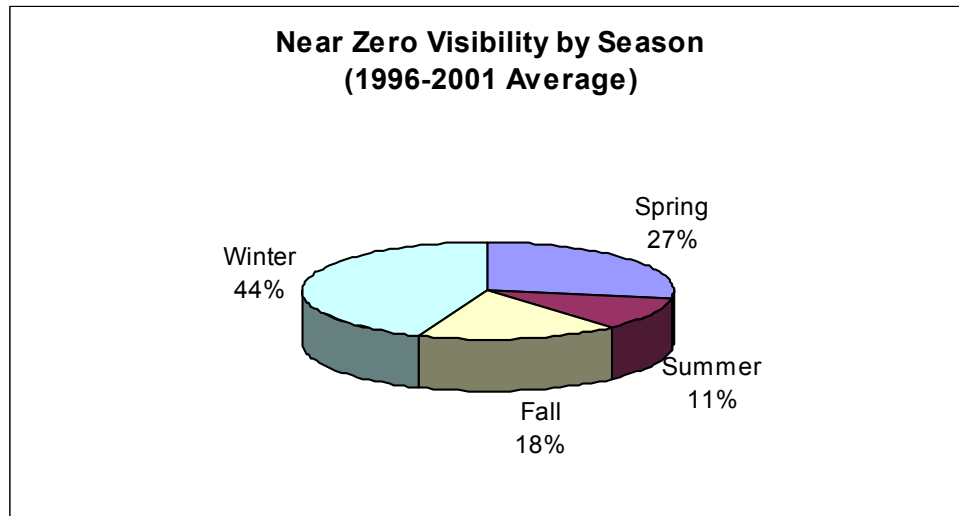
Number of visibility occurrences of 1/4 mile or less which occur on the hourly METAR report. Covers the ASOS era of computerized observations (1996-2001).

6YrFreq	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	6YrFreq
FG	1	1	1	0	0	0	1	0	0	1	0	0	0
S/BS	2	0	0	0	0	0	0	0	0	0	0	1	0
RA	0	0	0	0	0	0	0	0	0	0	0	0	0
POSS	100	100	100	100	100	100	100	100	100	100	100	100	100
SUM	2	1	2	1	0	0	1	0	0	1	1	1	1



Average of 1996-2001 Near Zero Visibility Data by Season

Spring (Mar-Apr-May)	20
Summer (Jun-Jul-Aug)	8
Fall (Sep-Oct-Nov)	13
Winter (Dec-Jan-Feb)	32



Aviation Weather - Ceilings (1996-2001)

Raw Data

2001	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
LIFR	68	10	53	15	5	12	15	2	7	7	11	9	214
IFR	69	40	58	35	20	16	4	6	22	14	53	41	378
MVFR	146	109	132	166	71	36	36	11	65	41	123	207	1143
VFR	461	513	501	504	648	656	689	725	626	682	533	487	7025

POSS	744	672	744	720	744	720	744	744	720	744	720	744	8760
<VFR	283	159	243	216	96	64	55	19	94	62	187	257	1735

2000	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
LIFR	7	32	21	9	7	4	19	5	4	20	33	6	167
IFR	25	37	24	11	5	11	4	16	22	42	99	21	317
MVFR	122	117	103	38	55	45	40	69	89	144	218	222	1262
VFR	590	510	596	662	677	660	681	654	605	538	370	495	7038

POSS	744	696	744	720	744	720	744	744	720	744	720	744	8784
<VFR	154	186	148	58	67	60	63	90	115	206	350	249	1746

1999	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
LIFR	3	5	15	19	0	0	3	7	43	2	2	16	115
IFR	76	25	27	21	15	10	5	17	14	5	0	49	264
MVFR	134	126	106	67	140	42	29	38	73	45	41	101	942
VFR	531	516	596	613	589	668	707	682	590	692	677	578	7439

POSS	744	672	744	720	744	720	744	744	720	744	720	744	8760
<VFR	213	156	148	107	155	52	37	62	130	52	43	166	1321

1998	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
LIFR	61	78	49	1	2	1	18	1	6	60	30	12	319
IFR	90	92	70	13	5	20	4	2	0	47	55	19	417
MVFR	219	224	180	70	43	62	18	46	23	151	163	101	1300
VFR	374	278	445	636	694	637	704	695	691	486	472	612	6724

POSS	744	672	744	720	744	720	744	744	720	744	720	744	8760
<VFR	370	394	299	84	50	83	40	49	29	258	248	132	2036

Number of LIFR, IFR, MVFR, or VFR occurrences on hourly METAR reports. Covers ASOS era of computerized observations (1996-2001). Ceiling defined on page 157.

<u>1997</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
LIFR	59	21	13	47	4	0	7	11	8	8	48	13	239
IFR	39	54	32	10	6	8	20	11	4	12	40	69	305
MVFR	115	184	84	61	74	34	77	56	22	118	241	162	1228
VFR	531	413	615	602	660	678	640	666	686	606	391	500	6988

POSS	744	672	744	720	744	720	744	744	720	744	720	744	8760
<VFR	213	259	129	118	84	42	104	78	34	138	329	244	1772

<u>1996</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
LIFR	48	16	19	15	17	9	5	1	12	13	44	38	237
IFR	33	35	26	8	19	11	4	1	16	18	44	96	311
MVFR	83	109	113	89	84	61	55	27	56	106	123	190	1096
VFR	580	536	586	608	624	639	680	715	636	607	509	420	7140

POSS	744	696	744	720	744	720	744	744	720	744	720	744	8784
<VFR	164	160	158	112	120	81	64	29	84	137	211	324	1644

Raw Data Converted into Totals, Averages, and Frequencies:

<u>6YrTotal</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>6YrTotal</u>
LIFR	246	162	170	106	35	26	67	27	80	110	168	94	1291
IFR	332	283	237	98	70	76	41	53	78	138	291	295	1992
MVFR	819	869	718	491	467	280	255	247	328	605	909	983	6971
VFR	3067	2766	3339	3625	3892	3938	4101	4137	3834	3611	2952	3092	42354

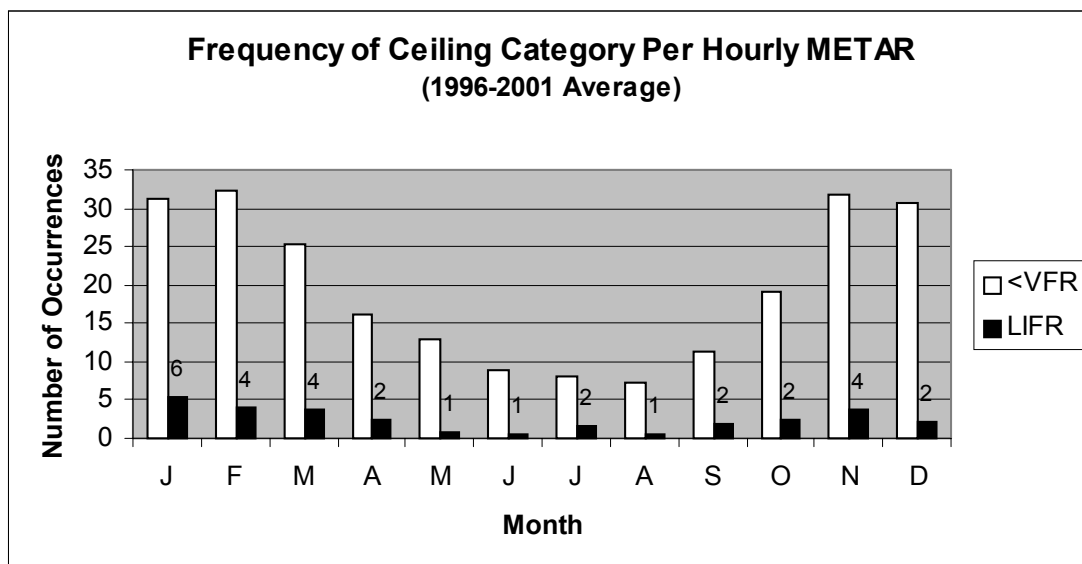
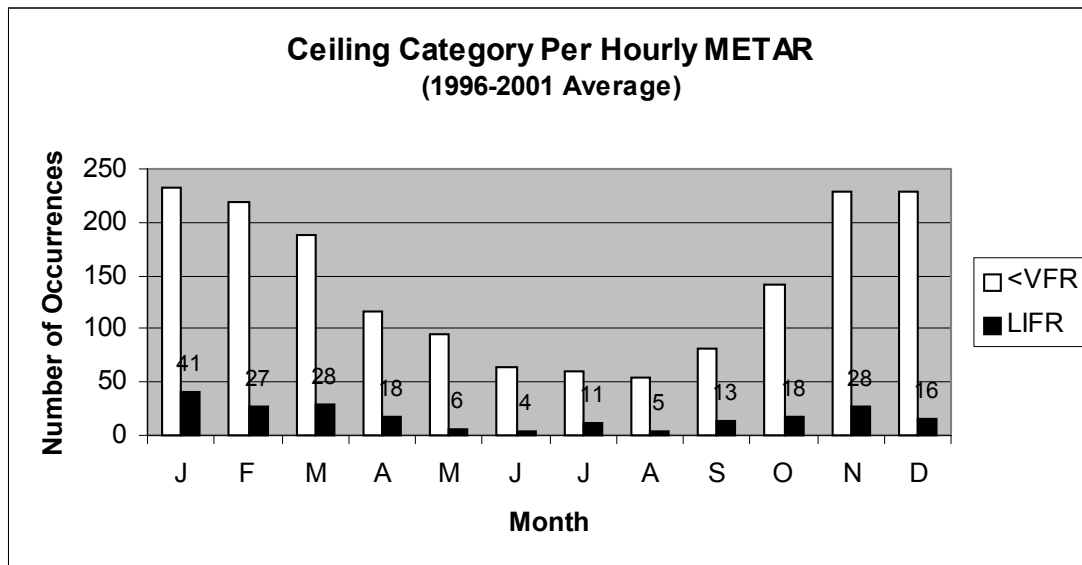
POSS	4464	4080	4464	4320	4464	4320	4464	4464	4320	4464	4320	4464	52608
<VFR	1397	1314	1125	695	572	382	363	327	486	853	1368	1372	10254

<u>6YrAvg</u>	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>6YrAvg</u>
LIFR	41	27	28	18	6	4	11	5	13	18	28	16	215
IFR	55	47	40	16	12	13	7	9	13	23	49	49	332
MVFR	137	145	120	82	78	47	43	41	55	101	152	164	1162
VFR	511	461	557	604	649	656	684	690	639	602	492	515	7059

POSS	744	680	744	720	744	720	744	744	720	744	720	744	8768
<VFR	233	219	188	116	95	64	61	55	81	142	228	229	1709

Number of LIFR, IFR, MVFR, or VFR occurrences on hourly METAR reports. Covers ASOS era of computerized observations (1996-2001). Ceiling defined on page 157.

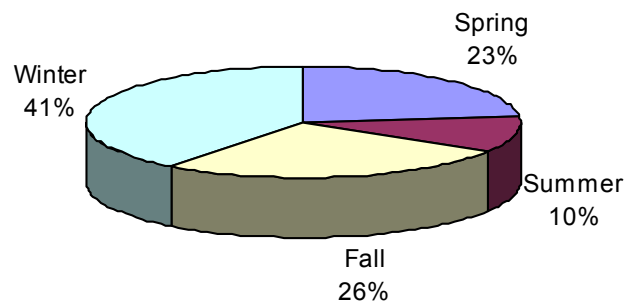
6YrFreq	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	6YrFreq
LIFR	6	4	4	2	1	1	2	1	2	2	4	2	2
IFR	7	7	5	2	2	2	1	1	2	3	7	7	4
MVFR	18	21	16	11	10	6	6	6	8	14	21	22	13
VFR	69	68	75	84	87	91	92	93	89	81	68	69	81
POSS	100	100	100	100	100	100	100	100	100	100	100	100	100
<VFR	31	32	25	16	13	9	8	7	11	19	32	31	19



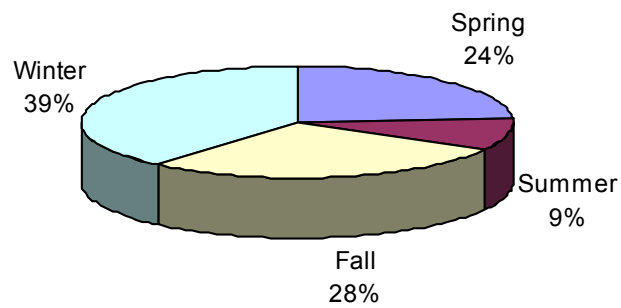
Average of 1996-2001 Ceiling Data by Season

	<VFR	LIFR
Spring (Mar-Apr-May)	399	52
Summer (Jun-Jul-Aug)	179	20
Fall (Sep-Oct-Nov)	451	60
Winter (Dec-Jan-Feb)	681	84

<VFR Ceilings by Season (1996-2001 Average)



LIFR Ceilings by Season (1996-2001 Average)



List of Abbreviations/Definitions

ASOS	Automated Surface Observing System (was commissioned in Fargo on November 1, 1995)
LIFR	Low Instrument Flight Rules or ceiling less than 500 feet AGL and/or visibility less than 1 statute mile.
IFR	Instrument Flight Rules or ceiling 500-900 feet AGL and/or visibility 1-<3 statute miles.
MVFR	Marginal Visual Flight Rules or ceiling 1000-3000 feet AGL and/or visibility 3-5 statute miles.
VFR	Visual Flight Rules or ceiling greater than 3000 feet AGL and/or visibility greater than 5 statute miles.
METAR Report	Surface aviation weather report which contains all the required surface meteorological elements (usually taken roughly 5 minutes before the hour). These elements are sky condition, visibility, weather and obstructions to vision, sea-level pressure, temperature, dew point, wind, and altimeter setting.
POSS	Possible
MaxT	Maximum Temperature (°F)
MinT	Minimum Temperature (°F)
AvgT	Average Temperature (°F)
Pcpn	Precipitation (liquid form) reported to the nearest hundredth of an inch
Snow	Snowfall (frozen form) reported to the nearest tenth of an inch
Depth	Snow Depth reported to the nearest whole inch
HDD	Heating Degree Days (Daily Average Temperature - 65 °F)
CDD	Cooling Degree Days (65 °F - Daily Average Temperature)
CST	Central Standard Time
CDT	Central Daylight Time (CST minus one hour)
LST	Local Standard Time (same as CST)
MAvg	Monthly Average

T	Trace or less than 0.005 inches for liquid precipitation, and less than 0.05 inches for frozen precipitation.
VSBY	Visibility or 10 foot visibility. ASOS uses a forward scatter sensor which measures only forward scattered light. More particles in the air equals more scattered light. The ASOS algorithm measures a light return every 30 seconds. The hourly METAR observation is an average 1-minute value from the past 10 minutes. Visibility is measured in statute miles (SM).
WIND DIR	Wind Direction (from true north) or 10 meter (32.8 feet) wind direction. ASOS measures the wind direction every second. 5-second wind direction averages are then computed from these 1-second readings. The sustained wind direction on the hourly METAR report is a 2 minute average of these 5-second wind direction averages taken 2 minutes prior to the observation time.
SUST WIND	Sustained Wind or 10 meter (32.8 feet) wind. ASOS measures the wind speed every second. 5-second wind speed averages are then computed from these 1-second readings. The sustained wind on the hourly METAR report is a 2 minute average of these 5-second wind speed averages taken 2 minutes prior to the observation time. Sustained wind is measured in miles per hour (mph).
WIND GUST	Wind gusts are rapid fluctuations in wind speed with a variation of 10 knots or more between the high and the low speed. The last 10 minutes of 5-second averages are checked for wind gusts. Wind gusts are measured in miles per hour (mph).
ALT SET	Altimeter Setting (inches of mercury)
Ceiling	Cloud ceiling is measured by a laser beam ceilometer. ASOS uses an algorithm that checks 30 minutes of 30-second samples of cloud "hits." By using this sampling technique, ASOS gets a larger sample area than just immediately above the sensor. Ceiling is the elevation of cloud bases for a broken or overcast cloud layer. A broken cloud layer covers 51-87% of the sky. An overcast cloud layer covers 87-100% of the sky. Ceiling is measured in feet above ground level (AGL).
Obstructions	Obstructions to visibility are produced by precipitation and other weather phenomenon such as fog and haze. These are reported in an hourly METAR report when they reduce the visibility to less than 7 miles. ASOS has a harder time with weather and obstructions to vision than it does for wind and ceilings, especially during the winter. ASOS algorithms for obstructions cross reference temperature, particle size, and fall velocity to try to determine the obstruction.
Dew Point	Dew point is the temperature to which a given parcel of air must be cooled at a constant pressure and constant water vapor content in order for saturation to occur.