# Iowa Tornado Climatology 1980-2019

**EF-5 Tornado near New Hartford, Iowa 5/25/2008**
**Courtesy of Rod Donavon**


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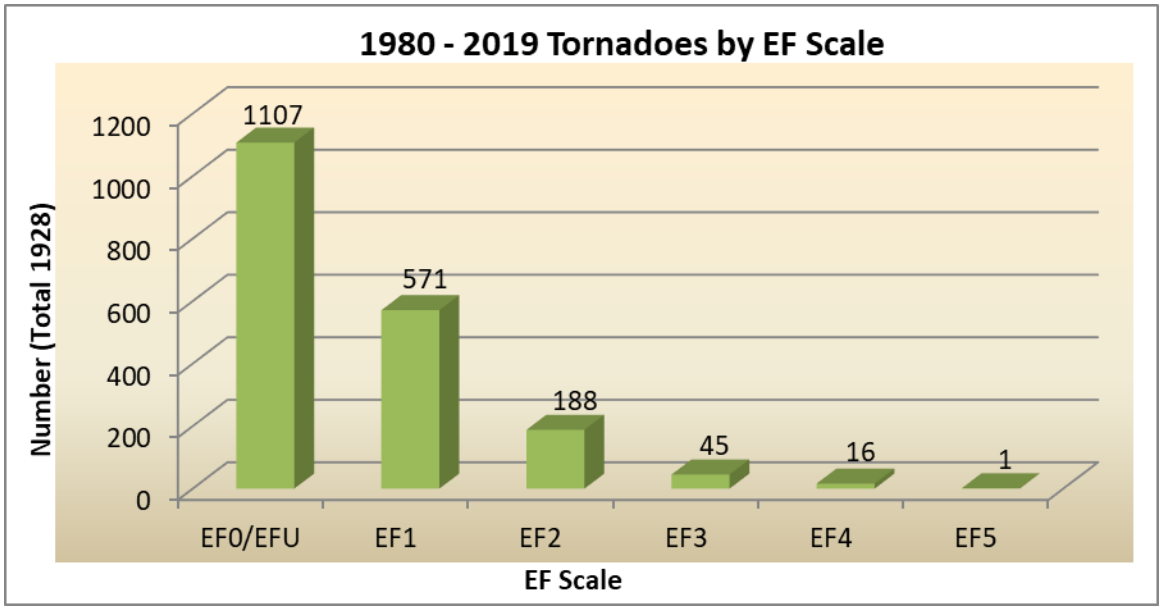
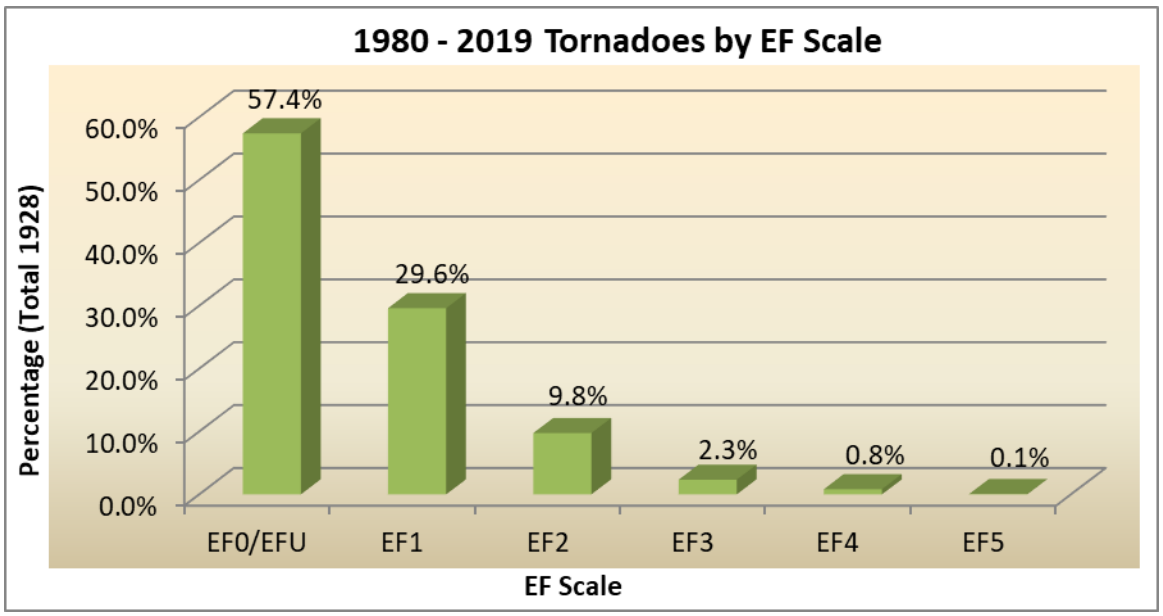
The following data contains tornado information for the state of Iowa from 1980 through 2019. The information provided was derived from National Weather Service Storm Data reports archived at the National Centers for Environmental Information. The cutoff at 1980 was chosen for two particular reasons: First, reporting of tornadoes was much more sporadic prior to this time with numbers skewed heavily toward stronger events. These events tended to cause more damage, therefore attracting the attention of local authorities if not the general media as well. As a result, there was higher probability for the stronger tornadoes to be reported to the local National Weather Service office for inclusion into Storm Data. Weak tornadoes may have also been observed, but due to the lack of damage and/or poor communications, the report never made it beyond the local coffee shop. Secondly, tornadoes are rated on the EF-scale (Enhanced Fujita scale) via a damage assessment. Prior to 1980, much of the assessment was done via newspaper articles and pictures often several years and in some instances, decades after the event. Although much information can be gleaned from these articles and pictures, a good EF-scale assessment should be done as quickly as possible after the event and if possible, at the location of the event. This is not an attempt to minimize events prior to 1980, since many significant events occurred prior to this time (e.g. Jordon Tornado, Charles City Tornado, etc…). However, from a climatological perspective, it was felt that the better assessment and reporting procedures of the last 40 years would be used to build the database.

## Totals Data

The total number of tornadoes over the 40 year period in Iowa is 1928. The first two charts below give an EF-scale breakdown of these tornadoes and their respective percentages.






What is obvious from the above charts is that a very large majority (87%) of the tornadoes are on the low end of the scale (EF0/EFU, EF1). The remaining 13 percent of tornadoes were rated EF2 through EF5. The single EF5 tornado was the Parkersburg tornado which occurred on May 25th, 2008 producing nine fatalities.

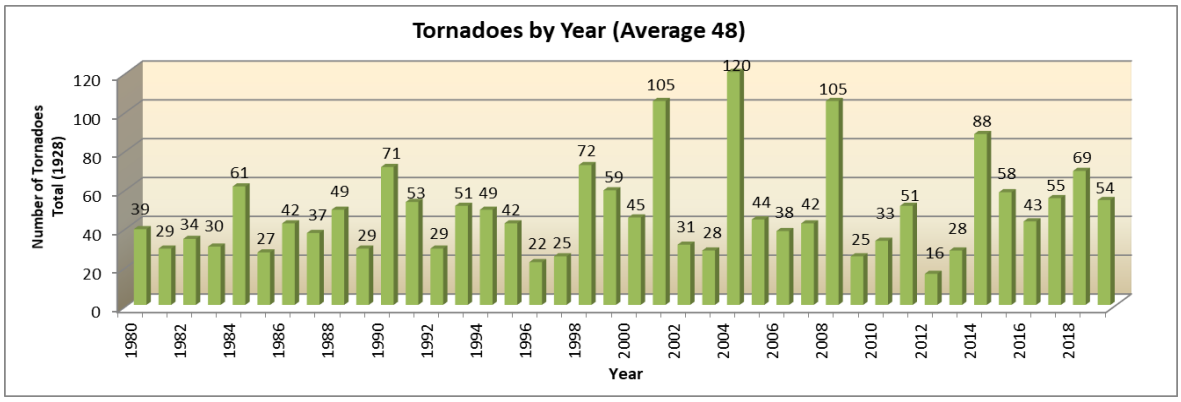
There was a transition between the older F-scale (Fujita) and newer EF-scale (Enhanced Fujita) occurring on Jan 31, 2007. The comparison between the scales is given below.

| FUJITA SCALE | | **OPERATIONAL EF SCALE** | |
|---|---|---|---|
| F Number | Fastest 1/4-mile (mph) | **EF Number** | **3 Second Gust (mph)** |
| 0 | 40-72 | **0** | **65-85** |
| 1 | 73-112 | **1** | **86-110** |
| 2 | 113-157 | **2** | **111-135** |
| 3 | 158-207 | **3** | **136-165** |
| 4 | 208-260 | **4** | **166-200** |
| 5 | 261-318 | **5** | **Over 200** |

*The Enhanced F-scale is still a set of wind estimates (not measurements) based on damage.* It uses three-second gusts estimated at the point of damage based on a judgment of up to 10 levels of damage to the 28 indicators. These estimates vary with height and exposure.

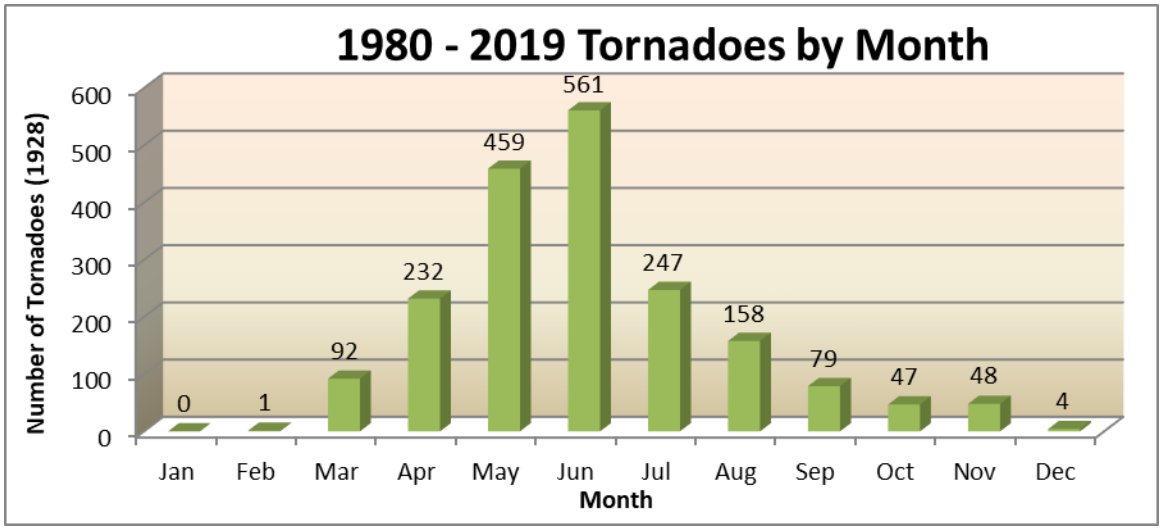
## Yearly Data

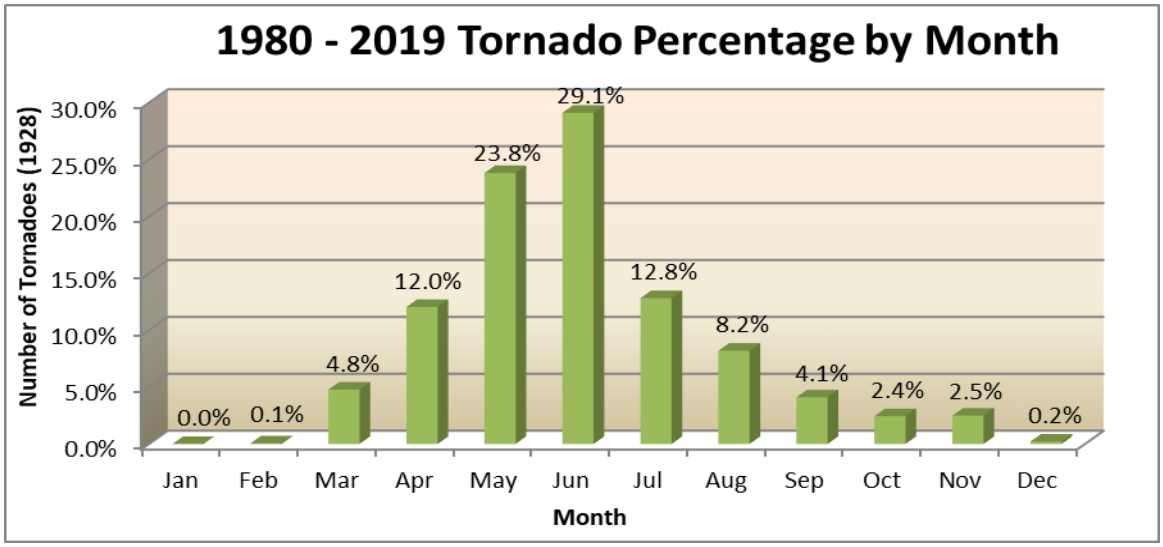
The number of tornadoes by year has averaged around 48. However, the variation from year to year can be great as evident between the years of 2008 and 2009 that had 105 and 25 tornadoes respectively. The recent trends have been for near to slightly above normal activity since 2014




## Monthly Data

Breaking the data down into the respective months, May and June lead the way in the number of tornadoes. These two months have prime conditions for tornadoes including warm temperatures, ample moisture, and relatively strong winds at different levels in the atmosphere (wind shear). However, it should be noted that tornadoes do occur in every month of the year including January with several tornadoes reported on January 24, 1967 in southeast Iowa.





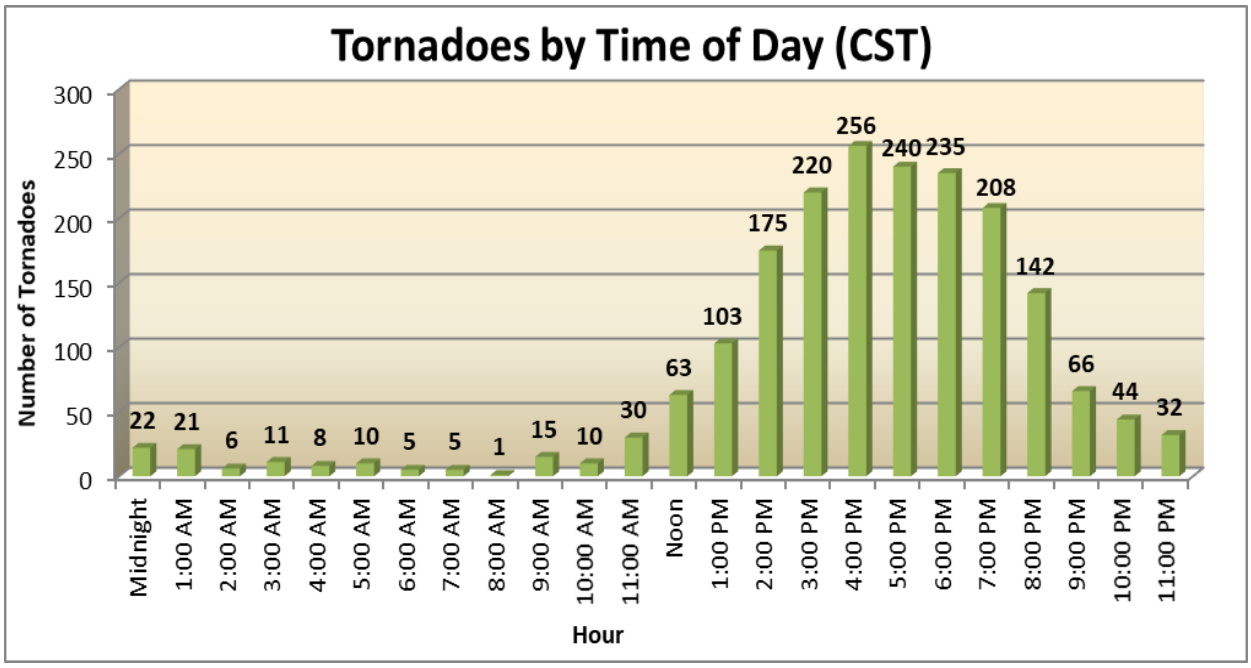

The rankings below provide the most tornadoes recorded in a one month period. June is heavily represented with a smattering of other months.

| Rank | Date | Tornadoes |
|---|---|---|
| 1. | May 2004 | 57 |
| 2. | June 1984 | 48 |
| | June 2008 | 48 |
| 4. | April 2001 | 40 |
| 5. | June 1990 | 36 |
| | Aug 2014 | 36 |
| 7. | May 1998 | 34 |
| | June 2001 | 34 |
| 9. | June 2014 | 31 |
| 10. | June 2004 | 28 |

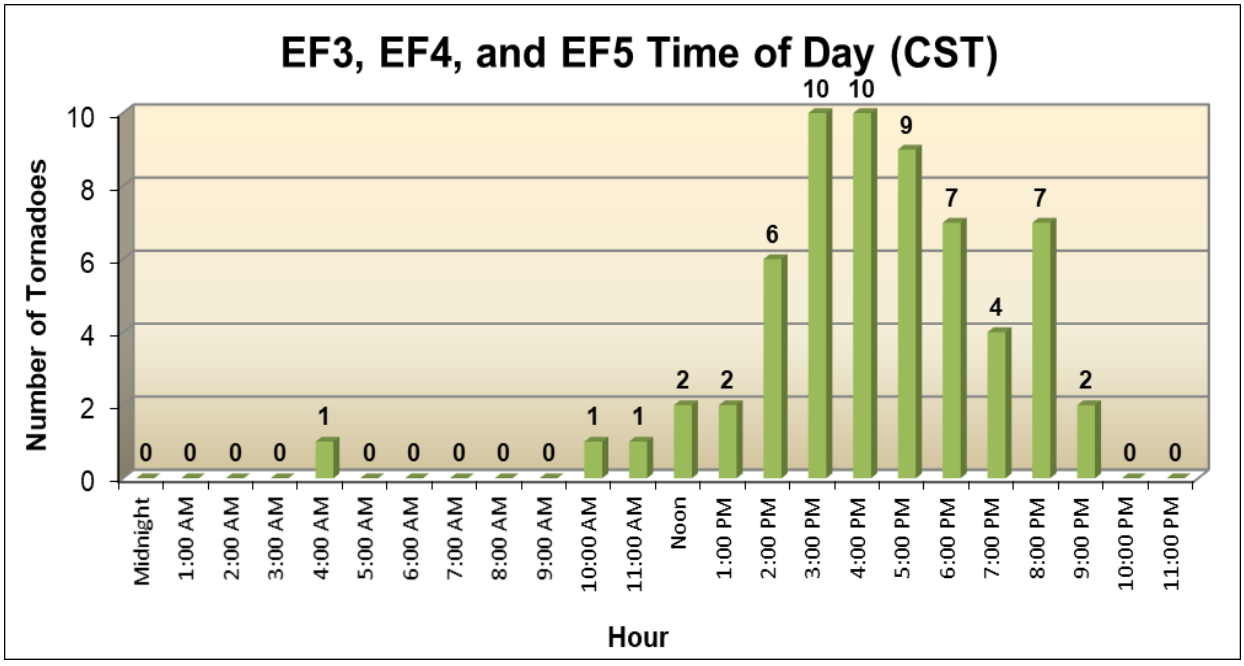
## Daily Data

As with certain months being more favorable than others for tornadoes, the same applies to the time of day. From the chart below, it is easy to see that from mid afternoon until around sunset, there is a peak in activity. Tornadoes need plenty of energy in the atmosphere to develop and maintain their structure. The sun warms up the atmosphere and the peak temperatures of the day often occur by mid afternoon. This warmth, combined with moisture in the atmosphere provides much of the energy needed to produce tornadoes (although other factors are also necessary). They are able to feed off this energy fairly efficiently until sunset when the surface temperatures begin to cool more quickly. The cooling decreases the energy in the lower atmosphere and therefore tornadoes have a more difficult time developing, especially for much of the AM hours. However, note that this is not always the case as tornadoes can occur at any time during the day or night given the right conditions. The time of day given to a tornado is the time

the tornado first "touched" the ground even if the tornado crossed over into a subsequent hour. In addition, a given time such as 5:00 PM includes all times between 5:00-5:59 PM.



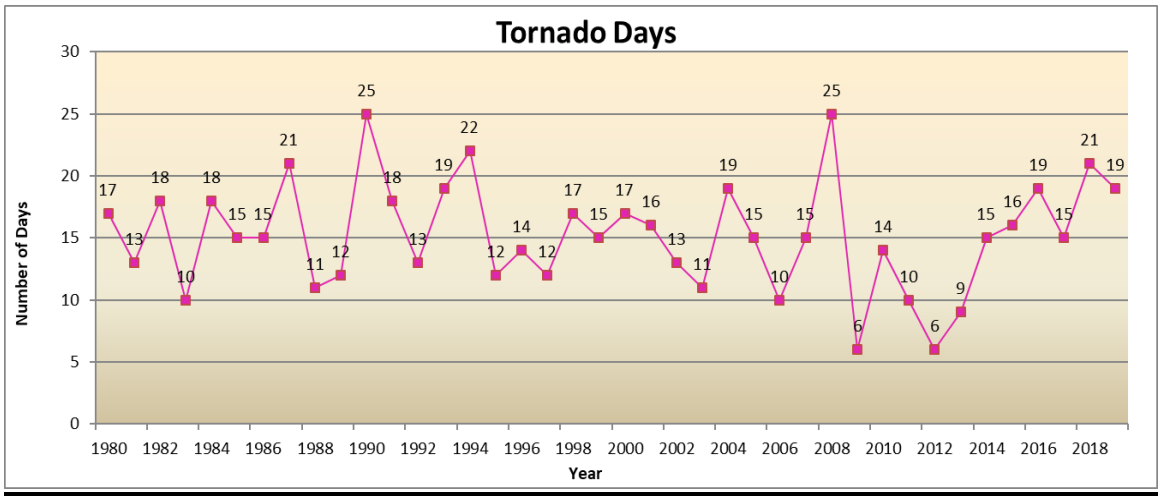

Notice that the more intense tornadoes (below chart), occur primarily with the heat of the day. Only one tornado has occurred in the 12 hour period from 10 PM to 9 AM CST.



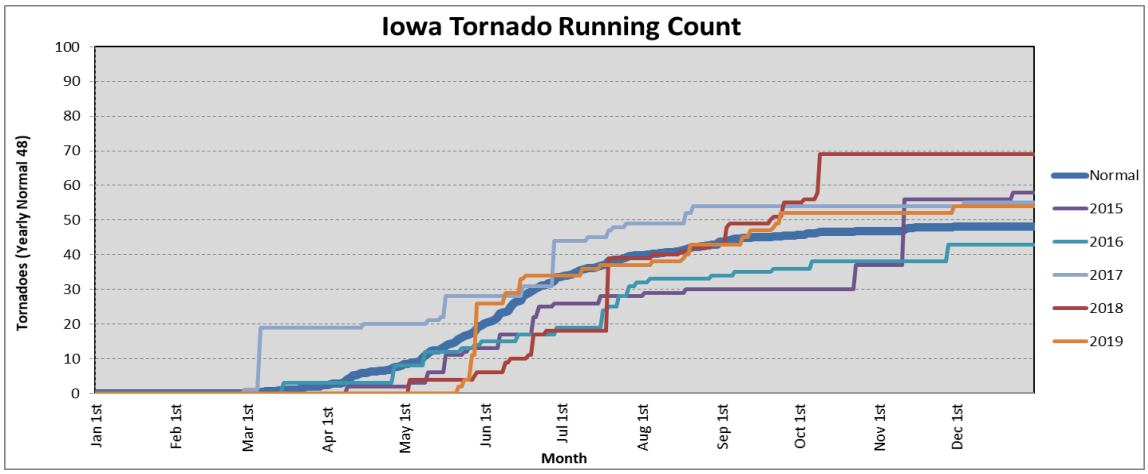
The following list provides the most tornadoes on an individual day. The biggest event was on August 31st, 2014 and produced numerous small tornadoes that were discovered using high resolution satellite imagery. Most of the events on this list have occurred since 2000 as reporting standards have continue to improve.

| Rank | Date | Tornadoes |
|---|---|---|
| 1. | August 31, 2014 | 35 |
| 2. | April 11, 2001 | 28 |
| 3. | June 11, 2004 | 24 |
| 4. | May 8, 1988 | 22 |
| 5. | June 7, 1984 | 21 |
| | July 19, 2018 | 21 |
| 7. | May 22, 2004 | 20 |
| | April 9, 2011 | 20 |
| 8. | Nov 11, 2015 | 19 |
| 9. | June 1, 2001 | 18 |
| | March 6, 2017 | 18 |

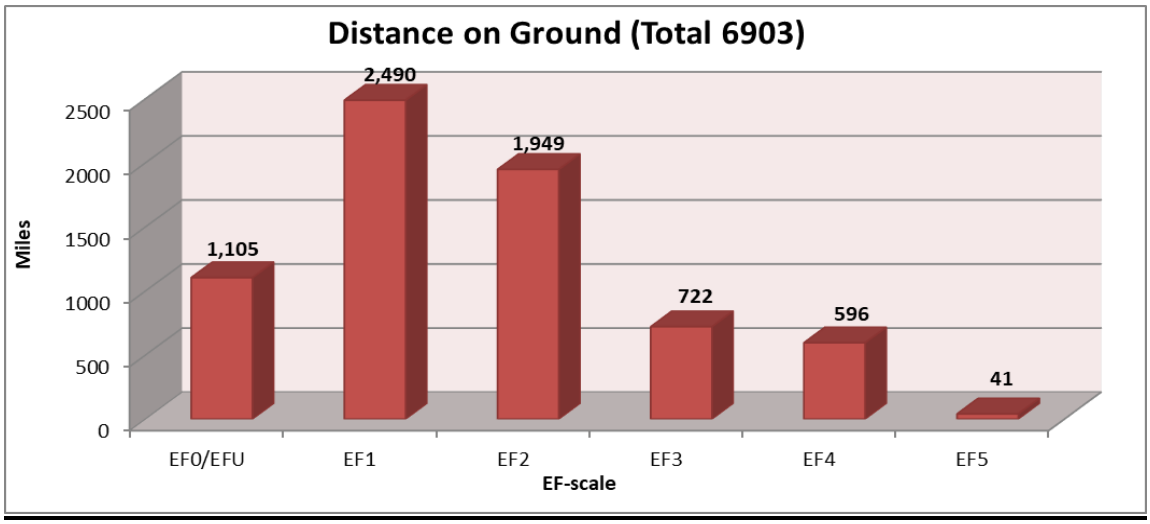
The number of days with tornadoes is shown below with an annual average of 15 days. This value has been fairly constant through the years, although there had been some decline after 2008 with the record minimum number of 6 tornado days occurred twice during this time in 2009 and again in 2012. A recent rebound has occurred with all years since 2014 at or above normal.

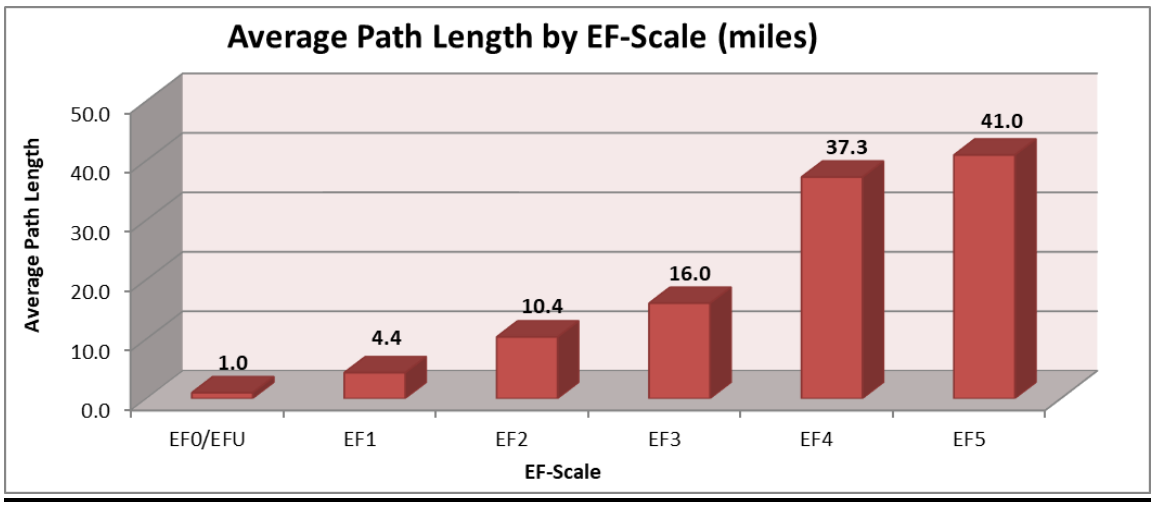



The running total for tornadoes in the past few years in provided below along with the average running total for all years. 2019 was very quiet until late May when almost half of the tornadoes for the year occurred with the last week of the month. After that, the tornado accumulation was nearly normal for the remainder of the year.




Of the final two charts below, the first chart provides the distance travelled on the ground by all tornadoes in each of the EF-scale categories. The last chart is the average path length for each EF-scale category.



## Injuries and Deaths

Since 1980, there have been 830 injuries and 30 deaths attributable to tornadoes. The following is a breakdown of each by year. In 2019, the first tornadoes of the year produced one death southeast of the town of Adair. In addition, there were two injuries during the year.

| Year | Injuries | Deaths | Year | Injuries | Deaths | Year | Injuries | Deaths |
|---|---|---|---|---|---|---|---|---|
| 1980 | 8 | 0 | 1995 | 3 | 0 | 2010 | 14 | 0 |
| 1981 | 12 | 0 | 1996 | 2 | 0 | 2011 | 16 | 0 |
| 1982 | 1 | 0 | 1997 | 0 | 0 | 2012 | 6 | 0 |
| 1983 | 35 | 0 | 1998 | 133 | 0 | 2013 | 0 | 1 |
| 1984 | 100 | 3 | 1999 | 28 | 2 | 2014 | 0 | 2 |
| 1985 | 30 | 2 | 2000 | 26 | 1 | 2015 | 5 | 0 |
| 1986 | 8 | 1 | 2001 | 12 | 2 | 2016 | 12 | 0 |
| 1987 | 0 | 0 | 2002 | 0 | 0 | 2017 | 6 | 0 |
| 1988 | 92 | 0 | 2003 | 0 | 0 | 2018 | 36 | 0 |
| 1989 | 9 | 0 | 2004 | 15 | 0 | 2019 | 2 | 1 |
| 1990 | 16 | 0 | 2005 | 14 | 1 | | | |
| 1991 | 4 | 0 | 2006 | 32 | 1 | | | |
| 1992 | 3 | 0 | 2007 | 7 | 0 | | | |
| 1993 | 9 | 0 | 2008 | 133 | 13 | | | |
| 1994 | 1 | 0 | 2009 | 0 | 0 | | | |

# Iowa Tornado Statistics

## 1980 – 2019

Compiled by: Craig Cogil

| | | |
|---|---|---|
| Total Number of Tornadoes: | 1928 | |
| Average Tornadoes in a year: | 48 | |
| Most Tornadoes in a day: | 35 | August 31, 2014 |
| Most Tornadoes in a month: | 57 | May 2004 |
| Most Tornadoes in a year: | 120 | 2004 |
| Least Tornadoes in a year: | 16 | 2012 |
| Number of Injuries: | 830 | |
| Most Injuries in a Year: | 133 | 1998 and 2008 |
| Number of Deaths: | 30 | |
| Most Deaths Individual Tornado: | 9 | May 25, 2008 Parkersburg |
| Most Deaths in a Year: | 13 | 2008 |
| Path Length of All Tornadoes: | 6903 miles | |
| Average Path Length: | 3.6 miles | |
| Longest Path Length Individual Tornado: | 124 miles | June 7, 1984 |
| Average Width: | 67 Yards | |
| Largest Width Individual Tornado: | 2640 Yards | April 9, 2011 |
| Peak Hour Tornado Occurrence: | 4pm - 5pm CST | |
| Peak Month Tornado Occurrence: | June | |
| Number of Tornado Days per Year: | 15 | |
| Most Tornado Days in One Year: | 25 | 1990 and 2008 |
| Least Tornado Days in One Year: | 6 | 2009 and 2012 |

**Contact Information**

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