



Iowa Tornado Climatology 1980-2016



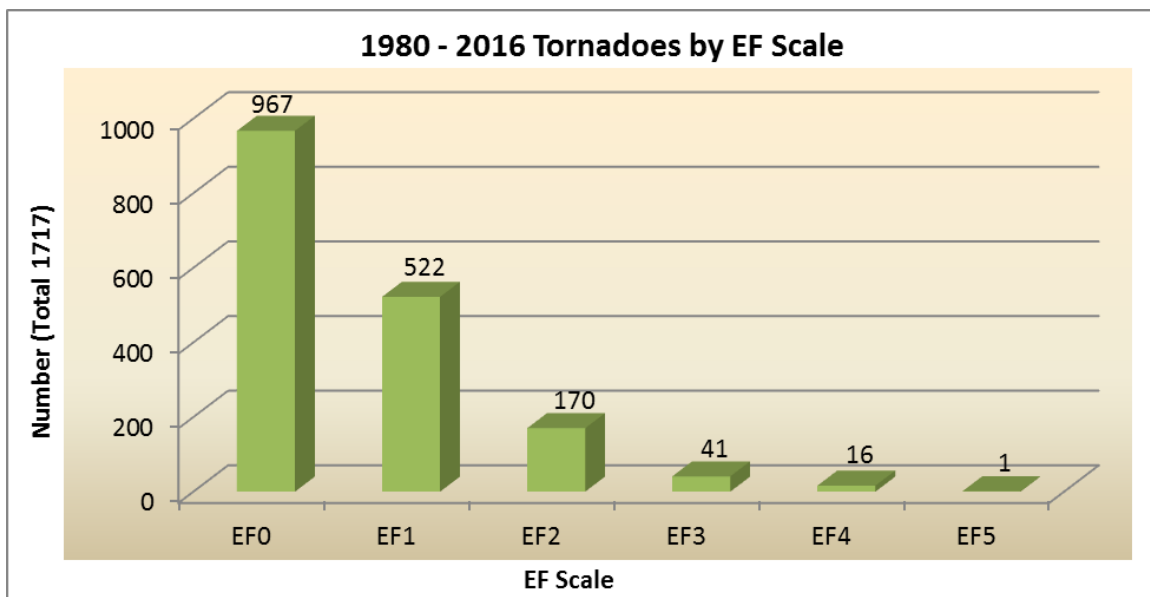
EF-5 Tornado near New Hartford, Iowa 5/25/2008
Courtesy of Rod Donavon

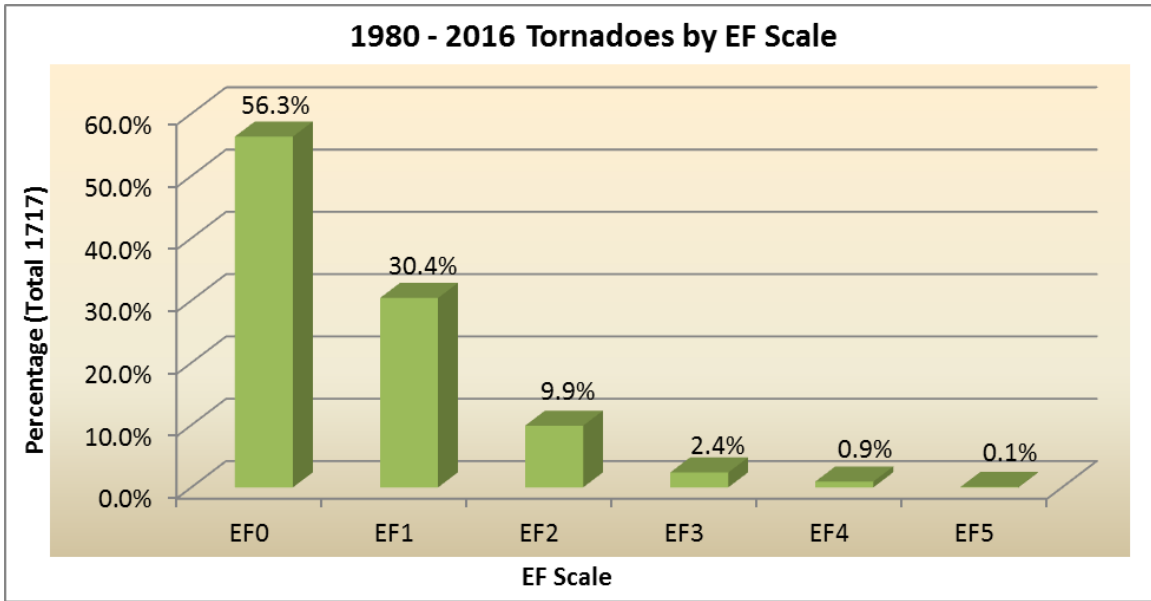
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The following data contains tornado information for the state of Iowa from 1980 through 2016. The information provided was derived from National Weather Service Storm Data reports archived at the National Centers for Environmental Information. The 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 36 years would be used to build the database.

Totals Data

The total number of tornadoes for the 36 year period in Iowa is 1717. 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, EF1). The remaining 13 percent of tornadoes were rated EF2 through EF5. On May 25th, 2008, the first EF5 occurred in Iowa since the Jordan tornado, which occurred in Boone and Story counties on June 13th, 1976.

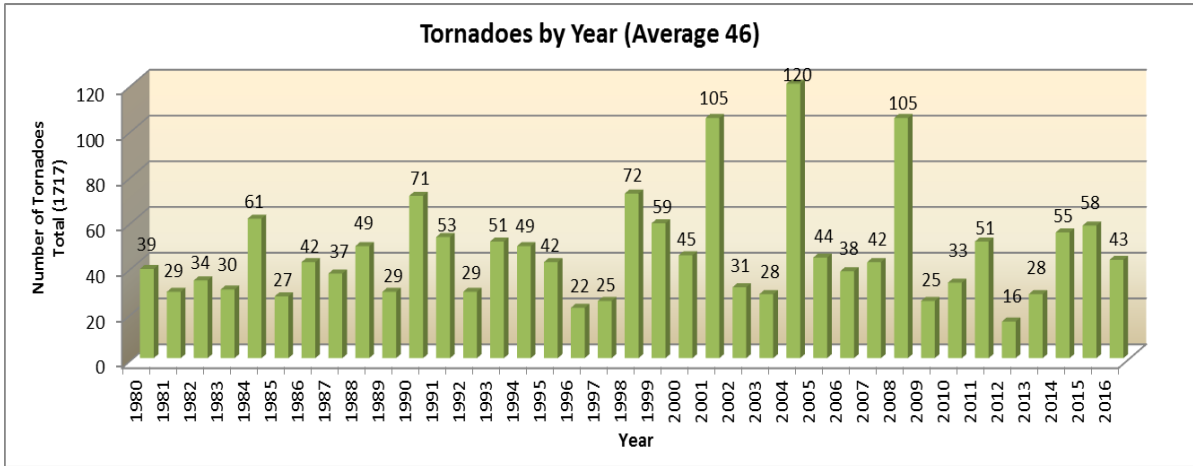
There was a transition between the older F-scale (Fujita) and newer EF-scale (Enhanced Fujita) occurring on Jan 31, 2007. The comparison between the scales is given below.

| 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.

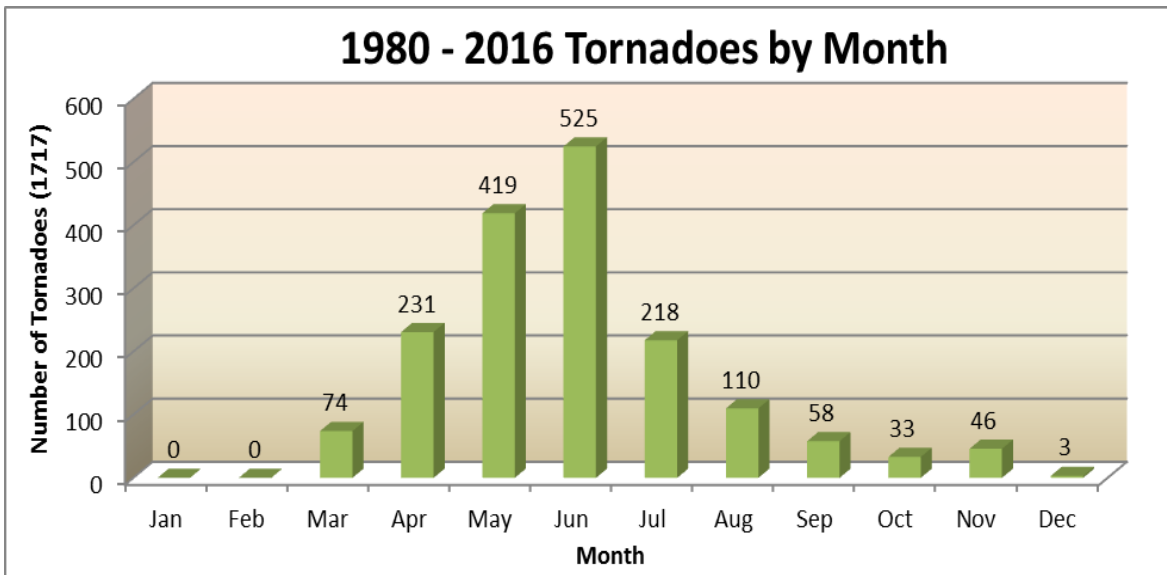
Yearly Data

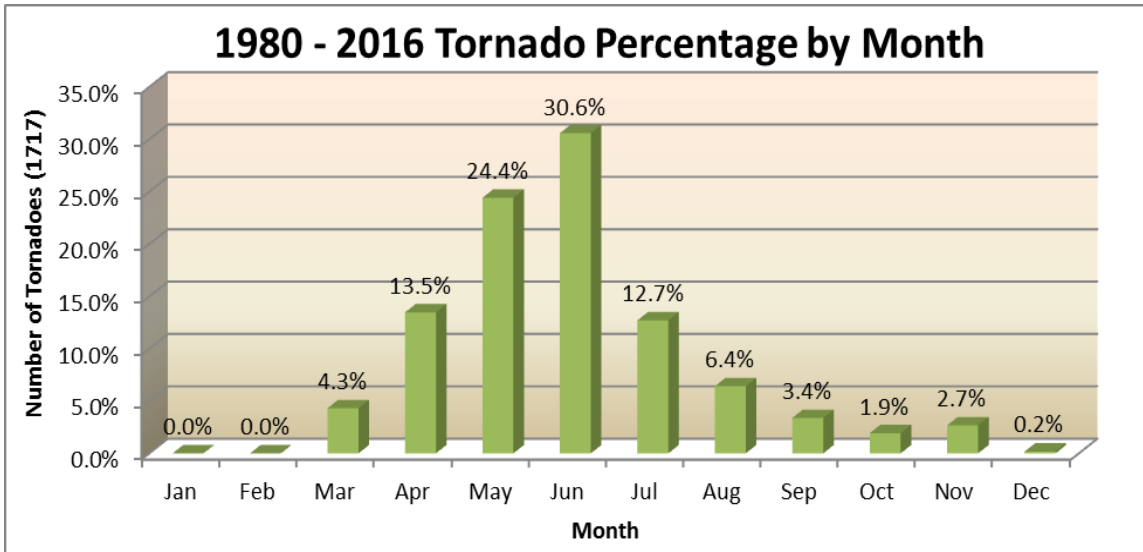
Next we will look at the number of tornadoes by year. Since 1980, there have been on average, 46 tornadoes per year in Iowa. However, the variation from year to year can be great as evident between the years of 2008 and 2009 that had 105 and 25 tornadoes respectively.



Monthly Data

Breaking the data down into monthly periods (graphs below), we see that 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. However, it should be noted that tornadoes do occur in every month of the year in Iowa. The data here only reflects tornadoes since 1980 with tornadoes having occurred in January and February in years prior to 1980.





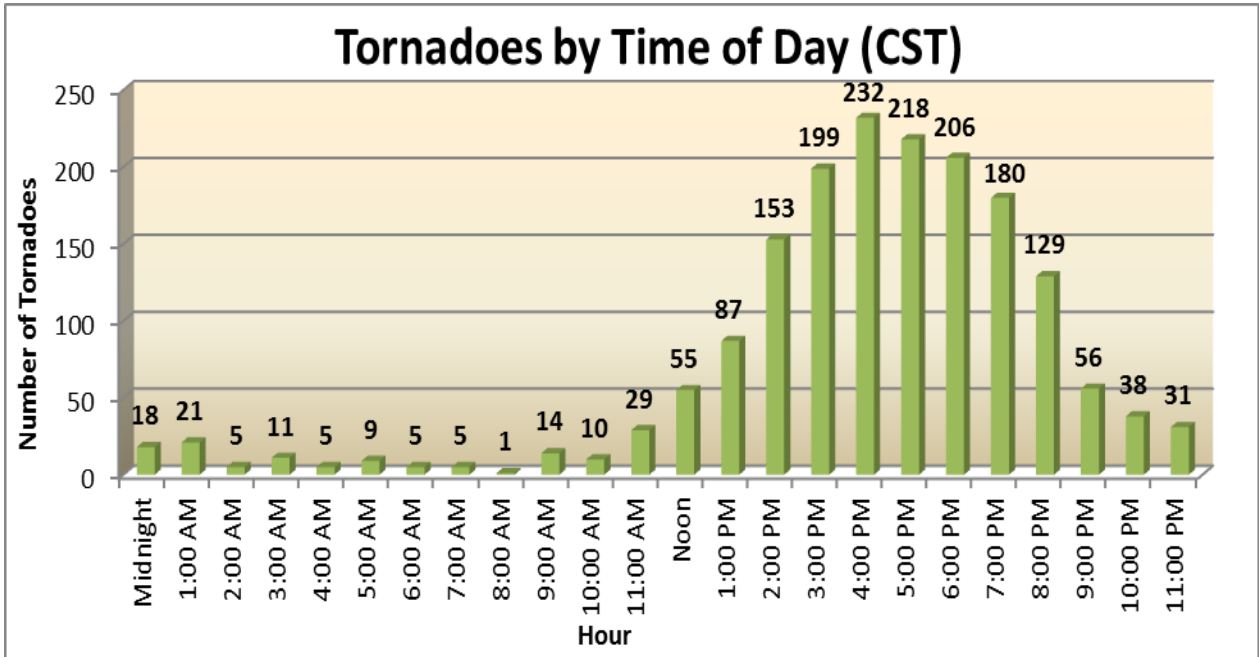
The rankings below provide the most tornadoes recorded in a one month period. May and June are heavily represented with a smattering of other months.

| Rank | Date | Tornadoes | Rank | Date | Tornadoes |
|------|------------|-----------|------|------------|-----------|
| 1. | May 2004 | 57 | 11. | May 1988 | 25 |
| 2. | June 1984 | 48 | | June 1998 | 25 |
| | June 2008 | 48 | | May 2008 | 25 |
| 4. | April 2001 | 40 | 14. | May 2000 | 24 |
| 5. | June 1990 | 36 | 15. | April 2006 | 23 |
| 6. | May 1998 | 34 | 16. | May 1995 | 22 |
| | June 2001 | 34 | 17. | June 1994 | 20 |
| 8. | June 2014 | 31 | | April 2011 | 20 |
| 9. | June 2004 | 28 | 19. | July 1994 | 19 |
| 10. | June 2010 | 27 | | April 1999 | 19 |
| | | | | June 1999 | 19 |
| | | | | Nov 2015 | 19 |

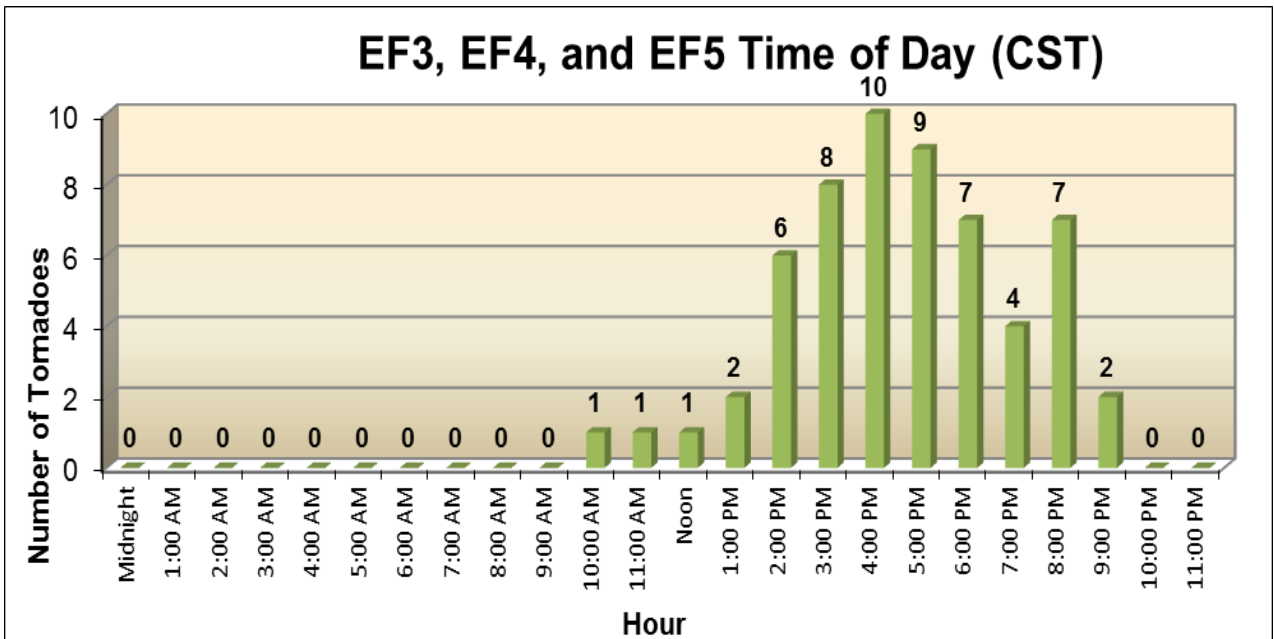
Daily Data

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.



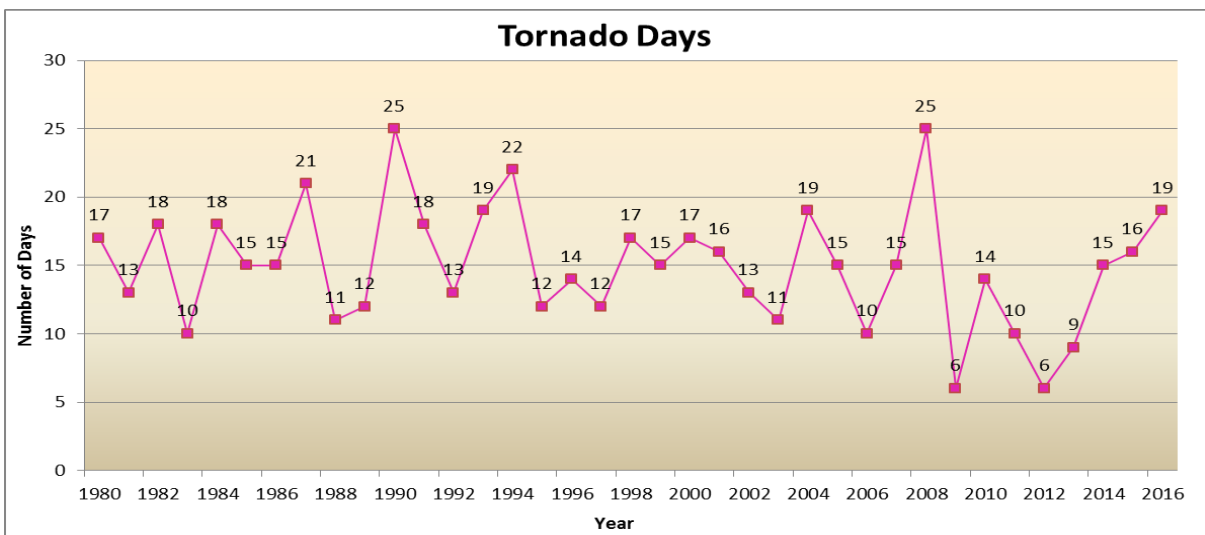
Notice that the more intense tornadoes (below chart), occur primarily with the heat of the day. None have occurred in the 12 hour period from 10 PM to 9 AM CST.



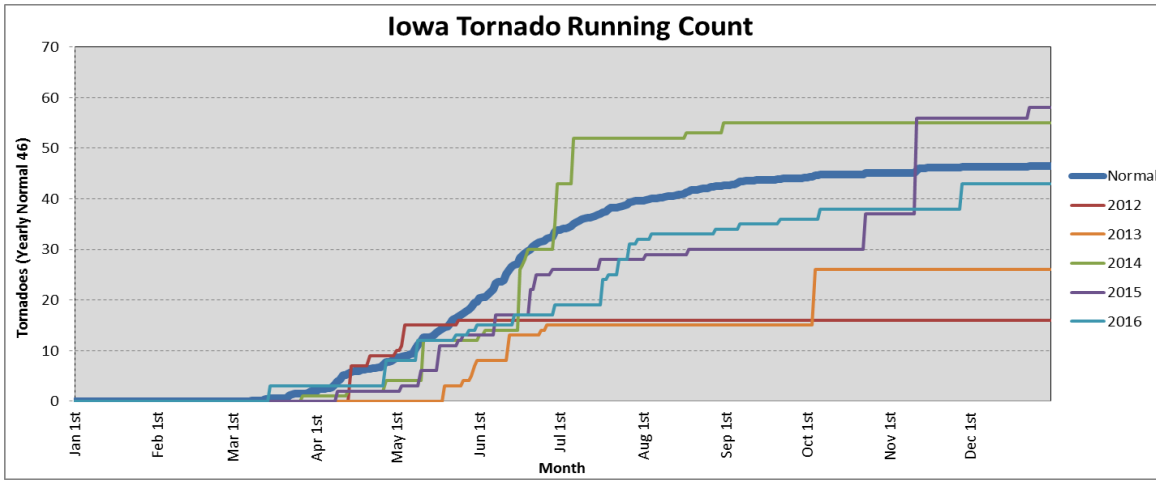
The following list provides the most tornadoes on an individual day. Again May and June have the most but some big events have also occurred in April. No events from 2016 made the list.

| Rank | Date | Tornadoes | Rank | Date | Tornadoes |
|------|----------------|-----------|------|----------------|-----------|
| 1. | April 11, 2001 | 28 | 12. | March 13, 1990 | 14 |
| 2. | June 11, 2004 | 24 | 13. | May 15, 1998 | 13 |
| 3. | May 8, 1988 | 22 | | May 16, 1999 | 13 |
| 4. | June 7, 1984 | 21 | 15. | March 22, 1991 | 12 |
| 5. | May 22, 2004 | 20 | | June 29, 1993 | 12 |
| | April 9, 2011 | 20 | | May 9, 1995 | 12 |
| 7. | Nov 11, 2015 | 19 | | May 10, 2001 | 12 |
| 8. | June 1, 2001 | 18 | | Nov 12, 2005 | 12 |
| 9. | April 8, 1999 | 16 | | April 13, 2006 | 12 |
| | May 21, 2004 | 16 | | June 16, 2014 | 12 |
| | June 11, 2008 | 16 | | | |

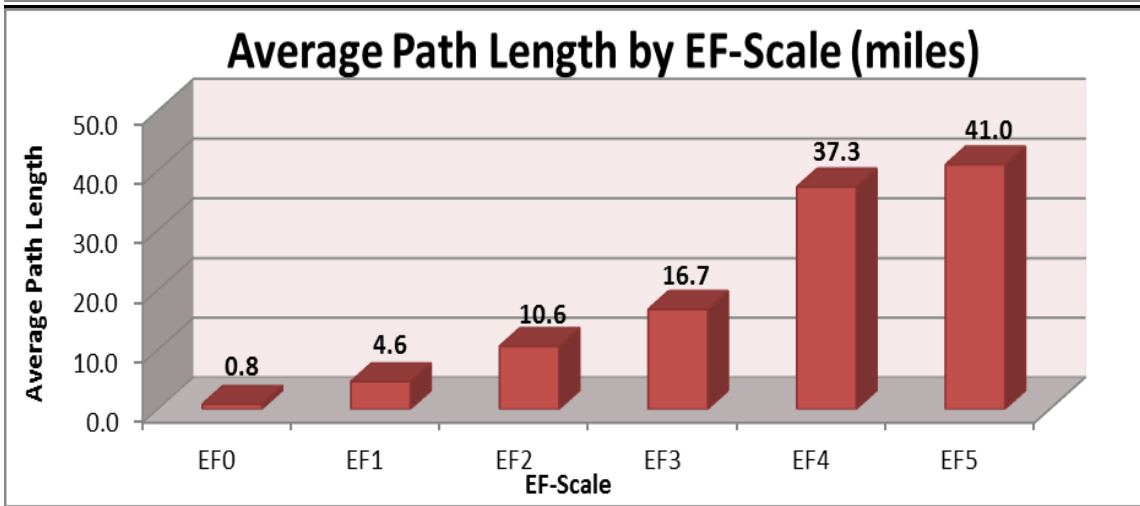
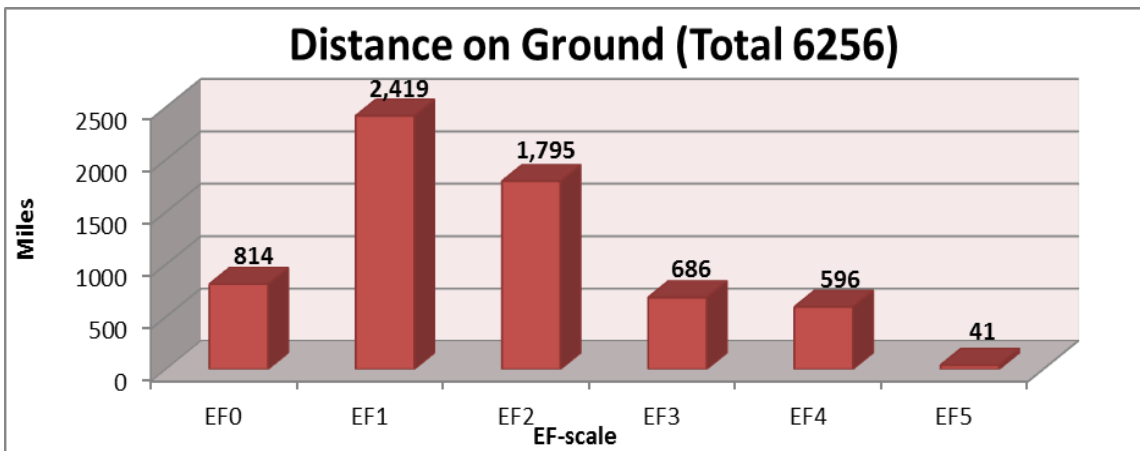
The number of days with tornadoes is shown below with an annual average of 15 days. This value has been fairly constant through the years, although there has been some decline since 2008 with the record minimum number of 6 tornado days occurred twice during this time in 2009 and again in 2012. A recent rebound has been observed with 19 tornado days occurring in 2016.



The running total for tornadoes in the past few years is provided below along with the average running total for all years. 2016 was fairly typical for the accumulation of tornadoes through the spring however there was an unusual lull in June. July was well above normal and then there was a late November tornado event to close out 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 786 injuries and 29 deaths attributable to tornadoes. The following is a breakdown of each by year. In 2016, there were fortunately no deaths but there were twelve injuries sustained from tornadoes.

| 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 | | | |
| 1988 | 92 | 0 | 2003 | 0 | 0 | | | |
| 1989 | 9 | 0 | 2004 | 15 | 0 | | | |
| 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 – 2016

Compiled by: Craig Cogil

| | | |
|---|---------------|----------------|
| Total Number of Tornadoes: | 1717 | |
| Average Tornadoes in a year: | 46 | |
| Most Tornadoes in a day: | 28 | April 11, 2001 |
| 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: | 786 | |
| Most Injuries in a Year: | 133 | 1998 and 2008 |
| Number of Deaths: | 29 | |
| Most Deaths Individual Tornado: | 9 | May 25, 2008 |
| Most Deaths in a Year: | 13 | 2008 |
| Path Length of All Tornadoes: | 6256 miles | |
| Average Path Length: | 3.7 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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