WISCONSIN TORNADOES

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INTRODUCTION

Tornadoes are one of nature's more spectacular storms. The American Meteorological Society's 1959 Glossary of Meteorology defines tornadoes as "A violent rotating column of air, pendent from a cumulo-nimbus cloud, and nearly always observable as a "funnel cloud" or tuba. On a local scale, it is the most destructive of all atmospheric phenomena. Its vortex, commonly several hundreds of yards in diameter, whirls usually cyclonically with wind speed estimated at 100 to more than 300 miles per hour." Later information indicates that wind speeds within the tornado vortex may possibly exceed 500 miles per hour. Most people will live their lives without seeing a tornado, but that does not mean that tornadoes are not a real threat in Wisconsin. With increasing population in the state, the number of people and amount of property within the paths of tornadoes will also increase. Timely forecasts and public cautionary measures are becoming more important.

Tornadoes have captured public attention at irregular intervals. Since the Civil War, outstanding damage or loss of life in Wisconsin from these storms has occurred over four dozen times and have been at times as devastating as anywhere in the world. The "Circus Day" tornado in New Richmond on June 12, 1899 killed 117 persons and destroyed much of the town as it swept down the main street that evening. Damages estimated at seven million dollars were reported in a single tornado of a complex of five on the evening of June 4, 1958 at Colfax in Dunn County. This exceeded, only in inflated dollar value, the four million dollar loss sustained on September 9, 1884 in a tornado that moved east-northeastward out of Minnesota, across St. Croix County to finally end in Price County in the north central portion of the state.

Known tornadoes and some of the more severe windstorms from 1843 through 1964 are tabulated for the first time in a chronological sequence to meet public requests, particularly those originating from news media. The statistics of Wisconsin tornadoes are derived

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from the 1916–64 period, except the tabulation and map of outstanding Wisconsin tornadoes, which spans the century from 1865 to the present. The data in this paper provide seasonal, diurnal and areal probabilities for a variety of applications and research. Following the seven million dollar loss suffered on June 4, 1958, insurance companies exhibited considerable interest in Wisconsin tornado statistics. The State Department of Public Instruction investigated the feasibility of including tornado safety features in planning school construction. South Carolina also investigated this possibility in 1959.[1] The need for adequate preparation in the event of a tornado strike has been demonstrated. The climatological information on tornadoes now available permits intelligent planning for such contingencies.

Obviously some bias exists in tornado records because of the methods of gathering information, the variable density of population, the location of the collection centers, and variable public and professional interests. Classifying these data by categories has not wholly eliminated bias, but it is believed that the longest and most damaging tornadoes are most likely to have been reported. There is evidence that a storm reported as one tornado may have been a complex of two or more tornadoes or have been subject to other human error, thereby producing some variation in tornado statistics.

Sources and Reliability of Data

Wisconsin windfall and tornado tabulations from the beginning of record-keeping in the early 1800's through 1964 were obtained from a number of sources.[2] Windfall record was derived from original public land survey maps and from the notes of the surveyors by Increase A. Lapham.[3] U. S. Signal Corps records were used for the portion of the record from 1840 to 1891.[4] Since 1891 official publications of the Weather Bureau have provided most of the data.[5] Newspaper accounts on file at the Wisconsin Historical Society Library provided supplemental information, particularly about earlier tornadoes.

The tornadoes reported during the early history of the state were mostly the spectacular ones—those with great loss of life and property. Examination of the written record of what has been called the earliest recorded tornado in Wisconsin, August 20, 1843, clearly describes a water spout. This phenomenon occurred 12 miles south of Kenosha over Lake Michigan; its formation and dissipation were witnessed by scores of people and vividly described by Lapham.

The range of detail used to describe earlier tornadoes appears in the following two examples:

> May 31, 1851. "Near the second of the Four Lakes in Dane County, six miles from Madison, the Capitol of the State of Wisconsin, was seen a dark column of leaves and branches whirling around with great rapidity, extending far above the forest trees, which bent and swayed before it like reeds. The noise and confusion defied all description; a tract of more than 100 acres was stripped bare of trees, all blown down, torn up by their roots, or twisted into fragments; the ground looking as if it had been harrowed. It took a direction nearly from the west, destroying everything in its way.
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> Another tornado passed on the same day, from near the farm of Abel Nutting in Farmington, Jefferson County, where two clouds came in contact, through portions of the towns of Concord, Ixonia and Oconomowoc, where it swept over LaBelle Lake assuming many of the characteristics of a water spout. Houses were unroofed and trees blown down for many miles in extent, and over a breadth of from 80 to 100 rods. Among the incidents that happened, was that a girl 13 years of age was lifted up, clinging to a feather bed, over the top of the trees and landed without injury—thus, literally riding upon the whirlwind."[6]

The opposite to this is contained in a comment. "October 15, 1870. A tornado occurring in the city of Milwaukee was not considered enough of a news event to make the local paper."[7]

The increase in the number of reported tornadoes in the 1870's was due to the efforts of the Signal Corps; increases are also noted in 1916 when the Weather Bureau strengthened their tornado observing network and in the early 1950's when the public became concerned with tornado forecasting. We can assume we have record for only a small percentage of the state's tornadoes prior to 1870, all notable tornadoes from 1870 to 1916, probably most of the tornadoes from 1916 to 1953, and nearly all tornadoes from 1952 to date.

There is no question that some tornadoes have been omitted or improperly classified. Tornadoes with long paths or with skipping paths suggest a complex of tornadoes generated at intervals by a parent storm. However, original records were not revised unless evidence strongly indicated that a change was in order.

The large increase in the number of tornadoes reported in recent years can be attributed primarily to the expansion of the Weather Bureau's storm reporting networks, the increase in the number of storm detection and radar tracking stations, and the new public awareness of possible danger through the issuance of tornado forecasts for specific areas and particular time periods. Wider distribution of public information materials on tornado warning procedures have also contributed to the recent increase in the detection and reporting of tornadoes. One of the recent problems is the tendency to call all severe storms tornadoes. Investigations of damage

sometimes show that reported tornadoes were locally severe thunderstorms with straight line winds.

The dollar value of storm damage can be useful in computing insurance rates, but was not used in this paper to obtain totals over a period of time as it is considered to be a misleading statistic. Estimates on actual loss have often been found erroneous, and changing property values and inflation casts doubt on computed dollar values.

Although there are shortcomings and omissions in the data presented, these records are the best presently available and have been carefully evaluated by meteorologists throughout the years.

WINDFALLS

The earliest comprehensive study on Wisconsin tornadoes was made by Increase A. Lapham in the 1850's and 1860's. He summarized his findings in a letter written to General A. J. Myer, Chief Signal Officer in May 1872. In addition to data on observed tornadoes, Lapham went to public surveys for information. The maps he examined were original surveys made between 1834 and 1865.

Early public land surveyors were required to record all windfalls crossing township and section lines. Windfalls were defined as "the tracks of tornadoes through forests as shown by the prostrated and confused masses of timber." Undoubtedly some of the entries were the result of straight line winds and not tornadoes, although examination of the maps indicate that many of the windfalls could only have been caused by tornadoes. In either case, winds were strong enough to blow down strips of virgin timber. These old surveys give us a record of severe wind storms that passed over the forested areas of the state within the time it took blown down trees to decay; few traces were left on open or prairie country in their natural condition.

Lapham prepared eighty pages of diagrams giving the exact location, length and width of each of the 360 windfalls recorded. Many of the storm tracks were so short that their direction cannot be accurately determined, although fifty-three paths were long enough to indicate the movement of the storm. The average direction from which these destructive winds blew was 254°, or about west–southwest. Lapham found that two tracks traveled directly from the south, seven from between south and southwest, twenty-nine from between southwest and west, thirteen between west and northwest, one from north–northwest and one from north. Approximately two-thirds of the windfalls were less than one mile long with only a few exceeding two to three miles. The width of

the tracks ranged from a few rods to a mile or more, and averaged less than a quarter mile. Several severe storms, apparently not tornadoes, covered many square miles.

A windfall in the northeastern part of the state was over twenty-two miles long, occurring between the time the township lines were surveyed in 1857 and the section lines in 1865. Another windfall extended from township 32N, range 6W to 38N, range 2W, touching down six times and devastating thirty-three miles of timber over a distance of fifty-five miles; parallel to this track and at a distance of eight miles away a second tornado of apparently even greater force touched down four or possibly five times.

Several of Lapham's interesting interpretations of the data are:

> "That two or more tornadoes may be united with one,[8] and pursue a course in a direction intermediate between that of each, is well established by these surveys . . . . . a case in township 35N, range 14E, where four tornadoes are united, each apparently modifying the general direction of the track and increasing in breadth. There are perhaps 20 other cases where tracks are thus united."
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> "There are also a few cases where tracks became divided, and two tornadoes continue their separate mark of destruction; and some, after thus separating, became united leaving a kind of island of standing timber amidst an expanse of prostrate trunks."
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> "We may suppose that the tornadoes causing the windfalls represented on the map occurred within a period of about ten years; and that therefore, there are about thirty-six cases annually when the wind blows in some part of the state with sufficient force to prostrate trees. Of these, perhaps not more than twenty are of sufficient magnitude and extent to cause considerable damage. Now, if these are compared with the 200,000 quarter sections in the state, it will be seen that there is about one chance in probability in 10,000 that any particular farm of 160 acres (in any year) will be visited by such a calamity."

Tornado Characteristics and Statistics in Wisconsin

The causes for the formation of tornadoes is only generally understood. They often develop southeast of a deep low centered in the central or north central states; they may appear in any section of the low and be associated with fronts, instability lines, troughs and have even formed within high pressure ridges. Their highly localized nature and random distribution make it impossible to forecast the spot they will strike with our present knowledge. The best meteorologists are able to do is to forecast an area in which they are likely to develop.

Wisconsin lies to the northeast of the principal tornado belt in this country. In comparison with other states it ranks seventeenth in number of days with tornadoes and eighteenth in number of tornadoes. Table 1 lists 102 tornadoes from the beginning of record

TABLE 1. LIST OF REPORTED TORNADOES FROM BEGINNING OF RECORD THROUGH 1964

Place		Date	Time	Direction of Advance	Length of Path, Miles	Width of Path, Yards	Number of Persons		Estimated Damage	
County	Town						Killed	Injured	Property (exclusive of Crops)*	Crops*
Fond du Lac		1844	3 PM	NNE		330				
Milwaukee		28 Aug. 1848	4 PM							
Ozaukee	Saukville	4 June 1850								
Waukesha, Jefferson	Through portions of Concord, Ixonia, Oconomowoc	30 July 1851		NE		500				
Dane	South of Madison	31 May 1851		E						
Monroe		31 May 1852								
Waukesha		16 Aug. 1853	3 PM	NE		550				
Monroe		3 July 1853								
Columbia, Sauk		23 July 1857	6 PM	ESE						
Dodge		21 Aug. 1860		E						
Winnebago	Oshkosh	22 Aug. 1861	2 AM							
Juneau	New Lisbon	8 July 1863	Early morning	NE						
Portage		11 Aug. 1863	9 PM	SE						
Vernon		21 Aug. 1864	Afternoon	NE						
Vernon	West of Viroqua to Hillsboro	17 June 1865	4 PM	NE	40	160	24	100	200, 000	
, Milwaukee	Milwaukee	28 June 1870	3:30 PM							
Crawford		15 Oct. 1872				220				
Vernon		Oct. 1875								
La Crosse		1875	7:40 PM	SE		200				
Grant	Hazel Green	1876	4:30 PM	E	5	170–220	9	15	46, 000	
Waushara	Wautoma	10 Mar. 1877								
		5 July								

TABLE 1. LIST OF REPORTED TORNADOES FROM BEGINNING OF RECORD THROUGH 1964—Continued

PLACE		DATE	TIME	DIRECTION OF ADVANCE	LENGTH OF PATH, MILES	WIDTH OF PATH, YARDS	NUMBER OF PERSONS		ESTIMATED DAMAGE	
County	Town						Killed	Injured	Property (exclusive of Crops)*	Crops*
Oconto	Pensaukee	1877 7 July	6–7 PM	SE	6	330	8	30	300, 000	
Iowa, Dane, Waukesha, Jefferson, Milwaukee	10 miles west of Mineral Point to Milwaukee	1878 23 May	3:00 PM	NE	150	220–330	At least 19	45 or more	130, 980	
Rock	Beloit	1880 18 April	5 PM	NE		160–2300	several		75, 000	
Monroe		1880 11 June	Afternoon	NE						
Wood		1880 20 Sep.	9:30 PM	NE						
Waushara	Wautoma	1881 29 Sep.	5 PM	NE		400–660				
Buffalo	Mondovi	1881 29 Sep.	Afternoon	NE			12			
Waupaca		1881 29 Sep.	2 PM	NE						
Sauk		1882 June	Afternoon	NE						
Rock		1883 9 May	4 PM	NE		220				
Rock		1883 18 May	4:15 PM	E		110				
Racine		1883 18 May	7 PM	NE	3	220	25	100	200, 000	
Waukesha		1883 25 May	Afternoon							
Rock		1883 11 June	5:50 PM	SE						
Green Lake		1883 11 June	4:45 PM	NE						
Sauk, Columbia		1883 10 July	Noon	S						
Jefferson, Waukesha		1883 16 July	1:20 PM	N		220				
Clark, Wood		1883 21 Aug.	Noon	E						
Wood		1883 21 Aug.	1:30 PM	NE		10–120				
Trempealeau		1883 8 Oct.	Noon	NE		660				
Crawford		1883 25 Nov.	9 PM	NE						

TABLE 1. LIST OF REPORTED TORNADOES FROM BEGINNING OF RECORD THROUGH 1964—Continued

PLACE		DATE	TIME	DIRECTION OF ADVANCE	LENGTH OF PATH, MILES	WIDTH OF PATH, YARDS	NUMBER OF PERSONS		ESTIMATED DAMAGE	
County	Town						Killed	Injured	Property (exclusive of Crops)*	Crops*
Trempealeau		1884 22 July	12:30 PM	ENE						
Ashland		1884 22 July	1 PM	NE						
Dunn		1884 25 July	2:40 PM	ESE						
Shawano		1884 29 July	4 PM	ENE						
Richland, Sauk, Columbia		1884 2 Aug.	5 PM	N		110–440		2	150, 000	
Buffalo		1884 22 Aug.	4:30 PM	N		75				
Crawford, Grant		1884 22 Aug.	6:20 PM	SE		55–440		Several		
St. Croix, Barron, Chippewa, Price, Polk Vernon		1884 9 Sep.	5 PM	NNE	120	880	6	75	4, 000, 000	
Waupaca		1885 7 June	1 PM	NNE						
Winnebago		1885 8 July	8 PM	NE						
Dane	Madison	1885 8 July	8 PM	NE						
Fond du Lac		1885 8 July	9 PM	SE		880				
Marathon		1886 3 Aug.	3:35 PM	ENE		70				
Rock		1886 21 June	Afternoon	NE		Narrow				
Polk		1887 6 Aug.	Afternoon							
Clark		1887 1 May	6 PM	NE		Narrow				
Dunn		1887 1 May	9 PM	NE		Narrow				
Clark		1887 6 July	5 PM	NE		330–1300				
Waupaca		1887 16 July	2 PM	NE		1000				
Walworth		1887 16 July	5 PM	NE		Narrow				
		1887 10 Aug.	Afternoon	E		Narrow				

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County	Town						Killed	Injured	Property (exclusive of Crops)*	Crops*
Richland		1887 11 Aug.	4 PM	NE						
Green		1888 4 May	4 PM	NE						
Crawford		1888 12 May	5 PM	SE						
Eau Claire		1888 11 June	3:30 PM	NE		440				
Winnebago		1888 18 June	11 PM	E						
Walworth		1888 19 June	3:30 PM	NE		Narrow				
Green		1888 3 July	7 PM	NE		220				
Washington		1888 4 July	4 PM	NE		270				
Kewaunee		1888 1 July	4 PM	NE		880				
Trempealeau		1888 28 July	6 PM	E		Narrow				
Dunn		1888 30 July	10:20 AM	NE		100				
Trempealeau		1888 1 Aug.	11 PM	E						
Trempealeau		1888 4 Aug.	9:40 PM	E						
Dunn		1888 16 Sep.	6 PM	E		Narrow				
Waukesha	Ottawa	1890 30 May	3 PM							
Milwaukee	Milwaukee	1891 14 June	2:51 PM						4, 000	
Grant	Near Livingston	1892 4 April	2:50 PM						Light	
Lafayette	Darlington	1893 22 May	5 PM	NE			2			
Iowa	Moscow	1893 22 May	5:03 PM				3		3, 500	
Clark	Humbird	1895 2 May						3	300	
Winnebago	Near Oshkosh	1896 8 June							One barn	

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Place		Date	Time	Direction of Advance	Length of Path, Miles	Width of Path, Yards	Number of Persons		Estimated Damage	
County	Town						Killed	Injured	Property (exclusive of Crops)*	Crops*
Polk	Clayton	1896 24 June	6:30 PM					2	6 houses, a few barns	
Eau Claire, Clark, Marathon, Lincoln, Langlade	Abbotsford, Antigo	1898 18 May	4 PM-6:40 PM	NE	110		17	100	710, 000	
Dane	Began SW of Madison	1898 18 May	6 PM	NE					10, 000	
Price, Oneida		1898 18 May	6:30 PM	NE	50	100	7	15	200, 000	
St. Croix, Polk, Barron	"New Richmond Tornado"	1899 12 June	6:30 PM	NE	45	100	117	125	600, 000	
Sheboygan		1900 20 Aug.	12:45 PM						25, 000	
Portage	Almond	1903 3 Oct.		NE		80	Several			
Vernon, La Crosse		1906 6 June		NE	20	400	4	18	70, 000	
Clark, Jackson, Juneau		1907 3 July	4:45-6:30 PM	SE	95	80	26		100, 000	
Green Lake, Winnebago		1907 3 July	6:30 PM	E	8		2			
Vernon to Juneau		1908 7 June	3:30 PM	NE	17	35	2			
Portage	"Stevens Point Tornado"	1908 25 Nov.	7 PM	NE	12	10–100	1	2	100, 000	
Wood	Rudolph	1908 25 Nov.	6:30 PM	NNE	7		1	6		
Rock		1911 11 Nov.	2 PM	NE	30		9	10	500, 000	
Vernon, Crawford, Juneau	"Soldiers Grove Tornado"	1913 10 Oct.	1:30 PM				4	27	250, 000	
Rock		1913 10 Oct.	4:20 PM					6		
Crawford	"Lansing-Ferryville Tornado"	1915 12 June	5:30 PM	NE	20	120–400	7	25	100, 000	
Sauk		1915 12 June	6:30 PM	NE	10	60	1	15	50, 000	
Dane	Near Mazomanie	1916 1 June	9 PM	NE	5–6	440			20, 000	
(None Reported)		1917								
Rusk, Price	Ladysmith to near Phillips	1918 19 May	1–4 AM	NE	40	67–100	1	2	50, 000	

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Place		Date	Time	Direction of Advance	Length of Path, Miles	Width of Path, Yards	Number of Persons		Estimated Damage	
County	Town						Killed	Injured	Property (exclusive of Crops)*	Crops*
Grant, Iowa, Richland, Sauk	1 mi. S of Glenhaven to 6 mi. N of Lancaster to Lone Rock to Baraboo	21 May	6:30 PM to later than 8 PM	NE	85	67–433	8	100	650, 000	
Wood, Portage	NE Wood County, NW Portage County	26 June	8–8:30 PM	E	few miles	50–67	0	1	15, 000	
Sauk	2 mi. NE of Ableman	1919		NE	Short	200			500	
Walworth	Eastern Walworth County	20 Aug. 1920	12:30	N			1		25, 000	
		28 Mar. 1921		NNE					60, 000 (incl. crops)	
Outagamie, Shawano	SE Shawano	20 June								
Dane	Near Madison	19 Aug. 1922	4:15 PM				2		620, 000	
Pierce	Trim Belle	3 May	Night	NE					10, 000	
St. Croix	From Roberts to intersection of Polk, Dunn, Barron, St. Croix cos. to near Chetek	15 June	7–9 PM	ENE	50	Few rods to 2 mi.	8	More than 100	500, 000	
Langlade (None reported)	W of Antigo	16 June 1923 1924	2:30 PM	NE	2	50–100	0		50, 000	
Racine	Center of Racine Co.	20 June	7:30 AM	ENE	30	300–3520	0	12	500, 000	
Trempealeau, Jackson	Osseo to Black River Falls	7 Aug.	6:30 PM	SE	27	334–1760	4	100	200, 000	
Barron, Chippewa	Dovre Township thru Chippewa Co.	7 Aug.	7 PM	SE	15	330	3		100, 000	
Barron, Rusk, Sawyer, Bayfield, Ashland	Chetek, Barron Co. to Marengo, Ashland Co.	21 Sept.	2–5:30 PM	NNE	90	67–880	10	50	250, 000	
Oneida	Minocqua	21 Sept.	4 PM						None reported	
Eau Claire, Clark, Marathon, Taylor, Lincoln, Oneida	Augusta, Eau Claire to near Three Lakes, Oneida Co.	21 Sept.	2:20-4:30 PM	ENE	120	67–880	26	114	564, 000	
Langlade	Antigo	21 Sept. 1925	Afternoon		Short				4, 000	
Calumet	Near center of county	11 April	12:30 AM	SW	Short	Up to 880	0	0	4, 000	
Clark	SW corner of Clark Co.	2 June	10:30 PM	NE	20	100	0	0	30, 000	
Florence	Brule	3 June	1 AM				2		2, 500	
Juneau	SW Juneau County	13 June 1926	5:45 PM		Short	20–25			30, 000	
Bayfield, Ashland, Iron, Vilas	20 mi. NW of Ashland Jct. to 4 mi. S of Winchester	16 July	6:15-7:45 PM	ESE	85	100–440	3	16	90, 000	
Sauk	3 mi. S of Wonewoc	20 Aug. 1927	12 PM	NE	½	167	0	1	1, 000	

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County	Town						Killed	Injured	Property (exclusive of Crops)*	Crops*
St. Croix, Pierce, Dunn	N Pierce to W Dunn	12 July	Evening						20, 000	
Ashland	N of Morse	30 Oct. 1928	4:30 PM		Short	880	0	0	1, 200	
Pierce	W and N central Pierce Co.	20 June	1:30-2:00 PM	NE	4	110	0	0	35, 000	
Polk	Dresser Jct.	2 July	12:30 AM	ENE	6		0	0	60, 000	
Barron	Prairie Farm	2 July	1:30 AM				0	0	50, 000	
Trempealeau	Blair	2 July	2:00 AM				0	0	25, 000	
La Crosse	New Amsterdam to near West Salem	20 Aug.	6:00 PM	SE	20	100–1760	0	Few	60, 000	
Rock	Magnolia	14 Sept.	3 PM		1	440	0		30, 000	
Dane	Riley, Verona	14 Sept.	3 PM		15	Few rods–880	0	13+	100, 000	
Waupaca	Scandinavia to Marion	14 Sept. 1929	3:30 PM	NE	20	55–110	0		27, 500	
Polk	10 mi. SW of Balsam Lake to 5 mi. N of Balsam Lake	5 April	6-6:30 PM	NE	15	440	0	0	10, 000	
Pierce to Iron	SW River Falls to Van Buskirk	5 Apr.	5:45-8:30 PM	NE	170	30–400	12	100	725, 000	
Grant to Green	Cuba City to N of Monticello	6 April	4:30-6:30	ENE	45	30–330	0	25	250, 000	
Rusk	Ladysmith	10 June	7:15 PM	SE	11	150	0	5	150, 000	
Oneida	Minocqua	10 June	7:30 PM	SE		35–200			100, 000	
Sawyer	8 mi. NW Stone Lake, Washburn Co.	29 June	8 PM	SSE	14	Few rods	0	1	12, 000	
Vernon	N Vernon Co.	1930 1 May	7:30 PM	E	5	70	1		100,000	
Trempealeau, Monroe, La Crosse	S. Trempealeau, across N La Crosse Co.	1 May	7:30-8 PM	E	33	500	1		202, 000	
Kewaunee		1 May	10:30 PM	NE	5	440	0		60, 000	
Walworth, Racine, Milwaukee	Angled across Racine, Milwaukee Co. line	1 May	11:00 PM	NE	40	500	0		30, 000	
Lincoln	N Lincoln Co.	3 June	2:15 PM	NE	3	Narrow	0	0	900	
Price	N Central Price Co.	12 June	6:45 PM	NE	2	20	0	0	5, 000	
Trempealeau, Jackson, Clark, Marathon, Lincoln	W Trempealeau, N Jackson, E Clark, NW Marathon	13 June	5:30-7:30 PM	NE	80	1, 300	0	0	600, 000	
Pierce, Dunn, Eau Claire, Chippewa, Clark	Cent. Pierce, S Dunn, NW Eau Claire, S Chippewa	13 June	5:30-8:00 PM	E	125	1, 000	6	80	1, 000, 000	
Dunn	Parallel to above tornado on left	13 June	6:30 PM	E		90	0	0	125, 000	
Eau Claire	Parallel to above tornado on right	13 June	7 PM	E	16		0	0	25, 000	
Portage	Near Darcy	20 July	4:30 PM	E	10	880	0	0	15, 500	

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Place		Date	Time	Direction of Advance	Length of Path, Miles	Width of Path, Yards	Number of Persons		Estimated Damage	
County	Town						Killed	Injured	Property (exclusive of Crops)*	Crops*
Portage	Coddington	27 July 1931	1:30 AM	SE	3	880	0	0	10,000	
Dane	Madison NE	6 May	5 PM		<1	50	0	0	100	
Rusk	Near Tony	1 July	Afternoon		<1	Narrow	0	0	8,000	
Lafayette	Darling and vicinity	1 July	5:30 PM	NE	7	880	0	0	25,000	
Rock, Jefferson, Waukesha	Near Oxfordville to Oconomowoc	21 Sept. 1932	7:30-9:00 PM	NE	50	200	1	9	300,000	
Manitowoc	Kiel	19 Sept. 1933	7 PM	NE		440	0	0	2,000	
Pepin	Durand	30 April	3 PM	S	2	100	0	0	5,000	
Wood	10 mi. SW Wis. Rapids to Rudolph	23 May	3:30 PM	NNE	15	100	0	1	75,000	
Green Lake	N of Marquette to Kingston then SE of Manchester	5 June	5:15 PM	SSE	10	150	1	4	100,000	5,000
Sauk	Reedsburg	1 July	7:30 PM	SE		250	0	0	5,000	
Polk	Clear Lake	10 Aug.	4:45 PM	ENE	12	50	0	0		
Polk	Clear Lake	10 Aug.	4:45 PM	ENE	20		1	4	25,000	
Dane	3½ mi. W of Cambridge	26 Sept. 1934	Midnight		1	Narrow	0	0	5,000	
Dane	Cottage Grove	17 Mar.	2:45 AM	S	Short	60	0	0	1,300	
Walworth	East Troy	21 May	3 PM		1½		0	0	10,000	
Dodge	Reeseville	8 June	2:30		2	220	0	0	4,000	
Green	Brodhead	20 June	5:45 PM		3	330	0	0	10,000	
Adams	Briggsville	25 June	11:30 PM		1½	880	0	0	3,000	
Waupaca	Manawa	30 June	3 PM				0	0	7,000	
Calumet, Manitowoc	NE Potter to SE Reedsville	12 July	8:00 PM	E			0	0	None	
Polk	E of Milltown	5 Oct. 1935			5	35	0	3	10,000	
Vernon	3 mi. W of Viroqua	26 April	Afternoon		Short	Narrow	0	0	300	
Eau Claire, Clark	Fairchild	5 July	5:45 PM	E	3	33–167	0	0	12,000	
Marathon	Wausau	5 July	7:15 PM	ENE	25	100–167	0	0	125,000	
Langlade	Phlox	11 July	5:30 PM	E		880	0	1	10,000	
Langlade	Near Neva	17 Sept.				33	0	0	1,000	
Polk	6 mi. NE of Amery	16 Oct.	5:30 PM		1/5	67	0	0	4,000	
Polk	3 mi. SE or Amery	16 Oct. 1936			Short	Narrow	0	0	500	
Trempealeau	N Trempealeau Co.	16 May	Mid-night	NE	6	275	0	0	30,000	
Lincoln	Tomahawk	11 July	4:30 PM	E	1	1,320	0	0	5,000	
Washington	West Bend	22 Aug. 1937	12:20 AM	NE	3	140	0	0	300	
Lafayette	S Cent. Lafayette Co.	25 June	3:30 PM	SSE	8	100	0	0	10,000	

TABLE 1. LIST OF REPORTED TORNADOES FROM BEGINNING OF RECORD THROUGH 1964—Continued

Place		Date	Time	Direction of Advance	Length of Path, Miles	Width of Path, Yards	Number of Persons		Estimated Damage	
County	Town						Killed	Injured	Property (exclusive of Crops)*	Crops*
		1938								
Langlade	W of Antigo	3 May	3:30 PM	E	2	35	0	2	10, 000	
Juneau	6 mi. NW of Wis. Dells	23 Aug.	1:00 PM	NE	3	100	0	0	5, 000	
(None reported)		1939								
		1940								
Vilas	Land O'Lakes	17 June	4:15 PM	E	5½	100	1	4	2, 500	
Oneida	Lake Tomahawk	17 June	4:30 PM	E	2	125	1	3	5, 000	
		1941								
Langlade	Deerbrook	13 April	4:00 PM	E	6	160	0	0	12, 000	
Portage	Plover	14 April	2:00 PM	NE	2		0	0	4, 000	
Rock	S Footville to Leyden	19 April	8:30 PM	NE	6	100	0	0	10, 000	
Grant	Cassville	3 Sept.	6:00 PM	NE		100	0	2	1, 000	
		1942								
Chippewa	Edson to SE of Thorp	4 April	5:00 PM	E	18	70	0	0	60, 000	
Polk	10–12 mi. SWbf Deronda to Deronda	13 May	3:00 PM	NE	12	30	0	2	50, 000	
Jackson, Clark	Black River Falls to Loyal, Clark Co.	13 May	3:00 PM	NW	35	100	1	1	100, 000	
Langlade	Antigo	13 May	3:45 PM	NE	10		0	0	15, 000	
Douglas	Hawthorne	11 June	Afternoon				0	0	500	
Winnebago	Waukau	28 July	4:00 PM	E	1½		0	1	10, 000	
Waushara	Hancock	28 July	4:00 PM	NE		30	0	0	3, 000	200
Chippewa	Stanley	16 Sept.	6:00 PM	NE	1½	50	0	0	Minor	
Chippewa	SE Chippewa Co.	17 Sept.	11:30 PM	E	1½	100	0	0	20, 000	
(None reported)		1943								
		1944								
Manitowoc	Two Rivers	4 June	4 PM	NE		67	0	0	600	
Portage		18 June	3:50 PM	ESE	12	55–1, 320	0	3	100, 000	5, 000
Lafayette	Belmont—crossed to Illinois	22 June	6:30-8:00 PM	SE	36	200–1, 760	7	65	1, 000, 000	25, 000
Wood	SE Wood Co.	22 June	9:30 PM	E	20	880	0	0	15, 000	25, 000
Dane	7 mi. NNE of Madison	23 July	5-5:15 PM	E	1½	67	0	1	15, 000	5, 000
		1945								
Taylor	S Taylor Co.	27 Mar.	7:30 PM	E	1		0	1	6, 000	
Langlade		11 April	3:20 PM	ENE	10	1, 760	1	0	100, 000	1, 000
Waushara	NW Waushara Co.	21 May	7:00 PM	NE	6	220	0	0	7, 000	
Wood, Portage	Sigel to southern Stevens Point	19 Sept.	3-3:45 PM	E	25	200	0	2	25, 000	
		1946								
Sauk	Lake Delton and vicinity	22 Sept.	5:55-6:10 PM	NE	Short	27	0	0	10, 000	
(None reported)		1947								

TABLE 1. LIST OF REPORTED TORNADOES FROM BEGINNING OF RECORD THROUGH 1964—Continued

PLACE		DATE	TIME	DIRECTION OF ADVANCE	LENGTH OF PATH, MILES	WIDTH OF PATH, YARDS	NUMBER OF PERSONS		ESTIMATED DAMAGE	
County	Town						Killed	Injured	Property (exclusive of Crops)*	Crops*
		1948								
Grant	Near Lancaster	29 July	5:15 PM	NE		Narrow	1	1	25, 400	
Iowa	Near Linden	29 July	5:25 PM	NE	1	333	0	0	10, 000	1, 100
Dane	Near Springfield Corner	29 July	6:00 PM	NE	2	133	1	11	20, 850	650
La Crosse		29 July	6:30 PM	NE		5	0	0	500	
		1949								
Polk	Near Amery	17 May	2:30 PM	NE	8	50	0	0	Minor	
Winnebago	Near Omro	19 May	4:03 PM	NE	Short	70	0	0	5, 000	
Lincoln	N of Tomahawk	18 July	Afternoon	ENE	15	300	0	0	No estimate	
Oneida	Clearwater	27 July	Afternoon	NE	Short	Narrow	0	0	Minor	
		1950								
Rusk	Ladysmith	25 June	7:20 PM	ENE	Short	Narrow	0	0	50, 000	
Price	Near Prentice	25 June	8:20 PM	ENE	1	Narrow	0	0	54, 000	
Oneida	SW Rhinelander	25 June	9:00 PM	NE	12	500	2	50	500, 000	
Clark	Near Unity	25 June	Night	NE	Short	Narrow	1	0	25, 000	
Green Lake	Berlin	25 June	11:30 PM	E	1	300	0	0	100, 000	
		1951								
Dodge	Near Brownsville	19 June	8:30 PM	NE	1	500	0	0	25, 000	Minor
Richland	Near Cazenovia	3 July	8:00 PM	NE	½	50	0	0	10, 000	
Pepin, Dunn	Greatest destruction 6 mi. E of Menomonie	12 Sept.	11:30 AM	NE	30	200	0	2	127, 000	Minor
Waupaca	Most destruction 3 mi. N of Waupaca	26 Sept.	3:50 AM	NE	20	100	6	3	250, 000	Minor
Columbia	Near Cambria	26 Sept.	4:30 PM	NE	10	100	1	10	225, 000	Minor
		1952								
Polk	Centuria	23 June	9:15 PM	NE	15	100	2	6	250, 000	
		1953								
Pierce, St. Croix, Polk, Burnett, Washburn, Douglas	First observed at River Falls, Pierce Co.	10 May	6:30-8 PM	NNE	100	100	4	27	1, 000, 000	Minor
Buffalo, Trempealeau, Eau Claire, Chippewa, Taylor, Price	Crossed River from Minn. into Buffalo Co.	10 May	6:30-8 PM	NE	100	100	0	10	1, 000, 000	
Oneida	Near Three Lakes	20 June	PM		Short		0	0	30, 000	
		1954								
Iowa	6 mi. N of Highland to 3 mi. SE of Avoca	7 April	5:45 PM	NE	6–8	400	0	4	60, 000	300
Waukesha	Oconomowoc	7 April	1:15 PM	NE			0	0	50, 000	
Fond du Lac	Mt. Calvary	7 April	Late AM-PM	E			0	0	30, 000	
Waushara	Neshkoro, Lohrville, Redgranite	15 April	3 PM	NE			0	0	10, 000	

TABLE 1. LIST OF REPORTED TORNADOES FROM BEGINNING OF RECORD THROUGH 1964—Continued

PLACE		DATE	TIME	DIRECTION OF ADVANCE	LENGTH OF PATH, MILES	WIDTH OF PATH, YARDS	NUMBER OF PERSONS		ESTIMATED DAMAGE	
County	Town						Killed	Injured	Property (exclusive of Crops)*	Crops*
La Crosse, Trempealeau	At Camp Dekorah between Holman and Galesville	26 April	3:35 PM	N			0	0	600	
Grant	N of Andover	26 April	4 PM				0	0	Losses not reported	
Jackson	Hixton	18 June	6:30 PM	ESE	10	900	0	0	100, 000 Includes Crops	
Marathon	Near Mosinee	20 June	2:40 AM	E			0	0	Losses not reported	
Calumet	Near Brothertown	20 June	AM				0	0	Losses not reported	
Pierce	Herbert (8 mi. SE Ellsworth)	29 June	3:30 PM	NE	6	.....	0	0	5, 000 Includes Crops	
Columbia	Lodi and Vicinity	30 July	7 PM	ESE	8	200	0	0	80, 000 Includes Crops	
St. Croix	New Richmond and Vicinity	15 Aug.	6 PM	E	6		0	0	70, 000 Includes Crops	
		1955								
Crawford	Near Prairie du Chien to near Lynxville	18 April	1 AM	NNE			0	0	25, 000	
Iowa	Dodgeville, Ridgeway, Barneveld	18 April	4 PM	E	13		0	0	Losses not reported	
Dane	Belleville and Vicinity	18 April	5 PM	ESE			0	0	250, 000	
Walworth	Heart Prairie and Vicinity	18 April	7 PM	E	4		0	1	Losses not reported	
Lincoln	Irma	3 May	6 PM	ENE	8		0	2	20, 000	
Rock	7 mi. NW of Janesville	28 May	1:15 PM	E	4	100	0	0	20, 000	Losses not reported
Waupaca	3 mi. W of Clintonville	28 May	3 PM	N	3	75	0	4	20, 000	Losses not reported
Pierce	Elmwood	22 July	2 PM	NE	2	220	0	0	1, 000	Minor
Manitowoc	Newton	31 July	5:10 PM	SSE			0	0	50, 000	25, 000
		1956								
Iowa	5 mi. NE of Highland	3 April	11:00 AM	NE	4	200	0	0	100, 000	
Portage	From Bancroft to near Amherst	3 April	12:50 PM	NE	18	100	2	7	180, 000	
Green Lake, Winnebago	Berlin and Northeastward	3 April	2:05 PM	NE	12	400	7	50	1, 000, 000	
Door	Brussels	1 July	12:00 PM	NE			0	0	100, 000	10, 000

TABLE 1. LIST OF REPORTED TORNADOES FROM BEGINNING OF RECORD THROUGH 1964—Continued

Place		Date	Time	Direction of Advance	Length of Path, Miles	Width of Path, Yards	Number of Persons		Estimated Damage	
County	Town						Killed	Injured	Property (exclusive of Crops)*	Crops*
Waukesha	Big Bend and Muskego areas	16 July	12:30 PM	E	3	30	0	0		1,000
Dodge	W of Beaver Dam	21 July	4 PM	E			0	0		
		1957								
La Crosse	Holmen	19 April	2:30 PM	NNW	2–3	150	0	0	18,000	
Juneau	Near New Lisbon through Necedah to Refuge N of Necedah	19 April	4 PM	NNE	20	300	1	0	7,500	
Walworth, Racine	Burlington area	19 April	4 PM	NE	6	200	0	2	75,000	
Portage	Coddington and Bancroft	19 April	4:05 PM	NE	5	30	0	0	15,000	
Waushara	Wautoma, Saxeville	19 April	4:15 PM	NE	12	150	0	1	50,000	
Monroe	Kendall	19 April	8:30 PM	NE	8	400	0	0	60,000	
Grant	Bloomington to Fennimore	25 May	4:30 PM	NW to NE	20	40	0	0	20,000	
Florence	Florence	14 June	5:30 PM	NE	7	100	0	0	50,000	
Barron	Brill	4 July	6:30 AM	NE	4	150	0	4	75,000	
Brown	Denmark	11 July	1:30 PM	ENE			0	0	1,000	
Manitowoc	Whitelaw	11 July	2 PM	NE			0	0	2,000	
Vernon	Hillsboro	19 Sept.	12:30 AM	NE	10	165	0	0	50,000	10,000
		1958								
Marinette		17 May	2:20	NE	5	80	0	1	175,000	
St. Croix, Pierce		24 May	2:45 PM	SE	50	50	0	5	385,000	
Lafayette		31 May	2:30 PM	NE	3		0	0	75,000	
St. Croix, Dunn		4 June	5:30 PM	ENE	32	880	19	110	7,000,000	10,000
Chippewa		4 June	6:45 PM	ENE	12	600	4	56	1,000,000	
Rusk		4 June	7:00 PM	ENE	15	200	0	0	7,500	
Chippewa		4 June	7:00 PM	ENE	5	300	0	3	75,000	2,000
Eau Claire, Clark, Marathon		4 June	7:30 PM	ENE	60	880	4	3	750,000	50,000
Chippewa		22 June	1:30 PM	E	440 yd.	25	0	0		1,000
St. Croix		22 June	3:25 PM	E	440 yd.	50	0	0	500	
Lincoln		30 June	5:30 PM	E	2	50	0	0	1,000	
Barron		14 July	1:00 PM	E	1	75	0	0	10,000	
Iron		14 July	2:45 PM	SE	25	250	0	0	75,000	
Milwaukee		7 Aug.	2:47 PM	SE	1	100	0	4	45,000	
Marinette		30 Aug.	5:30 PM	E	1	100	0	0	6,000	
St. Croix		9 Oct.	12:00 PM	NE	8	50	0	0	30,000	1,000
Dane		9 Oct.	4:45 PM	NE			0	0		

TABLE 1. LIST OF REPORTED TORNADOES FROM BEGINNING OF RECORD THROUGH 1964—Continued

Place		Date	Time	Direction of Advance	Length of Path, Miles	Width of Path, Yards	Number of Persons		Estimated Damage	
County	Town						Killed	Injured	Property (exclusive of Crops)*	Crops*
		1959								
Chippewa	10 NE Eau Claire	4 May	9:12 AM		¼		0	0		
Marathon	SW of Wausau	4 May	10:30 AM		1	200	0	0	2	1
Langlade	Deerbrook	4 May	11:05 AM		1	100	0	0	1	
Jackson	1 N Black River Falls	4 May	1:00 PM		1	150	0	0	4	1
Buffalo	Mondovi	5 May	7:00 PM		¼	150	0	0		
Waupaca	Symco to near Clintonville	6 May	3:20 AM		10	1,000	0	0	5	
Outagamie	3 NE Shiocton	6 May	1:30 PM		3	200	0	0	4	
Columbia	Portage	10 May	7:20 PM	NE	2	200	0	0	3	
Brown	Green Bay	10 May	8:50 PM		6	600	0	3	6	
Grant	SW Lancaster	19 May	5:20 PM	NE	5	200	0	0	4	
						Funnel later sighted near Mt. Horeb, Dane County.				
Trempealeau, Jackson Eau Claire	Trempealeau, Fairchild	26 May	3:45 PM				0	3	5	
Rusk	Ladysmith	26 May	3:45 PM				0	0	4	
Sauk	Prairie du Sac	28 May	2:02 PM				0	0	3	
Fond du Lac	5 N Ripon	28 May	3:05				0	0		
			A few small tornadoes touched the ground. Also funnels reported.							
Winnebago	N Oshkosh	28 May	3:15 PM				0	0	3	
Brown	7 S Green Bay	28 May	3:30 PM				0	0	3	
Brown	15 S Green Bay	28 May	3:38 PM				0	0		
Walworth	Whitewater	6 June	3:37 PM				0	0	0	
			Touched down once—no damage.							
Brown	4 E Green Bay	10 June	1:20 PM				0	0	0	
Waukesha	25 WSW Milwaukee	12 June	Mid-night to 1:45 AM		2	1,000	0	0	3	
Chippewa	12 N Chippewa Falls	26 June	1:20 PM							
Marquette	Harrisville	8 July	Mid-afternoon				0	0	4	
Marinette	Niagara	8 July	4:54 PM		Short		0	3	4	
Outagamie	26 SW Green Bay	28 Aug.	2:04 PM				0	0	2	
Burnett	Grantsburg	6 Sept.	6:24 PM		Short		0	0	0	
Clark	10 SE Stanley	22 Sept.	6:30 PM		½	30	0	0	2	
Milwaukee	Milwaukee	26 Sept.	6:28 PM		4	Narrow	0	3	5	
Racine, Kenosha	Kansasville to Racine	26 Sept.	6:30 PM		15	50	0	0	5	
Waukesha	2 NW Mapleton	8 Oct.	4:00 PM		1	Narrow	0	0	4	
Racine	Near Franksville	8 Oct.	4:48				0	2	4	
		1960								
Sawyer	27 SE Winter	23 April	7:00 PM				0	0	2	
Manitowoc	7 E Chilton	24 April	Late Afternoon		Short		0	0	2	
Sauk	40 NW Madison	21 May	5:10 PM				0	0		
Fond du Lac	20 W Fond du Lac	21 May	5:14 PM	NE			0	0		

TABLE 1. LIST OF REPORTED TORNADOES FROM BEGINNING OF RECORD THROUGH 1964—Continued

Place		Date	Time	Direction of Advance	Length of Path, Miles	Width of Path, Yards	Number of Persons		Estimated Damage	
County	Town						Killed	Injured	Property (exclusive of Crops)*	Crops*
Winnebago	5 W Oshkosh	21 May	5:30				0	0		
Trempealeau	Eleva	28 June	3:45		10	60	0	0	3	
Buffalo	Mondovi	28 June	Afternoon	SE	10					
Dodge	3 S Reeseville	8 Aug.	4:00 PM	S	Short	Narrow	0	0	2	
Iowa	15 SE Lone Rock	20 Aug.	4:05 PM				0	0		
		Two tornadoes, briefly touched ground.								
Taylor	3 N Medford	27 Aug.					0	0	Slight	
Monroe	8 N Sparta	28 Aug.	3:30 PM				0	0	4	
Rock	1½ N Union	15 Nov.	Late afternoon		2	Narrow	0	0	2	
Clark	2 NW Chili	15 Nov.	2:25		35	100	0	1	4	
		1961								
La Crosse	La Crosse	14 May	1:50 PM		1	35	0	0	4	
Burnett	Grantsburg	2 Aug.	7:00 PM	Touched momentarily						
Price	Park Falls	14 Aug.	7:50 PM	NE	5	400	0	0	5	4
St. Croix	Glenwood City	2 Sept.	9:30 PM				0	0		
Marathon	Fenwood	3 Sept.	12:10 AM				0	0		
Clark	5 W Thorp	3 Sept.	12:15 AM		3½	5	0	0	4	
Marathon	Athens	3 Sept.	1:00 AM				0	0		
Walworth	1 S Whitewater	22 Sept.	12:00 PM		5	Narrow	0	1	5	4
Fond du Lac	Campbellsport	22 Sept.	1:30 PM		4–5	300	0	0	3	4
		1962								
Fond du Lac	5 NE Ripon	17 June	6:00 PM	NE	1	75	0	0		
Clark	Thorp	23 June	4:40 PM				0	0	2	
Brown	Point Sauble, Green Bay	23 June	4:30 PM				0	0		
Portage	15 E Stevens Point	23 June		Briefly touched ground			0	0		
Milwaukee	West Allis	22 July	12:48 PM			25	0	0	3	
Lincoln	Merrill	24 July	5:00 PM				0	0	3	
Barron, Chippewa	Barron, Rice Lake, Bloomer, Cadott	15 Aug.	3:15 PM	SE		400	0	0	3	3
		Touched at Barron 8 NW at 3:15; at Rice Lake 12 SW at 3:30; Bloomer 14 NE at 5:00 PM; and Cadott shortly after 5:00 PM.								
Milwaukee	Greendale	4 Oct.	3:20 PM	NE			0	0	Minor	
Jackson	18 SE Neillsville	10 Oct.	8:30 AM		3	400	0	0	3	
		1963								
Dodge	Hustisford	8 June	7:15 PM	SE thne E	Short	30	0	0	5	
Dodge	Lomira	13 June	4:55	SE	Touched briefly.		0	0	2	
Kenosha	Near State Hwy 50 and County "B"	19 July	4-5 PM	S	8	30	0	0	4	4
Columbia	Prairie du Sac, Lodi	16 Aug.	7:15 PM	E	6	Narrow	0	13	5	4

TABLE 1. LIST OF REPORTED TORNADOES FROM BEGINNING OF RECORD THROUGH 1964—Continued

PLACE		DATE	TIME	DIRECTION OF ADVANCE	LENGTH OF PATH, MILES	WIDTH OF PATH, YARDS	NUMBER OF PERSONS		ESTIMATED DAMAGE	
County	Town						Killed	Injured	Property (exclusive of Crops)*	Crops*
Lafayette and Green	Lamont to 3 E Argyle	2 Sept.	5-6 PM		10	Narrow	0	0	5	
Dane		2 Sept.	6:30 PM			Narrow	0	0		
		Touched down in rural Mazomanie; rural Waunakee and rural Sun Prairie.								
Marquette	Buffalo	2 Sept.	6:30 PM				0	0	3	
Forest	Laona	19 Sept.	6:00 PM		½	Narrow	0	0	4	
		1964								
Jackson	2 SE Melrose	4 May	5:00 PM	NE	9	200	0	1	5	
Crawford	Lynxville to Rising Sun	4 May	8:00-8:45 PM	NE	25	200	0	2	5	
Juneau	Fountain and Orange	4 May	8:00-8:20 PM	NE	6	100	0	0	4	
Oneida and Vilas	St. Germain	4 May	6:00 PM			125	0	0	4	
Juneau	3 W Necedah	4 May	8:30 PM			25	0	0	3	
Barron	7 W Cumberland	5 May	2:15 PM		¼	100	0	0	4	
Juneau	1 N Meadow Valley	7 May	2:30 PM	ENE	4	30	0	1	3	
Wood	Wisconsin Rapids	7 May	6:00 PM	E		100	0	14	5	
Vernon and Richland	Readstown to 3 SW Hillsboro	8 May	5:30 PM	NE	23	300	0	1	5	
Marathon	Bevent to Elderon	8 May	4:50 PM	NE	12		0	0	5	
Waupaca	1 W Clintonville	8 May	5:00 PM	NE	3	200	0	1	5	
Juneau–Adams		8 May	5:15 PM	NE	25	150	0	0	5	
Winnebago–Outagamie	Fox Cities area	8 May	6:30 PM	NE	35	25–100	0	5	6	
Buffalo	5 SW Gilmantown	23 May	7:30 PM	NE	2	100	0	0	4	
Trempealeau–Jackson	Pleasantville	23 May	7:30 PM	NE	10	100	0	0	5	
Brown	Bellevue	30 May	1:28 PM				0	0	0	
Shawano	Belle Plaine	9 June	2:30 PM				0	0	4	
Marinette	Pound	9 June	3:00 PM				0	0	4	
Barron	Cameron	18 June	6:00 PM	NE	7½	12	0	2	4	
Buffalo	Mondovi	20 June	8:10 PM				0	0		
		Touched ground briefly.								
Taylor	2½ W Medford	6 July	6:15 PM				0	2	3	
Washington	Jackson	6 July	9:30 PM				0	0		
St. Croix	Hamilton	28 July	7:15 PM				0	1	3	
Fond du Lac	8 E Fond du Lac	22 Aug.	1:55 PM	NE	Short	Narrow	0	0	3	
Fond du Lac	Fond du Lac	22 Aug.	3:15 PM	NE	1	500	0	2	5	
Portage	Grant	22 Aug.	Mid-afternoon	NE	7	Narrow	0	0	4	4
Dodge	Lowell	22 Aug.	Mid-afternoon		Short	Narrow	0	0	3	3
Ozaukee	Port Washington	22 Aug.	3:55 PM	NE	1	50	0	30	6	
Milwaukee	Oak Creek	22 Aug.	4:00 PM	NE	2	400	0	0	5	
Barron–Burnett		28 Aug.	1:45-2 PM	NNW	4½	50	0	0	4	
Richland	Near Hwy. 60 and Co. "F"	3 Sept.	3:15-3:45 PM		15	850	0	4	5	4
Dodge	7 NW Hartford	3 Sept.	5:00 PM		Short	Narrow	0	0	3	3
Milwaukee	Milwaukee	3 Sept.	5:20 PM		1/8	100	0	0	5	

*After 1958, tornado damage is placed in the following categories:
1—Less than $50; 2—$50 to $500; 3—$500 to $5,000; 4—$5,000 to $50,000; 5—$50,000 to $500,000; 6—$500,000 to $5,000,000.

through 1915 and 293 tornadoes from 1916 through 1964. Unless otherwise specified, the data used in this paper are for the period 1916–1964.

Distribution of the number of tornadoes and number of tornado days by month is given in Figure 1. The number of tornadoes and tornado days reach the maximum in June, followed by May and July with a secondary peak in September. The two peaks occur at the approximate times of the beginning and ending of meteorological summer in Wisconsin, as well as the rainfall peaks of the year.

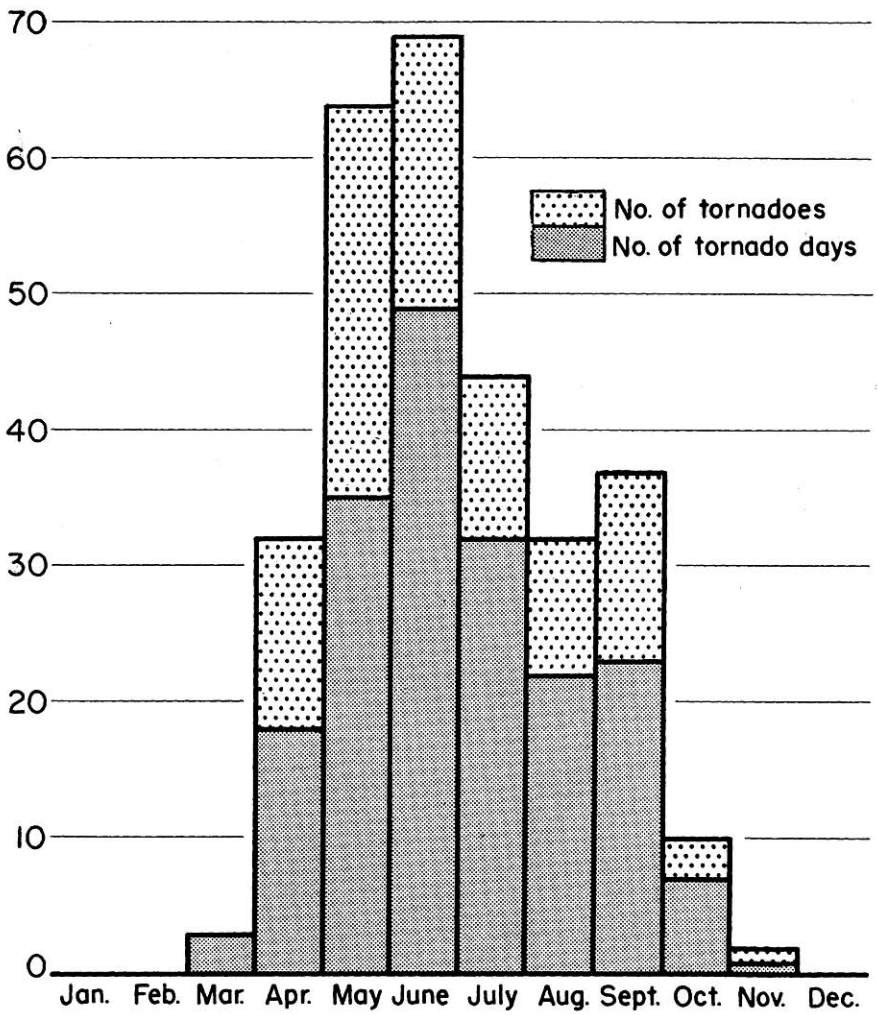

FIGURE 1. Number of tornadoes and tornado days, 1916–1964.

This timing is different from the national average, where the maximum number of tornadoes is reached in May with a secondary peak in November, and the number of days with tornadoes having one peak in June. Approximately 95% of the tornadoes and tornado days occur in the five-month period, April through September. No tornadoes have been reported in this state in December, January or February. The season's earliest recorded tornado occurred March 17, 1934, while the season's latest recorded tornado was November 15, 1960. Although tornado occurrences are generally distributed through the season, the highest probability is from June 20 to 25.

During the period 1916–1964, about 13% of the tornadoes were responsible for loss of human life, 28% were responsible for injury, and 32% were responsible for either death or injury. The fewer deaths and injuries in recent years are believed to reflect better forecasting, timely warning, and a better informed public knowing what safety precautions to take.

The number of tornadoes has averaged 6.0 per season, while the number of days with tornadoes has averaged 3.9 per season. (Table 2) No tornadoes were reported in 1917, 1923, 1939, 1943, and 1947. The thirty-three tornadoes reported and confirmed in 1964 makes it the highest season on record, followed closely by 1959 with thirty. There have been deaths in twenty-two of the forty-nine years in this study for an average of 3.2 deaths per year. Tornado related injuries occurred in thirty-three of these years for an average of 19.6 per year.

The most frequent time of day for tornadoes to occur is between 3 P.M. and 7 P.M., (Table 3) with 5 P.M. being the most probable hour. Three out of every four tornadoes have touched down between 1 P.M. and 8 P.M. The hours of least probability are between 2 A.M. and 11 A.M.

TABLE 2. NUMBER OF REPORTED TORNADOES, TORNADO DAYS, DEATHS, INJURED, PROPERTY LOSS BY YEAR, 1916–1964.

YEAR	NUMBER	DAYS	DEATHS	INJURED	PROPERTY LOSS
1916	1	1	0	0	$ 20,000
1917	0	0	0	0	0
1918	3	3	9	103	715,000
1919	1	1	——	——	500
1920	1	1	1	——	25,000
1921	2	2	——	2	620,000
1922	3	3	8	100+	560,000
1923	0	0	0	0	0
1924	7	3	43	276	1,618,000
1925	4	4	2	0	66,500
1926	2	2	3	17	91,000
1927	2	2	0	——	21,200
1928	8	4	0	13+	387,500
1929	6	4	12	131	1,247,000
1930	12	6	8	80	2,173,400
1931	4	3	1	9	333,100
1932	1	1	0	0	2,000
1933	7	6	2	9	220,000
1934	8	8	0	3	45,300
1935	7	5	0	1	152,800
1936	3	3	0	0	35,300
1937	1	1	0	0	10,000
1938	2	2	0	2	15,000
1939	0	0	0	0	0
1940	2	1	2	7	7,500
1941	4	4	0	2	27,000
1942	9	6	1	4	258,500
1943	0	0	0	0	0
1944	5	4	7	69	1,130,600
1945	4	4	1	3	138,000
1946	1	1	0	0	10,000
1947	0	0	0	0	0
1948	4	1	2	12	56,750
1949	4	4	0	0	5,000
1950	5	1	3	50	729,000
1951	5	4	7	15	637,000
1952	1	1	2	6	250,000
1953	3	2	4	37	2,030,000
1954	12	8	0	4	405,600
1955	9	5	0	7	386,000
1956	6	4	9	57	1,380,000
1957	12	6	1	7	423,500
1958	17	10	27	182	9,635,000
1959	30	17	0	14	*
1960	14	9	0	1	*
1961	9	6	0	1	*
1962	9	7	0	0	*
1963	10	6	0	13	*
1964	33	14	0	66	*
Total	293	190	155	1303	
Average	6.0	3.9	3.2	26.6	

*Losses categorized by classes after 1958.

TABLE 3. NUMBER OF TORNADOES BY HOUR AND MONTH, 1916–1964

HOUR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
00				1	1	1	1	1	3				8
01				1	1	1	2		1				6
02							1						1
03			1		1	1							3
04						1			1				2
05													0
06							2						2
07						1							1
08										1			1
09					1		1						2
10					1								1
11				1					1				2
12			1		1		2		2	1			7
13				2	4	4	3	1	1				15
14				3	6	4	2	3	2		1		21
15				4	11	6	1	4	5	1			32
16				8	7	4	6	6	2	2			35
17				2	9	9	7	4	3	3			37
18				3	7	7	5	3	10				35
19			1	2	7	11	4	5	2				32
20				2	3	5	2	1					13
21					1	4			1				6
22					1	1							2
23					1	2			1				4
Unknown				3	1	7	5	4	2	2	1		25
TOTAL			3	32	64	69	44	32	37	10	2		293

Surface winds in weather systems with devoloping tornadoes are usually from the southwest, and most tornadoes move from this direction. (Figure 2) However, tornadoes can come from any

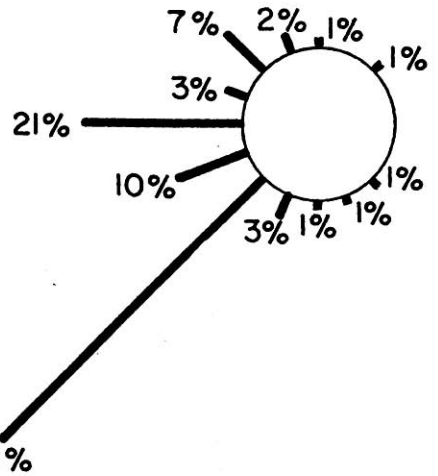

FIGURE 2. Tornado rose for Wisconsin showing percent of reported tornadoes moving from indicated directions, 1916–1964.

direction. Ninety fiive per cent of the tornadoes in Wisconsin have moved from a westerly direction with nearly fifty percent moving directly out of the southwest. National averages and Lapham's windfalls closely approximate these figures. The length of individual paths vary from brief touch downs to 170 miles. Although the average tornado path is 11.7 miles, the median of four miles is considered more representative since the average includes several extremely long paths. Tornado paths have been less than one mile in length 26% of the time, for one to five miles 32%, six to ten miles 15%, eleven to twenty miles 14%, twenty-one to fifty miles 9%, and over fifty miles 4% of the time. The average width of the path is 285 yards, while the median is 100 yards. Widths have been under 100 yards 35% of the time, from 100 to 200 yards 32%, from 300 to 500 yards 15%, from 600 to 1,000 yards 9%, and greater than 1,000 yards 5% of the time.

Tornadoes have been observed in nearly ever county in the state. (Figure 3) The area of greatest frequency is the west central section, while the area of least frequency is a band of counties along the northern border of the state and a band along Lake Michigan north of Milwaukee. A map of Lapham's windfalls, also by county,

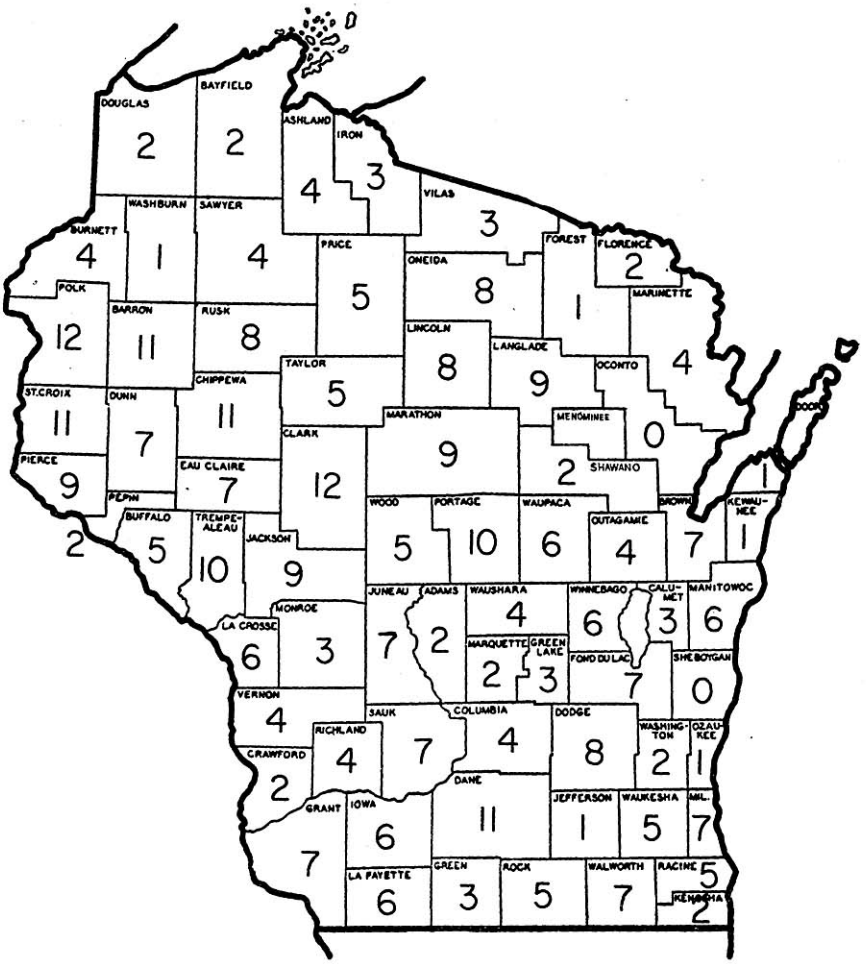

FIGURE 3. Number of reported tornadoes by county, 1916–1964.

makes an interesting comparison. (Figure 4) The highest frequency of windfalls is to the east and north of the highest frequency of tornadoes, suggesting that there were different wind flow patterns in the two periods. In the forty-nine year span, 1916–1964, no tornadoes were reported in Oconto County although early surveyors listed twenty-three windfalls in the county. Bryson's work with Wisconsin's earliest weather data indicates that wind

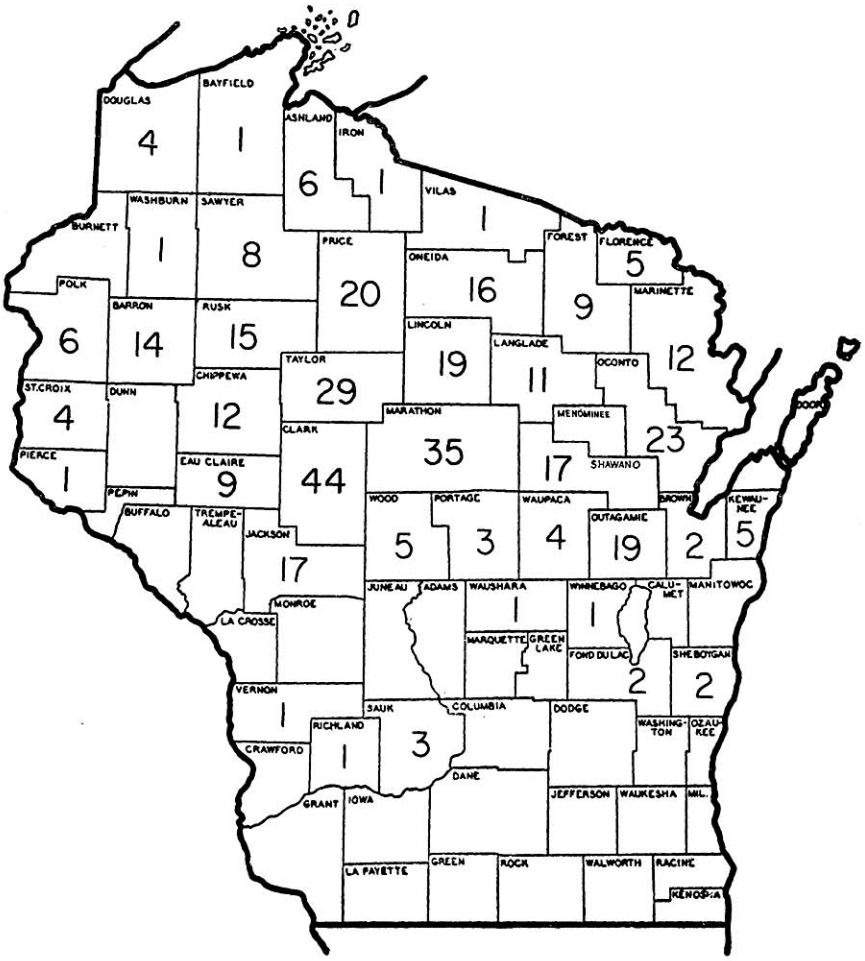

FIGURE 4. Number of windfalls by county. (before settlement)

flow patterns changed between the early 1800's and recent times, and that the changes took place between 1870 and 1880.[9] In making the comparison one must keep in mind that the windfalls are only for the part of the state unsettled and under virgin forest at the time of the survey, that a skipping tornado could leave a number of windfalls, and that some of the windfalls were probably the result of straight line winds.

Outstanding tornadoes are arbitrarily defined in this paper as meeting one or more of the following criteria: (1) loss of life to the extent of at least five, (2) property damage amounting to at least $500,000, (3) and path at least twenty-five miles in length. (Figure 5, Table 4) Wisconsin's "tornado alley" is clearly located in the west central counties, it appears to be approximately in line with the tornado gradient increasing southwest through Iowa into Kansas and Oklahoma. (See Figure 6). A large number of eastern

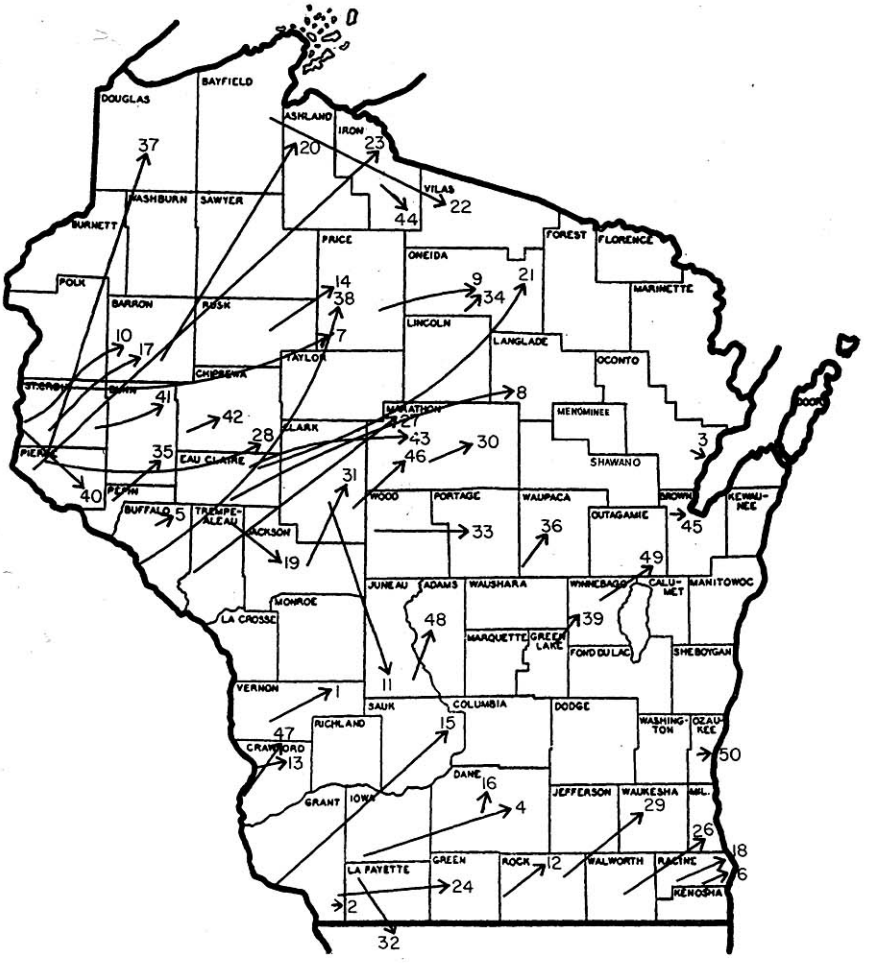

FIGURE 5. Outstanding tornadoes from beginning of record through 1964. Where loss of life was at least 5, or property damage was at least $500,000, or path was at least 25 miles long.

TABLE 4. OUTSTANDING TORNADOES FROM BEGINNING OF RECORD TO 1964. (WHERE LOSS OF LIFE WAS AT LEAST 5, PROPERTY DAMAGE WAS AT LEAST $500,000, OR PATH WAS AT LEAST 25 MILES LONG)

No.	Date	Counties	Time of Occurrence	Lives Lost	Injured	Estimated Property Damage	Length in Miles
1	1865, June 28	Vernon	4:00 PM	24	100	$ 200,000	40
2	1876, March 10	Grant	4:30 PM	9	15	46,000	5
3	1877, July 7	Oconto	6–7 PM	8	30	300,000	6
4	1878, May 23	Iowa to Dane	3:00 PM	19	45+	130,980	150
5	1881, Sept. 29	Buffalo	afternoon	12			
6	1883, May 18	Racine	7:00 PM	25	100	200,000	3
7	1884, Sept. 9	St. Croix to Price	5:00 PM	6	75	4,000,000	120
8	1898, May 18	Eau Claire to Clark, Langlade	4:00 PM	17	100	710,000	110
9	1898, May 18	Price, Oneida	6:30 PM	7	15	200,000	50
10	1899, June 12	St. Croix to Barron	6:30 PM	117	125	600,000	45
11	1907, July 3	Clark to Juneau	4:45-6:30 PM	26		100,000	95
12	1911, Nov. 11	Rock	2:00 PM	9	10	500,000	30
13	1915, June 12	Crawford	5:30 PM	7	25	100,000	20
14	1918, May 19	Rusk, Price	1:00 AM	1	2	50,000	40
15	1918, May 21	Grant, Iowa, Richland, Sauk	6:30 PM	8	100	650,000	85
16	1921, Aug. 19	Dane	4:15 PM	0	2	620,000	—
17	1922, June 15	St. Croix to Barron	7:00 PM	8	100+	500,000	50
18	1924, June 20	Racine	7:30 AM	0	12	500,000	30
19	1924, Aug. 7	Trempealeau, Jackson	6:30 PM	4	100	200,000	27
20	1924, Sept. 21	Barron to Ashland	2:00 PM	10	50	250,000	90
21	1924, Sept. 21	Eau Claire to Oneida	2:20 PM	26	150	564,000	120
22	1926, July 16	Bayfield to Vilas	6:15 PM	3	16	90,000	85
23	1929, April 5	Pierce to Iron	5:45 PM	12	100	725,000	170
24	1929, April 6	Grant to Green	4:30 PM	0	25	250,000	45
25	1930, May 1	Trempealeau to Monroe	7:30 PM	1		202,000	33
26	1930, May 1	Walworth to Milwaukee	11:00 PM	0		30,000	40
27	1930, June 13	Trempealeau to Marathon	5:30 PM	0	0	600,000	80
28	1930, June 13	Pierce to Chippewa	5:30 PM	6	80	1,000,000	125
29	1931, Sept. 21	Rock to Waukesha	7:30 PM	1	9	300,000	50
30	1935, July 5	Marathon	7:15 PM	0	0	125,000	25
31	1942, May 13	Jackson, Clark	3:00 PM	1	1	100,000	35

TABLE 4. OUTSTANDING TORNADOES FROM BEGINNING OF RECORD TO 1964. (WHERE LOSS OF LIFE WAS AT LEAST 5, OR PROPERTY DAMAGE WAS AT LEAST $500,000, OR PATH WAS AT LEAST 25 MILES LONG)—Continued

No.	Date	Counties	Time of Occurrence	Lives Lost	Injured	Estimated Property Damage	Length in Miles
32	1944, June 22	Lafayette	6:30 PM	7	65	1,000,000	36
33	1945, Sept. 19	Wood, Portage	3:00 PM	0	2	25,000	25
34	1950, June 25	Oneida	9:00 PM	2	50	500,000	12
35	1951, Sept. 12	Pepin, Dunn	11:30 AM	0	2	127,000	30
36	1951, Sept. 26	Waupaca	3:50 AM	6	3	250,000	20
37	1953, May 10	Pierce to Douglas	6:30 PM	4	27	1,000,000	100
38	1953, May 10	Buffalo to Price	6:30 PM	0	10	1,000,000	100
39	1956, April 3	Green Lake, Winnebago	2:05 PM	7	50	1,000,000	12
40	1958, May 24	St. Croix, Pierce	2:25 PM	0	5	385,000	50
41	1958, June 4	St. Croix–Dunn	5:30 PM	19	110	7,000,000	32
42	1958, June 4	Chippewa County	6:45 PM	4	56	1,000,000	12
43	1958, June 4	Eau Claire to Marathon	7:30 PM	4	3	750,000	60
44	1958, July 14	Iron	2:45 PM	0	0	75,000	25
45	1959, May 10	Brown	8:50 PM	0	3	500,000+	6
46	1960, Nov. 15	Clark to Marathon	2:25 PM	0	1	5,000+	35
47	1964, May 4	Crawford	8:00 PM	0	2	50,000+	25
48	1964, May 8	Juneau, Adams	5:15 PM	0	0	50,000+	25
49	1964, May 8	Winnebago, Outagamie	6:30 PM	0	5	500,000+	35
50	1964, Aug. 22	Ozaukee	3:55 PM	0	30	500,000+	1

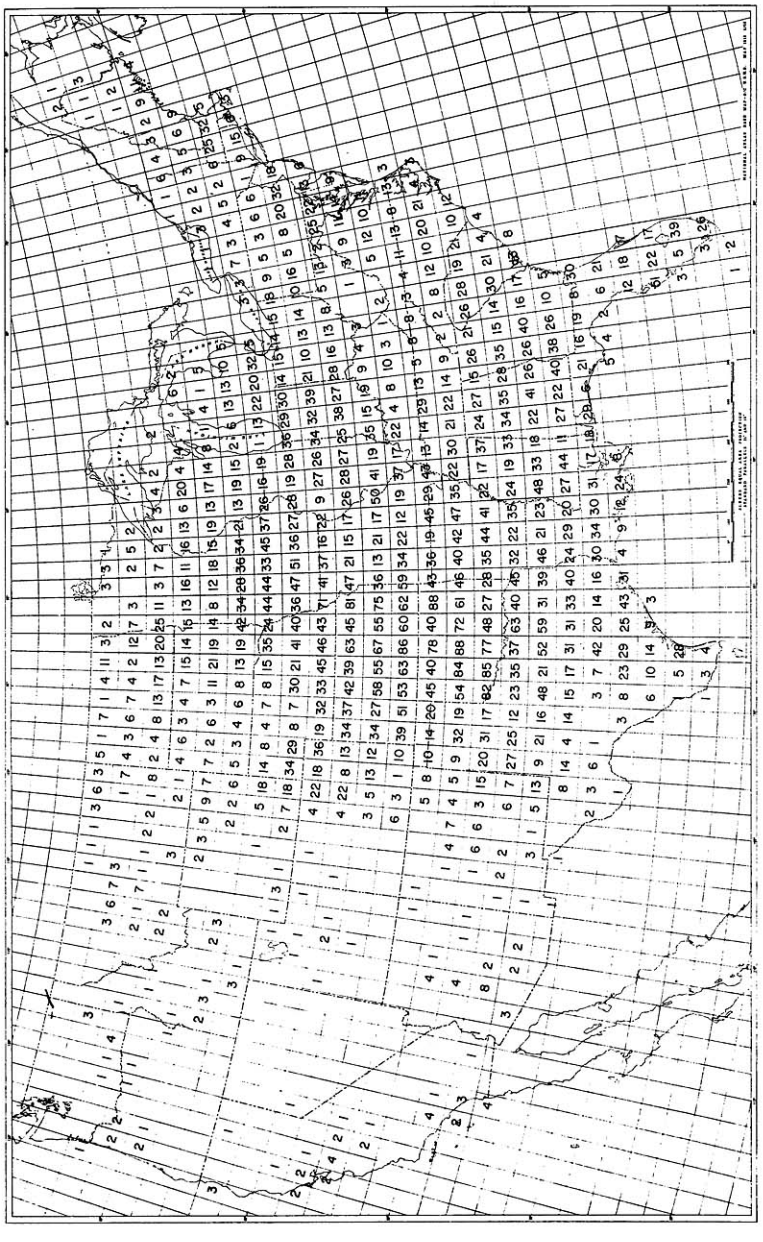

FIGURE 6. Number of reported tornadoes in the United States by 1° "squares", 1916–61. Based on the first point of contact with ground of 11,053 tornadoes.

counties have never been crossed by an outstanding tornado, as defined above. Fortunately, the heavier populated and industrialized part of the state has largely escaped the longer paths of whirling destruction. Figure 5 is in sharp contrast to Figure 3, number of tornadoes by county, where, although the greatest frequency is in west central counties, there is a general geographic distribution with gradual decreases outward from the maxima.

A waterspout is a tornado occurring over water. (Table 5) It is not unusual for a tornado to change to a waterspout or vice

TABLE 5. WATER SPOUTS, 1843–1964

PLACE	DATE	TIME	
Lake Michigan	August 20, 1843	Morning	Near Kenosha
Lac LaBelle	May 31, 1851		Near Oconomowoc
Lake Michigan	July 31, 1867	Dawn	Near Milwaukee
Lake Winnebago	July 22, 1938	12:30 PM	
Lake Koshkonong	July 6, 1954	PM	Near Madison
Sturgeon Bay	August 21, 1955	2:30 PM	Riley's Point near Little Sturgeon
Lake Winnebago	July 1, 1956	Noon	2 water spouts
Lake Winnebago	June 28, 1960	10:35 AM	
Green Bay	June 23, 1962	4:30 PM	Near Point Sauble
Big St. Germain	May 4, 1964	6:00 PM	Crossed over Vilas County lake drawing water to an estimated 200 feet
Lake Michigan	May 8, 1964	8:37 PM	Northeast of Milwaukee
Lake Winnebago	July 27, 1964	4:15 PM	Near High Cliff

versa. The funnel-shaped cloud dips to the water where upon the water may appear to boil and turn white as it rises in the funnel. Most authorities say that the funnel of a waterspout is composed of condensed water and is not, as is popularly thought, a column of water.

To make this report complete, a list of reported funnels is included. (Table 6) A funnel is defined as a whirling inverted cloud cone, most frequently found under cumulo-nimbus clouds. When the funnel touches the earth's surface, it is called either a tornado or waterspout. Most funnels never develop to the point of touching the earth, this phenomenon is often confused with mammatus or distant virga. Little or no record of funnels was kept until the late 1950's. Many of the funnels listed were part of a weather system that was generating tornadoes.

TABLE 6. FUNNELS 1916–1964

PLACE	DATE	TIME	
	1932		
Polk County	Aug. 10	4:45 PM	Town of Clayton
	1937		
Columbia County	June 15	1:30 PM	
	1956		
Brown County	July 1	12:00 PM	Bellevue
Brown County	July 1	12:00 PM	De Pere
Waushara County	July 15	6:47 AM	Plainfield
Beaver Dam	July 21	4:00 PM	3 funnels
	1957		
La Crosse 25 SE	May 31	1:30 PM	
Northfield	May 31	4:29 PM	
Madison N	July 7	12:36 PM	
Green Bay 5S	July 11	1:00 PM	
Madison 5 S	July 12	9:20 AM	
Madison 8 S	July 12	4:02 PM	
	1958		
Green County	May 31	3:30 PM	
St. Croix County	June 22	3:25 PM	
Walworth	June 22	7:50 PM	
Taylor County	July 14	3:15 PM	
Columbia County	Oct. 9	4:30 PM	
Dodge County	Oct. 9	5:30 PM	
	1959		
Eau Claire 35 NNE	May 4	10:05 AM	
Waupaca County	May 5	12:30 PM	
Eau Claire 4 W	May 5	7:25 PM	
Spring Valley	May 5	7:40 PM	
Rusk County	May 5	7:30 PM	
Chippewa Falls	May 5	7:45 PM	
Chippewa Falls	May 5	8:04 PM	
Eau Claire 6 NE	May 5	8:09 PM	
Ripon 5 N	May 28	3:05 PM	
Arlington	May 28	3:45 PM	
Green Bay	May 28	3:52 PM	
Lancaster	May 29	6:45 PM	
Menomonie	June 26	1:44 PM	
Eau Claire 15 NNE	June 26	5:55 PM	
Manitowoc County	Aug. 14	Evening	
Green Bay 15 S	Aug. 29		
Eau Claire 30 E	Sept. 22	5:30 PM	
Milwaukee 25 SW	Sept. 28	2:23 PM	
Germantown	Oct. 8	4:45 PM	
Milwaukee 40 S	Dec. 9	5:15 PM	
	1960		
Milwaukee	May 8	10:32 AM	
La Crosse 18 ENE	May 27	4:00 PM	
Madison 45 NNE	June 28	5:52 PM	
Madison 35 SE	July 2	5:30 PM	
Milwaukee 10 S	July 2	8:25 PM	
Madison 45 NNW	July 27	8:00 PM	

TABLE 6. FUNNELS 1916–1964—Continued

PLACE	DATE	TIME	
Green Bay	Aug. 13	8:55 PM	
Madison 40 NE	Aug. 20	10:00 AM	
Milwaukee 20 NW	Aug. 20	3:00 PM	
Green Bay 60 WSW	Aug. 28	6:10 PM	
Green Bay 25 SW	Aug. 28	6:40 PM	
Summit Lake 6 W	Sept. 7	5:00 PM	
Racine County	Sept. 24	4:25 PM	
Belleville	Nov. 15	6:15 PM	
	1961		
Milwaukee 50 W	May 14	4:00 PM	
Neillsville	May 14	Afternoon	
Winchester	May 14	Late afternoon	
Lone Rock	June 10	5:30 PM	2 funnels
Eau Claire 40 NE	June 21	2:56 PM	
Ladysmith	Aug. 4	Evening	
Sheboygan 1 W	Sept. 22	1:50 PM	
	1962		
Eau Claire 10 N	May 14	2:00 PM	
Appleton 16 SE	June 8	9:22 PM	
Columbus 7 N	June 17	5:00 PM	
Butte des Morts	June 17	7:15 PM	2 funnels over lake
Portage County	June 17	7:30 PM	
Lake Winnebago	June 18	10:00 AM	2 funnels over northern part of lake
Oshkosh 30 SW	July 11	2:58 PM	
Eau Claire 6 S	July 17	3:45 PM	
Eau Claire 10 SW	July 17	3:45 PM	
Eau Claire 20 WNW	July 17	3:45 PM	
La Crosse 30 SE	July 22	6:40 PM	
Green Bay	July 24	7:40 PM	2 funnels northeast of Green Bay
Madison 35 NE	Aug. 29	9:10 PM	
	1963		
Hartland	June 8	7:45 PM	
Burlington 10 SW	June 8	8:00 PM	3 funnels
Madison	Sept. 2	5:25 PM	
	1964		
Blue River	June 22	11:30 AM	

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6. Two of several descriptions in Increase A. Lapham's letter to General A. J. Myer, Chief Signal Officer, May 1872.
7. Quotation from Increase A. Lapham papers.
8. Since there are no times of tornado occurrences given by windfall records, Lapham's "tornadoes" interpretation would have been more correctly labeled "tornado paths", which may or may not have occurred in the same storm.
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