

CHAPTER 10. TORNADOES AND WINDSTORMS

Wyoming, lying just west of “tornado alley,” is fortunate to experience less frequent and intense tornadoes than its neighboring states to the east. However, tornadoes remain a significant hazard in the state. Tornadoes are the most intense storm on earth having been recorded at velocities exceeding 315 mph. The phenomena results in a destructive rotating column of air ranging in diameter from a few yards to greater than a mile, usually associated with a downward extension of cumulonimbus cloud.

Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis, better correlation between damage and wind speed. It is also more precise because it takes into account the materials affected and the construction of structures damaged by a tornado. Table 10.2 shows the wind speeds associated with the original Fujita scale ratings and the damage that could result at various levels of intensity. Table 10.1 shows the wind speeds associated with the Enhanced Fujita Scale ratings. The Enhanced Fujita Scale’s damage indicators and degrees of damage can be found online at the National Oceanic and Atmospheric Administration’s website.

According to the Wyoming Climate Atlas, the State of Wyoming ranks 25th in the number of annual tornadoes (10), 33rd in fatalities (six deaths per million people), 37th in injuries, and 36th in property damage (\$49,339,505) (figure from Wyoming State Geological Survey) in the US from 1950-1994 (excerpted from the Wyoming Climate Atlas).

Tornado statistics, especially prior to the 1970s, must be viewed as incomplete since many twisters may have occurred without being witnessed. Wyoming's open rangelands experience little if any damage from these storms so many go unreported. In the 1990s, the Internet and Doppler radar increased the public's awareness of tornadoes with the potential of more being observed and reported. However, the trend in annual tornadoes has decreased by one third since 1976 and appears to have coincided with a major hemispheric weather pattern shift, despite the increased reporting based on Doppler radar vortex (circulation) signatures (excerpted from the Wyoming Climate Atlas).

Table 10.1 Enhanced Fujita Scale

Enhanced Fujita (EF) Scale	Enhanced Fujita Scale Wind Estimate (mph)
EF-0	65-85
EF-1	86-110
EF-2	111-135
EF-3	136-165
EF-4	166-200
EF-5	Over 200

Table 10.2 Original Fujita Scale of Tornado Intensity

Fujita (F) Scale	Fujita Scale Wind Estimate (mph)	Typical Damages
F0	< 73	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261-318	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena will occur.

History

In a database composed of information derived from the National Oceanic and Atmospheric Administration's (NOAA) National Climactic Data Center (NCDC), the Wyoming Climate Atlas, and the Wyoming Office of Homeland Security, there are 37 recorded tornado events in Converse County since 1907. Of the 37, 10 tornadoes have been identified as damaging. Damage is defined by those events that resulted in injury, loss of property, or loss of life.

Table 10.3 provides a statewide county summary of reported tornadoes including those with associated damage. Twelve injuries were reported with these tornadoes. Figure 10.1 shows the reported tornadoes by county. Table 10.4 shows the 10 tornadoes that actually caused damage in Converse County. A damaging tornado occurs in Converse County every 10 years based upon the compiled data.

Table 10.3 Wyoming Tornado Data Totals by County (1907-2006)

County	Events	Deaths	Injuries	Property Damage (USD)	Crop Damage (USD)	Total Damage (USD)
Albany	21	0	2	77,500	0	77,500
Big Horn	23	2	2	329,500	2,750	332,250
Campbell	71	2	23	8,732,500	5,275	8,737,775
Carbon	16	0	0	27,500	277,750	305,250
Converse	37	0	12	185,800	2,750	188,550
Crook	30	0	0	648,525	308,000	956,525
Fremont	15	0	3	490,500	275	490,775
Goshen	51.3	0	26	3,023,775	27,500	3,051,275
Hot Springs	2	0	0	27,500	0	27,500
Johnson	13.5	0	0	11,050	0	11,050
Laramie	82.3	1	41	40,177,775	52,750	40,230,525
Lincoln	6	0	4	27,500	0	27,500
Natrona	31	0	9	390,500	0	390,500
Niobrara	31	0	6	854,750	100,275	955,025
Park	7	0	3	85,250	275,275	360,525
Platte	32.3	2	4	430,000	27,500	457,500
Sheridan	11.5	1	0	41,250	2,750	44,000
Sublette	2	0	0	0	0	0
Sweetwater	16	0	0	55,000	0	55,000
Teton	1	0	0	500,000	0	500,000
Uinta	2	0	0	5,500	0	5,500
Washakie	6	0	0	30,250	0	30,250
Weston	15	0	2	80,250	0	80,250
TOTAL	523	6	123	54,493,675	1,087,850	57,581,525

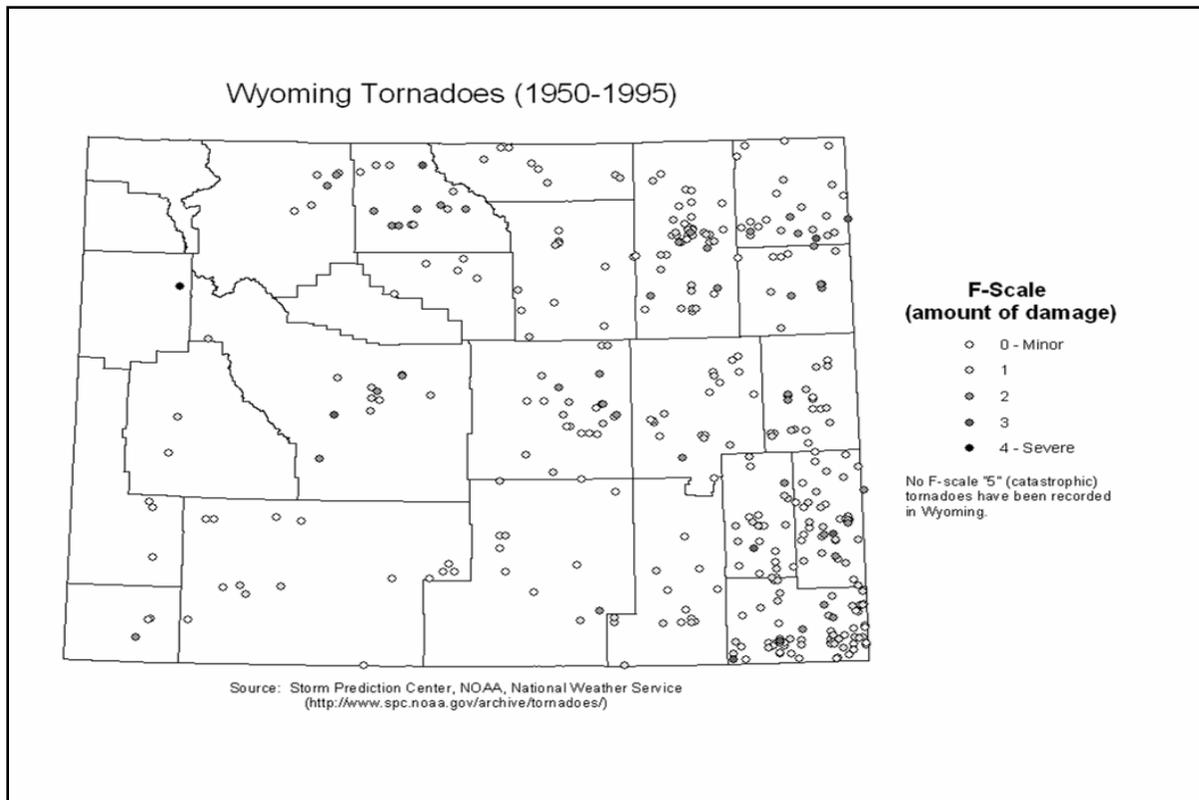


Figure 10.1 Wyoming Tornadoes

Table 10.4 Damaging Tornadoes in Converse County

Date	Location	Injuries	Total Estimated Damage	Information
5/18/1907	25 mi E of Douglas	6		
5/31/1923	5 mi W of Parkerton	2		
5/17/1944	16 mi S of Douglas		\$ 800	Ranch buildings were damaged.
6/17/1948	Converse and Niobrara Counties		\$ 100,000	Crops, farm and ranch property damaged.
7/18/1948	Glenrock		Not available	Slight damages
6/14/1965	Orin Junction		\$ 27,500	Tipped over a truck. Driver was injured.
5/9/1977	5 mi N of Douglas		\$ 2750	Cattle shed destroyed.

5/16/1978	Lost Springs		Not available	Destroyed a barn and water tower.
6/5/1982	Douglas	3	\$30,000	Five tornadoes in large thunderstorm complex. Three tornadoes touched down near Douglas causing several injuries and considerable property damage. Farm house, bar, mobile homes, powerlines damaged, vehicles blown off highways. Red Canyon Ranch and Lance Creek hit.
6/13/1984	3 mi SW of Bill		Not available	Ranch buildings, barns, mobile homes, powerlines, phone poles and vehicles damaged. Large hail associated.

Table 10.5 Converse County Windstorms 1997-2010

Date	Location	Description	Wind Speeds	Reported Damages
1/26/1997	County	High Wind	52 knots	
3/27/1997	County	High Wind	55 knots	
7/1/1997	County	High Wind	61 knots	\$ 10,000
10/31/1997	County	High Wind	67 knots	
11/21/1998	County	High Wind	68 knots	
12/26/1998	County	High Wind	57 knots	
1/14/1999	County	High Wind	87 knots	
2/2/1999	County	High Wind	81 knots	\$148,000
4/8/1999	County	High Wind	Unknown	\$10,000
8/1/2006	County	High Wind	75 knots	
8/12/2006	Douglas	Thunderstorm Wind	61 knots	
8/9/2007	County	High Wind	70 knots	\$5,000
8/22/2007	Douglas	Thunderstorm Wind	61 knots	
1/5/2008	County	High Wind	58 knots	
8/3/2009	Converse Co Airport	Thunderstorm Wind	51 knots	
4/3/2010	County	High Wind	52 knots	
4/23/2010	County	High Wind	53 knots	
5/4/2010	County	High Wind	50 knots	
7/18/2010	Converse Co Airport	Thunderstorm Wind	53 knots	

The historic data above was obtained from the National Climate Data Center. The data shows that high wind events can and do occur in any month of the year. Wind events are sometimes, but not always associated with thunderstorms or winter storms. No injuries or deaths in the county were reported from wind events during this period.

Impacts

Good information about dollar damages from windstorms does not exist in the NCDC data base. However, windstorms can cause the following impacts:

- Structure damage—roofs, windows, walls

- Damage to vegetation and landscaping
- Loss of topsoil
- Property damage to items not inside structures (fences, equipment, etc.)
- Damage to power and phone lines, loss of power service
- Damage to vehicles
- Vehicle accidents due to poor visibility, blow-offs, and rollovers
- Injury or death from being struck by flying objects.

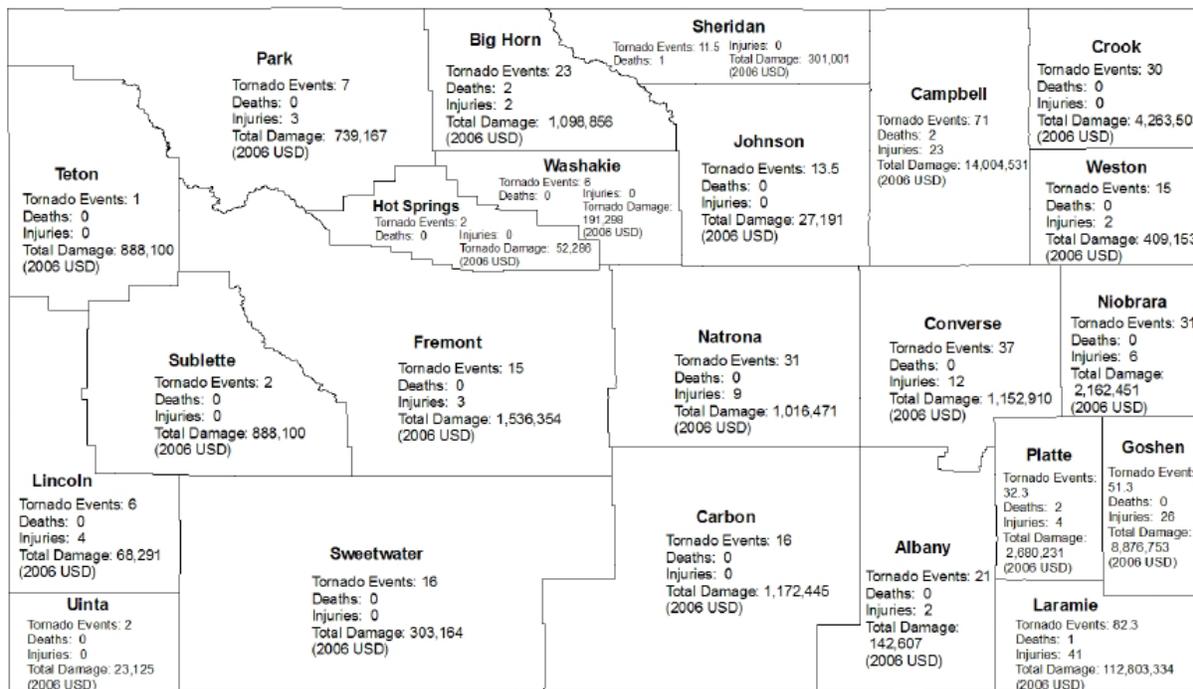
Although counties have been affected to lesser and greater extents by tornado intensity, frequency, and damage, they nevertheless have struck every county in Wyoming, thus proving to be a considerable danger. In year-of-event dollars, Converse County ranks 13th out of 23 counties for reported damage.

Table 10.6 Tornado Damage by County in Year of Event USD (1907 - 2006)

County	Damage
Laramie	40,230,525
Campbell	8,737,775
Goshen	3,051,275
Crook	956,525
Niobrara	955,025
Platte	674,000
Teton	500,000
Fremont	490,775
Natrona	390,500
Park	360,525
Big Horn	332,250
Carbon	305,250
Converse	188,550
Weston	130,250

Albany	77,500
Sweetwater	55,000
Sheridan	44,000
Washakie	30,250
Lincoln	27,500
Hot Springs	27,500
Johnson	11,050
Uinta	5,500
Sublette	0
TOTAL	134,008,519

**Wyoming Torando Damage Data:
Damage by County in 2006 USD (1907 - 2006)**



Wyoming State Totals:
Damaging Events: 523
Deaths: 6
Injuries: 123
Tornado Damage: 153,913,222
(2006 USD)



Figure 10.2 Wyoming Tornado Damage Data

Historical data demonstrates that the most critical area of the state for tornado hazard is the eastern one third, with the five most threatened being Laramie, Campbell, Goshen, Converse and Platte. The five least threatened include Teton, Uinta, Sublette, Hot Springs, and Washakie.

Laramie, Campbell, Goshen, Crook, and Niobrara are the five counties that have received the most damage, while Sublette, Uinta, Johnson, Lincoln, and Hot Springs sustained the least damage.

Tornadoes and wind storms will continue to occur in Converse County. Wind storms can occur at any time. Tornadoes occur primarily in the spring and summer months. Based on the recent record, a severe windstorm of 57 mph or greater will occur once every year on average. Based upon the historic record, a damaging tornado will occur once every ten years on average. The worst case historic tornado in the County resulted in damages of \$188,000. This should be considered to be the low end for maximum damage from a future event.

Table 10.7 Tornado Events by County (1907-2006)

County	Number of Events
Laramie	82.3 (crossed 3 counties)
Campbell	71
Goshen	51.3 (crossed 3 counties)
Converse	37
Platte	32.3 (crossed 3 counties)
Natrona	31
Niobrara	31
Crook	30
Big Horn	23
Albany	21
Carbon	16
Sweetwater	16
Fremont	15
Weston	15
Johnson	13.5 (crossed 2 counties)
Sheridan	11.5 (crossed 2 counties)
Park	7
Lincoln	6
Washakie	6
Hot Springs	2
Sublette	2
Uinta	2
Teton	1
TOTAL	523

Summary

PROPERTY AFFECTED: Medium
POPULATION AFFECTED: Medium
PROBABILITY: Medium
JURISDICTION AFFECTED: All