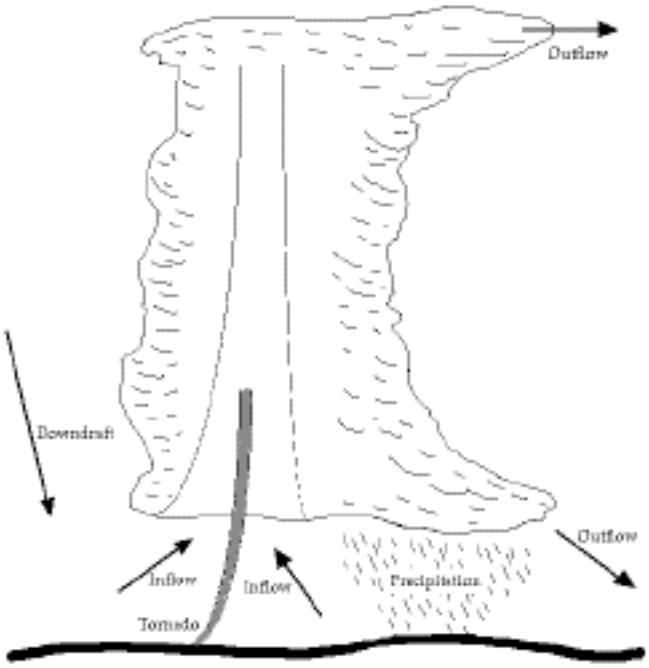
The Oregon Weather Book

A State of Extremes

George H. Taylor & Raymond R. Hatton

Tornadoes



Tornadoes are the most concentrated and violent storms produced by the earth's atmosphere. A tornado -- the name comes from the Latin word toronae ("to turn") -- is a vortex of rotating winds and strong vertical motion which possesses remarkable strength and can cause almost unbelievable damage. Wind speeds in excess of 300 mph have been observed within tornadoes, and it is suspected that some tornado winds exceed 400 mph. In addition, the low pressure at the center of a tornado can literally explode buildings and other structures that it passes over.

Tornadoes have been observed throughout the United States, but are especially common in the Midwest, which has more tornadoes than any other place on earth. West of the Rockies, however, tornadoes are infrequent and generally small compared with their midwestern counterparts. But, Oregon and other western states have experienced tornadoes on occasion, many of them producing significant damage and occasionally causing injury or death.

While tornadoes in Oregon are sometimes formed in association with large Pacific storms arriving from the west, most are caused by intense local thunderstorms. These storms, which usually also produce thunder, lightning, hail, and heavy rain, are more common during the warm season (April - October). Becasue of Oregon's relatively low population, there are probably many tornadoes which go unreported. Not surprisingly, most of the tornadoes identified here occurred near populated areas. In a few cases, tornadoes were identified by the damage they caused rather than by eyewitness.

The figure at the beginning of the chapter shows a cross-section of a large cumulonimbus (thunderstorm) cloud as it produces a tornado. Air is moving up into the cloud, and the more rapidly this inflow is drawn up, the more quickly

it rotates, eventually causing a tornado. The air is released in outflow both at the top and the base of the cloud. The very strong downward motion at the rear of the cloud is called the downdraft; in some cases this descending air is concentrated in a small area and very intense. Such situations produce the dreaded “downburst” or “microburst,” which appear to have caused a number of aircraft crashes in the central and eastern U.S.

Considering how often the word "tornado" is heard in the media or read in newspapers, it is interesting to note that at one time it was a forbidden word. A ban on using the word "tornado" was actually issued in 1886 and ended in 1952. In the 1880s John P. Finley of the U.S. Army Signal Corps, which then handled weather forecasting for the USA, developed generalized forecasts for the likelihood of tornadoes on a given day. In 1886 the Army ended Finley's program and banned the word "tornado" from forecasts because "the harm done by a (tornado) prediction would eventually be greater than that which results form the tornado itself." The reasoning was that widespread panic would occur when the tornado prediction became known. The ban stayed in place after the Weather Bureau, now the National Weather Service, took over forecasting from the Army. A tornado that destroyed 52 aircraft at Tinker Air Force Base, Okla., on March 20, 1948, caused Air Force meteorologists to begin working on ways to forecast tornadoes. The Weather Bureau also began looking for ways to improve tornado forecasts and established the Severe Local Storm Warning Center, which is now the Storm Prediction Center in Norman, Okla. The ban on the word "tornado" fell on March 17, 1952 when the new center issued its first "tornado watch."

Tornadoes in Oregon

Over sixty significant tornadoes have been reported in Oregon between 1887 and 1996; The generally minimal damages which have accompanied most of these tornadoes prove that such storms are not significant threats to people or property. In fact, even the strongest Oregon tornadoes would be considered relatively insignificant in the midwestern U.S. where the truly devastating storms are observed.

Greatest loss of life:

A tornado which formed near Jordan Butte, northwest of Lexington (Morrow County), on the afternoon of June 14, 1888, swept through Lexington, Sand Hollow, and Pine City, and destroyed 30 buildings including 2 schools. Six people, including two children at the school, were killed; four others were injured

Most memorable day:

In April 1957 a very strong storm system brought heavy rains and high winds to northern Oregon from the 12th through the 14th, with wind gusts reaching 70 mph on the 14th. At about noon on the 12th, a very dark storm cloud appeared near the city of Sandy, about 25 miles SE of Portland. Heavy rain began to fall, and then small hail.

The hail stones grew larger, reaching diameters of one quarter to one half inch. As the storm moved east from Sandy, a funnel cloud emerged and reached downward, eventually touching the ground and becoming a 50-yard-wide tornado. The tornado churned through the farmland of Sandy heading toward the Cascades. Large fir trees, 18 to 36 inches in diameter, were twisted off or snapped 30 to 40 feet above the ground. A large barn under construction was lifted off its foundation, carried several hundred feet in the air, and then dropped back to the ground, shattering it to pieces. Roofs of houses and barns were torn off and some farm outbuildings were carried a considerable distance before being destroyed.

Shortly thereafter, west of the small farm town of Ione in Gilliam County, a long thin funnel cloud was observed descending from a similar dark storm cloud. This tornado was much larger than the one in Sandy (it was 100-400 yards wide) and had a much longer path (15-20 miles). Fortunately, this area comprises largely range land and large wheat farms, and no buildings were in the path of the tornado. Several telephone poles were pulled out of the ground and some damage, mostly minor, was done to fields, much of it caused by the large amounts of hail that accompanied the tornado. In the Heppner area, a few hail stones exceeding one inch in diameter were found.

Most damaging:

The most damaging (and probably the most mysterious) tornado in Oregon occurred during the late afternoon on June 11, 1968. A very strong thunderstorm formed over Wallowa County in extreme northeastern Oregon. The tornado spawned by this storm touched down in mountainous, forested areas that were mostly uninhabited. There were virtually no eyewitnesses to this tornado, but its status as a tornado seems certain, it caused significant destruction along a path one half to two miles wide and 8 to 10 miles long. About 1800 acres of prime timber were destroyed and another 1200 acres were badly damaged. Over 40 million board feet of lumber were blown down. Some of the hail stones that accompanied the tornado were reportedly of golf- ball size.

First reported tornado in Oregon:

In a letter (dated January 19, 1887) to the January 22, 1887 edition of the Eugene City Guard, a Cottage Grove resident, described a "genuine cyclone of small proportions" in the vicinity of Cottage Grove. The tornado twisted a 4-foot diameter fir tree from its roots, picked up a couple of sheep and carried them for 200 yards, and tore down fences. The observer reported that the width of the storm track was only 30 yards. The tornado, described as being "funnel-shaped," damaged no homes.

Coastal tornado:

Oregon tornadoes are reported chiefly in the Willamette Valley and in the flatlands of eastern Oregon; only rarely do they affect the Oregon coast. In January 1996, an apparent tornado struck the coast near Lincoln City. There were no dissipating.

In Morrow County the same day, a tornado formed on the McElligott Ranch property southwest of Ione and traveled eastwards 20 miles before disappearing on the outskirts of Lexington. The twister was accompanied by heavy rains and hail, some of which, near Heppner, was golf-ball size. Two ranches near Lexington measured half an inch of rain in less than 10 minutes and in Sand Hallow another rancher reported 1.20 inches in less than 30 minutes. The tornado passed over rangeland, dairyland, and wheat farms and caused no structural damage.

When is a tornado not a tornado?

It is apparent that tornadoes occur in Oregon more frequently than many may imagine. Undoubtedly, because of the sparse population in many parts of Oregon, many tornadoes are not seen. Damage from tornadoes may be written off as being due to a "freak" wind. On the other hand, there are situations in which damage is attributed to a tornado that in reality was caused by other atmospheric phenomena. These may include wind shear, turbulence, or downbursts. The following story describes such a situation.

In early December 1996, an intense storm caused significant damage to areas east and northeast of Eugene. It was widely reported that a tornado had touched down and caused the damage; several Weather Service representatives were among those who made this assessment. Roger Cunningham, a climatologist from Florence, was there and sent the following report:

> *Yesterday (Thursday, 5 December) I was in the middle of some weather excitement without knowing the full extent of it until later. On Thursday morning my mother and I drove over to Eugene-Springfield. We got to Eugene at about 10:00 and stopped at one store on the north side of town. The sky was very black from NW around to NE, but it was mostly sunny where we were. We proceeded across I-5 to the Gateway Mall in Springfield. My mother went into the mall to Christmas shop. I stayed in the '96 Chrysler minivan (with temperature sensor) and read the New York Times."*
>
> *After 30 min or so a rain shower began and continued for 15-20 min lightly, with a S wind about 5-10 mph. Our parking space faced NW. I could see three flags to my right. At about 11:45, the rain suddenly got heavy and the S wind picked up to (my guess) 30-40 mph, or hard*

enough to rock the minivan a bit, for a minute; the wind then abruptly shifted to W, 20-30 mph, and quickly dropped to under 10 mph. The whole incident took about three minutes. The temp dropped from 46° to 41°. The rain shower stopped by 12:10. My mother returned at 12:00, and said that an air conditioner on the roof of the mall had momentarily lifted up and fallen back, sending debris to the floor. The mall security staff had to get people out of the area. We drove around Eugene to other places in few light showers, and left for home at 14:00. The return trip was mostly dry.."

Now what I didn't know until I saw the Eugene TV news at 17:00, and the newspaper this morning, was that I had been right in the middle of a thunderstorm DOWNBURST. Some people erroneously thought it was a small tornado. This downburst, which followed a SW-NE path, right past the mall parking lot I was sitting in, did quite a bit of damage in residential areas just over I-5 to my SW and also in Springfield to my NE. The strong winds knocked down several trees, which fell onto power lines and onto one house. A few other things blew around as well. This was the top local story on Thursday, and I serendipitously was in it.

It is easy to understand why observers would assume that they had experienced a tornado. After all, tornadoes are well known, are frequently in the news, and have even been the subject of several recent motion pictures. Downbursts are much less notorious. Furthermore, they are i*nvisible*, so even if they occurred in Oregon much more often than tornadoes their presence would go largely undetected.

In the long run, placing the blame on either tornadoes or downbursts may be a pointless exercise, since both phenomena share a common origin: they are small areas of strong winds in association with a severe thunderstorm. And while Oregon will continue to enjoy a near immunity to truly severe thunderstorms, the state will continue to be affected by periodic visits from these interesting and destructive intruders.

Grant County—June 1895
The Long Creek tornado killed three people, injured several, and did considerable damage in Grant County on June 14, 1895. The town of Long Creek, in particular, was struck by the tornado with such violence, that not a trace of the buildings in its path remained after the storm. One resident, L.W. Solawn, was picked up by the wind and carried over the top of a store, but fortunately landed safely on a pile of hay. Long Creek lost its school, its mill, and several residences. Damage totaled $5,000.

Umatilla County—June 1903
On June 15, the day after the disastrous Heppner Flood, a tornado touched down between Meacham and Huron. The *East Oregonian*, for June 17, 1903, stated that the tornado twisted hundreds of trees, including some large pines 3 feet in diameter, and uprooted telegraph poles for many miles.

East Portland—February 1904
On February 26, 1904, a tornado struck the vicinity of Mount Tabor on Portland's east side. Four houses were destroyed and others were moved off their foundations. Damage totaled $5,000. *The Oregonian*, February 27, 1904, reported that the tornado, spotted at 10:42 a.m., was "not unlike a giant express train." Its width was 50 to 100 feet and its height several times

that. In its short 1.5 mile path, it uprooted fir trees and tore down fences. Although there were no deaths, several injuries occurred. *The Oregonian* included a photo of the Starbuck residence, virtually wrecked by the tornado. It also stated: the escape of Mrs. T.H. Starbuck and her daughter, Edith, was a little short of miraculous. "My mother and I were in the kitchen at the time of the storm," said the pretty young woman who had so nearly escaped a tragic death.

> *I saw the storm coming and called my mother, and when she came to the window and saw the debris in the air she thought it was a cyclone and cried for me to hurry to the basement. We crossed the room to the basement door, but before we could get through the door, the house shook and we were thrown to the floor and went crashing down with the wreckage. The upper part of the house came down upon us, but was supported by the cook stove, which saved us from being crushed to death. My mother managed to make her escape from the wreckage before I did, although her clothes were nearly all torn from her. My father was in the bathroom putting up a shelf when the storm struck the house. He had a like escape, the bathtub and heavy iron bed frame supporting the wreckage and saving him from great injury.*

Baker County—June 1937
On June 16, 1937, a tornado formed in Pine Valley (eastern part of Baker County). The cooperative weather observer near Halfway, W.C. MacManiman, reported:

> *One funnel was distinctly seen by many people; some report having seen three funnels. The view of the storm was obscured in some directions by sheets of hail, the stones darkness prevailed. The first damage was done to a barn in the southwestern portion of Halfway; the barn was entirely wrecked. A house 150 feet from the barn was untouched. The storm seemed to jump about 300 yards, then came down again, wrecking buildings and fences and blowing down trees. It again jumped, missing the main part of town, coming down in the part where it tore everything down. The damage down by wind, rain and hail was serious, covering an area of several square miles. Gardens were ruined, chickens killed, and windows broken. One beneficial result of the storm was the destruction of large numbers of crickets. This was the first tornado ever known in the region affected.*

Property damage attributed to the tornado was estimated at $8,000.

Lane County—December 1951
U.S. Weather Bureau observers at Eugene Airport on December 6, 1951, were witnesses to a small twister that moved along just above the ground, lifted back into the parent cloud, then touched the ground for a distance of 500 yards. It lifted a 30 x 32-foot barn 300 feet into the air, spreading timbers over a half-mile area. The tornado sucked the water from ditches, leaving them as "dry as dust." Ice pellets 3/4-inch thick accompanied the storm.

Clackamas County—August 1979
Sandy experienced its second reported tornado when a twister cut a path over 2 miles long through the area on August 20, 1979. An observer to the storm, Robert Lee, described it as "a black roll cloud like a vertical cliff approaching, spitting lightning in a brilliant barrage." It rained so hard that he could not see "four feet in front." Harold Butler, of Sandy, stated that

he saw a funnel snake down out of the cloud touching the ground here and there. A house under construction was flattened, and others were hit by falling trees. A storage building full of machinery was blown apart. Power service through the Sandy area was temporarily knocked out.

Marion County—October 1984
On October 26, 1984, a "mini-tornado" occurred in the North Marion-South Clackamas County area, destroying the 30-by-80 foot barn of Leighton Whitsett of Aurora. The barn was lifted off its foundation and sent crashing into a clover field where it disintegrated. In addition, the twister lifted two 500-pound blocks from the barn's concrete foundation and uprooted large fir trees, but it missed Whitsett's home by 100 feet. At the same time, 7 miles away, a lightning bolt struck and killed a Woodburn nursery worker who was seeking shelter from the storm.

Marion County—December 1993
An F2 Tornado! This was the most powerful tornado in Oregon in many years. It started as a cold front that came with a deep surface low along the coast that moved across the Willamette Valley. Six veal calves were killed, a dairy farm was damaged, roofs were blown off some small buildings, and many trees were broken. People reported that the funnel was sucking water from the Willamette River as it moved northeast, where it greatly damaged a mobile home park. A tree at least 2 feet in diameter was snapped off 6 feet above the ground and hit a two-story house. Remarkably, no one was injured.