

Section 7: Windstorm

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Why are Windstorms a Threat to Douglas County?

Windstorms are a concern to communities across Douglas County. Severe windstorms can leave behind a distinctive trail. Trees toppled over on buildings and cars, downed power lines crisscrossing the roads, and widespread power outages are a few of the signs that a windstorm has struck. After such an event, it can take communities days, weeks, or longer to return to normal activities. In addition to costly structural damages, windstorms cause great risk to people.

Recently, windstorms in 1995 and 2002 damaged numerous homes, utilities, businesses, and public facilities, Oregon received \$2.8 million through the Federal Emergency Management Agency's (FEMA) Public Assistance program to repair and restore damaged infrastructure. Douglas County received a Presidential Disaster Declaration for the 1995 and 2002 windstorms.

Historical Windstorm Events

December 4, 1951

This storm reached its greatest intensity along the coast, where unofficial observations reported sustained wind speeds between 60 and 100 mph, while inland valley locations reported sustained wind speeds up to 75 mph. The fastest mile at Portland airport was 57 mph, Baker at 42 mph, and Roseburg with 40 mph. Serious damage to buildings and widespread power losses occurred throughout the state.

Columbus Day Windstorm October 1962

The Columbus Day storm in 1962 was the most destructive windstorm ever recorded in Oregon, both in terms of loss of life and property damage. Damage was most severe in the Willamette Valley. The storm did upwards of \$200 million in damage (over \$800 million in today's dollars). Hundreds of thousands of homes were without power for short periods of time, while others were without power for two to three weeks. Statewide, more than 50,000 homes were seriously damaged, and nearly 100 were completely destroyed. Roseburg experienced gusts of up to 62 mph.

October 2, 1967

This storm brought the highest winds recorded since the Columbus Day storm of 1962 to much of western, central, and northeastern Oregon. Significant widespread damage occurred to agriculture, timber, power and telephone utilities, and homes. Wind speeds of 100 to 115 mph were unofficially recorded along the Oregon coast. There was one fatality and about 15 persons were seriously injured. Roseburg experienced 69 mph wind gusts during the storm.

April 1972

The windstorm on April 5, 1972 has been described as an exceptionally destructive windstorm, as it was the most devastating tornado in Oregon's recorded weather history. The tornado damaged fifty cabin cruisers and destroyed a dry rock, boathouses and dock shelters. The funnel, described as a "black mass," was not

observed locally due to flying debris and mud. Douglas County was not significantly affected by the storm, but high winds caused damage to utilities and homes.

November 1981 Windstorm

November 1981 saw two successive windstorms on November 13 and 14. Numerous injuries resulted from wind-blown debris in western Washington and Oregon. Across the Pacific Northwest, hundreds of downed trees and power lines caused massive power outages and roof damage. Estimates indicated that nearly 500,000 homes were without power for at least a short time during the weekend. Numerous airports across Oregon and Washington suffered damage.

December 1995 Windstorm

On December 11, 1995 a large low pressure storm approached the Southern Oregon/Northern California coast and began to slow and intensify. The National Weather Service issued high wind warnings for the coast and inland valleys as the storm center tracked north along the Oregon coast. Gusts of over 100 mph occurred along the coast while gusts in the Willamette Valley exceeded 60 mph. Hundreds of thousands of people in the state lost power, and there was widespread damage to homes, buildings, and boats. Four Oregonians lost their lives during the storm.

Douglas County received a presidential disaster declaration. The most damaged areas included Reedsport and Winchester Bay. Throughout the county, the windstorm tore roofs from buildings, uprooted or otherwise damaged many trees, and knocked out electric and telephone service.

February 7, 2002 Windstorm

A powerful windstorm hit coastal Douglas County on February 7, 2002. A strong low-pressure system struck the northwest corner of Douglas County before moving inland to the Willamette Valley.

Wind gusts were reported at more than 100 miles per hour near Reedsport. The storm lasted less than an hour but caused loss of power, damage to businesses and homes and Officials estimate about 44 acres of timber fell within the drainage of Threemile Creek on the Oregon Dunes National Recreational Area and within the Umpqua Spit Roadless Area.

Characteristics of Windstorms

The most frequent surface winds in Oregon are from the southwest. These widespread winds are associated with storms moving onto the coast from the Pacific Ocean. Winds coming from the south are the most destructive. The Columbus Day Storm of 1962 was an example of this type of windstorm.

West winds generate from the Pacific Ocean and are strong along the coast, but slow down inland due to the obstruction of the Coastal and Cascade mountain ranges. Prevailing winds in Oregon vary with the seasons. In summer, the most common wind directions are from the west or northwest; in winter, they are from the south and east.

Tornadoes

Tornadoes are the most concentrated and violent storms produced by the earth's atmosphere. They are created by a vortex of rotating winds and strong vertical motion, which possess remarkable strength and cause widespread damage. Wind speeds in excess of 300 mph have been observed within tornadoes, and it is suspected that some tornado winds exceed 400 mph. The low pressure at the center of a tornado can destroy buildings and other structures it passes over.

Tornadoes are most common in the Midwest, and are more infrequent and generally small west of the Rockies. Nonetheless, Oregon and other western states have experienced tornadoes on occasion, many of which have produced significant damage and occasionally injury or death.

Oregon's tornadoes can be formed in association with large Pacific storms arriving from the west. Most of them however, are caused by intense local thunderstorms. These storms also produce lightning, hail, and heavy rain, and are more common during the warm season from April to October.

Windstorm Hazard Assessment

Hazard Identification

A windstorm is generally a short duration event involving straight-line winds and/or gusts in excess of 50 mph. Windstorms can affect areas of the county with significant tree stands, as well as areas with exposed property, major infrastructure, and above ground utility lines. The lower wind speeds typical in central Douglas County are still high enough to knock down trees and power lines, and cause other property damage.

Mountainous sections of the county experience much higher winds under more varied conditions. Because of the local nature of wind hazards in the mountains, a high-resolution wind speed map would be required to accurately identify the degree of wind hazard throughout the county. Such a map could identify wind hazards other than treefalls, such as winds high enough to cause various degrees of structural damage. Unfortunately, high-resolution wind maps were not available at the time of this publication, so a precise wind hazard analysis could not be performed.

Vulnerability and Risk

A vulnerability assessment that describes the number of lives and amount of property exposed to the wind hazard has not yet been conducted for Douglas County windstorms. However, there are many issues related to what is in danger within communities experiencing windstorms. Windstorms can cause power outages, transportation, and economic disruptions, and significant property damage and pose a high risk for injuries and loss of life. They can also be typified by a need to shelter and care for individuals impacted by the events. Several destructive windstorms, (most notably the 1962 Columbus Day storm) brought economic hardship and affected the life safety of county residents. Future windstorms may cause similar impacts countywide.

Factors that should be included in windstorm risk analysis include: population and property distribution in the hazard area; the frequency of windstorm events; and information on the types of trees and failure rates most susceptible to windstorm events. When sufficient data is collected for hazard identification and vulnerability assessment, a risk analysis can be completed. Insufficient data currently exists to complete a risk analysis.

Community Windstorm Issues

What is Susceptible to Windstorms?

Life and Property

Windstorms have the ability to cause damage over 100 miles from the center of storm activity. Isolated wind phenomena in the mountainous regions have more localized effects. Winds impacting walls, doors, windows, and roofs, may cause structural components to fail. Wind pressure can create a direct and frontal assault on a structure, pushing walls, doors, and windows inward. Conversely, passing currents can create lift and suction forces that act to pull building components and surfaces outward. The effects of winds are magnified in the upper levels of multi-story structures. As positive and negative forces impact the building's protective envelope (doors, windows, and walls), the result can be roof or building component failures and considerable structural damage. The effects of wind speed are shown in Table 7-1.

Table 7-1. The Effect of Wind Speed

Wind Speed (mph)	Wind Effects
25-31	Large branches will be in motion.
32-38	Whole trees in motion; inconvenience felt walking against the wind.
39-54	Twigs and small branches may break off of trees; wind generally impedes progress when walking; high profile vehicles such as trucks and motor homes may be difficult to control.
55-74	Potential damage to TV antennas; may push over shallow rooted trees especially if the soil is saturated.
75-95	Potential for minimal structural damage, particularly to unanchored mobile homes; power lines, signs, and tree branches may be blown down.
96-110	Moderate structural damage to walls, roofs and windows; large signs and tree branches blown down; moving vehicles pushed off roads.
111-130	Extensive structural damage to walls, roofs, and windows; trees blown down; mobile homes may be destroyed.
131-155	Extreme damage to structures and roofs; trees uprooted or snapped.
Greater than 155	Catastrophic damage; structures destroyed.

Source: Washington County Office of Consolidated Emergency Management

Debris carried along by extreme winds can directly contribute to loss of life and indirectly to the failure of protective building envelopes, siding, or walls of buildings. When severe windstorms strike a community, downed trees, power lines, and damaged property can be major hindrances to emergency response and disaster recovery.

Infrastructure

Storm winds can damage buildings, power lines, and other property and infrastructure due to falling trees and branches. During wet winters, saturated soils cause trees to become less stable and more vulnerable to uprooting from high winds.

Windstorms can result in collapsed or damaged buildings, damaged or blocked roads and bridges, damaged traffic signals, streetlights, and parks, among others. Roads blocked by fallen trees during a windstorm may have severe consequences to people who need access to emergency services. Emergency response operations can be complicated when roads are blocked or when power supplies are interrupted.

Industry and commerce can suffer losses from interruptions in electric service and from extended road closures. They can also sustain direct losses to buildings, personnel, and other vital equipment. There are direct consequences to the local economy resulting from windstorms related to both physical damages and interrupted services.

Utilities

Historically, falling trees have been the major cause of power outages in Douglas County. Windstorms can cause flying debris and downed utility lines. For example, tree limbs breaking in winds of only 45 mph can be thrown over 75 feet. As such, overhead power lines can be damaged even in relatively minor windstorm events. Utility lines brought down by summer thunderstorms have also been known to cause fires, which start in dry roadside vegetation.

Falling trees can bring electric power lines down to the pavement, creating the danger of electric shock. Rising population growth and new infrastructure in the county creates a higher probability for damage to occur from windstorms as more life and property are exposed to risk.

Existing Mitigation Activities

One of the most common problems associated with windstorms is power outage. High winds commonly occur during winter storms, and can cause trees to bend, sag, or fail (tree limbs or entire trees), coming into contact with nearby distribution power lines. Fallen trees can cause short-circuiting and conductor overloading. Wind-induced damage to the power system causes power outages to customers, incurs cost to make repairs, and in some cases can lead to ignitions that start wildland fires.

The basic strategy adopted by power companies to avoid wind-induced damage is to maintain adequate separation between its transmission circuits and trees. This is done with tree height limitations and ongoing tree trimming.

Windstorm Mitigation Goals

GOAL A

Protect Lives During Windstorms

GOAL B

Reduce Property Damage Resulting From Windstorms

GOAL C

Enhance Survivability of Infrastructure and Utilities During Windstorms

GOAL D

Enhance Education and Public Awareness of Windstorm Dangers

GOAL E

Increase Preparedness of Communities and Agencies

Windstorm Mitigation Action Items

The windstorm mitigation action items provide direction on specific activities that organizations and residents in Douglas County can undertake to reduce risk and prevent loss from windstorm events. Goals Each action item is followed by ideas for implementation, which can be used by the steering committee and local decision makers in pursuing strategies for implementation.

ACTION ITEM 1 - Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during windstorm events.

Ideas for Implementation

- Partner with responsible agencies and organizations to design and disseminate education information to property owners to reduce risk from tree failure to life, property, and utility systems.
- Enhance partnerships between utility providers and county and local public works agencies and landowners to document known hazard areas.
- Identify and find solutions to potentially hazardous trees in urban areas, near utility corridors, and near vital infrastructure.

Coordinating Organization: Douglas County Public Works, Utility Providers

Timeline 2 years

Plan Goals Addressed: Goals A, B, C, E

ACTION ITEM 2 - Map locations around the county that have the highest incidence of extreme windstorms.

Ideas for Implementation

Enhance mapping and tracking of severe windstorms and vulnerable homes, infrastructure and utilities. Data collected should include:

1. Windstorm data (sustained speeds, gusts, storm durations) for localities

- throughout the county;
2. Maps of the locations within the county, which are most vulnerable to high winds; and
 3. Injury and property damage estimates, including locations

Identify public infrastructure and facilities subject to damage or closure during windstorm events.

Coordinating Organization: Douglas County Planning Department, Douglas County Emergency Management

Timeline 5 years

Plan Goals Addressed: Goals A, B, C, D, E

ACTION ITEM 3 – Encourage critical facilities to secure emergency power.

Ideas for Implementation

Seek funding and capital improvements for emergency power stations for critical facilities.

Coordinating Organization: Douglas County Planning Department, Douglas County Emergency Management

Timeline Ongoing

Plan Goals Addressed: Goals A, C, E

ACTION ITEM 4 - Support/encourage contractors, homeowners and electrical utilities to use windstorm resistant construction methods where possible to reduce damage and power outages from windstorms.

Ideas for Implementation

- Increase the use of underground utilities where possible.

- Provide guidance on wind-resistant construction methods

Coordinating Organization: Douglas County Planning and Building Departments

Timeline: 5 years

Plan Goals Addressed: Goals B, C, D, E

ACTION ITEM 5 – Encourage harvesting of trees along utility and road corridors, preventing potential windstorm damage.

Ideas for Implementation

Douglas County Agencies, State Agencies, Federal Agencies and Utility Operators shall encourage the harvesting of trees along utility corridors and roads, which will prevent windstorm damage. The Planning Department shall encourage Federal, State, Local Agencies and Utility Operators to harvest trees in the corridors which will prevent windstorm damage, mitigate fire hazards, and could be used in fish enhancement projects.

Coordinating Organization: Douglas County Planning Department.

Timeline: Continue.

Plan Goals Addressed: Goals A, B, C and E.

ACTION ITEM 6 – Encourage harvesting of trees that are blown down during a windstorm.

Ideas for Implementation

Douglas County Planning Department shall encourage the harvesting of trees blown down in a winter storm. The Planning Department shall encourage Federal, State, and Local Agencies to harvest trees that have fallen during a windstorm, which will mitigate fire hazards, and could be used in fish enhancement projects.

Coordinating Organization: Douglas County Planning Department.

Timeline: Continue.

Plan Goals Addressed: Goal E

ACTION ITEM 7 - Enhance strategies for debris management for windstorm events.

Ideas for Implementation

Develop coordinated management strategies for clearing roads of fallen trees, and clearing debris from public and private property.

Coordinating Organization: Douglas County Public Works, Utility Providers

Timeline 2 years

Plan Goals Addressed: Goals A, B, C, E

ACTION ITEM 8 - Increase public awareness of windstorm mitigation activities.

Ideas for Implementation

- Collect information on public education materials for protecting life, property, and infrastructure from windstorm events; and
- Distribute educational materials to Douglas County residents and public and private sector organizations regarding preparedness for no power situations.

Coordinating Organization: Douglas County Planning Department, Hazard Mitigation Advisory Committee

Timeline Ongoing

Plan Goals Addressed: Goals A, B, C, D, E