

Section 9:

Severe Winter Storm

Severe Winter Storm	1
Why are Severe Winter Storms a Threat to Yamhill County?.....	2
Historical Severe Winter Storm Events.....	2
Characteristics of Severe Winter Storms in Yamhill County	6
Severe Winter Storm Hazard Assessment.....	7
Hazard Identification.....	7
Vulnerability Assessment.....	7
Risk Analysis	8
Severe Winter Storm Community Issues	8
Mitigation Plan Goals and Existing Activities	9
Mitigation Plan Goals Addressed.....	9
Existing Mitigation Activities.....	10
County Programs.....	10
State Programs.....	10
Federal Programs.....	11
Severe Winter Storm Mitigation Action Items.....	11
Short-term (ST) Severe Winter Storm Action Items	12
Long-term (LT) Severe Winter Storms Action Items.....	13
Severe Winter Storm Resource Directory	18
State Resources	18
Federal Resources	19
Additional Resources.....	20

Why are Severe Winter Storms a Threat to Yamhill County?

Severe winter storms pose a significant risk to life and property in Yamhill County by creating conditions that disrupt essential regional systems such as public utilities, telecommunications, and transportation routes. Severe winter storms can produce rain, freezing rain, ice, snow, cold temperatures, and wind. Ice storms accompanied by high winds can have destructive impacts, especially to trees, power lines, and utility services. Severe ice storms occur more frequently in areas exposed to east winds such as those blowing out of the Columbia River Gorge. Less common are severe freezes, where temperatures remain below freezing for five or more days, and severe or prolonged snow events. Both can produce widespread impacts on people and property throughout Yamhill County.

Historical Severe Winter Storm Events

Northwestern Oregon Region

Destructive storms, producing heavy snow and ice, have occurred throughout northwestern Oregon's history, most notably in 1937 and 1950. Over a five-day period between January 31 and February 4, 1937, snowstorms blew across most of Oregon. The heaviest snowfall occurred in the Cascade Mountains and Willamette Valley where Salem and Dallas recorded 26 inches of snow.¹ The storms were directly related to five Oregon deaths and caused over \$50,000 (in 1937 dollars) in damage to Salem.²

January 1950 was a very cold month statewide and was marked by three successive snowstorms that brought the heaviest snowfalls for the state as a whole since records were first kept in 1890. The snow and ice storms closed highways, stranded motorists, created power outages and resulted in hundreds of thousands of dollars of damage across the state.³

Snow Storms

December 1892

From December 20 to 23, 1892, substantial snow fell across most of northern Oregon, with the greatest snowfall reported over northwestern Oregon, where storm totals ranged from 15 to 30 inches.⁴

January 1909

A six-day storm in January brought many locations more snow than is usually accumulated in one year.⁵

December 1919

The December 1919 snowstorm was recorded as the third heaviest snowfall-producing storm in Oregon. The Columbia River froze over, closing the river to navigation from the confluence with the Willamette River upstream. The snowstorm affected nearly every part of the state, with heavy snow falling over a widespread area.⁶

January 1937

Much of the damage occurred as structures collapsed from the weight of the snow. In addition to property damage, many major roads were closed.⁷

January 1950

The entire month of January 1950 was cold and frequent snowstorms occurred statewide. Snowfall and precipitation including freezing rain was heaviest between the 9th and 18th.⁸ During this time, there were wind gusts up to 80 mph and sustained winds up to 25 mph in the Willamette Valley.^{9,10} Thirty-nine inches of snow fell on Salem over the course of the month.^{11,12} Schools throughout the county were sporadically closed and at least two weather related traffic fatalities occurred in Oregon, one in Lyons.

March 1960

The first week of March 1960 was marked by a winter storm that brought more snow to Yamhill County than any time since 1950. This storm was responsible for two fatalities in Oregon, and many storm related accidents in Yamhill County. In addition, most schools throughout the County were closed for several days.¹³

February 1989

A weather system from Alaska remained in the area for several days, bringing snow and plunging temperatures.¹⁴ The February 1989 storm saw temperatures as low as eight degrees Fahrenheit, and five-foot high snow drifts.¹⁵ The storm led to five accidents on Interstate 5 that closed the highway between Salem and Albany; and near Woodburn, an overturned truck spilled 1,000 gallons of oil. There was also a storm related four-vehicle accident on Highway 22 near Silverton. Hospitals in Salem reported 25 snow-related injuries. The Oregon Department of Transportation estimated \$25,000 in additional costs was necessary for wages and supplies to deal with the storm's effects.^{16,17,18} Two power outages affected 80 percent of McMinnville's customers,¹⁹ and the South Yamhill River began to freeze over.²⁰

February 1993

This storm event dropped nearly twelve inches of snow in Salem between February 18th and 19th; the greatest amount of snowfall ever recorded in a twenty-four hour period in Salem.²¹

Ice Storms

January 30-31, 1963 (Northern half of Oregon)

Cold temperatures and snow showers created hazardous driving conditions in Yamhill County during the last days of January 1963. Four inches of snow were recorded at McNary Field in Salem.²² Large numbers of power lines were downed due to large amounts of ice or felled trees. Injuries, one reported death, and statewide school closures were due to the icy streets and highways.

January, 1978

During the early days of January 1978 a layer of cold air was driven into the Willamette Valley from Eastern Oregon via the Columbia Gorge. Rain from a higher warm air mass fell through the cold air below causing it to freeze. The cold temperatures and freezing rain iced roads throughout Yamhill County and the Willamette Valley causing eight traffic fatalities and dozens of traffic accidents.²³

February 2-4, 1996

Similar to the 1978 event, this storm began with a mass of cold air trapped in western Oregon followed by a warmer front that blew over the top of the cold air mass. Once the two fronts collided, a severe ice storm was created. Traffic accidents and power outages plagued the Willamette Valley. Freezing rain fell for two days, causing a 100-car pileup between Clackamas County and Salem and a 22-car pile up on Highway 22 near Eola. One fatality occurred when a car lost control on the ice, slide off the road, and flipped over near Lincoln City.^{24, 25}

December 26, 2003 through January 14, 2004

According to state climatologist George Taylor, snowstorms that have swept through the region beginning December 26, 2003, are the snowiest, coldest winter since 1992-3. The winter snowstorm that blew through the northwest Oregon at the end of December turned into an ice storm in January.²⁶ Climatologists called this the worst storm to pelt the west side of Oregon's Cascade Range since 1992 – even worse than a big ice storm that hit in 1998. The storm resulted from the collision of a mass of moisture from the Pacific with an arctic cold front.

The storm's impact at Portland International Airport had thousands of passengers stranded for several days after the freezing rain cancelled flights. The runway conditions were among the worst in recorded history.²⁷ More than 330 flights were canceled on January 6, 2004, as airplanes sat on the runway encased in ice.²⁸ Another 140 flights were canceled for the morning of January 7th alone.²⁹

58,000 Portland General Electric (PGE) customers were without power on January 6, 2004.³⁰ The hardest hit areas are the eastern and southern sections of the service territory, including east Multnomah County, Oregon City, Estacada, Molalla and Mulino, and the Salem area.³¹

Salem received three inches of snow on January 6th, according to the National Weather Service.

On New Year's Eve, six- and seven-foot drifts collected atop Bald Peak and Mountain Top Roads, in the northeastern part of the county.³²

In Willamina, when water lines began to thaw, lines started breaking.³³ A big break occurred at Willamina Lumber Company on Willamina Creek Road, and another at the old Conifer Plywood Mill on Main Street.³⁴ The city lost about 200 gallons a minute until they were able to isolate the leaks and get them fixed.³⁵ In addition to the larger lines, residential lines also froze and broke when the thawing process started. A power outage knocked out Willamina's water intake pump for twelve hours during the storm.³⁶

Extreme Cold Weather Events

December 15-26, 1924

In December 1924, temperatures stayed near or below the freezing mark for eleven straight days. At the time, this event in 1924 was recorded as the coldest December ever in Oregon. The cold period was long and severe. Most streams and rivers were frozen and blocked with ice. People drove their automobiles across the Willamette River.³⁷

In addition to the cold weather, four inches of snow fell over much of the Willamette Valley. The weight of the snow downed 400 telephone lines in Salem and caused 21 car accidents there.^{38,39} The freezing temperatures formed ice in the Willamette River that crushed a steamboat and caused several thousand dollars of damage to the Dennison Bath House.⁴⁰

January 24-31, 1957

The cold weather in January 1957 was the result of an arctic air mass that moved into Eastern Oregon and spread west toward the coast. The cold temperatures brought icy roads throughout Yamhill County.⁴¹

Temperatures in Yamhill County during this seven-day period were in the mid-teens, not considering the wind-chill created by 21 mph wind gusts. The cold snap cut electricity for some county residents and froze water pipes in many homes.⁴² The cold temperatures also caused the Bonneville Power Authority to cut interruptible power to the region's industrial customers because ice behind the dam slowed water flow and limited the ability to generate power.⁴³

February 1-8, 1989

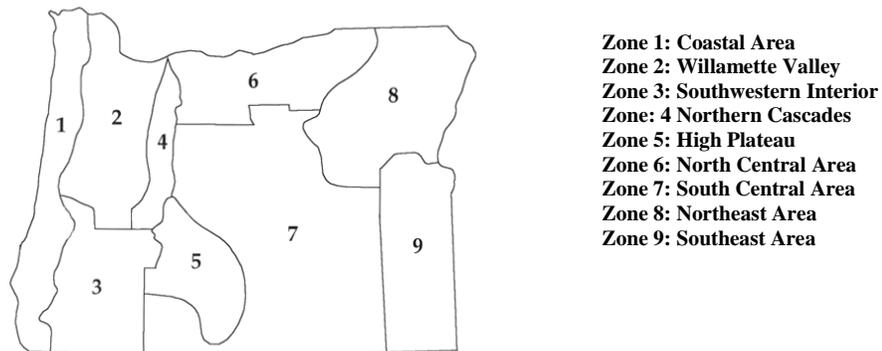
In early February 1989, Yamhill County experienced zero degree temperatures and wind gusts up to 40 mph that created a wind-chill factor of negative 65-75 degrees Fahrenheit. The extreme cold damaged crops, forced mills to send home employees and froze or burst residents' water pipes.^{44, 45, 46}

Characteristics of Severe Winter Storms in Yamhill County

Weather patterns

Severe winter storms affecting Yamhill County typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from October through March.⁴⁷ Yamhill County's average precipitation is 40.68 inches.⁴⁸ The National Climatic Data Center has established climate zones in the United States for areas that have similar temperature and precipitation characteristics. Oregon's latitude, topography, and proximity to the Pacific Ocean give the state diversified climates. Yamhill County is in Zone 2 as seen in Figure 9-1. The climate in Zone 2 generally consists of wet winters and dry summers.⁴⁹

Figure 9-1
Oregon Climate Zones



Source: Taylor, George H. and Hannan, Chris, *The Oregon Weather Book*, OSU Press (1999)

Snow

While snow is relatively rare in western Oregon, the break in the natural Cascades barrier at the Columbia Gorge provides a low-level passage through the mountains. Cold air, which lies east of the Cascades, often moves westward through the Gorge, and funnels cold air into the Portland Area, and may eventually sink southward into the Willamette Valley. If a wet Pacific storm happens to reach the area at the same time that the cold air is present, larger than average snow events may result.⁵⁰

An example of this type of snowstorm event occurred in January 1980, when strong storms, accompanied by snow, ice, wind, and freezing rain hit Oregon statewide. Impacts in the Portland area alone included one fatality, 200,000 customers left without power or phone service for several days. One hundred and twenty-five boats, with a combined value of over \$3 million dollars, sank in the Columbia Gorge.⁵¹

Ice

Ice storms occasionally occur in northern areas of Oregon, resulting from cold air flowing westward through the Columbia Gorge.⁵² Like snow, ice storms are comprised of cold temperatures and moisture, but subtle changes can result in varying types of ice formation, including freezing rain, sleet, and hail.⁵³

Freezing rain can be the most damaging of ice formations. While sleet and hail can create hazards for motorists when it accumulates, freezing rain can cause the most dangerous conditions within a community. Ice buildup can bring down trees, communication towers, and wires creating hazards for property owners, motorists, and pedestrians alike. The most common freezing rain problems occur near the Columbia Gorge, but also pose a hazard to Yamhill County. As noted above, the Gorge is the most significant east-west air passage through the Cascades. Rain originating from the west can fall on frozen streets, cars, and other sub-freezing surfaces, creating dangerous conditions.⁵⁴

Severe Winter Storm Hazard Assessment

Hazard Identification

A severe winter storm is generally a prolonged event involving snow or ice. The characteristics of severe winter storms are determined by a number of meteorological factors including the amount and extent of snow or ice, air temperature, wind speed, and event duration.

Precipitation, an additional element of severe winter storms, is measured by gauging stations. The National Weather Service, Portland Bureau, monitors the stations and provides public warnings on storm, snow, and ice events as appropriate.

Vulnerability Assessment

Vulnerability assessment is the second phase of a hazard assessment. It combines the information generated through severe winter storm identification with an inventory of the existing development exposed to this hazard assisting in the prediction of how different types of property and population groups will be affected by a hazard.⁵⁵ Data that includes the areas exposed to winter storms in Yamhill County can be used to assess the population and total value of property at risk from severe storms.

While a quantitative vulnerability assessment (an assessment that describes number of lives or amount of property exposed to the hazard) has not yet been conducted for Yamhill County severe winter storm events, there are many qualitative factors (issues relating to what is in danger within a community) that point to potential vulnerability. Severe winter storms can cause power outages and transportation and economic disruptions, and pose a high risk for injuries and loss of life. The events can also be typified by a need to shelter and care for adversely impacted individuals. Yamhill County has suffered severe

winter storms in the past that brought economic hardship and affected the life and safety of residents. Future severe winter storms may cause similar impacts countywide.

Risk Analysis

Risk analysis is the third, and most advanced phase of a hazard assessment. It is conducted by use of mathematical models and relies on information compiled during hazard identification and vulnerability assessments. Factors included in assessing severe winter storm risk include population and property distribution in the hazard area, the frequency of severe winter storm events, and information on trees, utilities, and infrastructure that may be impacted by severe winter storms. 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.

Severe Winter Storm Community Issues

Life and Property

Winter storms are deceptive killers. Many winter storm deaths occur as a result of traffic accidents on icy roads, heart attacks while shoveling snow, and hypothermia from prolonged exposure to the cold.

Property is at risk due to flooding (see chapter 6) and landslides (see chapter 10) resulting from heavy snowmelt. Ice, wind, and snow can affect the stability of trees, power lines, telephone lines, and television and radio antennas. Falling trees and limbs affected by these events, and saturated soils can become hazards for houses, cars, utilities and other property. Similarly, icy streets are difficult for emergency personnel to travel and may pose a secondary threat to life if police, fire, and medical personnel cannot respond to calls.⁵⁶

Roads and Bridges

Inclement winter weather can cause prolonged and extreme traffic disruptions. Snow and ice events resulting in icy road conditions can lead to major traffic accidents. Roads blocked by fallen trees during a windstorm may have tragic consequences for people who need access to emergency services. The ability to travel after a natural hazard event is a priority issue for county residents, organizations, and providers of essential services such as hospitals and utilities.

Power Lines

Historically, falling trees have been the major cause of power outages resulting in interruption of services and damaged property. In addition, falling trees can bring electric power lines down, creating the possibility of lethal electric shock. Snow and ice can also damage utility lines and cause prolonged power outages. Rising population growth and new infrastructure in the county creates a higher probability for damage to occur from severe winter storms as more life and property are exposed to risk.

Water Lines

The most frequent water system problem related to cold weather is a break in cast iron mainlines. Breaks frequently occur during severe freeze events, as well as during extreme cooling periods during the months of October, November, and December. Another common problem during severe freeze events is the failure of commercial and residential water lines. Inadequately insulated potable water and fire sprinkler pipes can rupture and cause extensive damage to property.

Mitigation Plan Goals and Existing Activities

Mitigation Plan Goals

The plan goals addressed by each action item are identified as a means for monitoring and evaluating how well the mitigation plan is achieving its goals following implementation.

The plan goals help to guide the direction of future activities aimed at reducing risk and preventing loss from natural hazards. The goals listed here serve as checkpoints as agencies and organization begin implementing mitigation action items.

Goal #1: EMERGENCY OPERATIONS

Goal Statement: Coordinate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures and with various other agencies, as appropriate.

Goal #2: EDUCATION AND OUTREACH

Goal Statement: Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.

Goal #3: PARTNERSHIPS

Goal Statement: Develop effective partnerships with public and private sector organizations and significant agencies and businesses for future natural hazard mitigation efforts.

Goal #4: PREVENTIVE

Goal Statements:

- Develop and implement activities to protect human life, commerce, and property from natural hazards.
- Reduce losses and repetitive damage for chronic hazard events while promoting insurance coverage for catastrophic hazards.

Goal #5: NATURAL RESOURCES UTILIZATION

Goal Statement: Link natural resources management, land use planning, and watershed planning with natural hazard mitigation activities to protect natural systems and allow them to serve natural hazard mitigation functions.

Goal #6: IMPLEMENTATION

Goal Statement: Implement strategies to mitigate the effects of natural hazards.

Existing Mitigation Activities

County Programs

Yamhill County Public Works' Road Department

The Public Works' Department sands paved, county roads when cold weather events are anticipated.

State Programs

One of the strongest and most widespread existing mitigation strategies pertains to vegetation clearance. **Oregon Line Safety Statute**, ORS 757.035, is the minimum legal standard in Oregon for the construction, operation and maintenance of electrical supply and signal lines. The law and rule applies to any person, company, agency, municipality, cooperative or association, their agents, lessees or acting trustees or receivers, appointed by any court, engaged in the management, operation, ownership, or control of electrical supply, and telecommunications equipment.

Failure to allow a utility company to comply with the law can result in liability to the homeowner for damages or injuries resulting from a vegetation hazard. Many insurance companies do not cover these types of damages if the policy owner has refused to allow the hazard to be eliminated. The power companies, in compliance with the above regulations, collect data about tree failures and their impact on power lines. This mitigation strategy assists the power company in preventing future tree failure. From the collection of this data, the power company can advise residents as to the most appropriate vegetative planting and pruning procedures.

Oregon Department of Transportation (ODOT) Winter Maintenance Practices

ODOT spends about \$16 million per year on snow and ice removal from the state highway system. ODOT's goal for winter maintenance is to improve the driving surfaces during winter conditions. ODOT uses three main approaches to mitigation of snow hazards on state highways:

- Snow plowing – moving snow out of the road;
- Sanding roadways for ice to make roads less slick; and
- Using anti-icing chemicals to stop ice from forming on roads.

ODOT highway maintenance crews prepare for severe winter conditions by November 1st each year. Crews make sure all equipment, including radios, and signs, are ready for the first frost or snowstorm. Equipment operators learn or refresh their ability to maintain and use snow and ice equipment.

Oregon State Parks close parks during natural disasters, and evacuate people from parkland when necessary.

Federal Programs

National Weather Service

The Portland Office of the National Weather Service issues severe winter storm watches and warnings when appropriate to alert government agencies and the public of possible or impending weather events. The watches and warnings are broadcast over NOAA weather radio and are forwarded to the local media for retransmission using the Emergency Alert System.

The National Weather Service issues a variety of advisories for winter weather situations. In general, a *watch* lets the public know that dangerous weather is possible within the next 24 hours. An *advisory* indicates that dangerous (but not necessarily life-threatening) winter weather conditions are already happening or may be about to begin. A *warning* indicates that very dangerous (an possibly life-threatening) winter weather conditions are already happening or may be about to begin. A *warning* should be taken more serious than an *advisory*, which is more serious than a *watch*.

Severe Winter Storm Mitigation Action Items

The mitigation action items for severe winter storms were formulated through research of regional mitigation plans, natural hazards planning literature, and interviews with local stakeholders. Plan action items were refined through discussions with the mitigation plan steering committee and through an open house at which the county received comments from the public.

The severe winter storms mitigation action items provide direction on specific activities that organizations and residents in Yamhill County can undertake to reduce risk and prevent loss from severe winter storm events. 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.

This section lists action items identified to reduce the risk from severe winter storm impacts in Yamhill County. These action items are designed to meet the mitigation plan goals.

Short-term (ST) Severe Winter Storm Action Items

Short-term severe winter storm action items include general mitigation activities that agencies are capable of implementing during the next two years, given their existing resources and authorities.

ST-SWS #1: Develop and implement, or enhance strategies for debris management due to severe winter storms.

Ideas for Implementation

- Develop coordinated management strategies for de-icing roads, clearing roads of fallen trees and debris from public and private property; and
- Utilize Community Emergency Response Teams (CERT) to attend to downed power lines until utility crews arrive, assist with clearing roads, and directing citizens away from hazards. This prevents a drain on emergency response personnel resources.

Coordinating Organization:	Road Division of County Public Works
Internal Partner:	GIS, Planning, and Administrative Services Director
External Partner:	Community Emergency Response Teams (CERT)
Timeline:	2 years
Plan Goals Addressed:	Emergency Operations; Education & Outreach; Partnerships; Preventive; Natural Resources Utilization; Implementation

ST-SWS #2: Develop and implement programs to coordinate maintenance and mitigation activities to reduce risk to public infrastructure from severe winter storms.

Ideas for Implementation

- Partner with responsible agencies and organizations to design and implement programs that reduce risk to life, property, and utility systems;
- Seek funding for acquiring snow drift fences to strategically place along the Chehalem Ridge (Snowdrifts can reach heights of 10 to 12 feet when conditions include relatively dry snow and east winds); and
- Develop partnerships between utility providers and county and local public works agencies to document known hazard areas and minimize risk.

Coordinating Organization: Emergency Management
 Internal Partner: Community Development/Planning, Public Works
 External Partner: Cities, utilities
 Timeline: 2 years
 Plan Goals Addressed: Emergency Operations; Partnerships; Natural Resources Utilization; Implementation

ST-SWS #3: Seek funding to acquire necessary emergency back-up power systems for all Rural Fire Protection District facilities and other identified critical facilities.

Coordinating Organization: Emergency Management
 Internal Partner: Administrative Services Director
 External Partner: Fire Defense Board
 Timeline: 1 to 2 years
 Plan Goals Addressed: Emergency Operations; Partnerships; Implementation

Long-term (LT) Severe Winter Storms Action Items

Long-term severe winter storms action items include general mitigation activities that are likely to take more than two years to implement and may require new or additional resources and/or authorities.

LT-SWS #1: Increase and maintain public awareness of severe winter storms and the benefits of mitigation activities through education aimed at households and businesses and increase targeting of special needs populations.

Ideas for Implementation

- Collect additional information and add to existing informational sources on public education materials for protecting life, property, and the environment from severe winter storm events;
- Distribute educational materials to County residents and public and private sector organizations regarding evacuation routes during road closures;
- Maintain and update Yamhill County's Web site information as it pertains to severe winter storm tips;
- Distribute audience-specific educational materials to schools, churches, and other public and private sector organizations;
- Develop methods of improving emergency warning system;
- Educate citizens about the variety of National Weather Service winter weather advisories;
- Identify and contact at-risk populations such as the elderly or disabled not living in group homes/assisted care facilities; and
- Create inventory of supplies available for at-risk populations in severe winter storm situations.

Coordinating Organization: Emergency Management
Internal Partner: Community Development
External Partners: Utilities, cities, American Red Cross, St. Vincent DePaul, churches, Oregon voluntary organizations active in disaster, fire districts
Timeline: 1 to 2 years, on-going
Plan Goals Addressed: Emergency Operations; Education & Outreach; Partnerships; Preventive; Natural Resources Utilization; Implementation

LT-SWS #2: Enhance weather monitoring to attain earlier severe winter storm warnings.

Ideas for Implementation

- Coordinate with appropriate organizations to evaluate the need for more weather stations and/or weather instrumentation; and
- Encourage partnerships with local amateur radio operators (Hams - ARES) to effectively improve communications during storm events.

Coordinating Organization: Emergency Management
External Partner: NWS, OCS, ARES

Timeline: On-going
Plan Goals Addressed: Education & Outreach; Preventive;
Implementation

LT-SWS #3: Develop and implement programs to keep trees from threatening lives, property, and public infrastructure as a result of severe weather events.

Ideas for Implementation

- Consider use of an arborist to survey potential problem areas for tree damage;
- Coordinate with overhead utilities in developing GIS layers for power lines and at-risk trees; and
- Collaborate with overhead utilities on “Right Tree – Right Place Program.”

Coordinating Organization: Emergency Management
Internal Partner: GIS, Public Works, Community Development
External Partner: Overhead utilities, cities
Timeline: On-going
Plan Goals Addressed: Partnerships; Preventive; Natural Resources Utilization

LT-SWS #4: Develop and maintain comprehensive impact database and when possible, map and publicize historical severe weather events in Yamhill County.

NOTE: Hazardous areas can be identified for the public so precautions can be taken at appropriate times. Information about county road icing and county road closures due to snow or other severe winter storm events may already exist within county offices such as the Data Command Center, yet it can be mapped and disseminated countywide to make residents knowledgeable about severe winter (and windstorm) events.

Ideas for Implementation

- Research and analyze historic severe weather events’ damage in county;
- Identify and map reoccurring patterns;
- Identify a responsible agency for central collection and reporting of storm data. Data collected should include:
 1. Records of ice and snow in localities throughout Yamhill County.

2. Maps of the locations within Yamhill County most vulnerable to snow and ice, including roads, bridges, and utility lines.
 3. Injury and property damage estimates, including locations.
- Identify a responsible agency to collect and transfer data to the National Climate Data Center, Oregon Climate Service, FEMA, or any other agency concerned with the incidence of storms, to help establish and maintain baseline and historic records of storm events;
 - Document future events including impacts and losses; and
 - Identify public infrastructure and facilities subject to closures due to snowfall and ice hazards during winter storms.

Coordinating Organization: Yamhill County
 Internal Partner: Community Development, GIS
 External Partner: Cities, NWS, NOAA, ODOT, OCS, overhead utilities
 Timeline: On-going
 Plan Goals Addressed: Education & Outreach; Partnerships; Preventive; Natural Resources Utilization

LT-SWS #5: Support/encourage electrical utilities to use underground construction methods where possible to reduce power outages from severe winter storms through public incentives and partnerships.

Ideas for Implementation

- Continue support of utility under-grounding program in newly developed areas to minimize future conflicts with utilities;
- Increase the use of underground utilities where possible in redevelopment areas;
- Coordinate with local utility companies and contractors to install underground utilities;
- Partner with utilities to investigate under-grounding utilities in sections of the county that are prone to hazards related to overhead utilities; and
- Identify underground utilities projects as a part of future Capital Improvement Projects (CIP).

Coordinating Organization: Emergency Management
 Internal Partners: Community Development, GIS
 External Partner: Cities, overhead utilities
 Timeline: On-going
 Plan Goal Addressed: Partnerships; Preventive

LT-SWS #6: Promote the benefits of tree-trimming and tree replacement programs and help to coordinate local efforts by public and private agencies.

NOTE: Overhead utilities' tree-trimming and tree replacement programs provide tree maintenance benefits to local communities. The utilities could benefit in turn from cooperation with public and private foresters in harvest plans that are adjacent to roads and/or power line easements.

Coordinating Organization: Public Works (Roads Division)
Internal Partners: GIS, Emergency Management
External Partners: Utility and telecommunications companies, ODOT, city public works, BLM, timber industries
Timeline: 3 to 5 years
Plan Goals Addressed: Education & Outreach; Partnerships; Natural Resources Utilization

LT-SWS #7: Encourage harvesting of trees along utility and road corridors, preventing potential winter storm damage.

Ideas for Implementation

- Encourage the harvesting of trees along utility corridors and roads, which will prevent winter storm damage; and
- Encourage Federal, State, local agencies and utility operators to harvest trees in the corridors which will prevent winter storm damage, mitigate fire hazards, and could be used in fish enhancement projects.

Coordinating Organization: Public Works (Roads Division)
Internal Partner: Emergency Management
External Partners: Cities, utilities, FEMA, ODFW, DSL, BLM, ODOT, timber industries
Timeline: On-going
Plan Goals Addressed: Preventive; Natural Resources Utilization; Implementation

LT-SWS #8: Encourage right-of-way coordination, education and management between property owners, utility operators, and government agencies.

Ideas for Implementation

- Encourage the cooperation and education for managing right-of-way corridors with property owners.

Coordinating Organization: Public Works (Road Division)
Internal Partner: GIS, Planning, Building
External Partner: ODOT, BLM, timber industries, utility operators, county residents
Timeline: On-going
Plan Goals Addressed: Partnerships; Preventive; Natural Resources Utilization; Implementation

LT-SWS #9: Encourage harvesting of trees that are blown down during a winter storm.

Ideas for Implementation

- Encourage the harvesting of trees blown down during a winter storm; and
- Encourage Federal, State and Local Agencies to harvest trees that have fallen during a winter storm, which will mitigate fire hazards, and could be used in fish enhancement projects.

Coordinating Organization: Emergency Management
Internal Partner: Planning, Public Works
External Partner: Cities, utilities, FEMA, ODFW, DSL, BLM, ODOT, timber industries
Timeline: On-going
Plan Goals Addressed: Preventive; Natural Resources Utilization

Severe Winter Storm Resource Directory

State Resources

Department of Land Conservation and Development (DLCD)

DLCD administers the state's Land Use Planning Program. The program is based on 19 statewide planning goals, including Goal 7, related to natural hazards. In order to help local governments address natural hazards effectively, DLCD provides technical assistance such as conducting workshops, reviewing local land use plan amendments, and working interactively with other agencies.

Contact: Natural Hazards Program Manager, DLCD
Address: 635 Capitol St. NE, Suite 200, Salem, OR 97301-2540
Phone: 503-373-0050
Fax: 503-378-6033
Website: <http://www.lcd.state.or.us/hazards.html>

Oregon Climate Service (OCS)

The Oregon Climate Service collects, manages, and maintains Oregon weather and climate data. OCS provides weather and climate

information to those within and outside the state of Oregon and educates the citizens of Oregon on current and emerging climate issues. OCS also performs independent research related to weather and climate issues.

Contact: Oregon Climate Service
Address: Strand Agriculture Hall 326, Corvallis, OR 97331-2209
Phone: 541-737-5705
Fax: 541-737-5710
Website: <http://www.ocs.orst.edu>
Email: coas@oregonstate.edu

Oregon State Police (OSP)-Office of Emergency Management (OEM)

The purpose of OEM is to execute the Governor's responsibilities to maintain an emergency services system as prescribed in Oregon Revised Statutes Chapter 401 by planning, preparing, and providing for the prevention, mitigation, and management of emergencies or disasters that present a threat to the lives and property of citizens of and visitors to the state of Oregon.

Contact: Office of Emergency Management
Address: 3225 State Street, Salem, OR 97301
P.O. Box 14370, Salem, OR 97309-5022
Phone: 503-378-2911
Fax: 503-373-7833
Website: <http://www.osp.state.or.us/oem>

Federal Resources

Federal Emergency Management Agency (FEMA)

FEMA's mission is "to reduce loss of life and property and protect our nation's critical infrastructure from all types of hazards through a comprehensive, risk-based, emergency management program of mitigation, preparedness, response and recovery." FEMA Region X serves the northwestern states of Alaska, Idaho, Oregon, and Washington.

Contact: FEMA, Federal Regional Center, Region 10
Address: 130-228th St. SW, Bothell, WA 98021-9796
Phone: 425-487-4600
Fax: 425-487-4622
Website: <http://www.fema.gov/regions/x/regx.shtm>

National Oceanic and Atmospheric Administration (NOAA)

NOAA's historical role has been to predict environmental changes, protect life and property, provide decision makers with reliable scientific information, and foster global environmental stewardship.

Contact: National Oceanic and Atmospheric Administration
Address: 14th Street & Constitution Avenue, NW, Room 6217, Washington, DC 20230
Phone: 202-482-6090
Fax: 202-482-3154
Website: <http://www.noaa.gov>

Email: answers@noaa.gov

National Weather Service, Portland Bureau

The National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure, which can be used by other governmental agencies, the private sector, the public, and the global community.

Contact: National Weather Service
Address: 5241 NE 122nd Ave, Portland, Oregon 97230-1089
Phone: 503-326-2340
Website: <http://nimbo.wrh.noaa.gov/Portland>

Additional Resources

American Red Cross

The American Red Cross is a humanitarian organization, led by volunteers, that provides relief to victims of disasters and helps people prevent, prepare for, and respond to emergencies. The Oregon Trail Chapter was chartered as a Red Cross unit in 1917. The chapter serves the residents of Clackamas, Clatsop, Columbia, Multnomah, Tillamook, Washington and Yamhill counties. The Oregon Trail Chapter provides a variety of community services, which are consistent with the Red Cross mission, and meets the specific needs of this area, including disaster planning, preparedness, and education.

Contact: American Red Cross, Willamette Chapter
Address: 3131 N Vancouver Ave, Portland, OR 97227-1560
P.O. Box 3200, Portland, OR 97208-3200
Phone: 503-284-1234
Fax: 503-284-4247
Email: info@redcross-pdx.org
Website: <http://www.redcross-oregontrail.org>

Institute for Business & Home Safety (IBHS)

IBHS was created as an initiative of the insurance industry to reduce damage and losses caused by natural disasters. Their website provides educational resources and on-line publications for insurers, businesses, and homeowners who are interested in taking the initiative to minimize future damages and losses.

Contact: Institute for Business and Home Safety
Address: 1408 North Westshore Boulevard - Suite 208 - Tampa, FL 33607
Phone: 813-286-3400
Fax: 813-286-9960
E-mail: info@ibhs.org
Website: <http://www.ibhs.org/ibhs2>

Publications

Public Assistance Debris Management Guide, Federal Emergency Management Agency (July 2000).

The Debris Management Guide was developed to assist local officials in planning, mobilizing, organizing, and controlling large-scale debris clearance, removal, and disposal operations. Debris management is generally associated with post-disaster recovery. While it should be compliant with local and county emergency operations plans, developing strategies to ensure strong debris management is a way to integrate debris management within mitigation activities. The *Public Assistance Debris Management Guide* is available in hard copy or on the FEMA website.

Contact: FEMA Distribution Center
Address: 130 - 228th Street, SW, Bothell, WA 98021-9796
Phone: 800-480-2520
Fax: 425-487-4622
Website: <http://www.fema.gov/r-n-r/pa/dmgtoc.htm>

Severe Winter Storms - Endnotes

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