# Section III:
# Risk Assessment Summary

An important component of the Wasco County Natural Hazards Mitigation Plan is the risk assessment. The purpose of this section is to define the risk assessment process, document the methods used to develop the assessment and to summarize the risk assessment findings for each hazard available at the local level. Detailed risk assessment information for each hazard is included in individual hazard annexes located at the end of the plan. The natural hazards addressed in this plan include: drought, earthquakes, floods, landslides/debris flows, volcanic events, wildfires, and severe storm (windstorms/ winter storms).

The risk assessment builds off the Community Profile by assessing the vulnerability and risk of various community assets including those identified in Section II. The assessment outcomes are used to develop goals and identify potential activities aimed at reducing the risks identified through the risk assessment process.

## What is a Risk Assessment?

The risk assessment process is used to identify and evaluate the impact of natural hazards on the human-built environment, businesses, social structure and services, and the natural environment of a community. Risk assessments provide information about the areas where the hazards may occur, the value of existing land and property in those areas, and an analysis of the potential risk to life, property, and the environment that may result from natural hazard events. Specifically, the following elements are present in a risk assessment:

1) Hazard Identification identifies the geographic extent of the hazard, the intensity of the hazard, and the probability of its occurrence. Maps are frequently used to display hazard identification data. Wasco County identified seven major hazards that consistently affect or threaten its geographic area. These hazards – drought, earthquakes, floods, landslides, volcanic events, wildfires, and severe storms (windstorms/winter storms) – were identified through a process that utilized input from a project steering committee, subject matter experts, the State Natural Hazard Risk Assessments, and historical records.
2) Profiling Hazard Events describes the causes and characteristics of each hazard, how they have affected the County in the past, and what part of the County's population, infrastructure, and environment have historically been vulnerable to each specific hazard. A profile of each hazard addressed in this plan from the State Natural Hazard Risk Assessment is provided in the plan's hazard annexes. For more information on the history of hazard specific events, please see the hazard specific annex.
3) Vulnerability Assessment/Inventorying Assets combines the hazard identification with an inventory of existing (or planned) property and population that would be exposed to a hazard. Critical facilities are of particular concern because they

provide essential products and services that are necessary to preserve the welfare and quality of life in Wasco County and fulfill important public safety, emergency response, and/or disaster recovery functions.

4) Risk Analysis/Estimating Potential Losses involves estimating the damage, injuries, and financial losses likely to be sustained from hazard events in a geographic area over a given period of time. This level of analysis typically involves using mathematical models, such as HAZUS. The two measurable components of risk analysis are magnitude of the impact that may result from the hazard event and the likelihood of the hazard occurring. Describing vulnerability in terms of dollar losses provides the community and the state with a common framework in which to measure the effects of hazards on assets. Where available, the best available data was used to determine the magnitude and likelihood of future natural hazard events. Where sufficient data was available, quantitative estimates for potential losses are included in the Hazard Annexes.

   The Department of Geology and Mineral Industries completed a HAZUS run for the County using both a crustal and Cascadia Subduction zone event. This analysis allows the County to be able to identify the type and number of buildings damaged as well as potential dollar losses from seismic events. These results include data on: expected building damage, expected damage to essential facilities, debris estimates, and expected economic losses. The outcome of the HAZUS run is documented in the Earthquake Hazard Annex.

5) Assessing Vulnerability/Analyzing Development Trends provides a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions. This plan provides a comprehensive description of the characteristics of Wasco County in Section II: Community Profile. The profile includes a description of the community's land use and development trends.

# Risk Assessment Methodology

The County took the following steps to develop the plan's risk assessment:

(1) Collection of Data

The first step in the risk assessment process involved the collection of the best available data the County possessed on natural hazard related events. Sources of this data include:

- Columbia Gorge Discovery Center & Wasco County Historical Museum
- Community Wildfire Protection Plan, Wasco County, Oregon
- Oregon State University Extension- Wasco County
- Wasco County Comprehensive Plan (Goal 7: Natural Hazards)
- Wasco County GIS
- Wasco County Hazard & Vulnerability Analysis (HIVA)
- Wasco County Public Works
- Wasco County Soil & Water Conservation District Fifteenmile Sub-basin Management Plan

(2) Review of State Natural Hazard Risk Assessment
This step in the risk assessment process involved a review of the State Natural Hazard Risk Assessment for Region 5 Mid-Columbia. The natural hazard vulnerability & probability assessments within the State plan were compared with the vulnerability & probability assessments in the Wasco County HIVA; similarities and differences were documented for presentation to the Steering Committee.

(3) Steering Committee Risk Assessment Meeting
The Risk Assessment Meeting agenda of 3 March 2006 proceeded as follows:

Action: Presented and processed local and state natural hazards data.
Result: Documented Steering Committee knowledge/input with respect to local hazard events.

Action: Community asset identification exercise.
Result: (a) Identified and discussed key elements of the region and individual communities within it; and (b) Identified main assets, resources and functions of region within the themes of People, Dollars (economy, cultural & historic assets, environmental assets), and Infrastructure (critical physical facilities).

Action: Community sensitivity table top mapping exercise.
Result: (a) Discussed and documented implications with regards to asset loss/damage to community; (b) Provided mechanism to focus planning efforts; (c) Provided a fact base for subsequent action item identification, and (d) Provided physical document (map) of Steering Committee input.

Figure 3.1 Steering Committee Exercise Map (County)

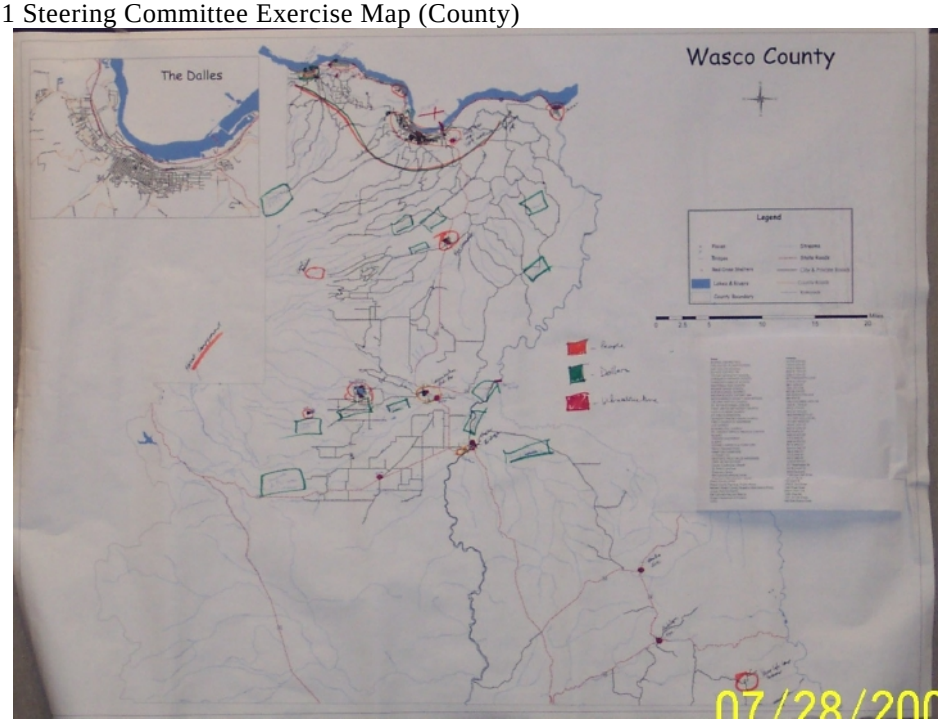
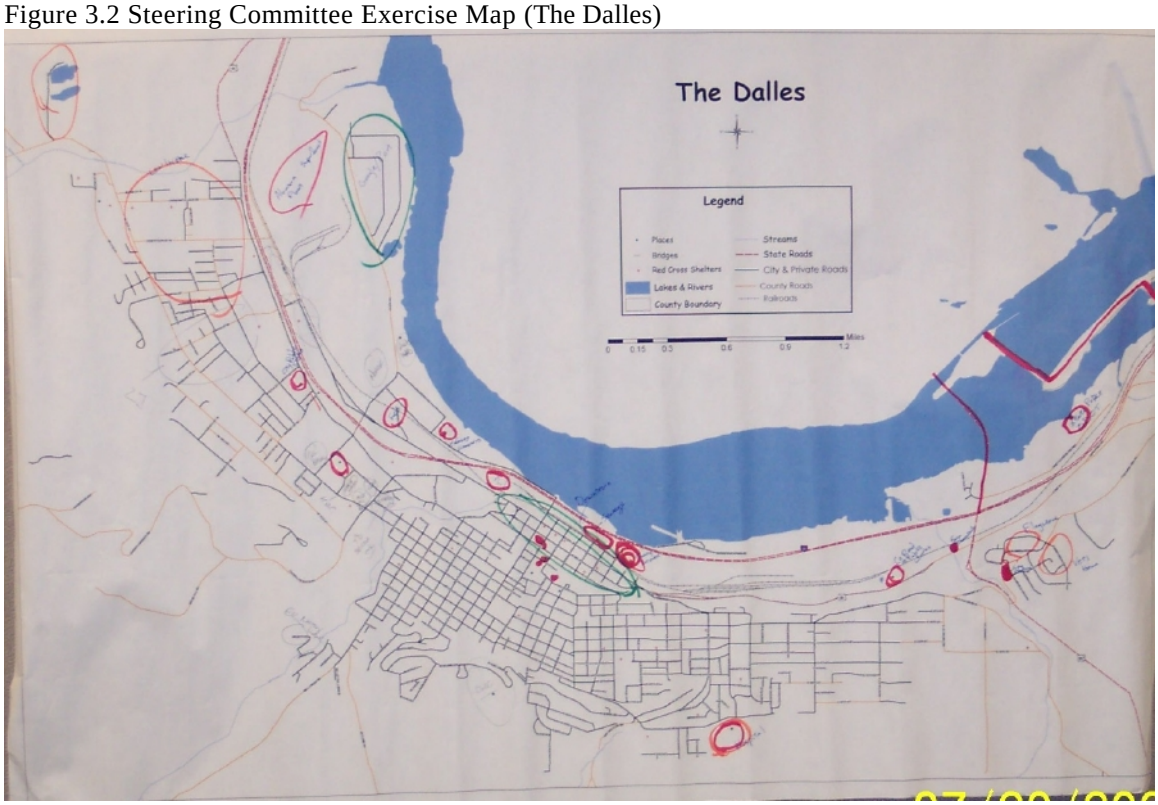



Figure 3.2 Steering Committee Exercise Map (The Dalles)



Action: Discussed of next steps and mitigation action items.
Result: Set schedule for the future planning efforts, documented potential action items discussed in meeting, and distributed action item worksheets to participants.

For more information on Steering Committee participation, please see Appendix A: Public Process.

(4) NHMP Community Stakeholder Forum

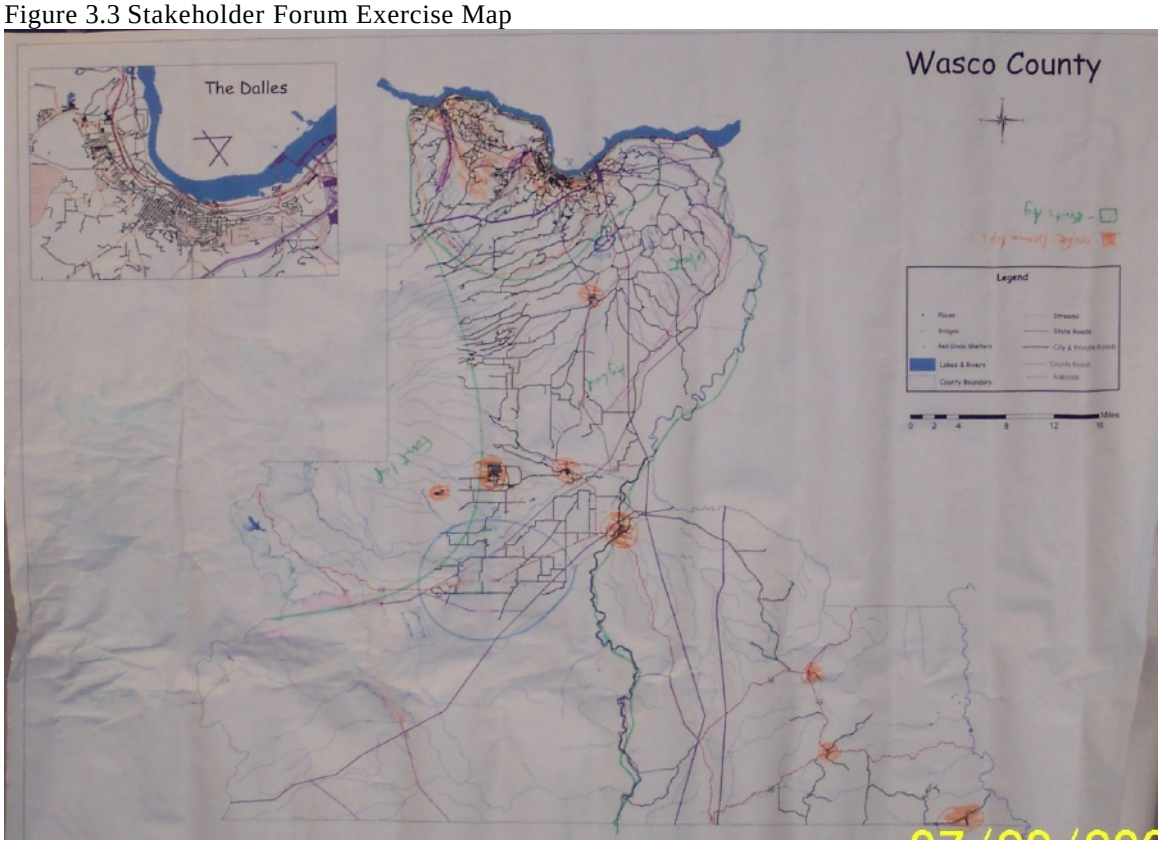
The Forum held 11 April 2006 was the same exercise as the Steering Committee Risk Assessment meeting. The Forum aimed to educate the community stakeholders, gain their insight into how hazard events have impacted the County in the past and how that impact may change in the future, and solicit input for potential action items.

Action: Presented and processed local and state natural hazards data.
Result: Documented community stakeholder knowledge/input with respect to local hazard events.

Action: Community asset identification exercise.
Result: (a) Identified and discussed key elements of the region and individual communities within it; and (b) Identified main assets, resources and functions of region within the themes of People, Dollars (economy, cultural & historic assets, environmental assets), and Infrastructure (critical physical facilities).

Action: Community sensitivity table top mapping exercise.
Result: (a) Discussed and documented implications with regards to asset loss/damage to community; (b) Provided mechanism to focus planning efforts; (c) Provided a fact base for subsequent action item identification, and (d) Provided physical document (map) of community input.

Figure 3.3 Stakeholder Forum Exercise Map




Action: Discussed importance mitigation and the development of action items.
Result: Documented potential action items discussed in forum, and distributed action item worksheets to participants.

For more information on community participation, please see Appendix A: Public Process.

(5) Stakeholder Interviews

Stakeholder interviews were used as a community involvement method to gain input from a variety of members in the community who might not normally be involved in the planning process. Interviews were typically conducted over telephone. The interviews offered an opportunity to extract hazard event knowledge (history, geography, potential impact) from the community that was not documented in county government records.

For more information on Stakeholder Interviews, please see Appendix A: Public Process.

(7) Potential Action Item Documentation

Throughout the risk assessment process, ideas for action items were identified and documented as they were discussed. Documentation of these ideas led to the development of potential action item worksheets which were then selected, prioritized, and refined for documentation in this plan.

For more information on Stakeholder Interviews, please see Section IV: Mission, Goals, and Action Items

# Risk Assessment Summary

This section provides an overview of the risk assessments for the natural hazards affecting Wasco County. For more detailed information on each hazard, see the Hazard Annexes at the end of the plan.

## DROUGHT

### Overview

The high desert and rolling plains of Wasco County have served its agricultural community well over the years. Because of its late season, the county's cherry crops command especially high prices. In the southern portions of the county, ranches and wheat farms dominate the landscape. Recreation and tourism along the Deschutes River and its tributaries, as well as hunting, fishing, and camping have drawn more and more people into the County during the fall, spring and summer months. As water is an essential component of both these industries, the history of drought within the region has periodically threatened two of the County's prime economic engines.

Table 3.1 Drought History

| DATE | DESCRIPTION |
|---|---|
| 1904-1905 | Statewide drought period of about 18 months |
| 1917-1931 | Dry period punctuated by brief wet spells in 1920-21 and 1927 |
| 1939-1947 | Three year intense drought |
| 1959-1964 | Primarily affected eastern Oregon |
| 1985-1997 | General dry period, capped by statewide droughts in 1992 and 1994 |
| 2000-2004 | General dry period, with State of Drought Declarations in 2001 and 2003 |
| 2005 | 2nd Worst drought year on record |

Sources: OR-SNHMP Risk Assessment (Region 5) Mid-Columbia & http://arcweb.sos.state.or.us

In every drought, agriculture has felt the impact, especially in non-irrigated areas such as farms. Droughts have left their major impact on individuals (farm owners), on the agricultural industry, and to a lesser extent, on other agriculture-related sectors. The City of The Dalles, for example, is a regional hub for the shipping and receiving of agricultural products.

### Conditions and Concerns

The following conditions and concerns are found in portions of the county which contribute to the drought threat and potential for economic loss and environmental degradation:

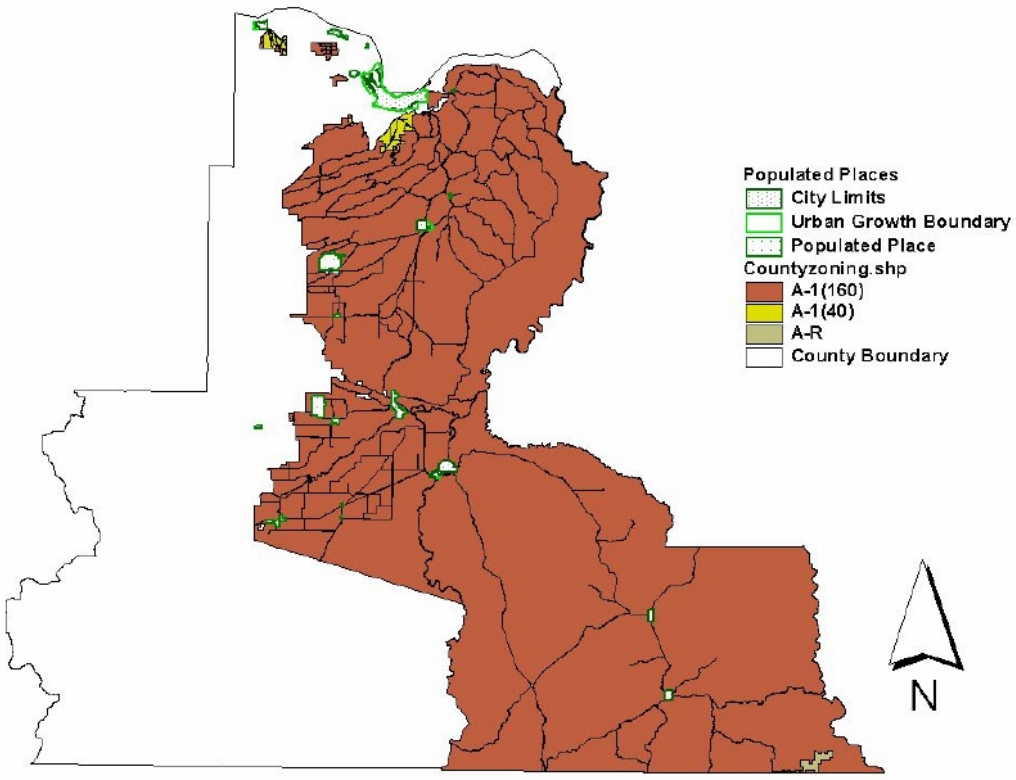
- Areas, the City of Mosier for example, relying upon wells have seen a reduction in groundwater supply

- Potential growth (increased population and building) within the County could pose serious problems in future drought years if water management practices and public education and outreach are not properly coordinated
- Extended drought and loss of agricultural production may have significant impact on the industry and, specifically, employment and wages of seasonal migrant workers

## Geographic Extent

The entire population of the county is vulnerable to the effects of drought. The agricultural industry (farms & ranches) is particularly vulnerable.

Figure 3.4 Wasco County Agricultural Lands




Source: Wasco County GIS

## Impact Summary[i]

The following details both historical and potential impacts of drought upon Wasco County

### Economic

- Drought effects result in economic and revenue losses for business, cities and the county; primarily agriculture

- Loss of timber
- Increased irrigation costs
- Loss related to curtailed tourist activity (e.g. fruit tours, hunting, fishing, kayaking) and impact on sellers of recreational equipment
- Strain on financial institutions (forecloses, more credit risk, capital shortfalls)
- Unemployment from drought related declines in agricultural production
- Reduced productivity of rangeland (increase in livestock mortality rates, disruption of reproduction cycles, decreased stock weights, increased cost for livestock water/feed)

Environmental

- Increased danger of wildfire resulting from drought conditions
- Erosion has occurred which caused serious damage to aquatic life, irrigation, and power development by heavy silting of streams, reservoirs, and river
- Low stream flows have created high temperatures, oxygen depletion, disease, and lack of spawning areas for our fish resources (native steelhead, chinook, endangered bull trout and other fish species)
- Tree disease
- Loss of wetlands
- Increased risk of range fires

For more information on drought in Wasco County, please refer to the Hazard Appendix.

## EARTHQUAKE

Overview

There is really no past "recent" history of earthquakes in Wasco County. Earthquakes in Wasco County are most likely to originate from two sources: 1) the Cascadia Subduction Zone; and 2) faults near the eastern end of the Columbia River Gorge.

Even with this lack of history, geology clearly shows that the county has been impacted by significant events in the last 500 years. It is this 500-year history that Oregon Department of Geology and Mineral Industries based the 1999 damage estimates on (see Impact Summary section below for damage estimates). Within the limits of predictability, we must assume a moderate probability of occurrence for a damaging earthquake during the next 50 years. A large earthquake centered in Western Oregon could also have a minor impact on Wasco County.

## Conditions and Concerns

The following conditions and concerns are found in portions of the county which contribute to the earthquake threat and potential for economic loss and environmental degradation:

- Water-saturated loose sand and silt loses its ability to support structures in an earthquake. Areas in Wasco County that are near the flood plains along rivers or areas with silt deposits are at the greatest risk during an earthquake.
- Potential growth (increased population and building) within the County could pose serious problems in future earthquakes for buildings are sited within floodplains or on grounds with steep slopes.
- Potential earthquake sources in Wasco County are not well known because there have not been frequent large earthquakes here.
- Much of the County's housing stock and some of its critical infrastructure was built before stricter State of Oregon building codes of the 1960's were adopted. These structures are particularly vulnerable to earthquake induced damage.

## Geographic Extent

It is difficult to identify a part of the community that is not vulnerable to an earthquake. People, buildings, emergency services, hospitals, transportation lifelines, and water and wastewater utilities are susceptible to the effects of an earthquake. In addition, electric and natural gas utilities and dams have a potential to be damaged. The best sources of extent and potential impact are provided by DOGAMI in the form of amplification and liquefaction maps, and HAZUS runs. Please refer to the Hazard Appendix for more information.

## Impact Summary [ii]

Oregon Department of Geology and Mineral Industries based on 1999 damage estimates.

Expected losses from the magnitude 8.5 Cascadia earthquake include:

- No casualties or deaths
- No buildings extensively damaged
- Over $950,000 of economic damage

Expected losses in Wasco County from the 500 year model include:

- 5 casualties, no deaths
- Over 3% buildings extensively damaged
- Over $31 million of economic damage

The 500 year model is an attempt to quantify the risk across the state. This estimate does not look at a single earthquake. Instead, this study includes many faults, each with a 10 percent chance of producing an earthquake in the next 50 years. It assumes each fault

will produce a single "average" earthquake during this time. More and higher magnitude earthquakes than used in this study may occur.

For more information on earthquakes in Wasco County, please refer to the Hazard Appendix.

## FLOOD

Overview

Historically, flooding occurs along one or more of the County's waterways every few years. These include the White River, the Deschutes River and the Columbia River. Flooding on these rivers usually occurs between October and February. Long periods of heavy rainfall and mild temperatures coupled with snowmelt contribute to flooding conditions.

Table 3.2 Presidential Disaster Declarations in Oregon 1992-2003

| DATE | DECLARATION |
|---|---|
| 02/09/96 | Severe Storms/Flooding |
| 03/19/96 | Severe Storms/Flooding |
| 12/23/96 | Severe Storms/Flooding |
| 01/23/97 | Severe Storms/Flooding |
| 06/15/98 | Flooding |
| 03/12/02 | Flooding |

Source: Wasco County HIVA

Table 3.3 Significant Flood Events

| DATE | COMMENT |
|---|---|
| January 1923 | Record flood levels on the Deschutes River |
| May 1928 | Columbia River flooding |
| March 1932 | Flooding occurred on the John Day and Grande Ronde Rivers |
| May 30, 1948 | Columbia River crested at 34.4 ft. |
| March 1952 | Flooding in John Day and Grande Ronde Rivers; highest flood stages on these rivers in over 40 years |
| July 1956 | Flash flooding occurred in Central Oregon |
| December 1964 | Region wide flooding occurred |
| July 1995 | Fifteen Mile Creek Flash flood caused by thunderstorm |
| January - February 1996 | The result of heavy rain and warming on heavy mid elevation snowpack. The Columbia River crested at 27.1 ft. on February 9. Heavy debris flows and log jams at the Mill Creek tunnel backed water up and into the downtown business area. |

| | |
|---|---|
| | Losses were in millions of dollars |
| December 1996 – February 1997 | Region wide flooding |
| June 1998 | Flood State of Emergency Declaration |
| March 2002 | Flood State of Emergency Declaration |

Source: Wasco County HIVA & http://arcweb.sos.state.or.us

### Conditions and Concerns

The following conditions and concerns are found in portions of the county which contribute to the drought threat and potential for economic loss and environmental degradation:

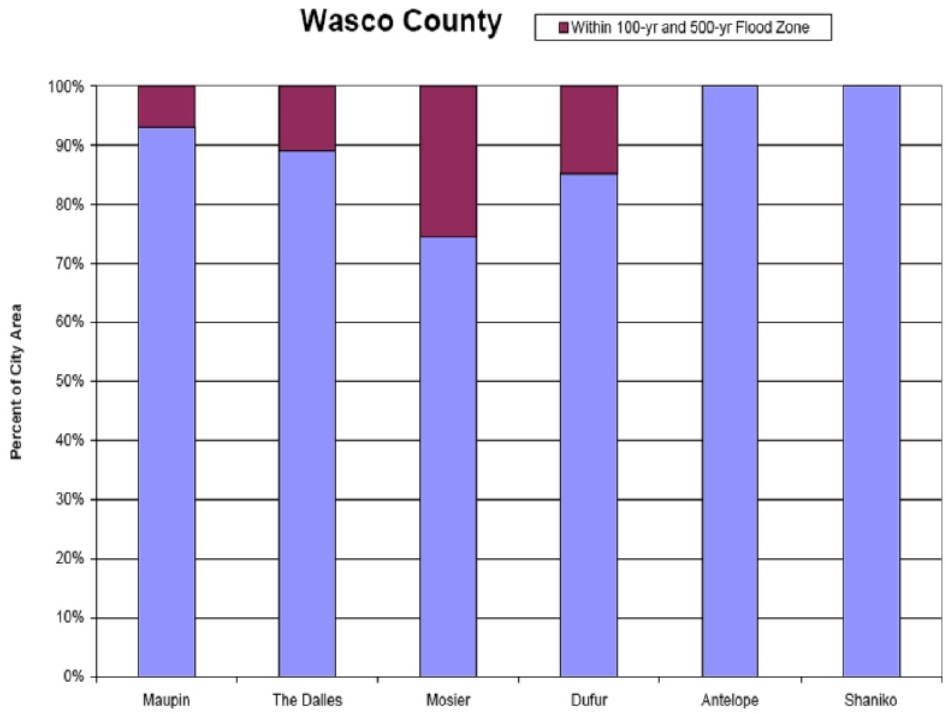
- Residents who live in flood plains face far greater risks than needed. These homeowners probably face greater financial liability than they realize. During a 30-year mortgage period, a home in a mapped flood plain has about a 26 percent chance of being damaged by a 100 year-flood event. The same structure has only about a one percent of being damaged by fire. Many homeowners who live in flood plains carry fire insurance, but do not carry flood insurance.
- As the density of development increases and permeable natural surfaces are replaced with homes and roads, the volume of storm water runoff and the area over which it floods will increase. As a result, unknown numbers of homes that were once outside mapped flood plains will face an increased threat of flooding, a threat they were never built to withstand. In fact, 35-40 percent of the National Flood Insurance claims are currently coming from outside the mapped flood plains.
- Riverine and flash floods may both occur in Wasco County. Riverine floods happen when the amount of water flowing through a river channel exceeds the capacity of that channel. Riverine floods are the most common type of flooding. Flash flooding occurs during sudden rainstorms when a large amount or rain falls in a very short period of time. These happen in steeply sloping valleys and in small waterways.
- Storm water flooding should be a concern in Wasco County because of rapid development. In the February 1996 flooding there were a surprising number of properties that were impacted that were not near a tributary. Instead these properties were in poorly drained areas where ponding and runoff patterns caused basements to flood and other types of water damage. Not all of this is due to development. Natural soil conditions and geological features often determine drainage patterns.
- The County does not keep a record or inventory of flood events and impacts.

### Geographic Extent

The main cause of Northwest floods is the moist air masses that regularly move over the region in the winter. In Wasco County, the weather that produces the most serious flooding events are extensive wet conditions that follow a period of mid and high elevation ice and snow pack development.

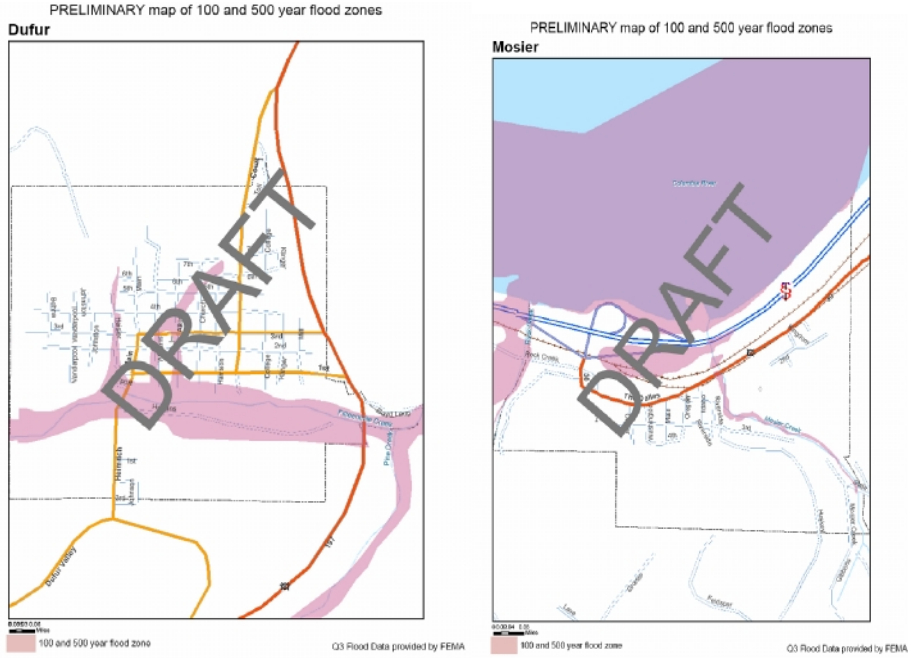
Figure 3.5 illustrates the percentage of cites' area within the flood zone. Maps of the flood zones for the County's two cities, Dufur and Mosier, with the highest percentage of area susceptible to flooding are shown in Figure 3.6.

Figure 3.5 Percentage of City Area within 100 & 500-yr Flood Zone




Source: DOGAMI

Figure 3.6 Flood Plains of Dufur & Mosier




Source: DOGAMI

### Impact Summary

The following details both historical and potential impacts of floods upon Wasco County:

- Floods can cause loss of life and great damage to structures, crops, land resources, flood control structures, roads, and utilities of all kinds.
- February 6-8 1996 the County suffered extensive flooding from record warm rains and heavy snow pack; streams and rivers went out of their banks damaging public and private property. The flooding of Mill Creek between Fourth St. and Second St. in downtown The Dalles caused in excess of $ 2 million in damages to downtown business and infrastructure.[iii]

For more information on floods in Wasco County, please refer to the Hazard Appendix.

## LANDSLIDES

### Overview

Wasco County has several areas where landslides have taken place and many areas that are susceptible to landslides. The slopes above the Columbia River are particularly susceptible. Slides in Wasco County generally range in size from thin masses of soil of a few yards wide to deep-seated bedrock slides. Landslides typically occur in Wasco County during or after periods of heavy rain and flooding. The last major landslide events occurred during the December1996 to February 1997 storms.

## Conditions and Concerns

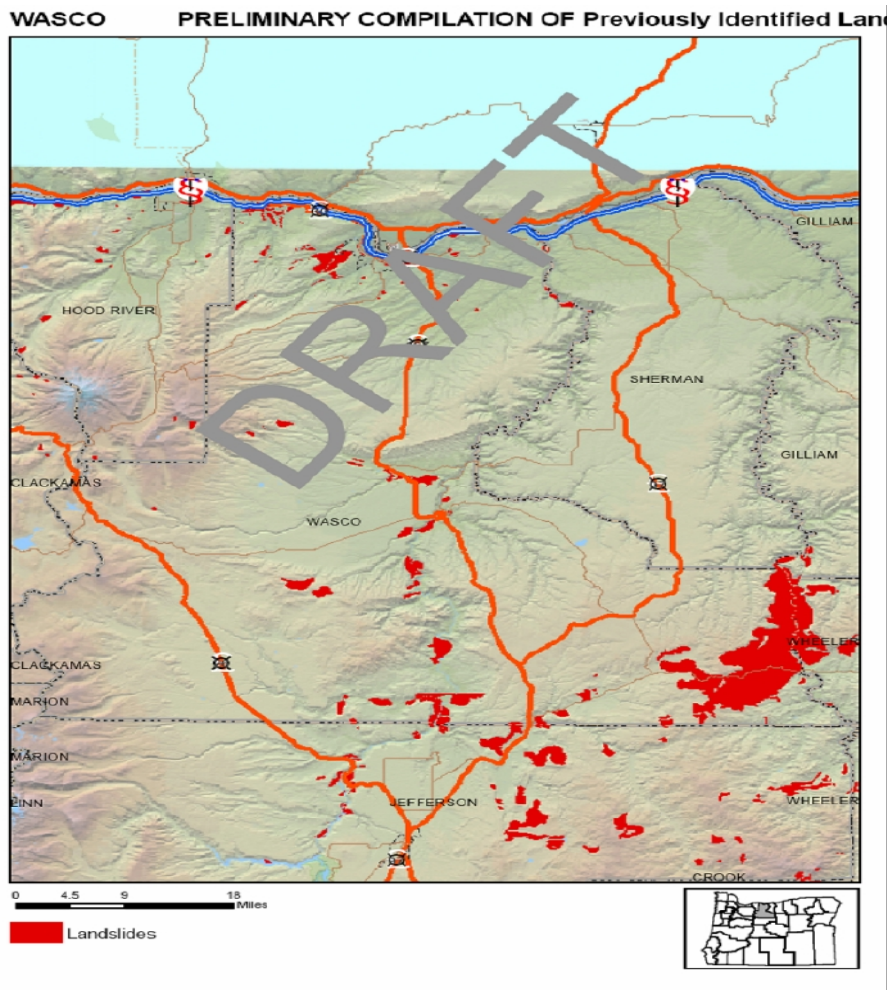
The following conditions and concerns are found in portions of the county which contribute to the landslide threat and potential for economic loss and environmental degradation

- The Pacific Northwest, with its wet climate and considerable topographic relief, is one of the more prolific portions of the nation for slope failures. As the County's population continues to increase, and as areas undergo development that previously had been considered unsafe for building, the problem is often exacerbated.
- Many of the losses due to landslides may go unrecorded because no claims are made to insurance companies, lack of coverage by the press, or the fact that transportation network slides may be listed in records simply as "maintenance."
- Some work has been done to prevent developments on top of or below slopes subject to sliding without geotechnical investigations and preventative improvements. Much more needs to be done to educate the public and to prevent development in vulnerable areas
- Slides along Interstate 84 can disrupt the transportation economics of the region.
- The recognition of ancient dormant slide masses is important as they can be reactivated by earthquakes or unusually wet winters. Also, because they consist of broken materials and disrupted ground water, they are more susceptible to construction-triggered sliding than adjacent undisturbed material.
- Potential growth (increased population and building) within the County could pose serious problems in future landslide years if building practices and public education and outreach are not properly coordinated.
- Computer models are in general agreement that the Pacific Northwest climate will become warmer and wetter over the next 50 years with an increase of precipitation in winter and warmer, drier summers. This could result in more flooding and landslides[iv].

## Geographic Extent

The slopes above the Columbia River are particularly susceptible.

Figure 3.7 Previously Identified Landslides in Wasco County




Source: DOGAMI

## Impact Summary

The following details both historical and potential impacts of landslide upon Wasco County:

- Damage or destruction of portions of roads and railroads, sewer lines, pipelines, and water lines, electrical and communications distribution lines, and destroyed homes and public buildings.
- Disruption of shipping and travel routes result in losses to commerce. Many of the losses due to landslides may go unrecorded because no claims are made to insurance companies, lack of coverage by the press, or the fact that transportation network slides may be listed in records simply as “maintenance.”

- The most significant effect of landslides is the disruption of transportation and the destruction of private and public property.

  For more information on landslides in Wasco County, please refer to the Hazard Appendix.

## SEVERE STORM[v]

Overview
Wasco County is vulnerable to a variety of severe storm hazards. Ice, snow, and windstorms all have the ability to severely impact the County. Severe local storms seldom cause death and serious property damage but they can cause major utility and transportation disruptions.

Ice Storm
Ice storms or freezing rain (black ice) conditions can occur in Wasco County. Ice storms occur when rain falls from warm moist upper layers of the atmosphere into a cold, dry layer near the ground. The rain freezes on contact with the cold ground and accumulates on exposed surfaces. This has the possibility to create real havoc when the ice accumulates on tree branches, and power lines. This can cause power outages and can obstruct transportation routes.

Snow Storm or Blizzard
The northern Oregon Cascades exert a profound effect on Oregon climate and weather. Mid-latitude storms approaching from the West are forced to rise as they encounter the Cascades, resulting in large amounts of orographic (terrain-induced) precipitation on the western slopes. So effective are the Cascades in removing moisture from the Pacific air masses, however, that most of Oregon east of the Cascades lies in a "rain shadow," resulting in large areas with annual precipitation less than 12 inches.
It is possible for significant snowfall to occur in the Northwest. Snowstorms primarily impact the transportation system and the availability or timing of public safety services. Heavy snow accumulations can also cause roofs to collapse. Snow accompanied by high winds is a blizzard, which can affect visibility, cause large drifts and strand residents for up to several days. Melting snow adds to river loading and can turn an otherwise benign situation into a local disaster

Wind Storm
Every so often the Northwest is severely impacted by strong windstorms. In the past, peak wind gusts have gone above 100 miles per hour. The strongest winds that impact Wasco County comes from two sources: 1) frequent and widespread strong winds from the west and are associated with strong storms moving onto the coast from the Pacific Ocean; and 2) strong west winds originating in the Columbia River Gorge when high atmospheric pressure is over the upper Columbia River Basin and low pressure is over the Pacific Ocean. The Columbia River Gorge acts as a funnel, concentrating the

intensity of the winds as they flow from the West. This generates strong winds throughout the Gorge and at its outlet.

### Conditions and Concerns

The following conditions and concerns are found in portions of the county which contribute to the severe storm threat and potential for catastrophic losses:

- Severe local storms create hazardous driving conditions that can slow down and completely inhibit traffic. This can hinder police, fire, and medical responses to urgent calls. These types of storms also can wreak havoc on first response operations. Law enforcement resources are often tied up in responding to welfare inquiries and in traffic control, while fire departments are tied up with electrical hazards and debris removal.
- Periodic closings of Interstate 84 due to severe storm disrupt the transportation economics of the region.
- Severe storms causes massive power and telephone outages. Severe storms in Wasco County have left many without power. In certain areas it may take several days for utility providers to restore power. This can create life-threatening problems for people with life support equipment such as dialysis machines, respirators, and oxygen generators.

### Geographic Extent

The entire County is vulnerable to the effects of a storm. High winds can cause widespread damage to trees and power lines and interrupt transportation, communications, and power distribution. Prolonged heavy rains cause the ground to become saturated, rivers and streams to rise, and often results in local flooding and landslides. Snow and ice can blanket roads and disrupt transportation, isolating areas in the south County.

### Ice Storm

Ice storms or freezing rain (black ice) conditions can occur anywhere in Wasco County. Ice storms occur when rain falls out of a warm atmospheric layer into a cold one near the ground. The rain freezes on contact with cold objects including the ground, trees, structures, and powerlines, causing power lines to break. High winds along the Columbia River Gorge can completely cover roads with ice, even high traffic highways such as Interstate 84.

### Snowstorm

Wasco County has had accumulations that vary depending on geographic location. For example, accumulations average between 4 – 5 inches in the City of the Dalles each year. However, during December of 1884, almost 30 inches of snow fell over a 3 day period and again in 1909 more than 14 inches fell over 5 days.

### Windstorm

Primarily impacts the areas immediately adjacent to the Columbia River Gorge.

### Impact Summary

The following details both historical and potential impacts of severe storm upon Wasco County:

- Even moderate storms can bring down power lines, and tree and tree limbs obstructing roadways and falling onto houses and other structures with enough force to cause damage. Downed powerlines create widespread electrical hazards.
- Severe windstorms will usually cause the greatest damage to ridgelines that face into the winds. There is an additional hazard in newly developed areas that have been thinned of trees to make way for new structures. Large unprotected trees in these areas are more likely to fall.
- Severe storms in Wasco County have left thousands without power. In certain areas it may take several days for utility providers to restore power. This can create life-threatening problems for people with life support equipment such as dialysis machines, respirators, and oxygen generators.
- Severe local storms create hazardous driving conditions that can slow down and completely inhibit traffic. This can hinder police, fire, and medical responses to urgent calls. These types of storms also can wreak havoc on first response operations. Law enforcement resources are often tied up in responding to welfare inquiries and in traffic control, while fire departments are tied up with electrical hazards and debris removal.
- The long-term challenge for severe local storms is in debris removal. Hundreds of tons of debris can pile up in residential and commercial areas.
- Snow accompanied by high winds is a blizzard, which can affect visibility, cause large drifts and strand residents for up to several days.
- Melting snow adds to river loading and can turn an otherwise benign situation into a local disaster.

For more information on severe storms in Wasco County, please refer to the Hazard Appendix.

## WILDFIRE

Note: This section adapted from the Wasco County Community Wildfire Protection Plan unless otherwise noted. Please see CWPP in the Wildfire section of the Hazard Annex for more information

### Overview

Wasco County has experienced serious wildfires in the past and there will continue to be fires in future years. The outlook is for more and larger wildfires, unless an active and

continuing program of hazard fuel reduction and public awareness is undertaken. Each year the existing vegetation continues to grow and more and more people will build homes in areas prone to wildfires. It is only a matter of time before "perfect storm" conditions occur and the county experiences a catastrophic wildfire that will destroy homes and possibly take human lives.

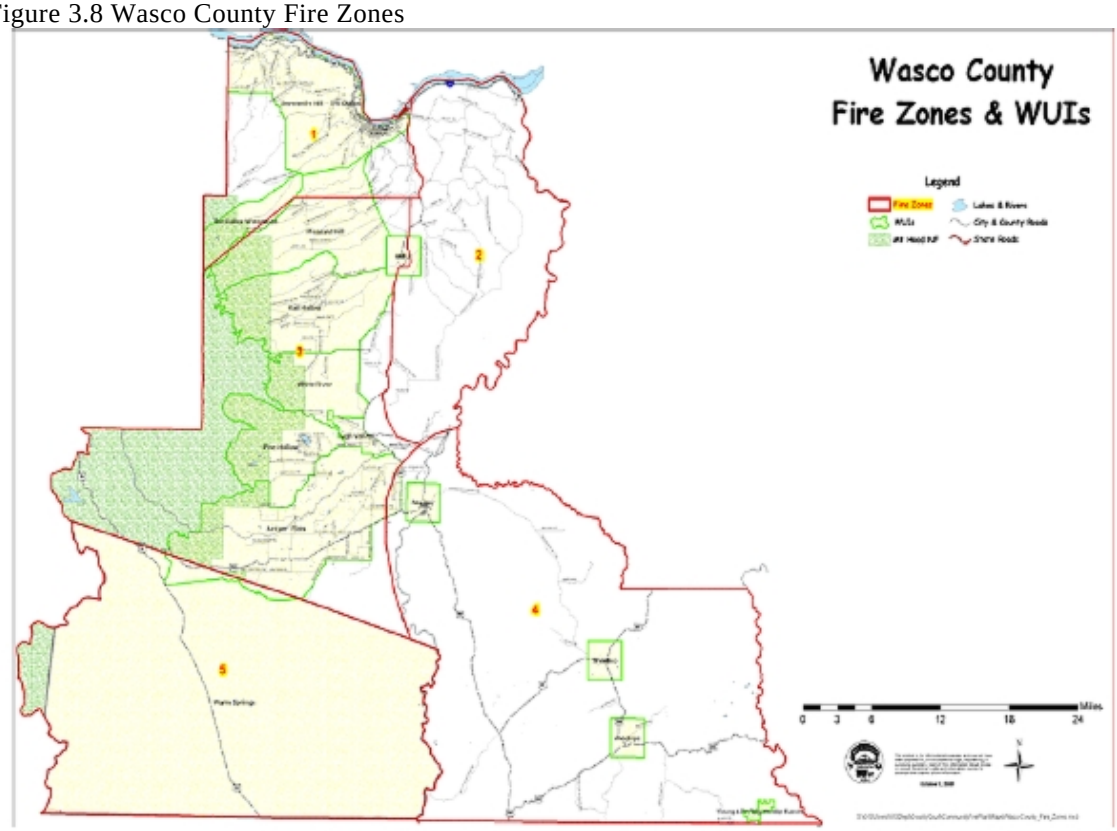
Table 3.4 Large Fires Reported in Wasco County

| Year | Location | Acres |
|---|---|---|
| 1902 | Columbia Gorge | 170,000 |
| 1912 | Maupin | n/a |
| 1977 | n/a | n/a |
| 1979 | Pine Grove | n/a |
| 1985 | Maupin | n/a |
| 1988 | Warm Springs | n/a |
| 1994 | Warm Springs | n/a |
| 1998 | Rowena | 2,208 |
| 2002 | Sheldon Ridge | 12,261 |
| 2002 | White River | n/a |

Source: Wasco County HIVA 2005

Wasco County is large in size and contains a diverse set of wildfire hazard and risk situations. Conditions throughout the county are conducive to large and destructive wildfires. Numerous Wildland Urban Interface (WUI) areas exist with the strong potential for property and human life loss during a wildfire event. Of the five Fire Zones along the WUI, two of the five have been identified and designated with a High Risk Rating (see Figure and Table X below).

Figure 3.8 Wasco County Fire Zones




Source: Wasco County GIS

Table 3.5 Wasco County Fire Zone Risk Ratings

| Zone | Risk Rating |
|---|---|
| 1 | High |
| 2 | Moderate |
| 3 | High |
| 4 | Moderate |
| 5 | Moderate* |

*Confederated Tribes of the Warms Spring CWPP designation

## Conditions and Concerns

The following conditions and concerns are found in portions of the county which contribute to the wildfire threat and potential for catastrophic losses:

- Heavy fuel loads on National Forest and private forest lands along the western portion of the county where large forest fires beginning on National Forest lands move to adjacent private lands with residential developments.
- Current and new residential developments in areas with heavy fuel loads where homes do not have adequate defensible space around them and, or, suitable access for fire fighting equipment and evacuation purposes.

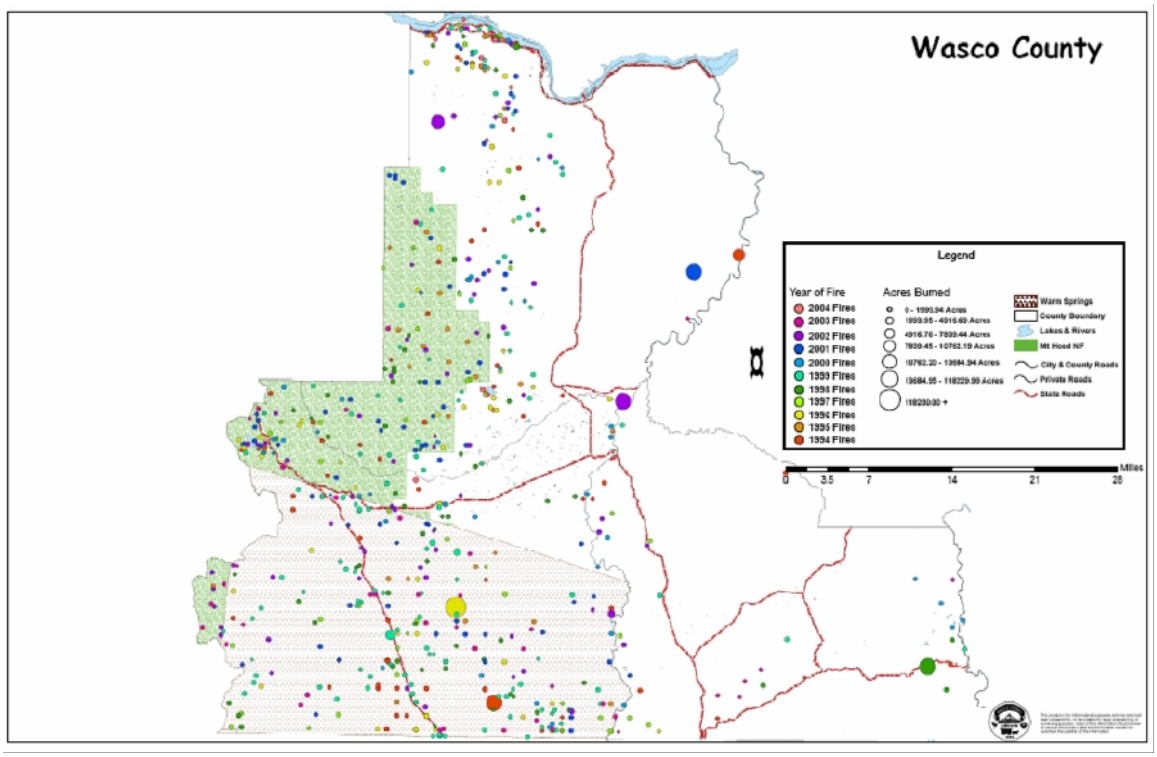
- Climatic and topographic conditions conducive for large wildfires: hot and dry conditions during the fire season throughout the county; frequent high winds along the Columbia River Gorge which can contribute to fast moving fires that are difficult to control; moderate to steep slopes in places like Mosier which add to the rate of wildfire spread and suppression difficulty.
- Large agricultural areas (mainly wheat fields) without wildfire protection districts are susceptible to fast moving fires which can destroy valuable crops in short periods of time. A significant portion of these areas do not have organized wildfire protection districts.
- Risk factors for starting wildfires include: major railroads cross east to west and north to south across the county represent significant ignition sources; lightning starts; power lines, highways (including Interstate Highway 84), debris burning and farming activities.
- Unprotected areas and fire districts with limited resources. Portions of the county do not fall within an organized fire district. Some of the ten different districts have limited resources for effective wildfire fighting. Many residential areas are located a considerable distance from a fire protection source.

### Geographic Extent

Wasco County's fire season usually runs from mid-May through October. However, any prolonged period of lack of precipitation presents a potentially dangerous problem. The effects of wild fires vary with intensity, area, and time of year. Factors affecting the degree of risk of fires include extent of rainfall, humidity, wind speed, type of vegetation, and proximity to fire fighting agencies. Figure 3.9 indicates the location of fires within the county over a ten year span (1994-2004).

The northwestern portion of Wasco County (including the City of The Dalles) is considered the highest overall priority for wildfire protection with its high population density, economic value business conglomeration, high value agriculture (cherry, wine grapes), high fuel loading, and weather conditions conducive to large and fast moving fires. The lightning caused Sheldon Ridge wildfire of 2002 near The Dalles burned 12,600 acres and threatened over 200 homes and a major power line.

Figure 3.9 Wasco County Fires 1994-2004




Source: Wasco County GIS

## Impact Summary

The following details both historical and potential impacts of wildfire upon Wasco County:

- Greatest short-term loss is the complete destruction of valuable resources, such as timber, agriculture (e.g. wheat), wildlife habitat, scenic vistas, and watersheds.
- There is an immediate increase in vulnerability to flooding due to wildfire destroying of all or part of a watershed.
- Long-term effects are reduced amounts of timber or agriculture for commercial purposes and the reduction of travel and recreational activities in the affected area.
- Home building in and near forests increases risks from forest fires.

For more information on wildfire in Wasco County, please refer to the Hazard Appendix.

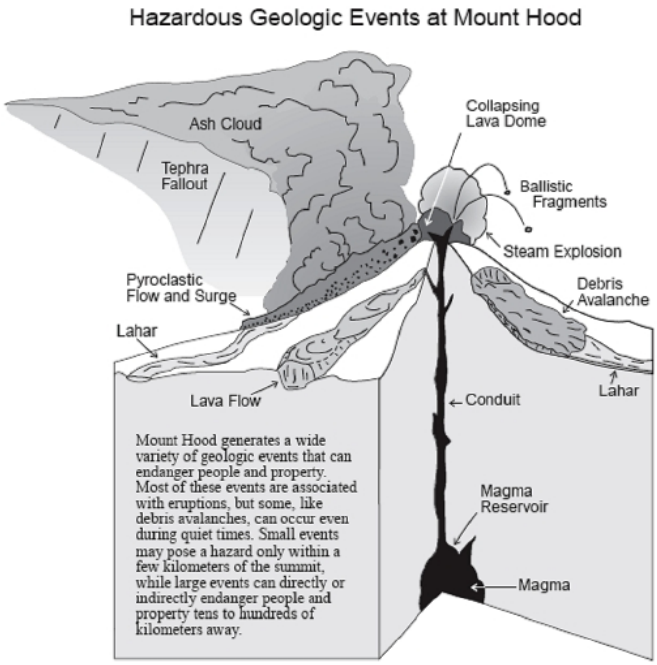
## Overview

Mount Hood is a potentially active volcano close to rapidly growing communities and recreation areas. The most likely widespread and hazardous consequence of a future eruption will be for lahars (rapidly moving mudflows) to sweep down the entire length of the Sandy (including the Zigzag) and White River valleys.

The most recent eruptions in the Cascade Range are the well-documented 1980-1986 eruptions of Mt. St. Helens, which claimed 57 lives and caused nearly a billion dollars in damage and response costs. The effects were felt throughout the northwest.

The largest magnitude event that is possible at Mount Hood is one of very low 30-year probability less than 1 in 10,000 but one that would have very serious consequences. Although preparing for such a rare event probably is not warranted, understanding the worst-case scenario is nonetheless prudent.

Figure 3.10 Hazardous Geologic Events at Mount Hood




Source: OFR97-89 Mt. Hood Report

## Conditions and Concerns[vi]

The following conditions and concerns are found in portions of the county which contribute to the volcanic threat and potential for catastrophic losses

- The probability of eruption - generated lahars affecting the Sandy and White River valleys is 1-in-15 to 1-in-30 during the next 30 years, whereas the

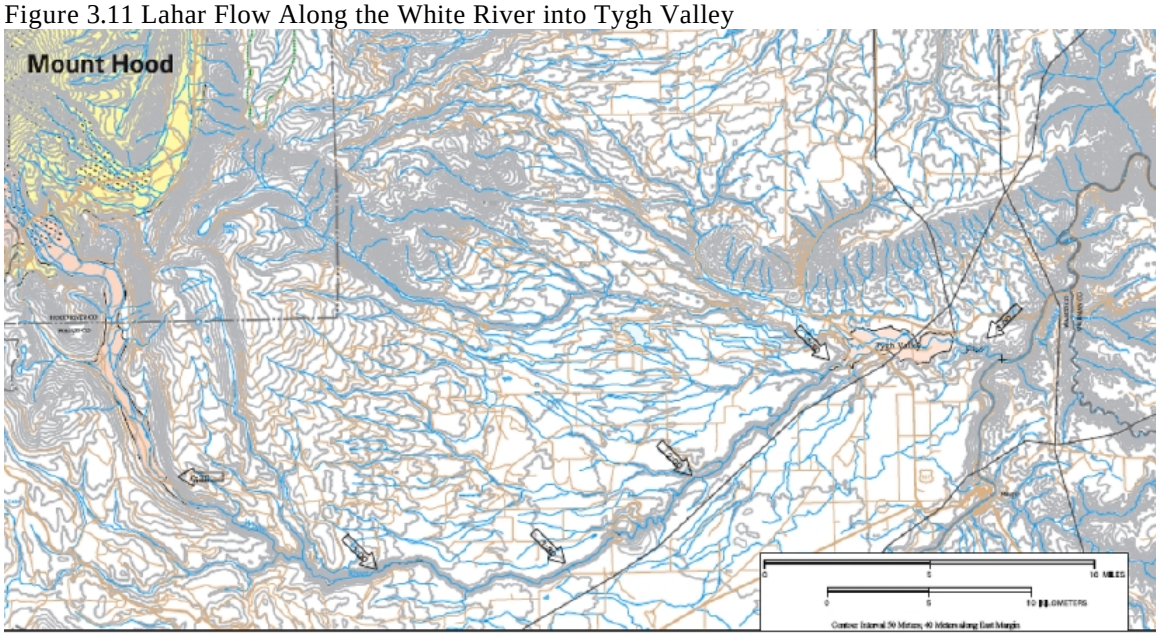
probability of extensive areas in Wasco County being affected by lahars is about ten times less.

- The factor that most limits Wasco County's vulnerability to a major eruption of Mt. Hood is the modern capability to accurately detect eruptive activity well before an eruption occurs. The USGS constantly monitors seismic activity directly underneath Cascade volcanoes. Clusters or 'swarms' of small earthquakes underneath a volcano have proven to be a precursor to renewed volcanic activity. Mt. St. Helens and Mt. Hood are both closely monitored, in terms of ground movement and seismic activity. It is up to emergency managers and other responsible agencies to ensure an aggressive response to these warnings.
- Lahars spawned by lava-dome collapses swept through the White River valley about 200 years ago and inundated large parts of Tygh Valley. Lahars of this magnitude would inundate the broad flood plain of White River in Tygh Valley, but probably not reach the town itself. Lahars that reach the Deschutes River probably would be diluted to muddy floods that would transport large amounts of sediment into the Columbia River upstream from The Dalles Dam. The probability of the White River being inundated by a debris avalanche or lahar is about 1 in 15 to 1 in 30.
- Seismic activity or flooding as result of Volcanic eruption could damage dam infrastructure, both major and local farm, throughout the many rivers in the County.

## Geographic Extent

The Tygh Valley and areas along the White River are particularly susceptible to a volcanic eruption of Mt. Hood as this is a projected route for lahar flows.

Figure 3.11 Lahar Flow Along the White River into Tygh Valley




Source: OFR97-89 Mt. Hood Report

Other areas of the county as far north of The Dalles may be subject to the tephra fallout and the secondary impacts of lahar flows along river and stream channels.

### Impact Summary

The following details both historical and potential impacts of volcanic events upon Wasco County

- Tephra clouds can create tens of minutes or more of darkness as they pass over a downwind area, even on sunny days, and reduce visibility on highways.

- Deposits of tephra can short-circuit electric transformers and power lines, especially if the tephra is wet and thereby highly conductive, sticky, and heavy. This effect could seriously disrupt hydroelectric power generation and transmission along the Columbia River and powerline corridors north and east of the volcano.

- Tephra clouds often spawn lightning, which can interfere with electrical and communication systems and start fires

- The onset of earthquakes and ground deformation related to magma intrusion would increase the probability of debris avalanches, especially those of large size that have the greatest chance of inundating developed areas.

For more information on volcanic activity in Wasco County, please refer to the Hazard Appendix.

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[i] National Drought Mitigation Center http://drought.unl.edu/index.htm
[ii] OR-SNHMP Risk Assessment (Region 5) Mid-Columbia
[iii] Hulbert & Associates. 1997. Hazard Mitigation Plan for The Mill Creek Wathershed. Annex to the State of Oregon NHMP Pursuant to Disaster No. FEMA-1099-DR-OR.
[iv] Hood River Subbasin Assessment
[v] Adapted from Wasco County HIVA
[vi] OFR97-89 Mt. Hood Report