



Wasco County

Natural Hazards Mitigation Plan

Final Report for:
Wasco County Emergency Management

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August 2006

The logo for Partners for Disaster Resistance Resilience. It features the text "PARTNERS for DISASTER RESISTANCE RESILIENCE" in a bold, sans-serif font. The text is partially enclosed by a large, light-colored, curved swoosh that starts under "PARTNERS" and ends under "RESILIENCE".

PARTNERS *for*
DISASTER RESISTANCE
RESILIENCE



Special Thanks & Acknowledgements

This Natural Hazard Mitigation Plan was developed through a regional partnership funded by the Federal Emergency Management Agency's Pre-Disaster Mitigation Grant Program. The Mid-Columbia Gorge Region grant was awarded to support the development of natural hazard mitigation plans for the region. The region utilized a seven-step planning process, plan framework, and plan development support provided by the Oregon Natural Hazards Workgroup at the University of Oregon.

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Executive Summary

What is the Mitigation Plan?

Wasco County's Natural Hazards Mitigation Plan is an effort to reduce future loss of life and property resulting from natural disasters. The plan includes resources and information that will assist County agencies, residents, public and private sector organizations, and other interested people in participation in hazard mitigation. (Natural hazard mitigation involves permanently reducing or alleviating the losses of life, property, and injuries resulting from natural hazards through long and short-term strategies). The plan contains:

- 8 Goals to direct the County vision for a disaster resilient community
- 48 Recommended actions for mitigation activities
- A summarized county hazard risk assessment with detailed annex
- Plan implementation and maintenance procedures
- Documentation of County, regional, State, and Federal resources

This plan focuses on the primary natural hazards that could affect Wasco County, Oregon, which include: drought, earthquake, flood, landslide, volcano, wildfire, and severe storm (windstorm and winter-storm). Section I: Introduction provides an in-depth overview of the plan, its purpose, how it's organized, and how it was developed.

What is the Plan's Mission?

The Wasco County Natural Hazard Mitigation Plan mission is...

“...to protect life, property and the environment through coordination and cooperation among public and private partners, which will reduce risk and loss, and enhance the quality of life for the people of Wasco County.”

The mission was formulated by the Steering Committee during the committee meeting focused on vision, mission, goals & action items.

Who Participated in Developing the Plan?

The mitigation plan is the result of a collaborative planning effort between Wasco County citizens, public agencies, non-profit organizations, the private sector, and state and regional organizations. The project steering committee was composed of individuals representing the following agencies:

- Wasco County Public Works
- Wasco County Emergency Management
- Wasco County Planning & Development
- Wasco County Soil & Water Conservation District
- City of The Dalles

- Wasco County Court
- Mid-Columbia Fire & Rescue
- American Red Cross

The Community Service Center (CSC) at the University of Oregon played a crucial role in the plan's development. The CSC's Oregon Natural Hazard Workgroup (ONHW) served as project advisor for mitigation plan development in the Mid-Columbia Region, while the Resource Assistance for Rural Environments (RARE) program provided staffing for Wasco County's project coordinator.

What are Plan Goals?

The plan goals help 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 organizations begin implementing mitigation action items. Each goal has a series of statements which further reflect and more clearly define the goals. Wasco County's goals include:

- Education & Outreach
- Disaster Resilient Economy
- Protection of Life & Property
- Intergenerational Equity
- Acknowledge Responsibility
- Facilitate Partnerships & Coordination
- Natural Resource Systems Protection
- Emergency Services Enhancement

The goals were formulated by the Steering Committee during the committee meeting focused on vision, mission, goals & action items. For more information on plan goals, please see Section IV: Mission, Goals & Action Items.

What are Action Items?

Short and long-term action items identified through the planning process are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. They address both multi-hazard (MH) and hazard specific issues. For more information on plan action items, please see Section IV: Mission, Goals & Action Items.

Section I: Introduction

This section answers a number of basic questions regarding the purpose of the Wasco Natural Hazards Mitigation Plan: why the plan was developed, how the plan was developed, and how the plan is organized.

What is Hazard Mitigation?

Natural hazard mitigation involves permanently reducing or alleviating the losses of life, property, and injuries resulting from natural hazards through long and short-term strategies. Mitigation is an inclusive effort on behalf of federal, state and local governments; individuals, private businesses, industries and community organizations.

Engaging in mitigation activities provides jurisdictions with a number of benefits including reduced loss of life, property, essential services, critical facilities and economic hardship; reduced short-term and long-term recovery and reconstruction costs, increased cooperation and communication within the community through the planning process; and increased potential for state and federal funding for recovery and reconstruction projects.

Why Develop a Mitigation Plan?

Wasco County developed this Natural Hazards Mitigation Plan in an effort to reduce future loss of life and property resulting from natural disasters. A natural disaster occurs when a natural hazard impacts people or property and creates adverse conditions within a community.

This plan focuses on the primary natural hazards that could affect Wasco County, Oregon, which include: drought, earthquake, flood, landslide, volcano, wildfire, and severe storm (windstorm and winter-storm).

The Natural Hazards Mitigation Plan is intended to assist Wasco County in reducing its risk from natural hazards by identifying resources, information, and strategies for risk reduction.

The plan is non-regulatory in nature, meaning that it does not set forth any new policy. It does, however, provide:

- a foundation for coordination and collaboration among agencies and the public in the County;
- identification and prioritization of future mitigation activities; and
- assistance in meeting federal planning requirements and qualifying for assistance programs.

The mitigation plan aims to complement existing plans and procedures rather than create an entirely new framework. To ensure that the plan is incorporated smoothly into County

processes, the NHMP Steering Committee, including a County Court member, shall reconvene quarterly to work on its implementation.

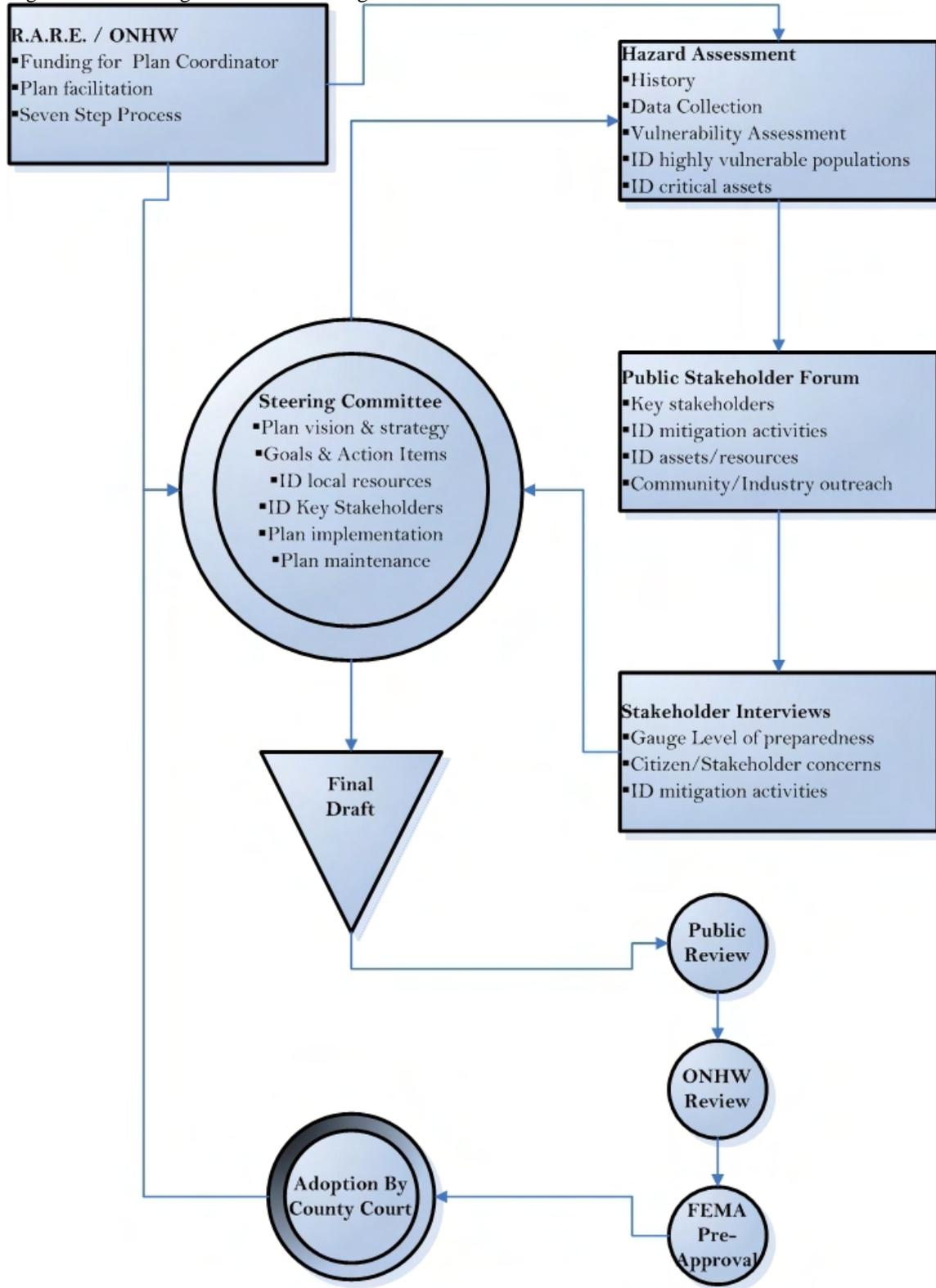
Who Will Benefit From This Mitigation Plan?

All unincorporated areas within the County, including all rural unincorporated communities, and special districts have an opportunity to benefit from The Natural Hazard Mitigation Plan. The City of The Dalles, a participant in the county planning process, also benefits from the Plan in meeting the Disaster Mitigation Act of 2000 (DMA2K) requirements for multi-jurisdictional participation in development of its own mitigation plan.

How was the Plan Developed?

The planning process used to create Wasco County's Natural Hazards Mitigation Plan was developed using a planning process created by the Community Service Center's Oregon Natural Hazard Workgroup (ONHW) at the University of Oregon.¹ Human resources were staffed by the RARE program of the Community Service Center at the University of Oregon. The RARE participant served as full-time project coordinator for the county natural hazards mitigation plan. The planning process was designed to: (1) result in a plan that is DM2K compliant; (2) coordinate with the State's plan and activities of the Partners for Disaster Resistance & Resilience; and (3) build a network of jurisdictions and organizations that can play an active role in plan implementation. The following is a summary of major activities included in the ONHW Seven Step planning process. Main components of the planning process are diagramed in Figure 1.1 below:

Figure 1.1 Planning Process Flow Diagram



ONHW Seven Step Process

This plan was developed using a Seven Step Process under the direction on the Oregon Natural Hazards Workgroup (ONHW) in partnership with Resource Assistance for Rural Environments (RARE), the Department of Geology and Mineral Industries (DOGAMI), and the Mid-Columbia Gorge Region (Gilliam, Hood River, Morrow, Sherman, Umatilla, Wasco, and Wheeler) counties. Funding for the project was made possible through a FEMA awarded Mid-Columbia Gorge Region grant in support of hazard mitigation plan development.

The ONHW Seven Step Process outlined below:

- **Step 1: Organizing to Prepare the Plan:**

Coordination for this project was provided by University of Oregon RARE participant under the supervision of Wasco County Planning & Development. Training, materials, and mitigation plan templates provided by the Oregon Natural Hazards Workgroup. A steering committee was formed to guide the NHMP Coordinator through the process of developing the plan.

- **Step 2: Involving the Community**

This step consisted of community forums, interviews, and surveys intended to involve the public in the plan development process.

The NHMP Coordinator conducted a NHMP Community Stakeholder Participant Forum to raise awareness about natural hazard events and solicit input from community. Invitations were sent out to key stakeholders and the community at large. Additionally, one-on-one stakeholder interviews were conducted to gain local community knowledge of hazard events and how to best address the community's risk.

As part of the regional PDM grant, ONHW implemented a region wide household preparedness survey. The survey gauged household knowledge of mitigation tools and techniques and assessed household disaster preparedness. The survey results improve public/private coordination of mitigation and preparedness for natural hazards by obtaining more accurate information on household understanding and needs. The results of the survey are documented in the plan's Appendix C: Regional Household Survey.

ONHW, with commitment from the Institute for Business and Home Safety (IBHS) provided individuals in the Region with access to, and use of, the IBHS interactive, web-based Open for Business property protection and disaster recovery planning tool. The purpose of the planning tool is to: 1. create understanding of the importance of disaster planning; 2. teach local businesses how to navigate the interactive, web-based Open for Business property protection and disaster recovery planning tool; 3. Assist small businesses in developing their own plans during the training; and 4. teach businesses how to communicate the importance of developing and utilizing plans for property protection and recovery from business interruption. A summary of the outcomes is available in Appendix A: Public Process.

- **Step 3: Describing the Community**
 The County developed a community profile in an effort to gain a better understanding of the community assets that might be at risk from natural hazards. The Community Profile section of this plan was created using information from the OR State Profile, County Comprehensive Land Use Plan, Economic Development Plan, and US Census.
- **Step 4: Identifying and Characterizing the Hazards Impacting the Community**
 Risk assessment performed by project coordinator, Steering Committee, and the Department of Geology and Mineral Industries (DOGAMI) with comparative data provided by local sources, Technical Resource Guide, and Oregon’s NHMP Risk Assessment and Regional Profile.
- **Step 5: Developing Plan Goals**
 Community input during stakeholder interviews was a critical aspect of goal development. Mitigation plan goals and goal statements were drafted by NHMP Coordinator using assistance from ONHW. Draft goals were brought before the Wasco County Steering Committee for review and approval. Goals were revised with Steering Committee input before adoption by committee
- **Step 6: Developing Solutions**
 Action Items were identified by Steering Committee in conjunction with stakeholder interviews and participant feedback from Stakeholder Forum.
- **Step 7: Setting the Plan in Motion**
 Wasco County Planning & Development shall serve as convener of this plan. The NHMP Steering Committee which guided the development of this plan shall also serve as the coordinating body to ensure implementation the mitigation plan.

Steering Committee

The Wasco County Steering Committee was comprised of individuals best suited to guide the county through the planning process and ensure that the mitigation plan is fully implemented once adopted.

Its mission is to ensure proper development and implementation of the county natural hazards mitigation plan by:

- setting goals;
- establishing sub committee work groups to address specific needs;
- ensuring public, private and federal participation;
- distributing and presenting the plan;
- facilitating public discussion/involvement;
- developing implementation activities; and
- coordinating plan maintenance and implementation strategies.

The Wasco County Steering Committee is comprised of representatives from eight County area organizations:

Table 1.1 Steering Committee Members

Name	Title	Organization
Dan Boldt	Director	Wasco County Public Works
Mike Davidson	Emergency Manager	Wasco County Emergency Management
Todd Cornett	Director	Wasco County Planning & Development
Jennifer Clark	Project Coordinator	Wasco County SWCD
Richard Gassman	Senior Planner	City of The Dalles
Sherry Holliday	County Commissioner	Wasco County Court
Stu Nagle	Fire Marshall	Mid-Columbia Fire & Rescue
Hannah Settje	District Manager	Red Cross

Three Steering Committee sessions were held over the course of the 2006 calendar year:

- 1) Introduction & Overview: 17 January 2006
- 2) Hazard Risk Assessment: 3rd March 2006
- 3) Goals & Action Items: 13 July 2006

Through raising awareness and citizen involvement, the Committee’s end goal is to make hazard mitigation a part of the community’s routine decision-making process.

How is the Plan Organized?

Each section of the mitigation plan provides specific information and resources to assist readers in understanding the hazard-specific issues facing Wasco County citizens, businesses, and the environment. Combined, the sections work together to create a mitigation plan that furthers the community’s mission “...to protect life, property and the environment through coordination and cooperation among public and private partners, which will reduce risk and loss, and enhance the quality of life for the people of Wasco County . This plan structure enables stakeholders to use the section(s) of interest to them.

Section 1: Introduction

The Introduction briefly describes the County’s mitigation planning efforts and the methodology used to develop the plan. It also includes information about the steering committee’s role, and how stakeholders provided input.

Section 2: Community Profile

The Community Profile briefly describes the County in terms of demographic, economic, and development trends as well as geography and environment, housing and transportation. The Community Profile also documents existing plans, policies, and programs, as well as completed mitigation activities.

Section 3: Risk Assessment Summary

This section describes the risk assessment process and summarizes the best available local hazard data. It is organized according to the federal requirements for a risk assessment: hazard identification; profiling hazard events; and vulnerability assessment/inventorying assets.

Section 4: Mitigation Plan Goals and Action Items

This describes the plan components which guide implementation of the identified mitigation strategies. This section also documents the plan vision, mission, goals, objectives, and actions.

Section 5: Plan Maintenance

This section provides information on the implementation and maintenance of the plan. It describes the process for prioritizing projects, and includes a suggested list of tasks for updating the plan to be completed at the annual and 5-Year review meetings.

Hazard Specific Annexes

The purpose of the hazard specific annexes is to provide additional resources and documentation of the hazard. The hazard annex consists of the regional risk assessments from the State Natural Hazard Mitigation Plan as well as the hazard chapters from the Technical Resource Guide. The State regional risk assessments include information on hazard characteristics, hazard history, probability, and vulnerability. The Technical Resource Guide chapters provide hazard specific information on a statewide basis for the following topics: hazard history, hazard type and characteristics, hazard identification, hazard related legal issues, mitigation examples and best practices, and resources. Where extensive local data is available beyond the scope of information provided in Section 3, the additional local data is located in the annex. The hazard specific annexes included with this plan are the following:

- Earthquake;
- Flood;
- Landslide/Debris Flow;
- Volcanic Event;
- Wildfire;
- Drought;
- and Severe Storm (Windstorm and Winter Storm)

In addition to the State Risk Assessment and Technical Resource Guide information, the Earthquake Annex includes a seismic risk assessment report provided by DOGAMI.

Resource Appendices

The resource appendices are designed to provide users of the Wasco County Natural Hazards Mitigation Plan with additional information to assist them in understanding the contents of the mitigation plan, and provide them with potential resources to assist with plan implementation.

A: Public Process

This appendix outlines the public involvement process in great detail. It serves (1) to document how the public was involved in the development of this plan, and (2) as a starting point for future public outreach methods.

B: Resource Directory

This appendix provides a one-stop listing for hazard related resources to assist the County in planning and preparation for hazard events.

C: Regional Household Preparedness Survey

This appendix includes the survey instrument and results from the household preparedness survey implemented by ONHW throughout the region. The survey aims to gauge household knowledge of mitigation tools and techniques to assist in reducing the risk and loss from natural hazards, as well as assessing household disaster preparedness.

D: Economic Analysis of Natural Hazard Mitigation Projects

This appendix describes the Federal Emergency Management Agency's (FEMA) requirements for benefit cost analysis in natural hazards mitigation, as well as various approaches for conducting economic analysis of proposed mitigation activities.

E: Existing Plans & Programs

This appendix summarizes the existing plans, policies and programs in Wasco County. The first section covers plans and policies on the books for the County and the second section covers social service providers.

F: Mitigation Tools

This appendix summarizes the mitigation tools provided by the Oregon Natural Hazards Workgroup (ONHW) website:

<http://www.oregonshowcase.org/index.cfm?mode=resources>

G: List of Acronyms

This appendix provides a list of acronyms for county, regional, state and federal agencies and organization that may be referred to within the Wasco County Natural Hazards Mitigation Plan.

ⁱ More information on the Oregon Natural Hazards Workgroup can be found at <http://darkwing.uoregon.edu/~onhw>

Section II:

Community Profile

This section provides information on the characteristics of Wasco County in terms of demographic, economic, and development trends as well as geography and environment, housing and transportation. Many of these community characteristics can affect how natural hazards impact communities, and can affect how communities choose to plan for natural hazard mitigation. Considering these characteristics during the planning process can assist in identifying appropriate measures for natural hazard mitigation.

Why Plan for Hazards in Wasco County?

Natural hazards cut across all aspects of the community: citizens and their property, business and the economy, recreational resources and the natural environment. Current trends indicate a continued influx of people, business and tourists into Wasco County. This continued influx of people and business places further strain on an already overburdened emergency services operation. In order to appropriately combat the risk that natural disasters pose, it is most pertinent to plan in advance and reduce risk through mitigation efforts.

By identifying and assessing hazard risk and county vulnerability, relevant mitigation strategies can be developed to reduce the impact of natural disasters. This effort requires fine tuned coordination amongst residents, businesses, non-profit agencies, and federal, state and local governments. A successful mitigation plan is one that pools resources from these parties in developing mitigation strategies and actions that reduce risk while also guaranteeing continued public awareness and involvement.

Geography & Environment

Wasco County lies east of the Cascade Range along the Columbia River. It is bounded on the west by the forests of Mt. Hood National Forest, on the north by the Columbia River, and on the east by the Deschutes and John Day Rivers.

Steep rolling hills and sharp cliffs and canyons are characteristic landforms in Wasco County. Elevations vary from 5,700 feet at Flag Point in the western part of the county to 150 feet on the Columbia River. From the higher elevations of the Cascade Range, a general slope occurs to the north and east. Tributary streams dissect steep canyons as they make their way to the Columbia, Deschutes and John Day Rivers.

A large portion of the southern half of the county is comprised of the Warm Springs Indian Reservation.

Source: Wasco County Comprehensive Land Use Plan

Climate

Wasco County lies in a transitional zone between western and eastern Oregon climates. Maritime air patterns are characteristic of western Oregon, while the drier continental air patterns dominate eastern Oregon. The Cascade Mountain Range forms a barrier which creates the climatic difference. The transition between these two major climates can be evidenced within the county.

Over-all, the climate in Wasco County is temperate and semi-arid. Low annual precipitation, low winter temperatures, and high summer temperatures are typical. Seasonal differences in temperature are greater than daily changes. Extremes of temperature most often occur when a continental air mass dominates the area with an east wind.

Source: Wasco County Comprehensive Land Use Plan

Month	Temperature Range (F)			Precipitation
	Min	Max	Mean	Inches
January	29	41	35	2.62
March	37	57	47	1.2
May	49	73	61	0.54
July	60	87	74	0.18
September	51	80	65	0.48
November	35	50	43	2.03

Source: National Weather Service

Topography

The county's rolling topography makes local differences in wind patterns. Highly unstable climatic conditions are found in the Columbia Gorge and nearby areas. The contact between continental and maritime air masses produces strong wind patterns. Prevailing winds are north-westerly in summer and northeasterly in winter. Winds are less dominant away from the Columbia Gorge. Western Wasco County is generally protected from winds by mountains in the west.

The topography of the county forms microclimates. The higher portions of rolling hills have higher soil temperatures because they are exposed to the sun and drying winds. The creek bottoms and canyons have lower soil temperatures and retain a greater amount of moisture. Differences in microclimates can be seen in the changes of vegetation. Trees and bushes are found in the canyons, while bunchgrass dominates the tops of rolling hills.

Source: Wasco County Comprehensive Land Use Plan

Rivers

Wasco County lies within three major drainage basins, the Hood, Deschutes River and John Day River Basins. The major rivers which drain these areas include the Columbia, Deschutes and John Day Rivers.

Stream flows are rapid during early winter rain-storms, before the heavy snowfall and freezing conditions prevail. This is the case with all streams in the county. Spring run-off due to snow melt greatly increases stream flow.

The Deschutes and John Day Rivers, as with most streams that drain arid basins, are subject to extreme flow variations. The John Day River has had periods when no flow was recorded. Seasonal variations are quite pronounced. The high water months normally are March, April, May, and June during snow melt.

Source: Wasco County Comprehensive Land Use Plan

Minerals & Soils

The soils in Wasco County have formed in a variety of parent materials. In the northeastern part of the county, soils have developed from loess deposits. These deposits range from a few inches to more than fifteen feet in thickness. In a southerly direction, the deposits become finer textured and thinner. Where a thin deposit of loess occurs, the soils developed from a mixture of loess and basalt. In the western part of the area, soils have developed from volcanic ash deposited over sediments. Soils in the southern part of the area have developed in fine textured sediments. These soils are predominantly fine textured with high percentages of coarse fragments. Water deposited soils formed in recent alluvium also occur along the major drainages in the county. Small amounts of volcanic ash occur throughout the county.

Source: Wasco County Comprehensive Land Use Plan

Population & Demographics

The county of Wasco was organized by the territorial legislature in 1854. This 250,000 square mile county, the largest ever established in the United States, has since been pared to its current size of 2,387 sq. miles. Wasco County is home to 23,791 residents, an increase of 2,108 residents since the 1990 census.

Wasco County residents have historically lived close to their place of employment. Areas in the south of the county have traditionally relied upon agriculture and natural resources, leading to a creation of a number of small cities and unincorporated communities. The city of the Dalles along the Columbia River in the north part of the county has remained the historical seat of county government as well as the county's transportation and economic hub. The Dalles is Wasco County's largest and highest density population center.

Wasco County Population Trends

In 2000, the population of Wasco County was 23,791 representing an increase of 8% since 1990. This growth pattern in the county, according to the Oregon Office of Economic Analysis, is projected to continue to grow at a moderate rate over the next 20 years.

Table 2.1 Wasco County Population, Incorporated & Unincorporated

Year	Incorporated	Unincorporated	Total
1990	12,308	9,375	21,683
2000	13,650	10,141	23,791

Source: US Census Bureau

Roughly 51% of Wasco County's population resides in the City of the Dalles. Since 1990 the city has seen population increase of 9%. Mosier, population 410, is the county's fastest growing city with a 68% increase in population since 1990. Dufur is the county's second largest city, but has seen little growth over the last decade

Table 2.2 Wasco County Incorporated Cities

City	2000 Population	1990 Population	% Change
Antelope	59	34	73.5
City of The Dalles	12,156	11,060	10.3
Dufur	588	527	11.5
Maupin	411	456	-9.8
Mosier	410	244	68.0
Shaniko	26	26	0.0

Source: US Census Bureau

Table 2.3 Wasco County Unincorporated Areas

City	2000 Population	1990 Population	% Change
Chenoweth CDP	3,412	3,246	9.5
Pine Grove CDP	162	N/A	N/A
Pine Hollow CDP	424	N/A	N/A
Rowena CDP	148	N/A	N/A
Tygh Valley CDP	224	N/A	N/A
Wamic CDP	36	N/A	N/A

Source: US Census Bureau

Recent increases in population have put pressures on emergency management agencies to increase their services without a parallel increase in human resources. This widening gap between the ratio of residents to responders can affect response times and overall quality of service provided. In addition, population increase has created a segment of the population that may be uninformed of hazards in the county and unprepared in the event of emergency.

Population growth in smaller unincorporated areas also presents challenges in communication and location logistics, as well as ensuring that areas without established full-time or volunteer emergency service agencies can respond.

More generally, population growth county-wide increases the risk of hazards due to human activity which, for example, may ignite wildfire. Likewise, vulnerability increases with new and higher density developments, in Maupin for example, that can impact runoff, drainage and changes in vegetation culminating in an increased risk to floods and landslides.

Vulnerable Populations

Vulnerable populations are those groups that possess specific characteristics that inhibit their ability to prepare for, respond to, or recover from a disaster. These characteristics include physical and developmental disabilities, mental illness, poverty, old age, or an inability to speak or understand English. These groups are more heavily impacted because they may lack the necessary knowledge, skills, social support structures, or the mental and physical abilities necessary to take care of themselves. Historically, vulnerable populations present a special challenge to emergency managers and response agencies and they are more likely to be victims of a disaster.

Source: Wasco County HIVA

The impact in terms of loss and the ability to recover vary among population groups following a disaster. Historically, 80% of the disaster burden falls on the public. Of this number, a disproportionate burden is placed upon special needs groups, particularly minorities, and the poor.

Source: OR-SNHRA: (Region 5) Mid-Columbia

Low Income

Roughly 13% of the county's total population is living in poverty. Seniors over the age of 62 account for nearly one fifth (19.4%) of the total population. Nationwide, as the baby boomer generation enters their 60's the senior population is expected to dramatically increase.

Table 2.4 Wasco County Population by Poverty Status in 1999

Group	Number Below Poverty Level	Percent Below Poverty Level
Families	674	10.3
- with related children under 5 years	244	19.2
Families with female householder, no husband present	319	35.8
- with related children under 5 years	129	46.9
Individuals	3,023	12.9
- related children 5 to 17 years	754	17.1
- 65 years and over	275	7.3

Source: US Census Bureau

Not having sufficient financial resources during and after a disaster can be a great disadvantage. Lower income people are more likely to live in mobile homes or other homes that are less able to resist damage from flooding, windstorms, and severe weather. Low-income people tend to have the greatest difficulty recovering from a disaster. According to 1999 estimates, approximately 12.9% of the total population have income below the national poverty level.

Source: Wasco County HIVA

Elderly

Table 2.5 Wasco County Population by Seniors

Group	Number	Percent
55-59	1,309	5.5
62 years and over	4,604	19.4
65 years and over	3,965	16.7

Source: US Census Bureau

16.7% of Wasco County's population is comprised of seniors over the age of 65, with 7.3% are living in poverty. Seniors present a significant challenge in the event of disaster due to their large numbers and special needs. Currently there is no comprehensive, easily accessible database for locating and servicing seniors in the event of disaster. Information is scattered about hospital records, Health Department, and is generally difficult to access due to privacy issues.

Non-English Speaking & Special Cultural Characteristics

According to the 2000 census estimates, approximately 10.5% of the Wasco County population over the age of 5 speak a language other than English at home.

Table 2.6 Population by Ethnic Group

County	Hispanic/Latino	Asian	African American	Native American	Total
Wasco	9%	1%	< 1%	4%	14%

Source: US Census Bureau

A lack of ability to speak or read the English language can present a challenge to emergency managers, since instructions for self-protective action and general disaster information is usually provided only in English. The non-English speaking population would be uninformed unless they have assistance from friends or services providers who may provide them with instruction and information in English. In certain areas of Wasco County it may be advisable for emergency managers and emergency response agencies to arrange for translation of instruction and information into different languages.

Source: Wasco County HIVA

Transient Populations

The transient population includes those who do not have a permanent residence in Wasco County.

Tourists are particularly vulnerable to disasters. This is because tourists are usually unfamiliar with the hazards in the region and because they do not have the knowledge or the materials needed to take care of themselves in a disaster. For example, a typical tourist, unfamiliar with Wasco County, may have difficulty using evacuation routes, or finding shelters. A light traveling tourist would also not have their own supply of food, water, flashlights, radios, and other supplies that locals can use to take care of themselves in a disaster. And finally, tourists usually do not have a local support structure of family, friends, and neighbors that most of us rely on.

Due to its proximity to the Columbia River and the cities, rivers and mountains of central Oregon, Wasco County is considered a major Northwest tourist destination.

Source: Wasco County HIVA

Disabled

Physically Disabled - According to 2000 census, 4,299 Wasco County citizens has a mobility limitation. These disabilities may or may not be permanent.

Developmentally Disabled - According to national prevalence formulas approximately 1% of the Wasco County Population or 204 residents (2000) have a developmental disability. A developmental disability is defined as a disability that is attributable to mental retardation, cerebral palsy, epilepsy, autism, or any neurological or other condition closely related to mental retardation.

There is a wide variation in the vulnerability of the developmentally disabled population in Wasco County. Some developmentally disabled individuals may have strong support structures and a high level of care provided to them by friends, neighbors, and care providers. Others may not have such a high level of support. Some individuals may be largely self-reliant. Some may have other disabilities in addition to their developmental disabilities. 10% of the developmentally disabled population is wheelchair bound and approximately 2% of the county population or 476 residents (2000) suffer from a mental illness.

Source: Wasco County HIVA

Mentally Ill

Disaster conditions can aggravate the symptoms of those who suffer from mental illness. The mentally ill tend to be very sensitive to changes in their environment. There is case studies of this phenomenon from Clark County, Washington. During the Mt. St. Helens eruption disaster several individuals incorporated the fall of ash into their delusional symptoms. There was a marked increase in the caseload for mental health crisis services at the Columbia River Mental Health Services. During the February 1996 floods several mental health patients were hospitalized as a result of increased stress due to relocation, forgetting to take their medications when evacuated, and increased anxiety. Another important consideration is the ability of disaster conditions to cause mental illness. It is estimated that 10% of disaster victims can develop mental health problems, including depression, and substance abuse.

Source: Wasco County HIVA

Land and Development

Wasco County’s Comprehensive Land Use Plan was last formally acknowledged by Oregon’s Land Conservation and Development Commission (L.C.D.C.) in 1984, with subsequent minor additions and revisions since. The plan demonstrates knowledge of the intent of land use planning and L.C.D.C.’s Goals and Guidelines.

The intent of the plan is to establish a single, coordinated set of policies which will act to provide for orderly development of Wasco County. These policies give direction to planning, establish priorities for action, serve as a basis for future decisions, provide a standard by which progress can be measured, and promote a sense of community for an improved quality of life. It also helps all levels of government and private enterprise to understand the wants and needs of Wasco County citizens.

The south county remains steeped in its agricultural and recreational heritage, and land use is dominated by those processes. In north county, industry, commercial and residential activities are concentrated within the City of The Dalles. State law requires that cities and the county jointly manage the Urban Growth Areas, delineated by a city’s Urban Growth Boundary (UGB) which identifies lands needed to meet population and economic demands for growth within a 20-year period.

Source: Wasco County Comprehensive Land Use Plan

Table 2.7 Estimated Demand for Employment in the Dalles UGB by Land Use Type 2006-2056

Land Use Type	Growth	Employment Growth No Demand for Land	Employment Growth for Land Demand	Employment per Net Acre Assumption	Land Demand (net acres)	Land Demand (gross acres)
Retail & Services	5,257	526	4,731	18	262.8	350.4
Industrial	1,891	189	1,702	10	170.3	227.0
Government	1,247	125	1,122	12	93.5	124.7
Total	8,395	840	7,556		526.6	702.1

Source: ECONorhtwest Preliminary Employment Forecast and Land Needs

Housing and Community Development

Wasco County, favorably set along the scenic Columbia River Gorge in the north, has been able to maintain a rural character that is attractive because of its historical significance along the Oregon Trail and its outdoor recreational resources. As development has pushed eastwards from Portland, the City of The Dalles has already seen increased interest in business and residential development marked by the arrival of Google and Home Depot, and proposed mixed-use development along the river. In the next 20 years development currently centered in The Dalles is expected to push southward into the more rural core of Wasco County.

Table 2.8 Wasco County Housing Units by Type

Single Family	Multi-Family	Mobile Homes	Boat/RV/Van, etc
63%	15%	21%	1%

Source: US Census Bureau

From 1990-2000 1,480 new housing units were built, a 22% increase from the 1980s. Currently 88.8% of housing units are occupied, with 5.7% reserved for seasonal or recreational use. The number of recreational and seasonal homes is expected to rise within the next 20-year period. The median value of housing in Wasco County is \$105,500.

Table 2.9 Year Structure Built

Pre 1959	1960-1979	1980 – 2000
44%	31%	25%

Source: US Census Bureau

Housing development types and year-built dates are important factors in mitigation planning. Housing types that warrant special attention tend to be of older make or of less sturdy material (mobile homes for example). Older homes tend to be at greater risk of damage since stricter building codes were not established in the Northwest until the late 1960s. 44.2% of Wasco County structures were built before 1960.

Source: OR-SNHRA: (Region 5) Mid-Columbia

Median household income can be used as an indicator for the strength of a region's economic stability. Median household income can be used to compare economic areas as a whole, but does not reflect how the income is divided among area residents. The median household income for Wasco County is \$35,959, which is below the national average of \$41,433 and the state's average of \$40,916.

Source: U.S. Bureau of the Census, Profile of Economic Characteristics 2000.

The City of the Dalles and Wasco County are currently in the process of updating the Urban Growth Boundary. Though no study has yet been done, projected development in the County is likely to see higher density development in many of the incorporated cities, e.g. The Dalles and Mosier, while lower density single family dwellings in unincorporated areas with mobile home development concentrated in park facilities. The recreational areas, Sportsman's Park for example, are likely to see concentrated high density development for seasonal populations.

Employment and Industry

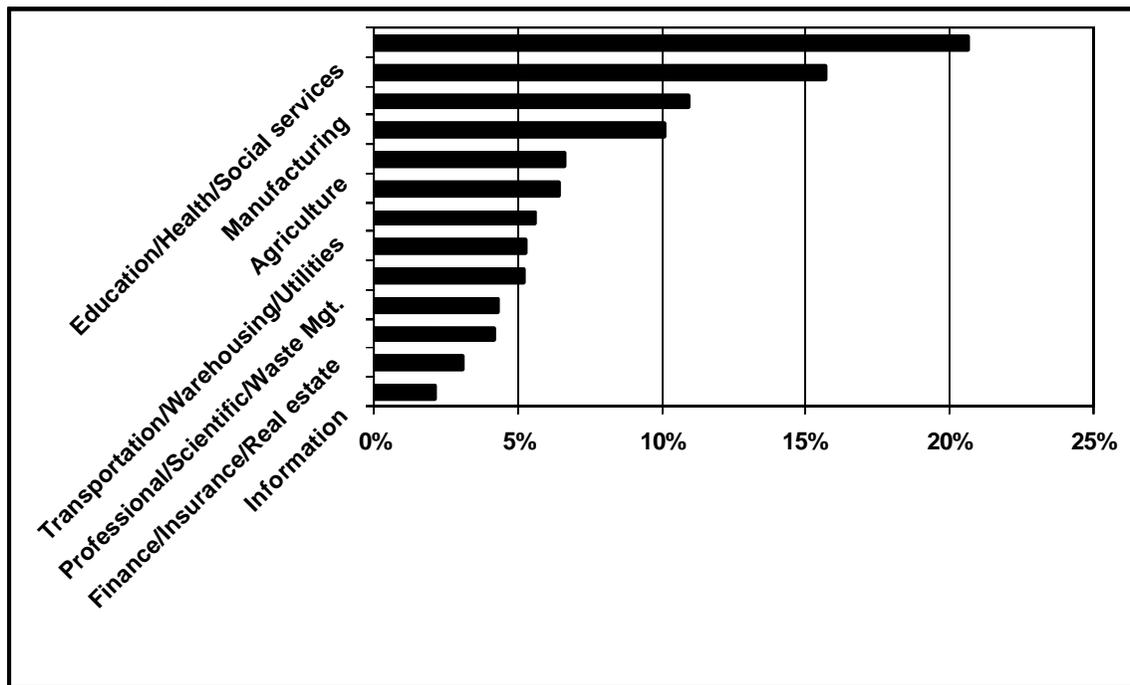
The county's economy is based upon agriculture (orchards, wheat farming, livestock ranching), lumber, manufacturing, electric power, transportation, and tourism. Aluminum production was once a major support of the local economy, but electrical price fluctuations over the past two decades and a slump in global aluminum prices has forced the closing of a number of local aluminum factories. Recent trends indicate a shift towards a more service oriented economy anchored by small business, tourism and recreation. Retail trade and services are concentrated in the City of The Dalles.

Table 2.10 Wasco County Labor Force

Wasco County	1998	1999	2000	2001	2002	2003
Population	22,600	22,650	23,791	24,150	23,750	23,550
Labor Force	12,258	12,334	12,643	12,813	12,780	12,887
Total Employment	11,308	11,381	11,807	11,527	11,522	11,510
Unemployment	950	953	836	1,286	1,258	1,377
Unemployment Rate (%)	7.8	7.7	6.6	10.1	9.8	10.7
Annual Per Capita Personal Income (\$)	22,514	22,779	23,656	23,499	24,008	N/A
Number of Business Units	812	830	837	835	833	N/A

Sources: Oregon Employment Department; Center for Population Research & Census, PSU; Bureau of Economic Analysis; Oregon Tourism Commission; Oregon Department of Revenue; Oregon Economic and Community Development Department

Table 2.11 Employment by Industry



Source: US Census Bureau 2000

According to the Oregon Employment Department, the region has experienced economic problems due to the downturn in the lumber, wood products and aluminum industries during the 1990s.

The County's proximity to the Portland area, the Southern Pacific, Union Pacific and Burlington Northern railroad lines that run across the western edge of the region and Interstate 84 provide good opportunities for the transportation of manufactured and agricultural goods. In addition, the region's proximity to the Columbia River, the Cascade Mountains and the high desert terrain provide year-round sporting and tourism activities. Looking towards the future, healthcare, services, manufacturing, retail trade, tourism, agriculture and food products, construction, lumber and wood products will

continue to grow and develop to provide goods, services and work opportunities for area residents.

Source: OR-SNHRA: (Region 5) Mid-Columbia

Tourism and recreation are becoming increasingly popular in Wasco County. The City of the Dalles is situated along the Oregon’s main east-west corridor (I-84) which runs through the Columbia Gorge National Scenic Area, and is only 83.4 miles from the Portland metropolitan area. Heading southbound along US- 197, The Dalles is only 130 miles from the recreational hotspot of Bend.

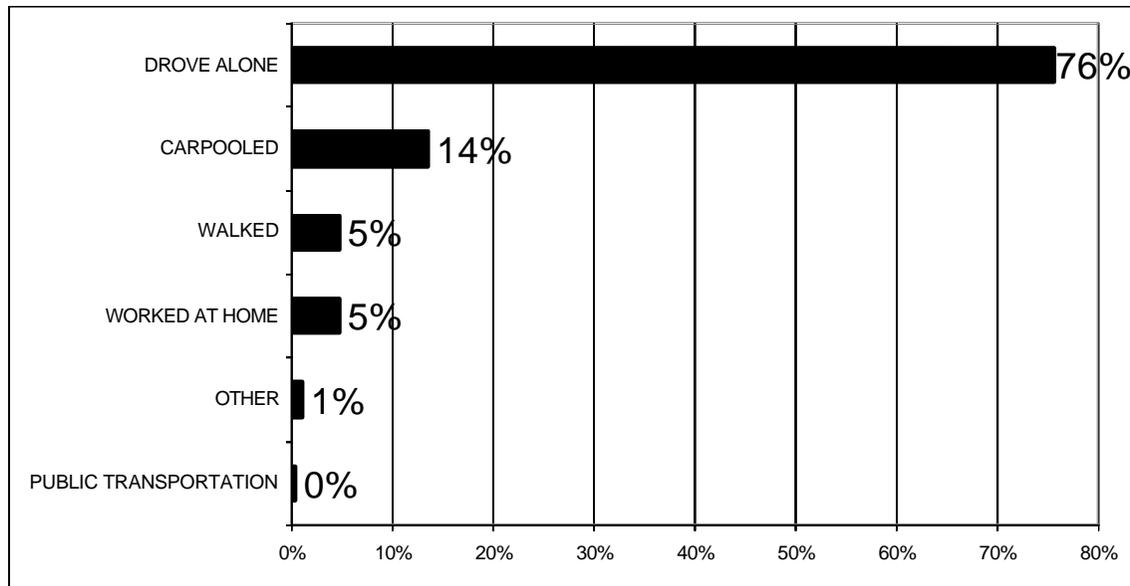
Transportation and Commuting Patterns

The automobile continues to dominate personal transportation within the county. Meanwhile, commercial products that are shipped to and from the County generally depend on truck, rail and water transport. Industry depends most heavily on rail transportation; forest products utilize trucks, while agricultural commodities depend on all three transportation modes.

Other transportation means in use in the County are commercial buses, Amtrak trains, The Dalles Municipal Airport located just across the Columbia River in Dallesport, and Senior Citizens buses. As populations and fuel prices increase, bicycles, mini-buses and commuter water travel may become more common forms of transportation.

Source: Wasco County Comprehensive Land Use Plan

Table 2.12 Commuting Patterns



Source: US Census Bureau 2000

The recent population growth in the area resulted in an increase of workers and automobiles and trucks on the roads. A high percentage of workers driving alone to work can cause traffic congestion, and accidents. The large increase of automobiles can place stress on roads, bridges and infrastructure within the cities, and also in rural areas where there are fewer transit roads. The impact of an emergency can disrupt automobile traffic

and shut down local transit systems across the area or region and make evacuations difficult. This is particularly important in this region, where hazardous materials are being transported along Interstate 84 and nearby railroad lines. In addition, weather related hazards, such as localized flooding can render roads unusable. A severe winter storm has the potential to disrupt the daily driving routine of thousands of people.

Source: OR-SNHRA: (Region 5) Mid-Columbia

Public Bridges, Highways and Roads

Most bridges are not seismically retrofitted, creating significant risk to the commuting population, particularly in an area that may be at risk for earthquakes. Incapacitated bridges can disrupt traffic and exacerbate economic losses because of the inability of industries to transport services and products to clients. The bridges in the region are part of the state and interstate highway and maintained by the Oregon Department of Transportation (see Table 2-13).

Source: OR-SNHRA: (Region 5) Mid-Columbia

Table 2.13 Bridges

State Hwy Bridges	County Hwy Bridges	City/Municipal	Historical	Covered	Total
104	113	4	0	0	221

Source: Oregon Department of Transportation.

The region’s major Expressway is Interstate 1-84 which runs east through Portland, on its way through the western edge of the Mid-Columbia region to eastern Oregon. Interstate 84 is the main transportation route for automobiles and trucks traveling from Oregon to the central and eastern states. Other state highways that service this region include US Routes 197 and 97 which runs south from The Dalles through Maupin in Wasco County.

Source: OR-SNHRA: (Region 5) Mid-Columbia

Critical Facilities and Infrastructure

Critical facilities are those facilities that are critical to government response and recovery activities (e.g., police and fire stations, public works facilities, sewer and water facilities, hospitals, bridges and roads, shelters, and more). Damaged facilities that could cause serious secondary impacts may also be considered critical.

Source: OR-SNHRA: (Region 5) Mid-Columbia

Table 2.14 Critical Facilities

# of Hospitals	# of Beds	Police Stations	Fire & Rescue Stations	School Districts & Colleges	Power Plants	# of Dams	Threat Potential
1	49	3	8	4 Districts; 1 Comm. College	0	9	4 high threat

Source: Oregon Department of Health, Local Sheriff Offices, Oregon Department of Education, Oregon Department of Energy, National Inventory of Dams.

Wasco County is served by the Oregon State Police Department and the Wasco County Sheriff's Office. The Dalles City Police Department provides services within the city limits.

The Wasco County Sheriff's Office has 13 deputies, one chief deputy, and a sheriff. Two of the deputies are assigned to the south part of Wasco County. The other 11 deputies are stationed in The Dalles and respond to calls any-where in the county. A majority of the Sheriff's Office work is around The Dalles area

There are six community sewer systems in the County. The Cities of Dufur, Maupin, Mosier and The Dalles each have a community sewer system. The rural unincorporated community of Wamic also has a community sewer system. The Sportsmen's Park subdivision has a community drainfield which services up to 180 lots.

The Northern Wasco County Sanitary Landfill is a privately owned facility and is the only sanitary landfill in the County. Various garbage collection services dump at the landfill.

The Dalles-Wasco County Library is the main facility in the County. Maupin, Mosier and Dufur each have small public libraries.

Source: Wasco County Comprehensive Land Use Plan

The County Courthouse located in Downtown The Dalles houses many of the administrative offices for Wasco County including the Sheriff as well as space for public hearings. The Courthouse also includes administrative offices for the State Courts. The Wasco County 911 Office is located at an undisclosed location nearby.

Historic and Cultural Resources

Historic and cultural resources such as historic structures and landmarks can help to define a community and may also be sources of tourism dollars. Because of their role in defining and supporting the community, protecting these resources from the impact of disasters is important

Environmental Assets

The major tourist attraction in the County is the Columbia River Gorge. Old Columbia River Road, Interstate 84, port dock facilities, parks and view points provide scenic and recreational facilities along the south side of the, Columbia River.

The Deschutes River provides a variety of water related recreational activities such as fishing, boating, camping and sight seeing. These major tourist attractions contribute to the local economy of Wasco County.

Source: Wasco County Comprehensive Land Use Plan

Fisheries habitats include the Columbia River, back-water ponds of the Columbia River, Fifteenmile Creek Drainage, the Deschutes River, Deschutes River Tributaries and lakes and reservoirs. The Columbia River is considered to be the single greatest fisheries

resource in the Pacific Northwest. The high quality water and stable flows provide optimum conditions for good fish populations, particularly Salmon.

The rivers of Wasco County are home to the north western most run of genetically pure Steelhead. As further development, erosion and floods contribute to a loss of habitat, Steelhead are becoming increasingly threatened. Infrastructure deficiencies in a lack of natural bottom culverts for roads along streams form a challenge to the migratory runs.

Celilo Falls, though currently underwater since the construction of the Dalles Dam, was the historically epicenter of trade for Native American Indian populations and one of the oldest continual use sites in North America.

Historic Assets

The following appear on the National Register of Historic Places:

Barlow Road

Roughly, N of Salmon and White Rivers from Rhododendron to SW of Wamic, Mt. Hood NF, Wamic
(61940 acres)

Columbia River Highway Historic District

Roughly bounded by the Sandy River Bridge, Troutdale, Multnomah County on the West, the Chenoweth Creek Bridge, etc., Mosier
(5290 acres, 38 structures)

Trevitt's Addition Historic District

Roughly bounded by 2nd, Liberty and 6th Sts. and Mill Cr., The Dalles
(250 acres, 51 buildings, 2 structures, 1 object)

The Dalles Commercial Historic District

Roughly bounded by Columbia River, Laughlin, Fifth, and Union Sts., The Dalles
(345 acres, 45 buildings, 1 object)

Imperial Stock Ranch Headquarters Complex

Hinton Rd. 3 mi. E of jct. with Bakeoven Rd., Shaniko
(202 acres, 5 buildings, 7 structures, 4 objects)

Shaniko Historic District

US 97 and OR 218, Shaniko
(334 acres, 18 buildings, 2 structures)

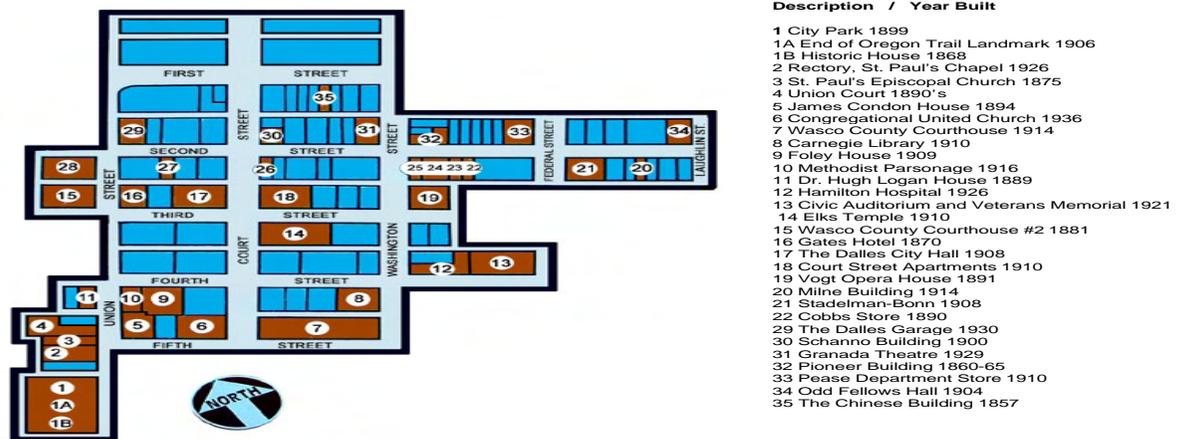
Source: National Register of Historic Places

Cultural Assets

Historic Downtown The Dalles is the current cultural and economic center of the county. Due to increased interest in the County, the downtown is expected to undergo rapid in-

fill, redevelopment and gentrification in the coming years. The downtown is also home to numerous historic and culturally relevant buildings.

Figure 2.1 Historic Downtown The Dalles



The Columbia Gorge Discovery Center is the official interpretive center for the Columbia River Gorge National Scenic Area. Historical research at the Columbia Gorge Discovery Center touches many areas of interest, including Lewis and Clark archaeology, local land settlement, Rock Fort, historic Fort Dalles and steamboats on western rivers. Also part of the Center, The Wasco County Historical Museum is a 17,200 square foot exhibit wing which tells the stories of the people of Wasco County past and present while the Dick Library has 2,000 volumes on local and regional history. Genealogy files, including genealogic history.

Source: <http://www.gorgediscovery.org/>

Rock Fort (Fort Rock) Lewis & Clark Campsite is located on 1st Street on the Port of The Dalles. The site is northeast of Webber and 2nd Street. Here Lewis & Clark and the Corps of Discovery camped on both legs of their journey; October 1805, and again in April 1806. While in The Dalles, Lewis & Clark encountered the largest gathering of indigenous peoples anywhere along their route and also saw the first homes made of wood since they left St Louis. Memorial plaque and interpretive signage located on site.

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)

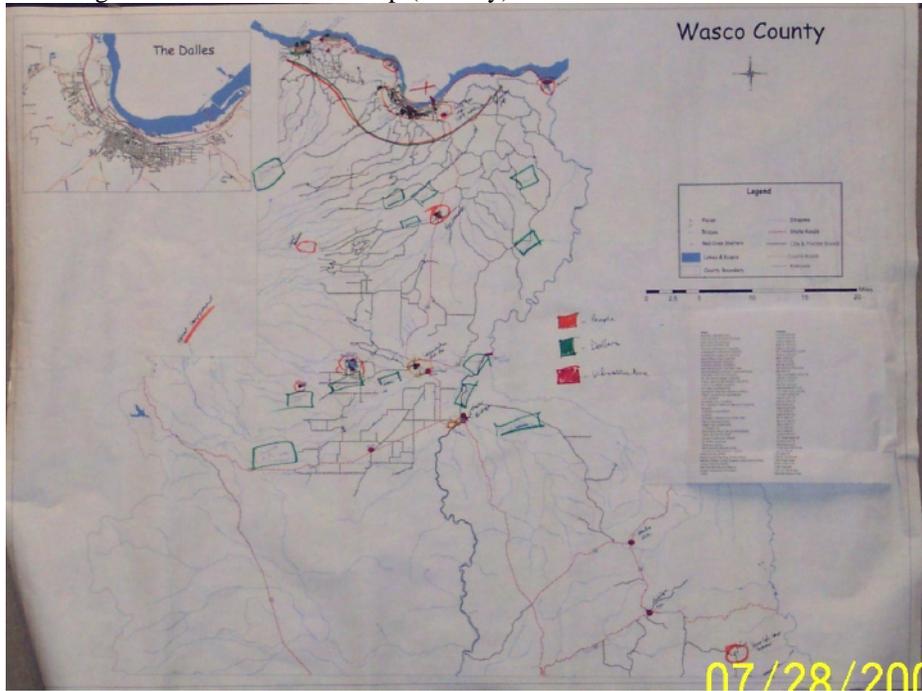
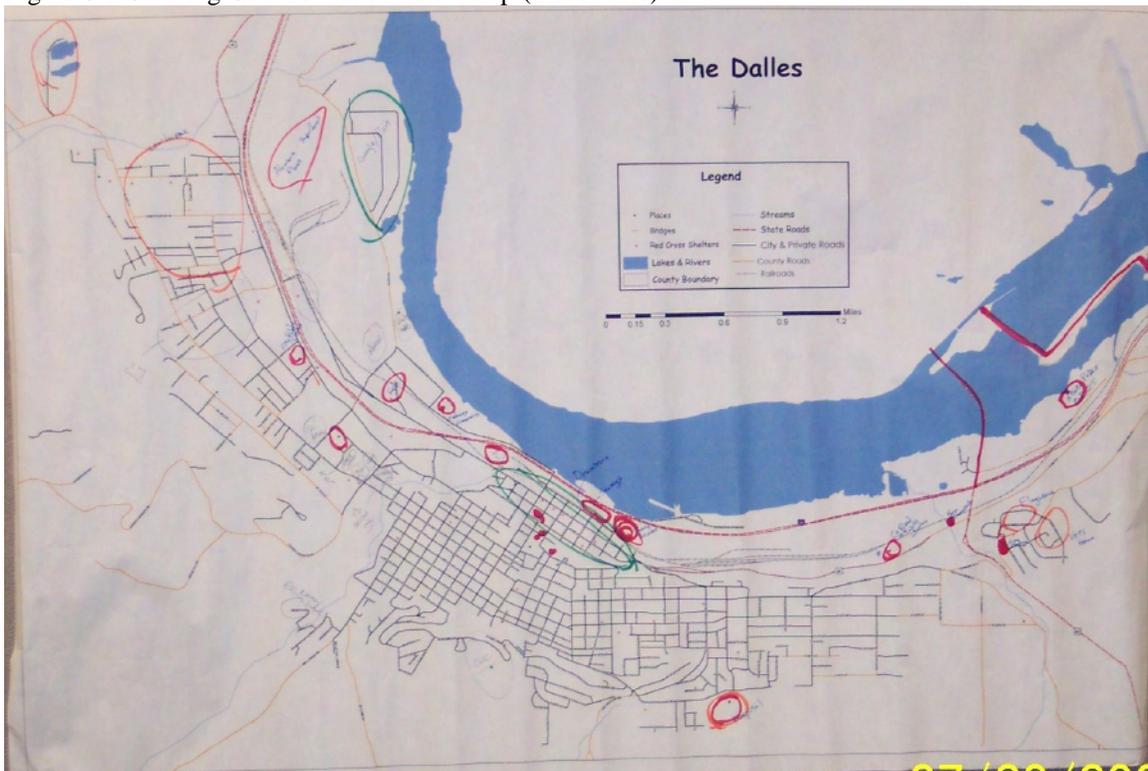


Figure 3.2 Steering Committee Exercise Map (The Dalles)



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.

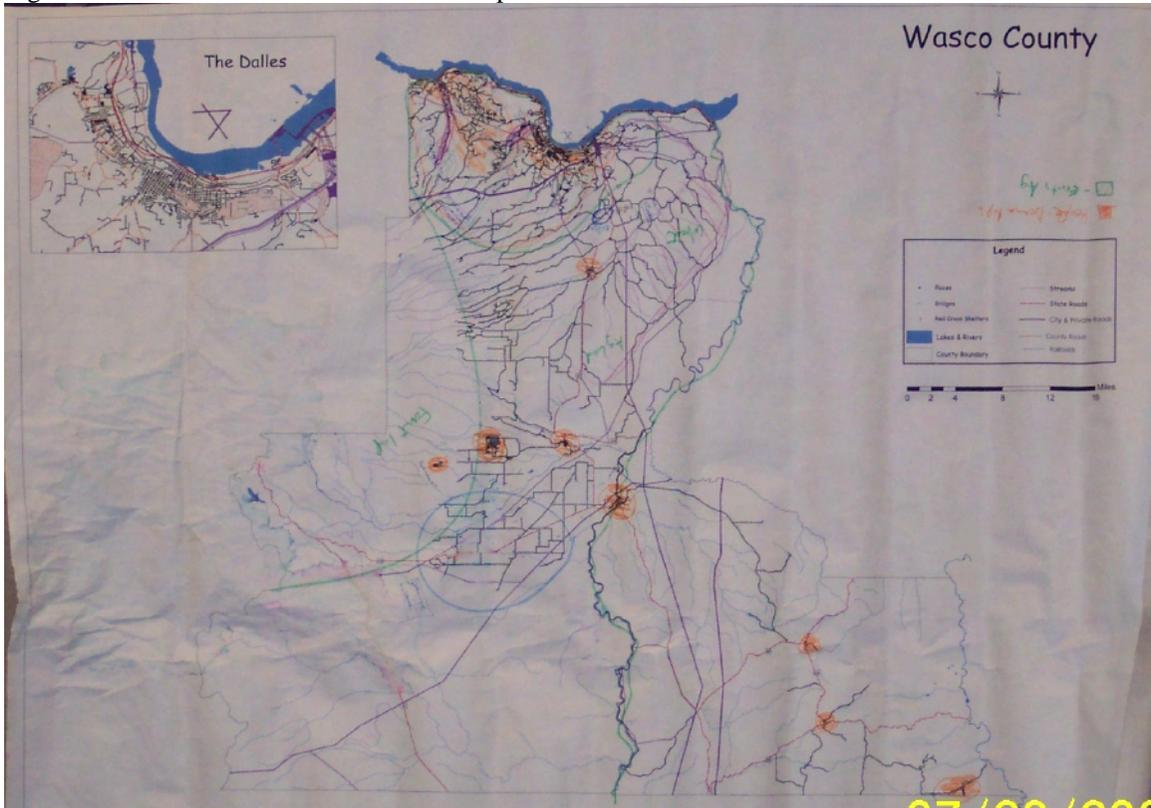
Action: Community asset identification exercise.

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	2 nd 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:

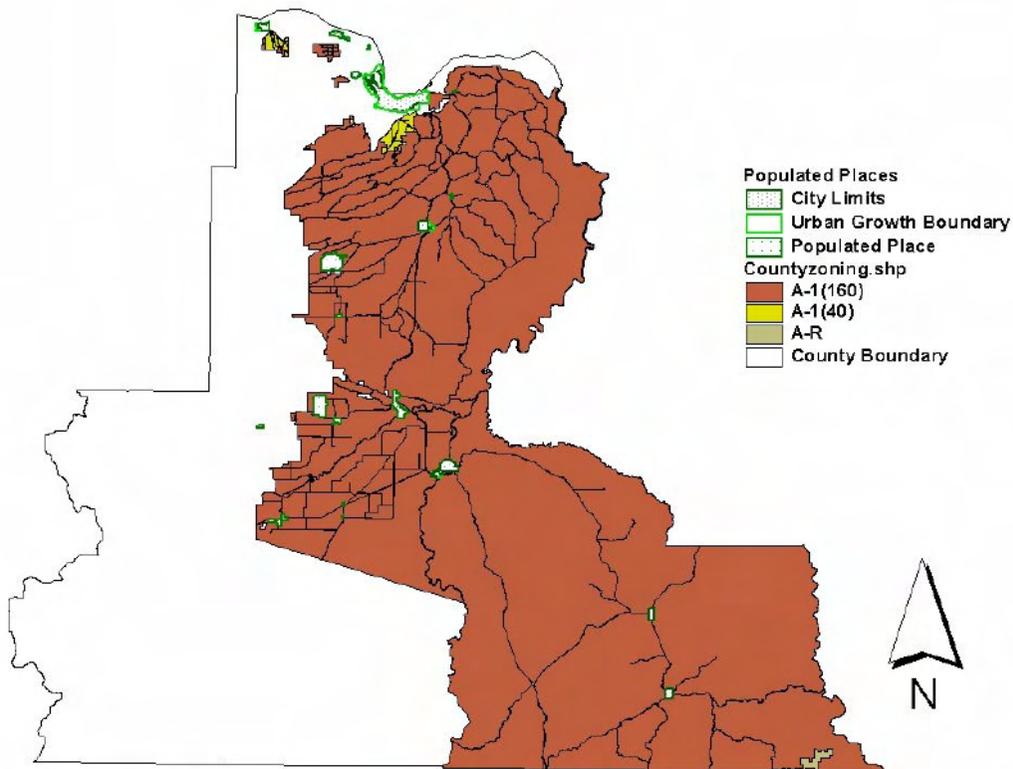
- Areas, the City of Mosier for example, relying upon wells have seen a reduction in groundwater supply

- 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 Summaryⁱ

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:

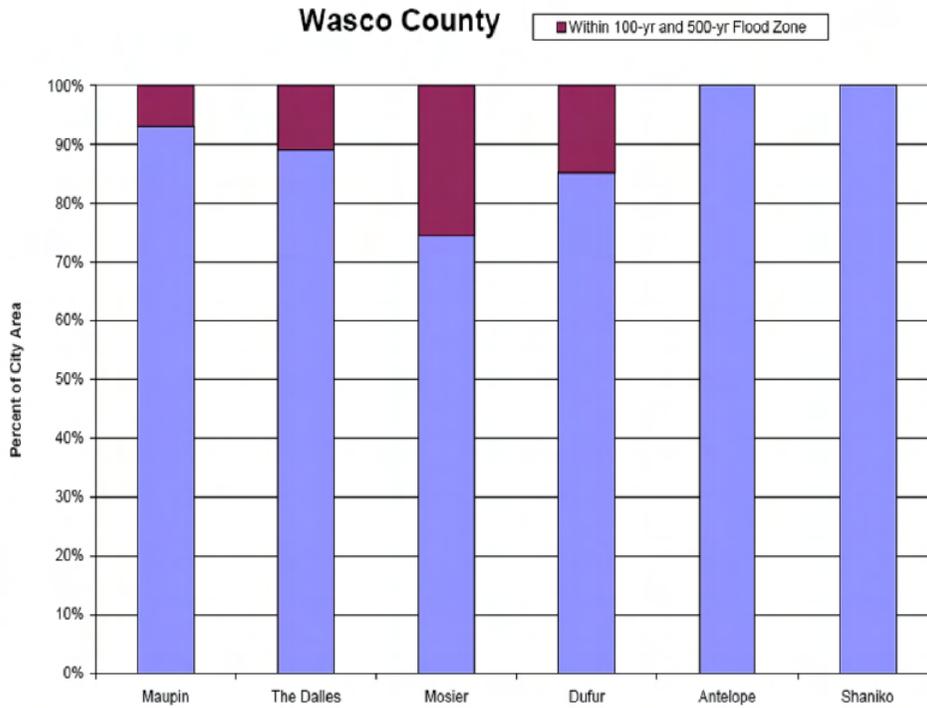
- Residents who live in flood plains face far greater risks than needed. These homeowners probably face greater financial liability than they realize. During a 30-year mortgage period, a home in a mapped flood plain has about a 26 percent chance of being damaged by a 100 year-flood event. The same structure 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 of 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.

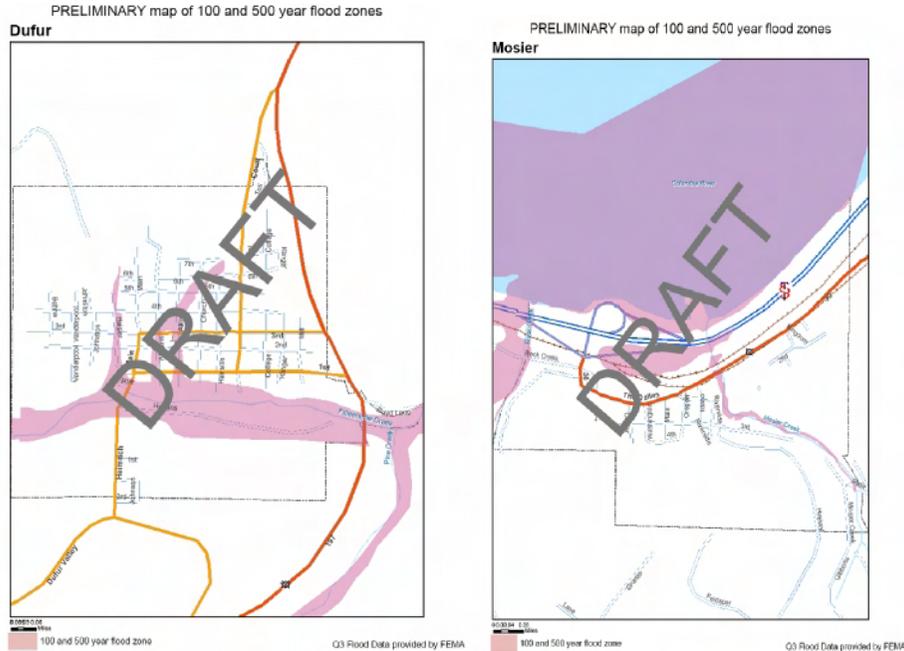
Figure 3.5 illustrates the percentage of cities' area within the flood zone. Maps of the flood zones for the County's two cities, Dufur and Mosier, with the highest percentage of area susceptible to flooding are shown in Figure 3.6.

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 December 1996 to February 1997 storms.

Conditions and Concerns

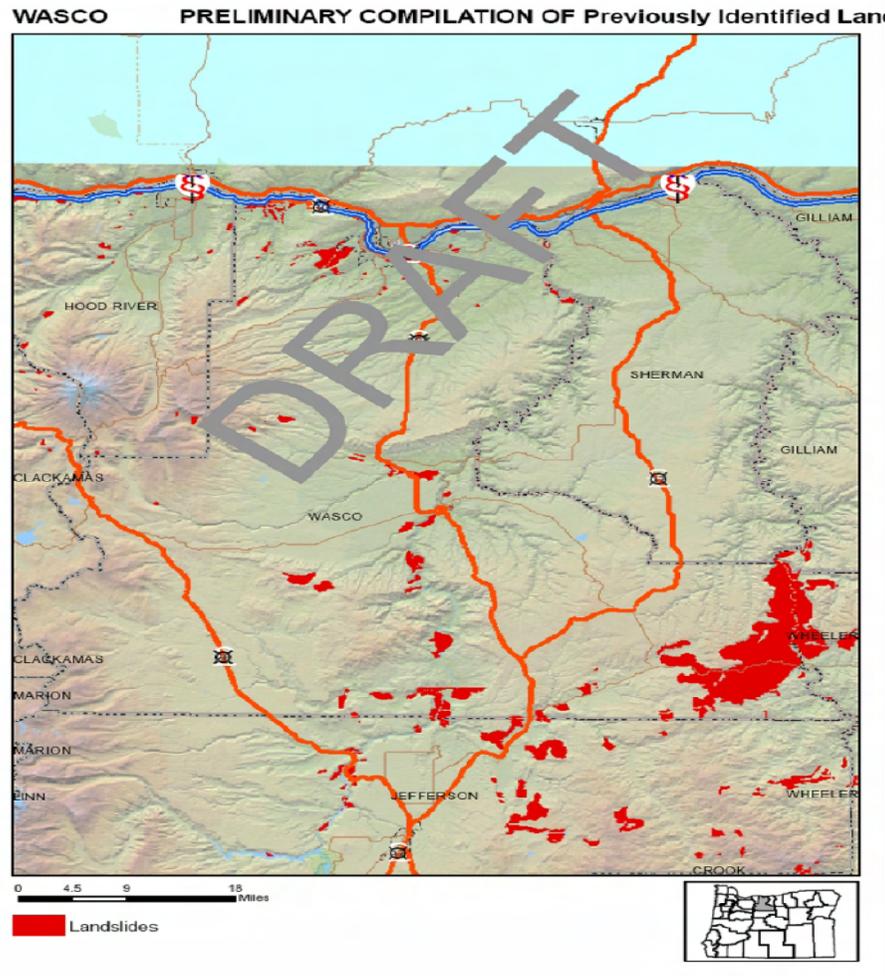
The following conditions and concerns are found in portions of the county which contribute to the landslide threat and potential for economic loss and environmental degradation

- 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.

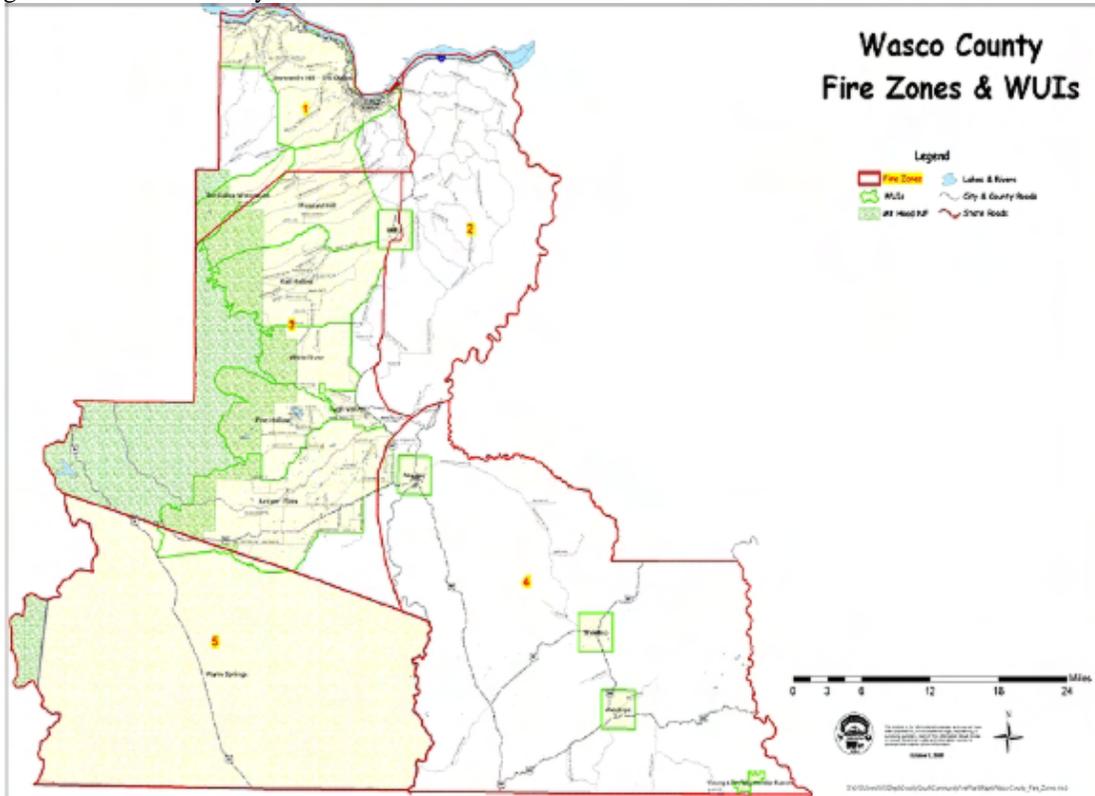
Table 3.4 Large Fires Reported in Wasco County

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 Warm Springs 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.

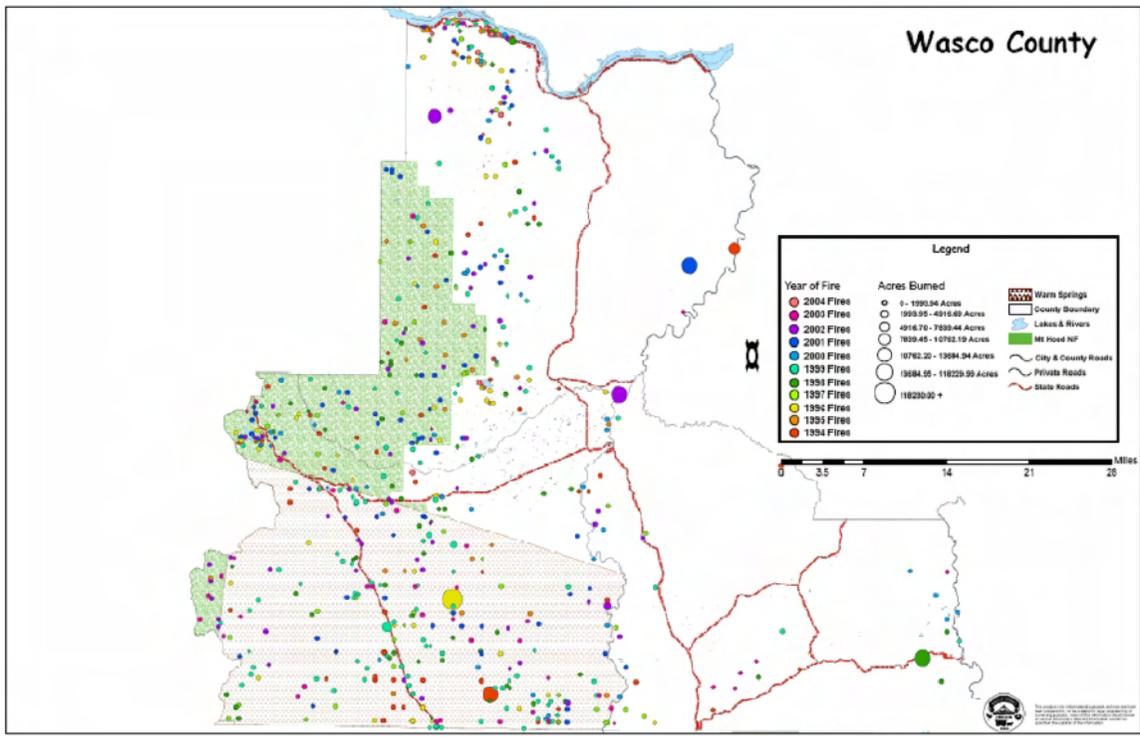
- Climatic and topographic conditions conducive for large wildfires: hot and dry conditions during the fire season throughout the county; frequent high winds along the Columbia River Gorge which can contribute to fast moving fires that are difficult to control; moderate to steep slopes in places like 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.

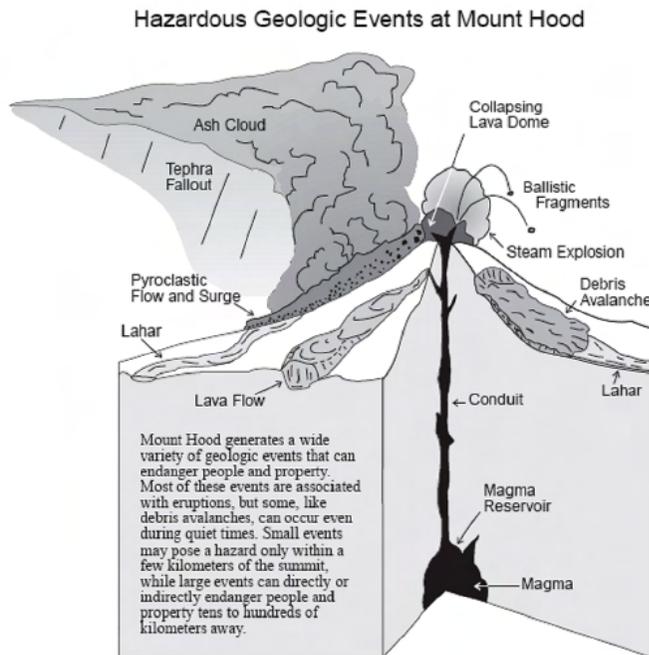
Overview

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

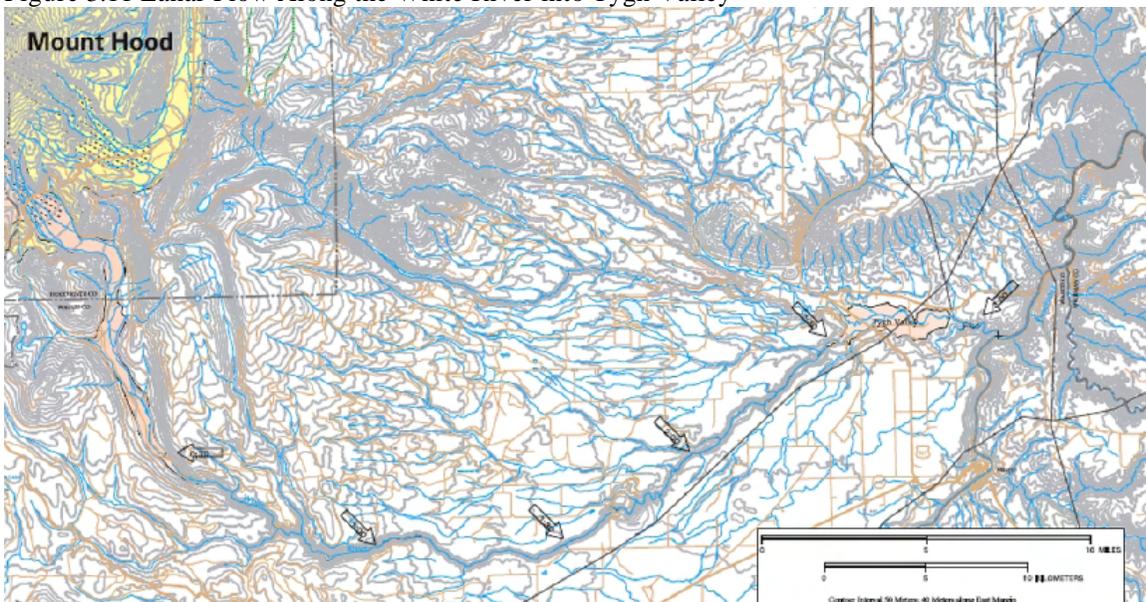
probability of extensive areas in Wasco County being affected by lahars is about ten times less.

- 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.

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 Watershed. 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

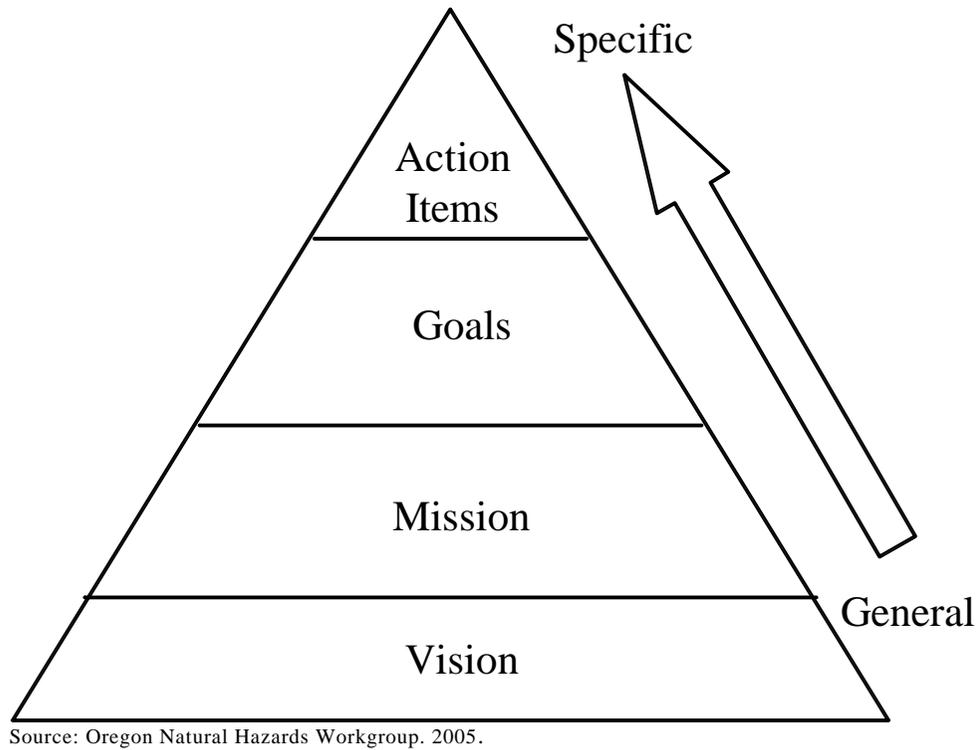
Mission, Goals, and Action Items

This section describes the components that guide the implementation of the identified mitigation strategies and is based on action plan principles. This section also provides information on the process used to develop the action plan components which include: vision, mission, goals, objectives and action items.

- **Vision**— The vision statement describes the preferred or desired future for the community with regard to natural hazards.
- **Mission**— The mission statement is a philosophical or value statement that answers the question “Why develop a plan?” In short, the mission states the purpose and defines the primary function of the County’s Natural Hazards Mitigation Plan. The mission is an action-oriented statement of the plan’s reason to exist. It is broad enough that it need not change unless the community environment changes.
- **Goals**—Goals are designed to drive actions and they are intended to represent the general end toward which the County effort is directed. Goals identify how the community intends to work toward mitigating risk from natural hazards. The goals are guiding principles for the specific recommendations that are outlined in the action items.
- **Action Items**—The action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk.

Figure 4.1 illustrates the components of the action plan and depicts the level of specificity for each of the action plan components.

Figure 4.1: Action Plan Components



Natural Hazard Mitigation Vision and Mission

The vision statement was culled from the adopted vision set forth by the Wasco County Court and Wasco County Planning & Development. Input from Stakeholder Interviews, Steering Committee meetings, Wasco County Court’s mission statement, and ONHW training sessions were synthesized by NHMP Coordinator into a NHMP mission statement draft. The mission statement draft was then approved and adopted by the Wasco County NHMP Steering Committee in the course of its final Goals & Action Items Meeting on 13 July 2006.

Vision

Wasco County’s mitigation plan vision is...

“...to be the best performing rural county government in Oregon and to preserve the beauty, livability, and economy of Wasco County for future generations.”

Mission

Wasco County’s mitigation plan mission is...

“...to protect life, property and the environment through coordination and cooperation among public and private partners, which will reduce risk and loss, and enhance the quality of life for the people of Wasco County.”

Mitigation Plan Goals

The plan goals help 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 organizations begin implementing mitigation action items. Each goal has a series of statements which further reflect and more clearly define the goals.

Soliciting community input during stakeholder interviews was a critical aspect of goal development. Armed with Stakeholder Interview input, the mitigation plan goals and goal statements were drafted by NHMP Coordinator using assistance from ONHW. The draft goals were brought before the Wasco County Steering Committee for review and approval. The goals were revised with Steering Committee input before adoption by committee.

In an effort to prioritize goals, each member of the Steering Committee was asked to (i) identify three statements that were most important to them and (ii) speak to why they chose those statements. Their statement choices were tallied and goals prioritized by the number of statements selected; goals with the most statements selected are ranked in priority from I-III. This exercise was not meant to exclude the importance of the other goals, but rather assist in the implementation of this plan by identifying which of the high priority risk reducing action items to pursue funding for first.

The outcome of the goal prioritization process is represented in Table 4.1 below. The “CHOICE” column indicates the number of times a given statement was identified as a community priority by Steering Committee members. The “PRIORITY” column tallies the number of statements selected for each goal and identifies the principal goals to serve as a starting point in the implementation of mitigation activities for Wasco County.

The primary goals identified are the Protection of Life & Property, and to Facilitate Partnerships and Coordination. Secondary and tertiary goals are to Acknowledge Responsibility for mitigating hazardous events, and the Enhancement of Emergency Services.

For more information on the public process, please refer to Appendix A: Public Process.

Table 4.1 Wasco County Goals, Statements, and Priority
WASCO COUNTY NHMP GOALS

GOAL	STATEMENT	CHOICE	PRIORITY
Education & Outreach	Develop and implement education programs to increase awareness among citizens, local, county, and regional agencies, non-profit organizations, businesses, and industry	1	
	Develop and conduct outreach programs to increase the number of local activities implemented by public and private sector organizations		
	Build community consensus through outreach, education and activities		
Disaster Resilient Economy	Foster a diverse economy to reduce the debilitating impacts of a hazard event on any one sector		
	Create the conditions for a transitional economy that welcomes new industry and innovative ideas that are sensitive to potential hazard risks faced by the County		
	Protect recreation and tourist industries by raising awareness of potential hazard impacts		
	Provide support for agricultural industries to help them prepare for hazardous events		
Protection of Life & Property	Develop and implement activities to protect human life, commerce, property and natural resource systems	2	I*
	Reduce insurance losses and repetitive claims for chronic hazard events while promoting insurance for catastrophic hazards	1	
	Evaluate county guideline/codes, and permitting processes in addressing hazard mitigation; emphasize non-structural means of mitigating hazard impact	3	
	When applicable, utilize structural mitigation activities to minimize risks associated with hazard events		
Intergenerational Equity	Encourage growth and development that meets the needs of the present without compromising future generations		
	Preserve the "small town" character of the County	1	
Acknowledge Responsibility	Coordinate programs to increase natural hazard knowledge base and use technology to better record events and model vulnerability	4	II
	Actively acknowledge amount of loss the County is susceptible to and develop efforts to overcome that loss without significant reliance on outside resources		
	Incorporate hazard mitigation as part of County leadership's routine decision making process	1	
Facilitate Partnerships & Coordination	Strengthen communication and coordination of public/private partnerships and emergency services among local, county and regional governments and the private sector	6	I*
	Incorporate hazard mitigation into the greater social, economic and natural resource goal framework		
Natural Resource Systems Protection	Link watershed planning, natural resource management, and land use planning with natural hazard mitigation activities to protect vital habitat and water quality		
	Preserve and rehabilitate natural systems to serve natural hazard mitigation functions and protect recreation and tourist resources		
Emergency Services Enhancement	Evaluate performance of critical facilities during a natural hazard event	2	III
	Minimize life safety issues		
	Ensure resources, staffing and volunteer base keeps pace with County growth	2	

*Tie

Mitigation Plan Action Items

Short and long-term action items identified through the planning process are an important part of the mitigation plan. Action items are detailed recommendations for activities that

local departments, citizens and others could engage in to reduce risk. They address both multi-hazard (MH) and hazard specific issues.

Action Item Development

The NHMP Coordinator led the effort to collect and document action item ideas, disperse action worksheets to government agencies and community stakeholders, and ultimately draft action item worksheets to present to the Steering Committee. Action item input was gathered through the NHMP Community Stakeholder Forum, stakeholder interviews, and Steering Committee meetings. The Steering Committee was charged with the selection of draft action items to document in the plan and prioritization (high or low) of action items to help guide implementation.

Selection and prioritization of action items was accomplished during the NHMP Steering Committee Goals & Action Items meeting on 13 July 2006. The method of selection and prioritization was as follows:

(1) First pass review (selection):

Each action item was reviewed individually by the Steering Committee with the question posed: “is this an action item worth pursuing, i.e. will it effectively reduce the county’s risk from natural hazards?” The action items were placed in “Yes” or “No” piles accordingly.

(2) Second pass review (prioritization):

Of those action items in the “Yes” pile, each item was reviewed individually by the Steering Committee and given a “High” or “Low” priority rating based on potential impact and feasibility.

(3) Third pass review (detail):

The details of the selected action items were discussed and debated with emphasis on rationale for the action, ideas for implementation, and the coordinating organization.

The Action Item Worksheet

Each action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. The action item worksheets can assist the community to pre-package potential projects for grant funding. The worksheet components are described below. These action item worksheets are located at the end of this section following the Action Plan Matrix which displays all the plan’s action items.

- **Rationale or Key Issues Addressed**

Action items should be fact based and tied directly to issues or needs identified throughout the planning process. Action items can be developed from a number of sources including participants of the planning process, noted deficiencies in local capability, or issues identified through the risk assessment.

- **Ideas for Implementation**

The ideas for implementation offer a transition from theory to practice. The ideas for implementation serve as a starting point for this plan. This component of the action item is dynamic as some ideas may be not feasible and new ideas can be added during the plan maintenance process. Ideas for implementation include things such as collaboration with relevant organizations, grant programs, tax incentives, human resources, education and outreach, research, and physical manipulation of buildings and infrastructure. This section should also include a description of how the mitigation activity may be implemented through existing community plans, policies and programs.

- **Coordinating Organization**

The coordinating organization is the public agency with regulatory responsibility to address natural hazards, or that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring, and evaluation.

- **Internal and External Partners**

The internal and external partner organizations listed in the Action Item Worksheets are potential partners recommended by the project steering committee, but not necessarily contacted during the development of the plan. The coordinating organization should contact the identified partner organizations to see if they are capable of and interested in participation. This initial contact is also to gain a commitment of time and/or resources towards completion of the action items.

Internal partner organizations are departments within the County that may be able to assist in the implementation of action items by providing relevant resources to the coordinating organization.

External partner organizations can assist the coordinating organization in implementing the action items in various functions and may include local, regional, state, or federal agencies, as well as local and regional public and private sector organizations.

- **Plan Goals Addressed**

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.

- **Timeline**

Action items include both short and long-term activities. Each action item includes an estimate of the timeline for implementation. Short-term action items (ST) are activities that may be implemented with existing resources and authorities within one to two years. Long-term action items (LT) may require new or additional resources and/or authorities, and may take between one and five years to implement.

Action Plan Matrix

The Action Plan matrix portrays the overall action plan framework and identifies linkages between the plan goals, partnerships (coordination and partner organizations), and actions. The matrix documents a description of the action, Steering Committee identified priority, the coordinating organization, partner organizations, timeline, and the plan goals addressed.

**NOTE: ACTION ITEM MATRIX & ACTION ITEM WORKSHEETS
ATTACHED SEPARATELY (LOCATED IN SECTION IV FOLDER)**

WASCO COUNTY NHMP GOALS

GOAL	STATEMENT	CHOICE	PRIORITY
Education & Outreach	Develop and implement education programs to increase awareness among citizens, local, county, and regional agencies, non-profit organizations, businesses, and industry	1	
	Develop and conduct outreach programs to increase the number of local activities implemented by public and private sector organizations		
	Build community consensus through outreach, education and activities		
Disaster Resilient Economy	Foster a diverse economy to reduce the debilitation impacts of a hazard event on any one sector		
	Create the conditions for a transitional economy that welcomes new industry and innovative ideas that are sensitive to potential hazard risks faced by the County		
	Protect recreation and tourist industries by raising awareness of potential hazard impacts		
	Provide support for agricultural industries to help them prepare for hazardous events		
Protection of Life & Property	Develop and implement activities to protect human life, commerce, property and natural resource systems	2	I*
	Reduce insurance losses and repetitive claims for chronic hazard events while promoting insurance for catastrophic hazards	1	
	Evaluate county guideline/codes, and permitting processes in addressing hazard mitigation; emphasize non-structural means of mitigating hazard impact	3	
	When applicable, utilize structural mitigation activities to minimize risks associated with hazard events		
Intergenerational Equity	Encourage growth and development that meets the needs of the present without compromising future generations		
	Preserve the "small town" character of the County	1	
Acknowledge Responsibility	Coordinate programs to increase natural hazard knowledge base and use technology to better record events and model vulnerability	4	II
	Actively acknowledge amount of loss the County is susceptible to and develop efforts to overcome that loss without significant reliance on outside resources		
	Incorporate hazard mitigation as part of County leadership's routine decision making process	1	
Facilitate Partnerships & Coordination	Strengthen communication and coordination of public/private partnerships and emergency services among local, county and regional governments and the private sector	6	I*
	Incorporate hazard mitigation into the greater social, economic and natural resource goal framework		
Natural Resource Systems Protection	Link watershed planning, natural resource management, and land use planning with natural hazard mitigation activities to protect vital habitat and water quality		
	Preserve and rehabilitate natural systems to serve natural hazard mitigation functions and protect recreation and tourist resources		
Emergency Services Enhancement	Evaluate performance of critical facilities during a natural hazard event	2	III
	Minimize life safety issues		
	Ensure resources, staffing and volunteer base keeps pace with County growth	2	

*Tie

MH#11	L	Develop Small Business Awareness & Continuity Planning Campaign	The Dalles Chamber of Commerce	County Court	LT (ongoing)	X	X		X		X		
DH#1	H	Ensure Long-range Water Resources Development	Planning	Public Works, GIS, District 3 Watermaster, County Court, SWCD, OSU Extension, DEQ, ODFW, OECDD, DOGAMI, DLCD	ST (ongoing)		X	X	X		X	X	
DH#2	L	Support Local Agencies Training on Water Conservation Measures and Drought Management Practices	SWCD	Planning, OSU Extension, Cherry Growers, Cattlemen's Association	LT (ongoing)	X	X		X		X	X	
FH#1	H	Mitigate Flood Event Resulting from Naturally Induced Dam Failure	SWCD	Public Works, GIS, Fire Dept., Emergency Management, Army Core of Engineers, BPA, DEQ, WRD	ST			X		X			
FH#2	H	Apply for NFIP Community Rating System / CRS Rating System	Planning	County Court, Cities, LCDC, FEMA, OEM, OECDD	ST	X			X	X			
FH#3	H	Address Repetitive Loss	Planning	County Court, Cities, LCDC, FEMA, OEM, OECDD	ST	X		X	X	X			
FH#4	H	Update FIRM Maps	Planning	GIS, Public Works, FEMA	ST			X	X			X	
FH#5	H	Update County Flood Ordinances	Planning	County Surveyor, DLCD	ST		X	X	X	X		X	
FH#6	L	Removal of Passage Barriers along Fifteen Mile Subbasin	SWCD	Planning, Public Works, ODF&W	LT			X	X			X	
FH#7	L	Develop Flood Education & Outreach Programs	County Court	EM, Planning, Building, SWCD, ONHW, FEMA, OEM	LT (ongoing)	X	X	X			X	X	
EH#1	H	Rehabilitate Identified Vulnerable Schools, Emergency Facilities, and Public Buildings/Lifelines	County Facilities	Emergency Management, County Court, Planning, GIS, Public Works, DOGAMI, OEM, DLCD	LT			X	X				X
EH#2	L	Improve Knowledge of Earthquake Sources / Improve Earthquake Hazard Zone Maps	Emergency Management	GIS, Public Works, DOGAMI, OEM, DLCD	LT					X			
EH#3	L	Improve Understanding of Vulnerability and Risk	Emergency Management	GIS, Public Works, DOGAMI, OEM, DLCD	LT					X			
EH#4	L	Educate Those at Risk	Emergency Management	GIS, Public Works, DOGAMI, OEM, DLCD	LT	X		X		X			
LS#1	H	Update County Landslide Ordinance	Planning	Planning Commission, ONHW, OEM	LT		X	X	X	X			
LS#2	L	Improve Understanding of Landslide Risk Inside Hazard Areas and Improve Warning Systems	GIS	Planning, Emergency Management, DOGAMI, ODF, DLCD	LT		X	X	X	X			X
LS#3	L	Improve Landslide Hazard Area Maps	GIS	Planning, Emergency Management, DOGAMI, ODF, DLCD	LT					X			
LS#4	L	Provide Education/Awareness for Those at Risk	Planning	GIS, Emergency Management, Planning, DOGAMI, ODF, DLCD	LT	X		X	X				
SH#1	H	Develop Partnership Programs to Reduce Vulnerability of Public Infrastructure from Severe Winter Storms	Emergency Management	Planning, Public Works, Cities, Utilities	LT		X	X			X		
SH#2	H	Encourage Critical Facilities to Secure Emergency Power	Emergency Management	Planning, Public Works, GIS, DOGAMI, OEM, DLCD, Red Cross	ST								X
SH#3	H	Support/Encourage Electrical Utilities to Use Underground Construction Methods	Planning	Emergency Management, GIS, Cities, Utilities, Building Contractors, Real Estate	ST		X		X				

SH#4	L	Increase and Maintain Public Awareness of Severe Storms.	Emergency Management	Planning, Public Works, Utilities, Cities, American Red Cross, St. Vincent DePaul, Churches, , Fire, FEMA	LT (ongoing)	X	X								
WH#1	H	Assessment of Non-County Roads for Response to Wildfire Hazards	Wasco County Road Department	County Planning Department, Rural Fire Departments, Oregon's Fire Marshall's Office, ODF	ST			X	X	X					X
WH#2	H	Bring All Unprotected Lands Under Some Form of Wildfire Protection Coverage	County Court	Rural Fire Districts, County Planning Director, Emergency Management, ODF, Oregon Fire Marshall's Office	LT			X			X				X
WH#3	H	Complete Surveys and Evaluations of Homesites Using NFPA 1141 Criteria	GIS	Rural Fire Districts, County Planning Director, Emergency Management, ODF, Oregon Fire Marshall's Office	LT	X		X	X	X	X				X
WH#4	H	Assist Fire District in Upgrading Equipment/Facilities and in Providing Training	County Court	Rural Fire Districts, County Planning Director, Emergency Management, ODF, USFS, Oregon Fire Marshall's Office	ST										X
WH#5	H	Increase Wildfire Prevention Awareness	Emergency Management	Rural Fire Districts, County Planning Director, Emergency Management, GIS Coordinator, ODF, USFS, Oregon Fire Marshall's Office	ST	X		X	X	X					
WH#6	H	Provide Parcel/Lot Identification Signage	Fire Districts	Emergency Management, Planning, Oregon Fire Marshall's Office	ST (ongoing)			X	X						X
WH#7	H	Accomplish Defensible Space Around Structures	Rural Fire Districts	Landowners, ODF, USFS, Oregon Fire Marshall's Office, Emergency Management	ST (ongoing)			X							X
WH#8	H	Treat Hazard Fuels in the Wildland Urban Interface Including in The Dalles Municipal Watershed	Rural Fire Districts	Landowners, ODF, USFS, Oregon Fire Marshall's Office, Emergency Management	ST (ongoing)			X	X				X	X	
WH#9	H	Conduct Firewise Workshops	Emergency Management	Rural Fire Districts, County Court,ODF, USFS, Oregon Fire Marshall's Office	ST (ongoing)	X				X					
WH#10	L	Map Fire Regimes and Condition Classes	GIS	Rural Fire Districts, County Court,ODF, USFS, Oregon Fire Marshall's Office	LT					X					
WH#11	L	Assist Pine Hollow, Sportsman's Park and Wamic Communities to Form a Tax Base Fire District	County Court	Rural Fire Districts, County Court,ODF, USFS, Oregon Fire Marshall's Office	LT			X			X				X
WH#12	L	Clean Up Brownfields Bark Piles in Maupin	County Court	Rural Fire Districts, County Court,ODF, USFS, Oregon Fire Marshall's Office	LT			X							X
WH#13	L	Create Fuel Breaks Around CRP Lands	County Court	Rural Fire Districts, Emergency Management, ODF, BLM, Oregon Fire Marshall's Office	LT			X					X	X	
VH#1	L	Acquire or Prepare Detailed Volcanic Hazard Maps	Emergency Management	GIS,DOGAMI, OEM, USGS	ST					X					
VH#2	L	Improve Knowledge Base of Volcanic Risk and Vulnerability	Emergency Management	GIS,DOGAMI, OEM, USGS	LT					X					

VH#3	L	Evaluate Emergency Response Plan and Identify Areas of Public Notification and Evacuation Routes.	Emergency Management	Emergency Response, Cities, ODF, BLM, Warm Springs,	LT			X	X	X	X		X
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Plan Implementation & Maintenance

The section details the formal process that will ensure that Wasco County Natural Hazards Mitigation Plan remains an active and relevant document. The plan implementation and maintenance process includes a schedule for monitoring and evaluating the Plan annually as well as producing an updated plan every five years. This section also includes an explanation of how the County intends to incorporate the mitigation strategies outlined in this Plan into existing planning mechanisms and programs such as the County comprehensive land use planning process, capital improvement planning process, and building codes enforcement and implementation. Finally, this section describes how the County will integrate public participation throughout the plan maintenance and implementation process.

Implementing the Plan

After the Plan is locally reviewed and deemed complete Wasco County Planning & Development will be responsible for submitting it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management will then submit the Plan to the Federal Emergency Management Agency (FEMA–Region X) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA the County will adopt the plan via resolution. At that point the County will gain eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and Flood Mitigation Assistance program funds.

Co-Conveners

Wasco County Planning & Development and Wasco County Emergency Management shall serve as co-conveners of this plan. The agencies shall split responsibilities with (1) Emergency Management coordinating emergency service related aspects of the plan and its projects; and (2) Planning & Development coordinating documentation, GIS and land use related aspects.

Emergency Services Convener: Wasco County Emergency Management

The County's Emergency Management system strives to coordinate activities to mitigate, prepare for, respond to and recover from major emergencies or disasters. As the agency responsible for the implementation and maintenance of the mitigation plan, Wasco County Emergency Management shall:

- Serve as a communication conduit between the Steering Committee, County Court, local stakeholders, and State/Federal government agencies; and
- Identify emergency management related funding sources for natural hazard mitigation projects.

Contact: Mike Davidson, Emergency Manager
Wasco County Emergency Management
511 Washington St., Suite 102
The Dalles, OR 97058
V: (541) 506-2790
E: miked@co.wasco.or.us

Land Use Convener: Wasco County Planning & Development

The agency administers and enforces land use planning regulations for the County. Wasco County Planning & Development strives to protect life, property, the environment, and economic health of the County by (1) coordinating private development with the provision of public services and infrastructure and (2) determining how and where development occurs in a way that preserves and enhances the beauty, livability and economy of Wasco County for future generations. As the agency responsible for the implementation and maintenance of the mitigation plan, Wasco County Planning & Development shall:

- Coordinate Steering Committee meeting dates, times, locations, agendas, and member notification;
- Document outcomes of Committee meetings;
- Incorporate, maintain, and update Wasco County's natural hazards risk GIS data elements; and
- Utilize the Risk Assessment as a tool for prioritizing proposed natural hazard risk reduction projects.

Contact: Todd Cornett, Director
Wasco County Planning & Development
2705 East 2nd St.
The Dalles, OR 97058
V: (541) 506-2560
E: toddc@co.wasco.or.us

Coordinating Body

The Steering Committee will serve as the coordinating body for the mitigation plan. The roles and responsibilities of the coordinating body include:

- Serving as the local evaluation committee for funding programs such as Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and Flood Mitigation Assistance program funds;
- Prioritizing and recommending funding for natural hazard risk reduction projects;
- Documenting successes and lessons learned;
- Evaluating and updating the Natural Hazards Mitigation Plan in accordance with the prescribed maintenance schedule; and
- Developing and coordinating ad hoc and/or standing subcommittees as needed.

Members

The following organizations were represented and served on the Steering Committee during the development of the Wasco County Natural Hazards Mitigation Plan: The Wasco County Steering Committee is comprised of representatives from eight County area organizations:

Table 5.1 Steering Committee Members

NAME	TITLE	ORGANIZATION
Dan Boldt	Director	Wasco County Public Works
Mike Davidson	Emergency Manager	Wasco County Emergency Management
Todd Cornett	Director	Wasco County Planning & Development
Jennifer Clark	Project Coordinator	Wasco County SWCD
Richard Gassman	Senior Planner	City of The Dalles
Sherry Holliday	County Commissioner	Wasco County Court
Stu Nagle	Fire Marshall	Mid-Columbia Fire & Rescue
Hannah Settje	District Manager	Red Cross

To make the coordination and review of Wasco County Hazard Mitigation Plan as broad and useful as possible, the Steering Committee will engage additional stakeholders and other relevant hazard mitigation organizations and agencies to implement the identified action items.

The Steering Committee will meet quarterly to review the plan and ensure that appropriate County agencies are actively pursuing grant funding for targeted mitigation activities.

Implementation through Existing Programs

The Natural Hazard Mitigation Plan includes a range of action items that, when implemented, will reduce loss from hazard events in the County. Within the plan, FEMA requires the identification of existing programs that might be used to implement these action items. Wasco County currently addresses statewide planning goals and legislative requirements through its comprehensive land use plan, capital improvement plans, mandated standards and building codes. To the extent possible, Wasco County will work to incorporate the recommended mitigation action items into existing programs and procedures.

Many of the Natural Hazards Mitigation Plan's recommendations are consistent with the goals and objectives of the County's existing plans and policies. Where possible, Wasco County should implement the Natural Hazards Mitigation Plan's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.¹ Implementing the Natural Hazards Mitigation Plan's action items through such plans and policies increases their likelihood of being supported and implemented.

Examples of plans, programs or agencies that may be used to implement mitigation activities include:

- Community Wildfire Protection Plan
- Wasco County Budget
- Wasco County Economic Development Action Plan
- Wasco County Comprehensive Land Use Plan
- Soil & Water Conservation District
- Mid-Columbia Council of Governments

For additional examples of plans, programs or agencies that may be used to implement mitigation activities, please refer to Appendix E: Existing Plans & Programs

Plan Maintenance

Plan maintenance is a critical component of the natural hazard mitigation plan. Proper maintenance of the plan will ensure that this plan will maximize the County's efforts to reduce the risks posed by natural hazards. This section was developed by the University of Oregon's Oregon Natural Hazards Workgroup and includes a process to ensure that a regular review and update of the plan occurs. The steering committee and local staff will be responsible for implementing this process in addition to maintaining and updating the plan through a series of meetings outlined in the maintenance schedule below.

Semi-Annual Meeting

The Committee will meet on a semi-annual basis to:

- Review existing action items to determine appropriateness for funding;

- Identify issues that may not have been identified when the plan was developed; and
- Prioritize potential mitigation projects using the methodology described below.

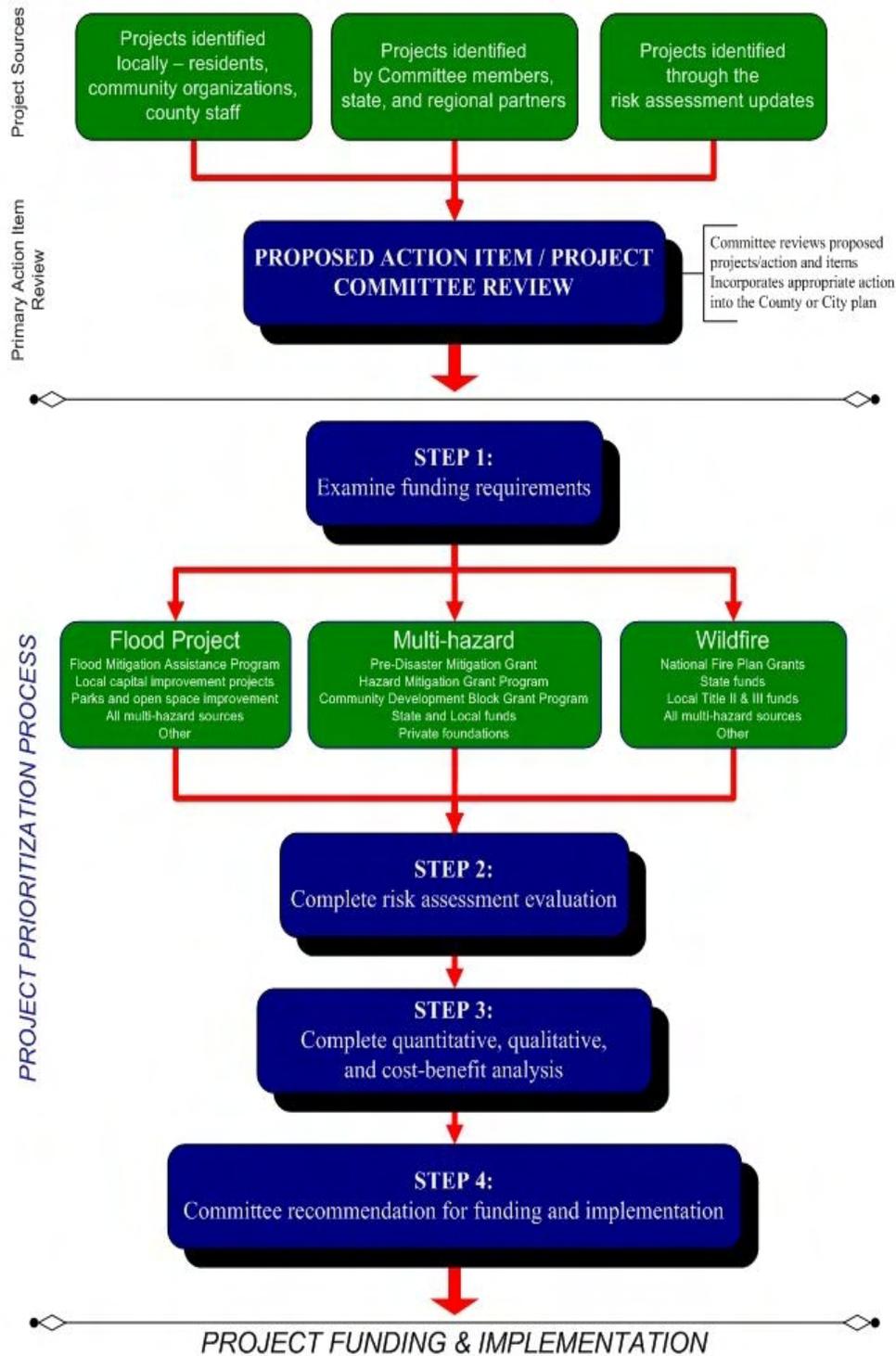
The co-conveners will be responsible for documenting the outcome of the semi-annual meetings. The process the Committee will use to prioritize mitigation projects is detailed in the section below.

Project Prioritization Process

The Disaster Mitigation Act of 2000 (DMA2K) via the Pre-Disaster Mitigation Program requires that County identify a process for prioritizing potential actions. Potential mitigation activities will often come from a variety of sources; therefore, the project prioritization process needs to be flexible. Projects may be identified by committee members, local government staff, other planning documents, or the risk assessment.

Depending on the potential project's intent and implementation methods, several funding sources may be appropriate. Examples of mitigation funding sources include, but are not limited to: FEMA's Pre-Disaster Mitigation competitive grant program (PDM), Flood Mitigation Assistance (FMA) program, National Fire Plan (NFP), Title II funds, Title III funds, Community Development Block Grants (CDBG), local general funds, and private foundations. Some of these examples are used in the figure 5.1 on the next page to illustrate the project development and prioritization process.

Figure 5.1: Project Prioritization Process Overview



Step 1: Examine funding requirements

The Steering Committee will identify how best to implement individual actions into the appropriate existing plan, policy, or program. The committee will examine the selected funding stream's requirements to ensure that the mitigation activity would be eligible through the funding source. The Committee may consult with the funding entity, Oregon Emergency Management, or other appropriate state or regional organization about the project's eligibility.

Step 2: Complete Risk Assessment Evaluation

The second step in prioritizing the plan's action items was to examine which hazards they are associated with and where these hazards rank in terms of community risk. The committee will determine whether or not the plan's risk assessment supports the implementation of the mitigation activity. This determination will be based on the location of the potential activity and the proximity to known hazard areas, historic hazard occurrence, and the probability of future occurrence documented in the Plan. To rank the hazards, community's natural hazard risk assessment was utilized. This risk assessment identified various hazards that may threaten community infrastructure and population in a range from:

- Low
- Moderate
- High

The rank ordering of hazards by risk follows:

1. Wildfire
2. Flood
3. Drought
4. Severe Storm
5. Landslide
6. Earthquake
7. Volcanic

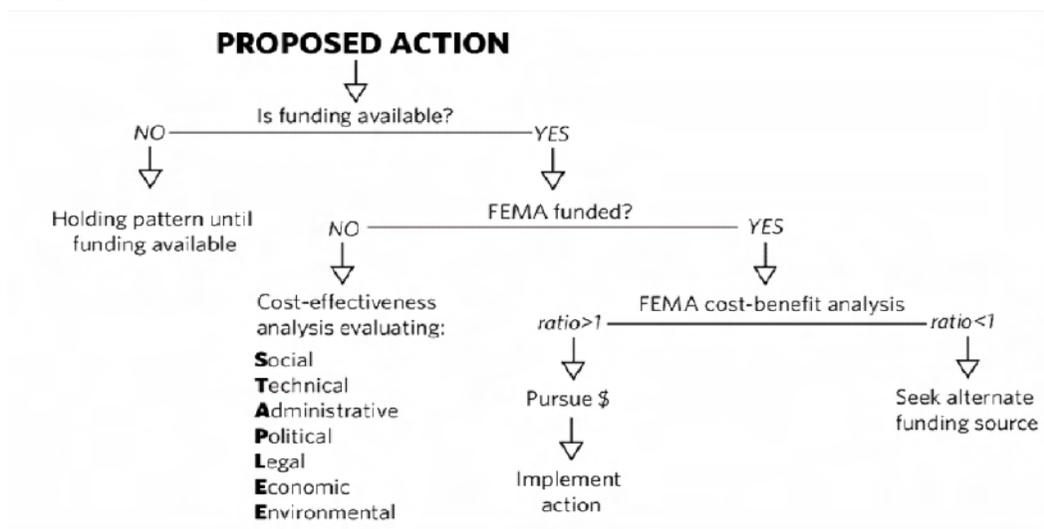
Each of the action items in the plan addresses risk from one or more of these hazards.

Step 3: Complete Quantitative and Qualitative Assessment, and Economic Analysis

The third step is to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects. Two categories of analysis that are used in this step are: (1) benefit/cost analysis, and (2) cost-effectiveness analysis. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth

undertaking now, in order to avoid disaster-related damages later. Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating natural hazards can provide decision makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects. Figure 5.2 shows decision criteria for selecting the method of analysis.

Figure 5.2: Project Prioritization Process Overview



Source: Community Service Center's Oregon Natural Hazards Workgroup at the University of Oregon, 2006.

If the activity requires federal funding for a structural project, the Committee will use a Federal Emergency Management Agency - approved cost-benefit analysis tool to evaluate the appropriateness of the activity. A project must have a benefit cost ratio of greater than one in order to be eligible for FEMA grant funding.

For non-federally funded or nonstructural projects, a qualitative assessment will be completed to determine the project's cost effectiveness. The committee will use a multivariable assessment technique called STAPLE/E to prioritize these actions. STAPLE/E stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental. Assessing projects based upon these seven variables can help define a project's qualitative cost effectiveness. The STAPLE/E technique has been tailored for natural hazard action item prioritization by the University of Oregon's Oregon Natural Hazards Workgroup. See Appendix D: Economic Analysis of Natural Hazard Mitigation Projects for a description of the STAPLE/E evaluation methodology.

Step 4: Committee recommendation

Based on the steps above, the committee will recommend whether or not the mitigation activity should be moved forward. If the committee decides to move forward with the action, the coordinating organization designated for the activity will be responsible for taking further action and documenting success upon project completion. The Committee will convene a meeting to review the issues surrounding grant applications and shared knowledge and or resources. This process will afford greater coordination and less competition for limited funds.

The Committee and the community's leadership have the option to implement any of the action items at any time, (regardless of the prioritized order). This allows the committee to consider mitigation strategies as new opportunities arise, such as funding for action items that may not be of highest priority. This methodology is used by the Committee to initially prioritize the plan's action items, in addition to maintaining the action list during annual review and update.

Annual Meeting

The steering committee will meet annually to review updates of the Risk Assessment data and findings, discuss methods of continued public involvement, and document successes and lessons learned based on actions that were accomplished during the past year. The convener will be responsible for documenting the outcomes of the annual meeting.

The plan's format allows the County to review and update sections when new data becomes available. New data can be easily incorporated, resulting in a natural hazards mitigation plan that remains current and relevant to Wasco County.

Five-Year Review of Plan

This plan will be updated every five years in accordance with the update schedule outlined in the DMA2K. During this plan update, the following questions should be asked to determine what actions are necessary to update the plan. The convener will be responsible for convening the Committee to address the questions outlined below.

- Are the plan goals still applicable?
- Do the plan's priorities align with State priorities?
- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?

- Have new issues or problems related to hazards been identified in the community?
- Do existing actions need to be reprioritized for implementation?
- Are the actions still appropriate given current resources?
- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

The questions above will help the committee determine what components of the mitigation plan need updating. The Committee will be responsible for updating any deficiencies found in the plan based on the questions above.

Continued Public Involvement & Participation

Wasco County is dedicated to involving the public directly in the continual reshaping and updating of the Natural Hazard Mitigation Plan. Although members of the Steering Committee represent the public to some extent, the public will also have the opportunity to provide feedback about the Plan.

During plan development, public participation was incorporated into every stage of the plan development process. To ensure continued public engagement and support of this plan, Wasco County shall invite the public to participate in future plan developments in the following ways:

- Post plan on Wasco County Planning & Development Website for comment (<http://co.wasco.or.us/planning/planhome.html>);
- Post notices that invite public to participate in one of the semi-annual Steering Committee meetings
- Hold community hazard workshops
- Implement various other outreach activities documented in this plan (see Section IV: Mission, Goals & Action Items)

ⁱ Burby, Raymond J., ed. 1998. Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities.

Hazard Annex

This annex gathers detailed information on natural hazard events in the County and places them into one easy to access file. The annex documents knowledge regarding each hazard threatening the County; each specific hazard annex is divided into four section headings:

- (1) Best Available Local Data
- (2) State of Oregon NHMP Mid-Columbia (Region 5) Risk Assessment
- (3) Wasco County Hazard Identification & Vulnerability Assessment (HIVA)
- (4) Oregon Technical Resource Guide (TRG)

A summary of the section headings is provided below:

Best Available Local Data

This section collects the best available local data (i.e. County data) on hazard events and their impact. Instances are noted where local data was not readily available or insufficient.

State of Oregon Natural Hazard Mitigation Plan: Mid-Columbia (Region 5) Risk Assessment

This section reports the hazard assessment scores from the State of Oregon's mitigation plan. Scores are based on an analysis of risk conducted by county emergency program managers, usually with the assistance of a team of local public safety officials.

The probability scores below address the likelihood of a future major emergency or disaster within a specific period of time, as follows:

- High = One incident likely within a 10 to 35 year period.
- Moderate = One incident likely within a 35 to 75 year period.
- Low = One incident likely within a 75 to 100 year period.

The vulnerability scores address the percentage of population or region assets likely to be affected by a major emergency or disaster, as follows:

- High = More than 10% affected
- Moderate = 1-10% affected
- Low = Less than 1% affected

In some cases, counties either did not rank the hazard or did not find it to be a significant concern. These cases are noted with a dash (-) in the table below.

A copy of the State NHMP can be downloaded here:

<http://www.oregonshowcase.org/index.cfm?mode=stateplan>

Wasco County Hazard Inventory & Vulnerability Analysis (HIVA)

This section highlights the risk assessment provided by the Wasco County HIVA. The Oregon Revised Statutes (ORS) requires each political subdivision to base its Emergency Operations Plan on a hazard analysis. The hazard analysis is also a training tool, providing introductory knowledge of the hazards posing a threat to Wasco County. To make the analysis more useful, adjective descriptors (High, Moderate, Low) are established for each hazard's probability-of-occurrence and vulnerability and a risk rating is assigned based on a subjective estimate of their combination. The risk rating is assigned on the probability of a hazard occurring over the next 50 years. The risk rating will help focus the emergency management program on the hazards of greatest risk.

A high risk rating warrants major program effort to prepare for, respond to, recover from, and mitigate against the hazard.

A moderate risk rating warrants modest program effort to prepare for, respond to, recover from, and mitigate against the hazard.

A low risk rating warrants no special effort to prepare for, respond to, recover from, or mitigate against the hazard beyond general awareness training.

Oregon Technical Resource Guide (TRG)

The TRG is a comprehensive resource developed to assist Oregon communities in planning and preparing for natural hazard events. The TRG includes information on:

- Comprehensive Planning
- Legal Issues of Planning
- Hazard Specific Planning, i.e.:
 - Is your community threatened by natural hazards?
 - What are the laws in Oregon for natural hazards?
 - How can your community reduce risk from natural hazards?
 - How are Oregon communities addressing natural hazards?
 - Where can your community find resources to plan for natural hazards?

A hard copy of the TRG can be found at the Wasco County Planning & Development office. The TRG is also available online at: <http://www.oregonshowcase.org/index.cfm>

Best Available Local Data

Drought data and its impact are not easily accessible at the local level. Stakeholder interviews revealed that the Oregon State University Extension Service has the capacity to perform detailed analysis of drought impact on the agricultural community, but had not done so at the time of this plan’s development. Additionally, the Wasco County Soil & Water Conservation District houses data on river and stream flows, and irrigation consumption.

State Risk Assessment

Scores are based on an analysis of risk conducted by county emergency program managers, usually with the assistance of a team of local public safety officials.

Vulnerability	Probability
High	High

HIVA Risk Assessment

History suggests a high probability of occurrence. The entire population of the county is vulnerable to the effects of drought. Transportation and communications infrastructure would be minimally impacted, if at all. As growth places more pressure on limited local resources, future impacts may be greater, suggesting high vulnerability. A high risk rating is assigned

Oregon Technical Resource Guide

There is no Drought specific section in the TRG. Please refer to the University of Nebraska-Lincoln’s National Drought Mitigation Center (NDMC) website for more information. The NDMC provides the excellent drought related coverage for:

- *Planning for drought*
- *Monitoring drought*
- *Drought risks & impacts*
- *Mitigating drought*

The website address is: <http://www.drought.unl.edu/>

EARTHQUAKE

Best Available Local Data

Due to a lack of recent earthquake events in the County, the best available data is spread across Federal and State sources, the Oregon Department of Geology and Mineral Industries (DOGAMI) in particular. The following Tables are taken from the State of Oregon NHMP and the Wasco County HIVA.

More detailed DOGAMI HAZUS runs, approximating expected damage to critical infrastructure, are forthcoming.

Table H.1: Significant Earthquakes in Oregon

DATE	LOCATION	MAGNITUDE (M)	REMARKS
Approximate Years 1400 BCE* 1050 BCE 600 BCE 400 750 900	Offshore, Cascadia Subduction Zone	Probably 8-9	Based on studies of earthquake and tsunamis at Willapa Bay, Washington. These are the mid-points of the age ranges for these six events.
January, 1700	Offshore, Cascadia Subduction Zone	Approximately 9.0	Generated a tsunami that struck Oregon, Washington, and Japan; destroyed Native American villages along the coast
March, 1893	Umatilla	VI-VII (Modified Mercalli Intensity)	Damage unknown
July, 1936	Milton-Freewater	6.1	Eastern Oregon's largest event, several aftershocks, \$100,000 dollars in damage based on 1936 dollars, chimney damage, houses shifted off foundations, school buildings damaged
January, 1951	Hermiston	V	Damage unknown
April, 1976	Deschutes Valley	4.8	Near Maupin, cracked plaster, objects thrown

Notes: * BCE: Before the Common Era

Source: Ivan Wong and Jacqueline D.J. Bolt, November 1995, A Look Back at Oregon's Earthquake History, 1841-1994, *Oregon Geology*, pp. 125-139.

Table H.2 Estimated Loss from Cascadia Subduction Zone Event

Wasco County	8.5 Cascadia subduction zone event	500 year model
Injuries	0	6
Deaths	0	0
Displaced households	0	23
Short term shelter needs	0	17
Economic losses for buildings	\$795,000	\$25 million
Operating the day after the quake:		
Fire stations	99%	NA
Police stations	100%	NA
Schools	100%	NA
Bridges	99%	NA
Economic losses to:		
Highways	\$71,000	\$3 million
Airports	0	\$2 million
Communication systems:		
Economic losses	\$6,000	\$1 million
Operating the day of the quake	100%	NA
Debris generated (thousands of tons)	1	16

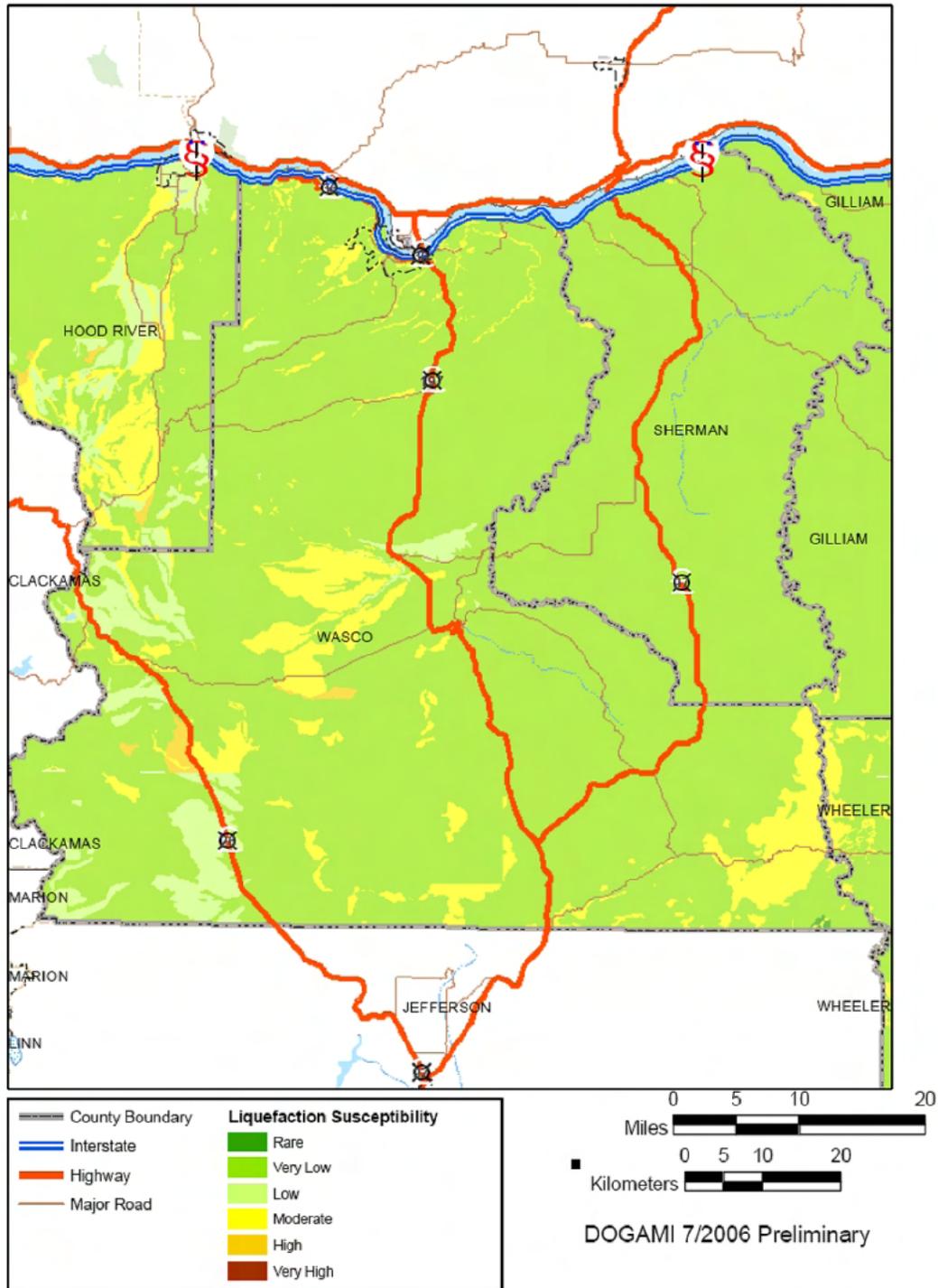
These figures have a high degree of uncertainty and should be used only for general planning purposes. Because of rounding, numbers may not add up to 100%.
Because the 500 year model includes several earthquakes, the number of facilities operational the "day after" cannot be calculated.

8.5 Cascadia event	Percentage of buildings in damage categories				
Building type	None	Slight	Moderate	Extensive	Complete
Agriculture	98	1	1	0	0
Commercial	98	1	1	0	0
Education	Unknown				
Government	98	1	0	0	0
Industrial	98	2	0	0	0
Residential	99	1	0	0	0

500 year model	Percentage of buildings in damage categories				
Building type	None	Slight	Moderate	Extensive	Complete
Agriculture	74	13	10	3	0
Commercial	68	16	12	3	0
Education	56	10	7	2	0
Government	66	16	14	4	1
Industrial	65	16	15	5	0
Residential	80	12	6	1	0

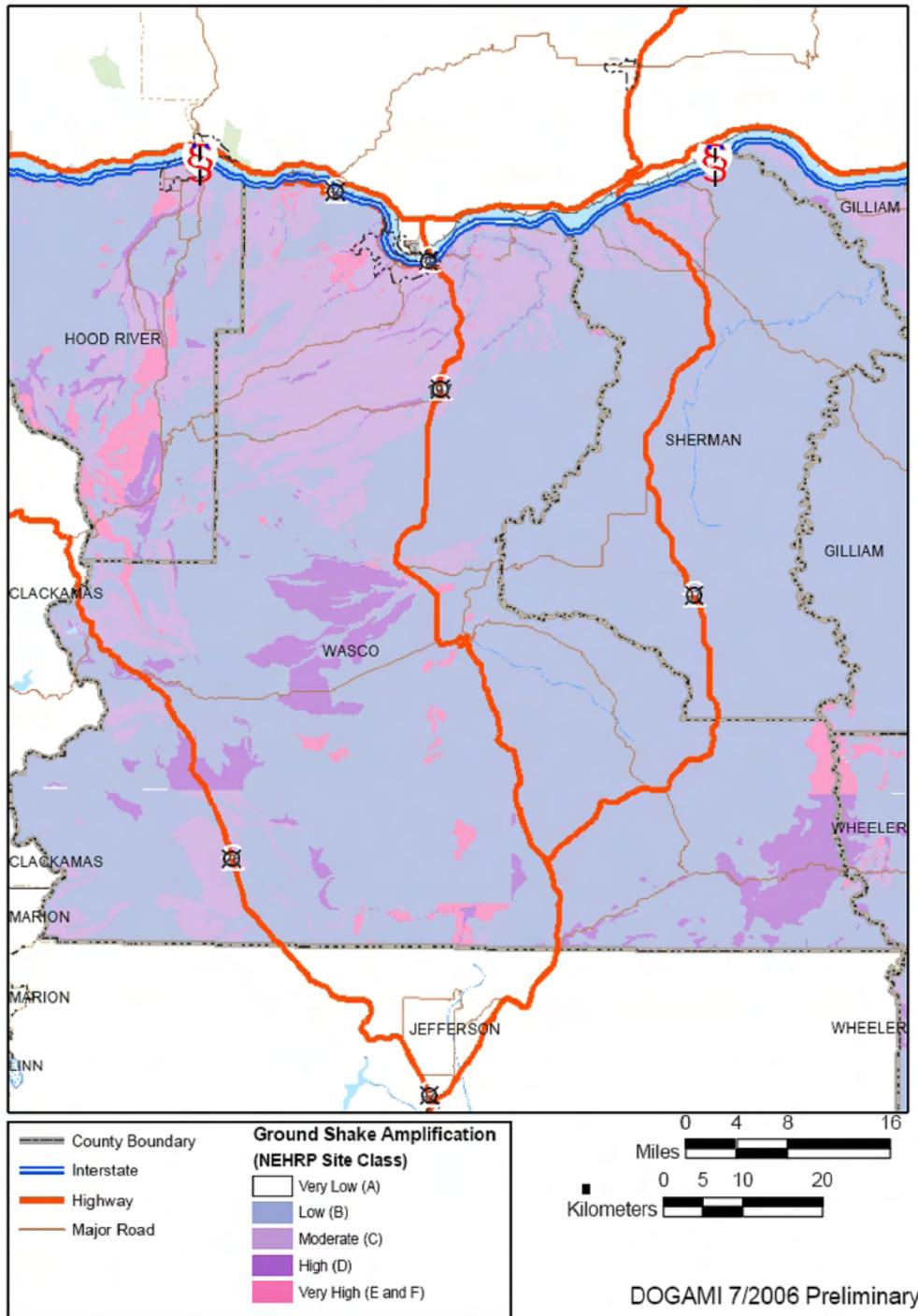
Source: Wasco County HIVA

Figure HA.1: Wasco County Liquefaction Susceptibility



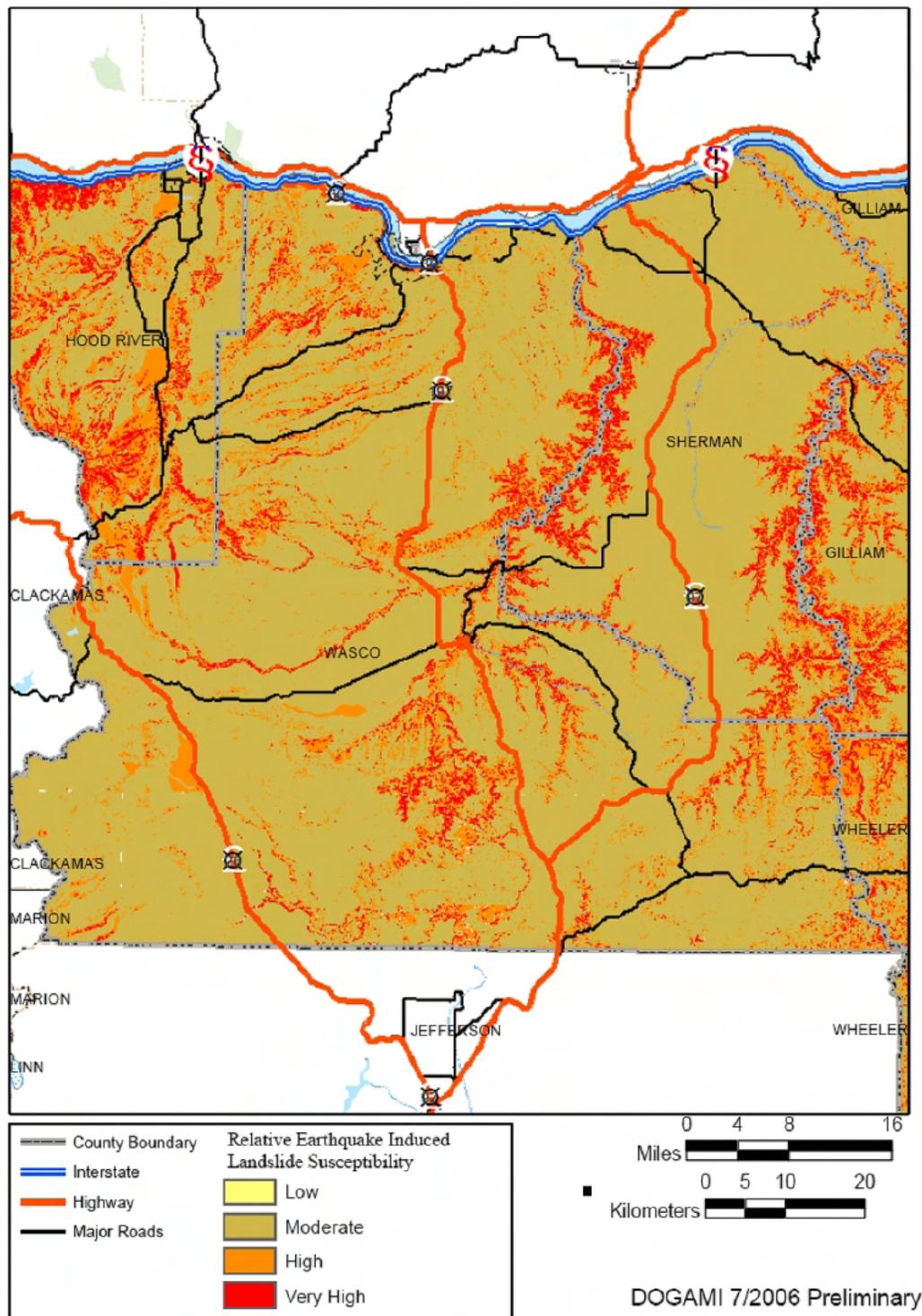
Source: DOGAMI

Figure HA.1: Wasco County Ground Shake Amplification Class



Source: DOGAMI

Figure HA.3 Relative Earthquake Induced Landslide Susceptibility



Source: DOGAMI

State Risk Assessment

Scores are based on an analysis of risk conducted by county emergency program managers, usually with the assistance of a team of local public safety officials.

Vulnerability	Probability
High	Low

HIVA Risk Assessment

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 have a minor impact on Wasco County suggesting moderate vulnerability. Accordingly, a moderate-risk rating is assigned.

Oregon Technical Resource Guide

A hard copy of the TRG can be found at the Wasco County Planning & Development office. The TRG is also available online at: <http://www.oregonshowcase.org/index.cfm>

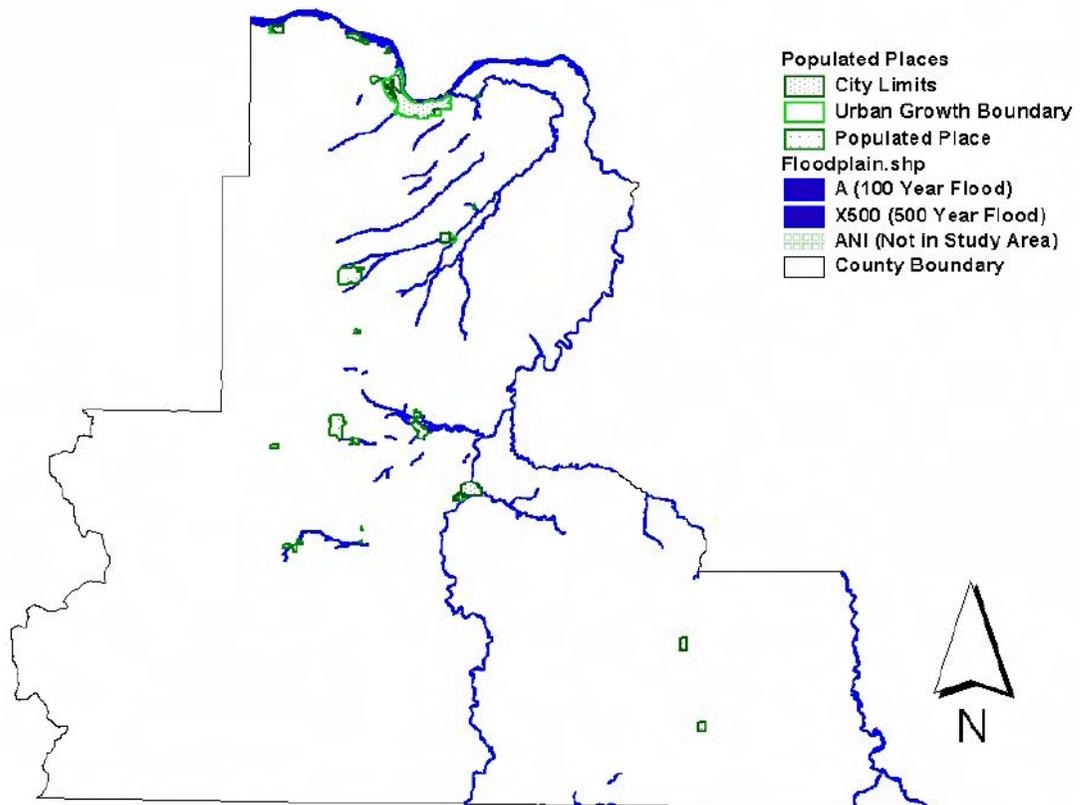
Best Available Local Data

The section includes Wasco County flood ordinances and DOGAMI flood plain maps for populated places within the County.

Ordinances

This section includes the Wasco County Land Use and Development Ordinance- Chapter 22. Flood Damage Prevention. The flood hazard overlay is provided in Figure HA.4 below.

Figure HA.4 Wasco County 100 & 500 Year Flood Plain



CHAPTER 22 FLOOD DAMAGE PREVENTION

SECTION 22.010 Statement of Purpose

It is the purpose of this chapter to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas by provisions designed:

- A. To protect human life and health;
- B. To minimize expenditure of public money for costly flood control projects;
- C. To minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- D. To minimize prolonged business interruptions;
- E. To minimize damage to public facilities and utilities such as water and gas mains, electric, telephone, and sewer lines, and streets and bridges located in areas of special flood hazard;
- F. To help maintain a stable tax base by providing for the second use and development of areas of special flood hazard so as to minimize future flood blight areas;
- G. To ensure that potential buyers are notified that property is in an area of special flood hazard; and,
- H. To insure that those who occupy the areas of special flood hazard assume responsibility for their actions.

SECTION 22.020 Methods of Reducing Flood Losses

In order to accomplish its purposes, this chapter includes methods and provisions for:

- A. Restricting or prohibiting uses which are dangerous to health, safety and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;
- B. Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- C. Controlling the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;
- D. Controlling filling, grading, dredging, and other development which may increase flood damage; and,
- E. Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

SECTION 22.030 Special Definitions

Unless specifically defined below, words or phrases used in this chapter shall be interpreted so as to give them the meaning they have in common usage and to give this chapter its most reasonable application.

- A. "Area of special flood hazard" means the land in the flood plain within a community subject to a one percent or greater chance of flooding in any given year. Designation on maps always includes the letters A or V. (revised 4-87)
- B. "Base flood" means the flood having a one percent chance of being equaled or exceeded in any given year. Also referred to as the "100-year flood". Designation on maps always includes the letters A or V. (revised 4-87)
- C. "Basement" means any area of the building having its floor subgrade below ground level) on all sides.
- D. "Development" means any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, paving, excavation or drilling operations located within the area of special flood hazard.
- E. "Flood" or "Flooding" means a general and temporary condition of partial or complete inundation of normally dry land areas from:
 - 1. The overflow of inland or tidal waters and/or
 - 2. The unusual and rapid accumulation or runoff of surface waters from any source.
- F. "Flood Insurance Rate Map (FIRM)" means the official map on which the Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.
- G. "Floodway" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot.
- H. "Lowest Floor" means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage, in an area other than a basement area, is not considered a building's lowest floor, provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of this ordinance found at Section 22.180 A.2.
- I. "Manufactured Home" means a structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities. The term "manufactured home" does not include a "recreational vehicle."
- J. "Manufactured Home Park or Subdivision" means a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.
- K. "Recreational Vehicle" means a vehicle which is: (1) built on a single chassis; and (2) 400 square feet or less when measured at the largest horizontal projection; (3) designed to be self-propelled or permanently towable by a light duty truck; and (4) designed primarily not

for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

- L. "Start of Construction" includes substantial improvement, and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, placement or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundation or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure.
- M. "Structure" means a walled and roofed building, including a gas or liquid storage tank, that is principally above ground. (revised 4-87)
- N. "Substantial improvement" means any repair, reconstruction, or improvement of a structure, the cost of which equals or exceeds fifty (50) percent of the market value of the structure either:
1. before the improvement or repair is started, or
 2. if the structure has been damaged and is being restored, before the damage occurred.

For the purposes of this definition "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure.

The term does not, however, include either:

1. any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions; or,
 2. any alteration of a structure listed on the National Register of Historic Places or a State Inventory of Historic Places.
- O. "Variance" means a grant of relief from the requirements of this ordinance which permits construction in a manner that would otherwise be prohibited by this ordinance."

SECTION 22.040 Lands to which this Chapter Applies

This chapter shall apply to all areas of special flood hazards within the jurisdiction of Wasco County.

SECTION 22.050 Basis for Establishing the Areas of Special Flood Hazard

The areas of special flood hazard identified by the Federal Insurance Administration on its Flood Insurance Rate Map (FIRM), dated September 24, 1984, and any revision thereto, is adopted by

reference and declared to be a part of this Ordinance. The Flood Insurance Rate Map is on file at the Wasco County Planning and Development Office. (revised 4-87)

SECTION 22.060 Abrogation and Greater Restrictions

This chapter is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this chapter and another ordinance, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

SECTION 22.070 Interpretation

In the interpretation and application of this chapter, all provisions shall be:

- A. Considered as minimum requirements;
- B. Liberally construed in favor of the governing body; and,
- C. Deemed neither to limit nor repeal any other powers granted under State statutes.

SECTION 22.080 Warning and Disclaimer of Liability

The degree of flood protection required by this chapter is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This chapter does not imply that land outside the areas of special flood hazards or uses permitted within such areas will be free from flooding or flood damages. This chapter shall not create liability on the part of Wasco County, any officer or employee thereof or the Federal Insurance Administration, for any flood damages that result from reliance on this chapter or any administrative decision lawfully made thereunder.

SECTION 22.090 Establishment of Development Permit

A Development Permit shall be obtained before construction or development begins within any area of special flood hazard established in Section 22.050. Application for a Development Permit shall be made on forms furnished by the Planning Director and may include, but not be limited to: plans in duplicate drawn to scale showing the nature, location, dimensions, and elevations of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities; and the location of the foregoing.

Specifically, the following information is required:

- A. General elevation to mean sea level of building site using best information available.
- B. Distance between ground elevation and level to which structure is to be flood-proofed.
- C. Certification by a registered professional engineer or architect that the flood-proofing methods for any non-residential structure meet the flood-proofing criteria in Section 22.180(B). (revised 4-87)
- D. Description of the extent to which any watercourse will be altered or relocated as a result of proposed development.
- E. Copies of all permits required from any governmental agency, together with a certification under penalties of perjury that all certificates and permits requested have been obtained.

SECTION 22.100 Designation of the Planning Director

The Planning Director is hereby appointed to administer and implement this chapter by granting or denying development permit applications in accordance with its provisions.

SECTION 22.110 Development Permit Required

A development permit shall be obtained before construction or development begins within any area of special flood hazard established in Section 22.050. The permit shall be for all structures including manufactured homes, as set forth in the "DEFINITIONS", and for all development including fill and other activities, also as set forth in the "DEFINITIONS". (added 4-87)

SECTION 22.120 Duties and Responsibilities of the Planning Director

Duties of the Planning Director shall include, but not be limited to:

A. Permit Review

1. Review all development permits to determine that the permit requirements of this chapter have been satisfied.
2. Review all development permits to determine if the proposed development adversely affects the flood carrying capacity of the area of special flood hazard. For the purposes of this chapter, "adversely affects" means damage to adjacent properties because of rises in flood stages attributed to physical changes of the channel and the adjacent overbank areas.
 - a. If it is determined that there is no adverse effect, then the permit shall be granted consistent with the provisions of this chapter.
 - b. If it is determined that there is an adverse effect, then flood damage mitigation measures shall be made a condition of the permit.
 - c. Review all development permits to determine that all necessary permits have been obtained from those Federal, State, or local governmental agencies from which prior approval is required. (added 4-87)

B. Use of Other Base Flood Data

When base flood elevation data has not been provided in accordance with Section 22.050, Basis for Establishing the Areas of Special Flood Hazard, the Planning Director shall obtain, review, and reasonably utilize any base flood elevation and floodway data available from a Federal, State or other source, in order to administer Section 22.180, Specific Standards and Section 22.150.

C. Information to be Obtained and Maintained

1. Where base flood elevation data is provided through the Flood Insurance Study or required as in Section 22.120 B., obtain and record all records and data on base flood elevations and flood-proofing certificates required in Section 22.090(C). (revised 4-87)
2. For all new or substantially improved floodproofed structures:
 - a. verify and record the actual elevation (in relation to mean sea level), and

- b. maintain the floodproofing certifications required in Section 22.090 C. (added 4-87)
3. Maintain for public inspection all records pertaining to this chapter.

D. Alteration of Watercourses

1. Notify adjacent communities, Division of State Lands, Department of Land Conservation & Development, and the Department of Water Resources prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Insurance Administration.
2. Require that maintenance is provided within the altered or relocated portion of said watercourse so that the flood carrying capacity is not diminished.

E. Interpretation of FIRM Boundaries

Make interpretations where needed, as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions).

SECTION 22.130 General Standards

In all areas of special flood hazards the following standards are required:

A. Anchoring

1. All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.
2. All manufactured homes must likewise be anchored to prevent flotation, collapse or lateral movement, and shall be installed using methods and practices that minimize flood damage. Anchoring methods may include, but are not limited to, use of over-the-top or frame ties to ground anchors (Reference FEMA's "Manufactured Home Installation in Flood Hazard Areas" guidebook for additional techniques). (revised 4-87)
3. Any alternative method of anchoring may involve a system designed to withstand a wind-force of ninety (90) miles per hour, or greater. Certification shall be provided to the Planning Director that this standard has been met.

B. Construction Materials and Methods

1. All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.
2. All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.
3. Electrical, heating, ventilation, plumbing, and air- conditioning equipment and other service facilities shall be designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding. (added 4-87)

C. Utilities

1. All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system;
2. New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters; and,
3. On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

D. Subdivision Proposals

1. All subdivision proposals shall be consistent with the need to minimize flood damage;
2. All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage;
3. All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage; and,
4. Where base flood elevation data has not been provided or is not available from another authoritative source, it shall be generated for subdivision proposals and other proposed development which contain at least fifty (50) lots or five (5) acres (whichever is less). (revised 4-87)

SECTION 22.140 Review of Building Permits

Where elevation data is not available either through the Flood Insurance Study or from another authoritative source (Section 22.120 B.), applications for building permits shall be reviewed to assure that proposed construction will be reasonably safe from flooding. The test of reasonableness is a local judgment and includes use of historical data, high water marks, photographs of past flooding, etc., where available. Failure to elevate at least two feet above grade in these zones may result in higher insurance rates. (added 4-87)

SECTION 22.150 Manufactured Homes

All manufactured homes to be placed or substantially improved within Flood Insurance Rate Map Zones A1-30, AH, and AE shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated a minimum of one foot (1') ~~at or~~ above the base flood elevation and be securely anchored to an adequately designed foundation system to resist floatation, collapse and lateral movement, and shall be in accordance with the provisions of subsection 22.130.2. (added 4-87)

SECTION 22.155 Recreational Vehicles

Recreational Vehicles placed on sites with an "A" zone (Areas of 100-year flood) as identified on the Flood Insurance Rate Maps (FIRM) must: (1) be on the site for fewer than 180 consecutive days; or (2) be fully licensed and ready for highway use, on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions; or (3) meets the requirements of Section 22.150 and the elevation and anchoring requirements for manufactured homes.

SECTION 22.160 Floodways (added 4-87)

Located within areas of special flood hazard established in Section 22.050 are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of flood waters which carry debris, potential projectiles, and erosion potential, the following provisions apply:

- A. Prohibit encroachments, including fill, new construction, substantial improvements, and other development unless certification by a registered professional engineer or architect is provided demonstrating that encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge.
- B. If Section 22.160 A. is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of Section 22.130, "Provisions for Flood Hazard Reduction".

SECTION 22.170 Encroachments

Any proposed development shall be analyzed to determine effects on the flood carrying capacity of the area of special flood hazard as set forth in Section 22.120(A)(2).

SECTION 22.180 Specific Standards

In all areas of special flood hazards where base flood elevation data has been provided as set forth in Section 22.120(B), Use of Other Base Flood Data, the following standards are required:

- A. Residential Construction (revised 4-87)
 1. New construction and substantial improvement of any residential structure shall have the lowest floor, including basement, elevated a minimum of one foot (1') above base flood elevation.
 2. Fully enclosed areas below the lowest floor that are subject to flooding are prohibited, or shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or must meet or exceed the following minimum criteria:
 - a. A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided.
 - b. The bottom of all openings shall be no higher than one foot above grade.
 - c. Openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.
- B. Non-residential Construction

New construction and substantial improvement of any commercial, industrial or other non-residential structure shall either have the lowest floor, including basement, elevated at or above the base flood elevation; or, together with attendant utility and sanitary facilities, shall:

 1. be flood-proofed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water;

2. have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and,
3. be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting provisions of this subsection based on their development and/or review of the structural design, specifications and plans. Such certifications shall be provided to the official as set forth in Section 22.120(C). (revised 4-87)
4. Nonresidential structures that are elevated, not floodproofed, must meet the same standards for space below the lowest floor as described in Section 22.180 A.2. (added 4-87)
5. Applicants floodproofing nonresidential buildings shall be notified that flood insurance premiums will be based on rates that are one foot below the floodproofed level (e.g. a building constructed to the base flood level will be rated as one foot below that level). (added 4-87)

SECTION 22.190 Variances

- A.** Appeals shall be processed as described in Chapter 2.
- B.** In considering a variance to floodplain standards, the Planning Commission shall consider all technical evaluations, all relevant factors, standards specified in other sections of this ordinance, and:
 1. The danger that materials may be sept onto other lands to the injury of others;
 2. The danger to life and property due to flooding or erosion damage;
 3. The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;
 4. The importance of the services provided by the proposed facility to the community;
 5. The necessity to the facility of a waterfront location, where applicable;
 6. The availability of alternative locations for the proposed use which are not subject to flooding or erosion damage;
 7. The compatibility of the proposed use with existing and anticipated development;
 8. The relationship of the proposed use to the comprehensive plan and floodplain management program for that area;
 9. The safety of access to the property in times of flood for ordinary and emergency vehicles;
 10. The expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters and the effects of wave action, if applicable, expected at the site; and

11. The costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water systems, and streets and bridges.

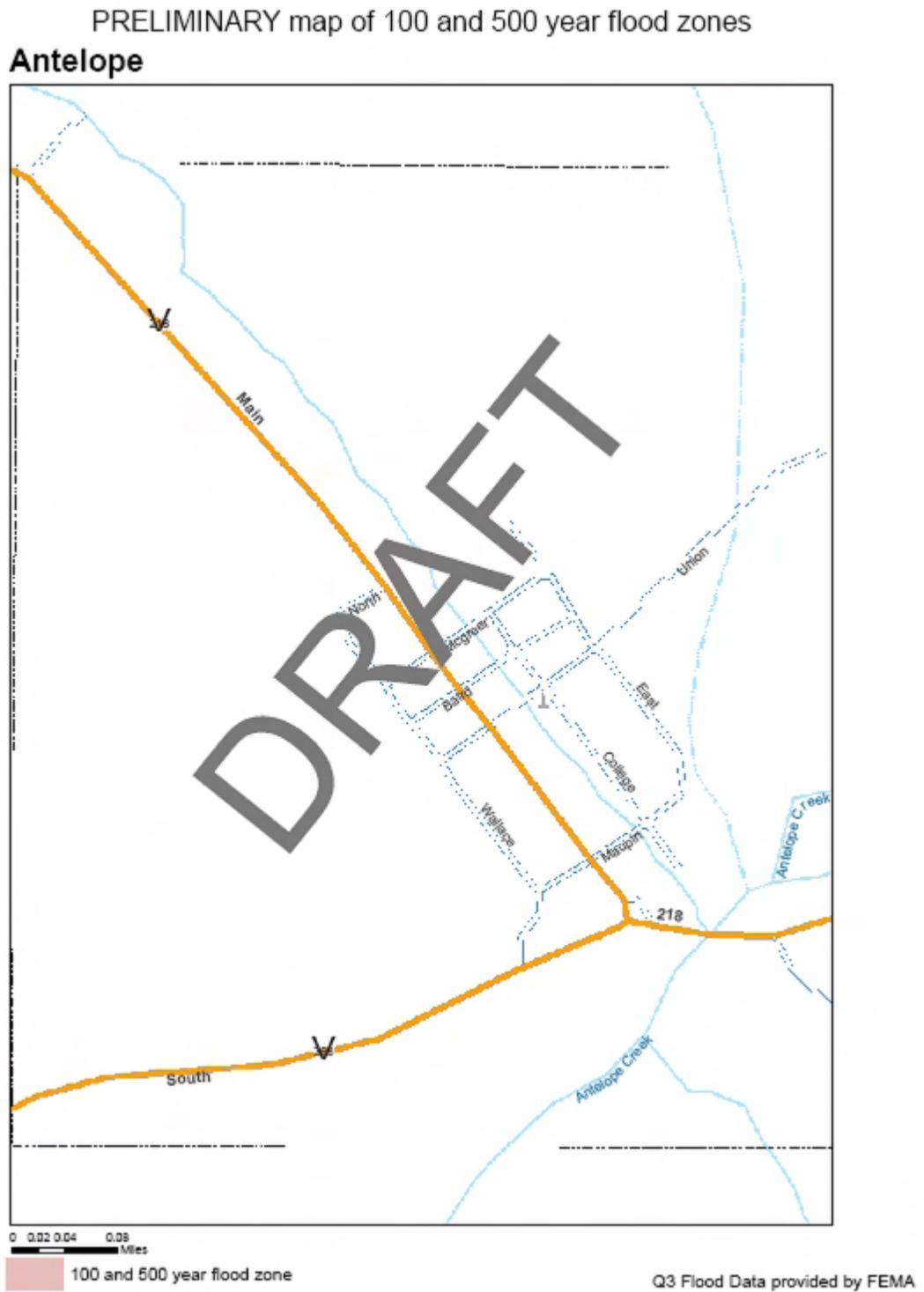
C. Upon consideration of the factors in B., and the purposes of this ordinance, conditions may be attached to the granting of the variance as is deemed necessary to further the purposes of this ordinance.

D. Records of all appeal actions shall be maintained by Wasco County and any variances shall be reported to the Federal Insurance Administration upon request.

E. Conditions for Variances:

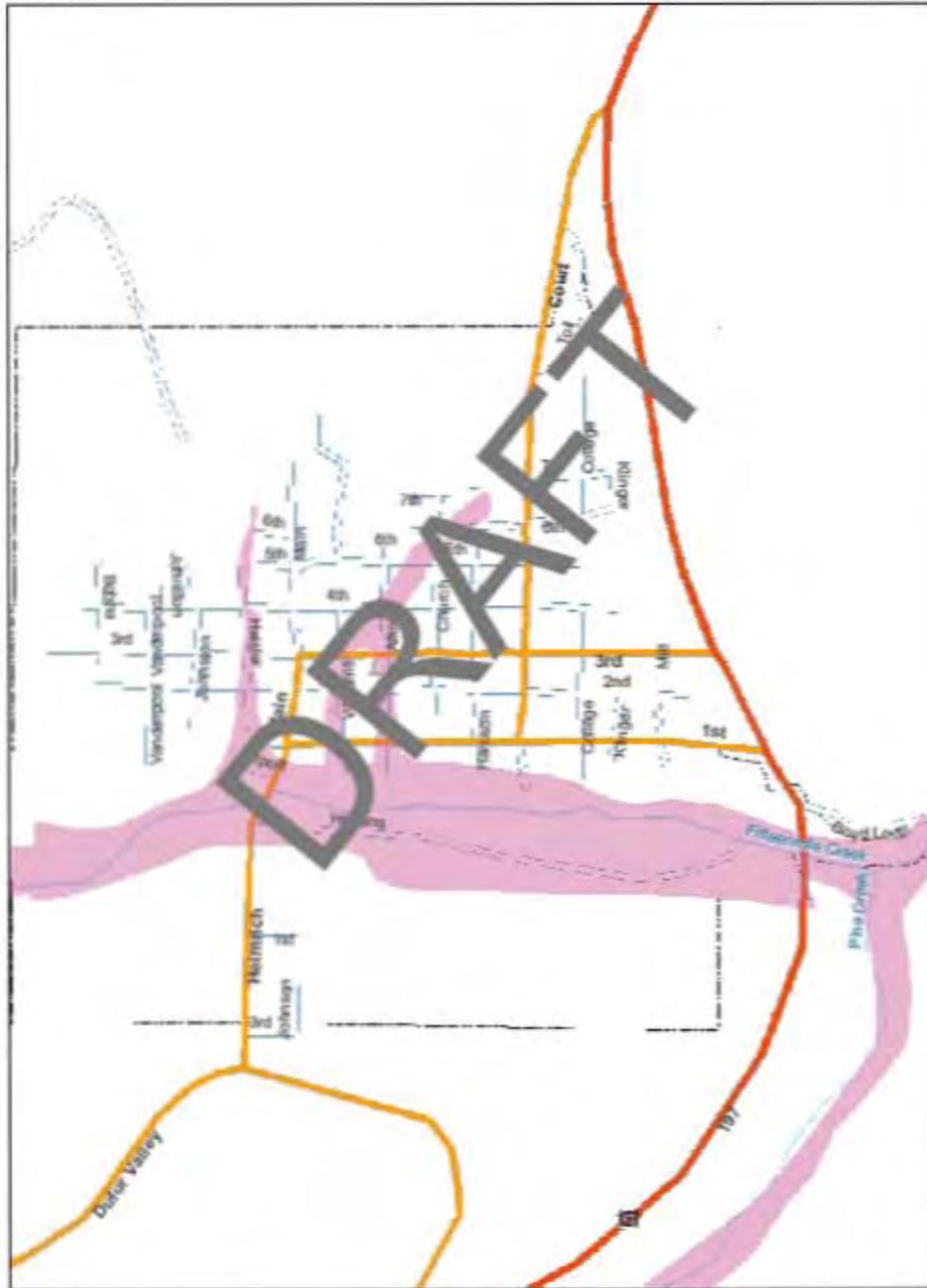
1. Generally, the only condition under which a variance from the elevation standard may be issued is for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing items.

Figures HA.5 – 10 DOGAMI Flood Zone Maps



PRELIMINARY map of 100 and 500 year flood zones

Dufur

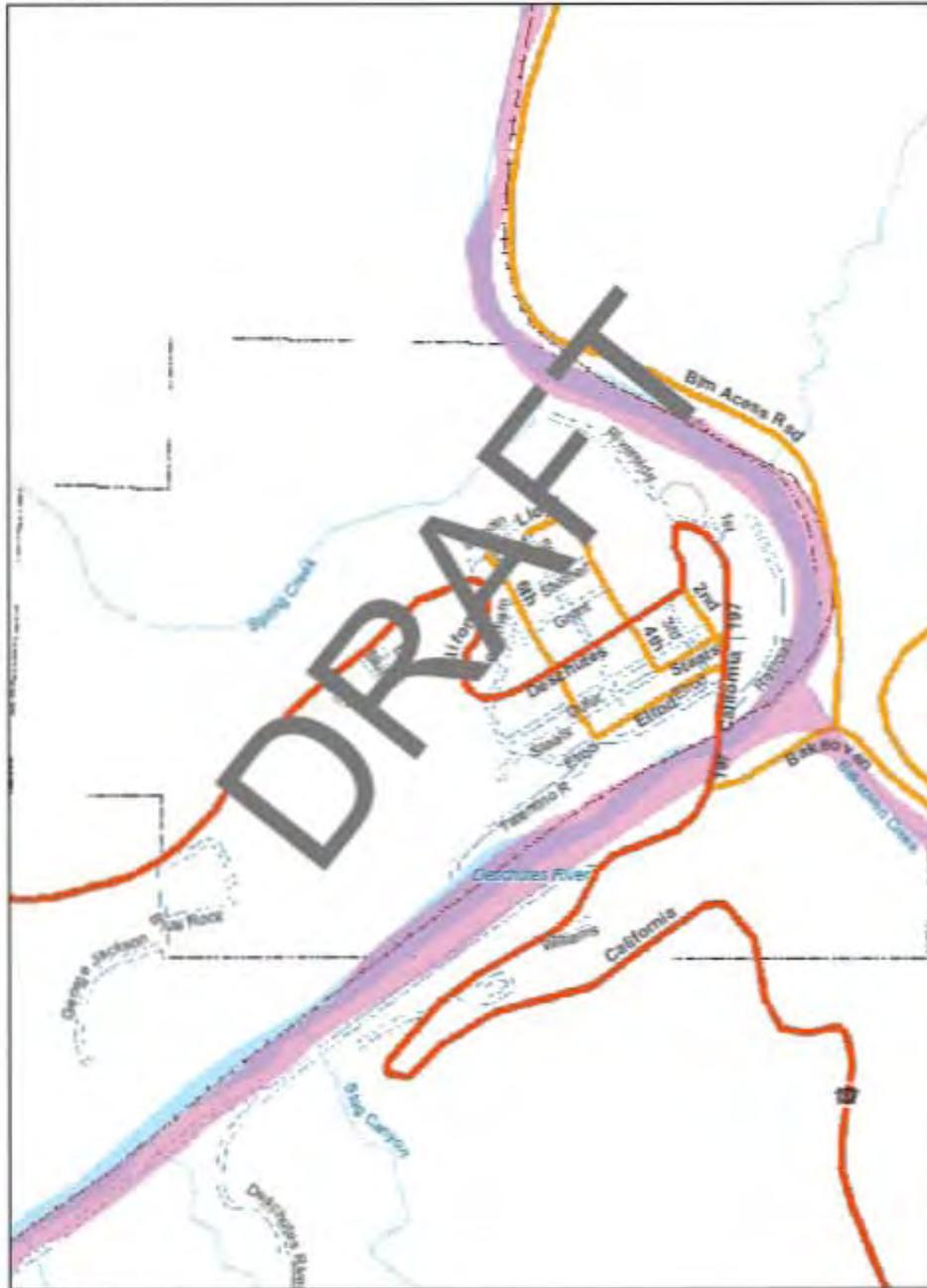


SCALE 0.25
Miles
100 and 500 year flood zone

Q3 Flood Data provided by FEMA

PRELIMINARY map of 100 and 500 year flood zones

Maupin

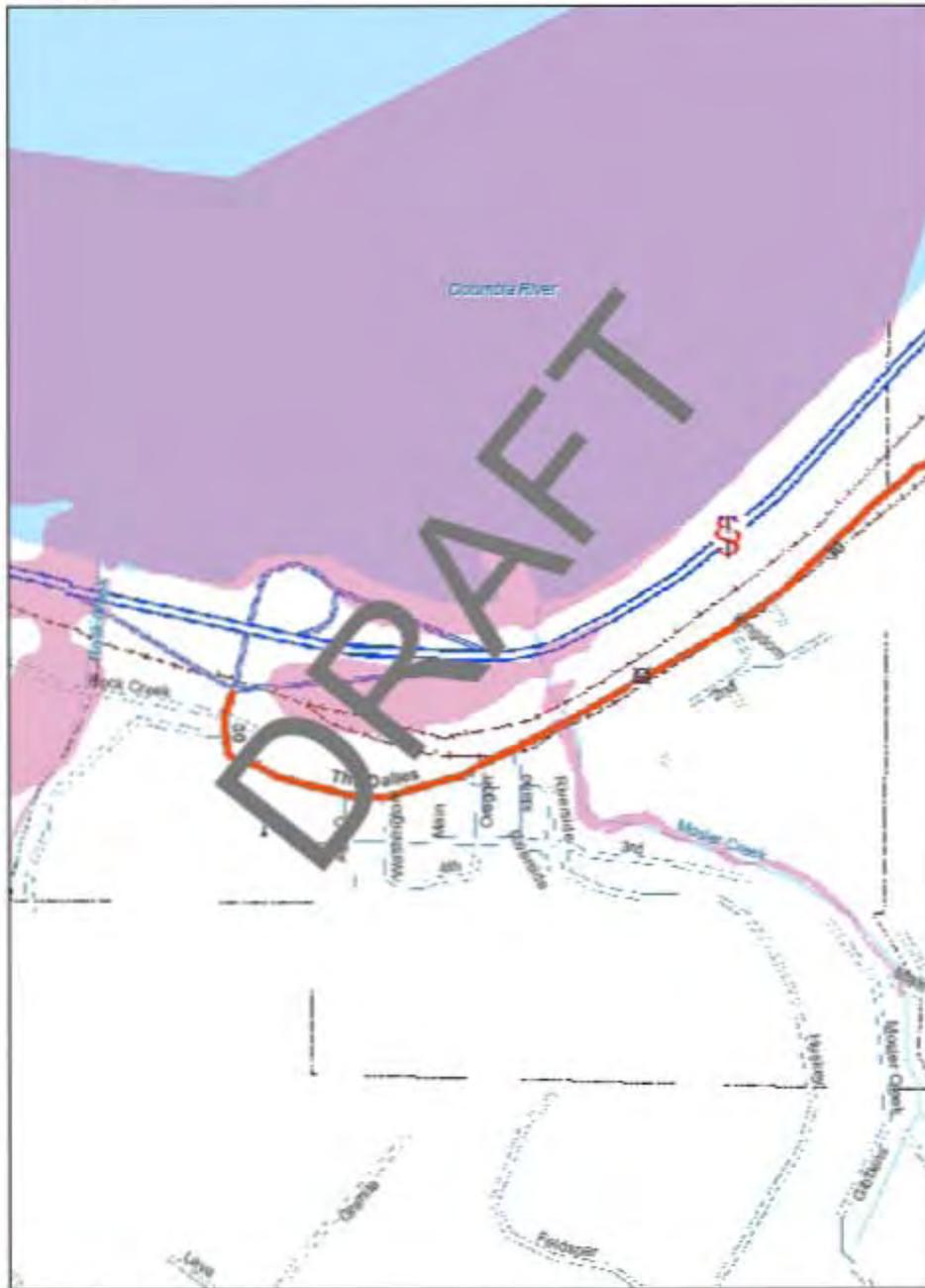


0.1 Miles
100 and 500 year flood zone

Q3 Flood Data provided by FEMA

PRELIMINARY map of 100 and 500 year flood zones

Mosier

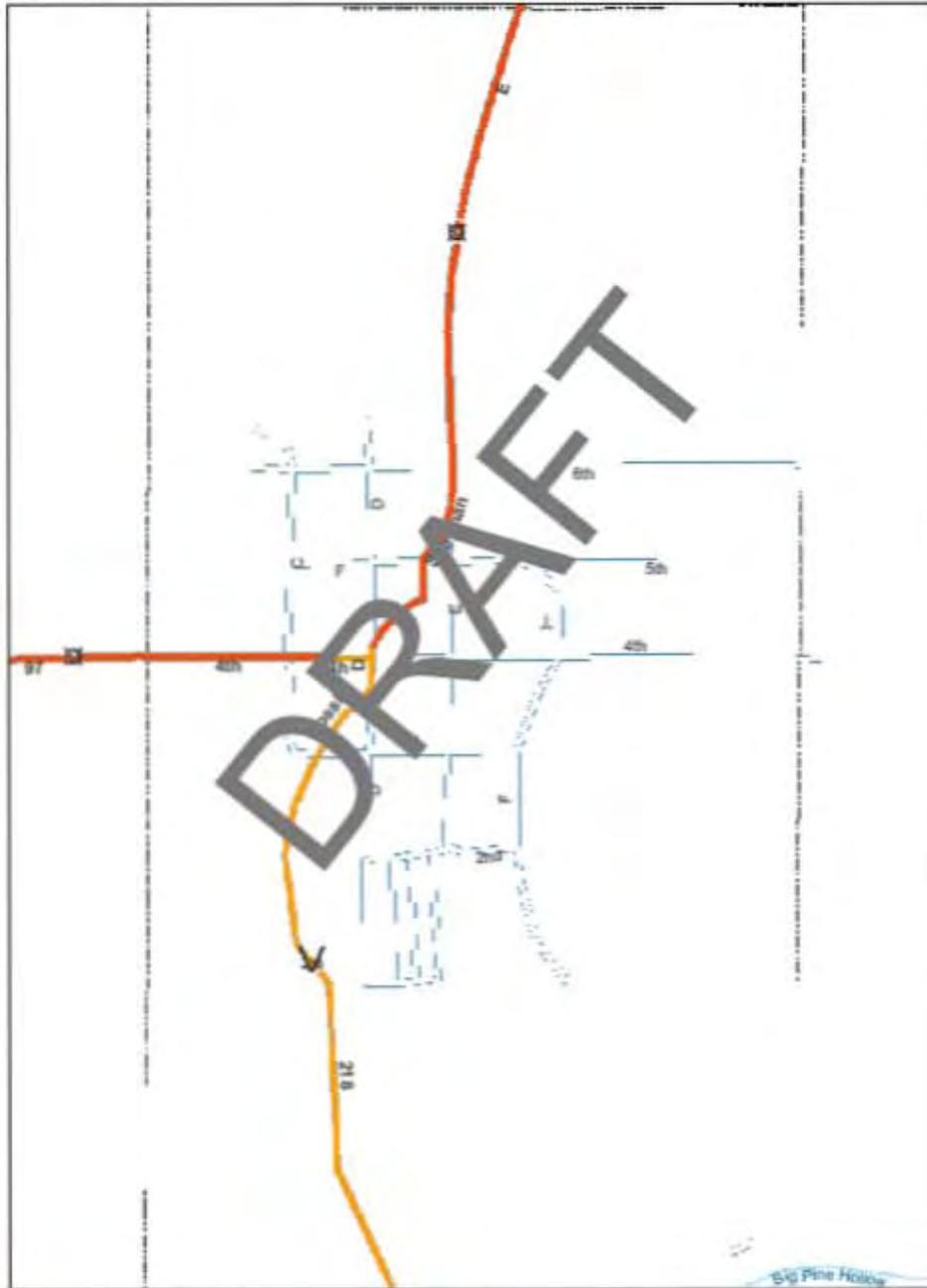


0.000000 0.000000 Miles
100 and 500 year flood zone

Q3 Flood Data provided by FEMA

PRELIMINARY map of 100 and 500 year flood zones

Shaniko



0.00 0.06
Miles
100 and 500 year flood zone

Q3 Flood Data provided by FEMA

PRELIMINARY map of 100 and 500 year flood zones
The Dalles



00:128.25 0.0
0.5
Miles
100 and 500 year flood zone

Q3 Flood Data provided by FEMA

State Hazard Assessment

Scores are based on an analysis of risk conducted by county emergency program managers, usually with the assistance of a team of local public safety officials.

Vulnerability	Probability
Moderate	High

HIVA Assessment

Historically, flooding occurs along one or more of the County's waterways every few years, suggesting a moderate probability of occurrence. Because of the relative land area and population affected, the County is exposed to moderate vulnerability. The frequency of flooding, the potential for simultaneous flooding events, plus the historical record of recurrent flooding and cumulative costs, all suggest the assignment of a moderate risk rating.

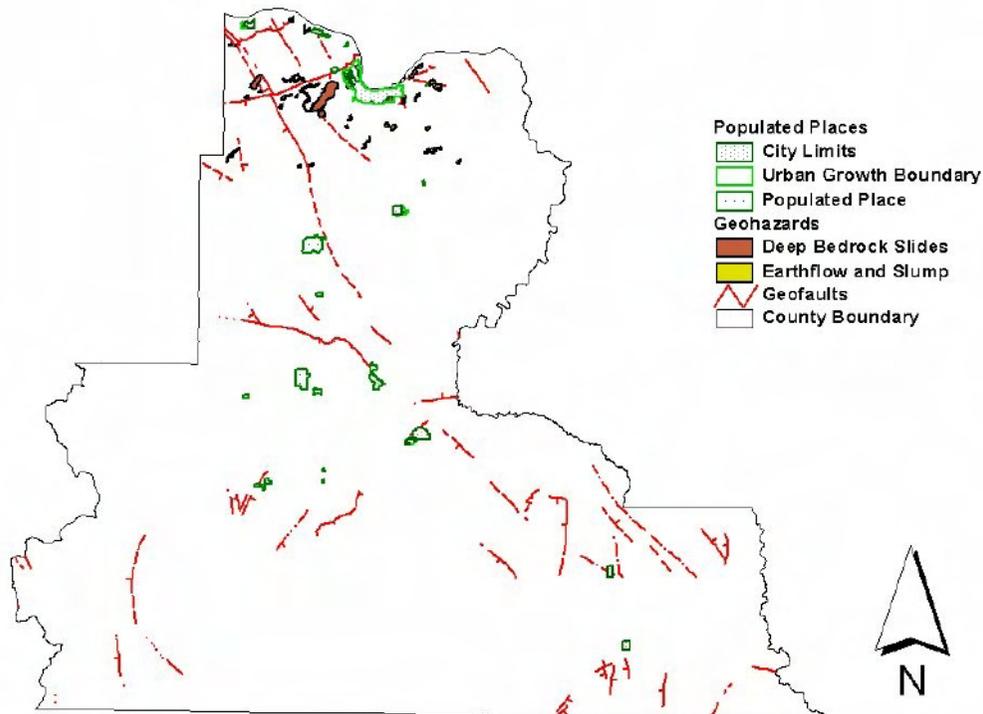
Oregon Technical Resource Guide

A hard copy of the TRG can be found at the Wasco County Planning & Development office. The TRG is also available online at: <http://www.oregonshowcase.org/index.cfm>

Best Available Local Data

From the Wasco County Land Use and Development Ordinance:

Figure HA.11 Wasco County Geologic Hazard Overlay



SECTION 3.750 DIVISION 2 - GEOLOGIC HAZARDS OVERLAY

The purpose of the Geologic Hazards Overlay District is to protect the public health, safety and welfare by assuring that development in hazardous or potential hazardous areas is appropriately planned to mitigate the threat to man's life and property.

A. Basis for Establishing the Geologic Hazards Overlay District

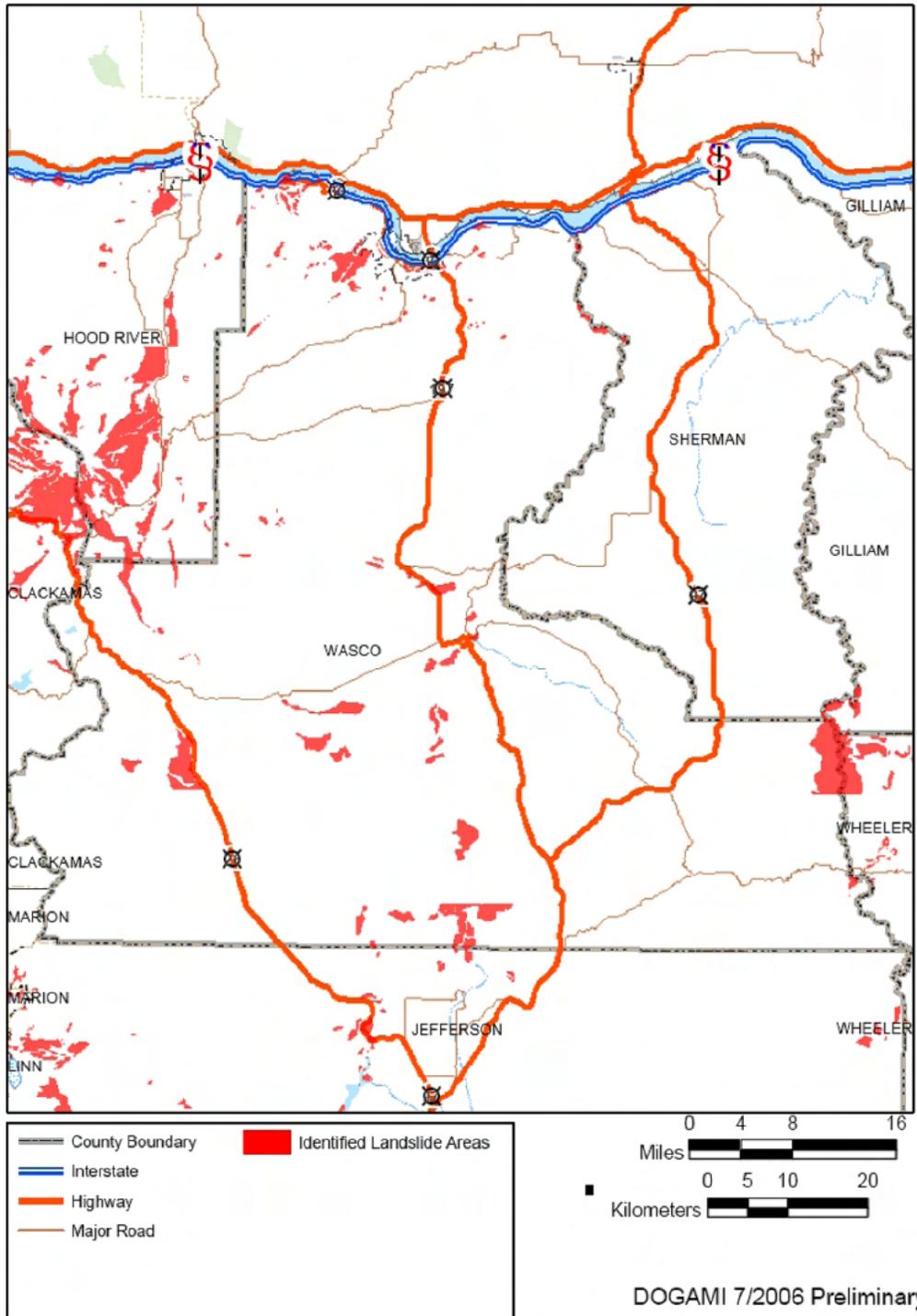
The Geologic Hazards Overlay District is intended to be applied to areas identified by the State of Oregon Department of Geology and Mineral Industries, Geologic Hazards of Parts of Northern Hood River, Wasco and Sherman Counties, Oregon, 1977. A complete explanation and maps showing the natural hazards and geologic units can be found in this document; however, this document may be superseded by a more site specific study conducted by a licensed engineer or geologist registered in the State of Oregon.

B. Approval Standards

Prior to development, the following measures shall be utilized:

1. Any proposed developments on slopes greater than twenty-five percent (25%) shall be reviewed to ensure site suitability. Such review shall be conducted in the process for building permit approval and, unless the site has been identified as a geologic hazard area, shall rely on provisions of the Uniform Building Code for the protection of the public health, safety and welfare.
2. Any proposed development in an identified geologic hazard area shall be preceded by a written report by an engineering geologist or an engineer who certifies he is qualified to evaluate soils for suitability. For purposes of this section, development shall include any excavation or change in topography, such as home construction, associated roads, driveways, septic tank disposal fields, wells and water tanks. The written report of the engineering geologist or engineer shall certify that the development proposed may be completed without threat to public safety or welfare and shall be used in ministerially reviewing the development proposal.
3. In approval of a development permit, whether ministerial or through the Administrative Action procedures of Chapter 2 of this Ordinance, the following conditions may be imposed at the time of approval to ensure site and area stability:
 - a. Maintain vegetation and eliminate widespread destruction of vegetation.
 - b. Carefully design new roads and buildings with respect to:
 1. placement of roads and structures on the surface topography.
 2. surface drainage on and around the site.
 3. drainage from buildings and road surfaces.
 4. placement of septic tank disposal fields.
 - c. Careful construction of roads and buildings.
 1. avoid cutting toeslopes of slump blocks.
 2. careful grading around the site, especially avoiding over-steepened cut banks.
 3. re-vegetating disturbed areas as soon as possible.
 - d. Other conditions may be imposed to reasonably assure that the development is protected from damage by mass movement.

Figure HA.12 Identified Landslide Areas within Wasco County



State Hazard Assessment

Scores are based on an analysis of risk conducted by county emergency program managers, usually with the assistance of a team of local public safety officials.

Vulnerability	Probability
Low	Low

HIVA Assessment

Wasco County has a history of landslides suggesting a moderate probability of occurrence. Landslides tend to occur in isolated, sparsely developed areas threatening individual structures and remote sections of the transportation, energy and communications infrastructure suggesting low vulnerability. Because of the moderate probability of occurrence, a moderate risk rating is assigned.

Oregon Technical Resource Guide

A hard copy of the TRG can be found at the Wasco County Planning & Development office. The TRG is also available online at: <http://www.oregonshowcase.org/index.cfm>

SEVERE STORM

Best Available Local Data

XXXXXXXXXXXX

State Hazard Assessment

Scores are based on an analysis of risk conducted by county emergency program managers, usually with the assistance of a team of local public safety officials.

Windstorm

Vulnerability	Probability
Moderate	Moderate

Winter Storm

Vulnerability	Probability
High	High

HIVA Assessment

Storm history suggests a high probability of occurrence. Historical damage and cumulative costs of destructive storms suggest high vulnerability. Accordingly, a high risk rating is assigned.

Oregon Technical Resource Guide

A hard copy of the TRG can be found at the Wasco County Planning & Development office. The TRG is also available online at: <http://www.oregonshowcase.org/index.cfm>

Best Available Local Data

Please consult the Wasco County Community Wildfire Protection Plan (CWPP) for more information (click on title below).

Wasco County, Oregon
Community Wildfire Protection Plan



December 21, 2005

**Prepared by
James H. Hulbert**

State Hazard Assessment

Scores are based on an analysis of risk conducted by county emergency program managers, usually with the assistance of a team of local public safety officials.

Vulnerability	Probability
High	High

HIVA Assessment

Historically, it appears that the instance of wildfire is increasing through the region. Additionally, the existence of open range lands and large forested areas, increasing population and recreational activities, and the uncertain impact of a changing climate combine to suggest a high probability of occurrence. The destruction of large tracts of forest land would have immediate economic impact to the community through lost jobs, reduced taxes, and increased public support while collateral economic and social effect could impact the County for years, suggesting moderate vulnerability. Accordingly, a high risk rating is assigned.

Oregon Technical Resource Guide

A hard copy of the TRG can be found at the Wasco County Planning & Development office. The TRG is also available online at: <http://www.oregonshowcase.org/index.cfm>

Best Available Local Data

Please consult the report [Volcanic Hazards in the Mount Hood Region, Oregon](#) for more information (click on title below).

U.S. Department of the Interior
U.S. Geological Survey

VOLCANO HAZARDS IN THE MOUNT HOOD
REGION, OREGON



By

W.E. Scott¹, T.C. Pierson¹, S.P. Schilling¹, J.E. Costa¹,
C.A. Gardner¹, J.W. Vallance², and J.J. Major¹

1. U.S. Geological Survey, Cascades Volcano Observatory, 5400 MacArthur Boulevard, Vancouver, WA 98661
2. McGill University, Department of Civil Engineering and Applied Mechanics, 817 Sherbrooke St. West, Montreal, QC, H3A 2K6, Canada

Open-File Report 97-89

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards or with the North American Standard Geographic Code. Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

1997

State Hazard Assessment

Scores are based on an analysis of risk conducted by county emergency program managers, usually with the assistance of a team of local public safety officials.

Vulnerability	Probability
High	Moderate

HIVA Assessment

History suggests a low probability of occurrence. Because of potential impact to the White River and Deschutes River drainages from a lahar flow, there is low vulnerability. Because Mt. Hood is relatively quiet, this hazard is assigned a low risk rating.

Oregon Technical Resource Guide

A hard copy of the TRG can be found at the Wasco County Planning & Development office. The TRG is also available online at: <http://www.oregonshowcase.org/index.cfm>

Appendix A:

Public Process

People tend to support what they help build. To engage public support of this plan, and to involve the residents in the process, the University of Oregon RARE participant assigned to coordinate this project reached out to the Wasco County community in three primary ways. First, a steering committee was formed to guide the NHMP Coordinator through the process of developing the plan. Secondly, The Coordinator sent out invitations to key stakeholders and an open invitation to the public for a NHMP Community Stakeholder Forum to raise awareness about natural hazard events and solicit input from community. Lastly, stakeholder interviews were conducted to retrieve local community knowledge of hazard events and how to best address the community's risk. Secondary methods of outreach were also conducted in posting the final draft of the mitigation plan for public comment on the County Planning & Development website and the printing and distribution of the International Business & Home Safety Protect Your Home From Wildfire brochure at the Wasco County Planning & Development service counter. Lastly, ONHW conducted region-wide outreach and training efforts in the form of a regional household preparedness survey and IBHS Open for Business training.

Steering Committee

The Wasco County Steering Committee was comprised of individuals best suited to guide the county through the planning process and ensure that the mitigation plan is fully implemented once adopted.

Its mission is to ensure proper development and implementation of the county natural hazards mitigation plan by:

- setting goals;
- establishing sub committee work groups to address specific needs;
- ensuring public, private and federal participation;
- distributing and presenting the plan;
- facilitating public discussion/involvement;
- developing implementation activities; and
- coordinating plan maintenance and implementation strategies.

Through raising awareness and citizen involvement, the Committee's end goal is to make hazard mitigation a part of the community's routine decision-making process.

Methodology

Three Steering Committee sessions were held over the course of the 2006 calendar year:

- 1) Introduction & Overview: 17 January 2006
- 2) Hazard Risk Assessment: 3rd March 2006
- 3) Goals & Action Items: 13 July 2006

These sessions set the tone and structure for the plan’s development. Through these meetings the NHMP Coordinator was able to collect valuable information regarding hazard events and impacts within the County, as well as contacts for additional stakeholders to involve in the process. The Steering Committee also played an integral part in the development of the mitigation plan vision, mission, goals and action items. The Committee revised the drafted vision, mission and goals, and selected and prioritized the action items documented in this plan.

Participants

The steering committee was formed by Michael Pasternak, NHMP Coordinator under the guidance of Todd Cornett, Wasco County Planning & Development. Additional input provided by the Oregon Natural Hazards Workgroup. Participants included:

Table A.1 NHMP Steering Committee

Name	Title	Organization
Dan Boldt	Director	Wasco County Public Works
Mike Davidson	Emergency Manager	Wasco County Emergency Management
Todd Cornett	Director	Wasco County Planning & Development
Jennifer Clark	Project Coordinator	Wasco County SWCD
Richard Gassman	Senior Planner	City of The Dalles
Sherry Holliday	County Commissioner	Wasco County Court
Stu Nagle	Fire Marshall	Mid-Columbia Fire & Rescue
Hannah Settje	District Manager	Red Cross

Community Stakeholder Forum

The County-wide Stakeholder Forum held was designed to solicit input from individuals and community organizations with resources or property that may be severely impacted by natural disasters. The Forums was held on April 10th 2006 at the Columbia Gorge Discovery Center in The Dalles, OR. Roughly 50 people from the County were invited to attend the Forum. The invitees consisted of business leaders, utility providers, government workers (state and county), service providers, transportation & communication workers, health providers, and representatives of vulnerable populations (e.g. elderly, migrant workers).

The purpose of the Forum was three-fold:

- 1) To spread awareness of potential disasters impacting the County by soliciting a large cross-section of the active public to participate in the hazard mitigation process;

- 2) To provide a factual basis for potential hazard mitigation measures by public input into critical County infrastructure and resources, and known hazard zones, through the critical asset and hazard identification mapping exercise; and
- 3) To plant the seeds for potential mitigation measures by introduction and discussion of action item concept and creating personal relationships (i.e. face-to-face introduction) for stakeholder interview and action item follow-ups.

Unfortunately attendance for the Forum was quite poor. Though nearly 50% RSVP'd, roughly 10% of invitees actually attended. Factors attributing to poor attendance were:

- 1) Forum was scheduled in the middle of government budget season;
- 2) Methods of outreach- emails, phone calls- proved inadequate;
- 3) General attitudes to hazards in the community and mitigation in particular (the floods of 1996 were the last major disaster) gave the Forum an air of little importance.

Those that participated in the Forum were actively responsive to the mapping exercise and the concepts and importance of hazard mitigation. The identification of critical assets and infrastructure re-enforced much of what had already been identified in steering committee meetings and coordinator research, and also provided some previously overlooked assets. All Forum participants have been willing participants in the stakeholder interview follow-ups.

Methodology & Outcomes

The method and outcomes of the Community Stakeholder Forum are described below:

(1) DOGAMI Hazard Impact Overview

Bill Burns, DOGAMI Engineering Geologist presented and dissected local and state natural hazards data, and informed participants on how communities are impacted by natural hazard events.

Outcome: Documented community stakeholder knowledge/input with respect to local hazard events.

(2) Community Asset Identification Exercise

Participants were asked to fill out a worksheet identifying the County's critical infrastructure and assets.

Outcome: (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).

- Participants identified many of the same critical assets identified in the Steering Committee meeting and NHMP Coordinator research. This that assured that data collected for mitigation plan purposes was relevant.

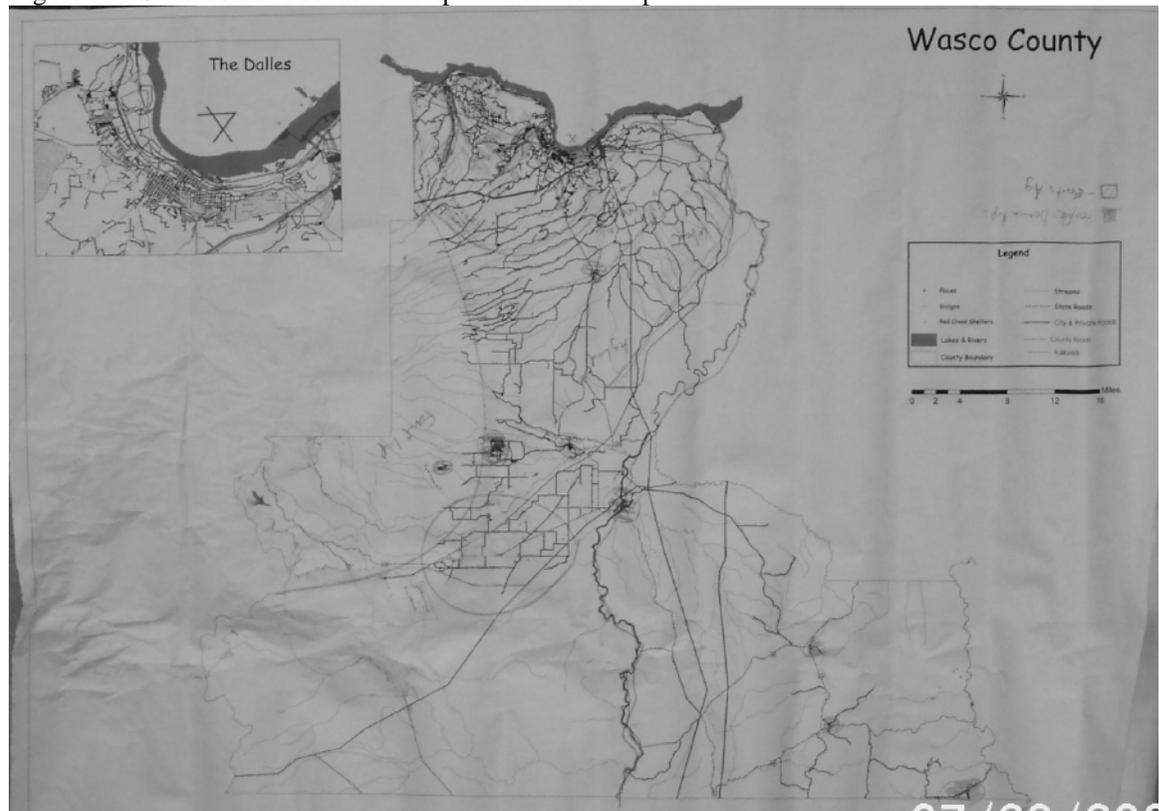
(3) Community Mapping Exercise

Participants were asked to map assets & infrastructure from previous exercise

Outcome: (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.

- Participants identified previously un-documented storm water drainage issues along County Hwy 216, the main east-west access route for the southwestern portion of the County.

Figure A.1 Stakeholder Forum Participant Exercise Map



(4) Action Items & Follow-up Stakeholder Interviews

Discussed importance mitigation and the development of action items; passed out action item forms to participants

Outcome: Documented potential action items discussed in forum, and distributed action item worksheets to participants. Set up stakeholder interview.

Invitees

The following the individuals and organizations were contacted to participate in the Forum:

Table A.2 Community Stakeholder Forum Invitees

Name	Organization
Susan Huntington	Dalles Area Chamber of Commerce
Katie MacKendrick*	MCCED
Robert Durham	Oregon Cattlemen's Association
Dan Ericksen	Cherry Growers Association
Kim MucCullough	OSU Extension
Bob Cole	Economic Development Commission
David S. Meyer	Bonneville Power Association
Andrea Klass	Port of The Dalles
Mel Gard	Oregon Department of Forestry
	Oregon Department of Transportation
Tom Yates	Sprint
Roger Nichols	The Dalles Chronicle
	Mid Columbia Medical Center
	Warm Springs
	Senior Advisory Council
Eugene Walters	Juniper Flat Fire District
	Mid Columbia Association of Realtors
Ben Beseda	Tenneson Engineering
Frank Toda	Columbia Gorge Community College
	Army Corp of Engineers
Leo Sidebotham	Bureau of Land Management
Leo Segovia	USDA Forest Service
Rod French	Oregon Department of Fish & Wildlife
Marty Matherly*	Wasco County Roads
	KACI Radio
	Wasco Public Health Department
Bill Burns*	DOGAMI
	Wasco County Schools
	Wasco County Building Codes
	Union Pacific Railroad
	Wasco County Public Works

*Participant

Stakeholder Interviews

Due to poor community participation in the Stakeholder Forum, the stakeholder interviews became a crucial component of the public process. Many of the Forum invitees were contacted and their input included in the plan. The individuals contacted

ranged from city, state, and federal government employees to business owners and farmers. These individuals provided insight into how hazard events have impacted the community in the past, how growth and development could collide with future hazard events, and how the community can best work together to reduce collective risk. Many of the action items documented in this plan were spawned from ideas discussed during the stakeholder interview process.

Methodology

Stakeholder interviews were conducted May through July 2006. The NHMP Coordinator telephoned stakeholders individually and asked a series of questions. The questions are as follows:

- What is the history of natural hazard events in Wasco County?
- How does growth and development in the community, both current and projected, contribute to natural hazard events?
- Does your organization/industry currently work in natural hazard mitigation? If so, how?
- How can your organization/industry contribute to strengthen regional coordination and cooperation in reducing risk from natural hazards?
- What activities will assist Wasco County in reducing risk and preventing loss from future natural hazard events? (e.g. If you had the money, how would you spend it?)
- How does your organization/industry view the County government's role in reducing risk from natural hazard events?
- What are the ways you would like to see agencies, organizations or individuals participating and coordinating to reduce risk from natural hazards?
- How does hazard mitigation fit into Wasco County's land-use, environmental, social, and economic goals?
- What goals should the County set to reduce risk from natural hazard events, and how would we measure whether our mitigation efforts are successful?
- Can you think of anyone else that should be contacted as part of this process?

The information recorded from the stakeholder interviews was primarily incorporated into three sections of this plan: Community Profile, Risk Assessment, and Goals & Action items.

Contacts

The following the individuals and organizations were contacted to participate in the stakeholder interview process:

Table A.3 Community Stakeholder Interview Contacts

Name	Organization
Susan Huntington*	Dalles Area Chamber of Commerce
Katie MacKendrick	MCCED
Robert Durham*	Oregon Cattlemen's Association
Dan Ericksen*	Cherry Growers Association
	OSU Extension
Bob Cole*	Economic Development Commission
David S. Meyer*	BPA
Andrea Klass*	Port of The Dalles
Mel Gard*	ODF
	ODOT
Tom Yates*	Sprint
Roger Nichols*	The Dalles Chronicle
	Mid Columbia Medical Center
	Warm Springs
	Senior Advisory Council
Eugene Walters*	Juniper Flat Fire District
John Helquist*	Maupin Fire
Marty Matherly*	Wasco County Public Works
Bill Burns*	DOGAMI

*Participant

Secondary Outreach Methods

Additional methods of outreach involved in the public process included:

Public Comment of Wasco County NHMP Draft

The mitigation plan draft was sent to steering committee members for review, comment, and approval before the final draft was shipped off the OEM for State review. Additionally, the plan was posted on the Wasco County Planning & Development website for public review and comment.

IBHS Wildfire Brochure

While the final draft of the NHMP was under review by the Steering Committee and public, the NHMP Coordinator oversaw the printing and distribution of the International Business & Home Safety Protect Your Home From Wildfire brochure at the Wasco County Planning & Development service counter.

ONHW Region-wide Outreach

The Oregon Natural Hazards Workgroup conducted region-wide outreach activities which included:

Household Preparedness Survey

As part of the regional PDM grant, ONHW implemented a region wide household preparedness survey. The survey gauged household knowledge of mitigation tools and techniques and assessed household disaster preparedness. The survey results improve public/private coordination of mitigation and preparedness for natural hazards by obtaining more accurate information on household understanding and needs. The results of the survey are documented in the plan's Appendix C: Regional Household Survey.

IBHS Open for Business Training

ONHW, with commitment from the Institute for Business & Home Safety (IBHS), provided individuals in the Mid-Columbia region with access to, and use of, the IBHS interactive, web-based Open for Business property protection and disaster recovery planning tool. The access was provided in two classes, one located in Hermiston, Oregon on May 24th, 2006 and the second in The Dalles, Oregon on May 25th, 2006.

The following agencies and organizations were invited to attend: agencies providing start-up and ongoing counseling services to micro and small businesses in low-income areas, such as the Statewide Small Business Development Center; agencies providing housing services to hundreds of low-income residents, such as County Housing Authorities, which also employs low-income people; and disaster assistance agencies serving at-risk populations, such as food banks and the American Red Cross. Any remaining spaces were made available to: micro- or small business start-up companies; and established micro- or small businesses.

The classes were organized as train-the-trainer classes, so that the agency personnel and the business people could: 1. Understand the importance of disaster planning; 2. Learn how to navigate the interactive, web-based Open for Business property protection and disaster recovery planning tool; 3. Start to develop their own plans during the training; 4. Learn how to communicate the importance of developing and utilizing plans for property protection and recovery from business interruption to their constituencies and/or colleagues, in order to institutionalize disaster safety into every day decision making.

Recruitment Process

The Oregon Natural Hazards Workgroup assembled a list of social service providers from basic internet searches and representative small businesses from Chamber of Commerce Membership databases for the seven counties in the region. E-mail and/or mailed invitations were sent to over 200 agencies, organizations and businesses in the region. Recruitment materials can be found on the following page. The following agencies and organizations attended the workshop:

- Umatilla/Morrow County Housing Authority
- Irrigon Chamber of Commerce

- Pendleton Chamber of Commerce
- Small Business Development Center – Blue Mountain Community College
- Small Business Development Center – Columbia Gorge Community College
- Wasco County Human Services Department

Appendix B: Resource Directory

The following appendix includes local, regional, state and federal resources for some of the hazards addressed in the plan. The directory also includes key publications and additional resources. This appendix was developed by the Community Service Center's Oregon Natural Hazards Workgroup at the University of Oregon for use by Pre-Disaster Mitigation Communities.

Multi-Hazard Mitigation Resources

County Resources

Northern Wasco County People's Utility District (PUD)

<http://www.nwasco.com/default.htm>

2345 River Road

The Dalles, Oregon 97058

Telephone: 541-296-2226

Fax: 541-298-3320

Wasco County Building Codes Information

541-298-4461

2705 East Second Street

The Dalles OR 97058

<http://www.co.wasco.or.us/statebuildingcodes/statecontacts.html>

Wasco County Commissioners / Judge

511 Washington St.

The Dalles OR 97058

Office: 541-506-2520

Wasco County Emergency Management

541-506-2790

421 E. 7th St. Annex B

The Dalles OR 97058

Wasco County Extension Service OSU

541-296-5494

400 E. Scenic Dr.

The Dalles OR 97058

Wasco County GIS

541- 506-2640

Coordinator: Tycho Granville

Wasco County Mental Health - Mid Columbia Center for Living

541-296-5452

719 E. 7th
The Dalles OR 97058

Wasco - Sherman County Public Health Department

Voice: 541-506-2600

--Communicable Disease: 541-506-2600

--Environmental Health: 541-506-2603

--Family Planning Program: 541-506-2600

--Immunization: 541-506-2600

--Prenatal: 541-506-2600

--WIC Program: 541-506-2610

Fax: 541-506-2601

TTY: 541-296-4035

419 E. 7th St., Rm 100

The Dalles OR 97058

<http://www.wshd.org/>

Wasco County Public Works Office & Shop

541- 506-2640

--County Surveyor: 541- 506-2640

--GIS: 541- 506-2640

--Roads-Antelope: 541-489-3326

--Roads-Dufur: 541-467-2242

--Roads-Mosier: 541-478-3355

--Roads-The Dalles: 541-506-2642

--Roads-The Dalles Shop: 541-

--Roads-Wamic: 541-544-2322

--Weed Department: 541-506-2650

2705 East Second Street

The Dalles OR 97058

<http://www.co.wasco.or.us/publicworks/default.html>

Wasco County Sheriff's Office

EMERGENCY : phone 9-1-1

--Animal Control: 541-296-5454

--Civil Division: 541- 506-2587

--Community Corrections: 541- 506-2570

--Communications Center: 541-298-5507

--Emergency Management: 541- 506-2790

--General Business: 541- 506-2580

--Non-Emergency Dispatch: 541-296-5454

Search & Rescue

511 Washington St.

The Dalles OR 97058

<http://www.co.wasco.or.us/sheriff/sheriffhome.html>

Wasco County Sheriff's Office - South County
541-395-2214
Maupin OR 97037
<http://www.oregonsheriffs.org/wasco/index.shtml>

Regional Resources

Mid Columbia Council of Governments

The mission of the Mid-Columbia Council of Governments (MCCOG) is to serve as a forum for intergovernmental cooperation and cost effectiveness by providing joint strategic planning for the provision of services; centralization of expertise which may not be affordable by individual member organizations; and the acquisition of revenue with which to fund programs and services as designated by its Board of Directors and the member governments which they represent.

Contact: John Arens, Executive Director
Address: 635 Capitol St. NE, Suite 200, Salem, OR 97301-2540
Phone: (800)735-2900
Fax:
Website: <http://www.mccog.com/default.htm>

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, with flood as its major focus. DLCD serves as the federally designated agency to coordinate floodplain management in Oregon. They also conduct various landslide related mitigation activities. 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.oregon.gov/LCD/HAZ/index.shtml>
Oregon Floodplain Coordinator: (503) 373-0050 ext. 250

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

OEM administers FEMA's Hazard Mitigation Grant Program, which provides post-disaster monies for acquisition, elevation, relocation, and demolition of structures located in the floodplain. OEM also administers FEMA's Flood Mitigation Assistance Program. This program provides assistance for NFIP insured structures only. OEM also helps local jurisdictions to develop hazard mitigation plans. OEM is heavily involved in flood

damage assessment and works mainly with disaster recovery and hazard mitigation programs. OEM provides training for local governments through workshops on recovery and mitigation. OEM also helps implement and manage federal disaster recovery programs.

Contact: Office of Emergency Management
Address: PO Box 14370, Salem, OR 97309-5062
Phone: (503) 378-2911
Fax: (503) 373-7833
Website: <http://www.oregon.gov/OOHS/OEM/index.shtml>
OEM Hazard Mitigation Officer: (503) 378-2911 xt. 22247
Recovery and Mitigation Specialist: (503) 378-2911 xt. 22240

Oregon Department of Geology and Mineral Industries (DOGAMI)

The mission of the Department of Geology and Mineral Industries is to serve a broad public by providing a cost-effective source of geologic information for Oregonians and to use that information in partnership to reduce the future loss of life and property due to potentially devastating earthquakes, tsunamis, landslides, floods, and other geologic hazards. The Department has mapped earthquake hazards in most of western Oregon.

Contact: Deputy State Geologist, Seismic, Tsunami, and Coastal Hazards Team Leaders
Address: 800 NE Oregon St., Suite 965, Portland, Oregon 97232
Phone: (971) 673-1555
Fax: (971) 673-1562
Website: <http://www.oregongeology.com>

Federal Resources

Federal Emergency Management Agency (FEMA)

FEMA provides maps of flood hazard areas, various publications related to flood mitigation, funding for flood mitigation projects, and technical assistance. FEMA also operates the National Flood Insurance Program. FEMA's mission is "to reduce loss of life and property and protect the 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: 228th St. SW, Bothell, WA 98021-9796
Phone: (425) 487-4678
Website: <http://www.fema.gov>

United States Geological Survey (USGS)

The USGS website provides current stream flow conditions at USGS gauging stations in Oregon and throughout the Pacific Northwest. The Oregon USGS office is responsible for water-resources investigations for Oregon and part of southern Washington. Their office cooperates with more than 40 local, state, and federal agencies in Oregon. Cooperative activities include water-resources data collection and interpretive water-availability and water-quality studies.

Contact: USGS Oregon District Office
Address: 10615 S.E. Cherry Blossom Dr., Portland, OR 97216
Phone: (503) 251-3200
Fax: (503) 251-3470
Website: <http://oregon.usgs.gov>
Email: dc_or@usgs.gov

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 6013, Washington, DC 20230
Phone: (202) 482-6090
Fax: (202) 482-3154
Website: <http://www.noaa.gov>
Email: answers@noaa.gov

National Weather Service, Portland / Pendleton

The National Weather Service provides flood watches, warnings, and informational statements for rivers in Wasco County

Contact: National Weather Service, Portland Bureau
Address: P.O. Box 2946, Portland, OR 97208-2946
Phone: (503) 261-9246 or (503) 261-9247
Fax: (503) 808-4875
Website: <http://www.wrh.noaa.gov/pqr/>

Contact: National Weather Service, Pendleton Bureau
Address: 2001 NW 56th Drive, Pendleton, OR 97801
Phone: (541) 276-7832
Website: <http://www.wrh.noaa.gov/pdt/>

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, Columbia, Multnomah, Washington, Yamhill, and Tillamook counties. The Oregon Trail Chapter provides a variety of community services which are consistent with the Red Cross mission and meet the specific needs of this area, including disaster planning, preparedness, and education.

Contact: Hannah Settje, District Manager
Address: PO Box 6839
Bend OR 97708
Phone: 541.382.2142
Fax: 541.382.2405
Website: <http://www.mountainriver.redcross.org>
Email:

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. This 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: 4775 E. Fowler Avenue, Tampa, FL 33617
Phone: (813) 286-3400
Fax: (813) 286-9960
E-mail: info@ibhs.org
Website: <http://www.ibhs.org/>

Flood Mitigation Resources

County/Regional Resources

Wasco County Watermaster

541-506-2650

2705 East 2nd St

The Dalles OR 97058

<http://www.co.wasco.or.us/weeds/weedwatermaster.html>

Wasco County Weed Division and State Watermaster

541- 506-2650

2705 East 2nd St

The Dalles OR 97058

<http://www.co.wasco.or.us/weeds/weedwatermaster.html>

Weed Division helps to manage the invasion and spread of noxious weeds throughout the county.

State Resources

Oregon Department of Fish and Wildlife (ODFW)

ODFW's mission is to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations. ODFW regulates stream activity and engages in stream enhancement activities.

Contact: ODFW
Address: 3406 Cherry Avenue N.E., Salem, OR 97303
Phone: (503) 947-6000
Website: <http://www.dfw.state.or.us/>
Email: Odfw.Info@state.or.us

Oregon Department of State Lands (DSL)

DSL is a regulatory agency, responsible for administration of Oregon's Removal-Fill Law. This law is intended to protect, conserve, and make the best use of the state's water resources. It generally requires a permit from DSL to remove, fill, or alter more than 50 cubic yards of material within the bed or banks of waters of the state. Exceptions are in state scenic waterways and areas designated essential salmon habitat, where a permit is required for all in-stream activity, regardless of size. DSL and the US Army Corps of Engineers may issue these permits jointly.

Contact: Department of State Lands
Address: 775 Summer Street NE, Suite 100, Salem, OR 97301-1279
Phone: (503) 378-3805
Fax: (503) 378-4844
Website: <http://statelands.dsl.state.or.us/>
Assistant Director: (503) 378-3805, ext. 279
Western Region Manager: (503) 378-3805, ext. 246

Oregon Water Resources Department (WRD)

The WRD's mission is to serve the public by practicing and promoting wise long-term water management. The WRD provides services through 19 watermaster offices throughout the state. In addition, five regional offices provide services based on geographic regions. The Department's main administration is performed from the central office in Salem.

Contact: WRD
Address: 725 Summer Street NE, Suite A, Salem, OR 97301-1271
Phone: (503) 986-0900
Website: <http://www.wrd.state.or.us/OWRD/index.shtml>

Federal Resources

Bureau of Reclamation

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public. The Bureau of Reclamation owns Scoggins Dam in Washington County and prepares emergency action plans for events at the dam.

Contact: Bureau of Reclamation, Pacific Northwest Region
Address: 1150 N. Curtis Road, Boise, ID 83706
Phone: (208) 378-5012
Website: <http://137.77.133.1/pn/index.html>

Army Corps of Engineers

The Corps of Engineers administers a permit program to ensure that the nation's waterways are used in the public interest. Any person, firm, or agency planning to work in waters of the United States must first obtain a permit from the Army Corps of Engineers. In Oregon, joint permits may be issued with the Division of State Lands. The Corps is responsible for the protection and development of the nation's water resources, including navigation, flood control, energy production through hydropower management, water supply storage and recreation.

Contact: US Army Corps of Engineers-Portland District, Floodplain Information Branch
Address: P.O. Box 2946, Portland, OR 97208-2946
Phone: (503) 808-5150
Website: <http://www.nwp.usace.army.mil/>

Wasco County Soil & Water Conservation District (SWCD)

The SWCD works in partnership with the Natural Resource Conservation Service to promote soil and water conservation in Wasco County. SWCD works with agricultural interests and landowners to provide information on natural resource conservation practices. The partnership blends individual member resources to offer technical and financial assistance in planning and applying natural resource conservation practices and systems. Areas of focus include: erosion management, wetlands preservation and restoration, resource inventories, watershed assessments, and conservation education.

Contact: Jennifer Clark, Coordinator

Address: 2325 River Road, Suite 3, The Dalles, OR 97058
Phone: 541) 296-6178
Fax: (541) 296-7868
Website: <http://www.wasco.oacd.org>

National Resources Conservation Service (NRCS), US Department of Agriculture (USDA)

NRCS provides a suite of federal programs designed to assist state and local governments, and landowners in mitigating the impacts of flood events. The Watershed Surveys and Planning Program and the Small Watershed Program provide technical and financial assistance to help participants solve natural resource and related economic problems on a watershed basis. The Wetlands Reserve Program and the Flood Risk Reduction Program provide financial incentives to landowners to put aside land that is either a wetland resource or experiences frequent flooding. The Emergency Watershed Protection Program (EWP) provides technical and financial assistance for clearing debris from clogged waterways, restoring vegetation, and stabilizing riverbanks. The measures taken under the EWP must be environmentally and economically sound and generally benefit more than one property.

Contact: USDA-NRCS
Address: 2325 River Rd., Suite 3 The Dalles, OR 97058
Phone: (541) 298-8559
Fax: (541) 298-7868
Website:

Additional Resources

The National Flood Insurance Program

The National Flood Insurance Program (NFIP) Website is a subsection of the Federal Emergency Management Agency (FEMA) site (<http://www.fema.gov>). The NFIP information is intended for both the general public and the many organizations and agencies participating in the program. It includes information about the NFIP and other flood disaster assistance available from the Federal Government. It also provides access to the newly revised NFIP booklet: Answers to Questions about the National Flood Insurance Program.

Contact: The National Flood Insurance Program
Phone: (888) FLOOD29 or (800) 427-5593
Website: <http://www.fema.gov/business/nfip/index.shtm>

The Association of State Floodplain Managers

The Association of State Floodplain Managers is an organization of professionals involved in floodplain management, flood hazard mitigation, the National Flood Insurance Program, and flood preparedness, warning, and recovery. ASFPM fosters communication among those responsible for flood hazard activities, provides technical advice to governments and other entities about proposed actions or policies that will affect flood hazards, and encourages flood hazard research, education, and training. The ASFPM Web site includes information on how to become a member, the organization's constitution and bylaws, directories of officers and committees, a publications list,

information on upcoming conferences, a history of the association, and other useful information and Internet links

Contact: The Association of State Floodplain Managers
Address: 2809 Fish Hatchery Road, Madison, WI 53713
Phone: (608) 274-0123
Website: <http://www.floods.org>

USGS Water Resources

This web page offers current US water news; extensive current (including real-time) and historical water data; numerous fact sheets and other publications; various technical resources; descriptions of ongoing water survey programs; local water information; and connections to other sources of water information.

Contact: USGS Water Resources
Phone: (503) 251-3200
Website: <http://or.water.usgs.gov/>
Email: info-or@usgs.gov

Office of Hydrologic Development, National Weather Service

The National Weather Service's Office of Hydrologic Development (OHD) and its Hydrological Information Center offer information on floods and other aquatic disasters. This site offers current and historical data including an archive of past flood summaries, information on current hydrologic conditions, water supply outlooks, an Automated Local Flood Warning Systems Handbook, Natural Disaster Survey Reports, and other scientific publications on hydrology and flooding.

Contact: Office of Hydrologic Development, National Weather Service
Website: <http://www.nws.noaa.gov/oh/>

The Floodplain Management Association

The Floodplain Management website was established by the Floodplain Management Association (FMA) to serve the entire floodplain management community. It includes full-text articles, a calendar of upcoming events, a list of positions available, an index of publications available free or at nominal cost, a list of associations, a list of firms and consultants in floodplain management, an index of newsletters dealing with flood issues (with hypertext links if available), a section on the basics of floodplain management, a list of frequently asked questions (FAQs) about the Website, and, of course, a copious catalog of Web links.

Contact: Floodplain Managers Association
Website: <http://www.floodplain.org>
Email: admin@floodplain.org

Northwest Regional Floodplain Managers Association (NORFMA)

This site is a resource for floodplains, fisheries, and river engineering information for the Northwest. This site provides technical information, articles, and Internet links in the field of floodplain and fisheries management

Contact: Northwest Regional Floodplain Managers Association
Website: <http://www.norfma.org/>

Publications

Planning for Natural Hazards: The Oregon Technical Resource Guide, Department of Land Conservation and Development (July 2000).

Produced by the Community Planning Workshop for the Department of Land Conservation and Development, this is a natural hazards planning and mitigation resource for Oregon cities and counties. It provides hazard-specific resources and plan evaluation tools. The document was written for local government employees and officials. The Technical Resource Guide includes a natural hazards comprehensive plan review, a hazard mitigation legal issues guide, and five hazard-specific technical resource guides, including: flooding, wildfires, landslides, coastal hazards, and earthquakes. This document is available online. You can also write, call, or fax to obtain this document:

Contact: Natural Hazards Program Manager, Department of Land Conservation and Development
Address: 635 Capitol St. NE, Suite 200, Salem, OR 97301-2540
Phone: (503) 373-0050
Fax: (503) 378-6033
Website: <http://www.oregon.gov/LCD/HAZ/publications.shtml>

NFIP Community Rating System Coordinator's Manual. FEMA/NFIP. Indianapolis, IN.

This informative brochure explains how the Community Rating System works and what the benefits are to communities. It explains in detail the CRS point system, and what activities communities can pursue to earn points. These points then add up to the "rating" for the community, and flood insurance premium discounts are calculated based upon that "rating." The brochure also provides a table on the percent discount realized for each rating (1-10). Instructions on how to apply to be a CRS community are also included.

Contact: NFIP Community Rating System
Phone: (800) 480-2520 or (317) 848-2898
Website: <http://training.fema.gov/EMIWeb/CRS/> (select resources)

Floodplain Management: A Local Floodplain Administrator's Guide to the NFIP. FEMA-Region 10. Bothell, WA.

This document discusses floodplain processes and terminology. It contains floodplain management and mitigation strategies, as well as information on the NFIP, CRS, Community Assistance Visits, and floodplain development standards.

Contact: National Flood Insurance Program
Phone: (800) 480-2520
Website: http://www.oregon.gov/LCD/HAZ/docs/floods/localofficial_4th.pdf

Reducing Losses in High Risk Flood Hazard Areas: A Guidebook for Local Officials, (February 1987), FEMA-116.

This guidebook offers a table on actions that communities can take to reduce flood losses. It also offers a table with sources for floodplain mapping assistance for the various types of flooding hazards. There is information on various types of flood hazards with regard to existing mitigation efforts and options for action (policy and programs, mapping, regulatory, non-regulatory). Types of flooding which are covered include alluvial fan, areas behind levees, areas below unsafe dams, coastal flooding, flash floods, fluctuating lake level floods, ground failure triggered by earthquakes, ice jam flooding, and mudslides.

Contact: Federal Emergency Management Agency
Phone: (800) 480-2520
Website: <http://www.fema.gov/hazard/flood/pubs/lib116.shtm>

Oregon Model Flood Damage Prevention Ordinance, (January 1999), FEMA/DLCD.

This is an example of how to write an ordinance that complies with NFIP/FEMA standards. Communities can simply adopt this ordinance, word for word, filling in the blanks specific to their community or jurisdiction.

Contact: Department of Land Conservation and Development
Phone: (503) 373-0050
Website: <http://www.oregon.gov/LCD/HAZ/docs/floods/floodord.pdf>

Wildfire Resource Directory

County Resources

Mid Columbia Fire & Rescue
1400 W 8th St. The Dalles, OR 97058

Mosier Fire Department
208 Washington St. Mosier, OR 97040

Regional Resources

State Resources

Oregon Department of Consumer and Business Services

The Building Codes Division of Oregon's Department of Consumer and Business Services is responsible for administering statewide building codes. Its responsibilities include adoption of statewide construction standards that help create disaster-resistant buildings, particularly for flood, wildfire, wind, foundation stability, and seismic hazards. Information about wildfire-related building codes is found through this department.

Contact: Building Codes Division
Address: 1535 Edgewater St. NW, P.O. Box 14470, Salem, OR 97309
Phone: (503) 373-4133
Fax: (503) 378-2322
Website: <http://www.cbs.state.or.us/external/bcd>

Oregon Department of Forestry (ODF)

ODF's Fire Prevention Unit is involved in interface wildfire mitigation and provides information about Oregon's Wildfire Hazard Zones. The Protection From Fire section of the ODF website includes Oregon-specific fire protection resources. Wildfire condition reports can be accessed on the website as well. ODF's Protection from Fire Program works to do the following:

- Clarify roles of ODF, landowners, and other agencies in relation to wildland fire protection in Oregon;
- Strengthen the role of forest landowners and the forest industry in the protection system;
- Understand and respond to needs for improving forest health conditions and the role/use of prescribed fire in relation to mixed ownerships, forest fuels and insects and disease; and
- Understand and respond to needs for improving the wildland/urban interface situation.

Contact: Oregon Department of Forestry, Fire Prevention Unit
Address: 2600 State Street, Salem, Oregon 97310
Phone: (503) 945-7440
Website: http://www.oregon.gov/ODF/FIRE/fire_protection.shtml

Office of the State Fire Marshal (OSFM)

The Prevention Unit of Oregon's Office of the State Fire Marshal contains 19 Deputy State Fire Marshals located in various regions. The responsibilities of these deputies include public education for local fire districts and inspection of businesses, public assemblies, schools, daycare centers, and adult foster homes. The State Fire Marshal's Community Education Services unit works to keep Oregonians safe from fires and injury by providing them with the knowledge to protect themselves and their property.

Contact: Oregon State Fire Marshal
Address: 4760 Portland Road NE, Salem, Oregon 97305-1760
Phone: (503) 378-3473
Fax: (503) 373-1825
Website: [http://159.121.82.250/Oregon Laws on Fire Protection:](http://159.121.82.250/Oregon%20Laws%20on%20Fire%20Protection)
http://159.121.82.250/SFM_Admin/firelaws.htm
Email: Oregon.sfm@state.or.us

Federal Resources and Programs

Federal Wildland Fire Policy, Wildland/Urban Interface Protection

This is a report describing federal policy and interface fire. Areas of needed improvement are identified and addressed through recommended goals and actions.

Website: <http://www.fs.fed.us/fire/management/policy.html>

National Fire Protection Association (NFPA)

This is the principal federal agency involved in the National Wildland/Urban Interface Fire Protection Initiative. NFPA has information on the Initiative's programs and documents. Other members of the initiative include: the National Association of State Foresters, the US Department of Agriculture Forest Service, the US Department of the Interior, and the United States Fire Administration.

Contact: Public Fire Protection Division
Address: 1 Battery March Park, P.O. Box 9101, Quincy, MA 02269-9101
Phone: (617) 770-3000
Website: www.nfpa.org

National Interagency Fire Center (NIFC)

The NIFC in Boise, Idaho is the nation's support center for wildland firefighting. Seven federal agencies work together to coordinate and support wildland fire and disaster operations. These agencies include the Bureau of Indian Affairs, Bureau of Land Management, Forest Service, Fish and Wildlife Service, National Park Service, National Weather Service, and Office of Aircraft Services.

Contact: National Interagency Fire Center
Address: 3833 S. Development Avenue, Boise, Idaho 83705-5354

Phone: (208) 387-5512
Website: <http://www.nifc.gov/>

United States Fire Administration (USFA) of the Federal Emergency Management Agency (FEMA)

As an entity of the Federal Emergency Management Agency, the mission of the USFA is to reduce life and economic losses due to fire and related emergencies through leadership, advocacy, coordination, and support.

Contact: USFA, Planning Branch, Mitigation Directorate
Address: 16825 S. Seton Ave., Emmitsburg, MD 21727
Phone: (301) 447-1000
Website: <http://www.fema.gov/hazard/wildfire/index.shtm> - Wildfire Mitigation Planning
<http://www.usfa.fema.gov/index.htm> - USFA Homepage
<http://www.usfa.fema.gov/wildfire/> - USFA Resources on Wildfire

United States Forest Service (USFS)

The USFS is a federal land management organization established to manage the nation's federally owned forests. As part of the Department of Agriculture, it provides timber for people, forage for cattle and wildlife, habitat for fish, plants, and animals, and recreation lands throughout the country.

The USFS offers a possible link from local jurisdictions to federal grant programs.

Contact: USDA Forest Service - Pacific Northwest Region
Address: 333 SW First Avenue, Portland, Oregon 97204-3440;
P.O. Box 3623, Portland, OR 97208-3623
Phone: 503-808-2468
Website: <http://www.fs.fed.us/r6/welcome.htm>

Additional Resources

FireFree Program to Promote Home Safety

In a pioneering effort to address wildfire danger in Bend, Oregon, four local agencies and a Fortune 500 corporation joined together to create "FireFree! Get In The Zone," a public education campaign designed to increase resident participation in wildfire safety and mitigate losses. Spearheaded by SAFECO Corporation, the partnership includes the Bend Fire Department, Deschutes County Rural Fire Protection District #2, Bend City Planning, and The Deschutes National Forest. The Oregon Department of Forestry and a number of local government agencies and businesses have joined the program.

Contact: FireFree
Address: 63377 Jamison St., Bend, OR 97701
Phone: (541) 318-0459
E-mail: dcrfpd2@dcrfpd2.com
Website: <http://www.firefree.org>

Firewise – The National Wildland/Urban Interface Fire program

Firewise maintains a Website designed for people who live in wildfire-prone areas, but it also can be of use to local planners and decision makers. The site offers online wildfire

protection information and checklists, as well as listings of other publications, videos, and conferences.

Contact: Firewise
Address: PO Box 9101, Quincy, MA 02269-9101
Phone: (617) 984-7056
E-mail: firewise@firewise.org
Website: <http://www.firewise.org/>

Publications

National Fire Protection Association Standard 299: Protection of Life and Property from Wildfire. National Wildland/Urban Interface Fire Protection Program, (1991). National Fire Protection Association, Washington, D.C.

This document, developed by the NFPA Forest and Rural Fire Protection Committee, provides criteria for fire agencies, land use planners, architects, developers, and local governments to use in the development of areas that may be threatened by wildfire. To obtain this resource:

Contact: National Fire Protection Association Publications
Phone: (800) 344-3555
Website: <http://www.nfpa.org> or <http://www.firewise.org>

An International Collection of Wildland-Urban Interface Resource Materials (Information Report NOR-X-344). Hirsch, K., Pinedo, M., & Greenlee, J. (1996). Edmonton, Alberta: Canadian Forest Service.

This is a comprehensive bibliography of interface wildfire materials. Over 2,000 resources are included, grouped under the categories of general and technical reports, newspaper articles, and public education materials. The citation format allows the reader to obtain most items through a library or directly from the publisher. The bibliography is available in hard copy or diskette at no cost. It is also available in downloadable PDF form. To obtain this resource:

Contact: Canadian Forest Service, Northern Forestry Centre, I-Zone Series
Phone: (780) 435-7210
Website: http://www.pfc.cfs.nrcan.gc.ca/cgi-bin/bstore/catalog_e.pl?catalog=11794

Wildland/Urban Interface Fire Hazard Assessment Methodology. National Wildland/Urban Interface Fire Protection Program, (1998), NFPA, Washington, D.C. To obtain this resource:

Contact: Firewise (NFPA Public Fire Protection Division)
Phone: (617) 984-7486
Website: <http://www.firewise.org>

Fire Protection in the Wildland/Urban Interface: Everyone's Responsibility. National Wildland/Urban Interface Fire Protection Program. (1998). Washington, D.C.: Author.
To obtain this resource:

Contact: Firewise (NFPA Public Fire Protection Division)
Phone: (617) 984-7486
Website: <http://www.firewise.org>

Planning for Natural Hazards: The Oregon Technical Resource Guide, Department of Land Conservation and Development (July 2000).

Produced by the Community Planning Workshop for the Department of Land Conservation and Development, this is a natural hazards planning and mitigation resource for Oregon cities and counties. It provides hazard-specific resources and plan evaluation tools. The document was written for local staffs and officials. The Technical Resource Guide includes a natural hazards comprehensive plan review, a hazard mitigation legal issues guide, and five hazard-specific technical resource guides, including: flooding, wildfires, landslides, coastal hazards, and earthquakes. This document is available online. You can also write, call, or fax to obtain this document:

Contact: Natural Hazards Program Manager
Address: 635 Capitol St. NE, Suite 200, Salem, OR 97301-2540
Phone: (503) 373-0050
Fax: (503) 378-6033
Website: <http://www.oregon.gov/LCD/HAZ/index.shtml>

Burning Questions. A Social Science Research Plan for Federal Wildland Fire Management, Machlis, G., Kaplan, A., Tuler, S., Bagby, K., and McKendry, J. (2002) National Wildfire Coordinating Group.

The plan covers a wide range of topics and questions related to the human dimensions of federal wildland fire management. Both the beneficial and harmful affects of wildland fire are considered. The plan includes research in the social sciences or anthropology, economics, geography, psychology, political science, and sociology, as well as interdisciplinary fields of research. The plan is national in scale but recognizes the importance of regional variation in wildland fire issues.

Contact: Cooperative Park Studies Unit
Address: 635 Capitol St. NE, Suite 200, Salem, OR 97301-2540
Phone: (208) 885-7054
Fax: (503) 378-6033
Website: <http://www.psu.uidaho.edu/>

Severe Weather Event Resource Directory

County Resources

Regional Resources

State Resources

Oregon Climate Service

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: Oregon Climate Service, Oregon State University
Strand Ag Hall Room 316, Corvallis, OR 97331-2209
Phone: (541) 737-5705
Website: <http://www.ocs.orst.edu>
Email: oregon@oce.orst.edu

Additional Resources

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/government/grant/pa/dmgtoc.shtm>

Landslide Resource Directory

County Resources

Regional Resources

State Resources

Oregon Department of Forestry (ODF)

The mission of the Oregon Department of Forestry is to serve the people of Oregon through the protection, management, and promotion of a healthy forest environment, which will enhance Oregon's livability and economy for today and tomorrow. ODF regulates forest operations to reduce the risk of serious injury or death from rapidly moving landslides related to forest operations, and assists local governments in the siting review of permanent dwellings on and adjacent to forestlands in further review areas.

Contact: Oregon Department of Forestry
Address: 2600 State Street, Salem OR 97310
Phone: (503) 945-7212
Website: <http://www.odf.state.or.us>

Oregon Department of Forestry Debris Flow Warning Page

The ODF debris flow warning page provides communities with up-to-date access to information regarding potential debris flows. As the lead agency, ODF is responsible for forecasting and measuring rainfall from storms that may trigger debris flows. Advisories and warnings are issued as appropriate. Information is broadcast over NOAA weather radio and on the Law Enforcement Data System. DOGAMI provides additional information on debris flows to the media that convey the information to the public. ODOT also provides warnings to motorists during periods determined to be of highest risk for rapidly moving landslides along areas on state highways with a history of being most vulnerable. Information is available on the ODF website at www.odf.state.or.us.

Oregon Department of Geology and Mineral Industries (DOGAMI)

DOGAMI is an important agency for landslide mitigation activities in Oregon. Some key functions of DOGAMI are development of geologic data, producing maps, and acting as lead regulator for mining and drilling for geological resources. The agency also provides technical resources for communities and provides public education on geologic hazards. DOGAMI provides data and geologic information to local, state, and federal natural resource agencies, industry, and private groups.

Contact: DOGAMI
Address: 800 NE Oregon Street, Suite 965, Portland, Oregon 97232
Phone: (971) 673-1555
Fax: (971) 673-1562
Website: www.oregongeology.com

Email: info@naturenw.org

Nature of the Northwest

Oregon Department of Geology and Mineral Industries and the USDA Forest Service jointly operate the Nature of the Northwest Information Center. The Center offers a selection of maps and publications from state, federal, and private agencies.

Contact: The Nature of the Northwest Information Center
Address: 800 NE Oregon Street #5, Suite 177, Portland, Oregon 97232
Phone: (503) 872- 2750
Fax: (503) 731-4066
Website: <http://www.naturenw.org>
Email: Nature.of.Northwest@state.or.us

Oregon Department of Transportation (ODOT)

ODOT provides warnings to motorists during periods determined to be of highest risk of rapidly moving landslides along areas on state highways with a history of being most vulnerable to rapidly moving landslides. ODOT also monitors for landslide activity and responds to slide events on state highways.

Contact: ODOT Transportation Building
Address: 355 Capitol St. NE, Salem, OR 97310
Phone: (888) 275-6368
Website: <http://www.odot.state.or.us>

Portland State University, Department of Geology

Portland State University conducts research and prepares inventories and reports for communities throughout Oregon. Research and projects conducted through the Department of Geology at Portland State University include an inventory of landslides for the Portland metropolitan region after the 1996 and 1997 floods and a subsequent susceptibility report and planning document for Metro in Portland.

Contact: Portland State University, Department of Geology
Address: 17 Cramer Hall; 1721 SW Broadway, Box 751, Portland, OR 97207
Phone: (503) 725-3389
Website: <http://www.geol.pdx.edu> Federal Resources

Natural Resource Conservation Service (NRCS)

The NRCS produces soil surveys. These may be useful to local governments who are assessing areas with potential development limitations including steep slopes and soil types. They operate many programs dealing with the protection of natural resources.

Contact: NRCS, Oregon Branch
Address: 101 S.W. Main Street, Suite 1300, Portland, OR 97204
Phone: (503) 414-3200
Fax: (503) 414-3103
Website: <http://www.or.nrcs.usda.gov>

US Geological Survey, National Landslide Information Center (NLIC)

The NLIC website provides good information on the programs and resources regarding landslides. The page includes information on the National Landslide Hazards Program Information Center, a bibliography, publications, and current projects. USGS scientists are working to reduce long-term losses and casualties from landslide hazards through better understanding of the causes and mechanisms of ground failure both nationally and worldwide.

Contact: National Landslide Information Center
Phone: (800) 654-4966
Website: <http://www.usgs.gov/hazards/landslides/>

Additional Resources

American Planning Association (APA)

The APA's research department embarked on a program to bring together solutions from multiple disciplines into a single source. It will help serve local planning efforts in identifying landslide hazards during the planning process so as to minimize exposure to landslide risks. The APA's website highlights planning efforts to reduce risk and loss from landslides.

Contact: Principal Investigator, Landslides Project
Address: Research Department, American Planning Association
122 S. Michigan Ave., Suite 1600
Chicago, Illinois 60603-6107
Phone: (312) 431-9100
Fax: (312) 431-9985
Website: <http://www.planning.org/landslides>
Email: landslides@planning.org

State of Washington, Department of Ecology

The Washington State Department of Ecology has a landslide website with tips for reducing risk, warning signs, and maps.

Contact: Department of Ecology
Address: PO Box 47600, Olympia, WA 98504-7600
Website: <http://www.ecy.wa.gov/programs/sea/landslides>
Email: hshi461@ecy.wa.gov

Publications

Planning for Natural Hazards: The Oregon Technical Resource Guide, Department of Land Conservation and Development (July 2000).

Produced by the Community Planning Workshop for the Department of Land Conservation and Development, this is a natural hazards planning and mitigation resource for Oregon cities and counties. It provides hazard-specific resources and plan evaluation tools. The document was written for local government employees and officials. The Technical Resource Guide includes a natural hazards comprehensive plan review, a hazard mitigation legal issues guide, and five hazard-specific technical resource guides,

including: flooding, wildfires, landslides, coastal hazards, and earthquakes. You can write, call, fax, or go on-line to obtain this document.

Contact: Natural Hazards Program Manager, DLCDC
Address: 635 Capitol St. NE, Suite 200, Salem, OR 97301-2540
Phone: (503) 373-0050
Fax: (503) 378-6033
Website: <http://www.oregon.gov/LCD/HAZ/index.shtml>

Mileti, Dennis, *Disasters by Design: A Reassessment of Natural Hazards in the United States* (1999) Joseph Henry Press.

This book offers a way to view, study, and manage hazards in the United States that will help foster disaster-resilient communities, higher environmental quality, inter- and intragenerational equity, economic sustainability, and an improved quality of life. The volume provides an overview of what is known about natural hazards, recovery, and mitigation; reveals how research findings have been translated into policies and programs; and advances a sustainable hazard mitigation research agenda.

Olshansky, Robert B., *Planning for Hillside Development* (1996) American Planning Association.

This document describes the history, purpose, and functions of hillside development and regulation and the role of planning, and provides excerpts from hillside plans, ordinances, and guidelines from communities throughout the US.

Olshansky, Robert B. & Rogers, J. David, *Unstable Ground: Landslide Policy in the United States* (1987) *Ecology Law Quarterly*.

This is about the history and policy of landslide mitigation in the US.

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

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 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
Website: <http://www.fema.gov/government/grant/pa/dmgtoc.shtm>

USGS Landslide Program Brochure. National Landslide Information Center (NLIC), United States Geologic Survey.

The brochure provides good, general information in simple terminology on the importance of landslide studies and a list of databases, outreach, and exhibits maintained by the NLIC. The brochure also includes information on the types and causes of landslides, rockfalls, and flows.

Contact: USGS- MS 966, Box 25046
Address: Denver, Federal Center, Denver, CO 80225
Phone: (800) 654-4966
Web: <http://geohazards.cr.usgs.gov/>

Earthquake

County Resources

Regional Resources

State Resources

Oregon Department of Consumer & Business Services-Building

Codes Division

The Building Codes Division (BCD) sets statewide standards for design, construction, and alteration of buildings that include resistance to seismic forces. BCD is active on several earthquake committees and funds construction related continuing education programs. BCD registers persons qualified to inspect buildings as safe or unsafe to occupy following an earthquake and works with OEM to assign inspection teams where they are needed.

Contact: Building Codes Division
Address: 1535 Edgewater St. NW, P.O. Box 14470, Salem, Oregon 97309
Phone: (503) 378-4133
Fax: (503) 378-2322
Website: <http://www.cbs.state.or.us/external/bcd/>

The Nature of the Northwest Information Center

The Nature of the Northwest Information Center is operated jointly by the Oregon Department of Geology and Mineral Industries and the USDA Forest Service. It offers selections of maps and publications from state, federal, and private agencies. DOGAMI's earthquake hazard maps can be ordered from this site.

Address: Suite 177, 800 NE Oregon Street # 5, Portland, Oregon 97232
Phone: (503) 872-2750
Fax: (503) 731-4066
Email: Nature.of.NW@state.or.us
Website: <http://www.naturenw.org/geo-earthquakes.htm>

Federal Resources

US Geological Survey (USGS).

The USGS is an active seismic research organization that also provides funding for research. (For an example of such research, see Recommended Seismic Publications below).

Contact: USGS, National Earthquake Information Center

Address: Box 25046; DFC, MS 967; Denver, Colorado 80225
Phone: (303) 273-8500
Fax: (303) 273-8450
Website: <http://neic.usgs.gov>

Building Seismic Safety Council (BSSC).

The Building Seismic Safety Council (BSSC), established by the National Institute of Building Sciences (NIBS), deals with complex regulatory, technical, social, and economic issues and develops and promotes building earthquake risk mitigation regulatory provisions for the nation.

Address: 1090 Vermont Avenue, NW, Suite 700, Washington, DC 20005
Phone: (202) 289-7800
Fax: (202) 289-1092
Website: <http://www.bssconline.org/>

Western States Seismic Policy Council (WSSPC).

The WSSPC is a regional organization that includes representatives of the earthquake programs of thirteen states (Alaska, Arizona, California, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming), three U.S. territories (American Samoa, Commonwealth of the Northern Mariana Islands and Guam), one Canadian Province (British Columbia), and one Canadian Territory (Yukon). The primary aims of the organization have been: to improve public understanding of seismic risk; to improve earthquake preparedness; and, to provide a cooperative forum to enhance transfer of mitigation technologies at the local, state, interstate, and national levels.

The mission of the Council is to provide a forum to advance earthquake hazard reduction programs throughout the western region and to develop, recommend, and present seismic policies and programs through information exchange, research and education.

Contact: WSSPC, Executive Director
Address: 121 Second Street, 4th Floor, San Francisco, CA 94105
Phone: (415) 974-6435
Fax: (415) 974-1747
Email: wsspc@wsspc.com
Website: <http://www.wsspc.org/>

Cascadia Region Earthquake Workgroup (CREW).

CREW provides information on regional earthquake hazards, facts and mitigation strategies for the home and business office. CREW is a coalition of private and public representative s working together to improve the ability of Cascadia Region communities to reduce the effects of earthquake events. Members are from Oregon, Washington, California, and British Columbia. Goals are to:

- Promote efforts to reduce the loss of life and property.

- Conduct education efforts to motivate key decision makers to reduce risks associated with earthquakes.
- Foster productive linkages between scientists, critical infrastructure providers, businesses and governmental agencies in order to improve the viability of communities after an earthquake.

Contact: CREW, Executive Director
 Address: 1330A S. 2nd Street, #105, Mount Vernon, WA 97273
 Phone: (360) 336-5494
 Fax: (360) 336-2837
 Website: <http://www.crew.org/>

Additional Resources

Publications

Planning for Natural Hazards: The Oregon Technical Resource Guide, Department of Land Conservation and Development (July 2000).

Produced by the Community Planning Workshop for the Department of Land Conservation and Development, this is a natural hazards planning and mitigation resource for Oregon cities and counties. It provides hazard-specific resources and plan evaluation tools. The document was written for local government employees and officials. The Technical Resource Guide includes a natural hazards comprehensive plan review, a hazard mitigation legal issues guide, and five hazard-specific technical resource guides, including: flooding, wildfires, landslides, coastal hazards, and earthquakes. You can write, call, fax, or go on-line to obtain this document.

Contact: Natural Hazards Program Manager, DLCDC
 Address: 635 Capitol St. NE, Suite 200, Salem, OR 97301-2540
 Phone: (503) 373-0050
 Fax: (503) 378-6033
 Website: <http://www.oregon.gov/LCD/HAZ/index.shtml>

Environmental, Groundwater and Engineering Geology: Applications for Oregon – Earthquake Risks and Mitigation in Oregon, Yumei Wang, (1998) Oregon Department of Geology and Mineral Industries, Star Publishing.

This paper deals with earthquake risks in Oregon, what is being done today, and what policies and programs are in action to help prevent loss and damage from seismic events. This article also gives a good list of organizations that are doing work in this field within the state. This article is somewhat technical but provides vital information to communities around the state.

Contact: DOGAMI
 Address: 800 NE Oregon St., Suite 965, Portland, Oregon 97232
 Phone: (971) 673-1555
 Fax: (971) 673-1562
 Website: www.oregongeology.com

Special Paper 29: Earthquake damage in Oregon: Preliminary estimates of future earthquake losses, Yumei Wang, Oregon Department Of Geology And Mineral Industries.

Wang, a geotechnical engineer, analyzed all faults with a 10% chance of causing an earthquake in the next 50 years and projected potential damage. Wang stresses that these are preliminary figures. "There are two things we could not incorporate into this study that would significantly increase these figures. One is a tsunami. The other is an inventory of unreinforced brick or masonry buildings."

Contact: DOGAMI
Address: 800 NE Oregon St., Suite 965, Portland, Oregon 97232
Phone: (971) 673-1555
Fax: (971) 673-1562
Website: www.oregongeology.com

Land Use Planning for Earthquake Hazard Mitigation: A Handbook for Planners, Wolfe, Myer R. et. al., (1986) University of Colorado, Institute of Behavioral Science, National Science Foundation.

This handbook provides techniques that planners and others can utilize to help mitigate for seismic hazards. It provides information on the effects of earthquakes, sources on risk assessment, and effects of earthquakes on the built environment. The handbook also gives examples on application and implementation of planning techniques to be used by local communities.

Contact: Natural Hazards Research and Applications Information Center
Address: University of Colorado, 482 UCB, Boulder, CO 80309-0482
Phone: (303) 492-6818
Fax: (303) 492-2151
Website: <http://www.colorado.edu/UCB/Research/IBS/hazards>

Using Earthquake Hazard Maps: A Guide for Local Governments in the Portland Metropolitan Region; Evaluation of Earthquake Hazard Maps for the Portland Metropolitan Region Spangle Associates, (1998/1999) Urban Planning and Research, Portola Valley, California.

These two publications are useful for local governments concerned with land use in earthquake hazard areas. The proximity of Washington County to Portland and their interactive communities make these guides applicable to the County. The publications are written in clear and simplistic language and address issues such as how to apply earthquake hazard maps for land use decisions.

Contact: DOGAMI
Address: 800 NE Oregon St., Suite 965, Portland, Oregon 97232
Phone: (971) 673-1555
Fax: (971) 673-1562
Website: www.oregongeology.com

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/government/grant/pa/dmgtoc.shtm>

Household Natural Hazards Preparedness Survey

Survey Report for:

(The Mid-Columbia Region)

Gilliam County, Oregon
Hood River County, Oregon
Morrow County, Oregon
Sherman County, Oregon
Umatilla County, Oregon
Wasco County, Oregon
Wheeler County, Oregon

Prepared by:

**Oregon Natural Hazards
Workgroup**

Community Service Center
1209 University of Oregon
Eugene, OR 97403-1209
Phone: 541.346.3889
Fax: 541.346.2040
Email: onhw@uoregon.edu
<http://www.oregonshowcase.org>

August 2006



Special Thanks & Acknowledgements

The Community Service Center would like to thank the following individuals for their assistance on this project:

Chris Fitzsimmons, Gilliam County

Ray Denny, Umatilla County

Carla McLane, Morrow County

Dennis Olson, Umatilla County

Michael Pasternak, Hood River and Wasco Counties

Shawn Payne, Sherman County

Marj Sharp, Wheeler County

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Krista Mitchell, Project Coordinator, Oregon Natural Hazards Workgroup

André LeDuc, Director, Oregon Natural Hazards Workgroup

Robert Parker, Managing Director, Community Service Center

This survey was developed and implemented as part of a regional planning initiative funded through the Federal Emergency Management Agency's Pre-Disaster Mitigation Competitive Grant Program. The Mid-Columbia Region grant was awarded to support the development of natural hazard mitigation plans for the region. The region's planning process utilized a seven-step planning process, plan framework, and plan development support (including the development of this report) provided by the Oregon Natural Hazards Workgroup at the University of Oregon.

Appendix C: Household Risk Perception Survey

Survey Purpose and Use

The purpose of the survey is to gauge the overall perception of natural disasters, determine a baseline level of loss reduction activity for residents in the community, and assess citizen's support for different types of individual and community risk reduction activities.

Data from this survey directly informs the natural hazard planning process. Counties in the Mid-Columbia region can use this survey data to enhance action item rationale and ideas for implementation. Other community organizations can also use survey results to inform their own outreach efforts. Data from the survey provides the counties with a better understanding of desired outreach strategies (sources and formats), a baseline of what people have done to prepare for a natural hazard, and desired individual and community strategies for risk reduction.

Background

The Federal Emergency Management Agency (FEMA) published Interim Rule 44 CFR Part 201 in February 2002, requiring all states and communities to develop natural hazard mitigation plans by November 2003. These planning and mitigation requirements for states and communities are being accomplished through the Pre-Disaster Mitigation Program (PDM). Oregon Natural Hazards Workgroup (ONHW) at the University of Oregon, as the coordinator of the *Partners for Disaster Resistance and Resilience: Oregon Showcase State Program*, is working with Oregon Emergency Management (OEM) and the PDM Program to assist local governments with their natural hazard mitigation planning efforts. As part of the PDM Program, ONHW is assisting the Mid-Columbia region of Oregon with the citizen involvement components of the natural hazard mitigation planning process.

Citizen involvement is a key component in the natural hazard mitigation planning process. Citizens have the opportunity to voice their ideas, interests and concerns about the impact of natural disasters on their communities. To that end, the Disaster Mitigation Act of 2000¹

¹ National Archives and Records Administration. 2002. Federal Emergency Management Agency 44 CFR Parts 201 and 206 Hazard Mitigation Planning and Hazard Mitigation Grant Program; Interim Final Rule in Federal Register.

requires citizen involvement in the natural hazard mitigation planning process. It states:

An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

1. An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.
2. An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process.

The benefits of citizen involvement, according to Bierle², include the following: (1) educate and inform public; (2) incorporate public values into decision making; (3) improve substantially the quality of decisions; (4) increase trust in institutions; (5) reduce conflict; and (6) ensure cost effectiveness.

Methodology

To conduct the household survey, ONHW adapted the eight page survey administered statewide in 2002 to better understand the perceptions of risk to natural hazards held by citizens, as well as the level of preparedness and types of risk reduction activities in which citizens have engaged. (See Appendix A) For the Mid-Columbia region survey, ONHW adapted the statewide survey to include questions about citizens' support for different types of community planning actions. Planning actions mentioned included protecting critical facilities, disclosing natural hazard risks during real estate transactions, and the use of tax dollars to compensate land owners for not developing in hazardous areas.

The survey was sent to 1200 households in the Mid Columbia Gorge region, which includes: Hood River, Wasco, Sherman, Gilliam, Wheeler, Morrow and Umatilla Counties. The households were randomly selected and population weighted based on mailing lists provided to ONHW by each of the counties. The following table documents the individual county list sources.

Table 1.1: County Mailing List Sources, 2006

² Bierle, T. 1999. "Using social goals to evaluate public participation in environmental decisions." *Policy Studies Review*. 16(3/4) ,75-103.

County	List Source
Gilliam	911 Addressing
Hood River	Voter Registration
Morrow	Voter Registration
Sherman	Sherman County Ambulance Service Membership List
Umatilla	Voter Registration
Wasco	Wasco County GIS: Tax Lot Database
Wheeler	Voter Registration

Source: Oregon Natural Hazards Workgroup

The mailing contained a cover letter, the survey instrument, and a postage-paid return envelope. Completed surveys were returned to ONHW. A second mailing was sent to households who did not respond to the first mailing, approximately three weeks later. ONHW received 276 valid responses, for a 23% response rate.

Limitations

The study identifies key issues about how members of the Mid-Columbia communities perceive their risk to natural hazards, providing a snapshot of those perceptions at a single point in time. As such, survey responses may reflect external issues, such as heightened concern about terrorism and the current state of the economy. This study was not intended to be representative of the perceptions of all residents, and cannot be generalized to the public.

A challenge is that the survey was not tailored to each community in which it was implemented and natural hazards are not evenly dispersed throughout the state. For example, the survey asked respondents about their level of concern about coastal erosion. Coastal erosion is only an issue in coastal areas of the state. Not surprisingly, the level of concern for coastal erosion is highest in coastal communities and is less significant for those who do not live there. Thus, coastal erosion is a specific concern for respondents who live near this hazard that they are susceptible to every day, just as those who live in the floodplain or near a volcanic hazard may have increased awareness of those hazards.

Organization of Report

The survey results are organized into the following sections:

Characteristics of Survey Respondents: This section reports information about respondent characteristics including: educational attainment, home ownership, age, and household income.

Perception of Risk: This section creates a profile of survey respondents and identifies:

- The hazards experienced;
- General level of concern over natural hazards risk;

- Respondent perceptions of threats posed by natural hazards;
- Perceptions of the effectiveness of various education and outreach material in raising natural hazard awareness; and
- Preferred avenues for information dissemination.

Level of Preparedness: This section provides an overview of household level natural hazard preparedness activities in the Mid-Columbia region.

Natural Hazard Risk Reduction: This section describes the types of structural and nonstructural measures that are being implemented by survey respondents, and the types of resources or programs that might increase risk reduction activities.

Community Natural Hazard Preparedness: This section describes citizens' priorities for planning for natural hazards and the community-wide strategies respondents support.

Written Responses to Open-Ended Questions: This section includes the transcripts of the open-ended questions and comments.

Characteristics of Survey Respondents

Demographic questions provide a statistical overview of the characteristics of the respondents. This section of the survey asked respondents about their age and gender, their level of education, and how long they have lived in Oregon. The survey also included questions regarding respondents' present housing.

There were 276 people who responded to the survey giving the survey a 23% response rate. Of the seven counties the survey was mailed to, the most surveys returned came from residents of Umatilla County (51.9%). This is not surprising as Umatilla has by far the greatest number of residents in the region with 70,548 of the 131,141 Mid-Columbia residents (2000 U.S. Census). Proportionally, the highest percentage of respondents per county was in Wheeler County where 0.5% of the total population responded to the survey.

Table 2.1 shows the percentage of people who responded to the survey by county.

Table 2.1. Percent of Surveys Received Per County

County	Percent of surveys received
Gilliam	3%
Sherman	3%
Wheeler	3%
Morrow	7.5%
Hood River	13.4%
Wasco	18.3%
Umatilla	51.9%

Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006).

Gender and Age

Women accounted for 57% of survey respondents even though they represented less than 50% of the population in the region according to the 2000 Census. The median age of survey respondents was 61 years even though the median age of Mid-Columbia residents, according to the U.S. Census,³ was 39.5. Table 2.2 compares the ages of survey respondents to the 2000 U.S. Census. This shows that younger people were underrepresented while older people were overrepresented.

Table 2.2. Percentage of Mid-Columbia Population and Survey Respondents in Each Age Classification (persons 20 and over)

Age Category	Mid-Columbia (from U.S. Census)	Survey Respondents
20-24	4.6%	1.5%
25-34	10.7%	5.2%
35-44	14.9%	8.4%
45-54	14.5%	24.3%
55-59	5.5%	14.9%
60-64	5.1%	16.4%
65-74	8.6%	14.5%
75-84	5.6%	10.7%
85 & over	1.9%	3.0%

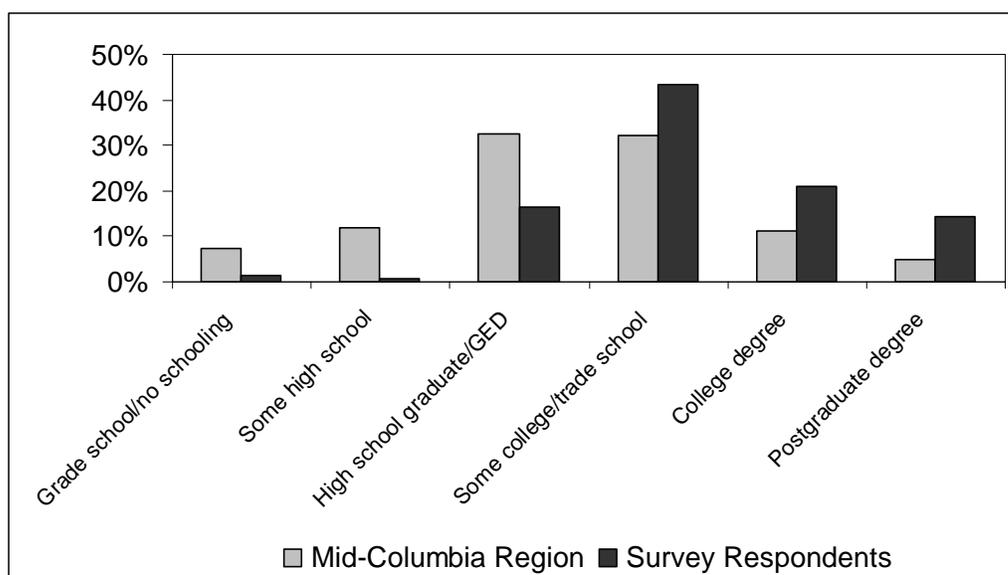
Source: U.S. Census Bureau: www.census.gov (2000) and Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006).

³ U.S. Census data presented in this report is an average of data from each of the seven counties represented in the Mid-Columbia region.

Level of Education

In general, survey respondents were relatively well educated. Figure 2.1 compares the level of education of survey respondents with the 2000 U.S. Census. About 79% of survey respondents have had some college or trade school or have a college or postgraduate degree. In contrast, figures from the Census show that an average of 48% of Mid-Columbia residents have attended some college or trade school or obtained an associate, bachelor or postgraduate degree. Therefore, survey respondents were more likely to have completed a higher educational level than the overall population of the Mid-Columbia region.

Figure 2.1. Level of Education of the Mid-Columbia Population and Survey Respondents

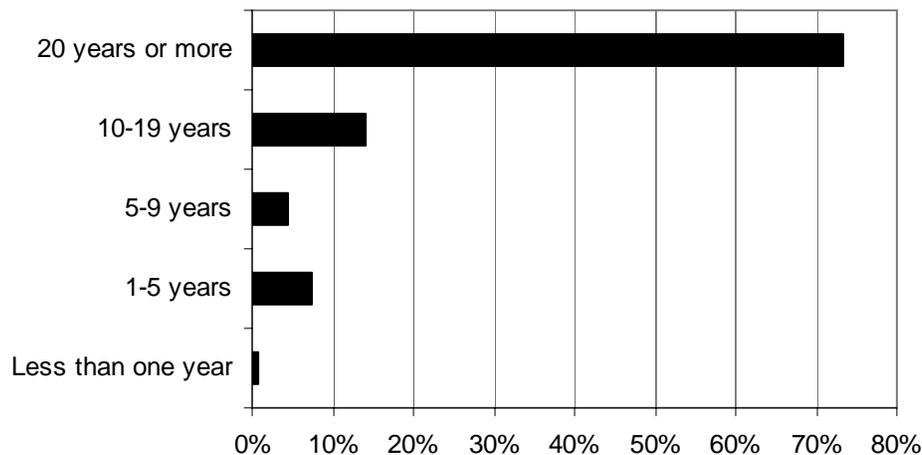


Source: U.S. Census Bureau: www.census.gov (2000) and Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

Oregon Residency

Over 73% percent of survey respondents have lived in Oregon for 20 years or more (see Figure 2). Respondents who have lived in Oregon for fewer than 20 years have most commonly moved from California (18%), Washington (17%), and Colorado (5%).

Figure 2.2. Length of Time Survey Respondents Have Lived in Oregon



Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

Housing Characteristics

Homeownership is an important variable in education and outreach programs. Knowledge of the percentage of homeowners in a community can help target the programs. Additionally, homeowners might be more willing to invest time and money in making their homes more disaster resistance. Table 2.3 compares the percentage of homeowners from the survey and the U.S. Census. Almost 88% of survey respondents are homeowners, compared to the 66% reported by the U.S. Census. The survey sample over represents the number of homeowners and considerably under represents the number of renters.

Table 2.3. Percentage of Mid-Columbia Population and Survey Respondents Who Own or Rent Their Home

Occupied housing units	Mid-Columbia	Survey Respondents
Owner-occupied housing units	66.0%	87.7%
Renter-occupied housing units	34.0%	12.3%

Source: U.S. Census Bureau: www.census.gov (2000) and Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

Almost 74% of survey respondents live in single-family homes, 16% live in manufactured homes, 3% in apartments, and 3% live in duplexes. In addition, 77% said they have access to the internet.

Perception of Risk

It is helpful to understand community members' experiences and perceptions of risk to natural hazards to make informed decisions about natural hazard risk reduction activities. The survey asked respondents for information regarding their personal experiences with natural disasters and their level of concern for specific hazards in the Mid-Columbia region. The primary objective of these questions was to create a "natural hazard profile" of respondents to better understand how Mid-Columbia residents perceive natural hazards.

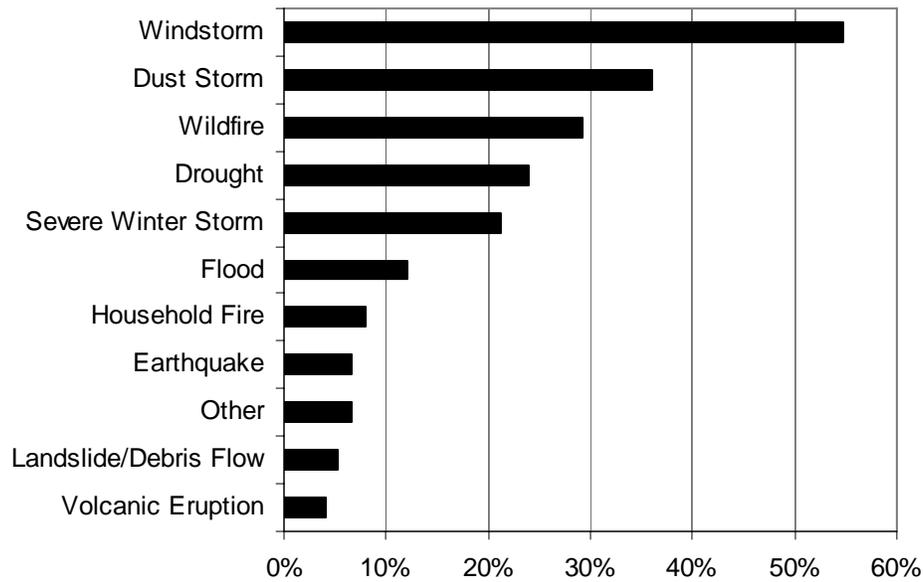
To understand the effectiveness of current outreach activities regarding home and family safety, the survey asked respondents about the types of information they receive on how to make their home and family safer. By identifying communication tools that have been effectively used in the past, local government agencies and organizations can continue to make use of or augment the use of these outreach materials.

General Level of Concern

The survey results indicate that about 27% of the respondents or someone in their household has personally experienced natural disasters in the past five years or since they have lived in the community in which they currently reside.

Of those respondents who have experienced a natural disaster in the last five years, 55% experienced windstorms, 36% experienced dust storms, and 29% experienced wildfires. Figure 3.1 illustrates the disasters experienced in the past five years in the Mid-Columbia region.

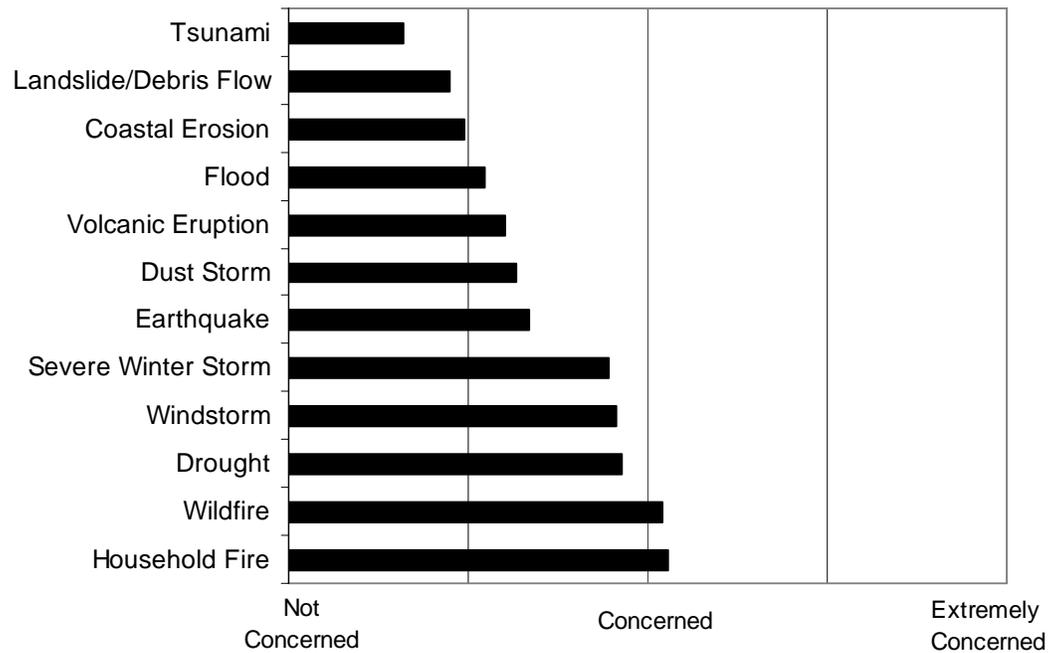
Figure 3.1. Percent of Disasters Experienced by Survey Respondents Within the Past Five Years



Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

The survey asked respondents to rank their personal level of concern for specific natural disasters affecting their community. Figure 3.2 shows the general level of concern about natural hazards in the Mid-Columbia region.

Figure 3.2. Survey Respondents' General Level of Concern about Natural Hazards in the Mid-Columbia Region



Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

Even though windstorms were the most common natural disaster experienced by survey respondents, results show that respondents were most concerned about household fire and wildfire. The respondents are least concerned about landslide/debris flows and tsunamis. See Table 3.1.

Table 3.1. Survey Respondents' Level of Concern Regarding Natural Hazards in the Mid-Columbia Region

Hazard Type	Extremely Concerned	Very Concerned	Concerned	Somewhat Concerned	Not Concerned
Drought	9%	20%	33%	24%	15%
Dust Storm	5%	12%	26%	17%	40%
Earthquake	5%	11%	26%	30%	28%
Flood	3%	10%	22%	26%	40%
Landslide/Debris Flow	1%	7%	19%	27%	46%
Wildfire	17%	24%	26%	18%	15%
Household Fire	19%	18%	32%	21%	11%
Tsunami	3%	5%	11%	17%	64%
Volcanic Eruption	5%	8%	21%	32%	33%
Wind Storm	9%	21%	27%	30%	13%
Coastal Erosion	9%	21%	27%	30%	13%
Severe Winter Storm	8%	20%	31%	26%	16%

Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

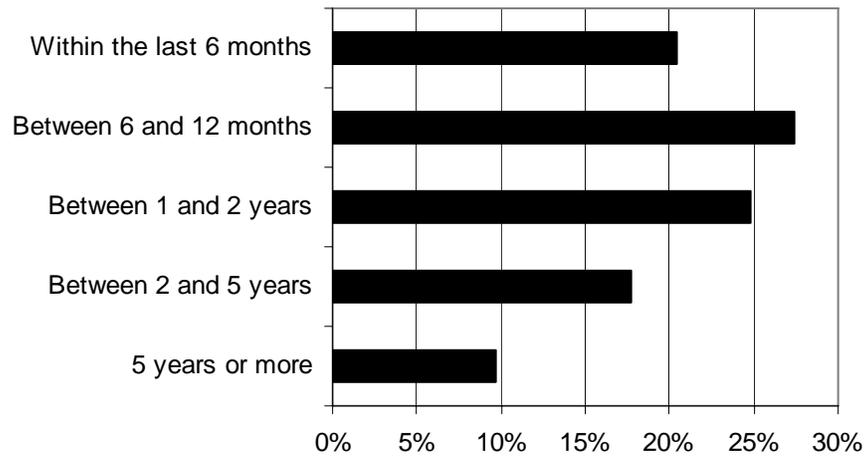
Information Distribution

One of the objectives of the survey was to assess the amount and effectiveness of outreach activities focusing on natural hazards. The survey asked a series of questions on information and outreach.

Recent information and sources

Over 46% of respondents indicated that they have received information regarding home and family safety at some time in the past. Of those who have received information, 20% received the information within the last six months and 27% received information six months to one year ago (see Figure 3.3). This suggests that, while outreach is occurring, it is reaching fewer than half of the households in the Mid-Columbia region and that many of the households have not received any information in over a year.

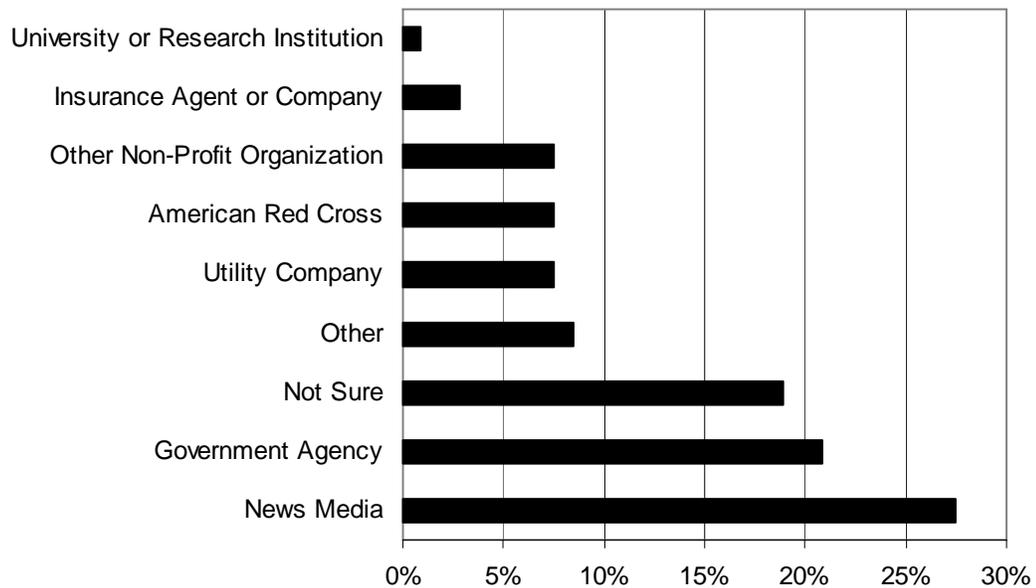
Figure 3.3. Survey Respondents' History of Receiving Information on Family and Home Safety



Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

Of the respondents who received information on natural hazard preparedness, the news media (26%) and government agencies (21%) were the sources that supplied the most respondents with information. Figure 3.4 shows the sources respondents last received information from.

Figure 3.4. Sources of Respondents' Most Recent Information



Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

Preferred Sources and Formats of Information

To develop and implement effective outreach and education activities, it is important to understand the mechanisms for information dissemination. It is interesting to compare the sources of information with which sources the respondents perceive to be the most trustworthy. Only 7.5% said they last received information from the American Red Cross yet the Red Cross was the most trusted source of information (40%). The second most trusted source was the utility company (38%) which also had only 7.5% of respondents stating that that was where their last safety information came from. Table 3.2 shows the sources respondents trust the most for providing this information.

Table 3.2. Survey Respondents' Most Trusted Sources of Information on Household Preparedness

Source	Percent of Respondents
American Red Cross	40%
Utility company	38%
University or research institution	34%
Insurance agent or company	34%
Government agency	31%
News media	28%
Other non-profit organization	14%
Not sure	14%
Other	7%

Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

When asked what the most effective way was to receive information, respondents indicated that television news (53%), mail (49%), and newspaper stories (48%) were the most effective. Table 3.3 shows the effectiveness rating of information dissemination methods presented in the survey.

Table 3.3. Survey Respondents' Rating of Various Information Sources in Terms of Outreach Effectiveness

Source	Percent of Respondents
Television news	53%
Mail	49%
Newspaper stories	48%
Radio news	38%
Fact sheet/brochure	35%
Fire department/rescue	30%
Internet	23%
Public workshops/meetings	20%
University or research institution	17%
Schools	15%
Newspaper ads	11%
Television ads	11%
Books	9%
Radio ads	8%
Chamber of Commerce	8%
Magazine	7%
Outdoor advertisement	7%
Other	6%

Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

Level of Preparedness

There are many steps people can take to prepare their households for a natural disaster or emergency. Preparing for a disaster can improve the safety and comfort of the members of a household immediately following a natural disaster or emergency. The survey asked respondents about what steps their households have taken or plan to take to increase their disaster preparedness.

Types of Household Preparedness Activities

Forty-five percent of respondents talked with members of their households about what to do in the case of a natural disaster or emergency. In addition, 41% were trained in first aid or CPR during the past year and 37% prepared a “Disaster Supply Kit” which entails storing extra food, water, and other emergency supplies. Table 4.1 summarizes the activities respondents indicated they have done, plan to do, have not done, or were unable to do to prepare for natural disasters.

Table 4.1. Survey Respondents’ Household Disaster Preparedness Activities

Preparedness Activity	Have Done	Plan To Do	Not Done	Unable To Do
Attended meetings or received written information on natural disasters or emergency preparedness?	32%	4%	59%	5%
Talked with members in your household about what to do in case of a natural disaster or emergency?	45%	12%	40%	3%
Developed a "Household/Family Emergency Plan" in order to decide what everyone would do in the event of a disaster?	29%	17%	51%	2%
Prepared a "Disaster Supply Kit" (Stored extra food, water, batteries, or other emergency supplies)?	37%	22%	40%	1%
In the last year, has anyone in your household been trained in First Aid or Cardio-Pulmonary Resuscitation (CPR)?	41%	4%	52%	3%

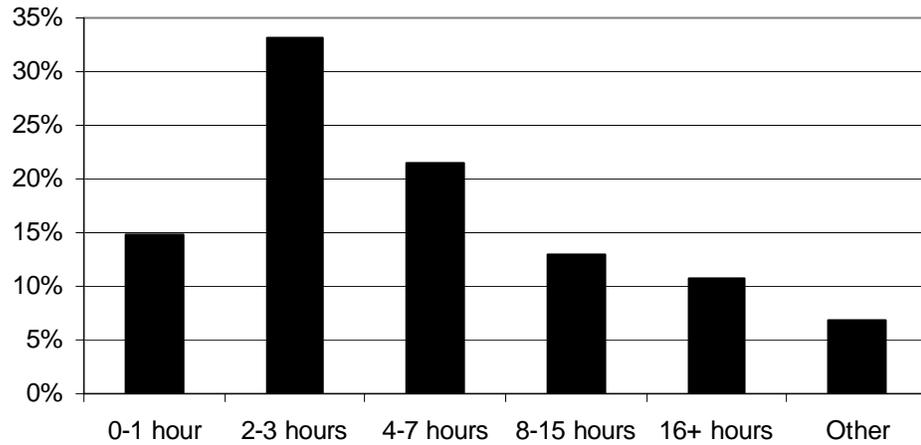
Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

Willingness to Participate in Risk Reduction Activities

Understanding how much time per year respondents are willing to spend on preparing themselves and their households for a natural disaster or emergency event can help a community focus its educational efforts. Over 33% of the respondents said they would be willing to spend two to three hours per year preparing themselves and about 21% said they would be willing to spend four to seven hours per year on

preparedness activities. Figure 4.1 shows the number of hours per year the respondents were willing to spend preparing themselves and/or their households for a natural disaster.

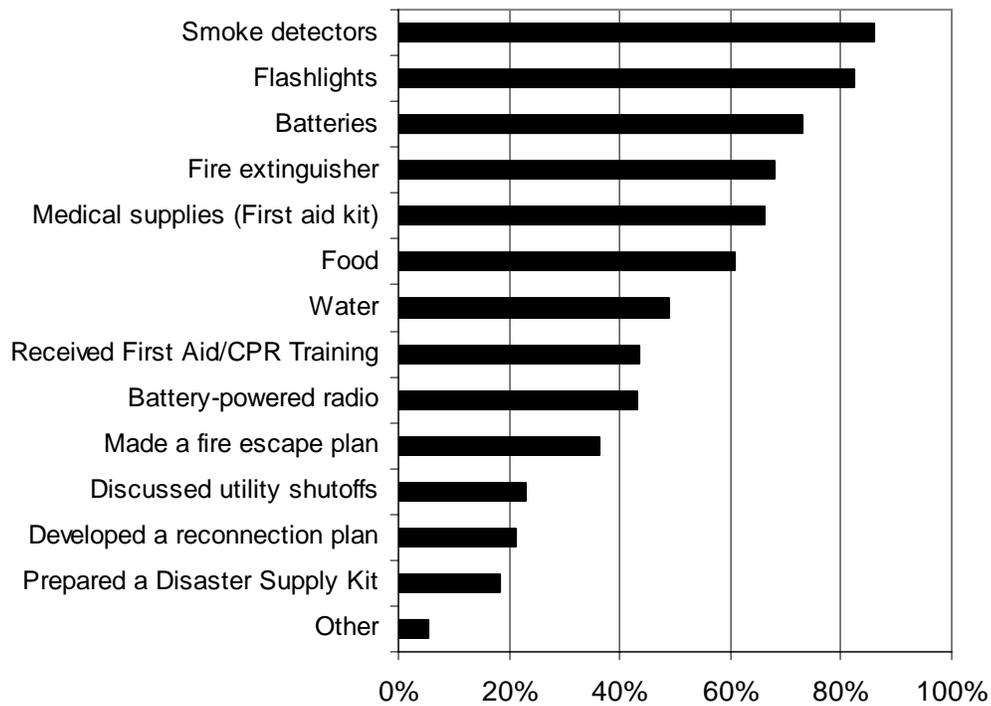
Figure 4.1. Hours Per Year Survey Respondents Were Willing to Spend on Preparedness Activities



Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

Figure 4.2 illustrates the steps respondents have taken to be better prepared for a natural disaster or emergency event. Placing smoke detectors on every level of the home (86%) and having flashlights in the home (83%) were the most common preparedness action taken. Preparing a disaster supply kit (18%) and developing a plan to reconnect with household members (21%) were the least common actions taken.

Figure 4.2. Preparedness Steps Taken by Survey Respondents



Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

Property and Financial Recovery

The need to have adequate provisions for financial and property recovery when natural disasters do occur is a necessary component of natural hazard preparedness. Twelve and a half percent of the respondents indicated they have flood insurance leaving 88% without it. However 73% of those who don't have flood insurance indicated the reason is because their home is not located in the floodplain and 8% felt it was not necessary. More people have earthquake insurance. Nineteen and a half percent of respondents indicated they have earthquake insurance. The top two reasons given by those who don't have earthquake insurance were that they never considered it (35%) or that it is not necessary (25%).

Table 4.2. Survey Respondents' Reasons For Not Having Flood and/or Earthquake Insurance

Flood Insurance	Percent of Respondents	Earthquake Insurance	Percent of Respondents
Not located in the floodplain	73%	Never considered	35%
Not necessary	8%	Not necessary	25%
Too expensive	6%	Not familiar	13%
Never considered	4%	Too expensive	10%
Other	4%	Other	8%
Not familiar	4%	Not available	5%
Deductibles too high	2%	Deductibles too high	4%

Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

Natural Hazard Risk Reduction

This chapter provides information on the long-term risk reduction activities Mid-Columbia residents have already taken or are willing to take. This chapter also explores the dollar amount respondents are willing to spend in order to reduce risks and the types of incentives that would motivate the respondents to take risk reduction steps.

Home and Life Safety

Only 34% of the respondents considered the possible occurrence of a natural hazard when they bought or moved into their current homes. While 34% of the respondents indicated they would be willing to spend more money on a home that had disaster-resistant features, almost 43% said they did not know whether they would be willing.

Almost 66% of respondents indicated they are willing to make their home more resistant to natural disasters. Table 5.1 illustrates how much respondents are willing to spend to better protect their homes from natural disasters.

Table 5.1. Amount Survey Respondents Are Willing to Spend

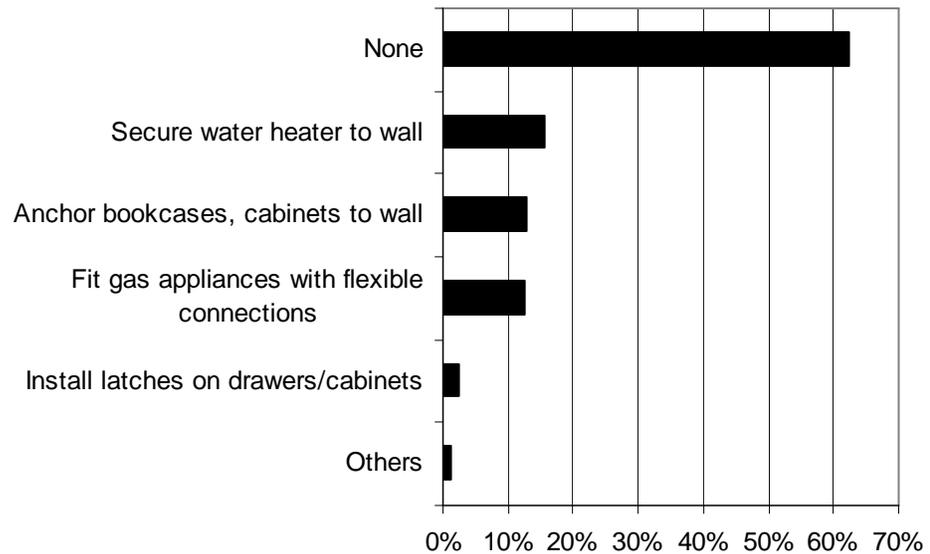
Amount	Percent of Respondents
Less than \$100	4%
\$100-\$499	8%
\$500-\$999	6%
\$1000-\$2499	15%
\$2500-\$4999	6%
\$5000 and above	4%
Nothing	3%
Don't Know	39%
What ever it takes	6%
Other	8%

Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

Nonstructural and Structural Home Modifications

While 62% of respondents said they have not completed any nonstructural modifications in their homes to prepare for earthquakes, Figure 5.1 shows that some respondents have taken such steps as securing water heaters to the wall and fitting gas appliances with flexible connectors.

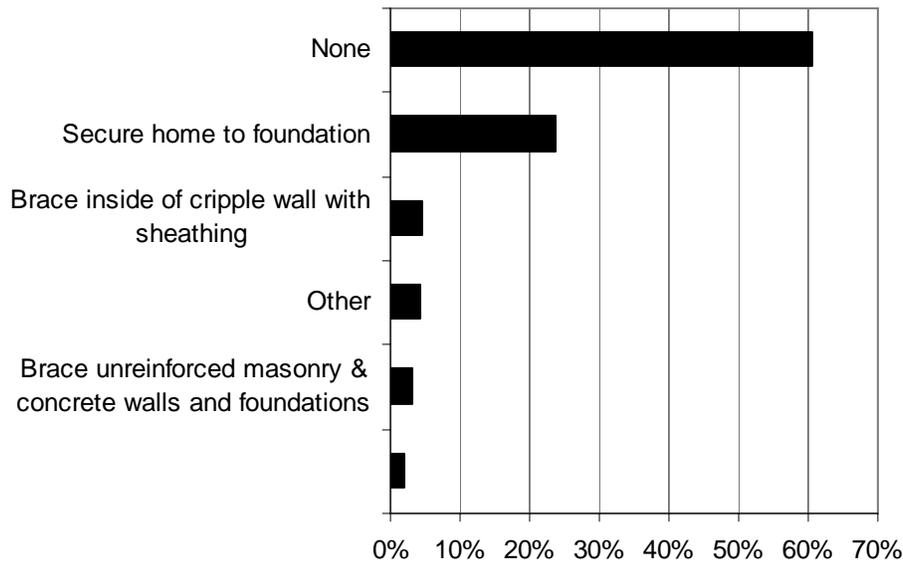
Figure 5.1. Nonstructural Modifications Survey Respondents Have Made to Their Homes



Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

Respondents also reported making some structural modifications to make their homes more resistant to earthquakes. However, almost 61% of the respondents have not completed any structural modifications. Figure 5.2 indicates that the most common step taken is securing the home to the foundation.

Figure 5.2. Structural Modifications Survey Respondents' Have Made to Their Homes



Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

Incentives

Approximately 67% of the respondents indicated that tax breaks or incentives would motivate them to take additional steps to better protect their homes from natural disasters. Over 59% also indicated that insurance discounts would be a motivator (See Table 5.2).

Table 5.2. Survey Respondents' Preferred Incentives for Protecting Homes

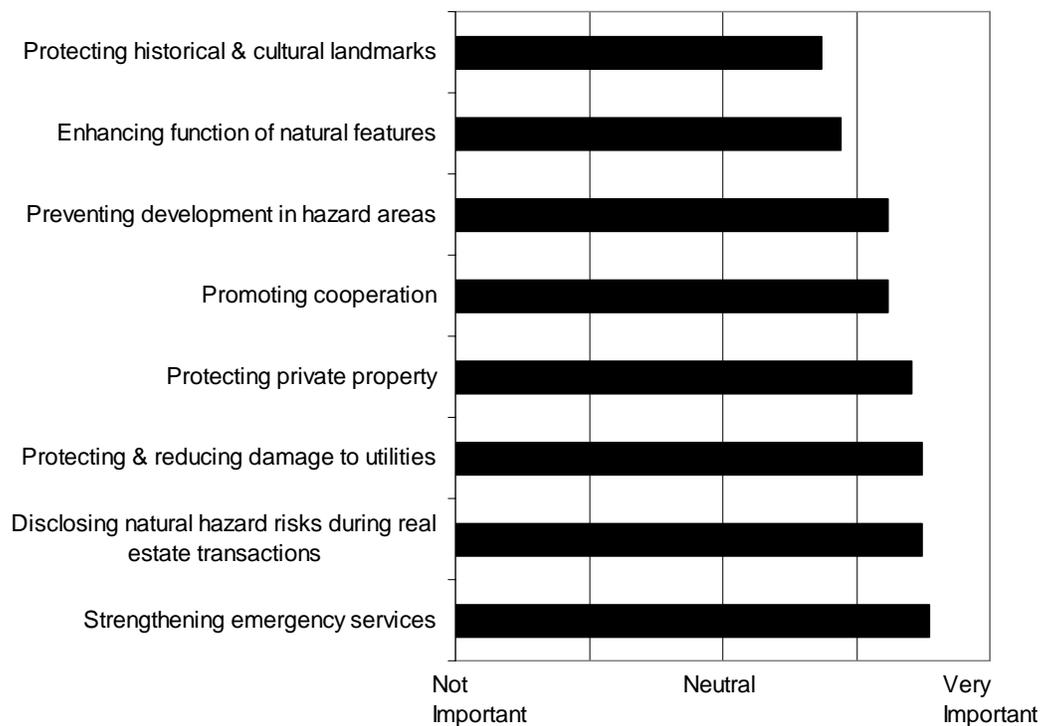
Incentive	Percent of Respondents
Tax break or incentive	67%
Insurance discount	59%
Low interest rate loan	25%
Mortgage discount	23%
None	17%
Lower new home construction costs	17%
Other	6%

Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

Community Natural Hazard Preparedness

To assist those preparing the communities' natural hazard mitigation plans, it is essential to understand the importance community members place on specific community-level risk reduction actions. These questions could help Mid-Columbia communities determine their citizens' priorities when planning for natural hazards. They also provide an idea of which types of strategies to reduce the communities' risk the citizens would be willing support. Figure 6.1 illustrates the important respondents placed on each statement.

Figure 6.1. Survey Respondents' General Level of Importance for Goal Statements



Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

As shown in Table 6.1, 96% of respondents indicated that it is very important or somewhat important for the community to protect critical facilities. In addition, over 91% indicated that it is very important or somewhat important to protect and reduce damage to utilities and strengthen emergency services.

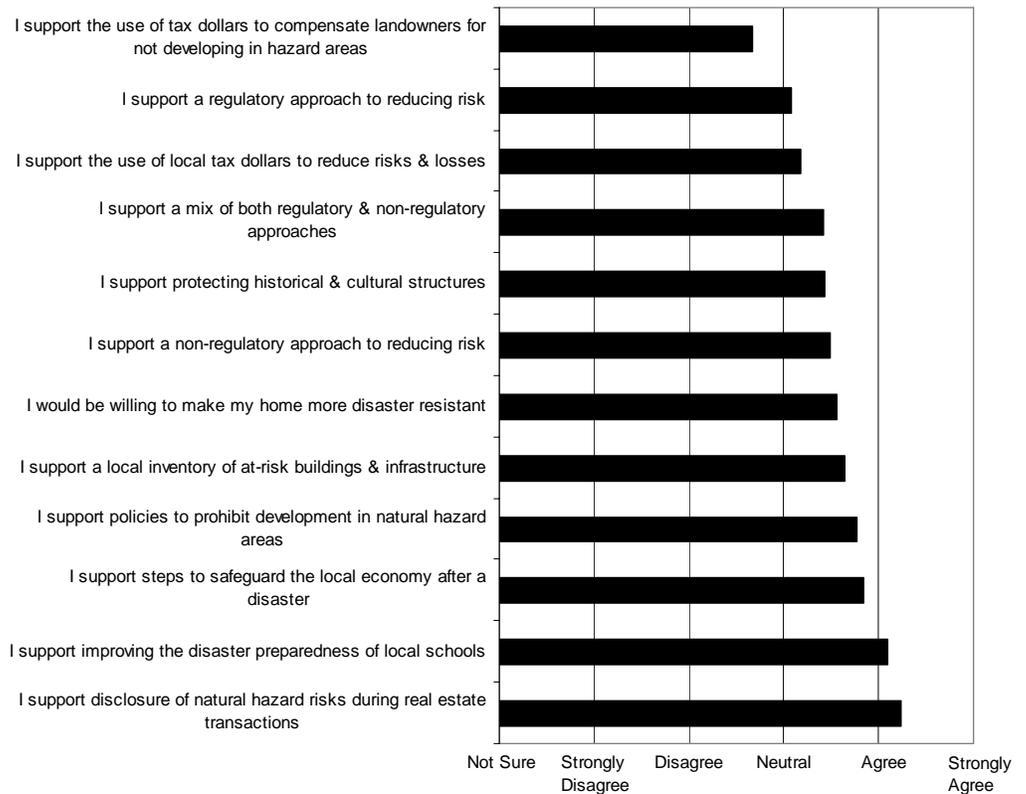
Table 6.1. Survey Respondents' Goal Prioritization

Statements	Very Important	Somewhat Important	Neutral	Not Very Important	Not Important
Protecting private property	58%	31%	10%	0%	2%
Protecting critical facilities	81%	15%	3%	1%	0%
Preventing development in hazard areas	48%	33%	15%	2%	2%
Enhancing the function of natural features	33%	36%	21%	5%	5%
Protecting historical and cultural landmarks	22%	44%	22%	8%	3%
Promoting cooperation among public agencies, citizens, non-profit organizations, and businesses	47%	34%	16%	3%	1%
Protecting and reducing utility damage	61%	31%	7%	1%	1%
Strengthening emergency services	66%	26%	6%	2%	1%
Disclosing natural hazard risks during real estate transactions	64%	25%	9%	1%	1%

Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

There are a number of activities a community can undertake to reduce the risk from natural hazards. These activities can be both regulatory and non-regulatory. Figure 6.2 shows respondents' general level of agreement regarding the community-wide strategies included in the survey.

Figure 6.2. Survey Respondents' General Level of Agreement Regarding Community-wide Strategies



Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

Table 12 illustrates that 85.8% of the respondents strongly agree or agree that they support improving the disaster preparedness of local schools. Also, 85% said they strongly agree or agree that they support disclosure of natural hazard risks during real estate transactions.

Table 6.2. Survey Respondents' Agreement Regarding Community-wide Strategies

Strategies	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Not Sure
I support a regulatory approach to reducing risk	11%	34%	25%	17%	9%	5%
I support a non-regulatory approach to reducing risk	18%	41%	26%	9%	1%	6%
I support a mix of both regulatory and non-regulatory approaches to reducing risk	18%	36%	28%	12%	3%	4%
I support policies to prohibit development in areas subject to natural hazards	26%	45%	15%	10%	2%	2%
I support the use of tax dollars (federal and/or local) to compensate land owners for not developing in areas subject to natural hazards	9%	21%	23%	26%	17%	4%
I support the use of local tax dollars to reduce risks and losses from natural disasters	7%	42%	26%	14%	7%	4%
I support protecting historical and cultural structures	12%	42%	34%	8%	3%	3%
I would be willing to make my home more disaster-resistant	9%	53%	30%	4%	1%	3%
I support steps to safeguard the local economy following a disaster event	14%	63%	20%	2%	0%	2%
I support improving the disaster preparedness of local schools	30%	56%	11%	2%	0%	1%
I support a local inventory of at-risk buildings and infrastructure	14%	51%	29%	3%	0%	3%
I support the disclosure of natural hazard risks during real estate transactions	44%	41%	11%	3%	0%	1%

Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

Written Responses to Open-Ended Survey Questions

Q1.1 Which of these natural disasters have you or someone in your household experienced?

These are the “other” responses:

- Ice storm on top of heavy snow
- Hail storm
- Not in but only sideline observer – my grandson fought the wildfire
- Hail & wind
- Minor drought

Q3.2 From whom did you last receive information about how to make your household and home safer from natural disasters?

Several people mentioned various governments or agencies as the last source of information:

- City of Pendleton
- Local fire department
- Volunteer fire department
- CSEPP (Chemical Stockpile Emergency Preparedness Program)

Other non-governmental organizations were also mentioned as sources including:

- Employee newsletter
- Boy Scout merit badge
- Church of Jesus Christ of Latter Day Saints
- School

Some respondents also mentioned more informal sources of information:

- Online internet
- Common sense
- Friends & neighbors
- Fire & heater smoke alarms
- When we lived in California

Q4 Who would you most trust to provide you with information about how to make your household and home safer from natural disasters?

The most often mentioned other source for information was various local agencies including three people mentioning the fire department. Other specific local sources included the Gilliam County Sheriff's Department and Sherman Health. Other comments include:

- Not sure, not government or university
- Radio
- Google.com
- Home owners
- Local task force/focus groups w/professional disaster relief
- Self (2)
- Gilliam Co Sheriff Dept
- Sherman Health
- Wildfire is the only disaster applicable to this area
- Combination of above (referring to all the categories listed in the survey question)
- Fire dept. (3)
- Others who have been through natural disasters
- Local help
- Local agency

Q5 What is the most effective way for you to receive information about how to make your household and home safer from natural disasters?

Some of the “other” responses to this question can be categorized into local government or agency sources:

- Sheriff Department
- Local tribal readiness office
- Local agency
- Local government.

Two federal sources were also mentioned:

- US Forest Service
- Army depot.

Two people listed church-related resources:

- Church officials
- www.lds.org (Latter Day Saints).

Another two people mentioned alarm systems:

- Local alarm systems

- Radio alert system

Other responses included:

- Observation
- Grants
- Not sure I need to be communicated to

Q7 Building a disaster supply kit, receiving First Aid training and developing a household/family emergency plan are all inexpensive activities that require a personal time commitment. How much time (per year) are you willing to spend on preparing yourself/household for a natural disaster or emergency event?

In response to this question, one person wrote, “we are ready.” Many of the other responses fit into a category of “whatever it takes” or “as much as necessary”:

- Whatever it takes (4)
- This is ongoing
- As much time as needed to get the job done
- As necessary (2)
- More.

Other responses were:

- Done these at an early age. None available in this remote area. We are at the exit age of life.
- I was in a security position for 12 years. I learned on the job.
- Disabled (2)
- Live alone
- We are ready

Q8 What steps, if any, have you or someone in your household taken to prepare for a natural disaster?

Several respondents wrote about extra supplies and safety mechanisms, including:

- Keep one vehicle full of gas, have backup generator, have cooking fuel & heating fuel on hand, have backup solar charger for all batteries, have extra clothes & food packed in a vehicle at all times & water purification (Storing things)
- Medicine
- Bought walkie talkies w/8 mile radius
- Extra fuel for heat
- Have all above but not in one spot
- Installed gas powered fire pump on 2000 gal swimming pool

- Gasoline, kerosene, firewood, tent & bedrolls, vehicles, cooking utensils
- Purchased generator, water filtration, home fire sprinklers, reduced/removed combustible vegetation around home, metal roof – non-combustible siding, weather alert radio.

Three people mentioned emergency plans:

- Discussed areas of evacuation (escape plans and action planning)
- We are in CSEPP notification area for evacuation from nerve gas leak at the Umatilla Army Depot. (We are prepared to shelter in place also.)
- I think a plan for neighbors who are disabled would be wise or at least know who is and where they are. Animals should be taken into account also.

The other responses were:

- Not really prepared
- Caregiver takes care of these things
- There will be no phones or electric

Q9.1 If “NO”, what is the main reason your household does not have insurance for flood events?

Four people mentioned that they don’t need flood insurance:

- I live in the desert
- Not sure TD has ever flooded. Less than 2 yrs in the area.
- Only Noah’s flood could reach this high
- Thought we were in a floodplain, but found we aren’t

Three people said they were not able to acquire flood insurance or it was not offered to them:

- Can’t get it
- Not obtainable
- Not offered (2)

Three people had other comments:

- Landlord’s responsibility
- Government program
- Risk versus benefit (meaning the probability of risk is not high enough to receive benefits)

Q10.1 IF “NO”, what is the main reason your household does not have earthquake insurance?

Many of the respondents who do not have earthquake insurance said that it was unnecessary for them to purchase because:

- Not located on a fault

- 70 to 80 yrs never had more than a tremor, if that
- We live on a mountainside!
- Not concerned/do not need it (5)

One respondent said he or she “plans to look into it” and two people said they were unable to obtain it:

- Can’t meet requirements by insurance company to get coverage because house is older
- Plan to look into it
- No response from insurance company.

There were two other comments:

- Policy speaks to collapse
- Risk versus benefit (meaning the probability of risk is not high enough to receive benefits)

Q13.1 How much are you willing to spend to better protect your home from natural disasters?

Many of the written responses were about how much the respondents could afford and how necessary the protection was.

- As I can do it
- Would depend on situation or feel the need for
- Whatever I can afford
- Would depend on what we could afford versus protection we would be provided
- It depends on how necessary it is and how much it would cost
- Being retired – within reason
- Will try cheapest way

One respondent mentioned that financial assistance would be necessary in order for him or her to protect the home:

- Would need financial assist. To get protection.

In addition, three respondents would not spend additional money to protect their homes. They provided a couple reasons for this:

- We’re in a 30 yr old double wide. Only one insurance co will cover it. We’d buy a newer one.
- Don’t own our home
- Don’t need

Q14 What nonstructural or structural modifications for earthquakes have you made to your home?

Three people wrote about additional nonstructural modifications to their homes. These were:

- Created a fire fuel free zone around home
- Large anchor bolts
- Fire & smoke detectors

There were more written responses about structural home modifications. They ranged from removal of a hazardous fireplace, to structural advantages built into new additions, to living in a recently build homes that were constructed with hazards in mind. Comments included:

- New addition is well secured to foundation
- Removed non-functional chimney
- Restored 100 year old house, mainly structural improvements
- New home built 2003-04
- All done at construction
- Heavier roofing, ty down, ext
- Built barn between house and rim above us.

Q15 Which of the following incentives, if any, would motivate you to take additional steps to better protect your home from a natural disaster?

Many of the respondents discussed why they did not take additional steps to protect themselves rather than discussing motivational techniques. Renting a home can be a disincentive to take additional steps to better prepare a home from a natural disaster. Four people wrote about renting a home as a reason for not taking additional steps:

- I rent (2)
- Move to a house – we currently live in a rented 2-story apartment
- Will own home in about 1 yr, wish I had this info earlier

Other reasons for not taking additional steps included:

- If I lived in a fault zone, if I lived in a flood plain, if I were not surrounded by irrigated land. (If the respondent lived in a fault zone or flood plain, he or she would be motivated to take additional steps.)
- Our home is solid & built well
- My plan is to build a new home.

Seven people did mention what would motivate them to take additional safety preparedness steps:

- Rental deduction
- Local grant money specific to local needs (ie, high hazard area = high grant for modifications)
- To know more about efficiency for gas heater & gas hot H₂O tank, to get credit for installation of more efficient furnace. Contractor did not know or advise us.

- Just do it!
- Safety of my family
- Shared cost program
- Free

One person never thought about it before and said:

- Just thought everyone did those (took steps to protect the home) – never really thought about it.

Q17 Are there any other issues regarding the reduction of risk and loss associated with natural disasters that you feel are important?

This question received comments covering several main themes including: location of development, maintenance techniques, regulations and government, man-made disasters, education/communication, personal responsibility and choice, and insurance. Many respondents discussed multiple topics in their comments. In these situations, the comment has been listed twice with a reference to where the comment is also located.

The **location of development** in natural hazard areas was a concern for some respondents. Some respondents felt that development in known hazard areas should be discontinued or reduced. Here are their comments:

- Its common sense to prohibit development in disaster-prone areas – planning departments should consider this as a matter of course in their zoning decisions just as they should consider the ability of a region to sustain development with regard to water, sewage, power, infrastructure, etc. To compensate any landowners not to develop in areas subject to natural disaster is to allow blackmail & is bad public policy.
- Not building in flood plains. Clearing debris, timber, etc., around homes & outbuildings. (This statement is also included in the following section on maintenance.)
- Don't build a whole city under water level
- Reducing houses in forested areas and floodplains
- The development in areas known to flood such as lower Oregon City & portions of Keizer should not be continued. Many developments along the coast are very vulnerable to a tsunami. Those areas will be hit someday. I have seen a tsunami years ago and it will be worse than anyone thinks.
- I feel that people should be given information regarding building homes in flood plains and new construction in these areas should be discouraged or prevented & society should not bear the cost of developers and individuals who choose to build in these areas. (This comment is also listed in the education/communication section.)
- Many of the potential disasters we face are not natural, i.e. human-caused wildfire. Limit home construction in interface area or require fire-safe construction, ingress, egress, utilities, etc. Safety cannot be legislated; it must be an attitude of society. We should not expect or

tolerate human-caused hazards. (This comment is also in the human-caused, man-made section.)

Other people suggested **methods of prevention or maintenance** that reduce natural hazard risk.

- Construction projects by state and fed government that can create flooding landslides. Poor fill & cut design by forest logging, state highway coast for example.
- When fields are plowed by highways & the winds are high it causes severe dust storms. I feel that if trees are planted at the edge of the fields, there would be less accidents.
- Not building in flood plains. Clearing debris, timber, etc., around homes & outbuildings. (This statement is also located in the location of development section).
- One should never plant large trees around the house; during a wind storm large branches come down causing considerable damage.
- Tree removal in flood area in city limits of Pilot Rock – once bridges get blocked up damage risk increases. Regulations can prevent repairs/corrections. (This comment is also in the role of government and regulation section.)
- Reasonable road and address signs so emergency vehicles can find addresses, etc. (Double sets of confusing mileposts installed by ODOT on the Cow River Gorge Historic Highway, old Highway 30, are particularly stupid & dangerous.) Note: The mileposts do not match up to maps.

Several respondents had strong feelings about the **role of government and regulation** in natural hazard preparedness and disaster recovery.

- Tree removal in flood area in city limits of Pilot Rock – once bridges get blocked up damage risk increases. Regulations can prevent repairs/corrections. (This comment is also in the methods of prevention or maintenance section.)
- Keep the public informed of risks without making restrictive laws. (This comment is also in the communication/education section.)
- Warnings to citizens, if possible, to get prepared. Communities should annually or more often require its citizens where to go, what to do, etc, etc. There should be regular checking and double-checking by county, state, and federal authorities to see that cities are complying and penalized if not.
- Intelligent public officials who can do the job they get paid for doing
- What is the Bureau of Rec, water master office, & my fire district doing to protect my home?!
- Reduce the impression that FEMA is intended to come to the rescue. Make all people more aware of their surroundings and their risks and their own personal responsibility. More government is not the solution,

only a tool. (This comment is also in the communication/education section.)

- Reinstate Clinton's FEMA; do away w/George Bush's
- I believe that the insurance industry should have policies for coverage in place that would influence building in hazardous areas. Couple that with regulated full disclosure for real estate sales and there should be no need for regulatory legislation. (This comment is also in the insurance section.)
- Replace FEMA with a grant program to local emergency agencies
Other people were more concerned about **human-caused or man-made disasters**. A few people expressed the opinion that there is nothing that can be done to prevent natural disasters.
- Many of the potential disasters we face are not natural, i.e. human-caused wildfire. Limit home construction in interface area or require fire-safe construction, ingress, egress, utilities, etc. Safety cannot be legislated; it must be an attitude of society. We should not expect or tolerate human-caused hazards. (This comment is also located in the location of development section.)
- Not worried about natural disasters, only man-made
- I really feel that there isn't much we can do to prevent acts of God. If they happen, we'll deal with it. Lookat Katrina – they did what they could & will pick up the pieces as well as they can.
- I am not as worried about natural disasters as I am about man destroying the earth with his inability to pull his head out of his greedy ass.
- There is nothing you can do to prevent natural disasters (acts of God) other than plan what to do if one happens to occur – plan, be prepared, & be informed.

Education and communication always play important roles in preparedness and recovery responses. People's comments on education and communication ranged from household communication to community preparedness training to including Spanish in communications.

- Realistic education for adults & children. NOT SCARE TATICS, no one believes them.
- Good communication system with monolingual Spanish speakers must be established in Hood River.
- Reduce the impression that FEMA is intended to come to the rescue. Make all people more aware of their surroundings and their risks and their own personal responsibility. (This comment is also in the regulation and government section.)
- "Use your head" and be prepared for oncoming disaster. Listen to media reports informing you that a disaster is forecast. Many Katrina victims had prior warning, but did not take it seriously enough.

- Communication ability
- Having a list of what to have on hand for different emergencies and knowing where to go in case of disaster. Should have a week each year for learning & having the info offered to those who would like it.
- I feel that people should be given information regarding building homes in flood plains and new construction in these areas should be discouraged or prevented & society should not bear the cost of developers and individuals who choose to build in these areas. (This comment is cross-listed in the location of development section.)
- Yes – it would be nice if everyone in our local community were educated on what to do and where to go for shelter or whatever.
- Keep the public informed of risks without making restrictive laws. (This comment is also in the regulation and government section.)
- The training of community members for service with the Red Cross provided locally on a regular schedule.

Three people talked about **personal responsibility and choice**. If people know that their home is in a hazard area, it is their responsibility to plan and prepare for the hazard.

- This is a lot like seatbelts and crash helmets – if anyone chooses to ignore these protections it should be on their head – no help if disaster strikes.
- Plan ahead!!! Responsibility for your own – then can help others.
- Disclose risk at public meetings. Make it clear that if you choose to live in at-risk area, you are not guaranteed bail-out from your problems. There are no guarantees in life.

Some people want the role of **insurance** companies to be increased or to expand their coverage areas.

- I believe that the insurance industry should have policies for coverage in place that would influence building in hazardous areas. Couple that with regulated full disclosure for real estate sales and there should be no need for regulatory legislation. (This comment is also located in the regulation and government section.)
- I think there should be insurance coverage readily available for outlying areas at a reasonable cost.
- I wish the insurance companies would just include them in their policies

Large-scale disaster planning and health care were the concerns of the some respondents.

- Adequate health care people and places for people affected
- In more populated areas the issue of riots & looting should be looked at. If there is an extreme & widespread disaster there will be unlawfulness and citizens should include how to avoid & protect themselves, family,

and property if need be. I feel that this is a “real” threat and byproduct of disasters in populated areas.

- The people, how to help them out during a nationwide disaster
- Stop the greed & graft when donated monies are given to aid disaster victims. Accountability for funds and actions or all this is just activity to create jobs that do nothing.
- What to do about seniors? Their meds – oxygen? Where to take them? How to get to them in a frontier area?

A few people mentioned **smaller-scale hazard warnings and preparation requirements**.

- Early warning for storms – other known existing problems – floods – etc.
- People living in flood places should be required to have boats & life jackets, one per person
- Affordable gas masks and transportation

Some respondents discussed **specific natural hazards** and how they would affect the region.

- Snow pack in mountains. Heavy rains on snow may cause flooding. Flooding over riverbanks & dikes.
- Earthquakes would totally isolate this community from outside help. Air services would be #1. We have wildfire around here, so are fight them! Floods would be minimal! One little river here!
- Forest fires. I live in an area with lots, lots, lots of trees. I live in the timber.

There were also a few unclassifiable responses.

- Protecting pets + livestock + wildlife
- Reduce traffic of toxins; reduce production of toxins, radioactive, etc.
- Using all means available to stop wildfires
- What helps are available?

Finally, one respondent said:

- Everything is pretty well covered.

Q21 Please indicate your level of education.

Only one response was in the “other” category:

- Specialty training

Q25 If you have lived in Oregon for less than 20 years, in what state did you live before you moved to Oregon?

The answer to this question was interesting because although the survey specifically listed California, Washington, and Idaho more respondents moved to the Mid-Columbia region from Colorado than Idaho (5.1% versus 3.4%).

Here are the responses:

- Arizona (2)
- Colorado (6)
- Kentucky
- Maryland
- Massachusetts
- Michigan
- Montana (4)
- Nevada
- New Jersey
- New Mexico
- Tennessee
- Texas
- Washington
- Wyoming
- Norway

Q28 Do you rent/own a:

- Ranch (2)
- Stick-built addition to manufactured home
- 19 ft travel trailer
- 2½ story home built in 1915
- Commercial building with living quarters
- We live/own our dwelling which is a duplex as well as an additional duplex
- Forest/grazing property

Please feel free to provide any additional comments in the space provided.

Three respondents discussed the need for **emergency education for the public and officials**. They felt they either lacked the information on how a particular hazard could affect their area or what to do/where to go in the case of an emergency.

- More than half of our town's houses are built on a hillside above the Columbia River. We also have a dam, and are of relative distance to Mt. Hood. Should the dam break, probably the lower half of the town would be wiped out within minutes. I'm not sure about the rest of the town on the hillsides. Should there be an earthquake, I'm not sure how that would affect us all. Wildfires are a hazard around us, more outside of our

city than directly in it. Should Mt. Hood suddenly erupt, well, I'm not sure what all that would affect in our town. To be honest, there are many natural disasters that could cause us all to be concerned 24/7, but which ones are more likely here? And how do you prepare for just the ones that might affect your area when you aren't sure which to prepare for? It would be nice to know the likelihood of each disaster in our area so we would know better how to prepare. Although, I must admit, your survey made me realize that I haven't done much to prepare at all. And that I should have done more by now. I will get started doing what I can!

- All of us living close to the Columbia River need to be educated on what to do and where to go – if The Dalles Dam or the John Day Dam were to rupture – if Mt. Hood were to rupture – or if an earthquake were to happen – we're not educated on what or where to go in our local areas.
- I feel that in our rural area we are not prepared for any kind of disaster. I really don't think that our leaders really know what they are going to do in actual case of a real disaster. We need more education on this. This does affect rich & poor. Thank you (comment also in govt.)

Several respondents discussed the importance of people taking **individual or personal responsibility** for their choices or actions. They stressed the importance of being responsible for themselves and their families rather than expecting an outside source to safeguard themselves and their possessions and provide compensation for destroyed property.

- Tax money should be used as little as possible. Individuals need to take more responsibility for safeguarding their own possessions. I would much rather pay for (or lose) for myself than to be forced to help pay for someone's loss if that person neglects to do what he can to protect his own things. Citizens must be willing to live with the consequences of his decision to build/live where a natural disaster may occur. Until or unless a person is forced to live in a dangerous area, it is that person's responsibility to safeguard his possessions. The government's responsibility is to inform the citizens of any dangers or considerations of living/building in a disaster zone. From there, it's the citizen's decision and risk.
- A lot of questions do not apply to us. As for insurance, we are insurance poor. Also, we live in a rural area. Nearest neighbor a mile away, so we have to take care of ourselves and glad of it.
- Because we live in the country, we probably feel that basically we are responsible for ourselves, except for fire, police, & ambulance, which our taxes and insurance help to pay for. Therefore, we feel that basically all people should be responsible for themselves. But, we realize that isn't reality, especially in towns, and that most services must be provided in order to people to survive. So, plan for the worst disaster and go from there. Good luck!
- 1) I feel very strongly that homes destroyed by floods in flood zones not be allowed to be reconstructed in the flood zones. Those who do shouldn't expect insurance companies to cover their homes, nor receive federal or

state aid to rebuild. 2) Each of us has to take personal responsibility in the location of our homes and our preparedness in meeting natural or other disasters and shouldn't expect governmental agencies to fully bear the burden of the costs to rebuild. 3) Volunteer fire departments in our area have been training for a variety of disasters, receiving funding through FEMA grants to do so. They should be commended for their efforts. (Hood River Area, WSFD.) (This comment is also located in the location of development section.)

- Early childhood education should stress the importance of individual responsibility for a safe environment. Nowhere except the U.S. can you cause a fire and not only not be shunned by society, but we will help you rebuild. Allowing building construction in flood, fire prone areas without adequate regard for bldg. techniques to reduce or eliminate major risk factors is ridiculous. This not only puts owners lives and property at risk but that of their neighbors and the emergency responders who are expected to protect us from ourselves.
- I believe timber land owners should be responsible for the fire threat on their property. They should have a fire prevention plan and clean up plan for their properties. Thinning, brush work, etc.

Two people thought changes to current **insurance** policies would be beneficial.

- Oregon's land use laws have addressed some of these problems which they have not done. They were hi-jacked by environmental extremists, & are no longer supported by the people of Oregon. I do not really trust the government to do the right thing. I would buy flood insurance if it was available from private companies. Actually, homeowners insurance should be expanded to cover all perils. (This comment is also located in the government section.)
- A lot of questions do not apply to us. As for insurance, we are insurance poor. Also, we live in a rural area. Nearest neighbor a mile away, so we have to take care of ourselves and glad of it.

Several respondents had comments about the **location of development** and related **planning and development codes**.

- 1) I feel very strongly that homes destroyed by floods in flood zones not be allowed to be reconstructed in the flood zones. Those who do shouldn't expect insurance companies to cover their homes, nor receive federal or state aid to rebuild. 2) Each of us has to take personal responsibility in the location of our homes and our preparedness in meeting natural or other disasters and shouldn't expect governmental agencies to fully bear the burden of the costs to rebuild. 3) Volunteer fire departments in our area have been training for a variety of disasters, receiving funding through FEMA grants to do so. They should be commended for their efforts. (Hood River Area, WSFD.) (This comment is also in the personal responsibility section.)
- Build where one wants does not mean we need to provide services or \$\$ when a disaster happens.

- Large expenditures for this sort of thing are unnecessary. 9-11 and Katrina have given much of our government agencies and education facilities a reason to spend money on things that may or not happen. All in the name of planning. (comment is also in funding section)
- Unfortunately, the scope of natural disasters is such that you can't depend on individual land owners to be able to do what needs to be done to be ready to be prepared. Building codes, zoning & properly educated planning staff at the local level need to set policies to support communities in this regard. Citizens should have cost-efficient resources available to them to deal with these issues as they can incorporate them into their lives (ie, a "lending library" of information, grants for funding improvements, staff to advise them, etc.). This is waving a "magic wand" but hey, you asked! :) (Also in
- We really need to enforce/create zoning and building codes that keep development out of natural resources; streams, river areas, & forest land. We should not authorize development in these areas. (also in location of dev section)

Concerns about **money** (how to spend it and who pays) are frequently contentious issues.

- Large expenditures for this sort of thing are unnecessary. 9-11 and Katrina have given much of our government agencies and education facilities a reason to spend money on things that may or not happen. All in the name of planning.
- I feel contingency funds should be set aside by the state for allocations to cities and counties in need of emergency services due to natural disasters. Fund could be used for prevention every so many years if natural disasters do not occur within that time period
- 1) Our home is located on 10 acres; 12 miles from fire dept (all uphill) – rural locations are subject to wildfire – our neighbor accidentally started a wildfire near our house. 2) Far too much effort and public money goes for flood protection of properties within the floodplains – perhaps we cannot protect every fool from their foolishness. 3) The Oregon State Police (Fire Marshall) spends much money gathering data about small amounts of propane, etc – the information IS NOT EVEN USED BY LOCAL FIRE DEPTS, too much paperwork.
- Tax money should be used as little as possible. Individuals need to take more responsibility for safeguarding their own possessions. I would much rather pay for (or lose) for myself than to be forced to help pay for someone's loss if that person neglects to do what he can to protect his own things. Citizens must be willing to live with the consequences of his decision to build/live where a natural disaster may occur. Until or unless a person is forced to live in a dangerous area, it is that person's responsibility to safeguard his possessions. The government's responsibility is to inform the citizens of any dangers or considerations of living/building in a disaster zone. From there, it's the citizen's decision and risk. (This comment is also in the individual responsibility section.)

Some respondents commented about the capability and role of **government** in natural hazard preparation and after natural disasters. The lack of **emergency services** was also mentioned.

- After New Orleans, I do not think government is capable of doing anything intelligent about natural disaster.
- I would hope government is more prepared to help our community better than they did down south – how sad it was to watch on the news.
- I feel that in our rural area we are not prepared for any kind of disaster. I really don't think that our leaders really know what they are going to do in actual case of a real disaster. We need more education on this. This does affect rich & poor. Thank you. (This comment also in the education section.)
- Gilliam County, Condon has 911, Sheriff Dept & no Red Cross. So the Sheriff Dept has it all. Red Cross will not come to Condon.
- 1) I feel very strongly that homes destroyed by floods in flood zones not be allowed to be reconstructed in the flood zones. Those who do shouldn't expect insurance companies to cover their homes, nor receive federal or state aid to rebuild. 2) Each of us has to take personal responsibility in the location of our homes and our preparedness in meeting natural or other disasters and shouldn't expect governmental agencies to fully bear the burden of the costs to rebuild. 3) Volunteer fire departments in our area have been training for a variety of disasters, receiving funding through FEMA grants to do so. They should be commended for their efforts. (Hood River Area, WSFD.) (This comment is also in the location of development section.)
- Oregon's land use laws have addressed some of these problems which they have not done. They were hi-jacked by environmental extremists, and are no longer supported by the people of Oregon. I do not really trust the government to do the right thing. I would buy flood insurance if it was available from private companies. Actually, homeowners insurance should be expanded to cover all perils. (This comment is also located in the insurance section.)

Another theme for some comments was **types of hazards** that should or should not be considered both in the Mid-Columbia region and Oregon.

- More relevant to this area of flat, irrigated former-desert are the risks of traffic accidents in dense fog or blowing dust.
- This whole county is dangerous because of Rimrock and deep canyons, and rough country. Population is very low here. Population is poor. Earthquakes would block all highways, dam the John Day River, and take out power. If terrorists bomb Hanford, traffic would be diverted through here and we don't have EMS/law enforcement to deal with it. The state would have to step up to the plate!
- It is difficult to imagine my level of "concern" when comparing life threatening events (e.g. volcanic eruption) with mere annoying problems (e.g. wind storm)(and economic disaster (drought). Also, my concerns are

more with events that have virtually no warning (tsunami) and those that have adequate warning (winter storm). The strategies to mitigate a bad outcome need to be different.

- Oregon is far too diverse a state to consider a “natural hazard” common to all parts of the state. Compare west of the Cascades to the high desert, or the Portland area with the rest of Oregon.

Several people offered **suggestions** about the types of preparation that should be made or considered.

- The best preparedness for our area where we have so much wind, windstorms, & hail storms, the Umatilla Army Depot (chemical depot) would be a storm cellar. I’ve lived in this area since 1940 & I’ve seen many kinds of storms, & wished I had a storm cellar.
- 1) To prevent wildfire spread, farmers who take CRP program should have fire buffer strip built into the CRP program – requiring the farmers to keep strips effective – we had the 60,000 acre fire a few years ago – we were lucky – buffer strips are the only way we will control this – too many farmers are not farming wheat anymore. 2) OLD cottonwoods fall into creek, plug channel & bridges – city of Pilot Rock needs to enforce floodway rules established by FEMA, and “oversee” a channel manage program – Pilot Rock has 4 bridges & foot bridges that can plug during floods – this can be done – everyone’s afraid of regulatory agencies giving out fines. To identify hazards is easy – no one wants to follow through.
- In some areas the flood plain designation appears to be given in a non-scientific manner. I have family in the Spokane County area – they have a 10 acre parcel which is surrounded by land that has been completely developed in the past 2 decades. They have been informed that their parcel is the “flood plain” and cannot be developed/a large percentage must be left undeveloped. Geologically the county does not seem to need any proof other than the necessity of no other undeveloped space left to absorb H₂O. I agree that flood plains should not be developed, but there needs to be a more scientific & comprehensive plan. Land owners who have left space undeveloped should also then be reasonably reimbursed. It benefits us all to have some earth to re-absorb water, but a single land owner should not be financially punished.

Two respondents wrote to say **thank you**.

- It’s about time someone did this. Way to go! Keep up the great work!
Sincerely, a thoughtfully concerned citizen, wife, and parent.
- Good luck on the survey

Finally, this last section contains **miscellaneous** comments.

- If I’d ever been in a disaster I’m sure some of my answers would be different. Was in storm in N.C., tho it was just heavy rains so went to movie at Base. It was cut short so went home & put rugs under the doors. Next AM all TV antennas were bent over & a new piece just completed a few months was lifted off the pilings & set down whole ¼ mile away. The fishing store & another building connected to pier were ok & they later

made them into rooms where we stayed for 2 nights for my husband's discharge papers & came then after 20 years in the Navy but last 5 yrs were spent at Marine bases since my husband was in Medical & Marines only have fighting men. 3 of my children attended U of O.

- 1) One question, why are you asking these questions? Do you know of a real disaster that's coming our way? I have heard before of the United States being split into 3 pieces from a severe earthquake. Most of California is man-made islands put together and the plates are very bad. Also New York & New Jersey are also in danger of shifting. Also along the Mississippi River. This is why I've been prepared for years. Not as much as I would like because of finances. Oregon will have its problems mostly with volcanoes & wildfires. Also coastal tsunamis.
- I know of a patented solution that, when sprayed on wood, will render it inflammable even when gasoline is applied and ignited. Why its sale and usage was somewhat squashed at the onset of its production is no mystery is it?
- The State of Oregon needs to protect the trees from being cut down, and not just timber forests either! Someone needs to stand up and protect the Columbia Gorge from a sewage dump. Has anyone taken into account the damage that will be done once the Warm Springs reservation builds their bloody casino? All the trash and pollution will destroy the salmon habitat for breeding grounds! We need to protect/save gas resources by raising the legal primary age limit to 18 years instead of 16 years. This would cut crime and teenage pregnancies!
- Please explain what the last question has to do with natural disaster.

Appendix D:

Economic Analysis of Natural Hazard Mitigation Projects

This appendix was developed by the Community Service Center's Oregon Natural Hazards Workgroup at the University of Oregon. It has been reviewed and accepted by the Federal Emergency Management Agency as a means of documenting how the prioritization of actions shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

The appendix outlines three approaches for conducting economic analyses of natural hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies. Information in this section is derived in part from: The Interagency Hazards Mitigation Team, State Hazard Mitigation Plan, (Oregon State Police – Office of Emergency Management, 2000), and Federal Emergency Management Agency Publication 331, Report on Costs and Benefits of Natural Hazard Mitigation. This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to provide the details of economic analysis methods that can be used to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

Why Evaluate Mitigation Strategies?

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred. Evaluating possible natural hazard mitigation activities provides decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, police, utilities, and schools. Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce “ripple-effects” throughout the community, greatly increasing the disaster's social and economic consequences.

While not easily accomplished, there is value, from a public policy perspective, in assessing the positive and negative impacts from mitigation activities, and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

What are Some Economic Analysis Approaches for Evaluating Mitigation Strategies?

The approaches used to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into three general categories: benefit/cost analysis, cost-effectiveness analysis and the STAPLE/E approach. The distinction between the methods is outlined below:

Benefit/cost Analysis

Benefit/cost analysis is a key mechanism used by the state Office of Emergency Management (OEM), the Federal Emergency Management Agency, and other state and federal agencies in evaluating hazard mitigation projects, and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

Benefit/cost analysis is used in natural hazards mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoided future damages, and risk. In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented. A project must have a benefit/cost ratio greater than 1 (i.e., the net benefits will exceed the net costs) to be eligible for FEMA funding.

Cost-Effectiveness Analysis

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

Investing in public sector mitigation activities

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods to evaluate the economic feasibility of public decisions which involve a diverse set of beneficiaries and non-market benefits.

Investing in private sector mitigation activities

Private sector mitigation projects may occur on the basis of one of two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

1. Request cost sharing from public agencies;
2. Dispose of the building or land either by sale or demolition;

3. Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
4. Evaluate the most feasible alternatives and initiate the most cost effective hazard mitigation alternative.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchasers. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

STAPLE/E Approach

Conducting detailed benefit/cost or cost-effectiveness analysis for every possible mitigation activity could be very time consuming and may not be practicable. There are some alternate approaches for conducting a quick evaluation of the proposed mitigation activities which could be used to identify those mitigation activities that merit more detailed assessment. One of these methods is the STAPLE/E Approach.

Using STAPLE/E criteria, mitigation activities can be evaluated quickly by steering committees in a systematic fashion. This set of criteria requires the committee to assess the mitigation activities based on the Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLE/E) constraints and opportunities of implementing the particular mitigation item in your community. The second chapter in FEMA's How-To Guide "Developing the Mitigation Plan – Identifying Mitigation Actions and Implementation Strategies" as well as the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process" outline some specific considerations in analyzing each aspect. The following are suggestions for how to examine each aspect of the STAPLE/E Approach from the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process".

Social: Community development staff, local non-profit organizations, or a local planning board can help answer these questions.

- Is the proposed action socially acceptable to the community?
- Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Will the action cause social disruption?

Technical: The city or county public works staff, and building department staff can help answer these questions.

- Will the proposed action work?
- Will it create more problems than it solves?
- Does it solve a problem or only a symptom?
- Is it the most useful action in light of other community goals?

Administrative: Elected officials or the city or county administrator, can help answer these questions.

- Can the community implement the action?
- Is there someone to coordinate and lead the effort?
- Is there sufficient funding, staff, and technical support available?
- Are there ongoing administrative requirements that need to be met?

Political: Consult the mayor, city council or county planning commission, city or county administrator, and local planning commissions to help answer these questions.

- Is the action politically acceptable?
- Is there public support both to implement and to maintain the project?

Legal: Include legal counsel, land use planners, risk managers, and city council or county planning commission members, among others, in this discussion.

- Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Are there legal side effects? Could the activity be construed as a taking?
- Is the proposed action allowed by the comprehensive plan, or must the comprehensive plan be amended to allow the proposed action?
- Will the community be liable for action or lack of action?
- Will the activity be challenged?

Economic: Community economic development staff, civil engineers, building department staff, and the assessor's office can help answer these questions.

- What are the costs and benefits of this action?
- Do the benefits exceed the costs?
- Are initial, maintenance, and administrative costs taken into account?
- Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private)?
- How will this action affect the fiscal capability of the community?
- What burden will this action place on the tax base or local economy?
- What are the budget and revenue effects of this activity?
- Does the action contribute to other community goals, such as capital improvements or economic development?
- What benefits will the action provide? (This can include dollar amount of damages prevented, number of homes protected, credit under the CRS, potential for funding under the HMGP or the FMA program, etc.)

Environmental: Watershed councils, environmental groups, land use planners and natural resource managers can help answer these questions.

- How will the action impact the environment?

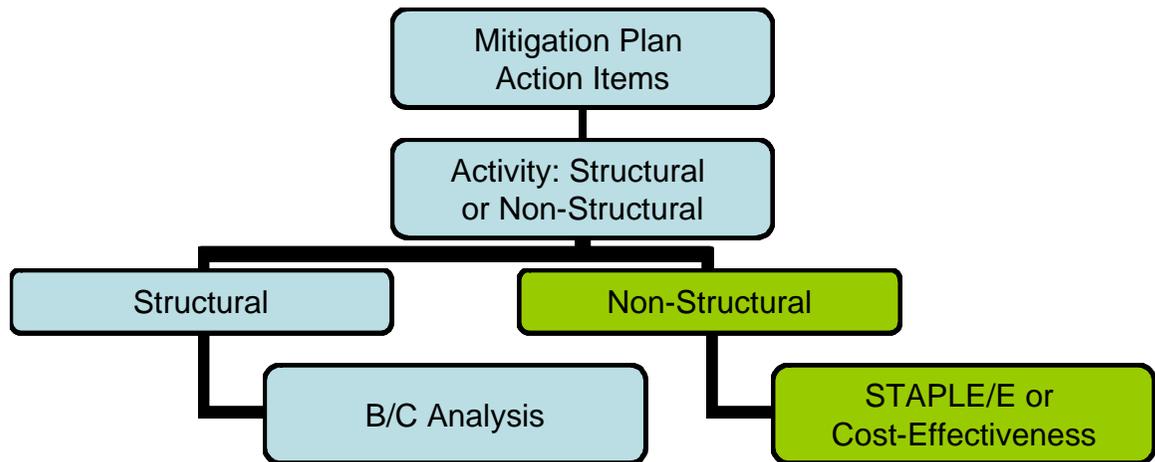
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

The STAPLE/E approach is helpful for doing a quick analysis of mitigation projects. Most projects that seek federal funding and others often require more detailed Benefit/Cost Analyses.

When to use the Various Approaches

It is important to realize that various funding sources require different types of economic analyses. The following figure is to serve as a guideline for when to use the various approaches.

Figure A.1: Economic Analysis Flowchart



Source: Community Service Center's Oregon Natural Hazards Workgroup at the University of Oregon, 2005

Implementing the Approaches

Benefit/cost analysis, cost-effectiveness analysis, and the STAPLE/E are important tools in evaluating whether or not to implement a mitigation activity. A framework for evaluating mitigation activities is outlined below. This framework should be used in further analyzing the feasibility of prioritized mitigation activities.

1. Identify the Activities

Activities for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation project can assist in minimizing risk to natural hazards, but do so at varying economic costs.

2. Calculate the Costs and Benefits

Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate activities.

Potential economic criteria to evaluate alternatives include:

- **Determine the project cost.** This may include initial project development costs, and repair and operating costs of maintaining projects over time.
- **Estimate the benefits.** Projecting the benefits, or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must

be researched, and they may include retained earnings, bond and stock issues, and commercial loans.

- **Consider costs and benefits to society and the environment.** These are not easily measured, but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.
- **Determine the correct discount rate.** Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Including inflation should also be considered.

3. Analyze and Rank the Activities

Once costs and benefits have been quantified, economic analysis tools can rank the possible mitigation activities. Two methods for determining the best activities given varying costs and benefits include net present value and internal rate of return.

- **Net present value.** Net present value is the value of the expected future returns of an investment minus the value of expected future cost expressed in today's dollars. If the net present value is greater than the project costs, the project may be determined feasible for implementation. Selecting the discount rate, and identifying the present and future costs and benefits of the project calculates the net present value of projects.
- **Internal Rate of Return.** Using the internal rate of return method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project. Once the mitigation projects are ranked on the basis of economic criteria, decision-makers can consider other factors, such as risk, project effectiveness, and economic, environmental, and social returns in choosing the appropriate project for implementation.

Economic Returns of Natural Hazard Mitigation

The estimation of economic returns, which accrue to building or land owners as a result of natural hazard mitigation, is difficult. Owners evaluating the economic feasibility of mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided

- Relocation and disruption expenses avoided
- Proprietor's income losses avoided

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period of time.

Additional Costs from Natural Hazards

Property owners should also assess changes in a broader set of factors that can change as a result of a large natural disaster. These are usually termed “indirect” effects, but they can have a very direct effect on the economic value of the owner's building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices
- Availability of resource supplies
- Commodity and resource demand changes
- Building and land values
- Capital availability and interest rates
- Availability of labor
- Economic structure
- Infrastructure
- Regional exports and imports
- Local, state, and national regulations and policies
- Insurance availability and rates

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision makers should understand the total economic impacts of natural disasters in order to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

Additional Considerations

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from natural hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects.

Several resources and models are listed on the following page that can assist in conducting an economic analysis for natural hazard mitigation activities.

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. Many communities are looking towards developing multi-objective projects. With this in mind, opportunity rises to develop strategies that integrate natural hazard mitigation with projects related to watersheds, environmental planning, community economic development, and small business development, among others. Incorporating natural hazard mitigation with other community projects can increase the viability of project implementation.

Resources

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Appendix E

Existing Plans, Policies, and Programs in Wasco County

The following appendix summarizes the existing plans, policies and programs in Wasco County. The first section covers plans and policies on the books for the County and the second section covers social service providers.

Existing Plans and Policies

The Disaster Mitigation Act of 2000 requires that communities identify a process where the requirements of the mitigation plan get incorporated into other planning mechanisms. The purpose of this appendix is to document those existing plans and policies in an effort to assist the community in identifying potential means to better integrate mitigation into the day-to-day decisions of local governments.

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances, and technical reports or studies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.¹

The Natural Hazards Mitigation Plan includes a range of recommended action items that, when implemented, will reduce the county's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the county's existing plans and policies. Linking existing plans and policies to the Natural Hazards Mitigation Plan helps identify what resources already exist that can be used to implement the action items identified in the Plan.

Implementing the natural hazards mitigation plan's action items through existing plans and policies increases their likelihood of being supported and getting updated to remain current, and maximizes the county's resources.

Below is a table of the plans and policies that currently exist in Wasco County. For each plan or policy, the table provides information on its author, its purpose, and how it relates to natural hazard mitigation. The information provided in the table can also be used to complete action item worksheets by identifying rationale and potential ideas for implementation.

Wasco County
Existing Plans and Policies

Name	Date of Last Revision	Author/Owner	Description	Relation to Natural Hazard Mitigation
2005 Comprehensive Economic Development Strategy	June 2006	Mid-Columbia Economic Development District / Wasco County Department of Economics?	This document is an economic vision for the Mid-Columbia counties with actionable agenda items for 05-06.	<ul style="list-style-type: none"> • The goals and vision developed for the entire Mid-Columbia region can be used as the rationale or need for mitigation activities aimed at protecting the local economy.
National Scenic Area Land Use and Development Ordinance	January 2006	Wasco County Planning & Development Office	This land use ordinance pertains to the protection of land use and development in the county and specifically the Columbia Gorge Natural Scenic Area.	<ul style="list-style-type: none"> • The ordinance outlines various land use and development ordinances. • The ordinance includes a disaster response procedures and guide that details emergency action plans for disaster recovery and community reconstruction strategy.
Transportation Improvement Program	May 2005 (updated every 3 years)	Wasco County Public Works Department	This program is an advance road planning program that helps identify the priority of road repairs/construction.	<ul style="list-style-type: none"> • Transportation systems assist in evacuation and response in the event of a natural hazard. • Can be linked to action items aimed at making the county's transit system more disaster resistant to reduce potential damage and risk.
Wasco County Comprehensive Plan	December 1981	Wasco County Planning Commission	The plan coordinates policies for orderly development of the county.	<ul style="list-style-type: none"> • Guides land use within the county. • Goals of preserving resource and protecting life from hazards can be linked to action items that guide development to reduce the county's risk to natural hazards. • Can be linked to action items for how the County will implement Oregon Statewide Planning Goal 7 requirements.

Wasco County
Existing Plans and Policies

Name	Date of Last Revision	Author/Owner	Description	Relation to Natural Hazard Mitigation
Wasco County Land Use and Development Ordinance	January 2005	Wasco County Planning and Economic Development Office	This plan outlines how land within Wasco county is zoned and regulated.	<ul style="list-style-type: none"> • Guides growth and development. • Can be linked to action items that shape growth and development so that they do not increase the county's risk to natural hazards. • Can be linked to action items that protect natural and historic areas and areas subject to natural hazards. • Can be linked to action items for how the County will implement Oregon Statewide Planning Goal 7 requirements.
Wasco County Transportation Needs Study	March 1995	Wasco County	This study reviews federal, state, and local transportation documents for methods of improving transportation services in the county.	<ul style="list-style-type: none"> • Periodic inventory of street systems in the community can help identify hazard prone routes or emergency routes for an evacuation of the community.

Existing Social Service Providers

Social systems can be defined as community organizations and programs that provide social and community-based services, such as health care or housing assistance, to the public. In planning for natural hazard mitigation, it is important to know what social systems exist within the community because of their existing connections to the public. . Often times, actions identified by the plan involve communicating with the public, or specific subgroups within the population (e.g. elderly, children, low income). The County can use existing social systems as resources for implementing such communication related activities because these service providers already work directly with the public and have already established a trusted method for communicating with these subgroups. On a daily basis social service providers work and communicate directly with the public on a number of issues, one of which could be natural hazard preparedness and mitigation.

The following is a brief explanation of how the communication process works and how the community's existing social service providers could be used to provide natural hazard related messages to their clients.

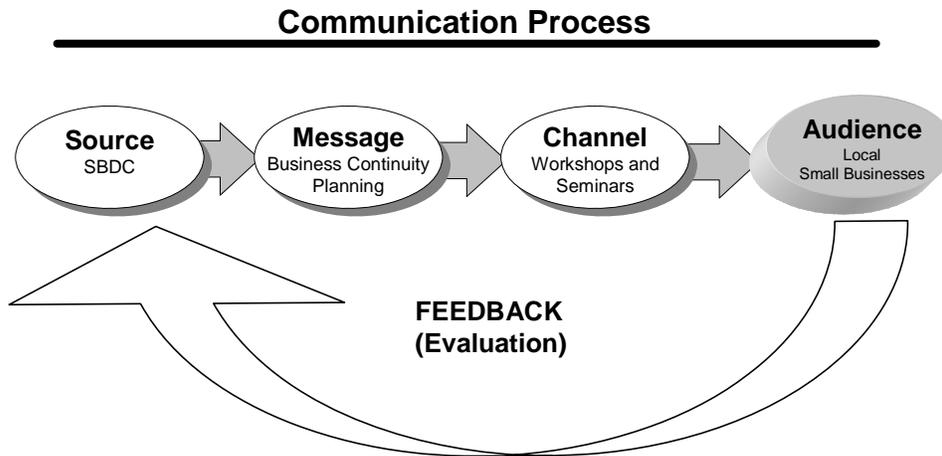
There are five essential elements for communicating effectively to a target audience:

- The **source** of the message must be credible,
- The **message** must be appropriately designed,
- The **channel** for communicating the message must be carefully selected,
- The **audience** must be clearly defined, and

The recommended action must be clearly stated and a **feedback** channel established for questions, comments and suggestions.

An example of an existing social system whose communication system can be linked to natural hazard mitigation is the Columbia Gorge Community College's Small Business Development Center (SBDC). The SBDC (the source) provides local businesses (the audience) with information on business contingency planning (the message) through workshops and seminars (the channel). To target small businesses, (insert name) County can provide the SBDC with information on developing business continuity plans and strategies for recovering from a natural hazard. When local small businesses attend the SBDC's workshops and seminars they can pick up this natural hazard mitigation information. This example communication process is graphically presented in *Figure X.2*:

Figure X.2 Communication Process



Source: Adapted from the U.S. Environmental Protection Agency Radon Division's outreach program

The following table provides a list of existing social systems within Wasco County. The table provides information on each organization or program's service area, types of services offered, populations served, and how the organization or program could be involved in natural hazard mitigation. The three involvement methods identified in the table are defined below:

- Education and outreach – organization could partner with the community to educate the public or provide outreach assistance on natural hazard preparedness and mitigation.
- Information dissemination – organization could partner with the community to provide hazard related information to target audiences.
- Plan/project implementation – organization may have plans and/or policies that may be used to implement mitigation activities or the organization could serve as the coordinating or partner organization to implement mitigation actions.

The information provided in the table can also be used to complete action item worksheets by identifying potential coordinating agencies and internal and external partners.

¹ Burby, Raymond J., ed. 1998. *Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities*.

Wasco County
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Potential Involvement in Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
American Red Cross Tel: 541-386-6000	Collect and provide blood and plasma to the community.	Hood River County		✓	✓	✓	✓	✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation
Arc of the Mid-Columbia P.O Box 521 The Dalles, Oregon, 97508 Website: http://community.gorge.net/arcofmidcolumbia	Provides help to individuals with developmental disabilities and their families in education, health, finance, employment, housing, and legal matters.	Hood River, Wasco, Sherman, and Gilliam Counties			✓				<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation
Bambinos Bilingual Learning Center Tel: 509-493-8525	Provide bilingual preschool and after-school childcare programs.	Hood River and Wasco Counties		✓				✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination
Boy Scouts of America - Mid Columbia District Tel: 541- 298-5022	Provides youth programs.	Mid-Columbia Region		✓				✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination
Campfire Boys and Girls - Mt. Hood Council Tel: 360-816-0570 Fax: 503-656-6356 5427 Glen Echo Ave. Gladstone, OR 97027	Provide youth programs.	Hood River, Sherman, and Wasco Counties		✓					<ul style="list-style-type: none"> • Education and outreach • Information dissemination
Columbia Gorge Center 2940 Thomsen Road Hood River, Oregon, 97031 Tel: 541-386-3520 Fax: 541-386-7788 Website: www.cgc-direct.com	Provides various services from health to employment issues for individuals. Also provides commercial services and residential services.	Hood River, Wasco, and Sherman Counties	✓		✓	✓	✓		<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation

Wasco County
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Potential Involvement in Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
Department of Human Services 700 Union Street The Dalles, Oregon, 97058 Webpage: http://egov.oregon.gov/DHS/	Provide self-sufficiency, medical, mental health, services and assistance for children, the elderly, and people with disabilities.	The Dalles		✓	✓	✓	✓	✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation
Eastern Oregon Support Services Brokerage P.O Box 329 Hood River, OR 97031 Tel: 541-387-3600 Fax 541-387-2999 Website: www.eossb.org	Provides consulting and self-sufficiency services to individuals with developmental disabilities.	Umatilla, Morrow, Wallowa, Malheur, Union, Baker, and Harney Grant Counties		✓	✓		✓		<ul style="list-style-type: none"> • Education and outreach • Information dissemination
Gorge Kids P.O Box 1233 Hood River, Oregon, 97401 Tel: 541-386-6250 Fax: 541386-6241 Email: info@gorgekids.com Website: www.gorgekids.com	Provides child-related information, events, and activities.	Columbia River Gorge		✓				✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination
Haven - Domestic Violence Help P.O Box 576 The Dalles, Oregon, 97058 Website: www.dhs.state.or.us/abuse/domestic/gethelp.htm	Provides a twenty-four hour crisis line for women and children counseling. Also provides temporary shelters, legal advice and transportation services.	The Dalles		✓					<ul style="list-style-type: none"> • Education and outreach • Information dissemination

Wasco County
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Potential Involvement in Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
Haven - Domestic Violence Help P.O Box 576 The Dalles, Oregon, 97058 Website:www.dhs.state.or.us/abuse/domestic/gethelp.htm	Provides housing services for individuals and families.	The Dalles					✓	✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation
Law Help - Legal Aid Service 421 High Street, Suite 110 Oregon City, Oregon, 97405 Tel: 503-655-2518 Fax 503-655-2701	Provides legal aid services to low-income residents.	Clackamas and Mid-Columbia Area						✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination
Maupin Area Chamber of Commerce PO Box 220 Maupin, OR 97037 Tel: 541-395-2599 Website: www.maupinoregon.com	Provide economic development assistance to local businesses.	Wasco County	✓						<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation
Mid Columbia Employment & Training Center 1113 Kelly Ave. The Dalles, OR 97058 Tel: 541-298-4101	Provides employment assistance	Wasco County	✓						<ul style="list-style-type: none"> • Education and outreach • Information dissemination
Mid-Columbia Center For Living 1610 Woods Court Hood River, Oregon, 97031	Provides assistance for mental, health, alcohol, drug abuse, and gambling addiction treatment.	Gilliam, Hood River, Sherman, and Wasco Counties			✓				<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Provides emergency response system to area

Wasco County
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Potential Involvement in Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
Mid-Columbia Community Action Council, Inc 312 East 4th Street The Dalles, Oregon, 97508 Tel: 541-298-5131 Fax: 541-298-5141 Website: www.mccac.com	Evaluates the programs aimed at reducing poverty, fosters community partnerships, and provides resources to reduce poverty.	Wasco, Hood River, and Sherman Counties				✓	✓	✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination
Mid-Columbia Council of Governments 1102 12th St. Hood River, OR 97031 Tel: 541-386-6300 Fax: 541-386-2189	Provides services to businesses and families.	Gilliam, Hood River, Sherman, Wasco, and Wheeler Counties	✓	✓	✓	✓	✓	✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation
Mid-Columbia Economic Development District 515 E. 2nd Street The Dalles, OR 97058 Tel: 541-296-2266 Website: http://www.mcedd.org/	Provides economic development services to communities	Hood River, Sherman, and Wasco Counties	✓						<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation
Mid-Columbia Senior and Disabled Services 500 Summer St. NE, E02 Salem, OR 97301-1073 Tel: 541-386-9080		Mid-Columbia Region			✓	✓			<ul style="list-style-type: none"> • Education and outreach • Information dissemination
Mid-Columbia Senior Center 1112 W 9th St The Dalles, OR 97058 Tel: 541-296-4788		Mid-Columbia Region				✓			<ul style="list-style-type: none"> • Education and outreach • Information dissemination

Wasco County
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Potential Involvement in Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
Mt. Hood Economic Alliance 4336 SW Condor Avenue Portland, OR 97201 Tel: 503-228-5565 Fax: 503-228-7456 Website: http://www.mthoodea.org/	Administers the Regional Investment and Rural Investment Programs which fosters and promotes economic development.	Clackamas, Hood River and Wasco Counties	✓						<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation
Next Door, Inc - Residential Services P.O Box 661, Hood River, Oregon, 97031 Tel: 541-386-6665 Fax: 541-386-5440 Website: www.nextdoorinc.org	Provides various programs and counseling for children, youths, adults, and families.	Hood River and The Dalles		✓				✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination
Region Nine Educational Services District 400 East Scenic Drive, Suite 207 The Dalles, Oregon, 97058 Tel: 541-296-5155 Fax: 541-296-2965 Website: www.r9esd.k12.or.us/	Provides educational support services for K-12 public schools.	The Dalles, Hood River and Wasco Counties		✓	✓				<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation
Social Security Office 420 East 3rd Street The Dalles, Oregon, 97058 Tel: 541-298-2734 Website: www.ssa.gov	Issues social security numbers and benefits for retirement, disability, and survivorship. Also provides security income program for those in need.	The Dalles	✓	✓	✓	✓	✓	✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination

Wasco County
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Potential Involvement in Natural Hazard Mitigation	
			Businesses	Children	Disabled	Elders	Families	Low Income		
Special Olympics 922 East 2nd Street The Dalles, Oregon, 97508 Website: www.specialolympics.com	Provides a year round of sports training to individuals with developmental disabilities.	Wasco and Sherman Counties		✓	✓			✓		<ul style="list-style-type: none"> • Education and outreach • Information dissemination
The Dalles Chamber of Commerce 404 W. 2nd Street The Dalles, OR 97058 Tel: 541-296-2231 Fax: 541-296-1688 Website: www.thedallescchamber.com	Provide economic development assistance to local businesses.	Wasco County	✓							<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation
The Dalles Employment Center 700 Union The Dalles, OR 97058 Tel: 541-296-5435	Provides employment assistance	Wasco County	✓							<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation
The Gorge Translink - Public Transportation 201 Federal Street The Dalles, Oregon, 97058 Tel: 541-298-5345 Fax: 541-296-5674 Website: www.gorgetranslink.org	Provides public transportation for people in the Mid-Columbia region to travel within the are or between counties.	Skamania, Klickitat, Hood River, Wasco, and Sherman Counties	✓	✓	✓	✓	✓	✓	✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation

Wasco County
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Potential Involvement in Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
Wasco County Commission on Children and Families 610 Court Street The Dalles, OR 97058 Tel: 541-506-2670	Works toward creating community partnerships that help improve the lives of children and families.	Wasco County		✓				✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation
Wasco County Juvenile Department 211 Weber Street The Dalles, Oregon, 97058 Tel: 541-298-3132 Fax: 541-296-2965 Website: www.wcid.co.wasco.or.us	Provides adolescents who committed crime to be punished.	The Dalles		✓					<ul style="list-style-type: none"> • Education and outreach • Information dissemination
Wasco Sherman Public Health Department 419 East 7th Street The Dalles, Oregon, 97058 Tel: 541-506-2600 Website: www.wshd.org	Enforces public and environmental health laws of federal, state, and county government.	Wasco and Sherman Counties	✓						<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation

Appendix F:

Mitigation Tools

Please refer to the Oregon Natural Hazards Workgroup website for a wide array of natural hazard mitigation tools:

<http://www.oregonshowcase.org/index.cfm?mode=resources>

Appendix G

List of Acronyms

This appendix was developed by the Community Service Center's Oregon Natural Hazards Workgroup at the University of Oregon for use by Pre-Disaster Mitigation Communities.

County and Regional

CPAWC	Cooperative Public Agencies of Washington County
CREW	Cascadia Region Earthquake Workgroup
CWPP	Community Wildfire Protection Plan
NHMP	Natural Hazards Mitigation Plan
NSA	National Scenic Area
PGE	Portland General Electric
PLP	Partners for Loss Prevention
NN	Northwest Natural
SWCD	Soil and Water Conservation District

Oregon

AGC	Associated General Contractors
AOC	Association of Oregon Counties
BCD	Building Codes Division (Department of Consumer and Business Services)
BPA	Bonneville Power Administration
CPW	Community Planning Workshop (University of Oregon)
DAS	Department of Administrative Services
DCBS	Department of Consumer and Business Services
DEQ	Department of Environmental Quality
DHS	Department of Human Services
DLCD	Department of Land Conservation and Development
DOGAMI	Department of Geology and Mineral Industries
DSL	Division of State Lands
ESD	Education Service District
GIHMT	Governor's Interagency Hazard Mitigation Team
GNRO	Governor's Natural Resources Office (State of Oregon)
LCDC	Land Conservation and Development Commission (State of Oregon)
LOC	League of Oregon Cities
OCS	Oregon Climate Service
ODA	Oregon Department of Agriculture
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OEM	Office of Emergency Management (Oregon State Police)
OEMA	Oregon Emergency Management Association

OERS	Oregon Emergency Response System
OHIRA	Oregon Hazard Identification and Risk Assessment
ONHW	Oregon Natural Hazards Workshop (University of Oregon)
ORS	Oregon Revised Statutes
ORVOAD	Oregon Voluntary Organizations Active in Disaster
OSFM	Office of State Fire Marshal (Oregon State Police)
OSP	Oregon State Police
OSSPAC	Oregon Seismic Safety Policy Advisory Commission
OSU	Oregon State University
OUS	Oregon University System
OWEB	Oregon Watershed Enhancement Board
PSU	Portland State University
PUC	Public Utility Commission
WRD	Water Resources Department

Federal

AASHTO	American Association of State Highway and Transportation Officials
AIA	American Institute of Architects
APA	American Planning Association
ARC	American Red Cross
ASCE	American Society of Civil Engineers
ATC	Applied Technology Council
b/ca	benefit/cost analysis
BFE	Base Flood Elevation
BLM	Bureau of Land Management
BSSC	Building Seismic Safety Council
CDBG	Community Development Block Grant
CFR	Code of Federal Regulations
CRS	Community Rating System
CVO	Cascade Volcano Observatory (USGS)
CWPP	Community Wildfire Protection Plan
DHS	Department of Homeland Security
EDA	Economic Development Administration
EPA	Environmental Protection Agency
ER	Emergency Relief
EWP	Emergency Watershed Protection (NRCS Program)
FAA	Federal Aviation Administration
FAS	Federal Aid System
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance (FEMA Program)
FTE	Full Time Equivalent
GIS	Geographic Information System

GNS	Institute of Geological and Nuclear Sciences (International)
GSA	General Services Administration
HAZUS	Hazards U.S.
HBA	Home Builders Association
HFRA	Healthy Forest Restoration Act
HMGP	Hazard Mitigation Grant Program
HMST	Hazard Mitigation Survey Team
HUD	Housing and Urban Development (United States, Department of)
IBHS	Institute for Business and Home Safety
ICC	Increased Cost of Compliance
IHMT	Interagency Hazard Mitigation Team
NCDC	National Climate Data Center
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NHMP	Natural Hazard Mitigation Plan (also known as “409 Plan”)
NIBS	National Institute of Building Sciences
NIFC	National Interagency Fire Center
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
PDM	Pre-Disaster Mitigation Program
SBA	Small Business Administration
SEAO	Structural Engineers Association of Oregon
SHMO	State Hazard Mitigation Officer
TDR	Transfer of Development Rights
UGB	Urban Growth Boundary
URM	Unreinforced Masonry
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USFA	United States Fire Administration
USFS	United States Forest Service
USGS	United States Geological Survey
USGS-CVO	United States Geological Survey – Cascades Volcano Observatory
WSSPC	Western States Seismic Policy Council