Wheeler County

Multi-Jurisdictional Natural Hazards Mitigation Plan

Report for:

Wheeler County
P.O. Box 447
Fossil, Oregon 97830

Prepared by:

VISION Consulting
and Grant Writing
1312 Sterling Drive
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December 2007

U.S. Department of Homeland Security
Region X
130 228th Street, SW
Bothell, WA 98021-9796

FEMA

April 7, 2008

Honorable Jeanne Burch
Judge, Wheeler County Court
P.O. Box 447
Fossil, Oregon 97830

Dear Judge Burch:

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has approved the ***Wheeler County Natural Hazard Mitigation Plan*** as a multi-jurisdictional local plan as outlined in 44 CFR Part 201. With approval of this plan, the following entities are now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants and Flood Mitigation Assistance project grants through April 7, 2013:

Wheeler County **City of Fossil** **City of Mitchell**

City of Spray

The plan's approval provides the above jurisdictions eligibility to apply for hazard mitigation projects through your state. All requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular program under which the application is submitted. For example, a specific mitigation activity or project identified in the plan may not meet the eligibility requirements for FEMA funding, and even eligible mitigation activities are not automatically approved for FEMA funding under any of the aforementioned programs.

Over the next five years, we encourage your communities to follow the plan's schedule for monitoring and updating the plan, and to develop further mitigation actions. The plan must be reviewed, revised as appropriate, and resubmitted for approval within five years in order to continue project grant eligibility.

If you have questions regarding your plan's approval or FEMA's mitigation grant programs, please contact our state counterpart, Oregon Emergency Management Division, which coordinates and administers these efforts for local entities.

Sincerely,

Mark Carey, Director
Mitigation Division

cc: Dennis Sigrist, Oregon Emergency Management

Enclosure

KM

Special Thanks & Acknowledgements

Project Steering Committee:

- Wheeler County Judge, Jeanne Burch
- City of Fossil Fire Chief, Rick Shaffer
- County Commissioner, John Asher
- City of Mitchell, Mike Brennan
- City of Mitchell, Rhonda Brennan
- City of Spray Fire Department, Scott Field
- City of Spray Council, Bill Wyatt
- Twickenham Volunteer Fire- Mal Hawley
- Wheeler County Road Master, Dwayne Simmons
- ODOT Supervisor, Andy Anderson
- Wheeler County Sheriff, & Emergency Management Director, David Rouse
- Wheeler County Emergency Services Coordinator, Marj Sharp

Project Managers:

Marj Sharp, Wheeler County Emergency Services Coordinator

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

Regional partners include:

- 911
- Bureau of Land Management
- Oregon Department of Forestry
- Soil and Water Conservation District
- U. S. Forest Service
- Oregon Department of Fish and Wildlife
- Columbia Basin Electric Company Coop
- Columbia Power Coop
- Oregon Department of Transportation

- D.R. Johnson Ranch
- Stanley Ranch

Geographic Information Systems (GIS) Maps:

All maps in this plan were developed by Oregon Department of Geology and Mineral Industries (DOGAMI) as part of the regional partnership.

Wheeler County
Multi-Jurisdictional Natural Hazards Mitigation Plan

Table of Contents

Executive Summary

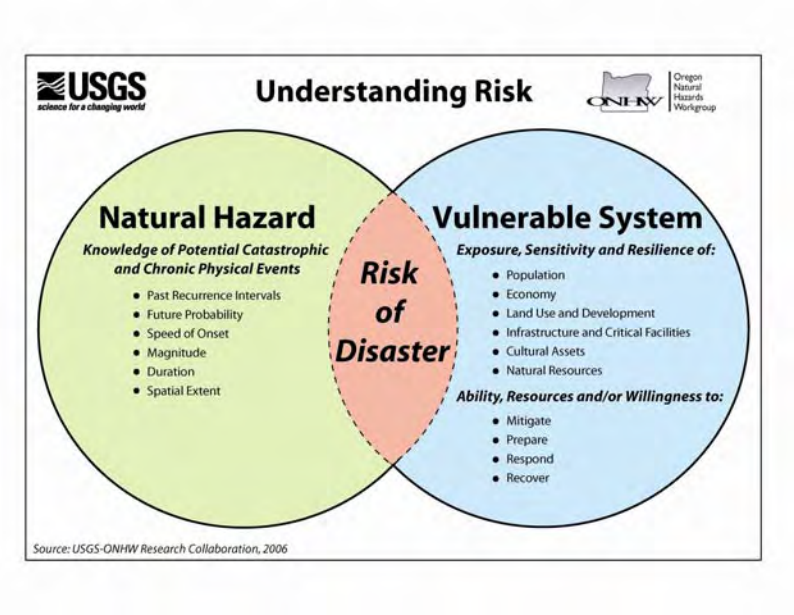
Wheeler County developed this Multi-Jurisdictional Natural Hazard Mitigation Plan in an effort to reduce future loss of life and property resulting from natural disasters. The plan includes both the unincorporated County as well as the cities of: Fossil, Mitchell, and Spray. It is impossible to predict exactly when these disasters will occur, or the extent to which they will affect the community. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize the losses that can result from natural disasters.

Natural hazard mitigation is defined as a method of permanently reducing or alleviating the losses of life, property, and injuries resulting from natural hazards through long and short-term strategies. Example strategies include policy changes, such as updated ordinances, projects, such as seismic retrofits to critical facilities; and education and outreach to targeted audiences, such as Spanish speaking residents or the elderly. Natural hazard mitigation is the responsibility of individuals, private businesses and industries, state and local governments, and the federal government.

Why Develop this Mitigation Plan?

This natural hazard mitigation plan is intended to assist Wheeler County and participating cities reduce the risk from natural hazards by identifying resources, information, and strategies for risk reduction. It will also help guide and coordinate mitigation activities throughout the community. The figure below is utilized throughout the plan to illustrate the concept of risk reduction.

Figure i.1 Understanding Risk



Source: Oregon Natural Hazards Workgroup, 2006

A natural hazard mitigation plan can assist the community to understand what puts the community at risk. When a community can identify and understand the relationship between the natural hazards it faces, its vulnerable systems, and its existing capacity, it becomes better equipped to identify and implement actions aimed at reducing the community's overall risk to natural hazards.

Who Participated in Developing the Plan?

In Fall 2005, the Oregon Natural Hazards Workgroup (ONHW) at the University of Oregon's Community Service Center partnered with the Department of Geology and Mineral Industries (DOGAMI) and the Southeast Oregon Region (Harney and Malheur as well as Jefferson and Lake) counties to develop a Pre-Disaster Mitigation Planning Grant proposal. Each county joined the Partnership for Disaster Resistance and Resilience (*The Partnership*) by signing (through their County Commissions) a Memorandum of Understanding for this project. FEMA awarded the Southeast Oregon Region grant to support the development of the natural hazard mitigation plans for the four counties in the region. ONHW, DOGAMI and the communities were awarded the grant in the Fall of 2005 and local planning efforts in this region began in the Fall of 2006.

Wheeler County Multi-Jursidictional Natural Hazard Mitigation Plan is the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector and regional organizations. A project steering committee guided the process of developing the plan. The steering committee was comprised of representatives from the following organizations.

- Wheeler County Judge, Jeanne Burch
- City of Fossil Fire Chief, Rick Shaffer
- County Commissioner, John Asher
- City of Mitchell, Mike Brennan
- City of Mitchell, Rhonda Brennan
- City of Spray Fire Department, Scott Field
- City of Spray Council, Bill Wyatt
- Twickenham Volunteer Fire- Mal Hawley
- Wheeler County Road Master, Dwayne Simmons
- ODOT Supervisor, Andy Anderson
- Wheeler County Sheriff, & Emergency Management Director, David Rouse
- Wheeler County Emergency Services Coordinator, Marj Sharp

Wheeler County was designated as the plan's convener and will take the lead in implementing, maintaining and updating the plan. Public participation played a key role in the development of goals and action items. Public participation played a key role in the development of goals and action items. The County's project webpage, located on the Partners for Disaster Resistance & Resilience website, will serve as an outreach tool to the community. As part of the regional PDM grant, ONHW implemented a region wide household preparedness survey.

What are the Plan Goals?

The plan goals describe the overall direction that Wheeler County agencies, organizations, and citizens can take toward mitigating risk from natural hazards.

- Ability to respond effectively and swiftly
- Safety of life and property
- Increased cooperation and collaboration between groups and agencies

These goals were established by the Wheeler County Hazard Mitigation Steering Committee and Stakeholders and were approved by the Cities and County Government. They are regional goals shared by Gilliam, Sherman, and Wheeler Counties.

How are the Action Items Organized?

The action items are organized within an action matrix (located at the end of this Summary), which lists all the multi-hazard and hazard-specific action items included in the mitigation plan. Data collection and research and the public participation process resulted in the development of these action items. The Action Item Matrix portrays the overall plan framework and identifies linkages between the plan goals, and actions. The matrix documents a description of the action, the coordinating organization, timeline, and the plan goals addressed.

- **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 Partners:** Internal partner organizations are departments within the community that may be able to assist in the implementation of action items by providing relevant resources to the coordinating organization.
- **External Partners:** External Partner organizations can assist the community 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.

The internal and external partner organizations listed in the mitigation plan are potential partners recommended by the project steering committee, but who were not necessarily contacted during the development of the plan. Partner organizations should be contacted by the coordinating organization to establish commitment of time and or resources to action items.

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

- **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 the implementation.

How will the plan be implemented?

The plan maintenance section of this document details the formal process that will ensure that the Wheeler County Multi-Jursidictional Natural Hazard Mitigation Plan remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the Plan annually and producing a plan revision every five years. This section describes how the community will integrate public participation throughout the plan maintenance process. Finally, this section intends to incorporate the mitigation strategies outlined in this Plan into existing planning mechanisms such as the Comprehensive Plan, Capital Improvement Plans, and Building Codes outlined in the Development Code.

Plan Adoption

The Emergency Management Department will be responsible for adopting the Wheeler County Multi-Jursidictional Natural Hazard Mitigation Plan and providing the support necessary to ensure plan implementation. After the Plan is locally reviewed and deemed complete the Emergency Management Department 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 the Flood Mitigation Assistance program funds.

The accomplishment of the Natural Hazards Mitigation Plan goals and actions depends upon the maintenance of a competent Steering Committee and adequate support from the county departments reflected in the plan in incorporating the outlined action items into existing county plans and procedures. It is hereby directed that the appropriate county departments and programs implement and maintain the concepts in this plan. Thorough familiarity with this Plan will result in the efficient and effective implementation of appropriate mitigation activities and a reduction in the risk and the potential for loss from future natural hazard events.[i]

[i] Based on the City of Beaverton's Promulgation Statement for plan adoption.

Section 1
Introduction

Why Develop a Mitigation Plan?

Wheeler County developed this multi-jurisdictional Natural Hazards Mitigation Plan in an effort to reduce future loss of life and property resulting from natural disasters. This plan includes Wheeler County as well as the cities of Fossil, Mitchell, and Spray. The three incorporated cities in Wheeler County have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, the actions identified in this plan are considered multi-jurisdictional actions because they benefit both the County and all the participating cities.

It is impossible to predict exactly when these disasters will occur, or the extent to which they will affect the County. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize the losses that can result 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 Wheeler County, Oregon, which include drought, seismic, wildfires, floods, landslides, volcano activity, windstorms and winter storms. The dramatic increase of the costs associated with natural disasters over the past decades has fostered interest in identifying and implementing effective means of reducing vulnerability. This Natural Hazards Mitigation Plan is intended to assist Wheeler 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: (1) a foundation for coordination and collaboration among agencies and the public in the County; (2) identification and prioritization of future mitigation activities; and (3) assistance in meeting federal planning requirements and qualifying for assistance programs. The mitigation plan works in conjunction with other County plans and programs including:

- Oregon Department of Forestry's Plan
- Oregon Department of Transportation Plan
- Wheeler County Transportation Plan
- Asher Clinic Disaster Plan
- City of Mitchell Strategic Plan
- City of Fossil Strategic Plan
- City of Spray Strategic Plan
- Emergency Operations Plan
- Community Wildfire Protection Plan –will be adopted by County Court 11/06

- Comprehensive Land Use Plan
- Wheeler County's Hazard Mitigation Plan

As well as the State of Oregon Natural Hazards Mitigation Plan.

The plan provides a set of actions to prepare for and reduce the risks posed by natural hazards through education and outreach programs, the development of partnerships, and implementation of preventative activities such as land use or watershed management programs. The removing, reducing or containment of risk factors and better preparation for a quick response to disasters should they occur in the county. The actions described in the plan are intended to be implemented through existing plans and programs within the County whenever possible when funding is not a factor. If funding is a factor in the implementation of the actions described, then funding will need to be explored and acquired.

What is Natural Hazard Mitigation?

What is natural hazard mitigation? Natural hazard mitigation is defined as permanently reducing or alleviating the losses of life, property, and injuries resulting from natural hazards through long and short-term strategies. Example strategies include planning, policy changes, programs, projects, and other activities. Mitigation is the responsibility of individuals, private businesses and industries, state and local governments, and the federal government.[i]

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.

Policy Framework for Natural Hazards in Oregon

Planning for natural hazards is an integral element of Oregon's statewide land use planning program, which began in 1973. All Oregon cities and counties have comprehensive plans and implementing ordinances that are required to comply with the statewide planning goals. The challenge faced by state and local governments is to keep this network of local plans coordinated in response to the changing conditions and needs of Oregon communities.

Statewide land use planning Goal 7: Areas Subject to Natural Hazards calls for local plans to include inventories, policies, and ordinances to guide development in hazard areas. Goal 7, along with other land use planning goals, has helped to reduce losses from natural hazards. Through risk identification and the recommendation of risk-reduction actions, this plan aligns with the goals of the County's Comprehensive Plan, and helps the County meet the requirements of statewide land use planning Goal 7.

The primary responsibility for the development and implementation of risk reduction strategies and policies lies with local jurisdictions. However, resources exist at the state and federal levels. Some of the key agencies in this area include Oregon Emergency Management (OEM), Oregon Building Codes Division (BCD),

Oregon Department of Forestry (ODF), Oregon Department of Geology and Mineral Industries (DOGAMI), and the Department of Land Conservation and Development (DLCD).

The Disaster Mitigation Act of 2000 (DMA 2000) is the latest federal legislation addressing mitigation planning. The legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. As such, this Act established a pre-disaster hazard mitigation program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). Section 322 of the Act specifically addresses mitigation planning at the state and local levels. States and local communities must have approved mitigation plans in place in order to qualify to receive post-disaster HMGP funds. Mitigation plans must demonstrate that their proposed mitigation measures are based on a sound planning process that accounts for the risk to the individual and their capabilities.

How was the Plan Developed?

In Fall 2005, the Oregon Natural Hazards Workgroup at the University of Oregon's Community Service Center partnered with the Department of Geology and Mineral Industries (DOGAMI) and the Mid-Columbia Gorge Region (Gilliam, Hood River, Morrow, Sherman, Umatilla, Wasco, and Wheeler) counties to develop a Pre-Disaster Mitigation Planning Grant proposal. Each county joined the Partnership for Disaster Resistance and Resilience (*The Partnership*) by signing (through their County Commissions) a Memorandum of Understanding for this project. FEMA awarded the Mid-Columbia Gorge Region grant to support the development of the natural hazard mitigation plans for the seven counties in the region.

The planning process used to create Wheeler County's Natural Hazards Mitigation Plan was developed using a planning process created by the Community Service Center's Oregon Natural Hazard Workgroup at the University of Oregon.[ii] The planning process was designed to: (1) result in a plan that is DMA 2000 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 planning process included the review and incorporation, if appropriate, of existing plans, studies, reports and technical information. In general, the following regional resources were reviewed and local resources have been cited throughout the plan.

- State of Oregon Natural Hazard Mitigation Plan – Regional Profiles and Hazard Assessments;
- Oregon Technical Resource Guide;
- Oregon Natural Hazards Workgroup Training Manual;
- The Oregon Atlas;
- The Oregon Weather Book;
- Wheeler County Comprehensive Plan;
- Wheeler County Zoning Ordinance;
- North Central Oregon: Strategic Plan for Tourism; and

- Region 5 Household Preparedness Survey Report.

The following is a summary of major activities included in the planning process.

Step 1: Organizing to Prepare the Plan:

In Wheeler County the Emergency Services Coordinator met and discussed the need to develop the Pre-Hazard Mitigation Plan with the County Commissioners and the amount of work involved in putting it together. It was decided the best option was to contract with an outside consultant to prepare the plan. An outside contractor Susan Brewer of VISION Consulting & Grant Writing was hired to do all aspects of preparing the plan. It was the responsibility of the contractor hired to facilitate all the steering committee meetings and to contact and /or meet with the stakeholders. The Emergency Services Coordinator was responsible for notifying the steering committee members when, where and what time there would be a meeting.

The Contractor attended the fall training workshop in The Dalles on October 12th and 13th 2005.

A Steering Committee was developed to assist in developing the plan. The committee includes:

- Wheeler County Judge, Jeanne Burch
- City of Fossil Fire Chief, Rick Shaffer
- County Commissioner, John Asher
- City of Mitchell, Mike Brennan
- City of Mitchell, Rhonda Brennan
- City of Spray Fire Department, Scott Field
- City of Spray Council, Bill Wyatt
- Twickenham Volunteer Fire- Mal Hawley
- Wheeler County Road Master, Dwayne Simmons
- ODOT Supervisor, Andy Anderson
- Wheeler County Sheriff, & Emergency Management Director, David Rouse
- Wheeler County Emergency Services Coordinator, Marj Sharp

Step 2: Involving the Community:

The first meeting of the Wheeler County Steering Committee was held on November 10, 2005 at the Wheeler County Resource Building Fossil Oregon. The following committee members were present at the meeting:

- Wheeler County Sheriff's Office
- Wheeler County Road Department
- City of Spray
- Wheeler County Volunteer Fire
- Twickenham Volunteer Fire

- Wheeler County Judge
- Oregon Department of Forestry
- Wheeler County Emergency Services

During the first meeting, the planning process and plan requirements were described to the Committee. In addition, the committee reviewed the list of critical infrastructure for their county and made several changes to what was listed for Wheeler County. The Steering Committee agreed to engage other interested stakeholders by inviting them to subsequent Steering Committee meetings. The following is a list of the stakeholders that received invitations to the remaining meetings.

- 911
- Bureau of Land Management
- Oregon Department of Forestry
- Soil and Water Conservation District
- U. S. Forest Service
- Oregon Department of Fish and Wildlife
- Columbia Basin Electric Company Coop
- Columbia Power Coop
- Oregon Department of Transportation
- D.R. Johnson Ranch
- Stanley Ranch

The second steering committee meeting was held on March 16, 2006 in Fossil at the Wheeler County Emergency Management office. A review of what had been written for sections #1, #2 and #3 was done. Committee members discussed any changes they would like made. The item was the identification of community assets and functions. Each member made a list and then the group discussed them as a whole. Following the discussion the group began plotting the agreed upon assets and functions on a County map. The following Steering Committee members and stakeholders were in attendance:

Steering Committee

- Fossil Fire
- City of Spray
- Wheeler County Road Department
- Wheeler County Emergency Services

The third steering committee meeting took place on May 23, 2006 in Fossil. The committee continued to work on identifying community assets and functions and finished working on the identification of past hazard events and the possible places where future events may occur. The following Steering Committee members and stakeholders were in attendance:

Steering Committee

- City of Spray
- Twickenham Fire
- Wheeler County Judge
- Wheeler County Emergency Services

Stakeholders

- County 911
- Wheeler County Soil & Water Conservation District
- Oregon Department of Forestry
- Office of State Fire Marshal
- Wheeler County Fire Defense Board
- Department of Geology and Mineral Industries

The fourth steering committee meeting took place on June 26, 2006 in Fossil. The focus of this meeting centered on developing hazard action plans for the eight hazards. The following Steering Committee members and stakeholders were in attendance:

Steering Committee

- City of Spray
- Wheeler County Judge
- Wheeler County Road Department
- Wheeler County Emergency Services

The fifth meeting was in Fossil on August 3, 2006. The committee picked up where they left off on June 26th and completed the hazard action plans. Following this they reviewed all the written sections of the plan and gave their approval.

The County's project webpage located on the Partners for Disaster Resistance & Resilience website will serve as an outreach tool to the community. The webpage will be used to provide local contact information and updates on the planning process and will also be used to post draft sections of the plan. Posting draft plan sections will provide the public an opportunity to review the draft plan prior to approval and adoption.

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 Resource Appendix.

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 develop 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.

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 Wheeler County community profile was created by utilizing data from the Regional Profile, State Plan, and appropriately through onset visits and discussions with the Wheeler County Steering Committee and stakeholders within and outside the county. Their were some updating of data from what was in the Regional Plan of one of the areas involving future hazards risk probability ratings which they feel strongly need to be rated at a higher level.

Step 4: Identifying and Characterizing the Hazards Impacting the Community:

The top and most likely hazards for Wheeler County are droughts, landslides/debris flow, floods, wildfire, windstorms, and winter storms. Large earthquakes or volcanic events are possible threats to Wheeler County, but are not a sizeable threat.

Identification of the hazards was done through the use of the State Technical Resource Guide and NHMP Risk Assessment, local data from the Steering Committee and Stakeholders, DOGAMI, The Oregon Weather Book, The National Climatic Data Center, the OEM State Natural Hazard Mitigation Plan of 2003 and FEMA Gov. News.

Once the data was gathered it was then plotted on a county map by the steering committee and stakeholders in two separate meetings.

During the second steering committee meeting, each member identified the community assets and functions and those were also added to the county map.

Once all the information is compiled and placed on the map it then will be transferred to a permanent map for planning purposes and for use during any natural hazard event.

Step 5: Developing Plan Goals:

Because the three smallest Counties in the State have the same needs and limited resources, both financial and human, they developed their plans around a regional concept. They carried this throughout their plans, including the development of goals. The Action plan goals were developed in Wheeler County by the Steering Committee and Stakeholders.

Step 6: Developing Solutions:

The Action Plans for each of the hazards wee developed by the Stakeholders and Steering Committee. Again a Regional approach of the three counties (Gilliam, Sherman and Wheeler) was used to focus on solutions or action items for each hazard. After the goals wee established for the plan, objectives were identified and

strategies wee established and priority actions identified using the action item form.

Step 7: Setting the Plan in Motion:

The County Court and Wheeler County Emergency Management 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 of the mitigation plan.

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 Wheeler County citizens, businesses, and the environment. Combined, the sections work together to create a mitigation plan that furthers the community's mission to produce a mitigation plan which is useable both in size, content and coordinates as well as compliments other plans within the county to reduce risks and prevent loss from future natural hazard events 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 Wheeler 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 that 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.

Plan Annexes

The plan includes several annexes, including:

- Annex I – Identifying & Assessment of Communities at Risk in Oregon
- Annex II – Map of County Assets, Facilities, Infrastructure and Public Buildings Identified as Critical Facilities
- Annex III - Resolutions

Resources Appendices

The resources appendices are designed to provide users of the Wheeler 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 - Resource Directory

This appendix describes the various local, regional, state and federal resources available for each of the hazards addressed in the plan.

B - Steering Committee and Public Meetings

This appendix describes the various agendas, minutes and sign-in sheets from the Steering Committee meetings held during the planning process.

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 – Regional Profile

This report was developed by the Community Service Center's Oregon Natural Hazards Workgroup at the University of Oregon. This report serves as the nexus between the State Natural Hazard Mitigation Plan and local plans. A component of the State Plan, the report is utilized by local communities to identify specific

issues locally and to develop potential action items. Communities review and update the data in the report based on their best available local data. The updates are then incorporated into the State Plan, creating a state level plan that is built upon information and data from the local level. Using the best available data, the regional profile includes a Demographic Profile that discusses the population in the region, an Infrastructure Profile that addresses the region's critical facilities and systems of transportation and power transmission, and an Economic Profile that discusses the scale and scope of the regional economy with a focus on the key industries. In addition to describing characteristics and trends, each profile section identifies the traits that indicate sensitivity to natural hazards.

This report also includes the regional risk assessment that describes historical impacts, general location, extent, and severity of past natural hazard events as well as the probability of future events. This information is aggregated at the regional level and provides counties with a baseline understanding of past and potential natural hazards.

These assessments were based on best available data from various state agencies related to historical events, repetitive losses, county hazard analysis rankings, and general development trends. The risk assessment was written in 2003 by the Community Service Center's Oregon Natural Hazards Workgroup at the University of Oregon as part of the State Natural Hazards Mitigation Plan.

E - 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.

F – Existing Plans and Policies and Organizations

This appendix identifies the existing plans and policies the County and cities have in place to assist in implementing the mitigation strategies identified in the plan. It also identifies existing community organizations that might serve as partners to implement mitigation actions.

G – Open For Business

This appendix documents the Institute for Business & Home Safety's Open for Business trainings that were held in conjunction with the regional planning effort.

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[i] Massachusetts Department of Environmental Management. 1999. "Hazard Mitigation: Managing Risks, Lowering Costs. http://www.state.ma.us/dem/programs/mitigate/whatis.htm Accessed 8/2/02

[ii] More information on the Oregon Natural Hazards Workgroup can be found at http://darkwing.uoregon.edu/~onhw

Section 2
Community Profile

This section provides information on the characteristics of Wheeler 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.

Geography and Climate

Wheeler County is located in Central Oregon and has a land mass of 1,656 square miles and a population of 1,600.

There is only one major river in Wheeler County which is the John Day River and several creeks.

Wheeler County lies along the northern part of the Ochoco Mountain Range and is entirely in Climate Division 7 (South Central Oregon) as established by the National Climatic Data Center. The Climate Division 7 is characterized by high desert prairie, with a number of mountain ranges and isolated peaks. It is primarily livestock country including cattle, swine, sheep dairy herds and horses. A large portion of the land is under irrigation. Crops in Climate Division 7 include potatoes, alfalfa, and hay to name a few.[i]

Most of the low precipitation amounts received in Wheeler County is during the winter months with a secondary amounts occurring in late spring and summer. July through September are the driest months with isolated thunderstorms. In Fossil the county seat, the annual precipitation averages 15 inches. In Mitchell at the southern end of the county, the average annual precipitation is 11 inches. The annual snowfall amounts average 15 inches in Fossil and 18 inches in Mitchell. The summer months are generally quite warm. The warmest months are July and August with the average temperatures ranging from 69 to 86 degrees with an extreme maximum of 107. On the other end of the spectrum the coldest months are generally January and February with the average temperatures ranging from 24 to 47 degrees with the extreme minimum of -27 degrees.[ii]

Wheeler County is known for being rugged and uneven, with terrain varying widely from sagebrush, juniper and rim rock to stands of pine, tamarack and fir. Portions of two national forests are within Wheeler counties boundaries with forest lands covering nearly one third of the county. The area is known as one of the most outstanding depositories of prehistoric fossils on the North American continent.[iii]

All of the soils in Wheeler County are what is known as Mollisols except for one exception in the far southeast corner of Wheeler County, where there are some Andisols. Mollisols are soils formed mainly in association with grassland vegetation and have relatively thick, dark surface horizons, rich in organic matter under which are subsoils which are either weakly developed or enriched in clay or carbonates. Andisols develop in materials of volcanic origin. The andisols in

Wheeler County are formed in a blanket of white ash mainly from the eruption of Mount Mazama.[iv]

Population and Demographics

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.

The population of Wheeler County is 1,547 and it has an average of one person per one square mile. While the state of Oregon as a whole has grown 4% from 2,000 to 2006, this area has declined by 6.6% for the same time period. There are 3 incorporated communities in Wheeler County, Fossil, Spray and Mitchell.[v]

The ethnic background of Wheeler County is:

Native Hawaiian and other Pacific Islander – 0.1%

Asian – 0.3%

Two or more races – 1.9%

Other – 3.5%

Hispanic or Latino – 5.1%

Caucasian – 93.3%[vi]

Over 50% of Wheeler County is male and 22.7 % of the population is under 18. The unemployment rate is averaging between 11% and 15% and 12.7% of Wheeler County families are below the federal poverty levels. Those with related children under age 18 the poverty rate is 22.7% and with related children under age 5 the rate 28.8%.[vii]

Wheeler County combined with Gilliam and Sherman counties have the largest number of uninsured children in the State at 18%. Babies born to mothers with a high school education is 67%. Children who live in a household where at least one parent works is 91%.[viii]

There is a lack of comprehensive medical care in Wheeler County. There is no hospital. The nearest hospitals from Fossil are The Dalles and Madras; from Spray John Day and Prineville and from Mitchell it would be Prineville. There is a fulltime medical clinic in Fossil, staffed by a Physician Assistant. Morrow County Behavioral Health provides limited mental health services and there is no dental service. There is a public health department.

The split of females to males in Wheeler County is almost exactly the same with the males with a slight edge of 50.5% to females at 49.5%. The median age is 48.1 years. A breakout of age shows 75.7% of the population is under age 62 and 27.8% are over 62.[ix]

Out of the total population of 1,547 individuals between the ages of 5 and 20 there are 8 who have a disability out of 320; in individuals between the ages of 21 and 64 there are 152 who have a disability out of 804 people; and in individuals 65 and older there are 122 out of 356.[x]

Employment and Economics

Wheeler County has an economy based around agriculture, cattle and tourism. In the past timber was the largest economic source. This is not the case any longer with the reduction of logging. The biggest draw for tourism used to be the fossils, hunting, fishing and activities on the John Day River. With the closure of private lands to hunting, with the exception of high end prices for "fee for hunting" by some land owners, hunting and some of the locations for fishing have gone by the wayside.

There are approximately 1,550 people residing in Wheeler County, with 662 of those 16 years old or older in the labor force. Of those 662 workers, 597 are involved in non-agriculture, forestry, hunting or fishing occupations. The per capita median personal annual income is $15,884. The family median income is $28,750. Of the 662 workers in the labor force 608 commute to work. Private wage and salary workers make up the largest class of worker with 327. Government workers make up the next largest with 137 and self-employed workers in their own non-incorporated business are third with 130. The leading industry is education, health and social services and the leading occupational category is management, professional and related occupations.[xi]

Wheeler County continues to run an unemployment rate of between 11% and 15%. The entire county is listed as a severely distressed county by the Oregon Economic and Community Development Department. Children who live in poverty in Wheeler County are in the 22% bracket. Wheeler County is one of three counties having the largest population of uninsured children.[xii]

Housing Wheeler County

Housing development types and year-built dates are important factors in mitigation planning. Certain housing types tend to be less disaster resistant and warrant special attention: mobile homes, for example, are generally more prone to wind and water damage than standard stick-built homes. Generally the older the home is, the greater the risk of damage from natural disasters. This is because stricter building codes have been developed following improved scientific understanding of plate tectonics and earthquake risk. For example, structures built after the late 1960s in the Northwest and California use earthquake resistant designs and construction techniques. In addition, FEMA began assisting communities with floodplain mapping during the 1970s, and communities developed ordinances that required homes in the floodplain to be elevated to one foot above Base Flood Elevation. Housing characteristics for Wheeler County are provided in the tables below.

There are a total of 842 housing units in Wheeler County of which 651 are one unit detached housing. There are 162 manufactured home units in the county. The rest of the housing units are either 1 unit attached, 2 units or 3 to 4 units attached. There are 15 miscellaneous housing units which include boats, RV's or vans.[xiii]

The majority of occupied housing units heat with wood, followed by fuel oil or kerosene, followed by electricity.[xiv]

The value of the majority of owner occupied units run between $50,000 and $99,999 with the number being 113; the next highest value is under $50,000 with there being 78 units. The median value is $66,300.[xv]

Land and Development

In Fossil in recent years a Recreational Vehicle (RV) site was developed next to the Fairgrounds. Presently work is being completed on an industrial site at the northwest end of Fossil. An educational center (Paleo Project) has been started and is being housed in the Fossil Grade School until an institute can be built. No land and development projects either residential or commercial have been completed or started recently in Spray or Mitchell. In 2002 there were only two residential building permits issued in Wheeler County.[xvi]

There are 498 rural addresses in Wheeler County of which 498 are residential. There are 1,041developed tax lots and 1,473 undeveloped tax lots in Wheeler County.[xvii]

Transportation and Commuting Patterns

Wheeler County has four main arterial roads. Hwy 19 which connects Fossil and Spray to John Day in Grant County; OR-207 which connects Fossil and Spray to Mitchell; U.S. Hwy 26 which connects Mitchell to Prineville in Crook County; and OR-218 which connects Fossil to Hwy 97 and on to Madras, Redmond and Bend.

Winter storms, debris flows, falling rocks and flooding are some of the causes of these roads being impassable.

There are 79 workers involved with the transportation industry, as well as moving materials and individuals.[xviii]

The mode of transportation for county residents is private vehicles with the exception of special transportation vehicles to take the elderly and disabled to other cities for shopping and medical appointments.

There is a commercial transportation company which contracts with area schools to provide transportation to students and for charter services. There is no rail, bus air or other passenger transportation in Wheeler County. There are private air fields on properties, but no state or municipal airports.[xix]

There are a total of 54 State Highway bridges and 6 Wheeler County owned bridges in the county. These bridges have not been seismically retrofitted, which causes a significant risk to commuters.[xx]

Critical Facilities and Infrastructure

Critical facilities are those that support government and first responders' ability to take action in an emergency. They are a top priority in any comprehensive hazard mitigation plan. Individual communities should inventory their critical facilities to include locally designated shelters and other essential assets, such as fire stations, and water and waste treatment facilities.

There are three incorporated cities in Wheeler County, Fossil, Spray and Mitchell. Each of these communities have their own fire and rescue stations and volunteer ambulance service. There is a medical clinic located in Fossil and a Red Cross Trailer stationed at Fossil. There are two rural fire stations, one in Twickenham

and Wheeler Point in Winlock. There is one law enforcement agency located in Wheeler County, in Fossil. It is the Wheeler County Sheriffs Office. There are three school districts plus the North Central Education Service District. There are two bridges in Wheeler County which provide access to the other half of the county. If they were destroyed it would strand half of the county from the other. There is also a long range radar site which is critical to the northwest, located in the mountains of Wheeler County and a communication center located on Rancheria Mountain.[xxi]

There are thirteen dams located on private property.[xxii]

Other infrastructure items are different for each community:

1.) Fossil –ambulance service, clinic and Air Life coverage; CenturyTel and AT&T telephone service; cable television; two local internet providers; water source is ground water surface water and spring and well water; age of system dates to 1896. Fossil has a wastewater treatment system which was built in 1995; there is no natural gas provider; electricity is provided by Columbia Basin Electric Coop; there is no air, rail, freight, passenger or bus service.[xxiii]

2.) Spray – ambulance service and Air Life coverage; CenturyTel and AT& T telephone service; two internet providers; no cable television; water source is ground water and was established in 1997; have a septic system and in the process of trying to establish a wastewater system; there is no natural gas provider; the electricity is provided by Columbia Power Cooperative; there is no air, freight, passenger service.[xxiv]

3.) Mitchell – ambulance service and Air Life coverage; CenturyTel and AT&T telephone service; one internet service provider; no cable television; water source is ground water and springs and the system was established in 1986; wastewater system is a septic system; there is no natural gas provider; electricity is provided by Columbia Power Co-op Association; there is no air, rail, freight, passenger service.[xxv]

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.

Wheeler County was formed by the Oregon Legislature in 1899 from parts of Grant, Gilliam and Crook counties and was named for Henry H. Wheeler, who operated the first mail stage line from The Dalles to Canyon City. The current Wheeler County Courthouse was built in 1900. The county is widely known for having one of the most outstanding depositories of prehistoric fossils in North America.[xxvi]

Points of interest include Richmond and the Painted Hills in the Mitchell area, the future Oregon Paleo Learning Institute and fossil beds in Fossil, the John Day River including fishing and rafting; and the John Day Fossil Beds National Monument.[xxvii]

Wheeler County has one building listed on the National Register of Historic Places. The house is the Thomas Benton Hoover House in Fossil. There are three museums in Wheeler County. The Fossil Museum and the Pine Creek School House Museum from the Clarno area. Both of these buildings are located in Fossil. The other museum is located in Spray.[xxviii]

Fossil has one of the few six hole golf courses in the country. It is a public course which is U.S.G.A. rated and is located 10 miles from Fossil near the old lumber mill site of Kinzua.

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[i] OSU- Oregon Climate Service

[ii] OSU- Oregon Climate Service

[iii] OSU- Oregon Climate Service

[iv] The Atlas of Oregon

[v] Center for population research and census, Portland State University

[vi] Center for population research and census, Portland State University

[vii] U.S. Census Bureau

[viii] Status of Oregon's Children County Data Book

[ix] U.S. Census Bureau

[x] U.S.Census Bureau

[xi] Oregon Economic & Community Development; U.S. Census Bureau

[xii] Oregon Economic & Community Development; U.S. Census Bureau; Children First for Oregon

[xiii] U.S. Census Bureau

[xiv] U.S. Census Bureau

[xv] U.S. Census Bureau

[xvi] Local Data; Oregon Economic and Community Development Department

[xvii] Local Data

[xviii] U.S. Census Bureau

[xix] Local Data

[xx] State Resources

[xxi] State Resources; Wheeler County Steering Committee

[xxii] State Resources

[xxiii] State resources; Wheeler County Steering Committee; Oregon Economic and Community Development

[xxiv] State resources; Wheeler County Steering Committee; Oregon Economic and Community Development

[xxv] State resources; Wheeler County Steering Committee; Oregon Economic and Community Development

[xxvi] Oregon Blue Book

[xxvii] Oregon Blue Book; Local data

[xxviii] The National Register Information System of Historical Places

Section 3
Local Risk Assessment Summary

An important component of the Wheeler County Multi-Jurisdictional Natural Hazard Mitigation Plan is the risk assessment. The purpose of this section is to define the risk assessment process and to summarize the risk assessment findings for each hazard available at the local level. Each hazard is also covered in a Hazard Annex at the end of the plan. The annexes include:

- Detailed Local Information – Previous disaster reports, local ordinances, hazard related studies and reports
- State Natural Hazard Mitigation Plan Regional Hazard Assessments – each hazard assessment includes information on the hazard's characteristics, history, probability and vulnerability
- Technical Resource Guide Hazard Specific Planning Chapter – these hazard specific chapters are designed at a statewide level to assist a local government in rolling up its sleeves and getting to work on developing long-term plans and hazard-specific ordinances to implement their plans

The natural hazards addressed in this plan include: drought, earthquakes, floods, landslides/debris flows, volcanic events, wildfires, windstorms, and winter storms.

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. Wheeler County identified eight major hazards that consistently affect or threaten its geographic area. These hazards – drought, earthquakes, floods, landslides/debris flows, volcanic events, wildfires, windstorms, and winter storms – were identified through a process that utilized input from a project steering committee, subject mater 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 a 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 Wheeler 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.

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 Wheeler County in Section 2: Community Profile. The profile includes a description of the community's land use and development trends.

Risk Assessment Summary

This section provides an overview of the risk assessments for the natural hazards affecting Wheeler County.

As part of the County Hazard Risk Analysis, each county develops risk scores for Oregon's major natural hazards. This score, ranging from 24 (low) to 240 (high), reflects the County's perceived risk for the particular hazard.

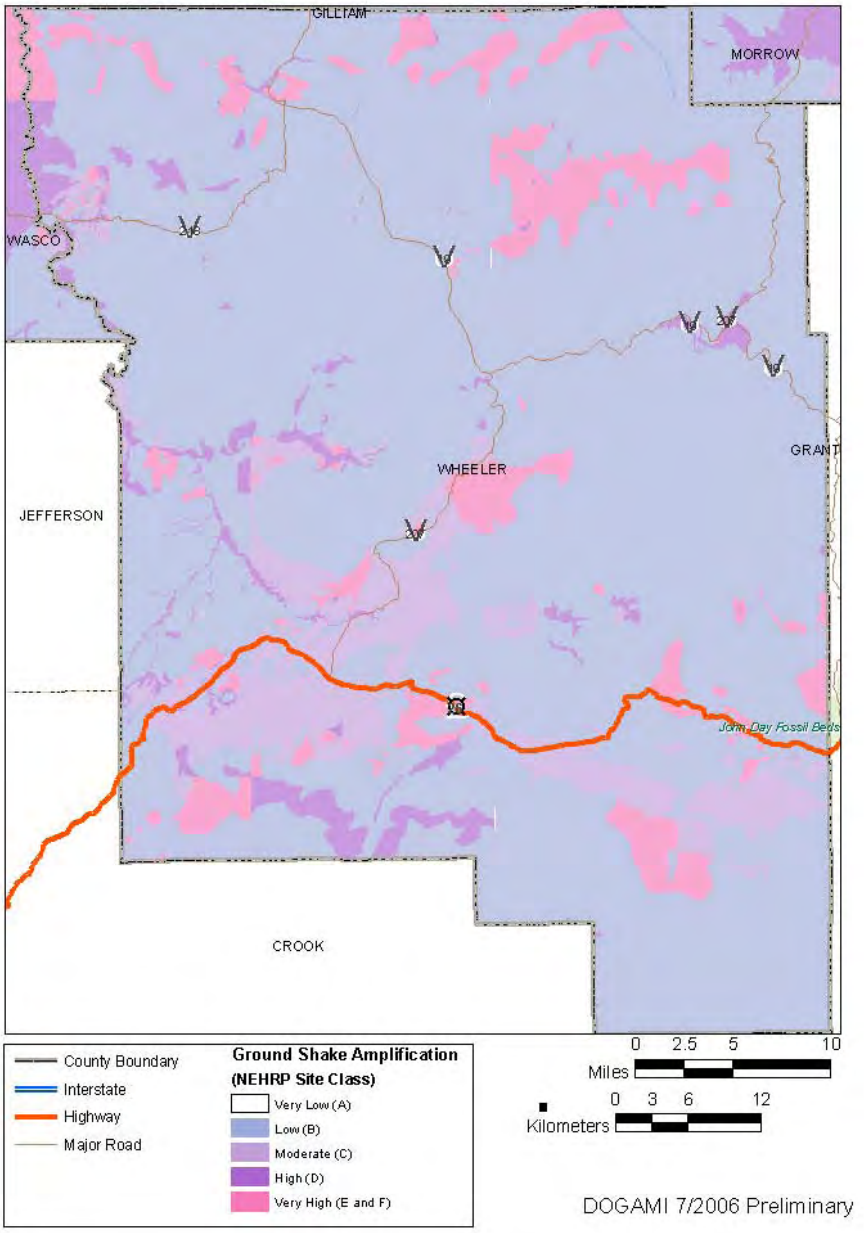
Drought Risk Summary

Location of Hazard:	Extent of Hazard at the Location:
• All of the County	• All of the County
Previous Occurrences of the Hazard Within the Community:	
1904-1905 – The entire state including Wheeler County, suffered through an 18 month long drought. 1917- 1931 – During this 15 year time period, Oregon fell victim to a very dry period, which the exception of 1920-1921 and 1927 in which there were periods of brief wet spells. 1939-1941 – This three year period of time saw a very intense drought for Oregon. 1959-1964 – Eastern Oregon including Wheeler County was affected by drought conditions. 1985-1997 – This was for the most part a dry 12 years with actual statewide droughts in 1992 and 1994.[i]	
Local Community's Self-Completed Drought Hazard Risk Rating:	
High	
Community's Probability a Future Hazard Event:	
High	
Community's Vulnerability to a Future Hazard Event:	
High	
Previous Mitigation Efforts:	
N/A	

Earthquake Risk Summary

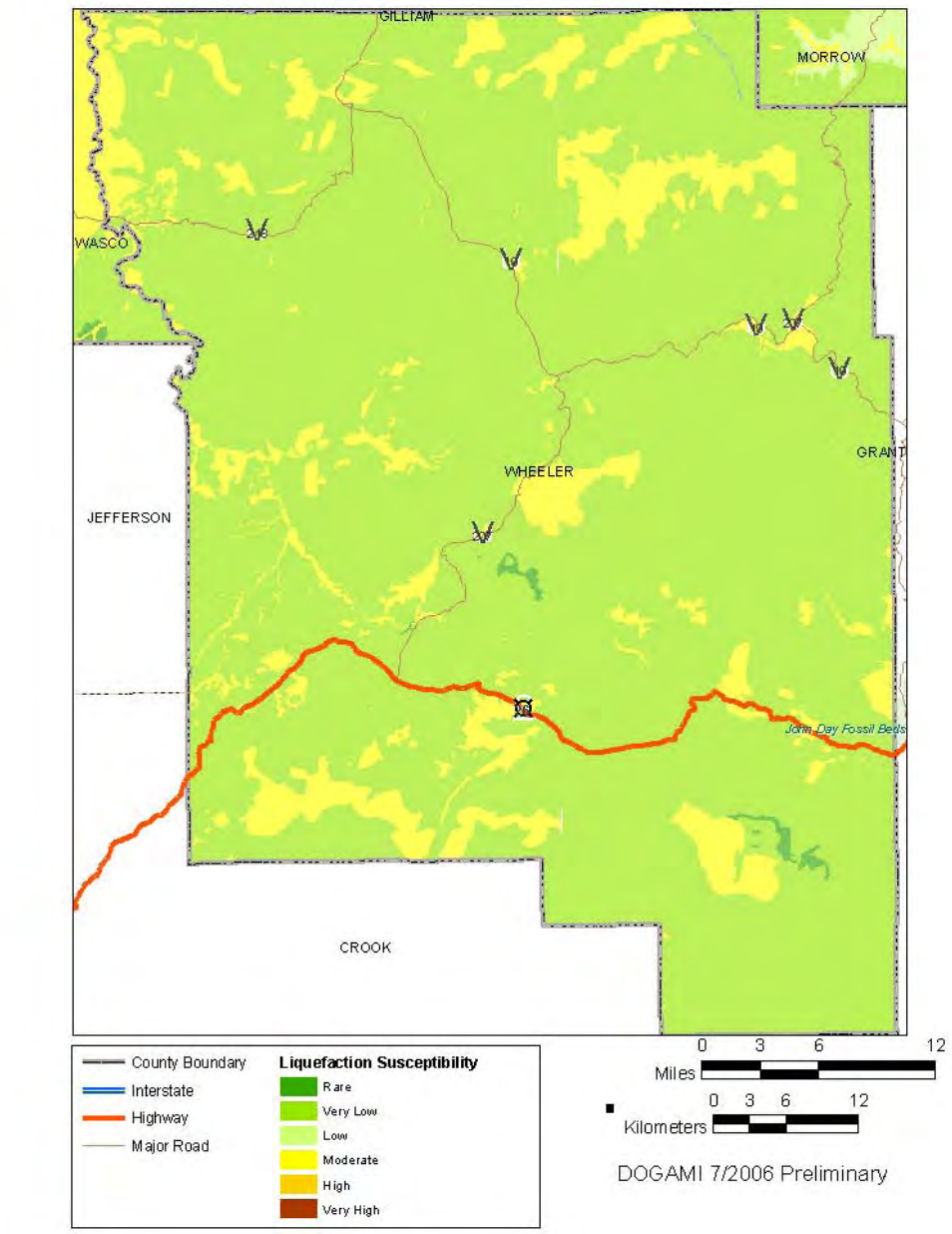
Location of Hazard:	Extent of Hazard at the Location:
• Lost Valley • Fossil Area	• Approximately 1/3 of the County
Previous Occurrences of the Hazard Within the Community:	
There has been seismic activity in the Lost Valley and Fossil areas of Wheeler County. Nothing of any significant size, but none the less some activity.[ii]	
Local Community's Self-Completed Earthquake Hazard Risk Rating:	
Medium, see DOGAMI hazard maps below.	
Community's Probability a Future Hazard Event:	
Medium, see DOGAMI hazard maps below.	
Community's Vulnerability to a Future Hazard Event:	
Medium, see DOGAMI hazard maps below.	
Previous Mitigation Efforts:	
• N/A	

Figure 3.1. Ground Shake Amplification - Wheeler County



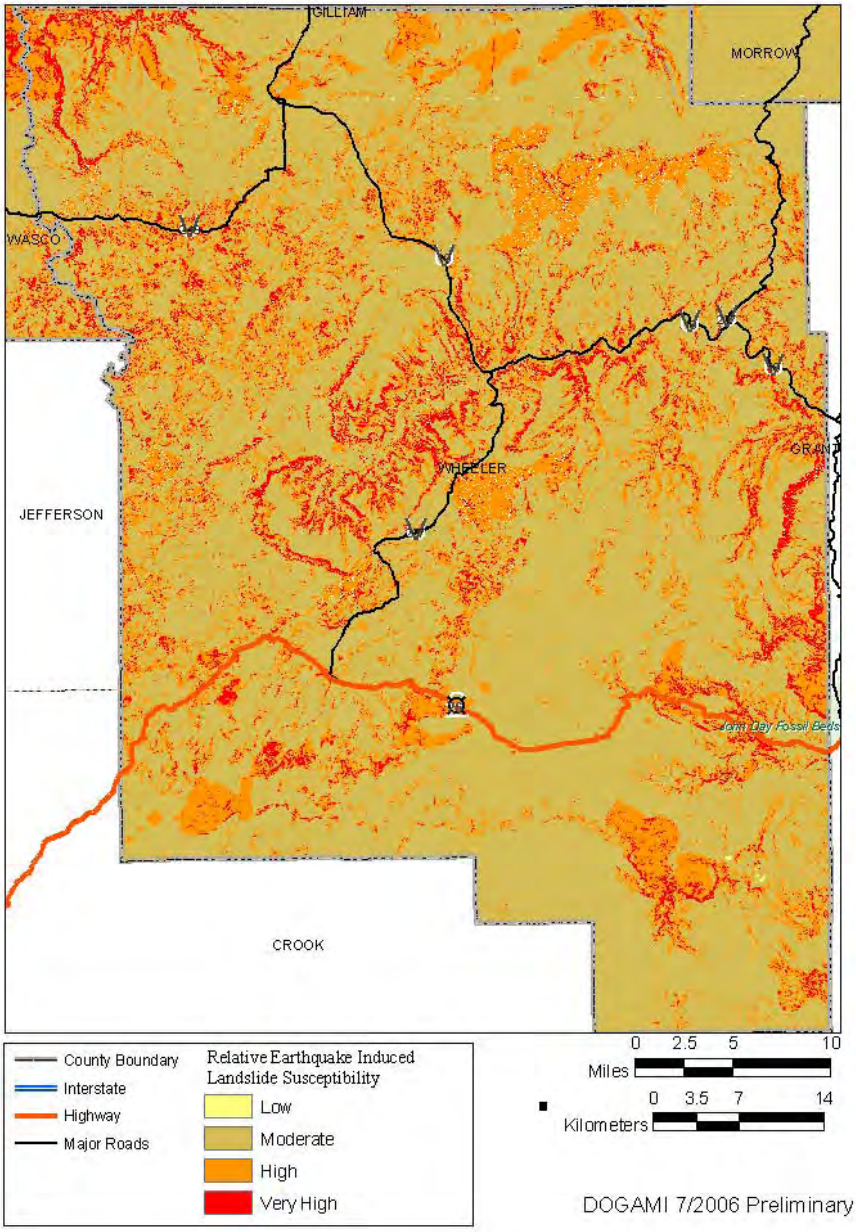
Source: Department of Geology and Mineral Industries, 2006.

`Figure 3.2. Liquefaction Susceptibility - Wheeler County



Source: Department of Geology and Mineral Industries, 2006.

Figure 3.3. Relative Earthquake Induced Landslide Susceptibility - Wheeler County



Source: Department of Geology and Mineral Industries, 2006.

Flood Risk Summary

Location of Hazard:	Extent of Hazard at the Location:
• Entire County • Flood Insurance rate maps completed in 1989	• Entire County

Previous Occurrences of the Hazard Within the Community:

June 1884 – Flash Flood in Wheeler County in the Painted Hills area; killing a mother and 3 children.[iii]

June 1900 – Flash Flood in Wheeler County in the Mitchell area; large area of the county was destroyed.[iv]

July 1956 - Flash Flood in Wheeler County in the Mitchell area; 20 buildings were destroyed, which was a large portion of the town.[v]

April 12, 1957 – Hail/Rain. 1.00 inches – No Injuries or property damages listed

December 1964- February 1965- The entire state had severe flooding from rain on snow. The central Oregon area including Wheeler County had severe flooding. All the towns were isolated.[vi]

February 1986 – The entire state had severe flooding including Wheeler County, from rain melting the snow.[vii]

March 24, 1993 – Flood- The North Fork of the John Day River and portions of the main stem John Day River flooded in response to rain and snowmelt runoff. These rivers flow through sparsely populated farmland and no significant damage was reported.[viii]

December 1996- Flood

May 14, 1997 – Lightning- A man in Spray and the horse he was riding were killed when they were struck by lightning on May Ridge.[ix]

August 1, 1997 – Hail/Rain- Weather spotters reported hail between 0.5 and 1.25 inches in magnitude in the Winlock area. Fossil also received it. Many vehicles and sides of houses were damaged.[x]

May 2, 1998- Heavy Rain- Heavy rain caused a mudslide that closed both lanes of Highway 26 thirty-eight miles east of Mitchell, near the Richmond area at mile post 26. No injuries or damages reported. This is the main highway connecting the Mitchell area to Spray and Fossil.[xi]

May 4, 1998- Heavy Rain- A thunderstorm produced heavy rain and ¼ inch in diameter hail which covered the ground in Mitchell. The heavy rain washed out some culverts along the west branch of Bridge Creek near Waterman.[xii]

July 10, 1998 – Hail/Rain – Dime size hail fell in Fossil accompanied by heavy rain. The magnitude was 0.75.[xiii]

July 30, 1998 – Flash Flood -Northeast Portion of Wheeler County- A three foot wall of water came down Alder Creek and the water level stayed up for two and a half hours. No significant damages or injuries where reported.[xiv]

June 24, 1999- Hail/Rain – Fossil- Sixteen miles East and South East of Fossil hail 1.00 inches in diameter was reported. No significant damages or injuries were reported. In Fossil, hail 1.50

inches in diameter was reported.[xv]

April 26, 2001 – Flood -Spray – Started 20 miles South of Spray and ended 20miles South West of Spray. A slow moving thunderstorm produced an estimated 1 inch of rain over mountainous terrain in southeastern Wheeler County. A small stream along State Highway 26 overflowed its banks and washed debris across the road near mile marker 94. A local rancher mentioned that water covered the road to a depth of 1.5 feet, leaving debris that accumulated to a depth of 6 inches. The Oregon Department of Transportation closed the road for several hours.[xvi]

July 24, 2002 -Hail/Rain – Kinzua – A weather spotter reported half-dollar size (1.25 inches) hail falling.[xvii]

August 25, 2002 –Flash Flood – Spray – Flash flooding was reported between Spray and Service Creek.[xviii]

August 4, 2003 – Hail/Rain- Hail 1.00 inches in diameter fell 6 miles north east of Mitchell. No significant damages reported.[xix]

June 29, 2004 –Flash Flood – Mitchell- Four inches of water was observed on highway 26, 10 miles west of Mitchell. Rocks and running water as well as flooding of ditches and canyons were also observed. A weather spotter reported 0.80 inches of rain in 20 minutes.[xx]

August 4, 2004 – Hail/Rain- Fossil- A hail storm near Fossil dropped hail 0.88 inches in diameter. No significant damages were reported.[xxi]

Primary flood sources in Wheeler County are the John Day River, Bridge Creek and Keyes Creek.[xxii]

Local Community's Self-Completed Flood Hazard Risk Rating:

High

Community's Probability a Future Flood Event:

High

Community's Vulnerability to a Future Flood Event:

High.

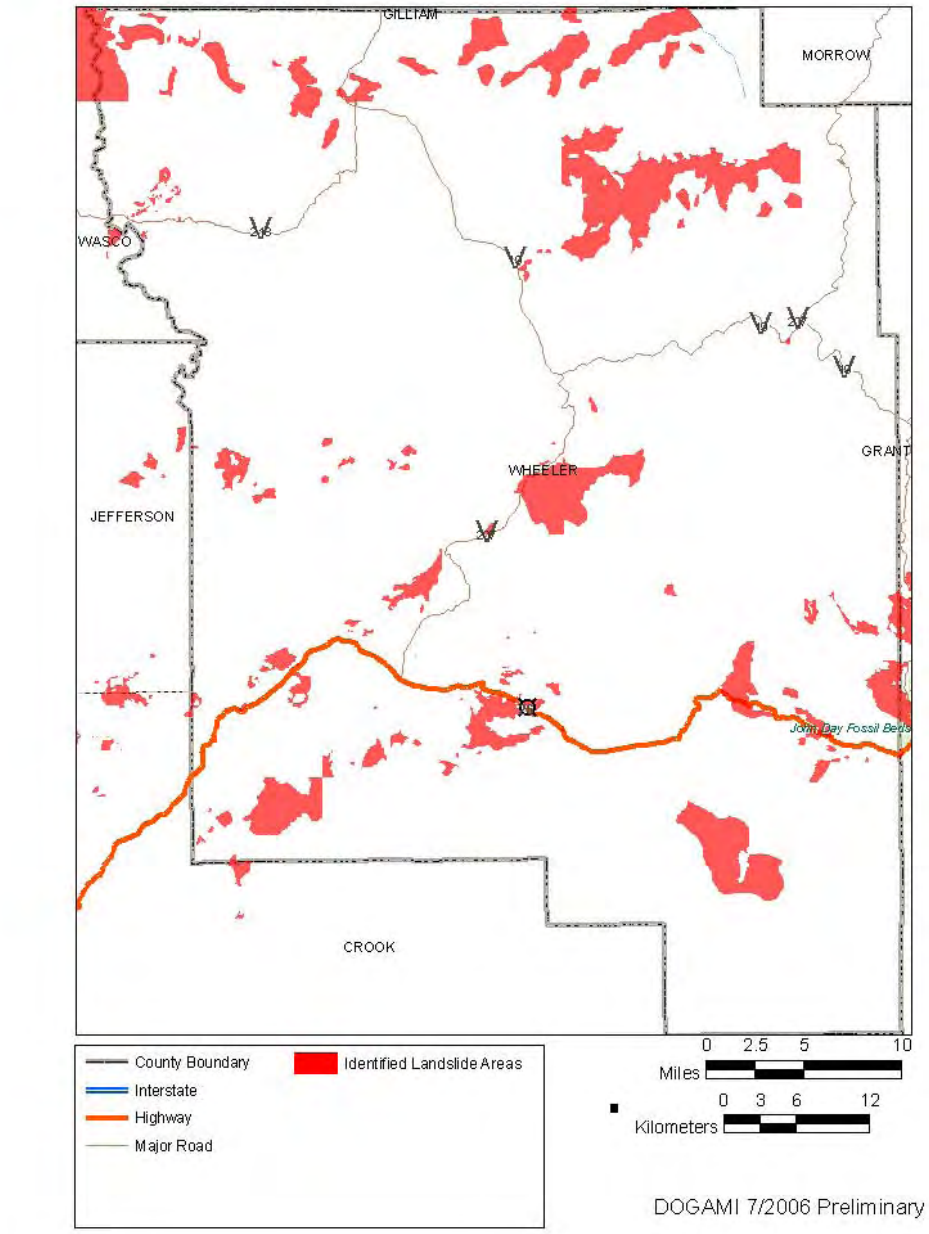
Previous Mitigation Efforts:

- Mitchell, Fossil and Wheeler County participated in the NFIP. Wheeler County FIRM in 1989.
- Under the NFIP, Wheeler County has no repetitive flood loss properties, however, there may be undocumented repetitive flood loss properties that aren't accounted for through NFIP.
- Wheeler County's last CAV was completed on 8/27/1992 and the last CAC was completed on 3/14/1991.
- The City of Fossil's last CAV was completed on 8/27/1992 and CAC on 3/11/1991.
- The City of Mitchell's last CAV was completed on 8/28/1992 and CAC on 5/21/1991.

Landslides

Location of Hazard:	Extent of Hazard at the Location:
• Mitchell area • Corridor of US Hwy 26 between Mitchell and Prineville • Between Mitchell and Richmond • Hwy 19 between Fossil and Spray • Between Fossil and Condon on Hwy 19	• Estimate 80% of main corridors
Previous Occurrences of the Hazard Within the Community:	
The most prevalent area in Wheeler County for landslides is in the Mitchell area. More precisely in the corridor of U.S. Hwy 26 between Mitchell and Prineville.[xxiii] In February 1996 a storm event causing landslides, resulted in 27 counties being declared a Federal disaster. Wheeler County was among those 27 counties. They were also declared a Federal disaster county for landslides during the storm event of December 1996/January 1997. Each of these storm events produced record rainfall, resulting in landslides. Damage was to infrastructure and natural resources.[xxiv] May 4, 1998-Heavy rain caused a mudslide that closed both lanes of Highway 26 thirty-eight miles east of Mitchell in the Richmond area at mile post 26. No injuries or damages reported. This is the main highway connecting the Mitchell area to Spray and Fossil.[xxv]	
Local Community's Self-Completed Landslide Hazard Risk Rating:	
High	
Community's Probability a Future Landslide Event:	
High	
Community's Vulnerability to a Future Landslide Event:	
High	
Previous Mitigation Efforts:	
• N/A	

Figure 3.4. Identified Landslide Areas – Wheeler County



Source: Department of Geology and Mineral Industries, 2006.

Volcanic Event

Location of Hazard:	Extent of Hazard at the Location:
• Entire county from ash fallout	• Entire county from ash fallout
Previous Occurrences of the Hazard Within the Community:	
With the exception of ash fallout when Mt. St. Helens blew, there have been no events occurring in Wheeler County involving volcanoes.	
Local Community's Self-Completed Volcanic Event Hazard Risk Rating:	
Low probability	
Community's Probability a Future Volcanic Event:	
Low	
Community's Vulnerability to a Future Volcanic Event:	
High	
Previous Mitigation Efforts:	
• N/A	

Wildfire

Location of Hazard:	Extent of Hazard at the Location:
• All of the county	• Entire county

Previous Occurrences of the Hazard Within the Community:

Wheeler County has a long history of wildfires. Some of the largest and more notable are:

1968: Snow Basin – Description not available[xxvi]

1968: Devil's Den – Description not available[xxvii]

1977: Stahl Canyon – Description not available[xxviii]

1992: Parrish Creek #1 – Description not available[xxix]

1994: China Hat (also known as First Creek Fire) –Wheeler County – July 9, 1994- Point of origin T.10S, R25E Section 01 NENW – Lat/Lon 44 43.80 /119 39.80. Fire lasted until 7/15/94; Magnitude 2,280 acres; Crop (timber) damage: $48,037 in Ponderosa Pine.[xxx]

1994: Parrish Creek #2 – No description available.[xxxi]

1994: McGinnis Creek –Wheeler County – August 13, 1994- Point of origin T20S R25E Section 34 NWNW- Lat/Lon 44 39.400/119 42.200. Fire lasted until 8/15/94; Magnitude 34 acres; Crop (Timber) damage: $4,944.00 in Ponderosa Pine.[xxxii]

1994: Fry Creek-Wheeler County – August 17, 1994- Point of origin T12S R23E Section 28 NESW – Lat/Lon 44 29.90/119 58.10. Fire lasted until 8/20/94. Magnitude 192 acres; Crop (timber) damage: $38,777.00 in Ponderosa Pine.[xxxiii]

1996: Wheeler Point- Wheeler County – August 8, 1996 – Point of origin T7S R24E Section 19 NE ¼ - Lat/Lon 44 56.700/119 53.800. Fire lasted until (Control Date) 8/17/1996 Magnitude 21,980 acres burned; Property Damage: Real Property $500,000; Personal Property (Equipment & Tools) $100,000; Total Property Damages $600,000; Crop (Timber etc.):

Doug Fir	$ 131,250
Ponderosa Pine	$ 943,200
Logs/Lbr Products	$ 200,000
Range	$ 43,257
Watersheds/Soils	$ 703,640
Recreation	$ 144,190
Wildlife	$ 216,285
TOTAL	$2,381,822[xxxiv]

1997: Parrish Creek #2- Wheeler County – July 23, 1997 – Point of Origin T9S R24E Section 35 NESW; Lat/Lon 44 44.600/119 48.300. Fire lasted until 7/28/97; Magnitude 1,195 acres. Crop (Range) Damages $240.[xxxv]

1997: Lake Creek #1 – Wheeler County – July 25, 1997- Point of origin T7S R23E Section33 SWNW; Lat/Lon 44 55.000/119 58.600; Fire lasted until 7/26/97; Magnitude 22 acres; Crop (Timber) Damages $62,175 (Ponderosa Pine)[xxxvi]

1999: Horse Mountain- No description available.[xxxvii]

2000: Tamarack Creek- Wheeler County- August 4, 2000- Point of origin T10S R22E Section 13 SWSE; Lat/Lon 44 42.10/120 1.90. Fire lasted until August 14, 2000; Magnitude 7,900 Acres. Property Damage (Barn) $20,000; Crop (Timber etc) Damage:

Ponderosa Pine	$411,068
Douglas Fir	$109,955
Grand Fir	$ 64,327
Range	$ 132
Watershed & Soils	$ 47,912
Wildlife	$ 7,144
TOTAL	$640,539[xxxviii]

2001: July 10, 2001 – Spray- a lightening caused fire 5 miles south east of spray, caused a 6,000 acre fire that burned for around 5 days near Sentinel Peak. No report of significant damages available.[xxxix]

2002: The Priest Hole Fire -July 13, 2002 – Richmond – Lightening sparked a fire which consumed 680 acres. No significant damages.[xl]

2001: Sentinel Peak- Wheeler County- July 10, 2001-Point of origin T9S R25E Section 9 NWSW; Lat/Lon 44 46.35/119 43.61. Fire lasted until July 11, 2001. Magnitude 3,500 acres. No information on damages. 2, 3

2003: Frog Hollow- Wheeler County- July 27, 2003- Point of Origin T11S R23E Section 29 NWNE. Fire lasted until August 2, 2003. Magnitude 725 acres. Crop (Timber etc.) damages:

Ponderosa Pine	$ 5,213
Douglas Fir	$ 4,805
Watershed & Soils	$ 1,918
Range	$ (91)
Wildlife	$ (594)
TOTAL	$11,251[xli]

2003: Hell's ½ Acre: Wheeler County- August 9, 2003- Point of Origin T7S R22E Section 26 NESE; Lat/Lon 44 55.72/120 3.11; Magnitude 465 acres; Crop (Timber etc) Damages:

Ponderosa Pine	$6,135
Douglas Fir	$8,257
Range	$ 98
Watershed & Soils	$2,600
Wildlife	$ 990[xlii]

2005: Will's Canyon: Wheeler County – August 21, 2005 – Point of Origin T9S R23E Section 27 NENW; Lat/Lon 44 46.08/ 119 57.12; Fire lasted until August 25, 2005; Magnitude 895 acres; Crop

(Timber etc.) Damage:

Range	$11
Watershed & Soils	$38
Wildlife	$22
TOTAL	$71[xliii]

August 8, 1998 – Wild Land Fire – Clarno Area- More than 8,000 acres burned in the Clarno area. Warm temperatures, dry air, and wind hampered fire fighting efforts. One outbuilding and a private vehicle were destroyed by the fire. Three air tankers and a helicopter were used to help put out the fire.[xliv]

Local Community's Self-Completed Wildfire Hazard Risk Rating:

High

Community's Probability a Future Wildfire Event:

High

Community's Vulnerability to a Future Wildfire Event:

High

Previous Mitigation Efforts:

- The Oregon Department of Forestry has done fuel reduction on State lands. Private land owners have done it on their lands. The USFS also has done fuel reduction over the years.

Windstorm

Location of Hazard:	Extent of Hazard at the Location:
• Entire County, but particularly the Fossil and Mitchell areas.	• Entire County, but particularly the Fossil and Mitchell areas.

Previous Occurrences of the Hazard Within the Community:

In general Wheeler County has been affected by the same windstorms which have hit other parts of the State, but in most cases has not had the severity of damages.

April 1931 – N. Central Oregon including Wheeler County unofficial wind speeds reported at 78 mph. Damage to fruit orchards and timber.

Nov. 10-11 1951 – Statewide – Widespread damage; transmission and utility lines; Wind speed 40-60 mph; Gusts75-80 mph.

Dec. 1951 – Statewide- Some places wind speed up to 60 mph with gusts to 75 mph. Damage to buildings and utility lines statewide.

Dec. 1955 – Statewide-Wind speeds 55-65mph with gusts of 69. Considerable damage to buildings and utility lines statewide.

Nov. 1958 – Statewide – Wind speeds at 51 mph with 71 mph gusts. Every major highway blocked by fallen trees.

Oct. 1962 – Statewide – Columbus Day Storm; Oregon's most destructive storm to date. All parts of the state affected. Est. 84 houses destroyed plus 5,000 severely damaged. Est. $170 million in damages.

Nov. 1981 – Statewide- Severe wind storm.

Dec. 1991 – North Central Oregon – Severe wind storm and Blowing dust.

Dec. 1995 – Statewide – Severe wind storm.[xlv]

August 4, 2003 – Tstm Wind/Rain –Fossil- 50 mile an hour winds blew in the Fossil area and were accompanied by rain in the amount of 0.50 inches which fell in 15 to 20 minutes. A power pole was blown down due to the strong winds. $1,000 in damages to property was reported.[xlvi]

July 19, 2004 – Tstm Wind- Mitchell- A severe thunderstorm produced strong wind gusts of 80-90 miles per hour. Winds of 74 miles per hour were constant. These winds knocked down numerous tree limbs. No significant damages were reported.[xlvii]

Local Community's Self-Completed Windstorm Hazard Risk Rating:

High

Community's Probability a Future Windstorm Event:

High

Community's Vulnerability to a Future Windstorm Event:

Medium

Previous Mitigation Efforts:

- N/A

Winter Storm

Location of Hazard:	Extent of Hazard at the Location:
• Entire County	• Entire County
Previous Occurrences of the Hazard Within the Community:	
Dec., 1861 – Entire state –Storm produced between 1 and 3 feet of snow. Dec. 1892- Northern counties – Between 15 and 30 inches of snow fell throughout the northern counties. Jan. 1916 – Entire state – Two storms. Heavy snowfall, especially in mt. areas. Jan. & Feb. 1937- Entire state – Deep snow drifts. Jan. 1950 – Entire state – Record snow falls; property damage throughout state. Mar. 1960- Entire state – Many automobile accidents; two fatalities. Jan. 1969 – Entire state – Heavy snow throughout state. Jan. 1980 – Entire state – Series of string storms across state; many injuries and power outages. Feb. 1985 – Entire state – Two feet of snow in northeast mountains; downed power lines; fatalities. Feb. 1986 – Central and Eastern Oregon – Heavy snow; traffic accidents; broken power lines. Mar. 1988 – Entire state – Strong winds; heavy snow. Feb. 1990 – Entire state – Heavy snow throughout the state. Nov. 1993 – Cascade Mountains – Heavy snow throughout the region. Mar. 1994 – Cascade Mountains – Heavy snow throughout region. Winter of 1998-99 – Entire state – One of the snowiest winters in Oregon history. Also icy roads in Region 5 and Region 6.[xlviii] December 26, 2003 through January 14, 2004 – Wheeler County one of Oregon's counties to be designated a disaster county by FEMA due to a severe winter storm. The declaration date was February 13, 2004.[xlix]	
Local Community's Self-Completed Winter Storm Hazard Risk Rating:	
High	
Community's Probability a Future Winter Storm Event:	
High	
Community's Vulnerability to a Future Winter Storm Event:	
High	
Previous Mitigation Efforts:	
• N/A	

[i] Taylor, George H., and Ray Hatton, 1999, The Oregon Weather Book

[ii] Wheeler County Steering Committee.; DOGAMI has historic earthquake maps

[iii] Taylor, George and Raymond Hatton, 1999, The Oregon Weather Book; Wheeler County Steering Committee

[iv] Taylor, George and Raymond Hatton, 1999, The Oregon Weather Book; Wheeler County Steering Committee

[v] Taylor, George and Raymond Hatton, 1999, The Oregon Weather Book; Wheeler County Steering Committee

[vi] Taylor, George and Raymond Hatton, 1999, The Oregon Weather Book; Wheeler County Steering Committee

[vii] Taylor, George and Raymond Hatton, 1999, The Oregon Weather Book; Wheeler County Steering Committee

[viii] Taylor, George and Raymond Hatton, 1999, The Oregon Weather Book; National Climatic Data Ceter

[ix] National Climatic Data Center

[x] FEMA, Wheeler County FIS, 07/17/89; National Climatic Data Center

[xi] National Climatic Data Center

[xii] National Climatic Data Center

[xiii] National Climatic Data Center

[xiv] National Climatic Data Center

[xv] National Climatic Data Center

[xvi] National Climatic Data Center

[xvii] National Climatic Data Center

[xviii] National Climatic Data Center

[xix] National Climatic Data Center

[xx] National Climatic Data Center

[xxi] National Climatic Data Center

[xxii] Wheeler County Steering Committee; FEMA, Wheeler County FIS, 07/17/89

[xxiii] Wheeler County Steering Committee

[xxiv] Oregon Department of Geology and Mineral Industries Special Paper 34

[xxv] National Climatic Center; DOGAMI has landslide maps

[xxvi] Jerry Brewer, Retired Assistant Unit Forester, Oregon State Dept. of Forestry, Fossil Unit, Wheeler County; Colleen Conlee, Administrative Assistant, Oregon Department of Forestry, John Day Unit, John Day, Oregon; Wheeler County Steering Committee

[xxvii] Jerry Brewer, Retired Assistant Unit Forester, Oregon State Dept. of Forestry, Fossil Unit, Wheeler County; Colleen Conlee, Administrative Assistant, Oregon Department of Forestry, John Day Unit, John Day, Oregon; Wheeler County Steering Committee

[xxviii] Jerry Brewer, Retired Assistant Unit Forester, Oregon State Dept. of Forestry, Fossil Unit, Wheeler County; Colleen Conlee, Administrative Assistant, Oregon Department of Forestry, John Day Unit, John Day, Oregon; Wheeler County Steering Committee

[xxix] Jerry Brewer, Retired Assistant Unit Forester, Oregon State Dept. of Forestry, Fossil Unit, Wheeler County; Colleen Conlee, Administrative Assistant, Oregon Department of Forestry, John Day Unit, John Day, Oregon; Wheeler County Steering Committee

[xxx] Jerry Brewer, Retired Assistant Unit Forester, Oregon State Dept. of Forestry, Fossil Unit, Wheeler County; Colleen Conlee, Administrative Assistant, Oregon Department of Forestry, John Day Unit, John Day, Oregon

[xxxi] Colleen Conlee, Administrative Assistant, Oregon Department of Forestry, John Day Unit, John Day, Oregon

[xxxii] Jerry Brewer, Retired Assistant Unit Forester, Oregon State Dept. of Forestry, Fossil Unit, Wheeler County; Colleen Conlee, Administrative Assistant, Oregon Department of Forestry, John Day Unit, John Day, Oregon

[xxxiii] Jerry Brewer, Retired Assistant Unit Forester, Oregon State Dept. of Forestry, Fossil Unit, Wheeler County; Colleen Conlee, Administrative Assistant, Oregon Department of Forestry, John Day Unit, John Day, Oregon

[xxxiv] Oregon Emergency Management, State Natural Hazard Mitigation Plan, 2003; Jerry Brewer, Retired Assistant Unit Forester, Oregon State Dept. of Forestry, Fossil Unit, Wheeler County; Colleen Conlee, Administrative Assistant, Oregon Department of Forestry, John Day Unit, John Day, Oregon; Wheeler County Steering Committee; National Climatic Data Center

[xxxv] Jerry Brewer, Retired Assistant Unit Forester, Oregon State Dept. of Forestry, Fossil Unit, Wheeler County; Colleen Conlee, Administrative Assistant, Oregon Department of Forestry, John Day Unit, John Day, Oregon; Wheeler County Steering Committee; National Climatic Data Center

[xxxvi] Jerry Brewer, Retired Assistant Unit Forester, Oregon State Dept. of Forestry, Fossil Unit, Wheeler County; Colleen Conlee, Administrative Assistant, Oregon Department of Forestry, John Day Unit, John Day, Oregon

[xxxvii] Colleen Conlee, Administrative Assistant, Oregon Department of Forestry, John Day Unit, John Day, Oregon

[xxxviii] Jerry Brewer, Retired Assistant Unit Forester, Oregon State Dept. of Forestry, Fossil Unit, Wheeler County; Colleen Conlee, Administrative Assistant, Oregon Department of Forestry, John Day Unit, John Day, Oregon; Wheeler County Steering Committee

[xxxix] National Climatic Data Center

[xl] National Climatic Data Center

[xli] Jerry Brewer, Retired Assistant Unit Forester, Oregon State Dept. of Forestry, Fossil Unit, Wheeler County; Colleen Conlee, Administrative Assistant, Oregon Department of Forestry, John Day Unit, John Day, Oregon; Wheeler; Wheeler County Steering Committee

[xlii] Jerry Brewer, Retired Assistant Unit Forester, Oregon State Dept. of Forestry, Fossil Unit, Wheeler County; Colleen Conlee, Administrative Assistant, Oregon Department of Forestry, John Day Unit, John Day, Oregon; Wheeler; Wheeler County Steering Committee

[xliii] Jerry Brewer, Retired Assistant Unit Forester, Oregon State Dept. of Forestry, Fossil Unit, Wheeler County; Colleen Conlee, Administrative Assistant, Oregon Department of Forestry, John Day Unit, John Day, Oregon; Wheeler; Wheeler County Steering Committee

[xliv] National Climatic Data Center

[xlv] Taylor, George H. And Ray Hatton. (1999) The Oregon Weather Book; FEMA-1405-DR-OR, February 7, 2002; Wheeler County Steering Committee

[xlvi] National Climatic Data Center

[xlvii] National Climatic Data Center

[xlviii] Taylor, George and Ray Hatton, 1999, the Oregon Weather Book; Wheeler County Steering Committee

[xlix] FEMA. GOV. NEWS DR-1510-OREGON

Section 4:
Goals and Action Items

This section describes the components that guide implementation of the identified mitigation strategies and is based on strategic planning principles. This section also provides information on the process used to develop a mission, goals and action items.

- *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.

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.

- Ability to respond effectively and swiftly
- Safety of life and property
- Increased cooperation and collaboration between groups and agencies

These goals were established by the Wheeler County Hazard Mitigation Steering Committee and Stakeholders and were approved by the Cities and County Government. They are regional goals shared by Gilliam, Sherman, and Wheeler Counties.

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 both address multi-hazard (MH) and hazard-specific issues.

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 in pre-packaging potential projects for grant funding. The worksheet components are described below. These action item worksheets are located at the end of this section.

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 at any time during the planning process and can come from a number of sources, including participants in 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 and serve as a starting point for this plan. This component of the action item is dynamic, since some ideas may prove to not be feasible, and new ideas may be added during the plan maintenance process. Ideas for implementation include such things 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 the 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 toward 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 in one to two years. *Long-term action items* (LT) may require new or additional resources and/or authorities, and may take from one to five years to implement.

Action Items

The following pages provide a list of mitigation Wheeler County can take to prepare itself in the event of a natural disaster. Although the actions are countywide, they also provide a direct benefit to the incorporated cities in Wheeler County. The three incorporated cities in Wheeler County – Fossil, Mitchell, and Spray – have limited resources and rely on the county to provide emergency services. Any actions that improve the capabilities of those services will therefore benefit not only the county, but the communities as well.

Multi-Hazard #1

Proposed Action Item: MH#1	**Alignment with Plan Goals:**
Complete an inventory of public buildings that may be particularly vulnerable to natural hazards in Wheeler County.	Goal 2: Safety of life and property Goal 3: Increased cooperation and collaboration between groups and agencies.

Rationale for Proposed Action Item:

- Wheeler County is vulnerable to a number of natural hazards that can affect public facilities. In a self-completed hazard analysis, the county rated its risk to drought, flood, landslide, wildfire, wind, and winter storm as high, and medium for earthquake. The probability that each hazard will recur is rated high. The State of Oregon's Natural Hazard Mitigation Plan also indicates Wheeler County's vulnerability to drought, wildfire, flood, landslide, volcano, and winter storm as high. Each natural hazard can pose significant risks to public facilities. By completing an inventory of public facilities that are vulnerable to natural hazards, the county can identify its overall level of vulnerability and mitigate their risk.
- The Disaster Mitigation Act of 2000 requires communities to identify vulnerability to natural hazards, and recommends identifying the types and numbers of buildings and infrastructure that could be affected by hazards [201.6(c)(2)(ii)(A)]. By completing an inventory of public facilities that are vulnerable to natural hazards, the county can identify its overall level of vulnerability and mitigate their risk.
- The Disaster Mitigation Act of 2000 requires communities to identify and analyze mitigation measures specifically actions and projects addressing the effects of hazards on existing buildings and infrastructure [201.6(c)(3)(ii)]. This inventory of public facilities that are vulnerable to natural hazards will allow the County to meet this requirement.
- The three incorporated cities in Wheeler County –Fossil, Mitchell, and Spray- have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.
-

Ideas for Implementation:

- The cities should coordinate with the county to identify critical facilities in their communities and seek funding for mitigation projects that will reduce risk in each community. Create list of important public facilities.
- Identify important historic and cultural resources, especially buildings or structures on the national register, vulnerable to natural hazards that should be preserved.
- Utilize outcomes of DOGAMI's efforts on Senate Bill 2 seismic hazard inventory and risk assessment: http://www.oregongeology.com/sub/projects/rvs/default.htm
- Results of initial Senate Bill 2 inventory for Wheeler County include: Asher Medical Clinic, Wheeler County Sheriff's Office, Wheeler High, Fossil Elementary, Mitchell Fire & Ambulance, Mitchell Volunteer Fire Department, Mitchell School, Wheeler Point Volunteer Fire Association, Spray Volunteer Fire Department, and Spray Schools
- Identify specific vulnerabilities to public facilities for each natural hazard, especially those constructed of un-reinforced masonry that are vulnerable to earthquakes.
- Prioritize facilities based on vulnerability.
- Identify actions communities can take to reduce a facility's vulnerability to a natural hazard.
- Incorporated communities should coordinate with the county to identify vulnerable facilities to mitigate their risk to natural hazards.

Coordinating Organization:	Wheeler County Emergency Management,

Internal Partners:		**External Partners:**
Wheeler County Advisory Committee Members, Wheeler County		Cities of Fossil, Mitchell, and Spray. OEM, DOGAMI, FEMA
Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
Short Term		
Form Submitted by:		

Multi-Hazard #2

Proposed Action Item: MH#2	**Alignment with Plan Goals:**
Seek funding for the implementation of priority projects that reduce the vulnerability of critical public facilities in Wheeler County.	Goal 2: Safety of life and property Goal 3: Increased cooperation and collaboration between groups and agencies.

Rationale for Proposed Action Item:

- Wheeler County is vulnerable to a number of natural hazards that can affect public facilities. In a self-completed hazard analysis, the county rated its risk to drought, flood, landslide, wildfire, wind, and winter storm as high, and medium for earthquake. The probability that each hazard will recur is rated high. The State of Oregon's Natural Hazard Mitigation Plan also indicates Wheeler County's vulnerability to drought, wildfire, flood, landslide, volcano, and winter storm as high. Each natural hazard can pose significant risks to public facilities. Once the county and communities have completed an inventory of critical public facilities, obtaining funding will help implement mitigation projects to reduce overall vulnerability to natural hazards.
- The Disaster Mitigation Act of 2000 requires communities to identify and analyze mitigation measures specifically actions and projects addressing the effects of hazards on existing buildings and infrastructure [201.6(c)(3)(ii)].
- The three incorporated cities in Wheeler County –Fossil, Mitchell, and Spray- have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.

Ideas for Implementation:

- The cities should coordinate with the county to identify city-specific, critical public facilities that are vulnerable to natural hazards, and coordinate funding opportunities with the county to fund mitigation projects for city-specific public facilities.
- Coordinate with local and state agencies to identify funding opportunities for specific projects.
- When available, implement mitigation actions identified in the building inventory process identified in Multi-hazard Action #1.
- Funding may become available from the state through Senate Bills 2-5 dealing with seismic vulnerability of critical facilities and schools.

Coordinating Organization:	Wheeler County Emergency Management

Internal Partners:	**External Partners:**
Wheeler County Advisory Committee Members, Wheeler	Cities of Fossil, Mitchell, and Spray, OEM, DOGAMI, FEMA

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Long Term	

Form Submitted by:	

Multi-Hazard #3

Proposed Action Item: MH#3	**Alignment with Plan Goals:**
Work with utilities operating in Wheeler County to establish tree-pruning programs around transmission lines and trunk distribution lines.	Goal 2: Safety of life and property Goal 3: Increased cooperation and collaboration between groups and agencies.

Rationale for Proposed Action Item:

- In certain natural hazards, such as wind and winter storms, electric utilities can be severely affected. Wheeler County rated itself high on a self-completed hazard risk rating study for both wind and winter storms. In addition, the State of Oregon's Natural Hazard Mitigation Plan indicates that Wheeler County has a high probability and medium vulnerability to wind storms, and a high probability and vulnerability to winter storms. Tree falls have the potential to damage buildings and infrastructure, block roadways, and down overhead power lines, causing electric power failures. Tree pruning helps reduce the vulnerability of trees to natural hazards, mitigating the potential damage they could cause to buildings and infrastructure. Implementing programs to complete tree pruning helps to maximize time, money, and other resources.
- The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on both new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Tree pruning will help reduce trees' vulnerability to natural hazards by reducing the risk that trees will be downed in a winter storm, damaging buildings and utilities. To effectively coordinate tree-pruning efforts, community members and utilities should establish agreed upon tree-pruning programs that will help reduce the risk that trees will damage buildings and utilities.
- The three incorporated cities in Wheeler County –Fossil, Mitchell, and Spray- have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities. A coordinated effort will reduce the overall the risk to natural hazards and damage to utilities for both the county and the incorporated communities.

Ideas for Implementation:

- The communities should coordinate with the county and the utilities to establish tree-pruning programs.
- Identify tree-pruning programs other communities have successfully implemented.
- Meet with utilities to discuss tree pruning programs and implementation measures.
- Conduct public outreach on this effort through appropriate channels such as utility bill inserts or other methods.

Coordinating Organization:	Wheeler County Emergency Management**.**

Internal Partners:	**External Partners:**
Columbia Basin Electric Company Cooperative, Columbia Power Cooperative	Wheeler County, communities of Fossil, Mitchell, and Spray.

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
Short term		

Form Submitted by:	

Multi-Hazard #4

Proposed Action Item: MH#4	**Alignment with Plan Goals:**
Reduce the effects of winter storms on existing utility lines	Goal 2: Safety of life and property Goal 3: Increased cooperation and collaboration between groups and agencies.

Rationale for Proposed Action Item:

- Wheeler County is vulnerable to a number of natural hazards. In a self-completed hazard analysis, the county rated its risk to winter storm as high. The probability that this hazard will recur is rated high.
- During winter storms, ice can weight down power lines so that those lines droop to the ground in places where power poles are spaced too far apart. Older power poles were placed at longer distances than new poles that are put up today. These older lines are more vulnerable to line breakage because of the span distance between poles.
- The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on existing buildings and infrastructure [201.6(c)(3)(ii)]. Supporting and encouraging utility providers to use hazard resistant construction methods for new utility construction reduce damage to utilities and buildings.
- The three incorporated cities in Wheeler County – Fossil, Mitchell and Spray - have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities. The Cities and the County services as well as local businesses all rely on the supply of power to the communities.

Ideas for Implementation:

- Seek funding to intersperse new power poles between existing poles where extra long spans have created service provision issues in the past.
- In the pre-disaster mode, seek FEMAs Pre-Disaster Mitigation grant funds. Following a Presidentially declared disaster, the Co-op may seek funds through FEMA's Hazard Mitigation Grant Program.

Coordinating Organization:	Columbia Power Cooperative, Columbia Basin Cooperative, or Wasco Electric Cooperative

Internal Partners:	**External Partners:**
	Wheeler County, Cities of Fossil, Mitchell and Spray

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
Short Term		

Form Submitted by:	

Multi-Hazard #5

Proposed Action Item: MH#5	**Alignment with Plan Goals:**
Develop and maintain a comprehensive impact database on severe natural hazard events in Wheeler County.	Goal 2: Safety of life and property Goal 3: Increased cooperation and collaboration between groups and agencies.

Rationale for Proposed Action Item:

- Wheeler County is vulnerable to a number of natural hazards. In a self-completed hazard analysis, the county rated its risk to drought, flood, landslide, wildfire, wind, and winter storm as high, and medium for earthquake. The probability that each hazard will recur is rated high. The State of Oregon's Natural Hazard Mitigation Plan also indicates Wheeler County's vulnerability to drought, wildfire, flood, landslide, volcano, and winter storm as high. Each natural hazard can pose significant risks to the public, especially in certain high-risk areas in the county. Compiling an impact database will allow Wheeler County to better prepare itself and the public to use precaution in potentially hazardous areas.
- The Disaster Mitigation Act of 2000 requires the documentation of previous hazard occurrences [201.6(c)(2)(i)]. Creating this database allows the communities to quickly update the hazard history portion of the mitigation plan required during the five year update process.
- The three incorporated cities in Wheeler County –Fossil, Mitchell, and Spray- have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities. A coordinated effort will reduce the vulnerability of the services and facilities that the incorporated communities depend on and help the county as a whole be better prepared to mitigate the effects of natural hazards.

Ideas for Implementation:

- The communities and the county should coordinate efforts to develop and maintain an impact database.
- Identify a responsible agency to collect natural hazards information to help establish and maintain baseline and historic records of hazard events;
- Document future events including impacts and losses;
- Identify public infrastructure and facilities subject to closures due to snowfall and ice hazards during winter storms; and
- Develop partnerships between utility providers and county and city public works agencies to document known hazard areas and minimize risks.

Coordinating Organization:	Wheeler County

Internal Partners:	**External Partners:**
Planning, GIS	Cities of Fossil, Mitchell, and Spray, National Weather Service, National Oceanic and Atmospheric Administration (NOAA), ODOT, Oregon Climate Service, Overhead Utilities

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
Ongoing		

Form Submitted by:	

Multi-Hazard #6

Proposed Action Item: MH#6	**Alignment with Plan Goals:**
Seek funding for generators and satellite phones for critical facilities	Goal 1: Ability to respond affectively and swiftly Goal 2: Safety of life and property Goal 3: Increased cooperation and collaboration between groups and agencies.

Rationale for Proposed Action Item:

- The Steering Committee identified the need for generators at schools, medical centers and pump houses.
- The Steering Committee identified the need for emergency services to have satellite phones.
- Wheeler County is vulnerable to a number of natural hazards. In a self-completed hazard analysis, the county rated its risk to drought, wildfire, wind, and winter storm as high, and medium for flood. The probability that each hazard will recur is rated high, except for flood which is rated medium. The State of Oregon's Natural Hazard Mitigation Plan also indicates Wheeler County's vulnerability to drought and winter storm as high. Each natural hazard can pose significant risks to the public, especially in certain high-risk areas in the county. Compiling an impact database will allow Wheeler County to better prepare itself and the public to use precaution in potentially hazardous areas.
- The three incorporated cities in Wheeler County –Fossil, Mitchell and Spray- have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.

Ideas for Implementation:

- Seek funding source for emergency back-up generator and satellite phones. (NOTE: FEMA mitigation programs will NOT fund generators).
- Identify all critical facilities without generators
- Prioritize need for generators at critical facilities

Coordinating Organization:	Wheeler County

Internal Partners:	**External Partners:**
Planning, GIS	Cities of Fossil, Mitchell and Spray, National Weather Service, National Oceanic and Atmospheric Administration (NOAA), ODOT, Oregon Climate Service, Overhead Utilities

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
Ongoing		

Form Submitted by:	

Multi-Hazard #7

Proposed Action Item: MH#7	**Alignment with Plan Goals:**
Identify opportunities to reduce existing barriers to interagency cooperation and work together reduce risk and loss from natural hazards	Goal 3: Increased cooperation and collaboration between groups and agencies.

Rationale for Proposed Action Item:

- The Steering Committee identified the need to create interagency agreements to help reduce barriers to collaboration.
- Gilliam, Sherman and Wheeler Counties often work together various projects already and have identified similar mitigation actions.
- The three incorporated cities in Wheeler County –Fossil, Mitchell and Spray- have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.

Ideas for Implementation:

- Develop interagency agreements to better coordinate risk reduction activities within the County and within the three county area.
- Identify opportunities to work together to leverage limited resources on commonly identified projects.

Coordinating Organization:	Wheeler County Emergency Services

Internal Partners:	**External Partners:**
	Cities of Fossil, Mitchell and Spray, Sherman County, Gilliam County

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
Ongoing		

Form Submitted by:	

Drought #1

Proposed Action Item: DR#1	**Alignment with Plan Goals:**
Include information regarding droughts in a brochure of natural hazards and mail/make available to county residents and the public.	Goal 2: Safety of life and property Goal 3: Increased cooperation and collaboration between groups and agencies.

Rationale for Proposed Action Item:

- Drought situations increase the risk of fire hazards.
- Drought situations cause visibility hazards.
- Drought situations cause critical water shortages for humans, animals and vegetation.
- The three incorporated cities in Wheeler County –Fossil, Mitchell and Spray- have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.

Ideas for Implementation:

- Educate the public on water conservation.
- Educate the public on Erosion control.
- Educate the public regarding drought resistant plants.

Coordinating Organization:	Wheeler County Emergency Management Coordinator

Internal Partners:	**External Partners:**
County Court	Cities of Fossil, Mitchell, Spray; Extension Agent, Oregon Dept. of Agriculture, OSU Ext., Cattle Assoc., Soil and Water, Oregon Dept. of Forestry, Water Master, Public Works, Oregon Dept. of Fish and Wildlife

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
____**X Some**	**X Some**	

Form Submitted by:	Susan C. Brewer

Earthquake #1

Proposed Action Item: EQ#1	**Alignment with Plan Goals:**
Include information regarding earthquakes in a brochure of natural hazards and mail/make available to county residents and the public.	Goal 2: Safety of life and property Goal 3: Increased cooperation and collaboration between groups and agencies.

Rationale for Proposed Action Item:

- People need to know what to expect.
- People need to know what they should do and have to prepare for an earthquake.
- People need to know what to do and where to go.
- Planning for a hazard helps to reduce the risk of injuries and loss of life.
- The three incorporated cities in Wheeler County –Fossil, Mitchell and Spray- have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.

Ideas for Implementation:

- Educate the public regarding earthquakes.
- Make sure citizens know which buildings are deemed shelters.

Coordinating Organization:	Wheeler County Emergency Management Coordinator

Internal Partners:	**External Partners:**
911, Road Dept., Law enforcement, County Court, Emergency Management,	Cities of Fossil, Mitchell, Spray; Public Works, utilities, ODOT, Red Cross, schools, medical clinic, fire dept., faith community, mental health

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
X Some	X Some	

Form Submitted by:	Susan C. Brewer

Flood #1

Proposed Action Item: FL#1	**Alignment with Plan Goals:**
Include information regarding flooding in a brochure of natural hazards and mail/make available to county residents and the public.	Goal 2: Safety of life and property Goal 3: Increased cooperation and collaboration between groups and agencies.

Rationale for Proposed Action Item:

- Flooding can increase the risk of mud and debris on the roads.
- Flooding can increase the risk of driving on the roads.
- Flooding can increase the risk of personal and vehicle accidents and injuries.
- Flooding can increase the risk of trees falling on to roads or homes.
- Flooding can increase the risk of down communication and power lines.
- The three incorporated cities in Wheeler County –Fossil, Mitchell and Spray- have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.

Ideas for Implementation:

- Education regarding good Erosion control.
- Educate the public on what to do in a flood.
- Educate the public regarding not driving through flooded roads.

Coordinating Organization:	Wheeler County Emergency Management Coordinator

Internal Partners:	**External Partners:**
County Court, Road Dept., Law Enforcement, 911, Emergency Management, Planning	Cities of Fossil, Mitchell, Spray; Faith Community, Mental Health, Public Works, Utilities

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
X		

Form Submitted by:	**Susan C. Brewer**

Flood #2

Proposed Action Item:	**Alignment with Plan Goals:**
Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.	Goal 2: Safety of life and property

Rationale for Proposed Action Item:

- The National Flood Insurance Program provides communities federally backed flood insurance to homeowners, renters, and business owners, provided that communities develop and enforce adequate floodplain management ordinances. The benefits of adopting NFIP standards for communities are a reduced level of flood damage in the community and stronger buildings that can withstand floods. According to the NFIP, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance.
- The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Continued participation in the NFIP will help reduce the level of flood damage to new and existing buildings in communities while providing homeowners, renters and business owners additional flood insurance protection.
- The CAV is a scheduled visit to a community participating in the NFIP for the purpose of: 1) Conducting a comprehensive assessment of the community's floodplain management program; 2) assisting the community and its staff in understanding the NFIP and its requirements; and 3) assisting the community in implementing effective flood loss reduction measures when program deficiencies or violations are discovered.
- The three incorporated cities in Wheeler County – Fossil, Mitchell and Spray - have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.

Ideas for Implementation:

- Actively participate with DLCD and FEMA during Community Assistance Visits.
- Conduct an assessment of the floodplain ordinances to ensure they reflect current flood hazards and situations, and meet NFIP requirements.
- The cities should coordinate with the county to ensure that floodplain ordinances and NFIP regulations are maintained and enforced.

Coordinating Organization:	Wheeler County Emergency Management

Internal Partners:		**External Partners:**
Cities of Fossil, Mitchell and Spray		FEMA, OEM, DLCD
Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	

Form Submitted by:	

Flood #3

Proposed Action Item:	**Alignment with Plan Goals:**
Develop a database of repetitive flood loss properties not covered by the National Flood Insurance Program	***Goal 2: Safety of life and property***

Rationale for Proposed Action Item:

- Often times, communities have repetitive flood loss properties that are not covered by the NFIP. Working with homeowners and business owners to identify mitigation actions, such as building elevation or property acquisition, can reduce the impact and damage from of floods on repetitive loss properties.
- The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address existing buildings and infrastructure [201.6(c)(3)(ii)]. Developing mitigation actions for repetitive flood loss properties can significantly diminish the impact and damage from flooding on these properties.
- The three incorporated cities in Wheeler County – Fossil, Mitchell, and Spray - have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.

Ideas for Implementation:

- Develop a database of repetitive flood loss properties not covered by the NFIP to track flood damage and to use when identifying mitigation actions.
- County public works and the cities should coordinate to identify properties not covered by the NFIP and teach homeowners and businesses about mitigation actions they can implement.
- Work with homeowners to identify potential mitigation measures to be funded through either Pre-Disaster Mitigation or Flood Mitigation Assistance.
- Develop countywide stormwater management strategies to address repetitive loss properties.

Coordinating Organization:	Wheeler County Office of Emergency Management

Internal Partners:	**External Partners:**
Wheeler County, cities of Fossil, Mitchell and Spray	FEMA, OEM, DLCD

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	

Form Submitted by:	

Landslide #1

Proposed Action Item:	**Alignment with Plan Goals:**
Include information regarding Landslides/Debris Flows in a brochure of natural hazards and mail/make available to county residents and the public	Goal 2: Safety of life and property Goal 3: Increased cooperation and collaboration between groups and agencies.

Rationale for Proposed Action Item:

- Landslides and Debris Flows can happen with out any or little warning.
- People need to know what to expect.
- People need to know what they should do and not do in the event of a Landslide/Debris Flow.
- Need to plan for the reduction in potential economic losses.
- The three incorporated cities in Wheeler County –Fossil, Mitchell and Spray- have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.

Ideas for Implementation:

- Educate the public in regards to what to do if they come across a landslide or debris flow.
- Develop interagency agreements to cut through the red tape and develop a uniform set of rules.
- Educate the public on better ways to provide drainage and structural improvements to reduce economic losses.
- Educate the public to pay attention to weather broadcasts and potential hazard warnings.

Coordinating Organization:	Wheeler County Emergency Management Coordinator

Internal Partners:	**External Partners:**
Road Dept., 911, Emergency Management, law enforcement, County Court	Cities of Fossil, Mitchell, Spray; Public works, ODOT, schools, Red Cross, medical clinic, Mid-Columbia Bus Company

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
X Some	X Some	

Form Submitted by:	Susan C. Brewer

Volcanic Event #1

Proposed Action Item: VE#1	**Alignment with Plan Goals:**
Include information regarding volcanoes in a brochure of natural hazards and mail/make available to county residents and the public.	Goal 2: Safety of life and property Goal 3: Increased cooperation and collaboration between groups and agencies.

Rationale for Proposed Action Item:

- The main concern in this county from an erupting volcano will be the ash fallout.
- Understanding of a hazard risks, empowers the public to use their resources more effectively to prepare for it.
- With limited agency resources available, it is necessary for the residents and general public to be able to respond.
- The three incorporated cities in Wheeler County –Fossil, Mitchell and Spray- have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.

Ideas for Implementation:

- Educate the public regarding staying indoors.
- Discuss what to expect and do if a volcano erupts, with children in school.
- Have information regarding volcanoes readily available to residents of the county and general public.

Coordinating Organization:	Wheeler County Emergency Management Coordinator

Internal Partners:	**External Partners:**
Emergency Management, Sheriff, 911, Road Dept., Senior Services, Planning, County Court, Public Health, Medical Clinics	Cities of Fossil, Mitchell, Spray; Medical Clinics, Media, EMS, Schools, ODOT, Red Cross, utilities, public works, USGS, OEM, DEQ, Medical

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
X		

Form Submitted by:	Susan C**.** Brewer

Wildfire #1

Proposed Action Item: WF#1	**Alignment with Plan Goals:**
Coordinate mitigation activities with the Wheeler County Community Wildlife Protection Plan (CWPP) Local Coordinating Group to reduce wildland fire risk in Wheeler County.	Goal 2: Safety of life and property. Goal 3: Increased cooperation and collaboration among groups and agencies

Rationale for Proposed Action Item:

- In a self-completed hazard analysis, Wheeler County reported itself as having a high level of risk to wildfire. In addition, the *State of Oregon's Natural Hazard Mitigation Plan* indicates that Wheeler County's probability for a future WUI fire is high (that the county would be likely to have a major WUI fire event in the next 10-35 years) and that the county's vulnerability to a WUI fire is also high. Coordinating mitigation activities with the Wheeler County CWPP Local Coordinating Group will ensure effective implementation of actions that will reduce the high level of fire risk.
- As the representative body for agencies involved in wildland fire risk reduction in Wheeler County, the Local Coordinating Group is responsible for the following:
    - Providing oversight to activities related to the Wheeler County CWPP;
    - Ensuring representation and coordination among different coordinating group members;
    - Developing and refining goals for fire protection in Wheeler County; and
    - Developing a long-term structure for sustaining efforts of the Wheeler County CWPP.

  Coordinating with the Local Coordinating Group on wildland fire mitigation activities will ensure effective implementation of projects and avoid duplication of wildland fire risk reduction activities.
- The three incorporated cities in Wheeler County – Fossil, Mitchell and Spray - have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.
- Wheeler County Communities at Risk include the incorporated communities of: Fossil, Mitchell and Spray as well as unincorporated communities: Richmond, Twickenham, and Winlock.

Ideas for Implementation:

- Coordinate wildland fire risk reduction activities with the Local Coordinating Group to assist them in accomplishing the following activities:
    - Access and utilize federal funding while still available to ensure continued federal funding for fuels reduction.
    - Set realistic expectations for reducing wildland fire risk. This will provide attainable goals for the public to achieve and increase public awareness about wildland fire risk.
    - Coordinate priorities for funding that will provide equitable distribution of funding and achieve appropriate landscape treatment.
    - Promote visible projects and program successes to increase awareness among the public about wildland fire risk reduction.
    - Find funding to support efforts that will lead to increased funding to implement programs.
    - Identify incentives for fire protection and community participation to increase citizen participation in wildland fire risk reduction.
    - Engage insurance companies to provide insurance industry investment in activities.
    - Promote local investment in property, infrastructure, and business to increase economic development.

<table>
<tr><td colspan="2">Coordinating Organization:</td><td colspan="2">Wheeler County</td></tr>
<tr><td colspan="3">Internal Partners:</td><td>External Partners:</td></tr>
<tr><td colspan="3">Local Coordinating Group, Wheeler County Court, Wheeler County Fire Defense Board, ODF, USFS Umatilla & Ochoco, NPS, Community and County leaders</td><td>Cities of Fossil, Mitchell, Spray</td></tr>
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<tr><td></td><td>Long Term</td></tr>
<tr><td colspan="2">Form Submitted by:</td><td colspan="2"></td></tr>
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Wildfire #2

Proposed Action Item: WF#2	**Alignment with Plan Goals:**
Coordinate emergency management planning efforts with the Wheeler County Community Wildfire Protection Plan (CWPP) Local Coordinating Group.	Goal 2: Safety of life and property. Goal 3: Increased cooperation and collaboration among groups and agencies

Rationale for Proposed Action Item:

- In a self-completed hazard analysis, Wheeler County reported itself as having a high level of risk to wildfire. In addition, the *State of Oregon's Natural Hazard Mitigation Plan* indicates that Wheeler County's probability for a future WUI fire is high (that the county would be likely to have a major WUI fire event in the next 10-35 years) and that the county's vulnerability to a WUI fire is also high. By coordinating emergency management planning efforts with the CWPP Local Coordinating Group, the county can ensure effective response in the event of a wildfire or emergency.
- The CWPP Local Coordinating Group identified coordinating emergency management planning efforts in Wheeler County with the Local Coordinating Group and local fire districts to ensure an effective response in the event of a wildfire or emergency.
- The three incorporated cities in Wheeler County – Fossil, Mitchell and Spray - have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.
- Wheeler County Communities at Risk include the incorporated communities of: Fossil, Mitchell and Spray as well as unincorporated communities: Richmond, Twickenham, and Winlock.

Ideas for Implementation:

- Strengthen emergency management, response, and evacuation plans
- Coordinate emergency management efforts with the Local Coordinating Group, county government, and local fire districts.
- Outline strategies and activities for public outreach in emergency management.

Coordinating Organization:	Local Coordinating Group

Internal Partners:	**External Partners:**
Wheeler County, Wheeler County Court, Wheeler County Fire Defense Board, ODF, USFS Umatilla & Ochoco, NPS, Community and County leaders	Cities of Fossil, Mitchell, Spray

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Long Term	

Form Submitted by:	

Wildfire #3

Proposed Action Item: WF#3	**Alignment with Plan Goals:**
Conduct risk assessment activities with the Wheeler County Community Wildfire Protection Plan (CWPP) Local Coordinating Group to assess areas in the county at risk to wildland fires.	Goal 2: Safety of life and property. Goal 3: Increased cooperation and collaboration among groups and agencies

Rationale for Proposed Action Item:

- In a self-completed hazard analysis, Wheeler County reported itself as having a high level of risk to wildfire. In addition, the *State of Oregon's Natural Hazard Mitigation Plan* indicates that Wheeler County's probability for a future WUI fire is high (that the county would be likely to have a major WUI fire event in the next 10-35 years) and that the county's vulnerability to a WUI fire is also high. Conducting risk assessment activities with the Wheeler CWPP Local Coordinating Group will help identify areas in the county at risk to wildland fires and will also help local agencies identify mitigation actions.
- The Community Wildfire Protection Plan identified risk assessment of properties to wildland fire as an action to reduce risk to wildland fire. Risk assessment will help local firefighting agencies, the county, communities, and the public determine the risk certain areas or communities face in terms of wildland fire. Risk assessment is also the first step in reducing an area's risk to wildland fire and provides a framework for identifying appropriate mitigation activities.
- The Disaster Mitigation Act of 2000 requires that communities continue to involve the public beyond the original planning process [201.6(c)(4)(*ii*)]. Promoting risk assessment activities with the public and property owners in the WUI would be a way to conduct outreach to inform the public of the county's risk to WUI fire and keep the public involved in the county's efforts to mitigate that risk.
- The three incorporated cities in Wheeler County – Fossil, Mitchell and Spray - have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.
- Wheeler County Communities at Risk include the incorporated communities of: Fossil, Mitchell and Spray as well as unincorporated communities: Richmond, Twickenham, and Winlock.

Ideas for Implementation:

- Identify communities at risk in the Wildland-Urban Interface.
- Develop wildland fire risk assessment strategies that will encourage public involvement and homeowners.
- Work with partners to develop risk assessment programs. Components of the program could include:
    - Determining what the assessments of communities would include, and who would be responsible for conducting them.
    - Determining if there is a need to prioritize at-risk communities based on vulnerability, and begin the program in the most vulnerable, highest priority communities first.
    - Identifying and developing the most appropriate methods of communication to reach at-risk homeowners.
- Identify hazardous fuels treatment projects.
- Identify funding sources to pay for risk assessment programs.

Coordinating Organization:	Local Coordinating Group

Internal Partners:	**External Partners:**
Wheeler County, Wheeler County Court, Wheeler County Fire Defense Board, ODF, USFS Umatilla & Ochoco, NPS, Community and County leaders	Cities of Fossil, Mitchell, Spray
Timeline:	**If available, estimated cost:**
Short Term (0-2 years) / Long Term (2-4 or more years)	
Short term	

Form Submitted by:	

Wildfire #4

Proposed Action Item: WF#4	**Alignment with Plan Goals:**
Coordinate information and outreach activities with the Wheeler County Community Wildfire Protection Plan Local Coordinating Group to promote fire prevention and risk reduction.	Goal 2: Safety of life and property. Goal 3: Increased cooperation and collaboration among groups and agencies

Rationale for Proposed Action Item:

- In a self-completed hazard analysis, Wheeler County reported itself as having a high level of risk to wildfire. In addition, the *State of Oregon's Natural Hazard Mitigation Plan* indicates that Wheeler County's probability for a future WUI fire is high (that the county would be likely to have a major WUI fire event in the next 10-35 years) and that the county's vulnerability to a WUI fire is also high. Coordinating information and outreach activities with the Wheeler CWPP Local Coordinating Group will ensure the county and the Group will conduct an effective public outreach campaign to promote fire prevention and risk reduction activities.
- The Disaster Mitigation Act of 2000 requires that communities continue to involve the public beyond the original planning process [201.6(c)(4)(*ii*)]. Coordinating information and outreach activities with the CWPP Local Coordinating Group will promote fire prevention and risk reduction activities among the public, as well as keep the public involved in the county's efforts to mitigate that risk.
- The three incorporated cities in Wheeler County – Fossil, Mitchell and Spray - have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.
- Wheeler County Communities at Risk include the incorporated communities of: Fossil, Mitchell and Spray as well as unincorporated communities: Richmond, Twickenham, and Winlock.

Ideas for Implementation:

- Develop strategies for increasing citizen awareness and action for fire prevention
- Develop strategies to extend awareness and actions for fire prevention to all citizens of Wheeler County.
- Examples of public outreach activities include fuel reduction activities and risk assessment (see other CWPP actions)

Coordinating Organization:	Local Coordinating Group

Internal Partners:	**External Partners:**
Wheeler County Wheeler County Court, Wheeler County Fire Defense Board, ODF, USFS Umatilla & Ochoco, NPS, Community and County leaders	Cities of Fossil, Mitchell, Spray
Timeline:	**If available, estimated cost:**
Short Term (0-2 years) / Long Term (2-4 or more years) / Long Term	

Form Submitted by:	

Wildfire #5

Proposed Action Item: WF#5	**Alignment with Plan Goals:**
Work with the Community Wildfire Protection Plan (CWPP) Local Coordinating Group to implement fuel reduction strategies to reduce the risk to wildland fire.	Goal 2: Safety of life and property. Goal 3: Increased cooperation and collaboration among groups and agencies

Rationale for Proposed Action Item:

- In a self-completed hazard analysis, Wheeler County reported itself as having a high level of risk to wildfire. In addition, the *State of Oregon's Natural Hazard Mitigation Plan* indicates that Wheeler County's probability for a future WUI fire is high (that the county would be likely to have a major WUI fire event in the next 10-35 years) and that the county's vulnerability to a WUI fire is also high. Working with the CWPP Local Coordinating Group to implement fuel reduction strategies will ensure a coordinated effort to reduce the overall risk to wildland fire.
- The Wheeler County Community Wildfire Protection Plan identified fuel reduction as an objective to reduce risk to wildland fire. Communities or homes that reduce sources of fuel for fire, such as woodpiles and low hanging trees or shrubs can greatly reduce their property's risk to fire damage.
- **Example Programs:**
  - Grant County, NM – "Grant County WILDLAND-URBAN INTERFACE Landowner Assistance Program": Provides cost-sharing between the State (70%) and the landowner (30%) for fuels treatments
  - Summit County, CO – 2002 Economic Action Program NFP Grant funds cost-share thinning and recycling of wastes
  - Humboldt and Del Norte Counties, CA – Free chipping for residents through the Community Chipping Program
  - Helena, MT – Project Impact Homeowner Assistance Program: A cost-share program to clear defensible space
- The three incorporated cities in Wheeler County – Fossil, Mitchell and Spray - have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.
- Wheeler County Communities at Risk include the incorporated communities of: Fossil, Mitchell and Spray as well as unincorporated communities: Richmond, Twickenham, and Winlock.

Ideas for Implementation:

- Identify funding sources or cost-sharing strategies to help pay for fuel treatment projects.
- Identify fuels treatment projects on lands using the risk assessment data.
- Identify strategies for coordinating fuels treatment projects at a landscape scale.
- Provide special need citizens with an opportunity to participate in programs.
- Develop long-term strategies for maintenance of fuels reduction
- Focus strategic planning for hazardous fuels treatment projects on evacuation routes/corridors (County Roads, FS Roads, State Highways, Public Access Roads, Private Drives).
- Promote information and outreach through all fuels reduction programs to ensure strong community involvement in fuels reduction and wildland fire prevention projects.
- Develop a method for determining community values and concerns about various fuel treatment options.
- Develop a method that can translate the community values, concerns, and input regarding various fuel treatment options into recommended options appropriate for the community.
- Engage local fire chiefs, ODF, and the US Forest Service personnel to do site visits to "hot spots"

and make recommendations to landowners regarding fuel treatment options.		
Coordinating Organization:	Local Coordinating Group	
Internal Partners:		**External Partners:**
Wheeler County, Wheeler County Court, Wheeler County Fire Defense Board, ODF, USFS Umatilla & Ochoco, NPS, Community and County leaders		Cities of Fossil, Mitchell, Spray
Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
Long Term		
Form Submitted by:		

Wildfire #6

Proposed Action Item: WF#6	**Alignment with Plan Goals:**
Include information regarding wildfires in a brochure of natural hazards and mail/make available to county residents and the public so they know what to do and how they can help those responsible for taking action.	Goal 2: Safety of life and property Goal 3: Increased cooperation and collaboration between groups and agencies.

Rationale for Proposed Action Item:

- Residents need to know of the existence of the County Wildfire Protection Plan.
- Those responsible for protection need to know where water sources are in the county.
- Need to know which evacuation roads need to be repaired.
- Need to be sure Mutual aid agreements are in place.
- Not all road departments not equipped with personal safety gear and often times their equipment is utilized on fires.

Ideas for Implementation:

- If appropriate and available follow County Wildfire Protection Plan.
- Educate the public on what to do in a wildfire.
- Educate public on 30 foot fuel reduction and debris removal around homes.
- Educate public on fire resistant roof, shelter and shrubs.

Coordinating Organization:	Wheeler County Emergency Management Coordinator

Internal Partners:	**External Partners:**
Road Dept., 911,Sheriff, Emergency Management, County Court	Cities of Fossil, Mitchell, Spray; Fire dept., public works, Oregon Dept. of Forestry, ODOT, State Police, Mental Health, Faith Community, Red Cross, Humane Society, Utilities, BLM, USFS, State Fire Marshall, Oregon Dept. of Fish and Wildlife

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
X Some	X Some	

Form Submitted by:	Susan C. Brewer

Wildfire #7

Proposed Action Item: WF#7	**Alignment with Plan Goals:**
Provide County Road Department with fire fighting training and equipment	Goal 2: Safety of life and property. Goal 3: Increased cooperation and collaboration among groups and agencies

Rationale for Proposed Action Item:

- In a self-completed hazard analysis, Wheeler County reported itself as having a high level of risk to wildfire. In addition, the *State of Oregon's Natural Hazard Mitigation Plan* indicates that Wheeler County's probability for a future WUI fire is high (that the county would be likely to have a major WUI fire event in the next 10-35 years) and that the county's vulnerability to a WUI fire is also high. Coordinating information and outreach activities with the Wheeler CWPP Local Coordinating Group will ensure the county and the Group will conduct an effective public outreach campaign to promote fire prevention and risk reduction activities.
- The three incorporated cities in Wheeler County – Fossil, Mitchell and Spray - have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.
- Wheeler County Communities at Risk include the incorporated communities of: Fossil, Mitchell and Spray as well as unincorporated communities: Richmond, Twickenham, and Winlock.
- A community's response capabilities can have a significant impact on the impact wildfire has on a community. Wheeler County's Road Department currently lacks adequate training and equipment.

Ideas for Implementation:

- Identify appropriate training for Road Department Staff
- Seek funding to support training
- Identify appropriate funding source for the purchase of fire fighting equipment such as fire pants, shirts, fire shelters, and web gear. Potential funding sources may include DHS' Assistance to Firefighters Grant.

Coordinating Organization:	Wheeler County Road Department

Internal Partners:	**External Partners:**
Wheeler County Public Works	Cities of Fossil, Mitchell and Spray, ODF; Fire Districts; State Fire Marshall; Local Cities; OEM; BLM; USFS; Utilities; Local WUI Property Owners

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
Short Term		

Form Submitted by:	

Windstorm #1

Proposed Action Item: WS#1	**Alignment with Plan Goals:**
Include information regarding wind storms in a brochure of natural hazards and mail/make available to county residents and the public	Goal 2: Safety of life and property Goal 3: Increased cooperation and collaboration between groups and agencies.

Rationale for Proposed Action Item:

- Windstorms increase the risk of down communication and power lines.
- Windstorms can increase the risk of debris on roads.
- Windstorms can cause poor visibility in areas where soil is loose.
- Windstorms can cause tree limbs to produce risks to homeowners/tenants.
- Windstorms are sometimes accompanied by heavy moisture.
- Windstorms can be a catalyst for traffic accidents.
- The three incorporated cities in Wheeler County –Fossil, Mitchell and Spray- have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.

Ideas for Implementation:

- Educate the public on what to do in a windstorm.

Coordinating Organization:	Wheeler County Emergency Management Coordinator

Internal Partners:	**External Partners:**
Emergency Management, Road Dept., 911, Sheriff, Senior Services, County Court, Medical	Cities of Fossil, Mitchell, Spray; Fire Dept., Utilities, ODOT, Media, Red Cross, City Public Works, Utilities, OEM, Other Medical

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
X		

Form Submitted by:	Susan C. Brewer

Winter Storm #1

Proposed Action Item: WS#1	**Alignment with Plan Goals:**
Educate farmers about ways to protect livestock from the effects of winter storms	Goal 2: Safety of life and property

Rationale for Proposed Action Item:

- Wheeler County rated itself high on a self-completed hazard risk rating study for both wind and winter storms. In addition, the State of Oregon's Natural Hazard Mitigation Plan indicates that Wheeler County has a high probability and vulnerability to winter storms. By encouraging farmers to better protect their livestock from winter storms, impacts to the local economy can be minimized.
- According to the Wheeler County Community Profile, 20% of employees work in the Agriculture industry in the County.
- The Disaster Mitigation Act of 2000 requires communities to identify a comprehensive range of specific mitigation actions and projects for each hazard [201.6(c)(3)(ii)]. Protecting important community assets from winter storms is important.
- The three incorporated cities in Wheeler County – Fossil, Mitchell, and Spray - have limited resources and rely on the county for certain services and public facilities. The cities should coordinate with the county to encourage farmers to protect livestock, establishing a unified countywide effort to reduce the impacts on the agricultural based economy.

Ideas for Implementation:

- The County and cities should partner with Oregon State University Extension Service and the Oregon Department of Agriculture for this effort.
- Installation of snow fences to reduce drifting snow on roads and paths, which could block access to barns, feed and water.
- Horses and livestock should have a shelter where they can be protected from wind, snow, ice and rain.
- Grazing animals should have access to a protected supply of food and non-frozen water

Coordinating Organization:	Wheeler County

Internal Partners:	**External Partners:**
	Cities of Fossil, Mitchell, and Spray, OSU Extension, Oregon Department of Agriculture

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Long Term	

Form Submitted by:	

Winter Storm #2

Proposed Action Item: WS#2	**Alignment with Plan Goals:**
Include information regarding winter storms in a brochure of natural hazards and mail/make available to county residents and the public.	Goal 2: Safety of life and property Goal 3: Increased cooperation and collaboration between groups and agencies.

Rationale for Proposed Action Item:

- Winter Storms increase the risk of down communication and power lines.
- Winter Storms can increase the risk of driving on roads.
- Winter Storms can increase the risk of low visibility on roads.
- Winter Storms can increase the risk of trees and tree limbs on homes.
- Winter Storms can increase the risk of running out of household supplies.
- Winter Storms can increase the risk of personal and vehicle accidents and injuries.
- The three incorporated cities in Wheeler County –Fossil, Mitchell and Spray- have limited resources and rely on the county for certain services and public facilities. Because the cities rely so heavily upon the County to provide services, this action is considered to be a multi-jurisdictional action because it benefits both the County and all the participating cities.

Ideas for Implementation:

- Educate the public on what to do in a winter storm.

Coordinating Organization:	Wheeler County Emergency Management Coordinator

Internal Partners:	**External Partners:**
County Court, Road Dept., Emergency Management, Law Enforcement, Medical Clinic	Cities of Fossil, Mitchell, Spray; ODOT, Mortuary Services, EMS, Mental Health, Faith Community, Medical, Red Cross, Schools, Coroner

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
Some Items X	Some Items X	

Form Submitted by:	Susan C. Brewer

Section 5:
Plan Implementation and Maintenance

The section details the formal process that will ensure that Wheeler County Multi-Jurisdictional Natural Hazard 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 the Emergency Management department through VISION CONSULTING & GRANT WRITING 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.

Convener

The County Court and the Emergency Management Department will be responsible for overseeing the implementation and maintenance of the plan. There will be joint conveners from the Emergency Management and partners as listed in the Action Plans and other sections of the plan, depending on what action may be implemented.

The lead Convener agency will be the Emergency Management Department. The emergency management personnel will work closely with the emergency management personnel from the other two counties in the region, Gilliam and Sherman. All three county Hazard Mitigation plans were developed in a regional concept format.

- Coordinate Steering Committee meeting dates, times, locations, agendas, and member notification
- Document outcomes of Committee meetings
- Serve as a communication conduit between the steering committee, key plan stakeholders and tri-county regional partners
- Identify emergency management related funding sources for natural hazard mitigation projects or contract for these services
- Incorporate, maintain, and update Wheeler County's natural hazards risk GIS data elements
- Utilize the Risk Assessment as a tool for prioritizing proposed natural hazard risk reduction projects
- Monitor and implement the one year and five year update schedule
- Schedule semi-annual steering committee meetings
- Keep the County Court updated on the progress of implementing the plan
- Educate new Commissioners on the County Court regarding the plan

Coordinating Body

The Steering Committee will serve as the coordinating body for the mitigation plan and will be responsible for the following tasks:

- 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
- 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 Wheeler County Multi-Jurisdictional Natural Hazard Mitigation Plan:

- Wheeler County Court
- City of Fossil
- City of Mitchell

- City of Spray
- City of Spray Fire Department
- Twickenham Volunteer Fire Department
- Wheeler County Road Department
- Wheeler County Sheriff's Department
- Wheeler County Emergency Services
- Guests

To make the coordination and review of Wheeler 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 semi-annually and annually to review the plan.

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. Wheeler 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, Wheeler 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, Wheeler 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.[i] Implementing the Natural Hazards Mitigation Plan's action items through such plans and policies increases their likelihood of being supported and implemented.

Existing plans, policies and programs can be found in Appendix E of this plan. Examples of these include:

- Oregon Department of Transportation Plan
- Wheeler County Transportation Plan
- Asher Clinic Disaster Plan
- City of Mitchell Strategic Plan
- City of Fossil Strategic Plan

- City of Spray Strategic Plan
- Emergency Operations Plan
- Community Wildfire Protection Plan
- Comprehensive Land Use Plan
- Wheeler County's Hazard Mitigation Plan
- U.S. Department of Agriculture Plan

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 Wheeler 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 bases to:

- Review existing action items to determine appropriateness for funding
- Identify issues that may not have been identified when the plan was developed
- Prioritize potential mitigation projects using the methodology described below

The convener 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.

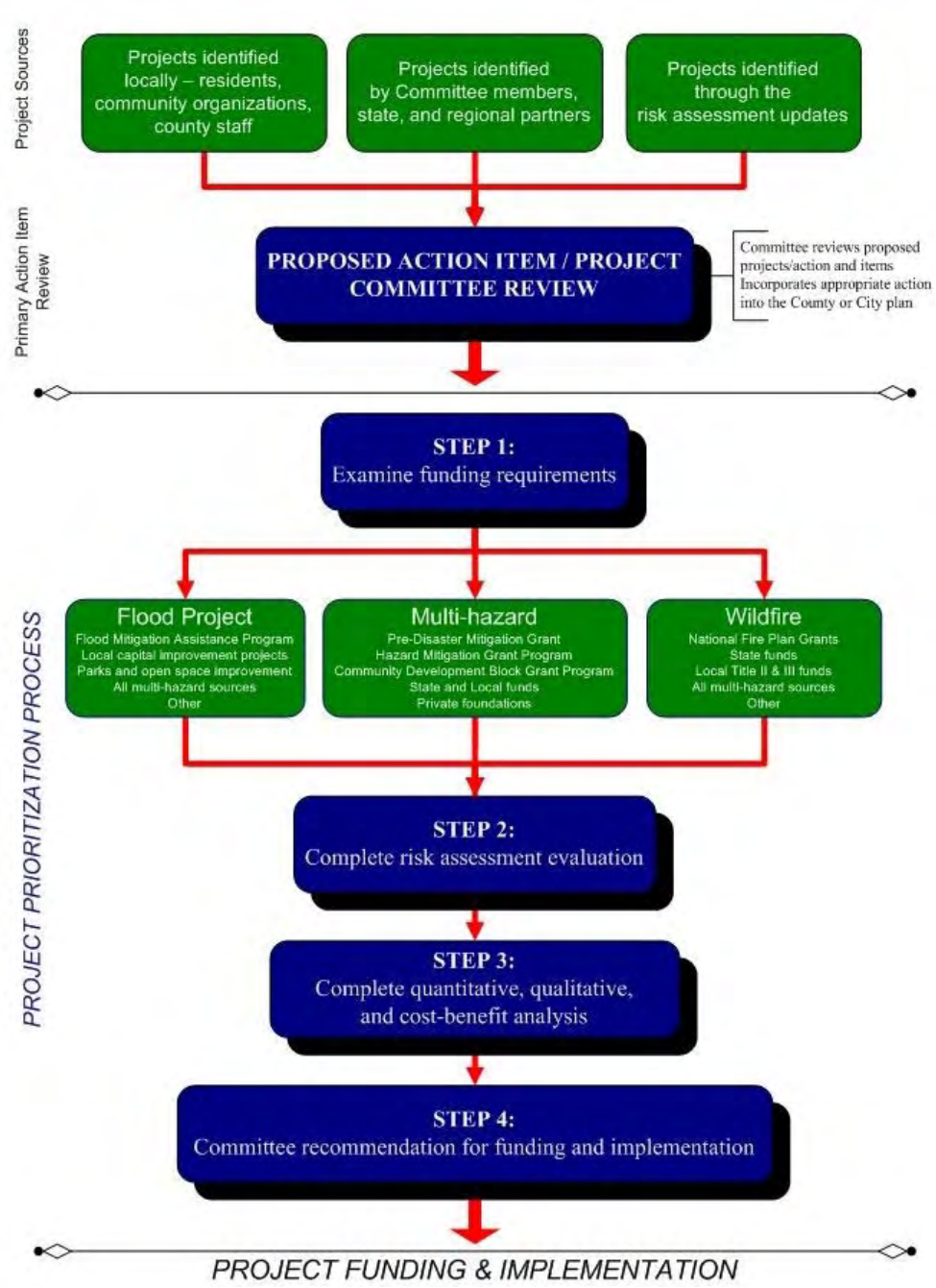
Project Prioritization Process

The Disaster Mitigation Act of 2000 (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



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

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

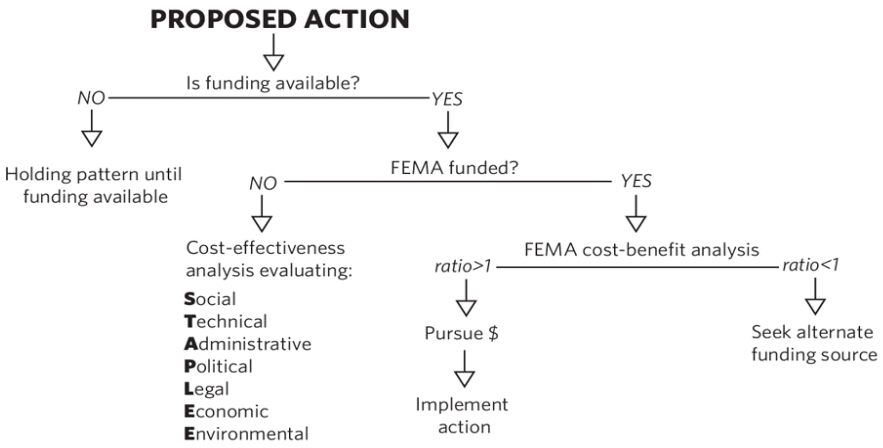
The second step in prioritizing the plan's action items was to examine which hazards they are associated with and where these hazards rank in terms of community risk. The committee will determine whether or not the plan's risk assessment supports the implementation of the mitigation activity. This determination 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
- Medium
- High

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 E: 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.

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 Wheeler County.

Five-Year Review of Plan

This plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. 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

Wheeler 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.

All meetings were open to the public. There were small numbers from the public in attendance, but their input was appreciated and valued.

During the resolution process by the cities and County Commissioners, the public was encouraged to attend and provide input.

New stakeholders and the public will be encouraged to attend the semi-annual and annual updates of the plan and to volunteer on sub-committees for fund raising, hazard project work, identification of new stakeholders and revisions and re-assessment of identified hazards and action plans.

Once the plan has been approved by the cities, County and FEMA it will be available to the public for review at the Emergency Management office and on the Oregon Natural Hazards Workgroup (ONHW) website.

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

Annex I:
Identifying and Assessment of Communities at Risk

The purpose of this section is to provide background on the wildfire hazard for Wheeler County. This includes a list of Communities at Risk as well as the methodology for determining Communities at Risk.

High Risk Communities July 29, 2005

Following, is a list of jurisdictions (communities), sorted by county, that have at least 28 persons per square mile within 8 km of a high risk watershed. This list was developed as an interim measure until the complete assessment is finished. Populated areas outside a city, fire district, federally recognized Indian reservation, or national park, are assigned to the county.

BAKER	BAKER (County)
BAKER	Baker City (City)
BAKER	BAKER RFPD (RFPD)
BAKER	EAGLE VALLEY RFPD (RFPD)
BAKER	Haines (City)
BAKER	HAINES FIRE PROTECTION DIST. (RFPD)
BAKER	Halfway (City)
BAKER	KEATING RFPD (RFPD)
BAKER	NORTH POWDER FIRE DEPT (RFPD)
BAKER	PINE VALLEY RFPD (RFPD)
BAKER	Richland (City)
BAKER	Sumpter (City)
BAKER	Unity (City)
CLACKAMAS	CLACKAMAS (County)
CLACKAMAS	HOODLAND RFPD (RFPD)
CLACKAMAS	SANDY RFPD #72 (RFPD)
COOS	BRIDGE VOL RFPD (RFPD)
COOS	COOS (County)
CROOK	CROOK (County)
CROOK	Prineville (City)
CROOK	Prineville (RFPD)
CROOK	REDMOND FIRE DEPT (RFPD)
CURRY	AGNESS-ILLAHE VOL (RFPD)
CURRY	CURRY (County)
CURRY	OPHIR RFPD (RFPD)
CURRY	SQUAW VALLEY N BANK RFPD (RFPD)
DESCHUTES	Bend (City)
DESCHUTES	BEND FD (RFPD)
DESCHUTES	BLACK BUTTE RANCH RFPD (RFPD)
DESCHUTES	CLOVERDALE RFPD (RFPD)
DESCHUTES	CROOKED RIVER RANCH RFPD (RFPD)
DESCHUTES	DESCHUTES (County)
DESCHUTES	LAPINE RFPD (RFPD)
DESCHUTES	Prineville (RFPD)
DESCHUTES	Redmond (City)
DESCHUTES	REDMOND FIRE DEPT (RFPD)
DESCHUTES	Sisters (City)
DESCHUTES	SISTERS-CAMP SHERMAN RFPD (RFPD)
DESCHUTES	Sunriver (RFPD)
DOUGLAS	AZALEA VOLS (RFPD)
DOUGLAS	Calapooya (RFPD)
DOUGLAS	CAMAS VALLEY VOL RFD (RFPD)
DOUGLAS	Canyonville (City)
DOUGLAS	CANYONVILLE SOUTH UMPQUA FD (RFPD)
DOUGLAS	Cow Creek (Reservation)
DOUGLAS	DAYS CREEK RFD (RFPD)
DOUGLAS	DOUGLAS (County)
DOUGLAS	DOUGLAS CO FIRE DIST #2 (RFPD)
DOUGLAS	Douglas CO Fire District #5 (RFPD)

DOUGLAS	Drain (City)
DOUGLAS	DRAIN RFPD (RFPD)
DOUGLAS	Elkton (City)
DOUGLAS	ELKTON RFPD (RFPD)
DOUGLAS	FAIR OAKS RFPD (RFPD)
DOUGLAS	Glendale (City)
DOUGLAS	GLENDALE RFPD (RFPD)
DOUGLAS	GLIDE RFPD (RFPD)
DOUGLAS	KELLOGG RFD (RFPD)
DOUGLAS	LOOKINGGLASS RFD (RFPD)
DOUGLAS	MILO RFPD (RFPD)
DOUGLAS	Myrtle Creek (City)
DOUGLAS	MYRTLE CREEK FD (RFPD)
DOUGLAS	Oakland (City)
DOUGLAS	OAKLAND RFPD (RFPD)
DOUGLAS	RICE HILL RFD (RFPD)
DOUGLAS	Riddle (City)
DOUGLAS	Riddle RFPD (RFPD)
DOUGLAS	Roseburg (City)
DOUGLAS	Sutherlin (City)
DOUGLAS	TENMILE RFPD (RFPD)
DOUGLAS	TILLER RFPD (RFPD)
DOUGLAS	TRI CITY FIRE DIST #4 (DOUG) (RFPD)
DOUGLAS	Winston (City)
DOUGLAS	Yoncalla (City)
DOUGLAS	YONCALLA RFPD (RFPD)
GILLIAM	GILLIAM (County)
GILLIAM	Lonerock (City)
GILLIAM	South Gilliam County (RFPD)
GRANT	Canyon City (City)
GRANT	Dayville (City)
GRANT	Granite (City)
GRANT	GRANT (County)
GRANT	John Day (City)
GRANT	JOHN DAY FIRE DEPT (RFPD)
GRANT	Long Creek (City)
GRANT	Monument (City)
GRANT	MT VERNON FD (RFPD)
GRANT	Mt. Vernon (City)
GRANT	Prairie City (City)
GRANT	PRAIRIE CITY FIRE DEPT (RFPD)
GRANT	Seneca (City)
HARNEY	Burns (City)
HARNEY	Burns Paiute (Reservation)
HARNEY	HARNEY (County)
HOOD RIVER	Cascade Locks (City)
HOOD RIVER	DEE RFPD (RFPD)
HOOD RIVER	Hood River (City)
HOOD RIVER	HOOD RIVER (County)
HOOD RIVER	MOSIER FD (RFPD)
HOOD RIVER	ODELL RFPD (RFPD)
HOOD RIVER	PARKDALE RFPD (RFPD)
HOOD RIVER	PINE GROVE RFPD (RFPD)
HOOD RIVER	Warm Springs (Reservation)
HOOD RIVER	WEST SIDE RFPD (RFPD)
JACKSON	APPLEGATE RFPD #9 (RFPD)
JACKSON	Ashland (City)

JACKSON	Butte Falls (City)
JACKSON	Central Point (City)
JACKSON	COLESTIN RFPD (RFPD)
JACKSON	Eagle Point (City)
JACKSON	EVANS VALLEY FIRE DIST #6 (RFPD)
JACKSON	Gold Hill (City)
JACKSON	JACKSON (County)
JACKSON	JACKSON CO FD #3 (RFPD)
JACKSON	JACKSON CO RFPD #4 (RFPD)
JACKSON	JACKSON CO RFPD #5 (RFPD)
JACKSON	Jacksonville (City)
JACKSON	LAKE CREEK RFPD #8 (RFPD)
JACKSON	Medford (City)
JACKSON	MEDFORD F&R (RFPD)
JACKSON	Phoenix (City)
JACKSON	PROSPECT RFPD (RFPD)
JACKSON	Rogue River (City)
JACKSON	ROGUE RIVER RFPD (RFPD)
JACKSON	RURAL METRO FIRE DEPT (RFPD)
JACKSON	Shady Cove (City)
JACKSON	Talent (City)
JEFFERSON	Camp Sherman (RFPD)
JEFFERSON	CROOKED RIVER RANCH RFPD (RFPD)
JEFFERSON	Culver (City)
JEFFERSON	JEFFERSON (County)
JEFFERSON	Madras (City)
JEFFERSON	Metolius (City)
JEFFERSON	North Unit (RFPD)
JEFFERSON	REDMOND FIRE DEPT (RFPD)
JEFFERSON	Warm Springs (Reservation)
JEFFERSON	WARM SPRINGS FIRE SFTY (RFPD)
JOSEPHINE	APPLEGATE RFPD #9 (RFPD)
JOSEPHINE	Cave Junction (City)
JOSEPHINE	Grants Pass (City)
JOSEPHINE	ILLINOIS VALLEY RFPD (RFPD)
JOSEPHINE	JOSEPHINE (County)
JOSEPHINE	Oregon Caves NM (NPS)
JOSEPHINE	ROGUE RIVER RFPD (RFPD)
JOSEPHINE	RURAL METRO FIRE DEPT (RFPD)
JOSEPHINE	WILLIAMS RFPD (RFPD)
JOSEPHINE	WOLF CREEK RFPD (RFPD)
KLAMATH	BLY RFPD (RFPD)
KLAMATH	Bonanza (City)
KLAMATH	BONANZA RFPD (RFPD)
KLAMATH	CHEMULT RFPD (RFPD)
KLAMATH	Chiloquin (City)
KLAMATH	CHILOQUIN-AGENCY LK RFPD (RFPD)
KLAMATH	Crater Lake NP (NPS)
KLAMATH	CRESCENT RFPD (RFPD)
KLAMATH	HARRIMAN RFPD (RFPD)
KLAMATH	KENO RFPD (RFPD)
KLAMATH	Klamath (County)
KLAMATH	Klamath (Reservation)
KLAMATH	KLAMATH CO FD #3 (RFPD)
KLAMATH	KLAMATH CO FD #5 (RFPD)
KLAMATH	KLAMATH CO FIRE DIST #1 (RFPD)
KLAMATH	Klamath Falls (City)

KLAMATH	LAPINE RFPD (RFPD)
KLAMATH	MALIN RFPD (RFPD)
LAKE	LAKE (County)
LAKE	Lakeview (City)
LAKE	LAKEVIEW FIRE DEPT (RFPD)
LAKE	NEW PINE CREEK RFPD (RFPD)
LAKE	Paisley (City)
LAKE	SILVER LAKE RFPD (RFPD)
LAKE	THOMAS CREEK/WESTSIDE RFPD (RFPD)
LANE	BLUE RIVER FD (RFPD)
LANE	DEXTER RFPD (RFPD)
LANE	DRAIN RFPD (RFPD)
LANE	LANE (County)
LANE	LORANE RFPD (RFPD)
LANE	LOWELL RFPD (RFPD)
LANE	MCKENZIE F&R (RFPD)
LANE	Oakridge (City)
LANE	UPPER MCKENZIE RFPD (RFPD)
LANE	Westfir (City)
LANE	WESTFIR FIRE DEPT (RFPD)
MORROW	HEPPNER FD (RFPD)
MULTNOMAH	MULTNOMAH (County)
MULTNOMAH	MULTNOMAH CO RFPD #14 (RFPD)
MULTNOMAH	SANDY RFPD #72 (RFPD)
UMATILLA	Adams (City)
UMATILLA	EAST UMATILLA CO RFPD (RFPD)
UMATILLA	ECHO RFPD (RFPD)
UMATILLA	Lower Mckay (RFPD)
UMATILLA	Mckay (RFPD)
UMATILLA	Milton-Freewater (City)
UMATILLA	Pendleton (City)
UMATILLA	Pilot Rock (City)
UMATILLA	PILOT ROCK RFPD (RFPD)
UMATILLA	Riverside (RFPD)
UMATILLA	Ukiah (City)
UMATILLA	UMATILLA (County)
UMATILLA	Umatilla (Reservation)
UNION	Cove (City)
UNION	COVE RFPD (RFPD)
UNION	Elgin (City)
UNION	ELGIN VOL FIRE DEPT (RFPD)
UNION	HAINES FIRE PROTECTION DIST. (RFPD)
UNION	Imbler (City)
UNION	IMBLER RFPD (RFPD)
UNION	Island City (City)
UNION	La Grande (City)
UNION	LA GRANDE RFPD (RFPD)
UNION	North Powder (City)
UNION	NORTH POWDER FIRE DEPT (RFPD)
UNION	Summerville (City)
UNION	Union (City)
UNION	UNION (County)
UNION	UNION EMERGENCY SERVICES (RFPD)
WALLOWA	Enterprise (City)
WALLOWA	Joseph (City)
WALLOWA	Lostine (City)
WALLOWA	Wallowa (City)

WALLOWA	WALLOWA (County)
WALLOWA	WALLOWA FD (RFPD)
WASCO	Dufur (City)
WASCO	JUNIPER FLATS RFPD (RFPD)
WASCO	Maupin (City)
WASCO	MID-COLUMBIA F&R (RFPD)
WASCO	Mosier (City)
WASCO	MOSIER FD (RFPD)
WASCO	PINE GROVE RFPD (RFPD)
WASCO	PINE HOLLOW VOL (RFPD)
WASCO	The Dalles (City)
WASCO	TYGH VALLEY VOL FD (RFPD)
WASCO	Wamic (RFPD)
WASCO	Warm Springs (Reservation)
WASCO	WASCO (County)
WHEELER	Fossil (City)
WHEELER	Mitchell (City)
WHEELER	Spray (City)
WHEELER	WHEELER (County)
WHEELER	WHEELER POINT VOL FIRE ASSOC (RFPD)

High Risk Communities July 29, 2005

Following, is a list of jurisdictions (communities) that have at least 28 persons per square mile within 8 km of a high risk watershed. This list was developed as an interim measure until the complete assessment is finished. Populated areas outside a city, fire district, federally recognized Indian reservation, or national park, are assigned to the county.

Name
AGNESS-ILLAHE VOL (RFPD)
APPLEGATE RFPD #9 (RFPD)
AZALEA VOLS (RFPD)
Adams (City)
Ashland (City)
BAKER (County)
BAKER RFPD (RFPD)
BEND FD (RFPD)
BLACK BUTTE RANCH RFPD (RFPD)
BLUE RIVER FD (RFPD)
BLY RFPD (RFPD)
BONANZA RFPD (RFPD)
BRIDGE VOL RFPD (RFPD)
Baker City (City)
Bend (City)
Bonanza (City)
Burns (City)
Burns Paiute (Reservation)
Butte Falls (City)
CAMAS VALLEY VOL RFD (RFPD)
CANYONVILLE SOUTH UMPQUA FD (RFPD)
CHEMULT RFPD (RFPD)
CHILOQUIN-AGENCY LK RFPD (RFPD)
CLACKAMAS (County)
CLOVERDALE RFPD (RFPD)
COLESTIN RFPD (RFPD)
COOS (County)
COVE RFPD (RFPD)
CRESCENT RFPD (RFPD)
CROOK (County)
CROOKED RIVER RANCH RFPD (RFPD)
CURRY (County)
Calapooya (RFPD)
Camp Sherman (RFPD)
Canyon City (City)
Canyonville (City)
Cascade Locks (City)
Cave Junction (City)
Central Point (City)
Chiloquin (City)
Cove (City)
Cow Creek (Reservation)
Crater Lake NP (NPS)
Culver (City)
DAYS CREEK RFD (RFPD)
DEE RFPD (RFPD)
DESCHUTES (County)
DEXTER RFPD (RFPD)

DOUGLAS (County)
DOUGLAS CO FIRE DIST #2 (RFPD)
DRAIN RFPD (RFPD)
Dayville (City)
Douglas CO Fire District #5 (RFPD)
Drain (City)
Dufur (City)
EAGLE VALLEY RFPD (RFPD)
EAST UMATILLA CO RFPD (RFPD)
ECHO RFPD (RFPD)
ELGIN VOL FIRE DEPT (RFPD)
ELKTON RFPD (RFPD)
EVANS VALLEY FIRE DIST #6 (RFPD)
Eagle Point (City)
Elgin (City)
Elkton (City)
Enterprise (City)
FAIR OAKS RFPD (RFPD)
Fossil (City)
GILLIAM (County)
GLENDALE RFPD (RFPD)
GLIDE RFPD (RFPD)
GRANT (County)
Glendale (City)
Gold Hill (City)
Granite (City)
Grants Pass (City)
HAINES FIRE PROTECTION DIST. (RFPD)
HARNEY (County)
HARRIMAN RFPD (RFPD)
HEPPNER FD (RFPD)
HOOD RIVER (County)
HOODLAND RFPD (RFPD)
Haines (City)
Halfway (City)
Hood River (City)
ILLINOIS VALLEY RFPD (RFPD)
IMBLER RFPD (RFPD)
Imbler (City)
Island City (City)
JACKSON (County)
JACKSON CO FD #3 (RFPD)
JACKSON CO RFPD #4 (RFPD)
JACKSON CO RFPD #5 (RFPD)
JEFFERSON (County)
JOHN DAY FIRE DEPT (RFPD)
JOSEPHINE (County)
JUNIPER FLATS RFPD (RFPD)
Jacksonville (City)
John Day (City)
Joseph (City)
KEATING RFPD (RFPD)
KELLOGG RFD (RFPD)
KENO RFPD (RFPD)
KLAMATH CO FD #3 (RFPD)
KLAMATH CO FD #5 (RFPD)
KLAMATH CO FIRE DIST #1 (RFPD)

Klamath (Reservation)
Klamath Falls (City)
LA GRANDE RFPD (RFPD)
LAKE (County)
LAKE CREEK RFPD #8 (RFPD)
LAKEVIEW FIRE DEPT (RFPD)
LANE (County)
LAPINE RFPD (RFPD)
LOOKINGGLASS RFD (RFPD)
LORANE RFPD (RFPD)
LOWELL RFPD (RFPD)
La Grande (City)
Lakeview (City)
Lonerock (City)
Long Creek (City)
Lostine (City)
Lower Mckay (RFPD)
MALIN RFPD (RFPD)
MCKENZIE F&R (RFPD)
MEDFORD F&R (RFPD)
MID-COLUMBIA F&R (RFPD)
MILO RFPD (RFPD)
MOSIER FD (RFPD)
MT VERNON FD (RFPD)
MULTNOMAH (County)
MULTNOMAH CO RFPD #14 (RFPD)
MYRTLE CREEK FD (RFPD)
Madras (City)
Maupin (City)
Mckay (RFPD)
Medford (City)
Metolius (City)
Milton-Freewater (City)
Mitchell (City)
Monument (City)
Mosier (City)
Mt. Vernon (City)
Myrtle Creek (City)
NEW PINE CREEK RFPD (RFPD)
NORTH POWDER FIRE DEPT (RFPD)
North Powder (City)
North Unit (RFPD)
OAKLAND RFPD (RFPD)
ODELL RFPD (RFPD)
OPHIR RFPD (RFPD)
Oakland (City)
Oakridge (City)
Oregon Caves NM (NPS)
PARKDALE RFPD (RFPD)
PILOT ROCK RFPD (RFPD)
PINE GROVE RFPD (RFPD)
PINE HOLLOW VOL (RFPD)
PINE VALLEY RFPD (RFPD)
PRAIRIE CITY FIRE DEPT (RFPD)
PROSPECT RFPD (RFPD)
Paisley (City)
Pendleton (City)

Phoenix (City)
Pilot Rock (City)
Prairie City (City)
Prineville (City)
Prineville (RFPD)
REDMOND FIRE DEPT (RFPD)
RICE HILL RFD (RFPD)
ROGUE RIVER RFPD (RFPD)
RURAL METRO FIRE DEPT (RFPD)
Redmond (City)
Richland (City)
Riddle (City)
Riddle RFPD (RFPD)
Riverside (RFPD)
Rogue River (City)
Roseburg (City)
SANDY RFPD #72 (RFPD)
SILVER LAKE RFPD (RFPD)
SISTERS-CAMP SHERMAN RFPD (RFPD)
SQUAW VALLEY N BANK RFPD (RFPD)
Seneca (City)
Shady Cove (City)
Sisters (City)
South Gilliam County (RFPD)
Spray (City)
Summerville (City)
Sumpter (City)
Sunriver (RFPD)
Sutherlin (City)
TENMILE RFPD (RFPD)
THOMAS CREEK/WESTSIDE RFPD (RFPD)
TILLER RFPD (RFPD)
TRI CITY FIRE DIST #4 (DOUG) (RFPD)
TYGH VALLEY VOL FD (RFPD)
Talent (City)
The Dalles (City)
UMATILLA (County)
UNION (County)
UNION EMERGENCY SERVICES (RFPD)
UPPER MCKENZIE RFPD (RFPD)
Ukiah (City)
Umatilla (Reservation)
Union (City)
Unity (City)
WALLOWA (County)
WALLOWA FD (RFPD)
WARM SPRINGS FIRE SFTY (RFPD)
WASCO (County)
WEST SIDE RFPD (RFPD)
WESTFIR FIRE DEPT (RFPD)
WHEELER (County)
WHEELER POINT VOL FIRE ASSOC (RFPD)
WILLIAMS RFPD (RFPD)
WOLF CREEK RFPD (RFPD)
Wallowa (City)
Wamic (RFPD)
Warm Springs (Reservation)

Westfir (City)
Winston (City)
YONCALLA RFPD (RFPD)
Yoncalla (City)
Grants Pass (City)
Klamath Falls (City)
Klamath (County)

IDENTIFYING AND ASSESSMENT OF COMMUNITIES AT RISK IN OREGON
Draft Version 4.0

October 18, 2004

Scope: This assessment methodology provides for a "seamless" process for identification and wildfire risk assessment of Oregon's communities that is appropriate at all levels resolution – from statewide to community to parcel.

Background: Assessment of wildfire's threat to communities in Oregon is occurring at several levels.

- The state will be using the National Association of State Forester's (NASF) *Field Guide* during the next 12 months with the desired outcome to identify and assess Oregon's communities to meet the needs of the "Collaborative Fuels Treatment MOU" and Task e, Goal 4 of the *Implementation Plan for the 10-Year Comprehensive Strategy.*
- The state is also beginning implementation of Oregon's Forestland-Urban Fire Protection Act of 1997 (SB360), which will use procedures contained in Oregon Administrative Rules to identify and classify forestlands in nearly every county in the state over the next 10 years.
- Many counties and communities are beginning a wildfire assessment with the desired outcome to:
    - Meet federal FEMA requirements for a wildfire mitigation plan (Title 44 CFR Part 201 of The Disaster Mitigation Act of 2000) and
    - Prioritize Title III and National Fire Plan projects.
- Additionally, individual communities and watershed councils are completing neighborhood level assessments as part of their neighborhood/community fire plans.
- The Healthy Forests Restoration Act of 2003 (HFRA) and a new federal fire management planning process addresses community fire plans and identification of WUI lands within and adjacent to "at-risk" communities.

Purpose: Provide a tiered collaborative process that best serves the various needs at the appropriate resolutions of assessment. – from statewide to an individual neighborhood. The assessment includes all lands and ownerships and collaboratively considers the complexity of ownership patterns, resource management issues and stakeholder interests. The higher quality local assessments will be used to further refine the statewide assessment.

<u>Process Overview</u>

ODF, with cooperators through a statewide steering committee will:

- Design and conduct a coarse scale statewide risk assessment to initially prioritize fire mitigation needs.
- Set standards and provide certain data for counties and communities to conduct a fire risk assessment.
- Initiate and maintain a risk assessment map and database for the state.

Counties and communities will:

- Using statewide standards, collaboratively further identify unique communities within their jurisdiction.
- Using statewide standards, collaboratively further refine the risk assessment
- Submit results to ODF for approval to be up-dated in statewide risk assessment.

Identifying/Naming Communities to be Assessed

Background: Under agreement of the NAFS and federal agencies, states are responsible for identification of communities at risk. For management of nearby federal lands, communities, through an approved *Community Wildfire Protection Plan (CWPP)*, will identify areas (Wildland-Urban Interface) within and adjacent to these state-identified communities using criteria contained in the HFRA. In areas not covered by a CWPP, federal agencies will determine the WUI boundary.

NASF Guidance defines *community* as " a group of people living in the same locality and under the same government."

The HFRA defines an "at-risk community" as:
1) An area comprised of:
- Where humans and their development meet or intermix with wildland fuel (federal register definition, January 4, 2001, which uses a structure density of 1 per 40 acres or population of 28 person per square mile), or
- Or a group of homes and other structures with basic infrastructure and services within or adjacent to federal land;

2) in which conditions are conducive to a large scale wildland fire event; and
3) for which a significant threat to human life or property exists as a result of a wildland fire disturbance event.

For its list of communities at risk in Oregon, ODF defines *community at risk* as ***a geographic area within and surrounding permanent dwellings with basic infrastructure and services, under a common fire protection jurisdiction or government, for which there is a significant threat due to wildfire***.

Identifying communities for initial statewide assessment:
- Geographic areas where at least 1 structure per 40 acres meet or intermix with wildland fuel are identified (federal register criteria).
- Adjacent landscapes that contain vegetation creating a risk to the community, generally a sixth field watershed, and municipal watersheds.
- These geographic areas are subdivided by the boundary of the jurisdictional with primary constitutional authority for protection of life from wildfire (Cities, fire districts, and county board of commissioners for "unprotected" areas).

Identifying communities for county and community assessments:
- For the purpose of providing a better community risk assessment and fire plan (and development of community wildfire protection plans under the HFRA), the jurisdictional areas identified at the statewide level should be divided into logical community boundaries collaboratively with fire districts, cities and counties. An unincorporated *rural community* without a common government or fire district providing structural fire protection is defined as consisting primarily of permanent residential dwellings but also at least two other land uses that provide commercial, industrial, or public uses (e.g. schools, churches, grange halls, post offices) to the community, surrounding rural area or persons traveling through the area (Oregon Department of Land Conservation and Development 1994).

Assessment of Risk Factors

Related to wildfire assessment, it is clear that one-size-does-not-fit-all. However, nearly all assessment models consider **risk, hazard, protection capabilities and values protected.** In addition, an assessment of the **vulnerability of values at risk** is needed for community down to parcel level assessments. Complex assessment worksheets available through Firewise, NFPA, RAMS, Western Fire Chiefs Association, International Fire Code Institute, and various states can be boiled into these groupings. FEMA requires risk assessments to profile hazards, vulnerabilities, and impacts in terms of location, extent, previous occurrence, and potential dollar loss to vulnerable assets.

Consistent with the NASF Guidance, an adjective rating of *Low*, *Moderate*, or *High* will be used to describe each factor (an additional *Very High* rating is allowed for Hazard) for the statewide assessment. However, field-testing has shown that there is a need for finer resolution of the data to accommodate local assessments. For example, it's possible that nearly every community in a county could receive a statewide rating of High for a factor. This would do little to help a local government or community prioritize areas of concern. To maintain the integrity of the statewide rating, yet provide of local needs, a point system that provides for a wide range of points for each factor is used. However, when this assessment is rolled up to the state, the statewide score system will be used

This paper provides a process for consistently assigning these adjective values. It uses *best available data* (BAD) for various resolutions of assessment.

Weighting of Factors

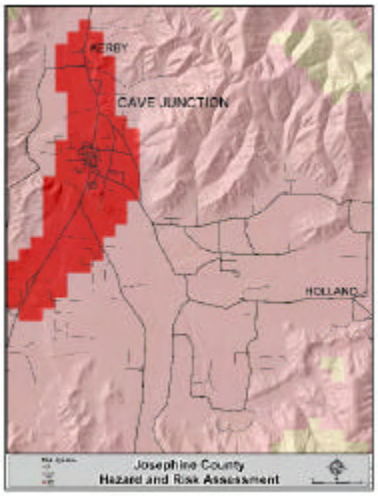
Risk: 40 Points
Hazard: 80 Points
Protection Capability: 40 points
Values at Risk: 50 Points
Structural Vulnerability: 90 Points

Risk: What is the likelihood of a fire occurring?

Statewide: Use historic wildfire occurrence provided by ODF, OSFM, and federal land management agencies and tribes.

Historic fire occurrence		**Points**
Fire occurrence - per 1000 acres per 10 years		
(Low)	0-.1	5
(Moderate)	.1-1.1	20
(High)	1.1+	40

Local: Use of historic fire occurrence alone would be adequate (see Josephine County Example). However, in addition, an assessment of **ignition risk potential** may help local communities better assess potential fire starts and design appropriate fire prevention strategies into a fire plan. The list of ignition sources in the RAMS model is a good source: *Transmission power lines, above ground distribution lines, power substations, active logging, construction, debris burning, slash burning, mining, dispersed camping, developed camping, off-road vehicle use, flammables present, fireworks, mowing dry grass, woodcutting, equipment use, target shooting, military training, arson, cultural activities, railroad, federal/state highway, county road, public access roads, camps/resorts/stables, schools, business, ranch/farm, lightning prone, dump*

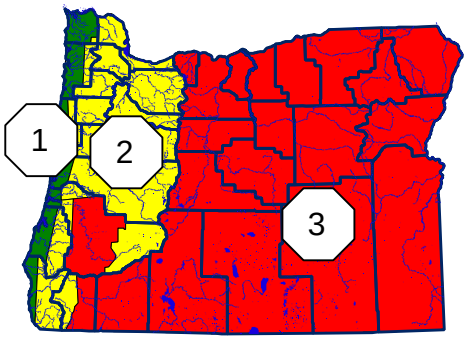


Historic fire occurrence	
Fire occurrence - per 1000 acres per 10 years	
0-0.1	5
0.1 –1.1	10
1.1+	20
Ignition Risk	
Home density (homes per 10 acres)	
0-.9 (rural)	0
1-5.0 (suburban)	5
5.1+ (urban)	10
Other risk factors present in vicinity	
< 1/3 present	0
1/3-2/3 present	5
> 2/3 present	10

Category Rating	**From**	**To**
Low	**0**	**13**
Moderate	**13**	**27**
High	**27**	**40**

Hazard: What is the resistance to control once a wildfire starts, being the weather, topography and fuel that adversely affects suppression efforts

Hazard is closely associated with fire weather, topography, and fuels (the fire behavior triangle).



Weather Hazard Factor Value: All levels: The number of days per season that forest fuels are capable of producing a significant fire event is important to consider. The reference for establishing the wildfire weather hazard factor is data provided by the Oregon Department of Forestry, which was developed following an analysis of daily wildfire danger rating indices in each regulated use area of the state and which is described in Table 1 of OAR 629-044-0230.

State/Community/Parcel	
OAR Table 1	**Points**
Non-forest in any zone (mask out)	0
1	0
2	20
3	40

Topographic Hazard Factor Value:
All levels**:** Slope and aspect affect both the intensity and rate of spread of a wildfire. Elevation affects the type of vegetation and the length of the season. The topography hazard factor is determined by considering slope, aspect, and elevation using DEM's. Each factor is added together to determine the topographic value:

Topography	**Points**
Slope	
0-25%	0
26-40%	2
>40%	3
Aspect	
N, NW, NE	0
W, E	3
S, SW, SE	5
Elevation feet above sea level	
5001+ feet	0
3501-5000 feet	1
0-3500 feet	2

Natural Vegetative Fuel Hazard Factor Value:

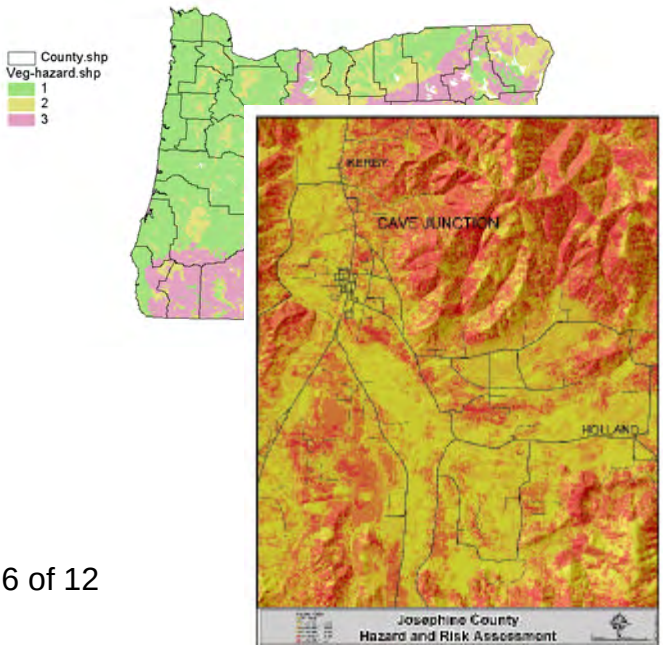
Given high-to-extreme fire danger for a geographic area, vegetation is the primary factor affecting the intensity of the fire, thus the resistance to control and the potential threat to protected resources (lives, property, and resources). It also affects the amount and travel distance of burning embers that again, significantly impact the resistance to control and the potential threat to protected resources

Determine by using fire behavior fuel models and/or potential flame length.

State/Community/Parcel*		
Fuel Hazard Factor	**Fuel Model**	**Fire Characteristics**
1	Grass (1) Low/less flammable brush (5) and short-needle timber litter (8)	Typically produces a flame length of up to 5 feet, a wildfire that exhibits very little spotting, torching, or crowning, and which results in a burned area that can normally be entered within 15 minutes.
2	Grass/Timber (2) Moderate brush, conifer reproduction, open sage and juniper (6)	Typically produces a flame length of 5 to 8 feet, a wildfire that exhibits sporadic spotting, torching, or crowning, and which results in a burned area that can normally be entered within one hour. Mixed severity.
3	Tall flammable grasses (3) Heavy/flammable brush (4), and mature timber with slash (10)	Typically produces a flame length of over 8 feet, a wildfire that exhibits frequent spotting, torching, or crowning, and which results in a burned area that normally cannot be entered for over one hour. Stand replacement severity.

Statewide: Best available data statewide will likely be a combination of grid vegetation and the GAP vegetation types with a cross-walk to hazard value (determined by an expert panel representing all areas – similar to Colorado assessment). Below is a sample of vegetation hazard value statewide using GAP data as a test (no collaboration or statewide input).

Vegetation (fuel model)	**Points**
SB360 - Natural Vegetative Fuel Hazard	
Non-forest	0
1	5
2	15
3	30

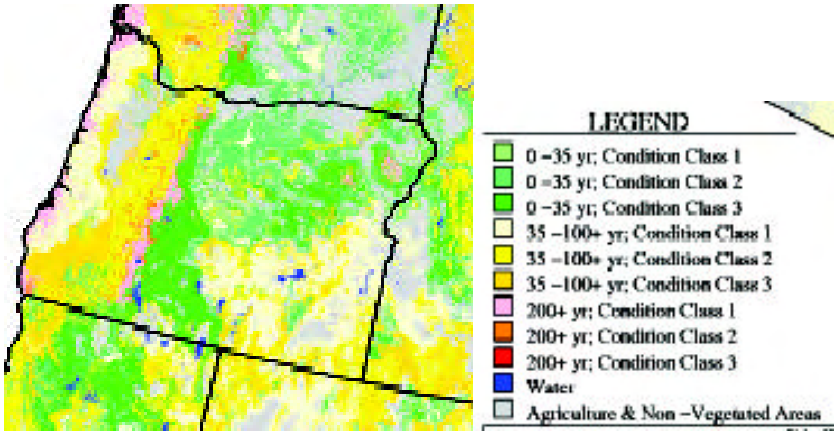


Local: The quality of fuels data varies significantly statewide. The best available data should be used to determine the expected fire behavior. Where data exists to determine crown fire potential, use the point system that follows:

Vegetation (fuel model)	**Points**
SB360 - Natural Vegetative Fuel Hazard	
Non-forest	0
1	5
2	15
3	20
Areas exposed to crown potential (including areas of insect and disease infestation, wind throw, and slash)	
Passive - Low	0
Active - Moderate	5
Independent - High	10

Category Rating	**To**
Low	**9**
Moderate	**40**
High	**60**
Extreme	**80**

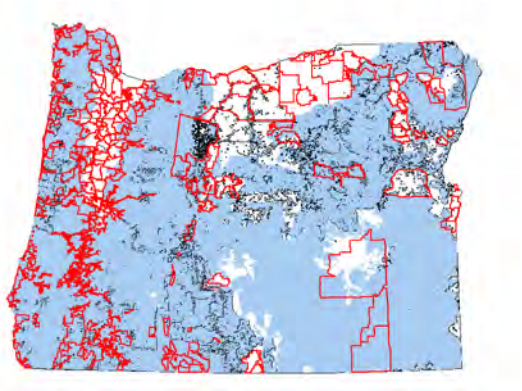
Note: Federal land management agencies are moving toward *condition class* rather than fuel model to assess hazard and prioritize projects. Discussions have begun with Region 6 staff as to how best coordinate this potential conflict. The good news is that condition class will likely be a close fit to the cross walk from vegetation to natural vegetation hazard. The clip below from a national condition class map (http://www.fs.fed.us/fire/fuelman/curcond2000/maps/frcc2000.pdf) shows similar results, except for the west slope of the Cascades (which could be resolved in development of the cross-walk).



Protection Capabilities: What are the risks associated with wildfire protection capabilities, including capacity and resources to undertake fire prevention measures?

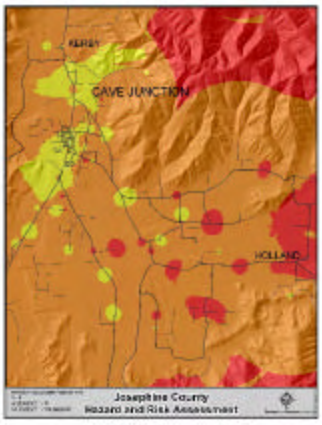
Protection capability is a combination of the capacities of the fire protection agencies, local government and community organizations. A high score represents high risk/low protection capability.

Statewide: Best available data to evaluation protection capability on a statewide basic is the absence or presence of structural and wildland protection agencies, using structural fire district boundaries and wildland protection boundaries.



Fire response	Points
Organized response	
Both structural and wildland	5
Wildland response only	15
No organized response	40

County and local: This system starts by assessing the fire response and then is increased based upon proven mitigation efforts of the community that will make the fire response effective. To assist with local assessments and planning, these factors should be identified and mapped as factors that will either increase or decrease the effectiveness of the protection system (i.e., areas with limited fire access that would lead to planning escape routes, safety zones, and/or road brushing projects). Generally, areas more than 300 feet for a road or driveway should be considered a limited response.



Fire response	Points
Organized structural response < 10 minutes	0
Inside fire district, but structural response> 10 minutes	8
No structural protection, wildland response < 20 min	15
No structural response & wildland protection > 20 minutes	36

Community preparedness	Points
Organized stakeholder group, community fire plan, phone tree, mitigation efforts	0
Primarily agency efforts (mailings, fire free, etc)	2
No effort	4

Category Rating	From	To
Low Risk	**0**	**9**
Moderate Risk	**10**	**16**
High Risk	**17**	**40**

Values Protected: What are the human and economic values associated with communities or landscapes (NASF definition)?

Statewide: Assessment of values is best accomplished at the local level. However, although protection priorities vary between agencies, protection of life is number one for all. In addition to number of lives at risk, identification of population or structure density accomplishes an assessment of associated values of community infrastructure and property.

Life/Property	Points
Population density (per square mile)	
28-111(rural)	10
112-559(suburban)	30
560+(urban)	50

County and local: Values at risk and setting protection priorities is best accomplished locally. For a general assessment of life, either population density (above) or home density (below) is a appropriate. However, identification and evaluation of additional human and economic values is needed for FEMA and community fire planning. It's important to identify **community** values at risk from wildfire

Life/Property	Points
Homes - density (homes per 10 acres)	
.1 -.9 (rural)	10
1-5.0 (suburban)	30
5.1+ (urban)	50

OR

Life/Property	Points
Homes - density (homes per 10 acres)	
.1 -.9 (rural)	2
1-5.0 (suburban)	15
5.1+ (urban)	30
Community Infrastructure	
Presence of an identified community infrastructure (examples below)	
None	0
One present	10
More than one present	20

Power substations & corridors, communication sites and facilities, transportation corridors, major manufacturing and utilities facilities, municipal watersheds, water storage and distribution, fuel storage facilities, hospitals and health care facilities, landfills and waste treatment facilities, schools, churches, community centers, and stores.

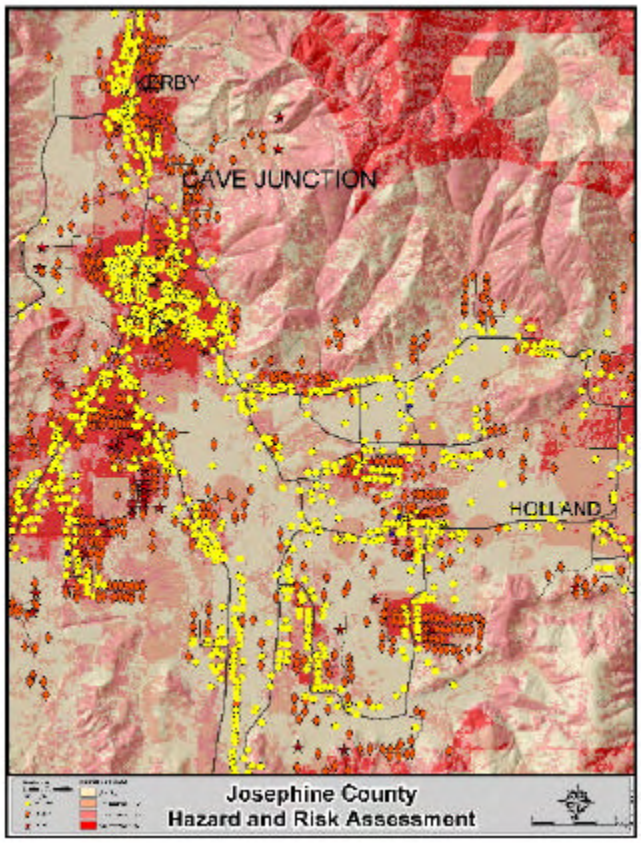
Category Rating	From	To
Low	**0**	**15**
Moderate	**16**	**30**
High	**31**	**50**

Structural Vulnerability: What is the likelihood that structures will be destroyed by wildfire?

Risk, hazard, and protection capabilities account of 90% of the likelihood of a wildfire event threatening life and property. However, factors controlled by landowners within what is now being called the home ignition zone account for 90% of the likelihood of a wildfire threatening the structures. The three primary factors are roofing assembly, defensible space, and presence of suppression action (access).

Statewide: It's not practical to evaluate structural vulnerability at the statewide level.

Local: An assessment of structural vulnerability is best accomplished by on-site visits. The results are best displayed as points over the completed risk assessment (see example to left). Areas of "red-on-red" are at highest risk of loss of structures.



Viewing factors individually will assist in determining what is causing the problem. Mapping of what is causing access issues (dead-end roads, poor bridges, heavy roadside fuel) etc) will be helpful in planning mitigation.

The table below displays two options of scoring. You can use local ordinances or the NFPA's 1144 (the portion dealing with structural vulnerability).

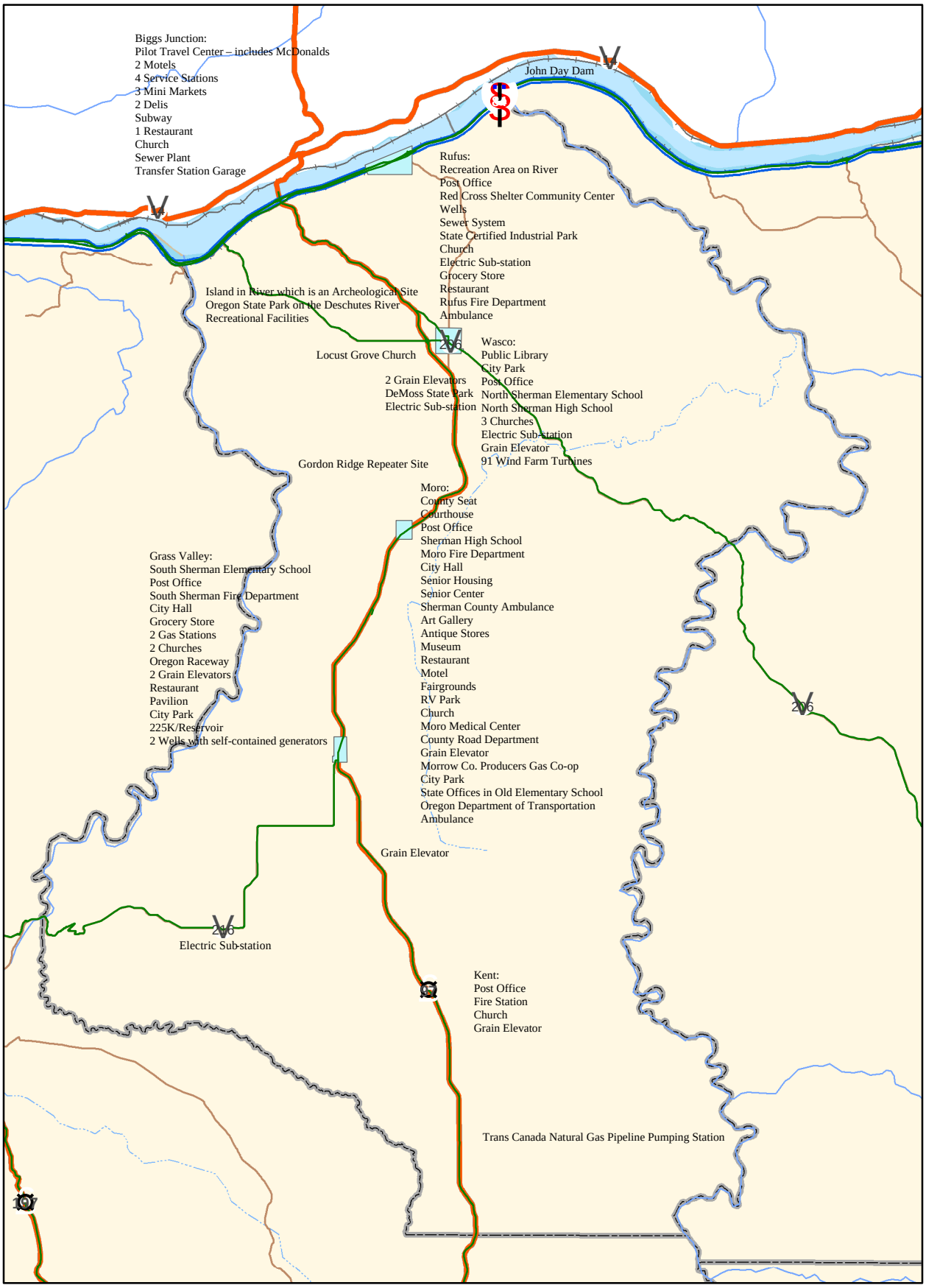
	Local	NFPA
Structure		
Flammable roofing		
Non-wood roofing	0	
Wood roofing	30	
Roofing assembly		
Class A roofing		0
Class B roof		5
Class C roof		10
Non-rated roof		20
Building materials		
Fire-resistant siding, eves and deck		0
Fire-resistant siding, eves and combustible deck		5
Combustible siding and deck		10
Building setback to slopes > 30%		
0 - 30 feet to slope		1
> 30 feet from slope		5
Defensible space		
Defensible space		
Meets local requirements	0	
Non-compliant with local standards	30	
> 100 feet		1
71-100 feet		3
30-70 feet		10
< 30 feet		25
Separation of adjacent homes contribute to fire spread		
> 100 feet apart		0
60-100 feet apart		3
< 60 feet apart		5
Fire access		
Roads and driveways		
Within 300 feet of access that meets local requirements	0	
Non-compliant with local standards	30	
Ingress/egress		
TWO or more roads in/out		0
ONE road in/out		7
Road width		
> 24 feet		0
24-20 feet		2
<20 feet		4
All-season road condition		
Surfaced, grade < 5%		0
Surfaced, grade > 5%		1
Non-surfaced, grade < 5%		1
Non-surfaced, grade > 5%		3
Other than all-season		4

Fire service access		
	< 300 feet with turnaround	0
	> 300 feet with turnaround	2
	< 300 feet without turnaround	4
	> 300 feet without turnaround	5
Street signs		
	Present - 4 inch and reflective	0
	Absent	5

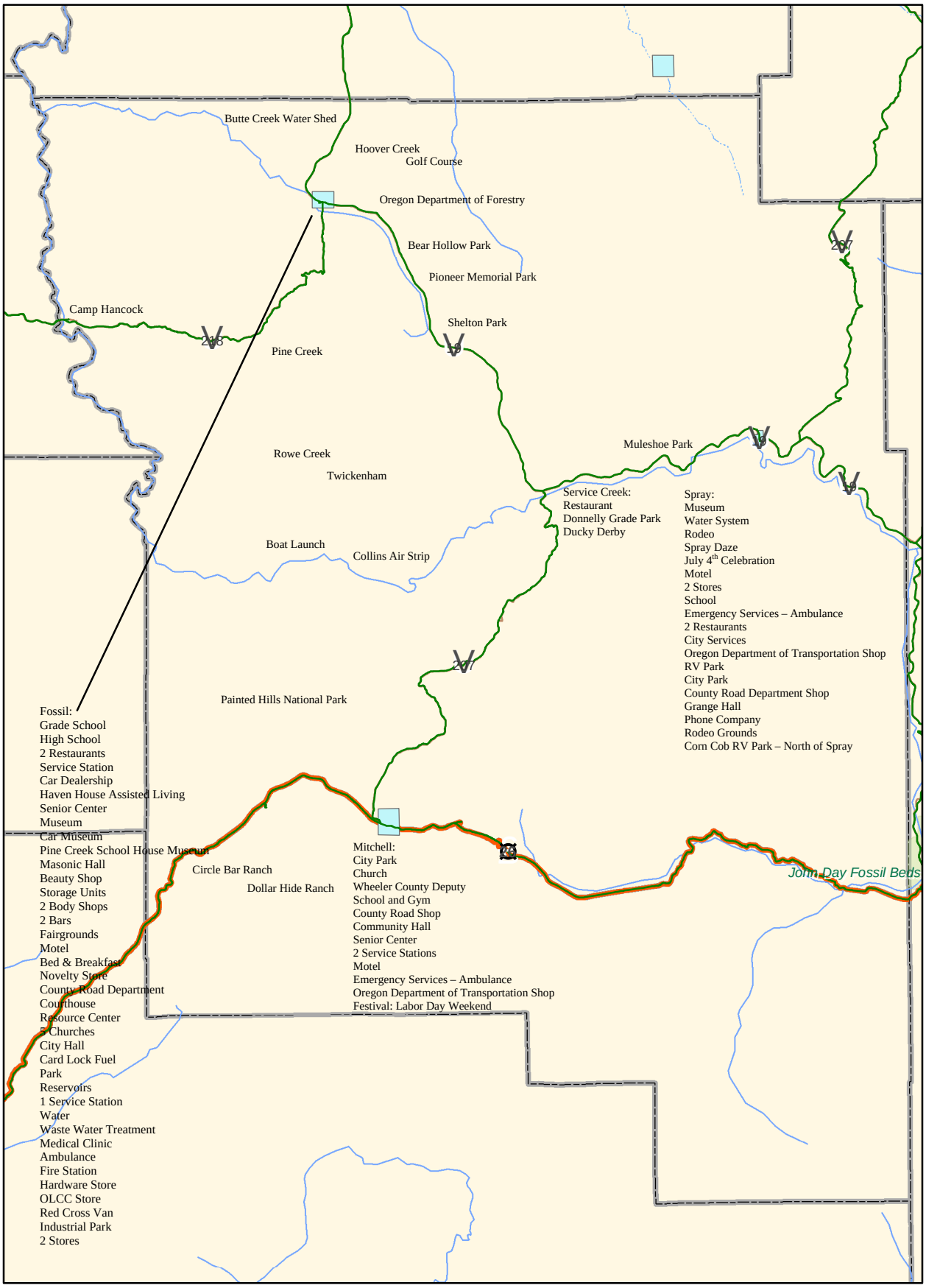
Category Rating	From	To
Low	**0**	**30**
Moderate	**31**	**60**
High	**61**	**90**

Annex II:
Community Asset Maps

The purpose of this section is to provide a map of Wheeler County assets as well as a list of public buildings.


Biggs Junction:
Pilot Travel Center – includes McDonalds
2 Motels
4 Service Stations
3 Mini Markets
2 Delis
Subway
1 Restaurant
Church
Sewer Plant
Transfer Station Garage
John Day Dam
Rufus:
Recreation Area on River
Post Office
Red Cross Shelter Community Center
Wells
Sewer System
State Certified Industrial Park
Church
Electric Sub-station
Grocery Store
Restaurant
Rufus Fire Department
Ambulance
Island in River which is an Archeological Site
Oregon State Park on the Deschutes River
Recreational Facilities
206
Locust Grove Church
Wasco:
Public Library
City Park
Post Office
North Sherman Elementary School
North Sherman High School
3 Churches
Electric Sub-station
Grain Elevator
91 Wind Farm Turbines
2 Grain Elevators
DeMoss State Park
Electric Sub-station
Gordon Ridge Repeater Site
Moro:
County Seat
Courthouse
Post Office
Sherman High School
Moro Fire Department
City Hall
Senior Housing
Senior Center
Sherman County Ambulance
Art Gallery
Antique Stores
Museum
Restaurant
Motel
Fairgrounds
RV Park
Church
Moro Medical Center
County Road Department
Grain Elevator
Morrow Co. Producers Gas Co-op
City Park
State Offices in Old Elementary School
Oregon Department of Transportation
Ambulance
Grass Valley:
South Sherman Elementary School
Post Office
South Sherman Fire Department
City Hall
Grocery Store
2 Gas Stations
2 Churches
Oregon Raceway
2 Grain Elevators
Restaurant
Pavilion
City Park
225K/Reservoir
2 Wells with self-contained generators
Grain Elevator
206
206
Electric Sub-station
Kent:
Post Office
Fire Station
Church
Grain Elevator
Trans Canada Natural Gas Pipeline Pumping Station
97

Ref Code	Name	Address	City	Zip
Sher_erc01	Sherman County Emergency Svc	309 Dewey St	Moro	97039
Sher_fir01	North Sherman County RFPD	811 Armsworthy St	Wasco	97065
Sher_fir02	South Sherman Fire District	109 Sw 2nd St	Grass Valley	97029
Sher_fir03	Moro RFPD	309 Dewey St	Moro	97039
Sher_fir05	Rufus VFD	400 Main St	Rufus	97050
Sher_pol01	Sherman County Sheriff	500 Court St	Moro	97039
Sher_sch01	So Sherman Elementary	212 Ne North St	Grass Valley	97029
Sher_sch02	Sherman High	65912 High School Lp	Moro	97039
Sher_sch03	North Sherman Elementary	1 Barnett St	Wasco	97065


Butte Creek Water Shed
Hoover Creek
Golf Course
Oregon Department of Forestry
Bear Hollow Park
Pioneer Memorial Park
Camp Hancock
Shelton Park
Pine Creek
Rowe Creek
Twickenham
Muleshoe Park
Service Creek:
Restaurant
Donnelly Grade Park
Ducky Derby
Spray:
Museum
Water System
Rodeo
Spray Daze
July 4th Celebration
Motel
2 Stores
School
Emergency Services – Ambulance
2 Restaurants
City Services
Oregon Department of Transportation Shop
RV Park
City Park
County Road Department Shop
Grange Hall
Phone Company
Rodeo Grounds
Corn Cob RV Park – North of Spray
Boat Launch
Collins Air Strip
Painted Hills National Park
Fossil:
Grade School
High School
2 Restaurants
Service Station
Car Dealership
Haven House Assisted Living
Senior Center
Museum
Car Museum
Pine Creek School House Museum
Masonic Hall
Beauty Shop
Storage Units
2 Body Shops
2 Bars
Fairgrounds
Motel
Bed & Breakfast
Novelty Store
County Road Department
Courthouse
Resource Center
5 Churches
City Hall
Card Lock Fuel
Park
Reservoirs
1 Service Station
Water
Waste Water Treatment
Medical Clinic
Ambulance
Fire Station
Hardware Store
OLCC Store
Red Cross Van
Industrial Park
2 Stores
Circle Bar Ranch
Dollar Hide Ranch
Mitchell:
City Park
Church
Wheeler County Deputy
School and Gym
County Road Shop
Community Hall
Senior Center
2 Service Stations
Motel
Emergency Services – Ambulance
Oregon Department of Transportation Shop
Festival: Labor Day Weekend
John Day Fossil Beds

Public Buildings Identified as Critical Facilities in Oregon SB2, 2005, Wheeler County

UniqueID	Type	Name	Address	City
Whee_fir01	Fire Station	Wheeler Point Volunteer Fire Associ	20550 Winlock Lane	Spray
Whee_fir02	Fire Station	Spray Volunteer Fire Department	300 Park	Spray
Whee_fir03	Fire Station	Mitchell Fire & Ambulance	202 SE High St	Mitchell
Whee_fir04	Fire Station	Mitchell Volunteer Fire Department	340 SE High St	Mitchell
Whee_hos01	Hospital	Asher Medical Clinic	712 Jay St	Fossil
Whee_pol01	Police Station	Wheeler County Sheriff's Office	701 Adams	Fossil
Whee_sch01	School	Spray Schools	303 Park	Spray
Whee_sch02	School	Mitchell School	202 SE High St	Mitchell
Whee_sch03	School	Wheeler High	600 B St	Fossil
Whee_sch04	School	Fossil Elementary	404 Main St	Fossil

Annex III:
Resolutions

The purpose of this section is to document the plan adoption for Wheeler County.

Resolution # 2008-06

Adopting the Wheeler County
Multi-Jurisdictional Natural Hazards Mitigation Plan

Whereas, Wheeler County recognizes the threat that natural hazards pose to people and property within our community; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, an adopted Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

Whereas, Wheeler County fully participated in the FEMA-prescribed mitigation planning process to prepare this Multi-Jurisdictional Natural Hazards Mitigation Plan; and

Whereas, the Oregon Office of Emergency Management and Federal Emergency Management Agency, Region X officials have reviewed the "*Wheeler County, Oregon Multi-Jurisdictional Natural Hazard Mitigation Plan*" (October, 2007) and pre-approved it (October 11, 2007) contingent upon this official adoption of the participating governments and entities;

Now, therefore, be it resolved, that the Wheeler County adopts the *"Wheeler County, Oregon Multi-Jurisdictional Natural Hazards Mitigation Plan"* as an official plan; and

Be it further resolved, Wheeler County will submit this Adoption Resolution to the Oregon Office of Emergency Management and Federal Emergency Management Agency, Region X officials to enable the Plan's final approval.

Passed: 2/20/2008

Jeanne E Smith

Certifying Official

RESOLUTION NO. 380

A RESOLUTION ADOPTING THE CITY OF FOSSIL'S REPRESENTATION IN THE WHEELER COUNTY MULTI-JURISDICTION HAZARD MITIGATION PLAN

WHEREAS, the City of Fossil is vulnerable to the human and economic costs of natural, technological and societal disasters, and

WHEREAS, the Common Council of the City of Fossil recognizes the importance of reducing or eliminating those vulnerabilities for the overall good and welfare of the community, and

WHEREAS, the City of Fossil has participated in the development of the Wheeler County Multi-Jurisdiction Natural Hazard Mitigation Plan, which has established a comprehensive, coordinated planning process to eliminate or minimize these vulnerabilities, and

WHEREAS, the City of Fossil's representatives and staff have identified natural hazard risks and prioritized a number of proposed actions and programs needed to mitigate the vulnerabilities of the City of Fossil to the impacts of future disasters, and

WHEREAS, these proposed projects and programs have been incorporated into the Wheeler County Multi-Jurisdiction Natural Hazard Mitigation Plan that has been prepared and promulgated for consideration and implementation by the cities of Wheeler County;

THEREFORE BE IT RESOLVED THAT:

Section 1. The Common Council of the City of Fossil hereby accepts and approves of its section of the Wheeler County Multi-Jurisdiction Hazard Mitigation Plan as a reasonable process to identify and plan for potential hazards in The City of Fossil and Wheeler County,

Section 2. The agency personnel of the City of Fossil are requested and instructed to pursue available funding opportunities for implementation of the actions and proposals designated therein,

Section 3. The City of Fossil will, upon receipt of such funding or other necessary resources, seek to implement the mitigation proposals identified by the Jurisdiction's Hazard Mitigation Planning Committee, and

Section 4. The City of Fossil will continue to participate in the updating and expansion of the Wheeler County Multi-Jurisdiction Hazard Mitigation Plan in the years ahead, and

Section 5. The City of Fossil will further seek to encourage the businesses, industries and community groups operating within and/or for the benefit of the City of Fossil to also participate in the updating and expansion of the Wheeler County Multi-Jurisdiction Hazard Mitigation Plan in the years ahead.

RESOLUTION NO. 380 is hereby adopted by the Common Council of the City of Fossil on March 11, 2008.

~~William C Brown,~~ Mayor
Jack Lorts, Council President

ATTEST:

Teresa Hunt, City Recorder

IN THE CITY OF SPRAY
OF THE STATE OF OREGON

A RESOLUTION ADOPTING THE CITY OF SPRAY'S REPRESENTATION IN THE WHEELER COUNTY MULT-JURISDICTION HAZARD MITIGATION PLAN	))))	RESOLUTION 2007/2008-#3

WHEREAS, the City of Spray is vulnerable to the human and economic costs of natural, technological and societal disasters, and

WHEREAS, the City Council of the City of Spray recognizes the importance of reducing or elimination those vulnerabilities for the overall good and welfare of the community, and

WHEREAS, the City of Spray has participated in the development of the Wheeler County Multi-Jurisdiction Natural Hazard Mitigation Plan, which has established a comprehensive, coordinated planning process to eliminate or minimize these vulnerabilities, and

WHEREAS, these proposed projects and programs have been incorporated into the Wheeler County Multi-Jurisdiction Natural Hazard Mitigation Plan that has been prepared and promulgated for consideration and implementation by the cities of Wheeler County; NOW THEREFORE

THE COMMON COUNCIL OF THE CITY OF SPRAY RESOLVES AS FOLLOWS:

Section 1. The Common Council of the City of Spray hereby accepts and approves of its section of the Wheeler County Multi-Jurisdiction Hazard Mitigation Plan as a reasonable process to identify and plan for potential hazards in The City of Spray and Wheeler County,

Section 2. The agency personnel of the City of Spray are requested and instructed to pursue available funding opportunities for implementation of the actions and proposals designated therein,

Section 3. The City of Spray will, upon receipt of such funding or other necessary resources, seek to implement the mitigation proposals identified by the Jurisdiction's Hazard Mitigation Planning Committee, and

Section 4. The City of Spray will continue to participate in the updating and expansion of the Wheeler County Multi-Jurisdiction Hazard Mitigation Plan in the years ahead, and

Section 5. The City of Spray will further seek to encourage the businesses, industries and community groups operating within and/or for the benefit of the City of Spray to also participate in the updating and expansion of the Wheeler County Multi-Jurisdiction Hazard Mitigation Plan in the years ahead.

PASSED BY THE CITY COUNCIL AND APPROVED BY THE MAYOR, MARCH 17, 2008

Hon. Bobby E. Adams, Mayor

Jeanette Laite, City Recorder

RESOLUTION NO. 2007-08-2

A RESOLUTION ADOPTING THE CITY OF MITCHELL'S REPRESENTATION IN THE WHEELER COUNTY MULTI-JURISDICTION HAZARD MITIGATION PLAN

WHEREAS, the City of Mitchell is vulnerable to the human and economic costs of natural, technological and societal disasters, and

WHEREAS, the City Council of the City of Mitchell recognizes the importance of reducing or eliminating those vulnerabilities for the overall good and welfare of the community, and

WHEREAS, the City of Mitchell has participated in the development of the Wheeler County Multi-Jurisdiction Natural Hazard Mitigation Plan, which has established a comprehensive, coordinated planning process to eliminate or minimize these vulnerabilities, and

WHEREAS, the City of Mitchell's representatives and staff have identified natural hazard risks and prioritized a number of proposed actions and programs needed to mitigate the vulnerabilities of the City of Mitchell to the impacts of future disasters, and

WHEREAS, these proposed projects and programs have been incorporated into the Wheeler County Multi-Jurisdiction Natural Hazard Mitigation Plan that has been prepared and promulgated for consideration and implementation by the cities of Wheeler County; NOW THEREFORE

THE COMMON COUNCIL OF THE CITY OF MITCHELL RESOLVES AS FOLLOWS:

Section 1. The Common Council of the City of Mitchell hereby accepts and approves of its section of the Wheeler County Multi-Jurisdiction Hazard Mitigation Plan as a reasonable process to identify and plan for potential hazards in The City of Mitchell and Wheeler County,

Section 2. The agency personnel of the City of Mitchell are requested and instructed to pursue available funding opportunities for implementation of the actions and proposals designated therein,

Section 3. The City of Mitchell will, upon receipt of such funding or other necessary resources, seek to implement the mitigation proposals identified by the Jurisdiction's Hazard Mitigation Planning Committee, and

Section 4. The City of Mitchell will continue to participate in the updating and expansion of the Wheeler County Multi-Jurisdiction Hazard Mitigation Plan in the years ahead, and

Section 5. The City of Mitchell will further seek to encourage the businesses, industries and community groups operating within and/or for the benefit of the City of Mitchell to also participate in the updating and expansion of the Wheeler County Multi-Jurisdiction Hazard Mitigation Plan in the years ahead.

PASSED BY THE CITY COUNCIL AND APPROVED BY THE MAYOR, this 25th day of February, 2008.

Nancy Fitzgerald

Hon. Nancy Fitzgerald, Mayor

ATTEST:

Sandra Davis

Sandra Davis, City Recorder

1 -- A RESOLUTION ADOPTING THE WHEELER COUNTY HAZARD MITIGATION PLAN.

Appendix A:
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

The Wheeler County Emergency Management (EM) Office is responsible for coordinating and over seeing hazard mitigation activities and planning. In the event of an incident, the EM Coordinator is responsible for coordination and setting up of an incident command center.

Contact: Wheeler County Emergency Management Coordinator

Address: Wheeler County Resource Center, P.O. Box 327, Fossil, OR 97830

Phone: 541-763-2372

Fax: 541-763-3299

Coordinator: Marjorie Sharp

Regional Resources

Regional resources for Wheeler County consist of their Emergency Management Office; the Sherman County Emergency Management Office and the Gilliam County Emergency Management Office.

Contact: Gilliam County Emergency Management Coordinator

Address: Gilliam County Courthouse, P.O. Box 427, Condon, OR 97823

Phone: 541-384-2857

Fax: 541-384-2878

Coordinator: Chris Fitzsimmons

Contact: Sherman County Emergency Services Director

P.O. Box 139, Moro, OR 97039-0139

Phone: 541-565-3100

Fax: 541-565-3024

Director: Shawn Payne

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, (Pendleton)

The National Weather Service provides flood watches, warnings, and informational statements for rivers in Wheeler County. The Pendleton Bureau serves the County.

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: American Red Cross, Oregon Mountain River Chapter
Address: 2680 Twin Knolls Drive, Bend, OR 97701
Phone: 541-382-2142
Fax: 541-382-2405
Website:
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

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/

Soil and Water Conservation District (SWCD)

The SWCD works in partnership with the Natural Resource Conservation Service to promote soil and water conservation in Wheeler 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: **Wheeler County Soil and Water Conservation District**
Address: P.O. Box 431, Fossil, OR 97830
Phone: **541-468-2990**
Fax: 541-468- 2991
Website:

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 that one property.

Contact: USDA-NRCS
Address: 333 S. Main Street, Condon, OR 97823
Phone: 541-384-2281
Fax: 541-384-2288
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

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/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

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

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, 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

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

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 provides, 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.

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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.

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Address: 130 228th Street, SW, Bothell, WA 98021-9796
Phone: (800) 480-2520
Fax: (425) 487-4622
Website: http http://www.fema.gov/government/grant/pa/dmgtoc.shtm

Appendix B:
Steering Committee and Public Meetings

The purpose of this section is to document the public process utilized to develop this plan. The following includes agendas, sign-in sheets and minutes from Steering Committee meetings.

eD

ATTENDANCE

		Name	Representing	Optional Address mailing or email
		DAVID ROUSE	Office of Sheriff	SHERIFF@WCSO.K12.OR.US
		MATT SHARP	FM	
31.04	64	H. John Asher	Wheeler Co.	
21.83	45	DeWayne Simmons	W.C.R.D.	
31.04	64	SCOTT FIELD	CITY OF SPRAY	
		JOAN FIELD	CITY OF SPRAY	
31.04	64 Miles	BILL WYATT	Wheeler RTVFA	
24.25	50 miles	Mal Hawley	Twickenham	Hawley@directwsy.com
		Jeanne Burch	Wheeler County	
		Susan Brewer	VISION	
97	200 mi.	Jerry Brewer	ODF retired.	Volunteer Consultant
		MILEAGE @ 0.485		

HAZARD MITIGATION

PRE-DISASTER HAZARD MITIGATION PLAN
STEERING COMMITTEE
FIRST MEETING AGENDA

Gilliam Mtg. – November 14, 2005 -2:00-4:00 pm @ the Gilliam Co. Courthouse
Sherman Mtg. – November 3, 2005 – 7:00 -9:00 pm @ the Sherman Co. Courthouse
Wheeler Mtg. – November 10, 2005 – 7:00 -9:00 pm @ the Family Res. Building

What Is Natural Hazard Mitigation?

Natural hazard mitigation is defined as permanently reducing or alleviating the losses of life, property, and injuries resulting from natural hazards through long and short-term strategies.

Examples strategies include planning, policy changes, programs projects, and other activities. Mitigation is the responsibility of individuals, private businesses and industries, state and local governments, and the federal government.

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.

The plan we have asked you to be a part of developing, is not a **mandated** plan, but rather a strategic plan for your county in the event a natural hazard occurs.

It is mandated however, that communities must have FEMA approved mitigation plans in place in order to qualify to receive post-disaster Hazard Mitigation Grant Program (HMGP) funds.

1) Introductions and sign-up sheet.
2) Overview of county plan process. (Chart)
3) Look at State Resources for Region.. Identify any missing items.
4) Look at County Hazards. Is the state and federal assessments accurate for each hazards 'risk potential?
   How would you rate each hazards' risk potential?
5) Map of County. Mark past events which you would rate having a medium or high risk factor.
6) Identify Stakeholders.
7) Identify other County Plans/Programs this Strategic Plan can/will be linked to.

How to contact me:
Susan C. Brewer, Owner
VISION Consulting & Grant Writing

ATTENDANCE

Name	Representing	Optional Address mailing or email
Rick Shaffer	Fossil Fine	
Bill Wyatt	SBBAY	64 miles
R Wayne Simmons	VCRD.	Spray

28.48
~~31.04~~

~~83 miles~~
~~30.56~~

28.04
~~.445~~
~~@ 0.485~~
~~$56.52~~

STEERING COMMITTEE MEETING #2

WHEELER COUNTY 3-16-06

1. Sign In / Mileage if any
2. Review Sections #1, #2 and first part of #3
3. Do Work Sheet
4. Plot Work Sheet on Map
5. Assess vulnerability of communities and regions to natural hazards
6. Assess community sensitivity and resilience to natural hazards
7. Identify potential mitigation, preparedness, response and recovery strategies.

ATTENDANCE

Name	Representing	Optional Address mailing or email
MARY SHARP	WC EMERGENCY MANAGEMENT	
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VOLUNTEERS + OFFICIALS 158.50

MILEAGE 753 @ .445 $335.09

Hazard Mitigation-CWPP April 20, 2006 Family Services, Fossil, OR

ATTENDANCE

Name	Representing	Optional Address mailing or email
JWard	911-Coord	
18 Bill Wyatt		SPRAY
18 Marcia Epley		~~Spray~~ Spray
18 Joan Field	Wheeler SWCD	Joan.Field@oacd.org
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5 Dustin Gustovson	ODF	
140 Sarah Poet	ODFM	Sarah.Poet@state.or.u
Rick Shaffer	Wheeler Co. Defense	
Jeanne Burch	Wheeler County	
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~~10~~ Bill Burns	Dogami	Portland

VOLUNTEERS + OFFICIALS 394 $396.00

MILEAGE 974 @ .445 175.33 $433.43

5/23/06 CWPP/Hazard Mitigation Family Services 1:30/3:30

ATTENDANCE

Name	Representing	Optional Address mailing or email
Susan C. Brewer	VISION Consulting	
Bill Wyss	SPRAY	
Jeanne Burch	Wheeler County.	
DeWayne Simmons	Wheeler County	
MARY SHARP		

VOLUNTEERS – $132.00

MILEAGE 64 @ .445 – 28.48

Hazard Mitigation June 26, 2006 Family Services, Fossil, OR

Appendix C:
Regional Household Preparedness Survey

The purpose of this section is to document the findings from the regional household preparedness survey.

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

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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

Project Manager:

Kamala Englin, Oregon Natural Hazards Workgroup

Project Advisors:

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 2000[1]

[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 Bierle[2], 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%

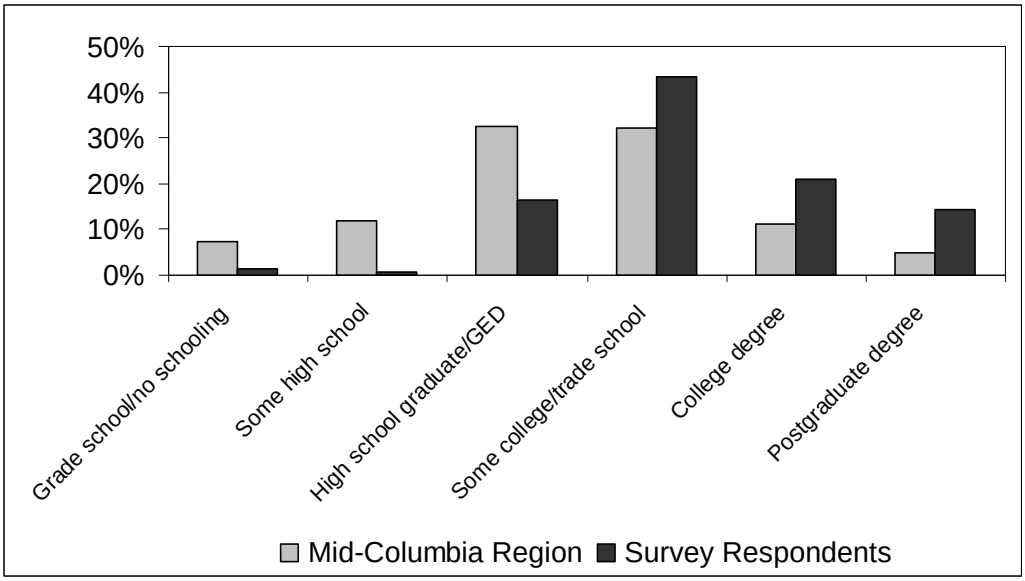
Source: U.S. Census Bureau: www.census.gov (2000) and Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006).

[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

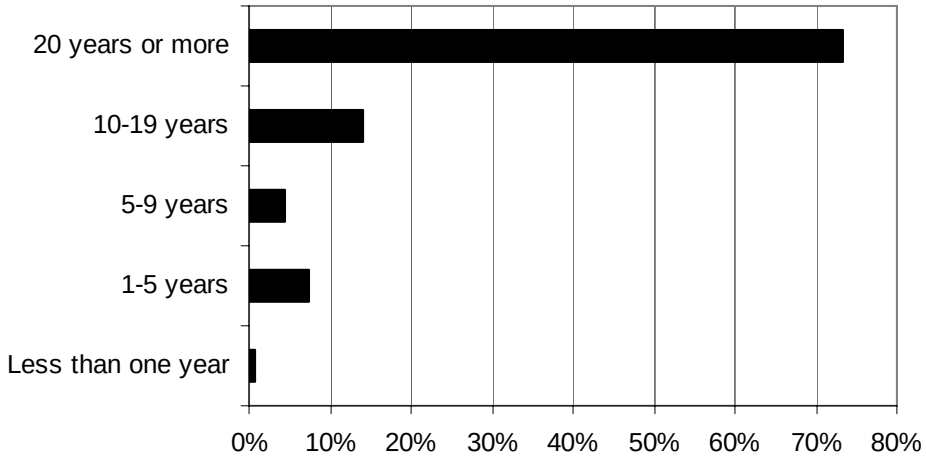


Source: U.S. Census Bureau: www.census.gov (2000) and Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

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.

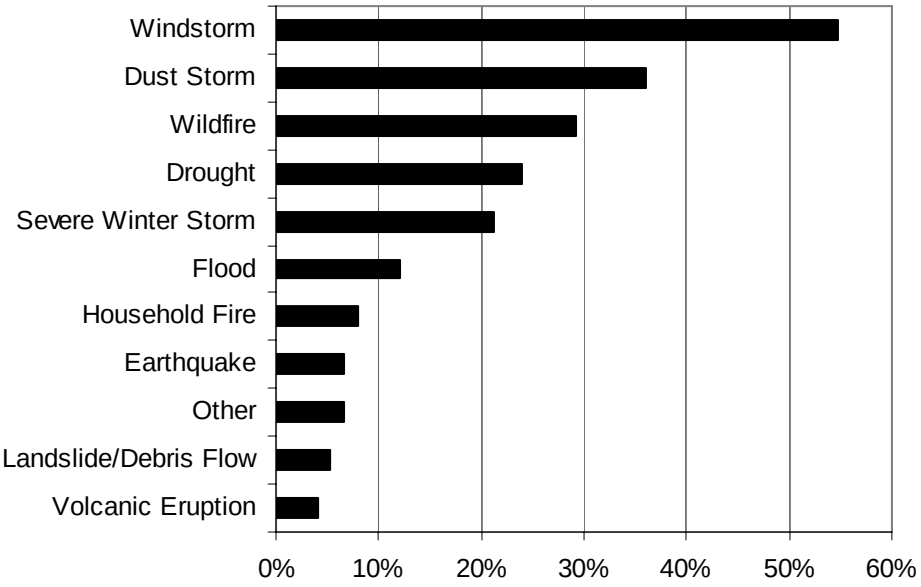
To understand the effectiveness of current outreach activities regarding home and family safety, the survey asked respondents about the types of information they receive on how to make their home and family safer. By identifying communication tools that have been effectively used in the past, local government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

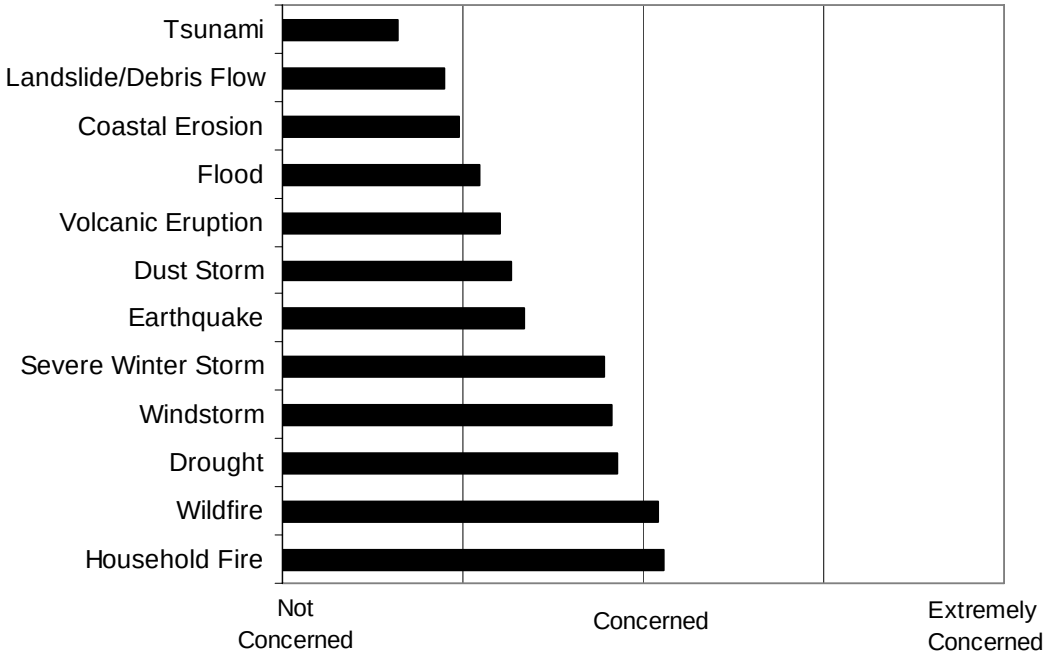
Figure 3.1. Percent of Disasters Experienced by Survey Respondents Within the Past Five Years



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)

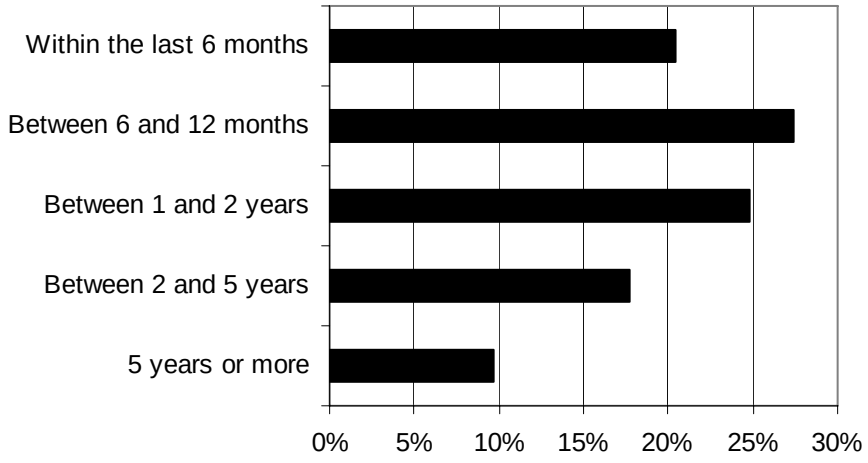
Information Distribution

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.

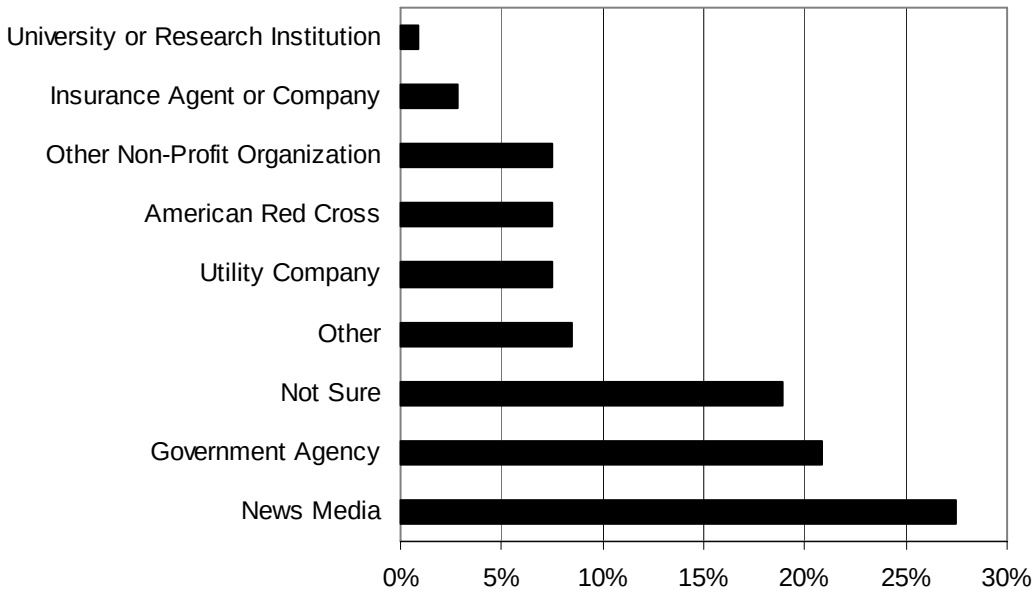
Figure 3.3. Survey Respondents' History of Receiving Information on Family and Home Safety



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%

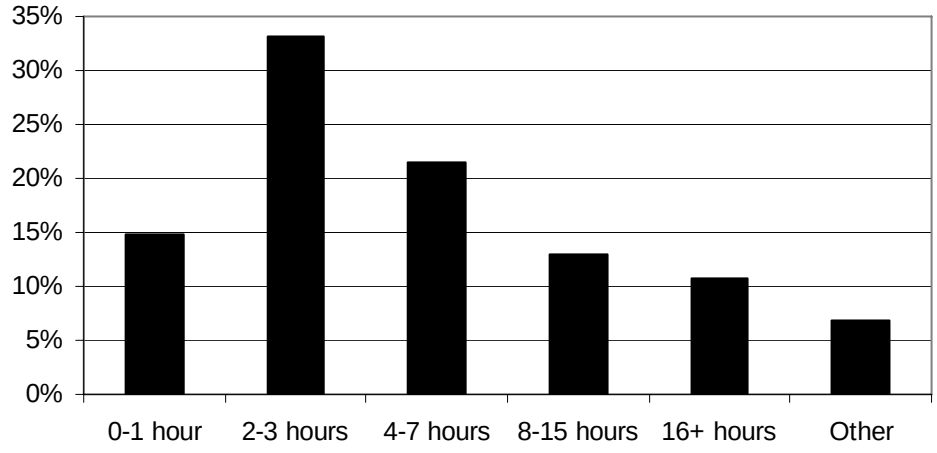
Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

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.

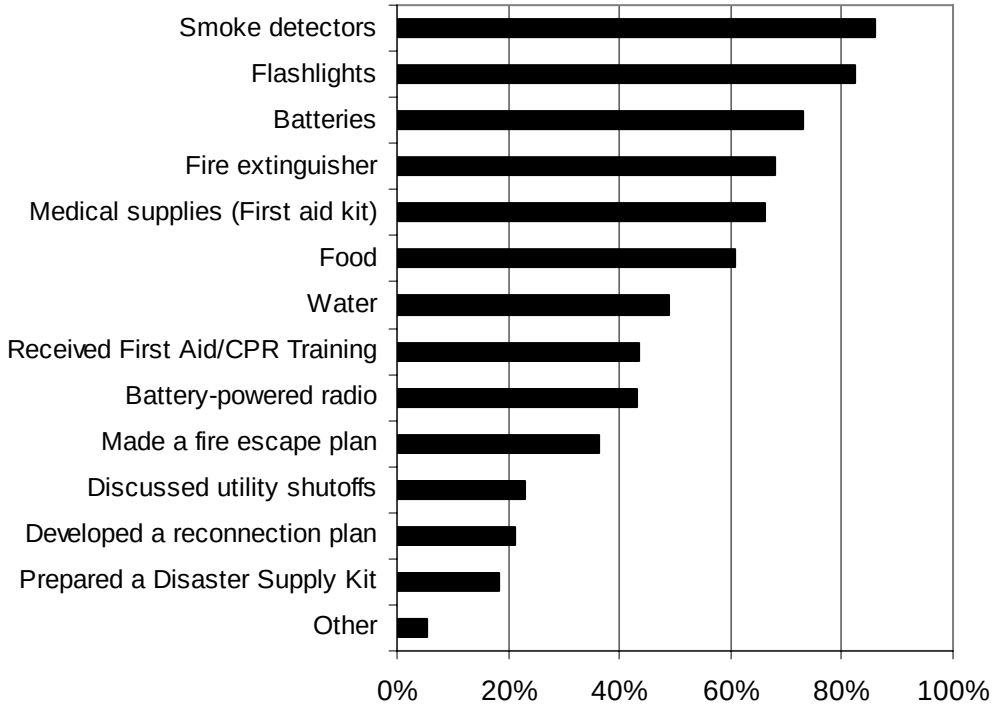
Figure 4.1. Hours Per Year Survey Respondents Were Willing to Spend on Preparedness Activities



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

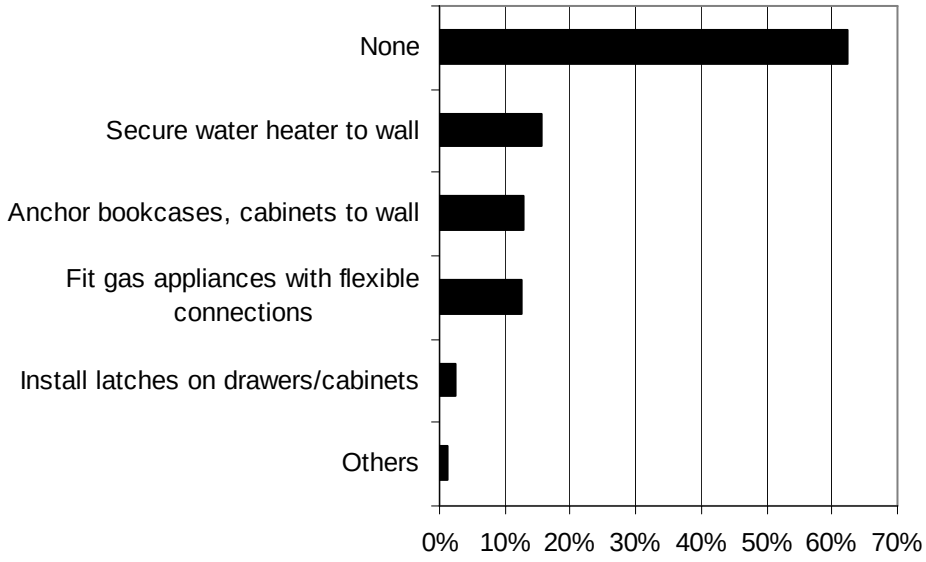
Amount	Percent of Respondents
Less than $100	4%
$100-$499	8%
$500-$999	6%
$1000-$2499	15%
$2500-$4999	6%
$5000 and above	4%
Nothing	3%
Don't Know	39%
What ever it takes	6%
Other	8%

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.

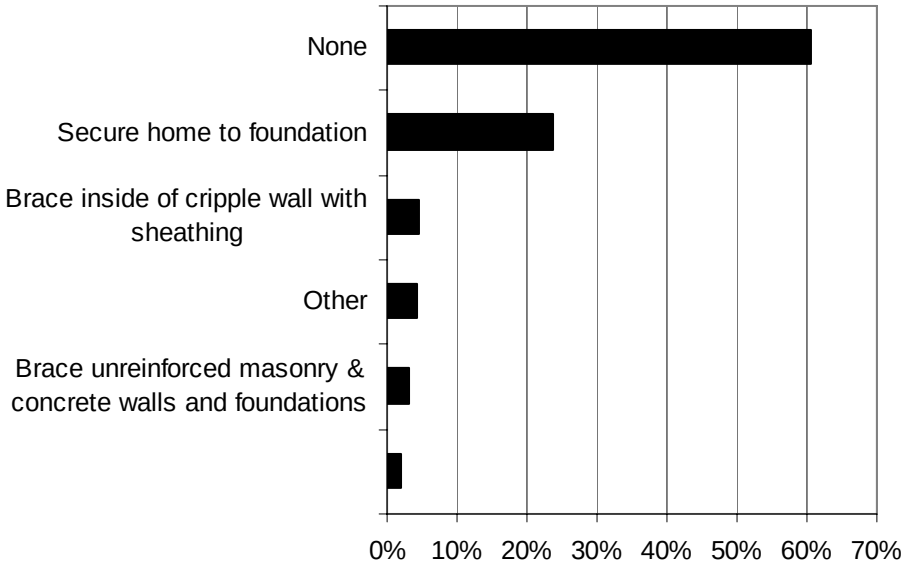
Figure 5.1. Nonstructural Modifications Survey Respondents Have Made to Their Homes



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

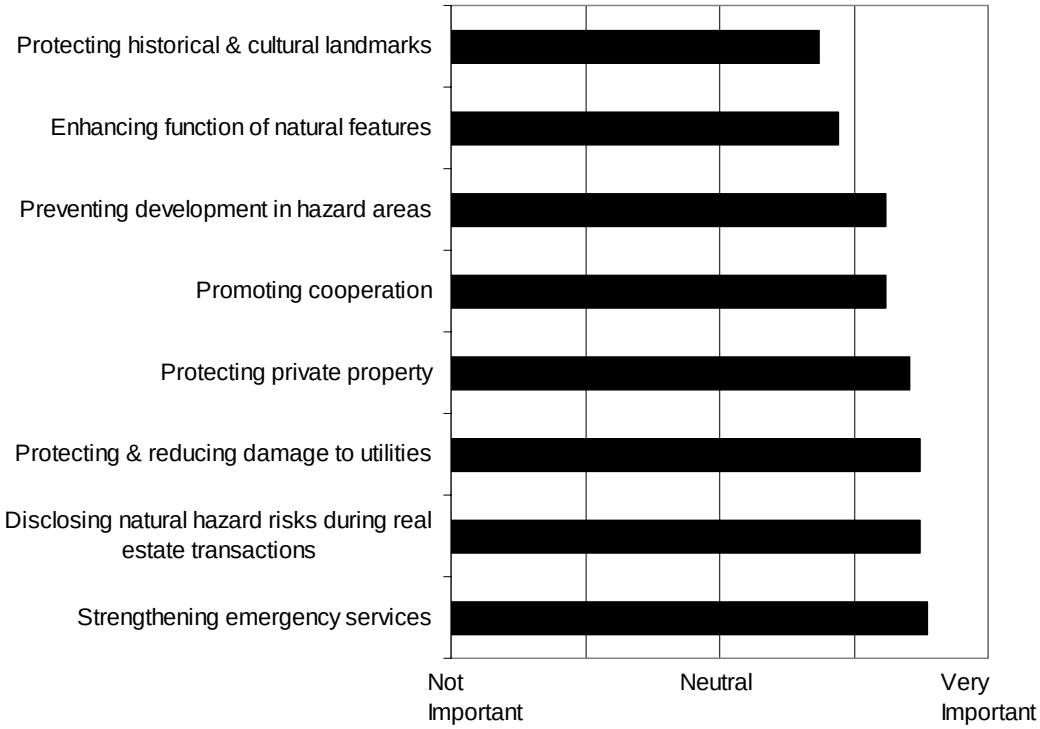
Incentive	Percent of Respondents
Tax break or incentive	67%
Insurance discount	59%
Low interest rate loan	25%
Mortgage discount	23%
None	17%
Lower new home construction costs	17%
Other	6%

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.

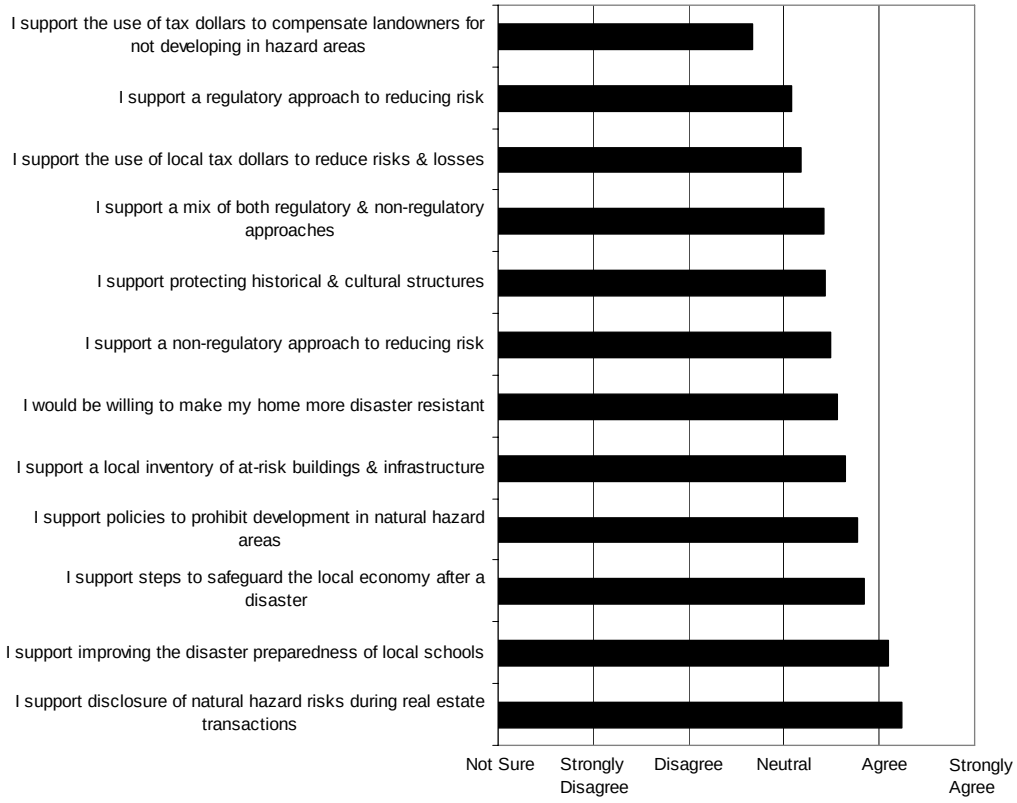
Table 6.1. Survey Respondents' Goal Prioritization

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 ot 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 <u>are you willing to spend</u> 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 H_2O 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 <u>never</u> 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 <u>not</u> 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 <u>nothing</u> 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 <u>forced</u> 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-hacked 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 <u>public money</u> 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 <u>forced</u> 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 are 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 H_20. 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:
Regional Profile and Hazard Assessment

The purpose of this appendix is to: 1) document regional characteristics related to population and demographics, critical facilities and infrastructure, the economy and 2) document regional hazard information including hazard characteristics, histories, probability and vulnerability.

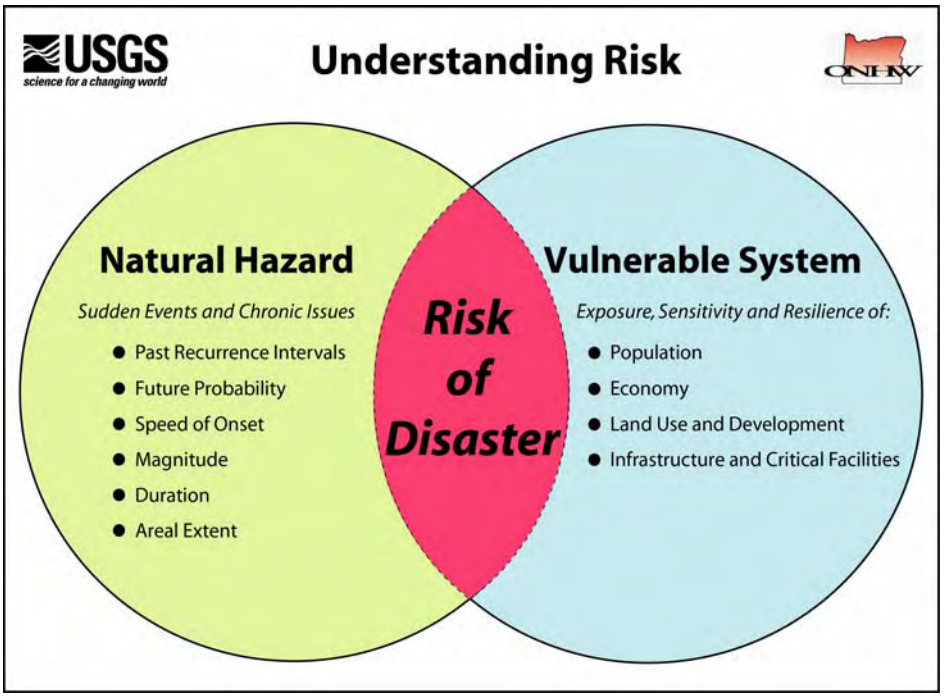
Region 6: Central Natural Hazard Risk Profile

Crook, Deschutes, Jefferson, Klamath, Lake, & Wheeler Counties

Introduction and Purpose

Oregon faces a number of natural hazards with the potential to cause loss of life, injuries and substantial property damage. A natural disaster occurs when a natural hazard event interacts with a vulnerable human system. The following quote and graphic summaries the difference between natural hazards and natural disasters:

> *Natural disasters occur as a predictable interaction among three broad systems: natural environment (e.g., climate, rivers systems, geology, forest ecosystems, etc.), the built environment (e.g., cities, buildings, roads, utilities, etc.), and societal systems (cultural institutions, community organization, business climate, service provision, etc.). A natural disaster occurs when a hazard impacts the built environment or societal systems and creates adverse conditions within a community.* [1]



It is not always possible to predict exactly when a natural disaster will occur or the extent to which they may impact the community. However, communities can minimize losses from disaster events through deliberate planning and mitigation. A report submitted to Congress by the National Institute of Building Science's Multi-hazard Mitigation

Council (MMC) highlights that for every dollar spent on mitigation society can expect an average savings of $4.00[2]

How to use this Report

The Oregon Natural Hazards Workgroup (ONHW) at the University of Oregon's Community Service Center developed this report as part of the regional planning initiative funded by the Pre-Disaster Mitigation Grant.[*] In addition to serving as a regional resource for local planning initiatives, this also serves as the regional profile for the State's enhanced natural hazard mitigation plan. This report is intended to be used as a planning process document by communities developing local natural hazard mitigation plans. This regional report should be reviewed and updated by locals using the best available local data as the local plans serve as the foundation for the State Plan.

The information in this report should be paired with local data to identify issues for which mitigation action items can be developed. The report can be used in conjunction with the ONHW Sample Action Item Report to develop and document the community's action items. The Sample Action Item Report lists potential mitigation activities by category, such as population, economy, understanding of risk, and implementation. The report also provides state and national level rationale on why the sample action may be appropriate.

Regional Overview

The Central region (Region 5 as identified in the state's natural hazard mitigation plan) includes Crook, Deschutes, Jefferson, Klamath, Lake, and Wheeler Counties. This region is at relatively high risk from drought, wildfires, and winter storms. It also faces moderate to high risk from earthquakes, flood, and windstorms. The Central region is also at risk from landslides in steep sloped areas and volcanic eruptions.

Organization of Report

This report includes three main sections that work together to develop a comprehensive picture of the region and its sensitivity to natural hazards.

Regional Maps

Critical Infrastructure Map- Updated maps coming soon

Using 2003 data from Oregon Department Of Transportation, this map shows the approximant location of critical infrastructure, including schools, hospitals, bridges, dams, and power stations. Knowing the location of critical infrastructure is important when determining the sensitivities of the region.

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[*] FEMA Pre-Disaster Mitigation Grant PDM-C-PL-10-OR2005-003

County Hazard Risk Analysis Maps- Updated maps coming soon

These maps depict the county's perceived risk for each natural hazard. Data for these maps comes from the County Hazard Risk Analysis in which each county develops risk scores for Oregon's major natural hazards. Scores are current as of March 2006.

Regional Profile and Sensitivity

Using the best readily available data, the regional profile includes a *Geographic Profile*, which provides a physical description of the region, a *Demographic Profile* that discusses the population in the Central region, an *Infrastructure Profile* that addresses the region's critical facilities and systems of transportation and power transmission, and an *Economic Profile* that discusses the scale and scope of the regional economy with a focus on key industries. In addition to describing characteristics and trends, each profile section identifies the traits that indicate sensitivity to natural hazards.

The data sources used in this section are all publicly available. This report examines the Central region as a whole and by individual counties when possible. Much of the demographic data was sourced from the 2000 U.S. Census; the economic data came from the 2002 Economic Census, the Bureau of Economic Analysis and the Oregon Department of Agriculture. State agency reports and plans and websites for private companies were also important sources of information.

Regional Natural Hazard Risk Assessment

The regional natural hazard risk assessment section describes historical impacts, general location, extent, and severity of past natural hazard events as well as the probability for future events. This information is aggregated at the regional level and provides counties with a baseline understanding of past and potential natural hazards.

These assessments were based on best available data from various state agencies related to historical events, repetitive losses, county hazard analysis rankings, and general development trends. The risk assessment was written in 2003 as part of the State Natural Hazard Mitigation Plan.

ONHW Potential Action Item Report

This is a separate report produce by the Oregon Natural hazards Workgroup at the University of Oregon. This report contains two main sections: the first is a series of explanations about what action items are, what purposes they serve, and how to create them; the second is a series of potential actions addressing all the natural hazards Oregon communities face. The actions include a statewide rationale for the action and ideas for implementation and are designed to serve as a starting point for local communities as they discuss, develop and prioritize local risk reduction strategies. Communities will ultimately want to develop more detailed action items based on regional or locally specific data.

Central Region

The Central Oregon region has experienced a 34% percent increase in population since 1990. Deschutes County has become the fastest growing county in the state – increasing by more than two and a half times the state growth for the same period. The region's population is almost equally divided between incorporated and unincorporated areas. Thirty-one percent of the region's houses were built before 1960, 34% between 1960 and 1980, and 36% were built after 1980. The impact of a disaster can disrupt automobile traffic and shut down local transit systems across the region, making evacuation difficult. The average commute for workers in this region is 20 minutes each way. Seventy-five percent of the region's workers drive alone to work. Thirteen percent carpool, six percent walk or use other means, and six percent work at home. Most bridges in the area have not been seismically retrofitted, creating significant risk to the commuting population in areas at risk from earthquakes.

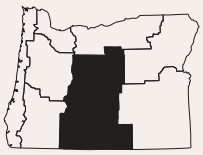
REGION FACTS

Population:

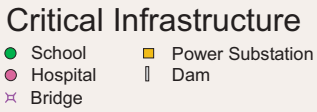
Total	226,302
Rural	120,344
Urban	105,968

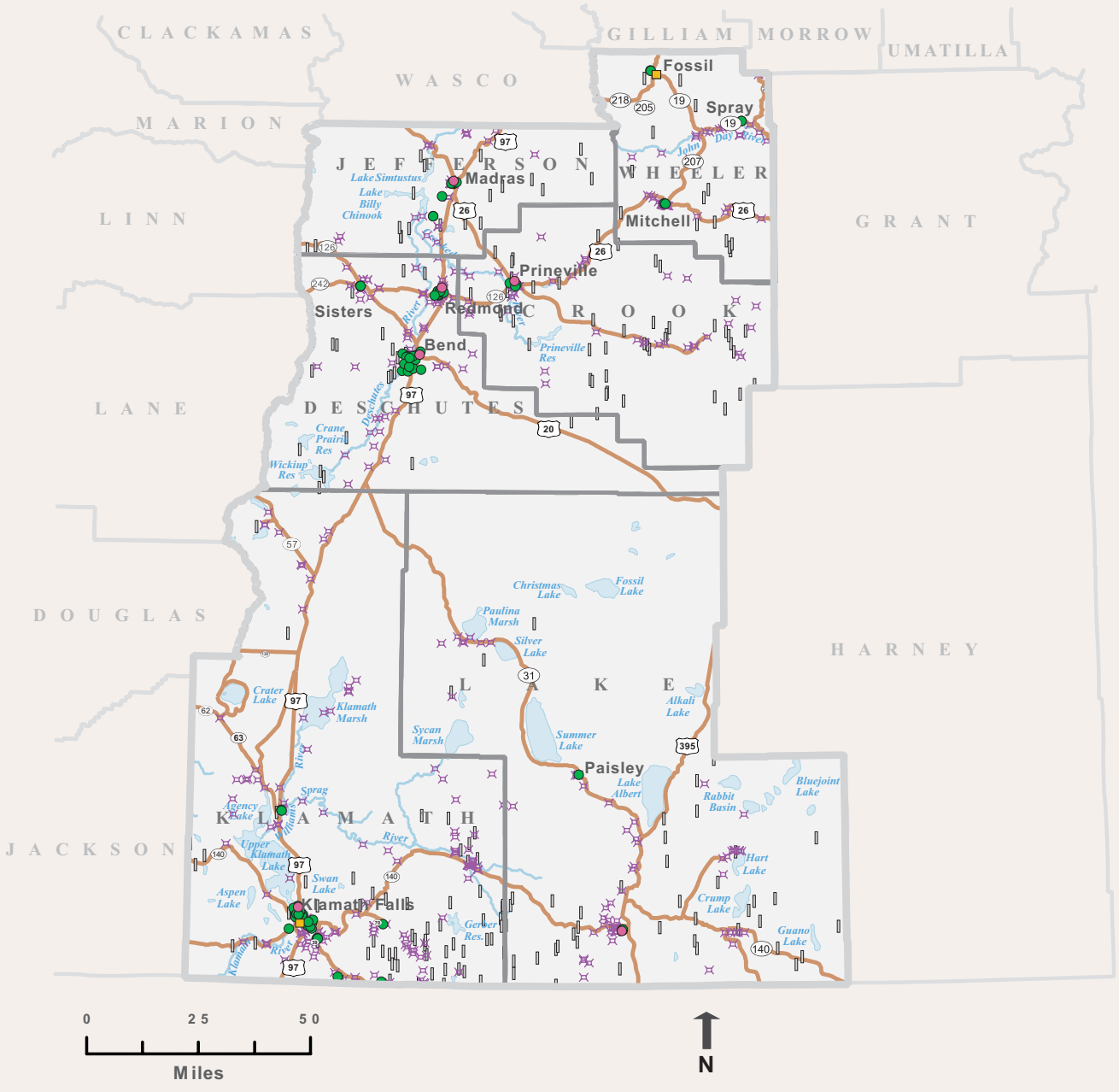
Housing:

Single-Family	66%
Multi-Family	10%
Mobile Homes	23%
Boat, RV, Van, etc	3%



County	# of Hospitals	# of Hospital Beds	Police Stations	Fire & Rescue Stations	Power Plants	Dams	Bridges
Crook	1	35	2	1	0	36	87
Deschutes	2	220	4	10	0	14	143
Jefferson	1	100	3	3	0	12	62
Klamath	1	131	3	32	2	45	307
Lake	1	21	2	14	0	30	96
Wheeler	0	0	1	4	0	13	60

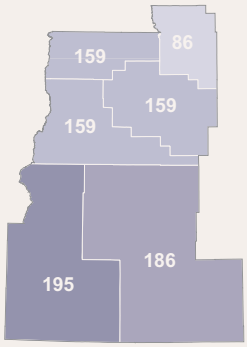




As part of the County Hazard Risk Analysis, each county develops risk scores for Oregon's major natural hazards. This score, ranging from 24 (low) to 240 (high), reflects the County's perceived risk for the particular hazard. Scores are current as of July 2003.

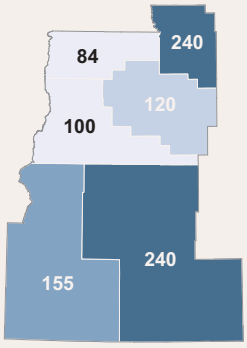
To obtain the most current scores, see http://www.oregonshowcase.org or contact Oregon State Police – Office of Emergency Management http://www.osp.state.or.us/oem/.

Seismic



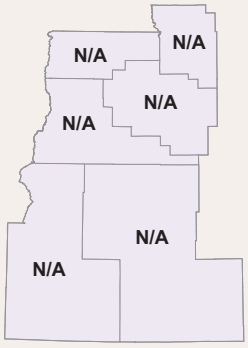
Seismic
- Not Available
- 0 - 120
- 121 - 165
- 166 - 190
- 191 - 205
- 206 - 220
- 221 - 240

Floods



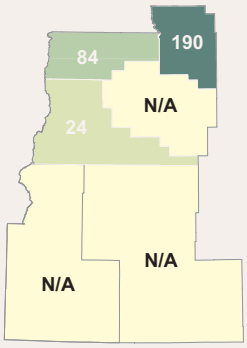
Floods
- 84 - 100
- 101 - 129
- 130 - 155
- 156 - 180
- 181 - 220
- 221 - 240

Windstorms



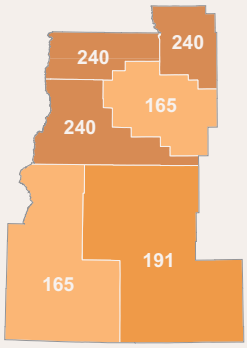
Windstorms
- Not Available
- 0 - 50
- 51 - 100
- 101 - 150
- 151 - 200
- 201 - 240

Landslides



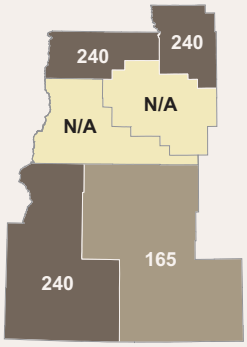
Landslides
- Not Available
- 0 - 24
- 25 - 84
- 85 - 115
- 116 - 140
- 141 - 190
- 191 - 240

Wildfires



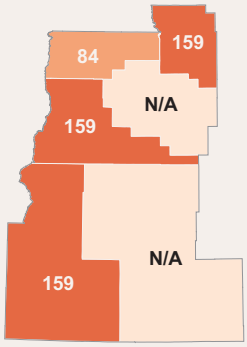
Wildfires
- Not Available
- 0 - 60
- 61 - 130
- 131 - 170
- 171 - 190
- 191 - 215
- 216 - 240

Drought



Drought
- Not Available
- 0 - 100
- 101 - 135
- 136 - 175
- 176 - 215
- 216 - 240

Volcanic



Volcanic
- Not Available
- 0 - 45
- 46 - 92
- 93 - 134
- 135 - 170
- 171 - 200
- 201 - 240

Regional Profile and Sensitivity

Section 1: Geography and Climate

The six-county area of the Central region is approximately 23,960 square miles. The Cascade Mountain range runs through the western part of the region and high desert comprises the eastern part of the region. The Ochoco Mountains also extends into the northeastern section of the region. The Cascades are volcanic in origin and are drained by hundreds of creeks, streams, rivers and lakes. Major rivers in the region include the Deschutes, John Day, Crooked, and Klamath. Average annual precipitation in the region ranges from up to 100 inches at the peak of the Cascades to 7 inches in the high desert. The Cascade Range forms a barrier to migrating air masses, keeping cold continental air masses in the region. [3]

Section 2: Demographic profile

This section describes the Central region in terms of its population, demographics and development trends. Data is followed by a discussion of characteristics that indicate community vulnerability to natural hazards. Identifying populations that are particularly vulnerable enables communities to design targeted strategies to reduce their risk. Reviewing development trends provides further guidance on how communities can accommodate growth in a manner that increases resilience to natural hazards.

Population and Demographics

In 2005, the estimated population of the Central region was 260,975, representing an increase of 9% since 2000. This growth pattern in the Central region is projected to continue at a moderate rate over the next 20 years, according to the Oregon Office of Economic Analysis. Table 1 displays the population change in each Central region county, along with their respective average annual growth rates.

Table 1. Population Growth, Central Region, 2000-2005

County	2000 Population	2005 Population	2000-2005 Population Change	% Change 2000-2005	AAGR, 2000-2005
Crook	19,182	22,775	3,593	18.7%	3.7%
Deschutes	115,367	143,490	28,123	24.4%	4.9%
Jefferson	19,009	20,600	1,591	8.4%	1.7%
Klamath	63,775	65,055	1,280	2.0%	0.4%
Lake	7,422	7,505	83	1.1%	0.2%
Wheeler	1,547	1,550	3	0.2%	0.0%
Regional Total	**226,302**	**260,975**	**34,673**	**9.0%**	**1.8%**

Source: Portland State University, Population Estimates, 2005.

The impact in terms of loss and the ability to recover varies among population groups following a disaster. Historically, 80% of the disaster burden falls on the public.[4] Of this number, a disproportionate burden is placed upon special needs groups, particularly minorities, and the poor. Minorities and the poor are more likely to be isolated in communities, are less likely to have the savings to rebuild after a disaster, and less likely to have access to transportation and medical care. Additionally, minorities and the poor are more likely to rent than own homes, and in the event of a natural disaster, where homeowners would gain homeowner insurance, renters often do not have rental insurance. As of 2003, 13% of the region's population was living in poverty. (A large percentage of these people presumably fall into both categories.)

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. Table 2 displays the median household income for the Central region, which was $34,640 in 2003. This is below the national average of $43,318 and the state's average of $42,593. The less than one percent median household income growth between 2000 and 2003 in the region is smaller than the two percent State and three percent National growth over the same time period.

Table 2. Median Household Income, Central Region, 2000 and 2003

County	2000	2003	% Change 2000-2003
Crook	$35,896	$35,903	0.0%
Deschutes	$42,712	$44,111	3.3%
Jefferson	$36,028	$35,682	-1.0%
Klamath	$33,044	$32,357	-2.1%
Lake	$30,496	$30,499	0.0%
Wheeler	$28,781	$29,288	1.8%
Regional Average:	**$34,493**	**$34,640**	**0.4%**

Source: U.S. Census Bureau Small Area Income Poverty Estimates, 2000 and 2003

In 2003, 13% of the nation's population was living in poverty, the same as the Central regional poverty level of 13%. Oregon's state poverty average was 12%, slightly less than the Central regional average. While the median household incomes are lower in the region than the state as a whole, the similar poverty rate may be due to a lower cost of living in the Central region. Table 3 details the county and regional poverty rates in 2003.

Table 3. Poverty Rates, Central Region, 2003

	Total Population in Poverty		Children Under 18 in Poverty	
County	Number	%	Number	%
Crook	2,496	12%	919	18%
Deschutes	13,761	10%	4,673	15%
Jefferson	2,845	14%	1,278	23%
Klamath	9,749	15%	3,525	23%
Lake	1,100	15%	374	23%
Wheeler	195	13%	59	23%
Regional Average		**13%**		**21%**

Source: U.S. Census Bureau Small Area Income Poverty Estimates, 2003

For hazard mitigation, low-income populations need special considerations, because they may not have the savings to withstand economic setbacks, and if work is interrupted, housing, food, and necessities become a greater burden. Additionally, low-income households are more reliant upon public transportation, public food assistance, public housing, and other public programs, all which can be impacted in the event of a natural disaster.

The age of the population is also an important consideration in hazard mitigation planning. In 2004, 36% of the regional population was under

14 or over 65 years of age.[5] Table 4 provides a breakdown of the percentages of youth and elderly in the Central region counties.

Table 4. Central Region Youth and Senior Populations, 2004

	0-14		65-74		75+	
County	**Number**	**%**	**Number**	**%**	**Number**	**%**
Crook	4,589	20%	1,865	8%	1,510	7%
Deschutes	26,999	19%	10,288	7%	8,499	6%
Jefferson	4,815	23%	1,676	8%	1,093	5%
Klamath	13,164	20%	5,176	8%	4,510	7%
Lake	1,295	17%	739	10%	646	12%
Wheeler	214	14%	217	14%	190	9%
Regional Total and Average %:	**51,076**	**19%**	**19,961**	**9%**	**16,448**	**8%**

Source: Portland State University Population Estimates, 2005

The high percentage of elderly individuals, particularly in Lake and Wheeler Counties, require special consideration due to their sensitivities to heat and cold, their reliance upon transportation for medications, and their comparative difficulty in making home modifications that reduce risk to hazards.

Young people also represent a vulnerable segment of the population. In Crook, Jefferson and Klamath counties, at least 20% of the population is within the 0-14 year age range. Special considerations should be given to young populations and schools, where children spend much of their time, during the natural hazard mitigation process. Children are more vulnerable to heat and cold, have fewer transportation options, and require assistance to access medical facilities.

Special consideration should also be given to populations who do not speak English as their primary language. These populations can be harder to reach with preparedness and mitigation information materials. They are less likely to be prepared if special attention is not given to language and culturally appropriate outreach techniques. In the Central region, most citizens speak English as their primary language. However, in every county in Oregon, Spanish is the second most prominent language. Table 5 shows the percentage of the individuals in the Central region who do not speak English as their primary language. On average, 4% of the total population in the Central region speaks a language other than English as a primary language.

Table 5. Central Region Population over age 5 that Speaks English less than "Very Well", 2000

County	%Population
Crook	3%
Deschutes	2%
Jefferson	9%
Klamath	3%
Lake	3%
Wheeler	2%
Regional Average:	**4%**

Source: US Census Bureau, 2000 Census Summary File 4

Housing and Development

To accommodate rapid growth, communities engaged in mitigation planning should address infrastructure and service needs, specific engineering standards and building codes. Eliminating or limiting development in hazard prone areas, such as floodplains, can reduce vulnerability to hazards, and the potential loss of life and injury and property damage. Oregon has been successful in developing land use goals that incorporate mitigation while preserving rural and protected lands within urban growth areas. If Measure 37 is upheld, it may impact the ability of communities to regulate land-use protection measures in communities. Communities in the process of developing land for housing and industry need to ensure that land-use and protection goals are being met to prevent future risks.

The urban and rural growth pattern impacts how agencies prepare for emergencies as changes in development can increase risks associated with hazards. The Central region is growing more urban, with two percent population growth in incorporated areas between 2000 and 2005, versus a two percent population loss in unincorporated areas during the same time period. Table 6 illustrates the trend in urban area population growth in the Central counties between 2000 and 2005.

Table 6. Urban/Rural Populations, Central Region, 2000-2005

	% Incorporated Population		% Change
County	**2000**	**2005**	**2000-2005**
Crook	38%	40%	1%
Deschutes	58%	64%	6%
Jefferson	34%	36%	2%
Klamath	35%	36%	1%
Lake	37%	38%	2%
Wheeler	50%	50%	-1%
Regional Average:	**42%**	**44%**	**2%**

Source: Portland State University Population Estimates, 2005

In addition to location, the character of the housing stock also affects the level of risk that communities face from natural hazards. Table 7 provides a breakdown by county of the various housing types available in 2000. Mobile homes and other non-permanent housing structures, which account for 30% of the housing in some Central counties, are particularly vulnerable to certain natural hazards, such as windstorms, and special attention should be given to securing these types of structures.

Table 7. County Housing Profile, Central Region, 2000

County	Single-Family	Multi-Family	Mobile Homes	Boat, RV, Van, etc.
Crook	64%	9%	24%	3%
Deschutes	70%	15%	14%	1%
Jefferson	56%	11%	29%	4%
Klamath	65%	15%	19%	1%
Lake	61%	5%	30%	4%
Wheeler	77%	2%	19%	2%

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

Table 7 shows that the majority of the housing stock is in single-family homes and this trend is continuing with new construction. In 2002, an estimated 97% of new housing was single-family units[6]. This trend suggests that hazard mitigation efforts should provide outreach and information that specifically addresses preparedness in detached housing units.

Aside from location and type of housing, the year housing structures were built has implications for community vulnerability. The older a home is, the greater the risk of damage from natural disaster. This is because structures built after the late 1960s in the Northwest and

California used earthquake resistant designs and construction techniques. In addition, FEMA began assisting communities with floodplain mapping during the 1970s, and communities developed ordinances that required homes in the floodplain to be elevated to one foot over Base Flood Elevation. Knowing the age of a structure is helpful in targeting outreach regarding retrofitting and insurance for owners of older structures. Table 8 illustrates the percentage of homes built per county during certain periods of time.

Table 8. Housing, Year Built, Central Region

County	1939 or earlier - 1959	1960-1979	1980-2000
Crook	23%	35%	42%
Deschutes	11%	33%	56%
Jefferson	13%	35%	52%
Klamath	38%	38%	24%
Lake	41%	36%	23%
Wheeler	57%	24%	19%

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

Section 3: Infrastructure Profile

This section of the report describes the infrastructure that supports Central region communities and economies. Transportation networks, systems for power transmission, and critical facilities such as hospitals and police stations are all vital to the functioning of the region. Due to the fundamental role that infrastructure plays both pre- and post-disaster it deserves special attention in the context of creating more resilient communities. The information that is provided in this section of the profile can provide the basis for informed decisions about how to reduce the vulnerability of Central region infrastructure to natural hazards.

Transportation

There are two primary modes of transportation in the region: highways and railroad. There are also many small airports scattered throughout the region that are used for passenger and freight service. The Central region combines two important freight corridors for the Pacific Northwest, State Highway 26 and U.S. 97. U.S. 97 connects to barge freight transportation along the Columbia River.

Roads and Bridges

There are two major highways that run through the Central region. I-84 is a major transportation corridor that connects Portland with eastern Oregon and beyond. State Highway 26 runs east-west through the Central region. U.S. 97 runs north-south through Klamath, Deschutes and Jefferson Counties. U.S. 97 is the most important north-south transportation corridor east of the Cascades.[7]

Many commercial entities make use of the highways in the Central region. Trucks on the section of U.S. 97 between Klamath Falls and Madras transported approximately 10 million tons of freight in 2002. Truck volume averaged between 500 and 1,499 trucks per day for most sections of U.S. 97, while averaging over 3,000 trucks per day outside the larger cities of Klamath Falls, Bend, and Madras.[8] U.S. 97 also serves as an important alternative route to I-5.

Highways are also heavily utilized by local traffic. According to the 2000 Census, 75% of workers in the Central region commute by driving alone. The average commute for workers in the Central region is just over twenty minutes each way.[9] Additionally, in 2003, 38% of employees living in counties in the Central region worked outside of their home county.[10] A severe winter storm has the potential to disrupt the daily driving routine of thousands of people.

The recent population growth in the region has contributed to an increase of automobiles on the roads:

- Average daily traffic volume on U.S. 97 recorded 1.7 miles south of Redmond increased by 47% between 1996 and 2005. Farther north at the Highway 360 Madras-Prineville junction, the average daily traffic for the same time period increased by 15%. Judging from these trends, traffic levels will continue to increase.[11]
- Average daily traffic counts also increased by 9% between 1996 and 2005 on U.S. 26, 10 miles southeast of Warm Springs in Jefferson County.[12]

A 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. Natural hazards can disrupt automobile traffic and shut down local transit systems across the area or region and make evacuations difficult.

The condition of bridges in the region is also a factor that affects risk from natural hazards. Most bridges are not seismically retrofitted, which is a particularly important issue for the Central region because of its risk from earthquakes. Incapacitated bridges can disrupt traffic and exacerbate economic losses because of the inability of industries to transport services and products to clients. Table 9 shows the number of state, county, and city maintained bridges and culverts, and the number of historic covered bridges in the region. The bridges in the region are part of the state and interstate highway and maintained by the Oregon Department of Transportation.

Table 9. Bridges and Culverts

County	State Highway Bridges	State Highway Culverts	County Highway Bridges	County Highway Culverts	City/ Municipal Highway Bridges	City/ Municipal Highway Culverts	Historic Covered Bridges	2006 Total
Crook	27	26	26	3	6	0	0	88
Deschutes	41	17	46	3	31	2	1	141
Jefferson	14	12	34	0	3	0	0	63
Klamath	58	42	180	18	10	0	0	308
Lake	26	29	38	0	1	0	0	94
Wheeler	23	34	6	0	0	0	0	63

Source: Oregon Department of Transportation, 2006

Railroads

Railroads are major providers of regional and national cargo and trade flows. Railroads that run through the Central region provide vital transportation links from the Pacific to the rest of the country. The Burlington Northern Santa Fe Railroad (BNSF) and the Union Pacific Railroad (UP) are the two major railroads in the region. The City of Prineville (COP) runs a line that connects with the BNSF between Bend and Madras, to provide service to Prineville.

BNSF owns the tracks that run north-south along the Deschutes River, running through Deschutes and Jefferson Counties. The tracks run through Oregon to Southern California where the tracks turn east and continue to Texas.[13] COP connects to the BNSF line to run the railroad into Prineville.

UP's tracks in the region run further west of the BNSF tracks, connecting with the BNSF tracks going north-south in Klamath County.[14]

Sixteen million tons of goods produced in Oregon are shipped out of state by railroad per year. The goods include lumber and wood products, pulp and paper, and miscellaneous mixed shipments.[15] Over 23 million tons of products originating in other states are annually shipped into Oregon by rail including wood, farm products, coal, and waste materials.[16] More than 22 million tons of products are shipped through Oregon annually by rail. More than 6 million tons of these products include grains and soybeans transported from the Northern Midwest to Washington.[17]

Rails are sensitive to icing from the winter storms that are common in the Central region. For industries in the region that utilize rail transport, these disruptions in service can result in economic losses. As mentioned above, the potential for rail accidents caused by natural hazards can also have serious implications for the local communities if hazardous materials are involved.

Airports

The Central region has 5 small airports. Klamath Falls in Klamath County, which transported 200 tons of freight in 2003 and Redmond Municipal Roberts Field, in Deschutes County, which transported 300 tons of freight in 2000, are the two commercial airports in the region. Bend Municipal and Lake County airports provide general business air transportation.[18]

Flights face the potential for closure from a number of natural hazards that are common in the Central region, including windstorms and winter storms. Airports have strict guidelines regarding when conditions are safe for flight.

Critical Facilities

Critical facilities are those facilities that are essential to government response and recovery activities (e.g., police and fire stations, public hospitals, public schools). Critical facilities in the Central region are displayed in Table 10 by county.

Table 10. Central Region Critical Facilities by county

County	Hospitals		Police Station	Fire & Rescue Station	School Districts & Colleges
	# of Hospitals	# of Beds			
Crook	1	35	1	1	1 District
Deschutes	2	264	7	7	4 Districts, 1 Community College
Jefferson	1	36	4	3	4 Districts, 1 Community College
Klamath	1	176	5	17	2 Districts, 1 Community College, 1 State University
Lake	1	21	2	6	5 Districts
Wheeler	0	0	1	4	3 Districts

Sources: State Hospital Licensing Department, Local Sheriff Offices, Oregon State Fire Marshall, Oregon Department of Education. Table updated July 2006.

In addition to those listed in Table 10, there are other critical and essential facilities that are vital to the continued delivery of key governmental services or that may significantly impact the public's ability to recover from emergencies. Some of these facilities, such as correctional institutions, public services buildings, law enforcement centers, courthouses, juvenile services buildings, public works facilities, and other public facilities should be detailed in local and regional mitigation plans.

Power Generation and Transmission

The Central region is an important throughway for oil and gas pipelines and electricity transmission lines, connecting Oregon to California and Washington. The infrastructure associated with power generation and transmission plays a critical role in supporting the regional economy.

The John C. Boyle dam is the largest dam in the Central region. Positioned along the Klamath River, the John C. Boyle has a maximum generating capacity of 80 megawatts (mw.)[19]

Dam failures can occur at any time and are quite common. Fortunately, most failures result in minor damage and pose little or no risk to life safety. However, the potential for severe damage and fatalities does exist, and the National Inventory of Dams (NID) has developed a listing of High Threat Potential Hazard dams for the nation. The state has developed a complementary inventory of dams in Oregon. Table 11 lists the dams included in these inventories.

Table 11. Central Region Power Plants and Dams by County

County	Power Plants	Dams		
		Dams† (State)	Dams‡ (National)	Threat Potential
Crook	0	57	40	3 High Threat
Deschutes	0	18	18	4 High Threat
Jefferson	0	17	15	5 High Threat
Klamath	2 plants, 570 MWs	66	54	4 High Threat
Lake	0	82	53	2 High Threat
Wheeler	0	18	13	0 High Threat

Sources: Oregon Department of Energy, National Inventory of Dams. Table updated July 2006.

The electric, oil, and gas lines that run through the Central region are privately owned. A network of electricity transmission lines running through the Central region allows Oregon utility companies to exchange electricity with other states and Canada.[20] Most of the natural gas Oregon uses originates in Alberta, Canada. One main natural gas transmission pipeline, owned by PG&E, runs through the

† Note: The National Inventory of Dams includes all dams with either:
a) a high or significant hazard rating
b) a low hazard dam that exceeds 25 feet in height AND 15 acre-feet storage
c) a low hazard dam that exceeds 6 feet in height AND 50 acre-feet storage

‡ Note: The State Inventory of Dams includes all dams over 10 feet in height AND 9.2 acre-feet storage

Central region, with lines connecting to Madras, Prineville, Bend, and Klamath Falls.[21] These lines may be vulnerable to severe, but infrequent natural hazards, such as earthquakes.

Section 4: Economic Profile

The following economic profile addresses the regional economy and its sensitivities to natural hazards. The sensitivities that are relevant to the Central region are a function of the types and diversity of industries and the composition of businesses that are present. To highlight key industries, this report will look at:

The largest revenue sectors, since interruptions to these industry sectors would result in significant revenue loss for the region.

The largest employment industries, since interruptions to these industry sectors would result in high unemployment in the region.

The industry sectors with the most businesses, since interruptions to these industry sectors would result in damage to the most businesses regionally.

By examining these key industry sensitivities and other economic sensitivities, such as industry diversity and the number of small businesses that exist in the Central region, informed decisions can be made about how to mitigate risk.

Economic Overview

The Central region enjoys some economic advantages due to its location. In addition, the region's close proximity to the Cascade Mountains and the high desert terrain provide year-round sporting and tourism activities.

According to the Oregon Employment Department, the Central region economy is experiencing an economic upturn. The rapid growth in Deschutes County has been accompanied by strong growth in the manufacturing and construction sectors. Unemployment has also gone down in Klamath and Lake Counties during the first five months of 2006. Government and recreation industries remain strong in the entire Central region.[22] As of 2004, the region employed 142,828 people with a combined payroll of over three billion dollars. Table 12 displays the payroll and employee figures per county.

Table 12. Central Employment and Payroll by County, 2004

County	# of Employees	Annual Payroll
Crook	9,821	$208,218,000
Deschutes	86,677	$1,865,202
Jefferson	8,640	$189,608
Klamath	32,626	$714,851,000
Lake	4,272	$69,897,000
Wheeler	792	$7,049,000
Total	**142,828**	**$3,054,825,000**

Source: Bureau of Economic Analysis

In 2004, there were 8,267 businesses in the Central region. Of these, 91%, or 7,489, were small businesses with less than 20 employees.[23] The prevalence of small businesses in the Central region is an indication of sensitivity to natural hazards because small businesses are more susceptible to financial uncertainty.[24] When a business is financially unstable before a natural disaster occurs, financial losses (resulting from both damage caused and the recovery process) may have a bigger impact than they would for larger and more financially stable businesses.[25]

The economic diversity of the businesses in the Central region varies markedly between counties. Deschutes and Klamath Counties have relatively high economic diversity, while the other counties have fairly homogenous economies. Low economic diversity means that certain industries are dominating the economic structure of the community, and are therefore extremely important to the Central region. Table 13 displays the diversity ranking for each county with 1 being the most diverse economic county in Oregon, 36 being the least diverse economic county in Oregon.

Table 13. County Economic Diversity Ranking, 1999

County	Economic Diversity Index Ranking
Crook	27
Deschutes	5
Jefferson	29
Klamath	8
Lake	34
Wheeler	31

Source: Oregon Employment Department[26]

An economy that is heavily dependent upon a few key industries may have a more difficult time recovering after a natural disaster than one

with a more diverse economic base. While a community with a diverse economic base may suffer from an industry sector being damaged during a natural disaster, they have a broader base of operating industry sectors to continue to rely upon. However, a community that relies upon specific key industry sectors may have a harder time recovering their economic base if one of those key industry sectors is damaged. Recognizing that economic diversification is a long-term issue, more immediate strategies to reduce vulnerability should focus on risk management for the dominant industries.

Key Industries

Key industries are those that represent major employers, major revenue generators, and for the purposes of hazard mitigation planning, industries that are represented by a high number of businesses. Different industries face distinct vulnerabilities to natural hazards, as illustrated by the industry specific discussions below. Identifying key industries in the region enables communities to target mitigation activities towards those industries specific sensitivities.

It is important to recognize that the impact that a natural hazard event has on one industry can reverberate throughout the regional economy. The effect is especially great when the businesses concerned belong to a basic sector industry. Basic sector industries are those that are dependent on sales outside of the local community; they bring money into a local community via employment. The farm and ranch, information, and wholesale trade industries are all examples of basic industries. Non-basic sector industries are those that are dependent on local sales for their business, such as retail trade, construction, and health and social assistance.

Basic sector businesses have a multiplier effect on a local economy, whereby the jobs and income they bring to a community allow for the creation of new non-basic sector jobs. Their presence can therefore help speed the recovery process following a natural disaster. If, on the other hand, basic sector industry production is hampered by a natural hazard event, the multiplier effect could be experienced in reverse. In this case, a decrease in basic sector purchasing power results in lower profits (and potentially job losses) for the local non-basic businesses that are dependent on them.

High Revenue Sectors

The Central region's top revenue generating industries are a mix of basic and non-basic sectors. In 2002, the three sectors in the Central region with the highest revenue were Retail Trade (36%), Manufacturing (24%), and Wholesale Trade (14%).[27] §

§ Note: US Census Total Sales figures were not available for all sectors and counties in Region 5. These figures represent the closest estimate.

Within individual counties in the Central region, however, the industries' relative contribution to revenue differs. For instance, in Lake and Wheeler counties, the Farm and Ranch sector garners either the highest, or second highest amount of revenue. Table 14 shows the percent of total county revenue that is contributed by various sectors.

Table 14. Percent of Revenue in Central Counties by Industry, 2002

	Industry										
County	Retail Trade	Wholesale Trade	Accommodation and Food Services	Health Care/ Social Assistance	Professional, Scientific and Technology	Other (except Public Admin)	Real Estate and Rental and Leasing	Arts/ Entertainment	Administrative/ Waste Services	Manufacturing	Farm and Ranch
Crook	19%	14%	4%	7%	n/a	2%	2%	n/a	1%	45%	7%
Deschutes	42%	16%	6%	12%	n/a	2%	3%	n/a	3%	16%	0%
Jefferson	24%	11%	6%	n/a	n/a	1%	1%	n/a	1%	49%	7%
Klamath	31%	11%	4%	10%	n/a	2%	2%	1%	1%	32%	7%
Lake	25%	15%	6%	12%	4%	1%	n/a	n/a	1%	n/a	36%
Wheeler	54%	n/a	3%	n/a	n/a	n/a	n/a	n/a	n/a	n.a	43%

Source: U.S. Census 2002, Oregon Department of Agriculture 2002

The *retail trade sector* in the Central region is primarily composed of small businesses (87%) that tend to be more sensitive to hazard induced costs due to prior financial instability. Retail trade is also largely dependent on wholesale trade and the transportation network for the delivery of goods for sale. Disruption of the transportation system could have severe consequences for retail businesses. Retail trade typically relies on local residents and tourists and their discretionary spending ability. Residents' discretionary spending diminishes after a natural disaster when they must pay to repair their homes and properties. In this situation, residents will likely concentrate their spending on essential items that would benefit some types of retail (e.g. grocery) but hurt others (e.g. gift shops). The potential income from tourists also diminishes after a natural disaster as people are deterred from visiting the impacted area. In summary, depending on the type and scale a disaster could affect specific segments of retail trade, or all segments.

In 2002, the *Manufacturing sector* generated 24% of all revenue in the Central region, making it the second-largest earning sector.[28] Manufacturers are highly dependent upon the transportation network in order to access supplies and send finished products to outside markets. As base industries they are not, however, dependent on local

markets for sales, which contributes to the economic resilience of this sector.

Wholesale trade is closely linked with retail trade but it has a broader client base than retail trade, with local and non-local businesses as the typical clientele. Local business spending will be likely to diminish after a natural disaster, as businesses repair their properties and wait for their own retail trades to increase. Distanced clients may have difficulty reaching local wholesalers due to transportation disruptions from a natural disaster. Both would adversely impact the profitability of this sector.

The *farm and ranch sector* is a top revenue generator for Lake and Wheeler Counties. Agriculture is inherently dependent on the weather and is susceptible to a variety of natural hazards that afflict the Central region, including flood, drought, and summer and winter storms. These natural hazards have the capacity to devastate seasonal crops, representing a significant financial loss for the year. The southern portion of the region is a major producer of cattle and hay. The northern part of the region is a significant producer of mint.[29]

In the Central region, a substantial ripple effect through the economy can be anticipated following agricultural loss. This is due both to the number of people who could lose employment in the wake of crop failure and the number of supporting industries (e.g. food processing manufacturers, wholesale trade, retail trade) that could be affected. Even if not directly impacted by a disaster, agricultural producers are also sensitive to the disruption of regional transportation networks from natural disasters; they need seasonal laborers to access the area and it is imperative that perishable products are moved to market in a timely manner.

Major employment sectors

Economic resilience to natural disasters is particularly important for the major employment sectors in the region. If these sectors are negatively impacted by a natural hazard, such that employment is affected, the impact will be felt throughout the regional economy. Thus, understanding and addressing the sensitivities of these sectors is a strategic way to increase the resiliency of the entire regional economy.

The five sectors in the Central region with the most employees in 2004 were Government (13%), Retail Trade (12%), Health Care and Social Assistance (9%), Construction (9%), and Manufacturing (9%).[30]**

Within the six Central counties, the percent of county employment by various sectors differs. For example, in Wheeler and Lake Counties, Farm is a large employer, though across the region, Farm accounts for a

** Note: The Bureau of Economic Analysis did not disclose employment figures in some counties where an industry was represented by only a few businesses. These figures represent the closest estimate.

smaller percentage of total employment. Table 15 shows the distribution of each county's employees across the five largest regional employment sectors.

Table 15. Percent of County Employment by the Five Largest Regional Employment Sectors, Central Region, 2004

	Industry					
County	Government	Health Care and Social Services	Retail Trade	Farm	Manufacturing	Accommodation and Food Services
Crook	13%	7%	9%	8%	14%	3%
Deschutes	9%	9%	14%	2%	8%	9%
Jefferson	29%	n/a	8%	8%	20%	6%
Klamath	17%	10%	12%	6%	6%	8%
Lake	21%	n/a	9%	16%	8%	6%
Wheeler	18%	n/a	8%	32%	1%	n/a

Source: Bureau of Economic Analysis 2004

Sectors that are anticipated to be major employers in the future also warrant special attention in the hazard mitigation planning process. Between 2005 and 2014, the largest job growth in the Central region is expected to occur in State government, Accommodation and food services, and Professional and business services sectors.[31]

Government is the highest employment sector in the Central region, and is projected to grow more than any other economic sector by 2014. In the event of a natural disaster, the Government sector may not be as vulnerable as other sectors, since employees will be called upon to provide support and structure for their communities and will have outside funding sources.

The *accommodations* sector includes hotels, motels, recreational accommodation, and boarding houses. The *food services* sector includes places that prepare food and/or drink for immediate consumption. Accommodation businesses are predominantly dependant on people who come to the area as tourists, on business, or simply passing through, and many food service businesses also serve this clientele. The industry relies on an open transportation network both for customers and for supplies and is particularly sensitive to road closures (e.g. from wildfires) during the summer tourism season. The businesses that primarily cater to tourists and recreationalists are also dependant on an unimpaired physical environment. Restaurants and other food providers that rely on local customers may also suffer the same fate as other non-essential retail services; after a disaster, the local population

may lack the funds to spend it on "luxury" services such as eating at restaurants.

The *professional and business services* sector is sensitive to a loss of power from a disaster and to disruptions of physical transmission cables (phone lines, etc.). There may also be a disruption of employees' ability to work as a result of damages/problems at home. If prepared and organized, however, this sector has the potential to have moderate resilience to many disasters. Some of the targeted consumers of this sector's services are located outside the region and their purchasing power would not be impacted by a localized natural disaster. The sector may also be more insulated from disruptions to the transportation network than others because there is a potential for many of the employees to work from home and because some services are offered via internet and phone.

Common Business Types

Identifying sectors that are represented by a large number of businesses can guide the development of targeted mitigation strategies for those sectors. Approximately 30% of all businesses in the Central region fall into two industry sectors. In the Central region, 17% (1,418) of all businesses are engaged in Construction and 15% (1,210) of all businesses are engaged in Retail Trade.[32]

The retail trade and health care and social assistance sectors' sensitivities to natural hazards are addressed above. The large number of businesses engaged in the *construction* industry warrants attention to its specific vulnerabilities. First, it should be noted that 96% of construction businesses in the region have fewer than 20 employees; small businesses tend face more financial uncertainty than larger ones. These businesses may therefore be particularly sensitive to any temporary decreases in demand following a moderate natural hazard event.

However, in the event of wildfires, floods, earthquakes, or other types of destructive natural disasters, the demand for reconstruction services may be expected to increase. Business from local residents looking to re-build their homes and businesses may boost construction revenue. If transportation routes have been affected, construction businesses may have difficulty accessing necessary supplies from outside the impacted area. Protecting infrastructure and transportation will help to enable the construction sector to continue operating and re-building communities after a natural disaster.

Regional Profile and Sensitivity Conclusion

Information presented in the Community, Infrastructure, and Economic Profiles can be used to help communities identify areas of sensitivity and vulnerability to natural hazards. Once the areas of sensitivity are identified, communities should identify appropriate, corresponding action items from the ONHW Potential Action Item Report.

1 LeDuc, A. "Establishing Mitigation as the Cornerstone for Community Resilience", 2006 Risk Management Yearbook, Public Entity Risk Institute. Fairfax, VA. 2006

2 National Institute of Building Science's Multi-hazard Mitigation Council. "Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities" 2005

3 Loy, William G., ed. Atlas of Oregon. 2001. University of Oregon Press.

4 Hazards Workshop. Session Summary #16. Disasters, Diversity, and Equity.
Annual Hazards Workshop, (July 12, 2000). University of Colorado, Boulder.
Peggy Stahl, FEMA Preparedness, Training and Exercise Directorate.

5 Portland State University, Population Estimates, 2005

6 US Census Bureau, County Building Permits, 2002

7 Oregon Transportation Plan Update, Freight Issues:

http://www.oregon.gov/ODOT/TD/TP/docs/otpMobility/FreightIssues.pdf

8 Ibid.

9 City-Data. www.city-data.com/counties.

10 US Census Bureau LEDmap, 2003

11 Oregon Department of Transportation website. "Permanent Automatic Traffic Recorder Stations." http://www.oregon.gov/ODOT/TD/TDATA/tsm/atrtremds.shtml#2005.

12 Ibid.

13 BNSF Railway website. http://www.bnsf.com/.

14 Union Pacific Railroad website. http://www.uprr.com.

15 Oregon Rail Plan: An Element of the Oregon Transportation Plan, 2001.
http://www.oregon.gov/ODOT/RAIL/docs/railplan01.pdf.

16 Ibid.

17 Ibid.

18 Oregon Department of Transportation, Department of Aviation, 2003

http://www.oregon.gov/Aviation/docs/AirportsbyCategory.pdf

[19] Loy, W.G., ed. 2001. *Atlas of Oregon*, 2nd Edition. Eugene: University of Oregon Press.

[20] Ibid.

[21] Ibid.

[22] OLMIS, Region 10 and 11 trends, 2006

[23] US Census Bureau, Economic Census, 2002

[24] Alesch, Dan, et al. 2001. Organizations at Risk: What Happens When Small Businesses and Non-for-Profits Encounter Natural Disasters. http://www.riskinstitute.org/uploads/ptrdocs/Organizations_at_Risk.pdf.

[25] Ibid.

[26] Oregon Employment Department, "Measuring Economic Development", 2001 http://www.qualityinfo.org/olmisj/ArticleReader?itemid=00002037&print=1

[27] US Census Bureau Economic Census 2002, Oregon Agriculture Information Network, 2002.

[28] US Census Bureau, Economic Census 2002

[29] Loy, W.G., ed. 2001. *Atlas of Oregon*, 2nd Edition. Eugene: University of Oregon Press.

[30] Bureau of Economic Analysis, 2004

[31] Oregon Employment Department, Workforce Analysis, 2005

[32] U.S. Census Bureau. 2002 Economic Census. 2002. http://factfinder.census.gov/servlet/IBQGeoSearchByListServlet?_lang=en&_ts=162143188835.

REGION 6
Central Oregon[1]
Hazards Assessment

[1] Crook, Deschutes, Jefferson, Klamath, Lake, and Wheeler counties

DROUGHT

Characteristics and Brief History

Droughts are not uncommon in the State of Oregon, nor are they just an "east of the mountains" phenomenon. They occur in all parts of the state, and in both summer and winter. They appear to be cyclic and they can have a profound effect on the state's economy, particularly the hydro-power and agricultural sectors. The environmental consequences also are far-reaching, including insect infestations in Oregon forests and the insufficient stream flows to support endangered fish species. Severe drought conditions preceded the four disastrous Tillamook fires (1933, 1939, 1945, 1951) and pitted farmers against fish propagation groups during the Klamath Basin drought of 2001. The minimum drought loss included about 1200 jobs and $150 million dollars in goods and services. Local farmers maintain that the cost was considerably more. Water allocation continues to be controversial. In recent years, the State has addressed drought emergencies through the Oregon Drought Council. This interagency (state / federal) council meets to discuss forecasts and advise the Governor as the need arises. Significant Oregon droughts are listed in Table 1.

Recurrence

Oregon's drought history reveals many short-term and a few long-term events. The average recurrence interval for severe droughts in Oregon is somewhere between 8 and 12 years. Table 1 provides an overview of some severe droughts in Oregon.

TABLE 1. SIGNIFICANT DROUGHTS

DATE	DESCRIPTION
1904-1905	A statewide drought period of about 18 months
1917-1931	A very dry period throughout Oregon, punctuated by brief wet spells in 1920-21 and 1927
1939-1941	A three-year intense drought in Oregon
1959-1964	Primarily affected eastern Oregon
1985-1997	Generally a dry period, capped by statewide droughts in 1992 and 1994
2000-2001	Klamath drought intensifies; Low snow pack in mountains worsens conditions Draw down at Detroit Lake, Oregon, all but curtails lake recreation

Source: Taylor, George H., and Ray Hatton, 1999, *The Oregon Weather Book*.

Vulnerability

The probability that Region 6 will experience drought and the region's vulnerability to their effects are depicted in Table 2 below. These 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

TABLE 2. Vulnerability and Probability Assessment of Drought

	Crook	Deschutes	Jefferson	Klamath	Lake	Wheeler
Vulnerability	H	H	H	H	M	H
Probability	H	H	H	H	H	H

Source: Oregon Emergency Management, July 2003, County Hazard Analysis Scores.

EARTHQUAKES

Characteristics and Brief History

The geographical position of this region makes it susceptible to earthquakes from four sources, though expert opinions vary regarding the degree of susceptibility from each. These four sources are: (1) the off-shore Cascadia Fault Zone, (2) deep intra-plate events within the subducting Juan de Fuca plate, (3) shallow crustal events within the North America Plate, and (4) earthquakes associated with renewed volcanic activity. All have some tie to the subducting or diving of the dense, oceanic Juan de Fuca Plate under the lighter, continental North America Plate. In the "Basin and Range" area in the southern part of the region (Klamath and Lake counties) earthquakes are also associated with extension (pulling apart of the crust). Stresses occur because of these movements. There also appears to be a link between the subducting plate and the formation of volcanoes some distance inland from the off-shore fault zone

When crustal faults slip, they can produce earthquakes with magnitudes (M) up to 7.0 and can cause extensive damage, which tends to be localized in the vicinity of the area of slippage. Deep intraplate earthquakes occur at depths between 30 and 100 kilometers below the earth's surface. They occur in the subducting oceanic plate and can approach M7.5. Subduction zone earthquakes pose the greatest hazard. They occur at the boundary between the descending oceanic Juan de Fuca Plate and the overriding North American Plate. This area of contact, which starts off the Oregon coast, is known as the Cascadia Subduction Zone (CSZ). The CSZ could produce a local earthquake up to 9.0 or greater.

Central Oregon includes portions of five physiographic provinces (High Cascades, Blue Mountains, Basin and Range, High Lava Plains, and Deschutes-Columbia Plateau). Consequently, its geology and earthquake susceptibility varies considerably. There have been several significant earthquakes that have been centered in the region, all in Klamath and Lake counties: 1906 north of Lakeview, 1920 Crater Lake, 1923 Lakeview area, 1958 Adel (M4.5), 1968 Adel swarm (4.7-5.1) and the 1993 Klamath County earthquakes (M5.9 and 6). There are also numerous identified faults in the region (mostly Lake and Klamath counties) that have been active in the last 20,000 years. The region has also been shaken historically by crustal and intraplate earthquakes and prehistorically by subduction zone earthquakes centered outside the area (Table 3). All considered, there is good reason to believe that the most devastating future earthquakes would probably originate along shallow crustal faults in the region.

Earthquake associated hazards include severe ground shaking, liquefaction of fine-grained soils, and landslides. The severity of these effects depend on several factors, including the distance from the

earthquake source, the ability of soil and rock to conduct seismic energy and the degree (angle) and composition of slope materials.

Earthquakes produced through volcanic activity could reach magnitudes of M5.2. However the Cascade volcanoes are some distance away from populated centers, which tends to lessen the concern.

Earthquake risk in Region 6 is reflected in the Uniform Building Code's (UBC) earthquake hazard maps (i.e., seismic zones 1-4). The higher the numerical designation, the more stringent the building standards become. Region 6 is within UBC Seismic Zone 2b, except for Klamath County, which is in Zone 3.

TABLE 3. SIGNIFICANT EARTHQUAKES

DATE	LOCATION	MAGNITUDE (M)	REMARKS
Approximate Years 1400 BCE* 1050 BCE 600 BCE 400 CE 750 CE 900 CE	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. * BCE: Before the Common Era
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
April, 1906	N of Lakeview	V	Three felt aftershocks
April, 1920	Crater Lake	V	One of three shocks
January, 1923	Lakeview	VI	
March, 1958	SE of Adel	4.5	
May-June, 1968	Adel	4.7-5.1	Damage to homes. Twenty earthquakes of M4.0 or greater were recorded between 05/28/68 and 06/24/68. Shallow crustal
September, 1993	Klamath Falls	5.9 and 6.0	Series of earthquakes, the largest being M 6.0. Considerable damage in and around Klamath Falls. Two earthquake-related fatalities (rock fall on highway and heart attack).

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

Probability

The Cascadia Subduction Zone generates an earthquake on average every 500-600 years. However, as with any natural process, the average time between events can be misleading. Some of the earthquakes may have been 150 years apart with some closer to 1,000 years apart.[2] Establishing a probability for crustal earthquakes is difficult given the small number of historic events in the region. Earthquakes generated by volcanic activity in Oregon's Cascade Range are possible, but likewise unpredictable.

[2] DOGAMI Special Paper 29: Earthquake Damage in Oregon, p.3.

Vulnerability

Region 5 is vulnerable to earthquake-induced landslides and strong ground shaking, specifically in Lake and Klamath counties.

The Oregon Department of Geology and Mineral Industries (DOGAMI) has developed two earthquake loss models for Oregon based on the two most likely sources of seismic events: (1) the Cascadia Subduction Zone (CSZ), and (2) combined crustal events (500-year model). Both models are based on HAZUS, a computerized program, currently used by the Federal Emergency Management Agency (FEMA) as a means of determining potential losses from earthquakes. The CSZ event is based on a potential 8.5 earthquake generated off the Oregon coast. The model does not take into account a tsunami, which probably would develop from the event. The 500-year crustal model does not look at a single earthquake (as in the CSZ model); it encompasses many faults, each with a 10% chance of producing an earthquake in the next 50 years. The model assumes that each fault will produce a single "average" earthquake during this time. Neither model takes unreinforced masonry buildings into consideration.

DOGAMI investigators caution that the models contain a high degree of uncertainty and should be used only for general planning purposes. Despite their limitations, the models do provide some approximate estimates of damage. Results are found in table 4-6.

TABLE 4. PROJECTED DOLLAR LOSSES BASED ON A M8.5 SUBDUCTION EVENT AND A 500-YEAR MODEL

REGION 6 COUNTIES	ECONOMIC BASE IN THOUSANDS (1999)	GREATEST ABSOLUTE LOSS IN THOUSANDS (1999) FROM A M 8.5 CSZ EVENT	GREATEST ABSOLUTE LOSS IN THOUSANDS (1999) FROM A 500-YEAR EVENT
CROOK	$733,000	Less than $1,000	$6,000
DESCHUTES	$4,673,000	$5,000	$71,000
JEFFERSON	$707,000	Less than $1,000	$14,000
KLAMATH	$3,134,000	$41,000	$939,000
LAKE	$393,000	Less than $1,000	$40,000
WHEELER	$82,000	Less than $1,000	$1,000

Source: DOGAMI, 1999, Special Paper 29: Earthquake Damage in Oregon.

TABLE 5. ESTIMATED LOSSES ASSOCIATED WITH A M 8.5 SUBDUCTION EVENT

REGION 6 COUNTIES	CROOK	DESCHUTES	JEFFERSON	KLAMATH	LAKE	WHEELER
INJURIES	0	1	0	14	0	0
DEATHS	o	0	0	0	0	0
DISPLACED HOUSEHOLDS	0	0	0	37	0	0
ECONOMIC LOSSES FOR BUILDINGD	$156,000	$5 million	$764,000	$41 million	$231,000	$11,000
OPERATIONAL THE DAY AFTER THE EVENT Fire stations Police stations Schools Bridges	 96% 96% 97% 100%	 100% 99% 99% 100%	 100% 100% 99% 100%	 99% 99% 97% 98%	 100% 100% 99% 100%	 No data No data 100% 100%
ECONOMIC LOSSES TO INFRASTRUCTURE Highways Airports Communications	 $6,000 0 $8,000	 $17,000 $40,000 $2,000	 $9,000 0 0	 $339,000 $642,000 $141,000	 $32,000 $96,000 $10,000	 $5 million $8 million $946,000
DEBRIS GENERATED (thousands of tons)	0	3	1	28	0	247

Source: DOGAMI, 1999, Special Paper 29: Earthquake Damage in Oregon.

TABLE 6. ESTIMATED LOSSES ASSOCIATED WITH A 500-YEAR MODEL[1]

REGION 6 COUNTIES	CROOK	DESCHUTES	JEFFERSON	KLAMATH	LAKE	WHEELER
INJURIES	1	17	7	630	19	0
DEATHS	0	0	0	12	0	0
DISPLACED HOUSEHOLDS	0	5	12	1,409	18	0
ECONOMIC LOSSES FOR BUILDINGS[2]	5.5 million	$71 million	$14 million	$939 million	$40 million	$708,000
OPERATIONAL THE DAY AFTER THE EVENT						
Fire stations	N/A[3]	N/A	N/A	N/A	N/A	N/A
Police stations	N/A	N/A	N/A	N/A	N/A	N/A
Schools	N/A	N/A	N/A	N/A	N/A	N/A
Bridges	N/a	N/A	N/A	N/A	N/A	N/A
ECONOMIC LOSSES TO INFRASTRUCTURE						
Highways	$879,000	$572,000	$698,000	$28 million	$20 million	$338,000
Airports	$316,000	$2 million	$395,000	$15 million	$8 million	$688,000
Communications	$18 million	$1 million	$104,000	$14 million	$4 million	$123,000
DEBRIS GENERATED (thousands of tons)	0	47	10	610	30	0

Source: DOGAMI, 1999, Special Paper 29: Earthquake Damage in Oregon.

Table 6 Notes:

[1]Every part of Oregon is subject to earthquakes. The 500-year model is an attempt to quantify the risk across the state. The estimate does not represent a single earthquake. Instead, the 500-year model includes many faults, each with a 10% chance of producing an earthquake in the next 50 years. The model assumes that each fault will produce a single "average" earthquake during this time. More and higher magnitude earthquakes than used in this model may occur (DOGAMI, 1999).

[2] "…there are numerous un-reinforced masonry structures (URMs) in Oregon, the currently available default building data does not include any URMs. Thus, the reported damage and loss estimates may seriously under-represent the actual threat" (page 126 – 1998, DOGAMI)

[3]NA - Because the 500-year model includes several earthquakes, the number of facilities operational the "day after" cannot be calculated

The probability that Region 6 will experience earthquakes and the region's vulnerability to their effects are depicted in Table 7 below. These 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

TABLE 7. Vulnerability and Probability Assessment of Earthquakes

	Crook	Deschutes	Jefferson	Klamath	Lake	Wheeler
Vulnerability	H	H	H	H	H	M
Probability	M	L	L	M	M	L

Source: Oregon Emergency Management, July 2003, County Hazard Analysis Scores.

FIRES IN THE WILDLAND/URBAN INTERFACE

Characteristics and Brief History

Oregon has a very lengthy history of fire in undeveloped wildland and in the developing urban/wildland interface. In recent years, the cost of fire suppression has risen dramatically, a large number of homes have been threatened or burned, more fire fighters have been placed at risk, and fire protection in wildland areas has been reduced. These things prompted the passage of Oregon Senate Bill (SB) 360 (Forestland / Urban Interface Protection Act, 1997). SB 360: (1) establishes legislative policy for fire protection, (2) defines urban/wildland interface areas for regulatory purposes, (3) establishes standards for locating homes in the urban/wildland interface, and (4) provides a means for establishing an integrated fire protection system. Table 8 describes some of the significant wildfires that have occurred in Region 6.

TABLE 8. Significant Wildfires

Year	Name of Fire	Location	Acres Burned	Remarks
1981	Redmond			State Conflagration Act Fire
1984	Crooked River Ranch			State Conflagration Act Fire
1985	Crooked River Ranch			State Conflagration Act Fire
1990	Delicious	Deschutes	1704	
1990	Awbrey Hall	Deschutes	3,400	This fire was an act of arson that affected the western fringe of Bend.
1992	Hanes Butte	Deschutes	348	
1992	Sage Flat	Deschutes	995	
1992	Round Lake	Klamath	490	
1992	Lone Pine	Klamath	30,320	
1994	LaClair	Jefferson		
1995	Day Road	Deschutes		
1996	Little Cabin	Jefferson	2,438	
1996	Smith Rock	Deschutes	500	1 structure was destroyed in this fire.
1996	Simnasho	Jefferson		
1996	Wheeler Point	Wheeler	21,980	
1996	Skeleton	Deschutes	17,700	19 structures were destroyed in this fire impacting the eastern fringe of Bend.
1996	Ashwood/Donnybrook	Central Oregon	118,000	This fire burned in areas of the state not protected from fire.
1999	McCoin Road	Deschutes	99	Prineville
2002	Eyerly	Jefferson	23,573	37 structures destroyed.
2002	Winter	Lake	35,779	
2002	Cache Mountain	Deschutes	4,200	2 structures destroyed.

Source: Oregon Emergency Management, State Natural Hazard Mitigation Plan, 2003, Wildland/Urban Interface chapter.

Note: This list is representative of a lengthy wildfire history. There have been many fires, named and unnamed. Statistics differ, depending on the source.

Probability

The natural ignition of forest fires is largely a function of weather and fuel; human-caused fires add another dimension to probability. Dry and diseased forests can be mapped accurately and some statement can be made about the probability of lightning strikes. Each forest is different and consequently has different probability/recurrence estimates.

This document defines wildfire as an uncontrolled burning of forest, brush, or grassland. Wildfire always has been a part of these ecosystems and sometimes with devastating effects. Wildfires result from natural causes (e.g., lightning strikes), a mechanical failure (Oxbow Fire), or human-caused (unattended campfire, debris burning, or arson). The severe fire season of 1987 resulted in a record setting mobilization of the state. Most wildfires can be linked to human carelessness.

Vulnerability

An understanding of risk begins with the knowledge that wildfire is a natural part of forest and grassland ecosystems. Past forest practices included the suppression of all forest and grassland fires. This practice, coupled with hundreds of acres of dry brush or trees weakened or killed through insect infestation, has fostered a dangerous situation. Present state and national forest practices include the reduction of understory vegetation through thinning and prescribed (controlled) burning.

Each year a significant number of people build homes within or on the edge of the forest (urban/wildland interface), thereby increasing wildfire hazards. In Many Oregon communities (incorporated and unincorporated) are within or abut areas subject to serious wildfire hazards. Oregon, there are about 240,000 homes worth around $6.5 billion within the urban/wildland interface. Such development has greatly complicated firefighting efforts and significantly increased the cost of fire suppression. These communities have been designated “Interface Communities” and include those in Table 9.

A detailed community inventory of factors that affect vulnerability is important in assessing risk and is beyond the scope of the statewide assessment.

When assessing the risks from natural hazards, established mitigation practices already provide benefits in reduced disaster losses. It is important for communities to understand the benefits of past mitigation practices when assessing their risks, being mindful of opportunities to further reduce losses.

Possible mitigation practices include:

- Identify and map current hazardous forest conditions such as fuel, topography, etc.;
- Identify forest / urban interface communities - List of interface communities, Federal Register, 08/17/01. V. 66, N. 160;

- Identify and map Forest Protection Districts;
- Identify and map water sources;
- Implement effective addressing system in rural forested areas;
- Clearly mark evacuation routes;
- Identify and locate seasonal forest users. Initiate information program through schools, summer camps, forest camping grounds, lodges, etc;
- Identify and map bridges that can (and can not) support the weight of emergency vehicles. This is a basic requirement for fire suppression;
- Form committees to implement Oregon Senate Bill 360. This is required in Oregon Senate Bill 360; and
- Create road standards in interface areas to reflect fire suppression needs. Roads must be wide enough for fire suppression vehicles to turn around. Road grades cannot be too steep for large, heavy vehicles.

TABLE 9. WILDLAND/URBAN INTERFACE COMMUNITIES

CROOK	DESCHUTES	JEFFERSON	KLAMATH	LAKE	WHEELER
Jasper Point Resort	Bend	Ashwood	Beaty	Adel	Fossil
Paulina	Black Butte	Camp Sherman	Beaver Marsh	Christmas Valley	Mitchell
Post	Brothers	Crooked River Ranch	Bly	Drew's Gap	Richmond
Prineville	Elk Lake	Culver	Bly Mountain	Lakeview Basin	Spray
	Hampton	Gateway	Bonanza	New Pine Creek	Twickenham
	LaPine	Madras	Chemult	Paisley	Winlock
	Redmond	Metolius	Chiloquin	Plush	
	Sisters-Cloverdale	Warm Springs	Crater Lake	Silver Lake	
	Sunriver		Crescent	South Drews	
	Terrebonne		Crescent Lake	Summer Lake	
	Tumalo		Dairy	Valley Falls / Chandler	
			Diamond Lake Junction		
			Gilchrist		
			Harriman		
			Keno		
			Klamath Falls		
			Little River		
			Malin		
			Merrill		
			Odell Lake		
			Rocky Point		
			Rosedale		
			Running Y		
			Sand Creek		
			Klamath		
			Sprague River Valley		
			Sycan Estates		

Source: Federal Register

The probability that Region 6 will experience interface fires and the region's vulnerability to their effects are depicted in Table 10 below. These 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

TABLE 10. Vulnerability and Probability Assessment of Fires in Interface Areas

	Crook	Deschutes	Jefferson	Klamath	Lake	Wheeler
Vulnerability	M	H	H	M	M	H
Probability	H	H	H	H	H	H

Source: Oregon Emergency Management, July 2003, County Hazard Analysis Scores.

FLOOD

Characteristics and Brief History

Central Oregon is subject to a variety of flood conditions, including (1) spring run-off from melting snow, (2) intense warm rain during the winter months, (3) ice-jam flooding, (4) local flash flooding, (5) lake flooding associated with high winds (e.g., Klamath Lake), (6) closed basin playa flooding (e.g., N. Goose Lake Basin, Lake County) and (6) flooding associated with the breeching of natural debris dams. Although not as notable as flash floods, the most common flood condition in Central Oregon is associated with warm winter rain on snow.

Rain-on-snow floods, so common in western Oregon, also occur east of the Cascades. The weather pattern that produces these floods occurs during the winter months and has come to be associated with La Nina events, a three to seven year cycle of cool, wet weather. In brief, cool, moist weather conditions are followed by a system of warm, moist air from tropical latitudes. The intense warm rain associated with this system quickly melts foothill and mountain snow. Above-freezing temperatures may occur well above pass levels in the Cascade Mountains (4,000-5,000 feet). Some of Oregon's most devastating floods are associated with these events.[3]

Although flooding occurs throughout central Oregon, local geology and the relatively low population of the six-county area lessen its effects. Volcanic rocks, some of which have a large capacity for water storage, underlie much of the region. Consequently, the discharge rates for some streams (e.g., Deschutes River) are very low considering the size of their basins[4]. In addition, there are some large reservoirs in the upper watersheds that can contain considerable quantities of runoff. Potential flood losses also are mitigated through land-use standards; all Region 6 communities participate in the National Flood Insurance Program.

The Flood Insurance Studies (FIS) for each of the Region 6 counties provide some insights associated with ice jam flooding (Deschutes County), basin lakes that receive run-off from all directions (e.g., Goose Lake Basin, Lake County), lake level differentials produced by local wind conditions (Klamath County), and possible flooding caused by the failure of natural debris dams (Deschutes County). Although these phenomena have not and would not produce devastation like historical flash floods in Jefferson and Wheeler counties, they certainly warrant the consideration of local emergency managers.

Table 11 describes significant floods in the region; Table 12 describes principal flood sources.

[3] George Taylor, 1999.

[4] June 8, 1998, Deschutes County Flood Insurance Study.

TABLE 11. SIGNIFICANT FLOODS

DATE	LOCATION	DESCRIPTION	TYPE OF FLOOD
June, 1884	Wheeler County (Painted Hills)	Mother and 3 children perished	Flash flood
June, 1900	Wheeler County (Mitchell)	Large area of county devastated	Flash flood
July, 1956	Wheeler County (Mitchell)	Much of town destroyed (20 buildings)	Flash flood
December, 1964	Entire state	Severe flooding in central Oregon	Rain on snow
August, 1976	Jefferson County (Ashwood)	Severe flooding. Damaged buildings	Flash flood
February, 1986	Entire state	Severe flooding	Rain on snow
August, 1991	Crook County (Aspen Valley)	Severe flooding. 1 fatality	Flash flood
March, 1993	Wheeler County	Severe flooding. Damage	Rain on snow
May, 1998	Crook County (Prineville)	Federal disaster declaration (FEMA-DR-1221-OR); Ochoco Dam threatened	Rain on snow

Source: Taylor, George and Raymond Hatton, 1999, *The Oregon Weather Book.*

TABLE 12. PRINCIPAL RIVERENE FLOOD SOURCES

CROOK COUNTY	DESCHUTES COUNTY	JEFFERSON COUNTY	KLAMATH COUNTY	LAKE COUNTY	WHEELER COUNTY
Crooked River	Deschutes River	Willow Creek	Sprague River	Chewaucan River	Bridge Creek
Ochoco River	Little Deschutes River	Unnamed stream north of Culver	Williamson River	N. Goose Lake Basin	Keyes Creek
	Squaw Creek	Muddy Creek	Klamath River		
	Paulina Creek		Williamson River		
	Spring River		Link River		
			Four Mile Creek		
			Varney Creek		
			Upper Klamath Lake		

Sources: FEMA, Crook County Flood Insurance Study (FIS) 07/17/89; FEMA, Deschutes County FIS, 06/08/98; FEMA, Jefferson County FIS, 07/17/89; FEMA, Klamath County FIS, 06/18/84; FEMA, Lake County FIS, 12/05/89; FEMA, Wheeler County FIS, 07/17/89.

Probability

The Federal Emergency Management Agency (FEMA) has mapped the 10, 50, 100, and 500-year floodplains in the Region 6 counties. This corresponds to a 10%, 2%, 1% and 0.2% chance of a certain magnitude flood in any given year. In addition, FEMA has mapped the 100-year floodplain (i.e., 1% flood) in the incorporated cities. The 100-year flood is the benchmark upon which the National Flood Insurance Program (NFIP) is based.

Vulnerability

The probability that Region 6 will experience floods and the region's vulnerability to their effects are depicted in Table 13 below. These 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

TABLE 13. Vulnerability and Probability Assessment of Floods

	Crook	Deschutes	Jefferson	Klamath	Lake	Wheeler
Vulnerability	M	L	M	M	M	H
Probability	M	M	L	H	H	H

Source: Oregon Emergency Management, July 2003, County Hazard Analysis Scores.

LANDSLIDES / DEBRIS FLOWS

Characteristics and Brief History

Landslides and debris flows always have and always will shape Oregon's landscape. Landslides become problematic, however, when people place buildings and infrastructure in harm's way. Additionally, development practices can cause or contribute to the severity of landslides.

There are several categories of landslides, based on configuration (slide mechanism), slide materials, and rate of movement. Some slides are ancient, deep-seated, and slow moving. Others move rapidly as a mass of rock, mud, and large woody debris. All can be problematic when in the vicinity of buildings and infrastructure. Fast-moving landslides, or debris flows, occur throughout Oregon, but are especially noteworthy in the Cascade and Coast Ranges.

Debris flows (mudslides, mudflows, debris avalanches) are a common type of rapidly moving landslide that generally occur during intense rainfall on previously saturated ground. They usually begin on steep hillsides as slumps or slides that liquefy, accelerate to speeds as great as 35 mph or more, and flow down slopes and channels onto gently sloping ground. Their consistency ranges from watery mud to thick, rocky, mud-like wet cement, dense enough to carry boulders, trees, and automobiles. Debris flows from different sources can combine in canyons and channels, where their destructive power is greatly increased. In general, slopes that are over 25% or have a history of landslides might signal a landslide problem.

In recent events, particularly noteworthy landslides accompanied storms in 1964, 1982, 1966, and 1996. Two major landslide producing winter storms occurred in Oregon during November 1996. Intense rainfall on recently and past logged land as well as previously un-logged areas triggered over 9,500 landslides and debris flows that resulted directly or indirectly in eight fatalities. Highways were closed and a number of homes were lost. The fatalities and losses resulting from the 1996 landslide events brought about the passage of Oregon Senate Bill 12, which set site development standards, authorized the mapping of areas subject to rapidly moving landslides and the development of model landslide (steep slope) ordinances.

Oregon's landslide / debris flow warning system primarily involves three state and one federal agency: the Oregon Department of Forestry (ODF), the Oregon Department of Geology and Mineral Industries (DOGAMI), the Oregon Department of Transportation (ODOT), and the National Oceanic and Atmospheric Administration (NOAA). The warning system is triggered by rainfall and monitored in areas that have been determined to be hazardous.

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; ODOT provides information concerning the location of landslides / debris flows, alternate transportation routes, etc.

Most landslides in Region 6 occur within the US Highway 26 corridor (Prineville-Mitchell). U.S. Highway 97 just north of Klamath Falls has a history of rock falls. One person was killed by a rockslide in this area during the 1993 Klamath Falls earthquake.

Probability

The probability of rapidly moving landslide occurring depends on a number of factors; these include steepness of slope, slope materials, local geology, vegetative cover, human activity, and water. There is a strong correlation between intensive winter rainstorms and the occurrence of rapidly moving landslides (debris flows); consequently, the Oregon Department of Forestry tracks storms during the rainy season, monitors rain gages and snow melt, and issues warnings as conditions warrant. Given the correlation between precipitation or snowmelt and the onset of rapidly moving landslides, it would be feasible to construct a probability curve. The installation of slope indicators or the use of more advanced measuring techniques could provide information on slower moving slides.

Geo-engineers with the Oregon Department of Forestry estimate widespread landslide activity about every 20 years; In western Oregon, landslides at a local level can be expected every 2 or 3 years.[5] It is reasonable to expect a longer recurrence interval within Region 6.

Vulnerability

The probability that Region 6 will experience landslides and the region's vulnerability to their effects are depicted in Table 14 below. These 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.

[5] Mills, 2002.

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.

TABLE 14. Vulnerability and Probability Assessment of Landslides

	Crook	Deschutes	Jefferson	Klamath	Lake	Wheeler
Vulnerability	-	L	M	-	L	H
Probability	-	L	L	-	L	H

Source: Oregon Emergency Management, July 2003, County Hazard Analysis Scores.

VOLCANO-RELATED HAZARDS

Characteristics and Brief History

The western boundaries of Jefferson, Deschutes and Klamath counties coincide with the Cascade Mountains. Volcanic activity in the Cascades will continue, but questions regarding how, to what extent, and when, remain. Most volcano-associated hazards are local (e.g., explosions, debris, lava, and pyroclastic flows). However, lahars can travel considerable distances down stream valleys and wind-borne tephra (ash) can blanket areas many miles from the source.

There is virtually no risk from lahars, debris or pyroclastic flows in Wheeler and Crook counties, although normal prevailing winds could carry ash into those areas. Jefferson, Deschutes, and Klamath counties are at risk, however, and should consider the impact of volcano-related activity on small mountain communities, natural debris dams (e.g., South Sister, Broken Top), dams creating reservoirs, tourist destinations (e.g., Crater Lake), highways and railroads. These counties also should consider probable impacts on the local economy (e.g., wood products and recreation) should a volcano-related hazard occur.

The history of volcanic activity in the Cascade Range is contained in its geologic record, and the age of the volcanoes vary considerably. Some lava flows on Washington's Mt. Rainier are thought to be older than 840,000 years; Mt. Saint Helens erupted in May 1980, and continues to be active. In short, all of the Cascade volcanoes are characterized by long periods of quiescence and intermittent activity. And these characteristics make predictions, recurrence intervals, or probability very difficult to attain.

Several Region 6 communities are within a few miles of prominent volcanoes. Mt. Jefferson, the Three Sisters, Broken Top, and Mt. Bachelor dominate the skyline between Redmond and Bend (Deschutes County). A less imposing, but none-the-less important volcano, Newberry Crater, is within 15 miles of La Pine (Deschutes County) and less than 25 miles from the City of Bend. The string of volcanoes continue south with Mt. Thielsen, Mt. Scott (Crater Lake), and Mt. McLaughlin dominating the horizon. The composition, eruptive behavior and history of these volcanoes are not the same, which probably has a bearing on any future activity.

A brief overview of the prominent Region 6 volcanoes is contained in Table 15.

TABLE 15. PROMINENT VOLCANOES

NAME	ELEVATION	TYPE	REMARKS
Mt. Jefferson	10,495 ft.	Composite	Capable of large explosive eruptions. Not extinct. Partly on Warm Springs Reservation. Lahar inundation zones on Shitike Creek; Warm Springs settlement endangered. Lahars could enter Lake Billy Chinook via the White River, overtop dam and create damage below. (USGS OFR 99-24)
Mt. Washington	7,796 ft.	Mafic volcano	Popular recreation area. Information on Mt. Washington is very limited. Best source: USGS Cascade Volcano Observatory (CVO) web sites. No report on potential hazards. Mafic volcanoes are less explosive than composite volcanoes.
North Sister	10,085 ft.	Mafic volcano	
Middle Sister	10,047 ft.	Composite volcano	May erupt explosively in the future (USGS OFR 99-437)
South Sister	10,358 ft.	Composite volcano	May erupt explosively in the future. Carver Lake on mountain is formed by a natural debris dam. Dam failure, for any reason, could send flood water down Squaw Creek toward City of Sisters (Ref. USGS OFR 87-41 and Deschutes Co. Flood Insurance Study) City of Sisters (pop. 900 plus many tourists) also subject to possible lahars (USGS OFR 99-437, Plate 1). Recent uplift detected near the South Sister (about 1 in./yr), but no indication of pending eruption.
Broken Top	9,152 ft.	Composite volcano	Popular hiking destination; Source of Bend water supply
Mt. Bachelor	9,065 ft.	Mafic volcano	All-season recreation area. Mt. Bachelor ski resort.
Newberry Crater	7,984 ft.	Composite volcano	Popular recreation area. Less than 25 miles from Bend. Violent eruptions in past. Will erupt in future. Lahars could reach residential areas in the vicinity of Sun River via Little Deschutes River (USGS OFR 99-437)
Mt. Thielsen	9,187 ft.	Basalt/andesite Shield volcano	Popular hiking / climbing destination
Crater Lake (Mt. Mazama)	8,926 ft. (Mt. Scott)	Overlapping shield and composite volcanoes	Popular destination.
Mt. McLaughlin	9,496 ft.	Mafic volcano	Less explosive than composite volcanoes

Source: USGS/Cascades Volcano Observatory, web site information

Probability

The probability of volcanic activity can be very difficult to predict, unless there are obvious precursors. The precursors might include increased seismic activity, temperature and chemical changes in groundwater, etc. Probability is especially difficult when the volcano has been inactive for many thousands of years and lacks a clear geologic record of past events. Also, the knowledge of volcanoes is too limited to know how long a dormant period at any volcano can last[6], and this probably is the case for most Cascade volcanoes. Eruption probabilities generated by the USGS for the Oregon Cascades are largely based on the position of volcanic rocks in the geologic record. There is a considerable opportunity for error. Table 16 describes the probability of volcano-related hazards in Region 6.

[6] USGS OFR 99-24, p. 6.

TABLE 16. PROBABILITY OF VOLCANO-RELATED HAZARDS

VOLCANO-RELATED HAZARDS	AFFECTED AREA						REMARKS
	Jefferson	**Deschutes**	**Klamath**	**Wheeler**	**Crook**	**Lake**	
Tephra (volcanic ash) (annual probability of 1cm or more accumulation from eruptions throughout the Cascade Range)	1 in 5,000	1 in 5,000	1 in 5,000	1 in 1,000 to 1 in 5,000	1 in 5,000	1 in 5,000	USGS Open File Report (OFR 97-513) p.9)
Lahar	Source: Mt. Jefferson	Source: Newberry Crater and Three Sisters	Source: Crater Lake	No Risk	No Risk	No Risk	If the Detroit Lake dam is breached, lahars could reach Mill City, Lyons, and Stayton in Marion County. OFR 99-24 (Maps) Lane County: OFR 99-437 (Map)
Lava flow	Source: Mt. Jefferson	Source: Newberry Crater and Three Sisters	Source: Crater Lake	No Risk	No Risk	No Risk	Mt. Jefferson: OFR 99-24 (Maps) Three Sisters: OFR 99-437 (Maps)
Debris flow / avalanche	Source: Mt. Jefferson	Source: Three Sisters	Source: Crater Lake	No Risk	No Risk	No Risk	Mt. Jefferson: OFR 99-24 (Maps) Three Sisters: OFR 99-437 (Maps)
Pyroclastic flow	Source: Mt. Jefferson	Source: Newberry Crater and Three Sisters	Source: Crater Lake and Newberry Crater	No Risk	No Risk	Source: Newberry Crater	Mt. Jefferson: OFR 99-24 (Maps) Three Sisters: OFR 99-437 (Maps)

Source: USGS Open File Reports 99-24, 99-437, 97-513

Vulnerability

The probability that Region 6 will experience volcano-related hazards and the region's vulnerability to their effects are depicted in Table 17 below. These 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.

TABLE 17. Vulnerability and Probability Assessment of Volcano-Related Hazards

	Crook	Deschutes	Jefferson	Klamath	Lake	Wheeler
Vulnerability	-	H	M	H	L	H
Probability	-	L	L	L	L	L

Source: Oregon Emergency Management, July 2003, County Hazard Analysis Scores.

WINDSTORMS

Characteristics and Brief History

Extreme winds (other than tornadoes) are experienced in all of Oregon's eight regions. The most persistent high winds occur along the Oregon Coast and the Columbia River Gorge, so much so that these areas have special building code standards. This is not the case in Central Oregon, although high winds in inter-mountain valleys are not uncommon. For example, stiff winds from the Ochoco Mountains often occur in the City of Prineville (Crook County).

The majority of the destructive surface winds in Oregon are from the southwest. Under certain conditions, very strong east winds may occur, but these usually are limited to small areas in the vicinity of the Columbia River Gorge or other low mountain passes. The much more frequent and widespread strong winds from the southwest are associated with storms moving onto the coast from the Pacific Ocean. A historic overview of high winds affecting Region 6 may be found in Table 18.

TABLE 18. SIGNIFICANT WINDSTORMS

DATE	AFFECTED AREA	CHARACTERISTICS
Apr., 1931	N. Central Oregon	Unofficial wind speeds reported at 78 mph. Damage to fruit orchards and timber.
Nov. 10-11, 1951	Statewide	Widespread damage; transmission and utility lines; Wind speed 40-60 mph; Gusts 75-80 mph
Dec., 1951	Statewide	Wind speed 60 mph in Willamette Valley. 75 mph gusts. Damage to buildings and utility lines.
Dec., 1955	Statewide	Wind speeds 55-65 mph with 69 mph gusts. Considerable damage to buildings and utility lines
Nov., 1958	Statewide	Wind speeds at 51 mph with 71 mph gusts. Every major highway blocked by fallen trees
Oct., 1962	Statewide	Columbus Day Storm; Oregon's most destructive storm to date. 116 mph winds in Willamette Valley. Estimated 84 houses destroyed, with 5,000 severely damaged. Total damage estimated at $170 million
Mar., 1971	Most of Oregon	Greatest damage in Willamette Valley. Homes and power lines destroyed by falling trees. Destruction to timber in Lane Co.
Nov., 1981	Statewide	Severe wind storm
Dec., 1991	N. Central Oregon	Severe wind storm; Blowing dust. Damage reported in Bend (Deschutes County)
Dec., 1995	Statewide	Severe wind storm

Source: Taylor, George H., and Ray Hatton. (1999), The Oregon Weather Book. p.151-157; and FEMA-1405-DR-OR, February 7, 2002, Hazard Mitigation Team Survey Report, Severe Windstorm in Western Oregon.

Probability

Generally, windstorms occur yearly even east of the Cascades. More destructive storms occur once or twice per decade. High wind events on the order of the 1962 Columbus Day storm are thought to have a 100-year recurrence interval.

Vulnerability

Many buildings, utilities, and transportation systems within Region 6 are vulnerable to wind damage. This is especially true in open areas, such as natural grasslands or farmlands. It also is true in forested areas, along tree-lined roads and electrical transmission lines, and on residential parcels where trees have been planted or left for aesthetic purposes. Structures most vulnerable to high winds include insufficiently anchored manufactured homes and older buildings in need of roof repair. The Oregon Department of Administrative Service's

inventory of state-owned and operated buildings includes an assessment of roof conditions as well as the overall condition of the structure. Oregon Emergency Management has arranged this information by county.

Fallen trees are especially troublesome. They can block roads and rails for long periods of time, impacting emergency operations. In addition, up-rooted or shattered trees can down power and/or utility lines and effectively bring local economic activity and other essential facilities to a standstill. Much of the problem may be attributed to a shallow or weakened root system in saturated ground. Many roofs have been destroyed by uprooted trees felled by high winds. In some situations, strategic pruning may be the answer. Prudent counties will work with utility companies in identifying problem areas and establishing a tree maintenance and removal program.

The probability that Region 6 will experience windstorms and the region's vulnerability to their effects are depicted in Table 19 below. These scores are based on the perceptions of area emergency managers.

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

TABLE 19. Vulnerability and Probability Assessment of Windstorms

	Crook	Deschutes	Jefferson	Klamath	Lake	Wheeler
Vulnerability	M	M	M	M	M	M
Probability	H	H	H	H	H	H

Source: Oregon Emergency Management, July 2003, County Hazard Analysis Scores.

WINTERSTORMS

Characteristics and Brief History

Within the State of Oregon, Region 6 communities are known for cold, snowy winters. This is advantageous in at least one respect: in general, the region is prepared, and those visiting the region during the winter, usually come prepared. However, there are occasions when preparation cannot meet the challenge. Drifting, blowing snow has often brought highway traffic to a standstill. Also, windy, icy conditions have often closed mountain passes and canyons to certain classes of truck traffic. In these situations, travelers must seek accommodations, sometimes in communities where lodging is very limited. And local residents also experience problems. During the winter, heating, food, and the care of livestock and farm animals are everyday concerns. Access to farms and ranches can be extremely difficult and present a serious challenge to local emergency managers. Table 20 provides an historic overview of severe winter conditions within Region 6.

TABLE 20. SIGNIFICANT WINTERSTORMS

DATE	LOCATION	REMARKS
Dec., 1861	Entire state	Storm produced between 1 and 3 feet of snow
Dec., 1892	Northern counties	Between 15 and 30 inches of snow fell throughout the northern counties
Jan., 1916	Entire state	Two storms. Heavy snowfall, especially in mt. areas
Jan., Feb., 1937	Entire state	Deep snow drifts
Jan., 1950	Entire state	Record snow falls; Property damage throughout state.
Mar., 1960	Entire state	Many automobile accidents; Two fatalities
Jan., 1969	Entire state	Heavy snow throughout state
Jan., 1980	Entire state	Series of string storms across state. Many injuries and power outages.
Feb., 1985	Entire state	Two feet of snow in northeast mountains; Downed power lines. Fatalities
Feb., 1986	Central / Eastern Oregon	Heavy snow in Deschutes Basin. Traffic accidents; Broken power lines
Mar., 1988	Entire state	Strong winds; Heavy snow
Feb., 1990	Entire state	Heavy snow throughout state
Nov., 1993	Cascade Mountains	Heavy snow throughout region
Mar., 1994	Cascade Mountains	Heavy snow throughout region
Winter 1998-99	Entire state	One of the snowiest winters in Oregon history (Snowfall at Crater Lake: 586 inches)

Source: Taylor, George and Ray Hatton, 1999, *The Oregon Weather Book* p.118-122.

Probability

The recurrence interval for severe winter storms throughout Oregon is about every 13 years, however, there can be many localized storms between these periods.

Vulnerability

The probability that Region 6 will experience winterstorms and the region's vulnerability to their effects are depicted in Table 21 below. These 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

TABLE 21. Vulnerability and Probability Assessment of Winterstorms

	Crook	Deschutes	Jefferson	Klamath	Lake	Wheeler
Vulnerability	H	H	H	H	H	H
Probability	H	M	H	H	H	H

Source: Oregon Emergency Management, July 2003, County Hazard Analysis Scores.

Appendix E
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 Mitigatio*n. 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 there 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.

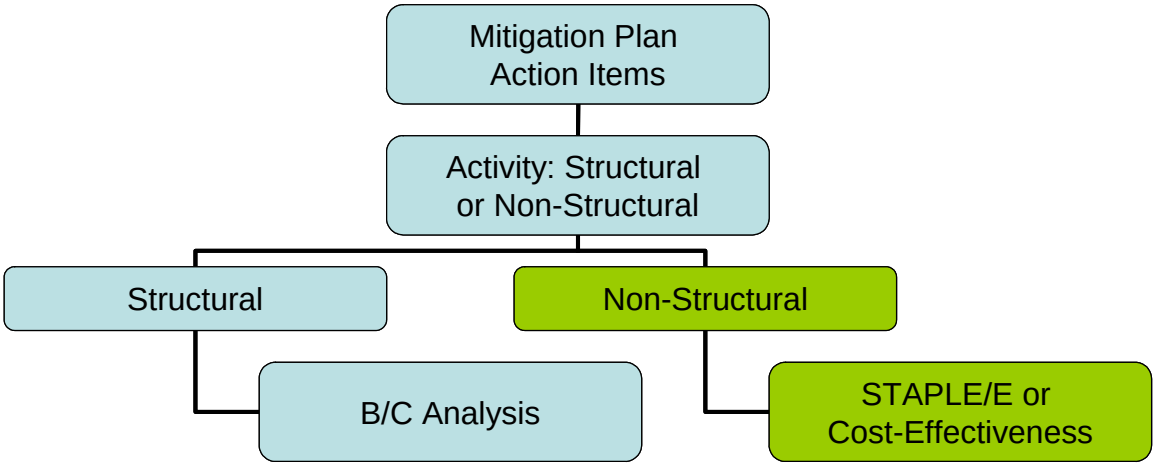
- How will the action impact the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

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

CUREe Kajima Project, *Methodologies For Evaluating The Socio-Economic Consequences Of Large Earthquakes*, Task 7.2 Economic Impact Analysis, Prepared by University of California, Berkeley Team, Robert A. Olson, VSP Associates, Team Leader; John M. Eidinger, G&E Engineering Systems; Kenneth A. Goettel, Goettel and Associates Inc.; and Gerald L. Horner, Hazard Mitigation Economics Inc., 1997.

Federal Emergency Management Agency, *Benefit/Cost Analysis of Hazard Mitigation Projects*, Riverine Flood, Version 1.05, Hazard Mitigation Economics Inc., 1996.

Federal Emergency Management Agency *Report on Costs and Benefits of Natural Hazard Mitigation.* Publication 331, 1996.

Goettel & Horner Inc., *Earthquake Risk Analysis Volume III: The Economic Feasibility of Seismic Rehabilitation of Buildings in The City*

of Portland, Submitted to the Bureau of Buildings, City of Portland, August 30, 1995.

Goettel & Horner Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects* Volume V, Earthquakes, Prepared for FEMA's Hazard Mitigation Branch, October 25, 1995.

Horner, Gerald, *Benefit/Cost Methodologies for Use in Evaluating the Cost Effectiveness of Proposed Hazard Mitigation Measures*, Robert Olson Associates, Prepared for Oregon State Police, Office of Emergency Management, July 1999.

Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan*, (Oregon State Police – Office of Emergency Management, 2000).

Risk Management Solutions, Inc., *Development of a Standardized Earthquake Loss Estimation Methodology*, National Institute of Building Sciences, Volume I and II, 1994.

VSP Associates, Inc., *A Benefit/Cost Model for the Seismic Rehabilitation of Buildings*, Volumes 1 & 2, Federal Emergency Management Agency, FEMA Publication Numbers 227 and 228, 1991.

VSP Associates, Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects: Section 404 Hazard Mitigation Program and Section 406 Public Assistance Program, Volume 3: Seismic Hazard Mitigation Projects*, 1993.

VSP Associates, Inc., *Seismic Rehabilitation of Federal Buildings: A Benefit/Cost Model*, Volume 1, Federal Emergency Management Agency, FEMA Publication Number 255, 1994.

Appendix F
Existing Plans, Policies, and Programs in Wheeler County

The following appendix summarizes the existing plans, policies and programs in Wheeler 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 Wheeler 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.

Wheeler County
Existing Plans, Policies Programs

Name	Date of Last Revision	Author/Owner	Description	Relation to Natural Hazard Mitigation
Wheeler County, Oregon, Comprehensive Plan	1992	Wheeler County	Provides the County with the Authority to implement policies that influence the development of the land, the economy, and the provision of services.	• 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.
Zoning Ordinance, Wheeler County, Oregon	1969	Wheeler County Planning Commission with the University of Oregon Bureau of Governmental Research and Service	Provides standards to encourage the development of the county and to promote public health and safety.	• 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.
North Central Oregon: Gilliam, Grant, Morrow, Sherman, Wasco and Wheeler Counties; Strategic Plan for Tourism	1996	Michael Wetter and Associates	Provides recommendations for how the North Central Oregon Region can use collective resources to develop local tourism industries and local economies.	• Can be linked to action items that help the County prepare for assisting visitors to the county in the event of a natural hazard. • Can be linked to action items that address tourism in areas subject to natural hazards without increasing the County's vulnerability to natural hazards.

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.

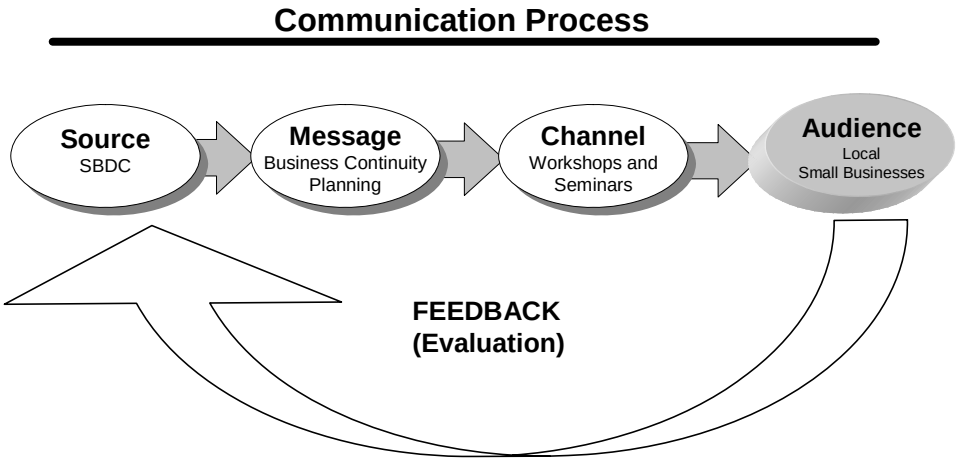
There are five essential elements for communicating effectively to a target audience:

- 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 F.1***:

Figure F.1 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 Wheeler 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.

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

Wheeler County
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Potential Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
American Red Cross Oregon Mountain River Chapter Tel: 541-382-2142 Fax: 541-382-2405 6839 SW Simpson (97701) Bend, OR 97008	Collect and provide blood and plasma to the community.	Gilliam, Hood River, Jefferson, Morrow, Sherman, Umatilla, Wheeler, Wasco Counties		✓	✓	✓	✓	✓	• Education and outreach • Information dissemination • Plan/project implementation
Boy Scouts of America - Mid Columbia District Tel: 541-298-5022	Provides youth programs.	Mid-Columbia Region		✓			✓		• Education and outreach • Information dissemination
Campfire Boys and Girls - Oregon Trail Council P.O. Box 115 Pendleton, OR 97801 Tel: 541-276-6181 888-276-6181	Provide youth programs.			✓					• Education and outreach • Information dissemination
Community Action Program of East Central Oregon Tel: 541-276-1926 800-752-1139 Fax: 541-276-7541	Provides employment, housing, food, and senior citizen-specific services.	Gilliam, Morrow, Umatilla, and Wheeler Counties				✓		✓	• Education and outreach • Information dissemination
Department of Human Services 813 7th St. Fossil, OR 97830 Tel: 541-763-4235	Provide self-sufficiency, medical, mental health, services and assistance for children, the elderly, and people with disabilities.	Mid-Columbia Region		✓	✓	✓	✓	✓	• Education and outreach • Information dissemination • Plan/project implementation

Wheeler County
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Potential Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
Eastern Oregon Support Services Brokerage P.O. Box 329 1216 "C" St. Hood River, OR 97031 Tel: 514-387-3600 800-387-3601 Fax: 541-387-2999	Provides consulting and self-sufficiency services to individuals with developmental disabilities.	Gilliam, Hood River, Sherman, and Wheeler Counties			✓				• Education and outreach • Information dissemination
Fossil Cooperative Preschool 535 Main Fossil, OR Tel: 541-763-2024 Fax: 541-763-2148	Provides childcare services.	The City of Fossil		✓					• Education and outreach • Information dissemination
Greater Eastern Oregon Development Corp PO Box 1041 Pendleton, OR 97801 Tel: 541-276-6745 Website: http://www.geodc.org/	Provide economic development assistance to local businesses.	Gilliam, Grant, Morrow, Umatilla, Wheeler, Harney and Malheur Counties	✓						• Education and outreach • Information dissemination • Plan/project implementation
Haven House Retirement Center 714 Main Fossil, OR Tel: 541-763-4651 Fax: 541-763-2148	Provides assisted living services.	The City of Fossil				✓			• Education and outreach • Information dissemination
Hospice of the Gorge Tel: 541-296-3228 (The Dalles) 541-387-6449 (Hood River)	Provides medical services and personnel, as well as in-home medical care.	Mid-Columbia Region			✓				• Education and outreach • Information dissemination

Wheeler County
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Potential Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
Housing Authority of the County of Umatilla PO Box 107 Hermiston, OR 97838 Tel: 541-567-3241 TDD: 800-545-1833, ext. 771 Fax: 541-567-3246	Provides affordable housing options for low-income residents.	Gilliam, Morrow, Umatilla, and Wheeler Counties						✓	• Education and outreach • Information dissemination
Legal Aid Services of Oregon - Pendleton Office 365 SE Third St. Pendleton, OR 97801 Tel: 541-276-6685	Provides legal aid services to low-income residents.	Gilliam, Morrow, Umatilla, and Wheeler Counties						✓	• Education and outreach • Information dissemination
Lifespan Respite Care Network - Gilliam County 110 Main St., #2 Moro, OR 97039 Tel: 541-384-3767	Provide respite care services.	Sherman and Wheeler Counties			✓				• Education and outreach • Information dissemination
Mid-Columbia Council of Governments P.O. Box 306 Fossil, OR 97830 Tel: 541-763-4235 Fax: 541-763-4236	Provides services to businesses and families.	Gilliam, Hood River, Sherman, Wasco, and Wheeler Counties	✓	✓	✓	✓	✓	✓	• Education and outreach • Information dissemination
Mid-Columbia Habitat for Humanity P.O. Box 161 Hood River, OR 97031 Tel: 541-386-7982	Providing affordable housing through building and renovating houses for low-income families.	Mid-Columbia Region						✓	• Education and outreach • Information dissemination • Plan/project implementation

Wheeler County
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Potential Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
Mid-Columbia Senior and Disabled Services Tel: 541-386-9080		Mid-Columbia Region			✓	✓			• Education and outreach • Information dissemination
Mid-Columbia Senior Center 1112 W 9th St The Dalles, OR 97058 Tel: 541-296-4788		Mid-Columbia Region				✓			• Education and outreach • Information dissemination
Mitchell Cooperative Preschool 204 SE High Mitchell, OR 97750 Tel: 541-462-3433	Provides childcare services.	The City of Mitchell		✓					• Education and outreach • Information dissemination
Morrow - Wheeler Behavioral Health P.O. Box 469 Heppner, OR 97836 Tel: 541-676-9161 Fax: 541-676-5662	Provides mental health services for people with developmental disabilities	Morrow and Wheeler Counties			✓				• Education and outreach • Information dissemination
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 services for children			✓					

Wheeler County
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Potential Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
Special Olympics Mid-Oregon Region P.O. Box 1317 Bend, OR 97709 Tel: 541-504-1231	Provides sports programs for people with developmental disabilities.	Crook, Deschutes, Harney, Jefferson, and Wheeler Counties		✓	✓		✓		• Education and outreach • Information dissemination
Spray Cooperative Preschool 303 Park Ave. Spray, OR 97874 Tel: 541-468-2226	Provides childcare services.	The City of Spray		✓					• Education and outreach • Information dissemination
St. Vincent DePaul Tel: 541-296-9566	Provides housing, food, employment, and medical services to low-income residents.	Mid-Columbia Region					✓	✓	• Education and outreach • Information dissemination
Transportation Network Tel: 541-296-7595 877-875-4657	Provide transportation services to and from medical appointments for people without transportation	Mid-Columbia Region			✓	✓		✓	• Education and outreach • Information dissemination
Wheeler County Community Transportation P.O. Box 512 Spray, OR 97874 Tel: 541-468-2859 800-721-8425	Provides transportation services for residents and those with special transportation needs	Wheeler County			✓	✓			• Education and outreach • Information dissemination

Wheeler County
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Potential Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
Wheeler County Health Office - Asher Clinic 712 Jay St. P.O. Box 307 Fossil, OR 97830 Tel: 541-763-2725 Fax: 541-763-2850	Provides public health services	Wheeler County		✓	✓	✓	✓	✓	• Education and outreach • Information dissemination
Women, Infants, and Children's Program (WIC) 910 Pacific Ave Hood River, OR 97031 Tel: 541-387-6882 Fax: 541-386-9181	Provides health and nutrition assistance and programs.	Hood River County		✓			✓	✓	• Education and outreach • Information dissemination

Appendix G:
Open for Business

The purpose of this section is to document the Open for Business training that took place in conjunction with the development of this natural hazard mitigation plan.

Open for Business Workshop Summary

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

April 26, 2006

Greetings!

You are invited to attend the *Open for Business Toolkit* Training, co-hosted by the Oregon Natural Hazards Workgroup (ONHW) and the Institute for Business and Home Safety (IBHS).

The Open for Business Toolkit is an interactive, web-based program that businesses can follow to develop customized property protection and recovery plans (also known as contingency plans), which are then stored securely on-line for future reference and updating.

Why should your business attend the *Open for Business Toolkit* Training?

- To learn how to use the toolkit to develop disaster preparedness and recovery plans (also known as business continuity plans) to make your business better prepared for disasters;
- By preparing your business, you are helping to make the regional economy more disaster resistant; and
- It's free, the interactive toolkit is valued at $2,000).

Who should attend the *Open for Business Toolkit* Training:

- Owners and managers;
- Risk managers; and/or
- Payroll and financial staff.

Two dates and locations are being offered for the *Open for Business Toolkit* training.

Wednesday, May 24, 2006
1:30 pm – 5:00 pm
Blue Mountain Community College
980 SE Columbia Drive
Hermiston, OR 97838

Thursday, May 25, 2006
1:30 pm – 5:00 pm
Columbia Gorge Community College
400 E. Scenic Drive
The Dalles, OR 97058

Space is limited in each session, so please RSVP as soon as possible. If you are interested in attending the training, please contact Linda White at (541) 346-3889 or lindaw@uoregon.edu and indicate which training date you would prefer to attend.

Oregon Natural Hazards Workgroup
Community Service Center • 1209 University of Oregon
Eugene • Oregon • 97403-1209 Phone: 541.346.5833 • Fax: 541.346.2040

Even if the worst happens -

Open for Business *sm* **-**
A Disaster Planning Toolkit
for the Small Business Owner

PLAN NOW TO STAY…

DISASTER READINESS SELF-ASSESSMENT QUESTIONS

1. Are you concerned that your normal business operations might be interrupted by a natural or human-caused disaster?

2. Have you determined what parts of your business need to be operational as soon as possible following a disaster, and planned how to resume those operations?

3. Do you and your employees have a disaster response plan in place to help assure your safety and to take care of yourselves until help can arrive?

4. Could you communicate with your employees if a disaster happened during work hours or after work hours?

5. Can your building withstand the impact of a natural disaster, and are your contents and inventory sufficiently protected so they will not be damaged?

6. Are your vital records protected from the harm that could be caused by a disaster?

7. Are you prepared to stay open for business if your suppliers cannot deliver, your markets are inaccessible, or basic needs (e.g. water, sewer, electricity, transportation) are unavailable?

8. Do you have plans to stay open for business, even if you cannot stay in or reach your place of business?

9. Have you worked with your community — public officials and other businesses — to promote disaster preparedness and plan for community recovery?

10. Have you consulted with an insurance professional to determine if your insurance coverage is adequate to help you get back in business following a disaster?

May 2, 2006

Greetings!

You are invited to attend the *Open for Business Toolkit* Training, co-hosted by the Oregon Natural Hazards Workgroup (ONHW) and the Institute for Business and Home Safety (IBHS).

The Open for Business Toolkit is an interactive, web-based program that organizations can follow to develop customized property protection and recovery plans (also known as contingency plans), which are then stored securely on-line for future reference and updating.

Why should your organization attend the *Open for Business Toolkit* Training?

- To learn how to use the toolkit to develop disaster preparedness and recovery plans (also known as business continuity plans) to make your organization better prepared for disasters;
- To use the training's information to help other businesses and organizations in your community develop their own preparedness and recovery plans; and
- There is no training fee, (the interactive toolkit is valued at $2,000).

Who should attend the *Open for Business Toolkit* Training:

- Administrators and managers;
- Staff that provide direct assistance to businesses;
- Risk managers; and/or
- Payroll and financial staff.

Two dates and locations are being offered for the *Open for Business Toolkit* training.

Wednesday, May 24, 2006
1:30 pm – 5:00 pm
Blue Mountain Community College
980 SE Columbia Drive
Hermiston, OR 97838

Thursday, May 25, 2006
1:30 pm – 5:00 pm
Columbia Gorge Community College
400 E. Scenic Drive
The Dalles, OR 97058

The opportunity to participate in the training is being offered on a first-come-first serve basis. As a local service provider, you have been given the first opportunity to attend. If you are interested in attending the training, please contact Linda White at (541) 346-3889 or lindaw@uoregon.edu and indicate which training date you would prefer to attend. Please reserve your place as soon as possible. Remaining spaces will be offered to local business owners on May 5th.

Oregon Natural Hazards Workgroup
Community Service Center • 1209 University of Oregon
Eugene • Oregon • 97403-1209 Phone: 541.346.5833 • Fax: 541.346.2040

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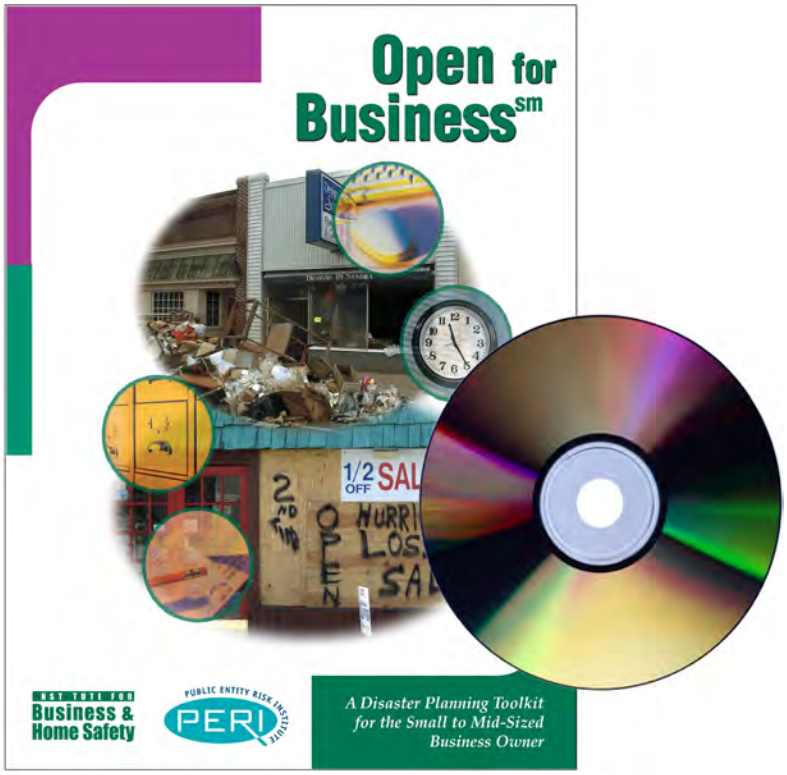
8. Do you have plans to stay open for business, even if you cannot stay in or reach your place of business?

9. Have you worked with your community — public officials and other businesses — to promote disaster preparedness and plan for community recovery?

10. Have you consulted with an insurance professional to determine if your insurance coverage is adequate to help you get back in business following a disaster?



Open for Business℠ Toolkit

(includes CD-ROM)

Wildfires, floods, hurricanes/ high winds/tornadoes, earth-quakes and freezing weather.

Loss of power, waterline breaks, and computer crashes.

Disasters come in many sizes, but they can often mean big trouble for businesses, large and small. In fact, when disasters force businesses to shut down, 25% will never reopen.

But you can stay ***Open for Business℠***, with advanced planning and the right tools.

That's why the Institute for Business & Home Safety (IBHS) created ***Open for Business℠***, a comprehensive disaster planning toolkit in booklet and CD-ROM formats. The easy-to-use guide helps you reduce the potential for loss, should disaster strike, and reopen quickly should you be forced to close. This creates savings for your business and also benefits your employees and customers who rely on it.

The kit includes valuable worksheets to help you develop a property protection and business continuity plan, and gives you tips on disaster protection and recovery. This information can help you identify the hazards your business faces, plan for and reduce the impact of disaster, keep your doors open after a disaster hits, advise you on disaster supplies, and help make your business disaster resilient.

Single copies of the toolkit are available free! You can download ***Open for Business℠*** from www.ibhs.org , or you can email info@ibhs.org or call 1-866-657-IBHS (4247) to request a single copy without charge. Multiple copies can be ordered from the Public Entity Risk Institute, www.riskinstitute.org.

PUBLIC ENTITY RISK INSTITUTE
PERI

www.riskinstitute.org

INSTITUTE FOR
Business & Home Safety®
www.ibhs.org

Taking the Lead in Property Loss Reduction℠

The Institute for Business & Home Safety's mission is to reduce deaths, injuries, property damage, economic losses and human suffering caused by natural disasters.