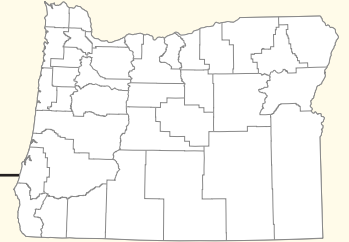




Harney County

Multi-Jurisdictional Natural Hazards Mitigation Plan



Harney County

Natural Hazards Mitigation Plan

Report for:

Harney County

450 N Buena Vista
Burns, OR 97720

Prepared by:

Oregon Natural Hazards Workgroup

Community Service Center
1209 University of Oregon
Eugene • Oregon • 97403-1209

October 2007



Special Thanks & Acknowledgements

Project Steering Committee:

Fred Flippence, Harney Electric Cooperative
Steve Grasty, Harney County Court
Brandon McMullen, Harney County Planning Department
David Justin Boone, City of Burns
Pamela Mather, City of Hines
Ruth Schultz, City of Hines
Kenton Dick, Paiute Native American Tribe
Mike Williams, Bureau of Land Management, Burns District
William Huber, US Forest Service
Carey Goss, US Fish and Wildlife Service

Project Managers:

A. Gregoor Passchier, Oregon Natural Hazards Workgroup
Krista Mitchell, Oregon Natural Hazards Workgroup

This Natural Hazards 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 process 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:

- Federal Emergency Management Agency Region 10;
- Oregon Emergency Management;
- Oregon Department of Geology and Mineral Industries;
- Oregon Natural Hazards Workgroup at the University of Oregon's Community Service Center;
- Resource Assistance for Rural Environments at the University of Oregon's Community Service Center;
- Harney County;
- Jefferson County;
- Lake County, and
- Malheur County.



FEMA

April 7, 2008

Honorable Steven E. Grasty
Judge, Harney County Court
450 North Buena Vista
Burns, Oregon 97720

Dear Judge Grasty:

On March 19, 2008, the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) approved the *Harney County Natural Hazards 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 March 19, 2013:

Harney County
City of Burns

City of Hines

Harney Electric Cooperative

The list of approved jurisdictions has been updated to include the City of Burns, which has recently adopted the Harney County Natural Hazards Mitigation Plan. To continue eligibility the plan must be reviewed, revised as appropriate, and resubmitted within five years of the original approval date.

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,

A handwritten signature in black ink that reads "Mark Carey".

Mark Carey, Director
Mitigation Division

cc: Dennis Sigrist, Oregon Emergency Management

Enclosure

KM:bb

FEB 7 - 2008

9.00 O'CLOCK A M
MARIA ITURRIAGA, COUNTY CLERK
BY D. Robinson DEPUTY

IN THE COUNTY COURT FOR THE STATE OF OREGON
FOR THE COUNTY OF HARNEY

In the Matter of Adopting the Harney
County Natural Hazards Mitigation Plan

RESOLUTION #2008-03

WHEREAS, the Harney County Court 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, Harney County fully participated in the FEMA-prescribed mitigation planning process to prepare this Natural Hazards Mitigation Plan; and

WHEREAS, the Oregon Office of Emergency Management and Federal Emergency Management Agency, Region X officials have reviewed the "Harney County, Oregon Natural-Hazards Mitigation Plan" (dated, October 2007) and pre-approved it (January 17, 2008) contingent upon this official adoption by the cities of Burns and Hines and the Harney Electric Cooperative who is the Plan's convener;

NOW, THEREFORE, BE IT RESOLVED, that the Harney County Court adopts the "Harney County, Oregon Natural Hazards Mitigation Plan" as an official plan; and

BE IT FURTHER RESOLVED, the Harney County Court 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.

DATED this 6th day of February, 2008.

HARNEY COUNTY COURT



Steven E. Grasty
Steven E. Grasty, Judge

Dan Nichols
Dan Nichols, Commissioner

Jack Drinkwater
Jack Drinkwater, Commissioner

20080274

RESOLUTION NO. 2080

A RESOLUTION ADOPTING THE HARNEY COUNTY
NATURAL HAZARDS MITIGATION PLAN

WHEREAS, the City of Hines 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 the 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

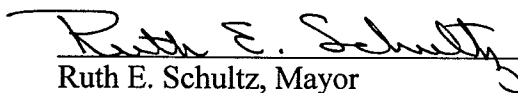
WHEREAS, the City of Hines fully participated in the FEMA-prescribed mitigation planning process to prepare this Natural Hazards Mitigation Plan; and


WHEREAS, the Oregon Office of Emergency Management and Federal Emergency Management Agency, Region X officials have reviewed the "Harney County, Oregon Natural-Hazards Mitigation Plan" (dated, October 2007) and pre-approved it (January 17, 2008) contingent upon this official adoption by the cities of Burns and Hines and the Harney Electric Cooperative who is the Plan's convener;

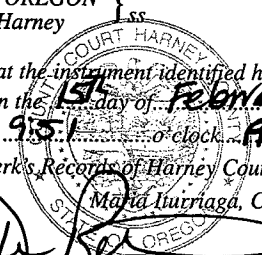
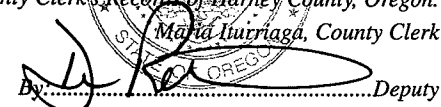
NOW, THEREFORE, BE IT RESOLVED, that the Hines Common Council adopts the "Harney County, Oregon Natural Hazards Mitigation Plan" as an official plan; and

BE IT FURTHER RESOLVED, the Hines Common Council 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.

Adopted this 12th day of February, 2008.


Ruth E. Schultz, Mayor

ATTEST: 
Pamela L. Mather, City Administrator/Recorder

STATE OF OREGON }
County of Harney } ss
I certify that the instrument identified herein was recorded on the 15th day of February, 2008 at 9:51 o'clock AM. In the County Clerk's Records of Harney County, Oregon.

Marta Iurriaga, County Clerk
By:  Deputy

RESOLUTION NO. 08-483

A RESOLUTION ADOPTING THE CITY OF BURNS REPRESENTATION AND PARTICIPATION IN THE HARNEY COUNTY MULTI-JURISDICTION HAZARD MITIGATION PLAN

WHEREAS, the City of Burns recognizes it is vulnerable to the human and economic costs of natural, technological and societal disasters; and

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

WHEREAS, the City of Burns has participated in the development of the Harney 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 Burns has identified natural hazard risks and prioritized a number of proposed actions and programs needed to mitigate the vulnerabilities of the City of Burns to the impacts of potential future disasters; and

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

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

Section 1. The City of Burns hereby accepts and approves of it's section of the Harney County Multi-Jurisdiction Hazard Mitigation Plan as a reasonable process to identify and plan for mitigation of potential hazards in the City of Burns and Harney County.

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

Section 3. The City of Burns will, upon receipt of such funding and/or other necessary resources, seek to implement the mitigation proposals identified by the Harney County Multi-Jurisdiction Natural Hazard Mitigation Planning Committee.

Section 4. The City of Burns will continue to participate in the updating and expansion of the Harney County Multi-Jurisdiction Hazard Mitigation Plan in the future.


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

PASSED BY THE CITY COUNCIL AND APPROVED BY THE MAYOR, this 13th day of February, 2008.

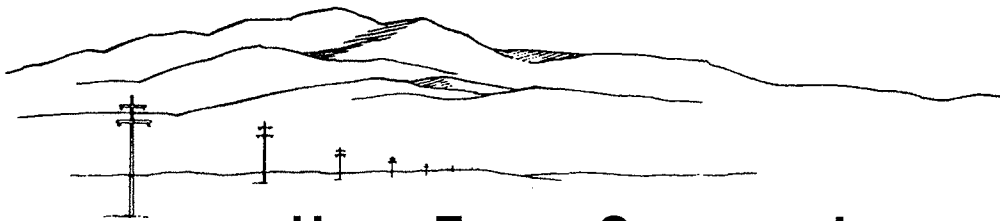


Laura Van Cleave, Mayor

ATTEST:



Dauna Wensenk, City Recorder



SERVICE CENTERS:
OROVADA, NEVADA
FIELDS, OREGON



HARNEY ELECTRIC COOPERATIVE, INC.

1326 HINES BLVD.
BURNS, OREGON 97720
PHONE: (541) 573-2061

Federal Emergency Management Agency
Federal Regional Center
Attn: Kristen Myers
130 228th St SW
Bothell, WA 98021-8627

January 22, 2008

Dear Kristen Myers:

This letter is to notify the Federal Emergency Management Agency that the Harney Electric Cooperative has adopted the Harney County Natural Hazards Mitigation Plan as the official mitigation plan for Harney County, the cities of Burns, Hines, and for the Harney Electric Cooperative.

The Harney Electric Cooperative is identified as the convener of the Harney County Natural Hazards Mitigation Plan, and will work closely with the jurisdictions identified in the plan to implement, maintain, and update the Mitigation Plan.

Sincerely,

Fred Flippence
Office Manager
Harney Electric Cooperative

**Harney County
Natural Hazards Mitigation Plan**

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Executive Summary

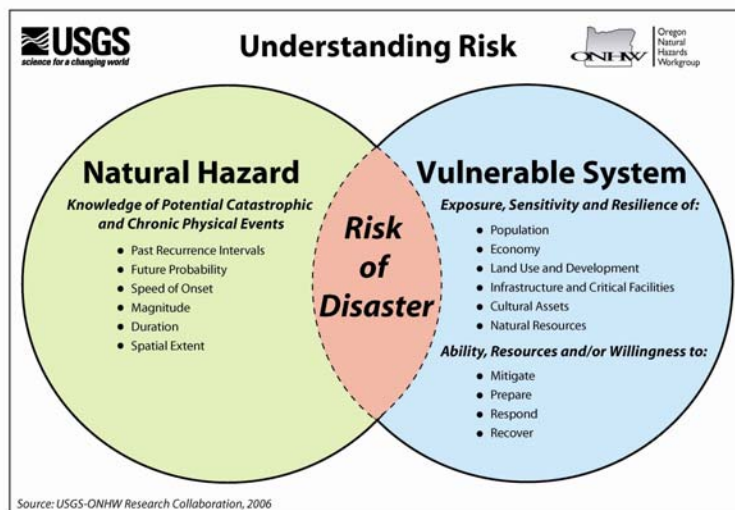
Harney County developed this Natural Hazards Mitigation Plan in an effort to reduce future loss of life and property resulting from natural disasters. It is impossible to predict exactly when these disasters will occur, or the extent to which they will affect the community. However, with careful planning 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 Harney County to 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.

The Harney County 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.

- Harney County Court;
- Harney County Planning Department;
- Harney Electric Cooperative;
- City of Burns;
- City of Hines;
- United States Forest Service;
- Bureau of Land Management;
- US Fish and Wildlife Service; and
- Paiute Indian Tribe.

The Harney Electric Cooperative 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 was achieved with the establishment of the Harney County Natural Hazards Mitigation Steering Committee, which was comprised of community members representing different organizations and sectors in Harney County. The Steering Committee was closely involved throughout the development of the plan and served as the local oversight body for the plan's development. In addition, community members outside of the steering committee were involved in the planning process.

What is the Plan's Mission?

The mission of the Harney County Natural Hazards Mitigation Plan is to create a disaster-resilient Harney County. This mission statement is intended to be a timeless statement that is adaptable to any future changes made to the plan. It was developed in collaboration with the Harney County Natural Hazards Mitigation Steering Committee members.

What are the Plan Goals?

The plan goals describe the overall direction that Harney County's agencies, organizations, and citizens can take toward mitigating risk from natural hazards. The goals for the Harney County Natural Hazards Mitigation Plan were developed based on the needs identified by community members. ONHW, together with Steering Committee members developed the following goals for the Mitigation Plan:

- Save lives and reduce injuries.
- Minimize and prevent damage to public and private buildings and infrastructure.
- Increase cooperation and coordination among local, state, and federal agencies.
- Reduce economic loss.
- Protect natural resources.
- Protect cultural resources.

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 Harney County Natural Hazards 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 Harney Electric Cooperative and the Harney County Court, together with the Cities of Burns and Hines will be responsible for adopting the Harney County Natural Hazards Mitigation Plan and providing the support necessary to ensure plan implementation. This Plan is a multi-jurisdictional plan that covers information on natural hazards, vulnerabilities, and action items for the jurisdictions of Harney County, Burns, and Hines. The Plan also provides hazard and vulnerability information and action items for the Harney Electric Cooperative who is the coordinating organization for this Plan. After the Plan is locally reviewed and deemed complete, the Harney Electric Cooperative 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 and the cities 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.

Harney County NHMP Action Item Matrix

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals					
					Save Lives and Reduce Injuries	Minimize and prevent damage to public and private buildings and infrastructure	Increase cooperation and coordination among local, state, and federal agencies	Reduce economic loss	Protect natural resources	Protect cultural resources
Flood # 1	Update the FEMA Firm Floodplain maps.	Harney County Planning Department	Burns, Hines, Harney County, Paiute Tribe, DLCDC, FEMA, OEM	LT	X	X				
Flood # 2	Update regulations in the Harney County floodplain ordinance that incorporate no adverse impact (NAI) practices and address the construction of driveways and culverts in new developments.	Harney County Planning Department	Burns, Hines, County landowners, Harney County Watershed Council, Paiute Tribe, Cattleman Association, Harney County Watermaster, FEMA, DLCDC	ST	X	X			X	
Flood # 3	Educate current homeowners and prospective buyers of property in Harney County about potential floodplain issues on their property and actions they can implement to mitigate the impacts of a flood.	Harney County Planning Department	Burns, Hines, Paiute Tribe, DLCDC, FEMA	ST	X	X				
Flood # 4	Explore the possibility of joining the National Flood Insurance Program (NFIP) Community Rating System (CRS) to reduce NFIP premiums.	Harney County Planning Department	Burns, Hines, Paiute Tribe, DLCDC, FEMA	ST		X				

Flood # 5	Develop mitigation actions for repetitive flood loss properties and single loss properties that will reduce the impact of floods.	Harney County Planning Department	Burns, Hines, Paiute Tribe, DLCDD, FEMA	LT		X				
Wildfire # 1	Revise and update subdivision/partition ordinances to incorporate wildfire mitigation measures to prevent future losses from wildfire.	Harney County Planning Department	Burns, Hines, Paiute Tribe, DLCDD, Oregon Department of Forestry (ODF)	ST		X		X		
Wildfire # 2	Continue cooperation among the Burns Interagency Fire Zone (BIFZ), Oregon Department of Forestry (ODF), Burns and Hines Fire Departments, US Fish and Wildlife Service, Burns Paiute Indian Reservation, the Rangeland Fire Protection Associations, (RFPA), and private landowners concerning wildfire issues as outlined in the CWPP.	Harney County CWPP Core Team	Harney County, Burns, Hines, Paiute Tribe, Rural Fire Protection Association, ODF, United States Fish and Wildlife Service (USFWS)	ST	X		X			
Wildfire # 3	Conduct the Community Firewise Outreach program annually, as outlined in the Harney County CWPP, to encourage residents to create a defensible space around their residences and teach residents about the long-term investment to increase fire safety.	Harney County CWPP Core Team	Harney County, Burns, Hines, Paiute Tribe, BLM, Forest Service	LT	X		X			
Wildfire # 4	Strengthen the Rangeland Fire Protection Associations (RFPAs) capacity to ensure the quality of fire protection service throughout Harney County as detailed in the CWPP.	Harney County CWPP Core Team	Harney County, Burns, Hines, Paiute Tribe, ODF, National Fire Protection Association (NFPA)	ST	X		X			
Wildfire # 5	Provide supplemental water supply tanks in key locations to ensure availability of water throughout the county.	Harney County CWPP Core Team	Harney County, Burns, Hines, Paiute Tribe, FEMA, ODF	LT		X			X	

Wildfire # 6	Use the Community Wildfire Protection Plan's Core Team to coordinate response efforts among federal, state, and county agencies to ensure that wildfire response efforts are effective in the county.	Harney County CWPP Core Team	Harney County, Hines, Burns, Paiute Tribe, BLM, Forest Service, FEMA, ODF	LT			X			
Wildfire # 7	Develop and implement fuel reduction strategies to manage forest health and reduce the likelihood of large-scale wildfires in the Emigrant Creek Ranger District and the Burns BLM District lands.	Harney County	Harney County, Burns, Hines, Paiute Tribe, Nature Conservancy, Forest Service, BLM	LT		X		X	X	
Wildfire # 8	Construct fuel breaks and manage hazardous fuels as delineated in the Community Wildfire Protection Plan (CWPP) to break up the continuity of wildland fuel near major population centers.	CWPP Core Team	Burns, Hines, Harney County, Paiute Tribe, FEMA, Forest Service, BLM	LT		X		X		
Wildfire # 9	Construct barriers on pole power transformers to prevent birds from building nests on them, thereby reducing the chance of wildfires from transformer shorts.	Harney Electric Cooperative	County, Burns, Hines, Paiute Tribe, Audubon Society, Harney County National Wildlife Refuge, Nature Conservancy	LT		X				
Landslide # 1	Make ODOT aware of the landslide issues on Highway 205 at the NWR near Frenchglen, Highway 395 at Divine Canyon, and County Road 47.	Harney County Road Department	Harney County, Oregon Department of Transportation (ODOT)	ST		X		X		
Severe Weather # 1	Educate residents and visitors to Harney County about the dangers of lightening strikes, flash floods, and severe weather in the high desert.	Harney County Chamber of Commerce	Harney County Planning Department, Hunter's Booth Coordinators, BLM, Forest Service, Oregon Hunter's Association	ST	X			X		

Severe Weather # 2	Replace primary electrical overhead lines to mountaintop communication services with underground lines.	Harney Electric Cooperative, Inc	Oregon Trail Electric Cooperative, Companies which are served by the utility and the utility company, Malheur County, Lake County	LT		X		X		
Severe Weather # 3	Shorten spans and anchor poles on utility lines in high wind or heavy icing areas.	Harney Electric Cooperative, Inc.	Oregon Trail Electric Cooperative, Malheur County, Lake County	LT		X				
Earthquake # 1	Inventory and identify critical facilities for seismic retrofit.	Harney County School District No. 3	Burns, Hines, Harney County, Crane School District, DOGAMI, OEM	LT		X				
Drought # 1	Conduct public outreach campaigns to raise awareness about drought hazards and mitigation actions residents can take to reduce the impact of drought on the county.	Harney County Watershed Council	Burns, Hines, Harney County, Paiute Tribe, Natural Resources Conservation Services, Oregon Department of Agriculture	ST					X	
Multi-Hazard # 1	Educate residents about preparing emergency kits and stocking a 14-day supply of food to adequately prepare for a natural hazard event.	Harney County Health Department	Burns, Hines, Paiute Tribe, Harney County, Senior Center (food bank), OEM	ST	X					
Multi-Hazard # 2	Work with local businesses to develop business continuity plans.	Harney County Economic Development (HCED)	Harney County Chamber of Commerce, Oregon Cattleman's Association, Oregon Natural Hazards Workgroup (ONHW)	LT				X		
Multi-Hazard # 3	Inventory historic and cultural resources, with an emphasis on unreinforced masonry buildings, and identify their vulnerabilities to natural hazards to develop mitigation actions for their protection.	Harney County Chamber of Commerce	Burns, Hines, Paiute Tribe, Harney County, Oregon State Historic Preservation Office (SHPO), Forest Service, BLM, USFWS	LT		X				X
Multi-Hazard # 4	Develop a Continuity of Operations Plan (Coop) for Harney County.	Harney County	Burns, Hines, Paiute Tribe, OEM, FEMA	LT		X		X		

Plan Implementation # 1	The Harney County Natural Hazards Mitigation Steering Committee will be the coordinating body responsible for implementing the Harney County Natural Hazards Mitigation Plan.	Harney County Natural Hazard Mitigation Coordinating Body	Burns, Hines, Harney County Planning Department, Harney County Court, Paiute Tribe, US Forest Service, BLM, USFWS	ST			X			
Plan Implementation # 2	Coordinate mitigation planning activities with existing planning activities to incorporate mitigation actions and avoid duplicating efforts.	Harney County Hazard Mitigation Coordinating Body	Harney County, Burns, Hines, Paiute Tribe, CWPP Core Team, Harney County Health Department, Forest Service, BLM, Oregon Department of Health	ST			X			
Plan Implementation # 3	Use the services of the Harney County Emergency Manager to assist in coordinating hazard mitigation meetings and in implementing mitigation action items.	Harney County Hazard Mitigation Coordinating Body	Harney County, Burns, Hines, Paiute Tribe, OEM	ST			X			

Volume I: Natural Hazards Mitigation Plan

Executive Summary

Section 1: Introduction

Section 2: Community Sensitivity and Resilience

Section 3: Risk Assessment Summary

Section 4: Mission, Goals, and Action Items

Section 5: Plan Implementation and Maintenance

Section 1

Introduction

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 policy changes, such as updated ordinances; projects, such as seismic retrofits to critical facilities; education and outreach to targeted audiences, such as Spanish speaking residents, or the elderly. Mitigation is the responsibility of individuals, private businesses and industries, state and local governments, and the federal government.ⁱ

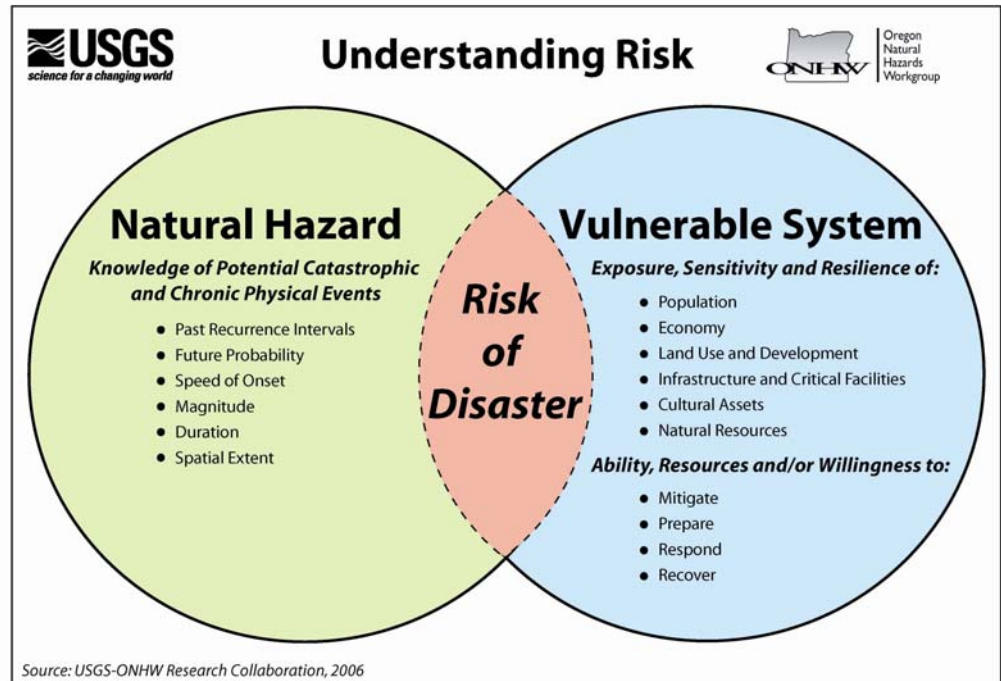
Engaging in mitigation activities provides jurisdictions with a number of benefits, including reduced loss of life, property, essential services, critical facilities and economic hardship; reduced short-term and long-term recovery and reconstruction costs; increased cooperation and communication within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

Why Develop a Mitigation Plan?

Harney County, together with the Harney Electric Cooperative and the cities of Burns and Hines, developed this multi-jurisdictional Natural Hazard Mitigation Plan in an effort to reduce future loss of life and damage to property resulting from natural hazards. It is impossible to predict exactly when these hazards 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 hazards.

Natural disasters occur as a predictable interaction among three broad systems: natural environment (e.g., climate, river systems, geology, forest ecosystems, etc.), the built environment (e.g., cities, buildings, roads, utilities, etc.), and societal systems (e.g. cultural institutions, community organizations, business climate, service providers, etc.) as is depicted in Figure 1.1 below. A natural disaster occurs when a natural hazard impacts the built environment or societal systems and creates adverse conditions within a community.ⁱⁱ

Figure 1.1 Understanding Risk



Source: Oregon Natural Hazards Workgroup

This multi-jurisdictional plan focuses on the primary natural hazards that could affect Harney County, Oregon, the cities of Burns and Hines, and the Harney Electric Cooperative, including wildfire, flood, and severe weather events. Although the plan focuses on these three events, it also addresses earthquake, landslide, volcanic, and drought hazards in the county. The dramatic increase in the costs associated with natural disasters over the past decades has fostered interest in identifying and implementing effective means of reducing vulnerability. 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.ⁱⁱⁱ This Natural Hazards Mitigation Plan is intended to assist Harney County, the cities of Burns and Hines, and the Harney Electric Cooperative in reducing its risk from natural hazards by identifying resources, information, and strategies for risk reduction.

The plan is strategic and non-regulatory in nature, meaning that it does not necessarily 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; (3) aid in meeting federal planning requirements and qualifying for assistance programs. The mitigation plan works in conjunction with other County plans and programs including, the Harney County Comprehensive Plan, the Harney County Transportation Plan, the Harney County Zoning Ordinance, the Harney County Subdivision and Partition Ordinance, the Harney County Emergency Operations 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 the implementation of preventative activities such as land use or watershed management programs and infrastructure improvements. The actions described in the plan are intended to be implemented through existing plans and programs within the County.

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 jurisdiction's comprehensive plan, and helps each jurisdiction 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. It reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. As such, this Act established the Pre-Disaster Mitigation (PDM) grant 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. State 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 (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 a grant to support the development of the natural hazard mitigation plans for the four counties in the region. ONHW, DOGAMI, and the participating communities were awarded the grant in the Fall of 2005 and local planning efforts in this region began in the Fall of 2006.

ONHW provided participating communities with print and web-based resources and facilitated a quarterly series of plan development work sessions that focused on the four phases of the mitigation planning process. In addition, ONHW also provided communities with a number of regional mitigation products to be utilized in the local process. Those products include:

- Plan Templates;
- Training Manual;
- Regional Profile and Risk Assessment; and
- Household Preparedness Survey Report.

DOGAMI provided communities with updated risk assessment data to be utilized in the local planning process. DOGAMI's efforts include updating the Regional Risk Assessment of the State Natural Hazard Mitigation, completion of the HAZUS model for earthquake losses, and identification of existing state and federal hazards data.

Each community is responsible for facilitating the mitigation planning process locally, utilizing the resources provided by ONHW, DOGAMI and other state partners. The community reviewed the resources provided by the various organizations and applied local knowledge, information and data about community characteristics, assets and resources in order to identify potential mitigation actions aimed at reducing the community's overall risk.

The planning process used to create Harney 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.^{iv} 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;
- Harney County Comprehensive Plan;

- Harney County Subdivision Ordinance; and
- Region 8 Household Preparedness Survey Report.

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

Phase I: Getting Started

In December 2006, the Harney Electric Cooperative signed a memorandum of agreement with the Oregon Partners for Disaster Resistance and Resilience to lead the development of a Natural Hazards Mitigation Plan for Harney County. The Oregon Natural Hazards Workgroup hired a graduate student (A. Gregoor Passchier, Graduate Teaching Fellow for the Oregon Natural Hazards Workgroup) to manage the hazard mitigation planning process as well as plan and facilitate community meetings. ONHW staff (Krista Mitchell, ONHW Assistant Director, and André LeDuc ONHW Director) assisted in developing the plan and facilitating the planning process. The Harney Electric Cooperative (Fred Flippence, Harney Electric Cooperative Office Manager) served as the primary local contact, identifying steering committee members for community meetings, organizing community meetings, and fielding any questions local community members had about the planning process. In addition, the Harney Electric Cooperative served as chair for all steering committee meetings.

In January 2007, the Harney Electric Cooperative identified community members to serve as members of the Harney County Mitigation Steering Committee. The steering committee functioned as the community body responsible for overseeing the mitigation planning process, and included representatives from the following organizations:

- US Forest Service;
- Bureau of Land Management;
- Harney County Court;
- Harney County Planning Department;
- Malheur National Wildlife Refuge;
- City of Hines;
- City of Burns; and
- Burns Paiute Tribe

The committee members worked collaboratively with the Electric Cooperative and ONHW to provide local input and feedback to the planning process. On February 9, 2007 the steering committee met for the first time to discuss hazard mitigation in Harney County and the roles and responsibilities expected of committee members and of ONHW. ONHW facilitated the discussion while the Harney Electric Cooperative served as the committee chair. An agenda and a sign-in sheet for this meeting are available in the Appendix A: Planning and Public Process.

Participation among key community members in steering committees served as the primary method for ensuring public participation during Phase I. The Harney Electric Cooperative and ONHW invited community members and stakeholders from around Harney County to participate in the planning process and provide representation from their organization's point of view. Appendix A: Public

Process lists the participating members. Committee members were also encouraged to speak with their local representatives to inform them of the mitigation planning process currently being undertaken by their organization.

In addition, as part of the regional PDM grant, ONHW implemented a region-wide household preparedness survey where the public could provide input to the plan regarding their natural hazards. 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. Results of the survey are documented in an independent report in Appendix D Household Preparedness Survey.

To supplement information gathered from Steering Committee members, ONHW also conducted stakeholder interviews with the following organizations in Harney County:

- Harney County Planning Department
- Bureau of Land Management
- US Forest Service
- Harney Electric Cooperative
- Harney County Health Department
- City of Hines
- City of Burns

Interviews conducted with the above organizations provided information on the extent of natural hazards found within Harney County, as well as information on mitigation or other emergency management planning efforts being undertaken within the county.

The County's project webpage located on the Partners for Disaster Resistance and Resilience website (www.OregonShowcase.org) served as an outreach tool to the community. The webpage was used to provide local contact information and updates on the planning process. The final adopted and approved plan will be posted on the Partnership website via the University of Oregon Libraries' Scholar's Bank Digital Archive.

Phase II: Risk Assessment

The plan's risk assessment is documented in three individual components within the plan. First, the community's vulnerability in terms of community assets and resources at risk as well as existing capabilities to address mitigation are documented in Section 2 – Community Sensitivities and Resilience. Second, the hazards impacting the community are identified and profiled in Section 3 – Risk Assessment Summary. Third, each hazard addressed in the plan has an accompanying hazard annex which includes information on hazard specific ordinances, plans or studies, after-incident reports, and any relevant hazard maps. All three of these components together help to define the community's risk, as is depicted in Figure 1.1.

ONHW completed the community participatory elements of Phase II in two back-to-back meetings in March 2007.

On March 28, 2007, ONHW facilitated a community asset identification workshop to identify important assets in Harney County. The asset identification workshop focused on the following five themes:

- Population
- Economy
- Critical Facilities and Infrastructure
- Historic and Cultural Resources
- Environmental

Thirteen community members representing different segments in Harney County attended the meeting to provide community input. Including community members outside of the Steering Committee for the workshop served as the primary means for public participation in this meeting (see Appendix A: Planning and Public Process for an agenda, meeting notes, and a list of participants).

To assist in information gathering, ONHW distributed worksheets that listed a series of questions for each of the five themes. Participants had a few moments to write down their ideas and then later shared them with the group. The worksheets were also distributed to participants several weeks prior to the meeting to help facilitate discussion among community members (see Appendix A: Planning and Public Process, Community Assets Workshop Notes for a summary of the meeting notes).

The following day, on March 29, 2007, ONHW facilitated a hazard identification workshop with steering committee members and several community members to discuss the primary hazards affecting Harney County (see Appendix A: Public Process Annex for an agenda, meeting notes, and a participant list). ONHW, together with DOGAMI, presented geographic features for each natural hazard as well as the local hazard history in Harney County. ONHW then discussed with committee members potential impacts of the hazard on the county. Finally, committee members rated the three most significant natural hazards affecting Harney County using sticker dots. The three most concerning hazards committee members identified are the following:

1. Wildfire
2. Flood
3. Severe Weather events

The hazards listed above are rated by priority, with wildfire being the most concerning hazard of the three.

The risk and vulnerability assessments provided in the plan are a combination of the State of Oregon's Natural Hazard Mitigation Plan (NHMP) Risk Assessment for Harney County and local information. The State of Oregon NHMP provides risk and vulnerability assessments for drought, wildfire, flood, landslides, windstorms, and winter storms. The information provided by the state is supplemented in this plan with local information provided by steering committee

members familiar with hazards in the county and their potential impact on certain segments of the population. For example, flooding was identified in Harney County as having a significant impact on residents in some county housing developments.

Harney County is vulnerable to a number of different natural hazards. Based on the risks assessments included in this plan, the primary natural hazards that affect Harney County include:

- Wildfire
- Flood
- Drought
- Severe Weather

Other hazards, such as earthquake and volcano, affect Harney County to a lesser extent, but should they occur elsewhere in the state, they could have an indirect impact on the county.

Phase III: Developing a Mission, Goals and Action Items

The Plan's mission statement and goals direct the Plan's action items and reflect the priorities found in the community. ONHW, in consultation with the Harney County Mitigation Steering Committee, developed a mission statement and goals for the plan. On June 28, 2007, ONHW facilitated the Mission, Goals, and Action Items Steering Committee Meeting, chaired by the Harney Electric Cooperative, where Steering Committee members conducted a final review and approved the stated goals and action items. (For an agenda and participant list, see Appendix A: Planning and Public Process in this plan) The mission statement for the Plan, while simple, is intended to be a timeless statement that can withstand any changes the plan may undergo over time. The goals reflect the broad needs found within the community.

In addition to the mission and goals, the Mitigation Plan also includes action items which are specific mitigation activities the county can implement to reduce its vulnerability to natural hazards. ONHW, in consultation with the Harney County Mitigation Steering Committee, identified actions based on previous Steering Committee meetings and stakeholder interviews. At the June 28, 2007 Mission, Goals, and Action Items Steering Committee meeting, ONHW and Steering Committee members reviewed each action item and approved them after necessary changes. The action items for the Harney County Natural Hazard Mitigation Plan address all major natural hazards identified in the plan and include a comprehensive range of activities to be completed. The approved action items are found in Section 4 of this plan.

Phase IV: Plan Implementation and Maintenance

The implementation and maintenance structure for the Mitigation Plan relies on continued community involvement. On June 28, 2007, the Mitigation Steering Committee and ONHW met to discuss the plan implementation and maintenance process. The Steering Committee identified the Harney Electric Cooperative as the convener for organizing and prioritizing implementation of action items, and Steering Committee members as the members of the coordinating body to oversee implementation of the plan. The Steering Committee agreed that the coordinating

body will meet on a semi-annual basis to review the plan and review implementation of the action items. The Steering Committee also agreed that continued public involvement is essential to maintaining the Plan and obtaining community support for mitigation action items.

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 Harney County, the cities of Burns and Hines, citizens, businesses, and the environment. Combined, the sections work in synergy to create a mitigation plan that furthers the community's mission to reduce risk 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.

Section 2: Community Sensitivity and Resilience

This section documents the community's sensitivities – those community assets and characteristics that may be impacted by natural hazards, as well as community resilience – the ability to manage risk and adapt to hazard event impacts.

Examples of community sensitivity factors include human populations, the local economy, critical facilities and infrastructure, cultural and historic resources, and environmental assets. Community resilience factors include existing plans, policies, programs or community organizations that influence a community's character, governance or growth trends.

Section 3: Risk Assessment Summary

This section describes the risk assessment process and summarizes the best available local hazard data. A hazard summary is provided for each of the hazards addressed in the plan. The summary includes hazard history, location, extent, probability and previous mitigation efforts.

Section 4: Mission, Goals and Action Items

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

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 semi-annual and 5-year review meetings.

Hazard-Specific Annexes

The purpose of the hazard-specific annexes is to provide additional resources and documentation of the hazard. Where extensive local data is available, beyond the scope of information provided in Section 3, the additional local data is placed in the annex found in Appendix B of the plan. The hazard specific annexes included with this plan are the following:

- Earthquake;

- Flood;
- Landslide/Debris Flow;
- Volcanic Event;
- Wildfire;

City Addendums

The Harney County Natural Hazards Mitigation Plan is a multi-jurisdiction plan that includes addendums addressing natural hazards found in the cities of Burns and Hines and for the Harney Electric Cooperative. While the Mitigation Plan covers natural hazards found throughout the county, the addendums provide additional natural hazard information and action items specific to the cities of Burns, Hines, and for the Harney Electric Cooperative.

Resource Appendices

The resource appendices are designed to provide the users of the Harney 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.

Public Participation

Appendix A includes documentation of all the public processes utilized to develop the plan. It includes invitation lists, agendas, sign-in sheets, and summaries of Steering Committee meetings as well as any other public involvement methods.

Economic Analysis of Natural Hazards Mitigation Projects

Appendix C 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. 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.

Regional Household Preparedness Survey

Appendix D 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.

Success Template

Appendix G includes the State of Oregon's template for documenting mitigation successes. The templates provide a format communities can use to document successful mitigation projects they have completed, and may serve as the plan's record of completed mitigation projects.

Independent Reports Referenced

The following reports were utilized to develop portions of the mitigation plan. These reports are not included as appendices to this mitigation plan, as they are either a component of the State's approved enhanced mitigation plan or an independent report developed by partner agencies.

Regional Profile and Risk Assessment

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.

2006 Action Item Report

This report identifies sample mitigation actions by category, including: population, economy, land use and development, infrastructure and critical facilities, natural resources, historic and cultural resources, understanding risk, community capacity, and implementation. For each category, state and national rationale as well as ideas for implementation are provided. Communities can utilize this report to strengthen local action items.

ⁱ Massachusetts Department of Environmental Management. 1999. "Hazard Mitigation: Managing Risks, Lowering Costs.

<http://www.state.ma.us/dem/programs/whatis.htm> Accessed 8/2/02

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

ⁱⁱⁱ National Institute of Building Science’s Mutli-hazard Mitigation Council.
“Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings
from Mitigation Activities” 2005.

^{iv} More information on the Oregon Natural Hazards Workgroup can be found at
<http://www.oregonshowcase.org/onhw>

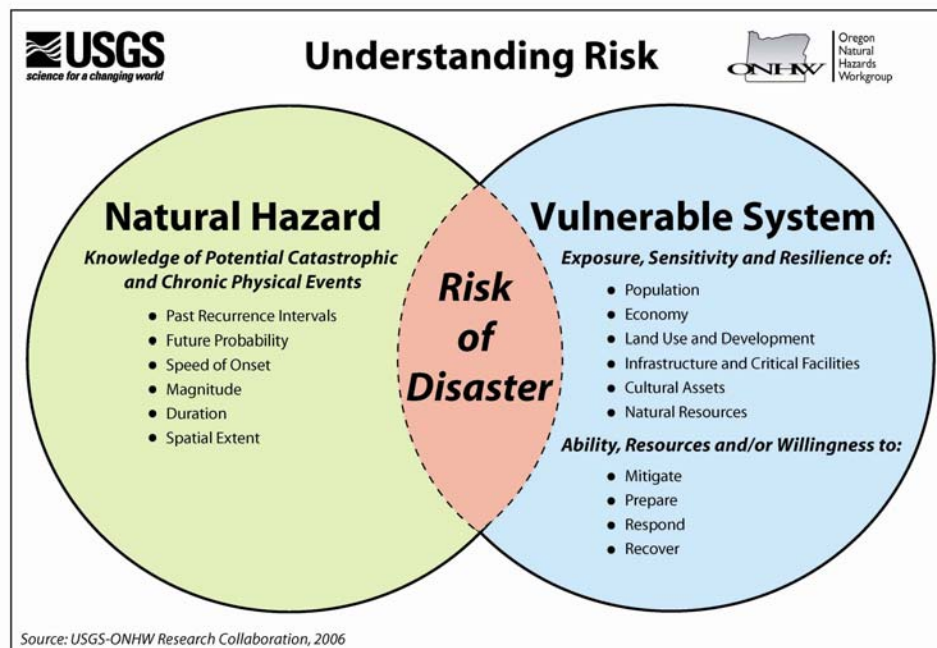
Section 2

Community Sensitivity and Resilience

This section documents the community’s sensitivity factors, or those community assets and characteristics that may be impacted by natural hazards, (e.g., special populations, economic factors, and historic and cultural resources). It also identifies the community’s resilience factors, or the community’s ability to manage risk and adapt to hazard event impacts (e.g., governmental structure, agency missions and directives, and plans, policies, and programs). The information in this section represents a snapshot in time of the current sensitivity and resilience factors in the community when the plan was developed. The information documented below, along with the findings of the risk assessment, should be used as the local level rationale for the risk reduction actions identified in Section 4 – Mission, Goals, and Action Items. The identification of actions that reduce a community’s sensitivity and increase its resilience assist in reducing the community’s overall risk, or the area of overlap in Figure 2.1 below.

Sensitivity and resilience factors specific to the cities of Burns and Hines and the Harney Electric Cooperative can be found in the city addendums located at the end of this plan.

Figure 2.1 Understanding Risk



Source: Oregon Natural Hazards Workgroup, 2006.

Community Sensitivity Factors

The following table documents the key community sensitivity factors in Harney County. The information presented below was gathered at the March 28, 2007 community asset identification meeting (see Appendix A: Planning and Public Process for a meeting agenda, notes, and participation list).

Population
<p>Population segments located in Harney County that can be particularly vulnerable to natural hazards include the following:</p> <ul style="list-style-type: none"> • Students, especially in rural school districts • Assisted living residents located in Burns • Elderly populations in rural areas far from medical facilities • Rural populations that can be isolated in an emergency • Ranchers and agricultural workers • Tourists: hunters, birders, and visitors to Steens Mountain • Disabled populations that are homebound and located in rural areas • Young families • Native American populations, the Paiute Indians • Spanish-speaking populations • Incarcerated population • Newcomers to Harney County that may not realize some of the dangers of living in the high desert. • Mobile homes located in the floodplain in and around Burns/Hines. • Population areas are growing into wildland/urban interface, with new housing developments growing in wild sagebrush area northwest of town • The Meadowlands Ranch subdivision in the county is being built in the 100-year floodplain. The flood risk is uncertain because of the outdated flood maps for the county.
Economic Assets
<ul style="list-style-type: none"> • Major employers in Harney County are government agencies such as the Bureau of Land Management and the US Forest Service • Local governments of Burns, Hines, and the county also provide employment • The School system is a major employer, but the buildings are vulnerable to earthquakes. • Agriculture is a major employer with hay and cattle ranching being the major products. Harney County has approximately 114,000 cattle in the whole county. • Small businesses such as hotels depend on tourists who come to see the Malheur National Wildlife Refuge • Two bulk plants in Burns and Hines for fuel storage • Historic resources that benefit the economy are the Frenchglen Hotel, the Diamond Hotel, and the Round Barn. • Infrastructure, especially the state highways (20, 395, 205, 78) are important to sustaining the local economy • The hospital is an important economic asset to the community • Wildlife in Harney County brings tourists, bird watchers and hunters. • Wind farms are a growing economic asset to the county

Cultural and Historic Assets

- Unique historic structures in Harney County include the following:
 - Peter French Round barn
 - Frenchglen Hotel
 - Diamond Hotel
- All three buildings are subject to flooding, fire, and wind damage.
- All three buildings serve as economic assets, attracting tourists, but some also provide essential services to tourists such as hotel services
- Buildings or structures in Harney County listed on the National Register of Historic Places include the following:
 - Allison Ranger Station
 - Double-O Ranch Historic District
 - Pete French Round Barn
 - Frenchglen Hotel
 - P Ranch
 - Riddle Ranch
 - Sod House Ranch
- Paiute Indian Tribes represent a cultural and historic asset to the community, some of their resources include seasonal camps, trails, and European and American homesteads located throughout the county, mostly in Forest Service and BLM lands.
- Fire lookouts in Forest Service and BLM lands provide unique cultural and historic structures representing wildfire history
- Structures relating to the timber and ranching industry are unique historical assets.
- Harney County Museum in Burns contains a collection of historical artifacts
- Other structures considered historical assets in Harney County include:
 - Civilian Conservation Corps structures
 - The Hines Park
 - Old Hines Guesthouse
 - The Hospital
 - Military sites representing significant military battle sites

Critical Facilities & Infrastructure

Critical facilities and infrastructure in Harney County include:

- The State highways, (395, 20, 78, 205)
- County roads
- Police, fire, and other emergency services
- Communications centers, especially the 911 call centers
- Communications infrastructure
 - Cell phone towers
 - Telephone lines
 - Utilities
 - Television and Cable
- Burns Municipal Airport which is located in the floodplain
- The Harney District Hospital and EMS.
- Water storage and treatment plans, both located in floodplains
- Oregon National Guard facility
- Veterinary Office for the treatment of animals and livestock

- Government buildings
 - County Courthouse
 - City halls of Burns and Hines
 - Jails-Youth Facility
- Schools
 - Burns High School
 - Hines Middle School
 - Slater Grade School
- Interagency type 3 team, also known as the high desert type 3 team to respond to wildfires
- Fireguard stations in Frenchglen and Burns and Hines
 - Areas important because to respond to a hazard event successfully, these areas must be protected
- Waste disposal facilities
- Fuel storage facilities
- Fairgrounds, also located in the floodplain
- Several areas in Harney County, especially in rural areas are one road in and one road out, and these areas are particularly vulnerable.

Natural Resources

Major Natural resources in Harney County include:

- Malheur National Wildlife Refuge
 - Major tourist attraction for Harney County that could impact the county economically if the area is impacted by natural hazards
- Steens Mountain
 - Major tourist attraction for Harney, and a vulnerable area for severe weather events for tourists visiting the mountain.
- Grazing allotments on Federal land (4 million acres), and many ranchers depend on these allotments to feed their livestock.
 - Should grass and grazing be compromised due to natural hazards, then many ranchers could suffer losses or incur additional expenses to feed livestock.
- Impoundments
 - Chickahominy reservoir
 - Allison Spring
- Hot springs throughout Harney County
- Wildlife-Hunting, tourism
- Native hay meadows, important to keep them intact
- Forests
 - Malheur National Forest
 - Ochoco National Forest
- Park systems, golf course
- Geologic stability
- Mineral deposits
- Water resources
- Natural energy resources
 - Solar
 - Wind
 - Geothermal

Land Use and Development

- Isolated county parcels a problem in Harney County due to limited access to roads and services such as power and water
- Little regulation of buildings being built in the floodplain, there are building codes and restrictions that must be met, but no restrictions on where a building can be placed and what standards they can implement.
- Growth occurring in the northwest corner of Burns and Hines in the hills
- Meadow Land Ranch subdivision just east of Burns and Hines is another growth area
 - This area is subject to flooding events, and new development, especially the construction of driveways, is restricting natural water flow in the low-lying area.
- Septic tanks are a problem in the county especially during flooding events.
- The floodplain map is very outdated and does not reflect existing flooding standards.

Community Resilience Factors

The following documents the key community resilience factors in Harney County including a description of the local government's structure, existing plans and policies, and community organizations and programs.

Government Structure

Harney County's governing jurisdiction includes all areas not governed by the US Forest Service, the Bureau of Land Management, the Paiute Indian reservation, the Malheur National Wildlife Refuge, and the incorporated communities of Burns and Hines.

The Harney County Court is the governing body responsible for administering Harney County ordinances and regulations. The court is comprised of three elected officials: the County Judge who presides over the court and two county commissioners. The court and commissioners are responsible for creating and presiding over regulations in the county.

The Harney County government also includes a number of different departments responsible for implementing county regulations.

The Planning department implements the Harney County Comprehensive Plan, the Harney County Zoning Ordinance, and the Harney County Subdivision Ordinance. The department is also responsible for processing county land use applications. The county zoning ordinance includes regulations for development in natural hazard areas, such as floodplains, steep slopes, and areas subject to wildfire. The county is also responsible for issuing a Floodplain Development Permit that provides documentation showing a structure is constructed at a particular height above grade to mitigate against future flood damage.²

¹ <http://www.harneycounty.org/buildingprocess.htm#floodplain>, accessed April 11, 2007

Harney County contracts building inspections and permitting to a private business, Inspections, Inc., in place of having a county building department. Inspections, Inc. is responsible for conducting inspections on buildings in the county and issuing building permits, which are given final approval by the county. In addition, Inspections, Inc. is responsible for ensuring that buildings meet building code requirements in terms of requirements in floodplains.

Existing Plans & Policies

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.²

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, and maximizes the county's resources.

The following are existing plans and policies already in place within the community:

- Harney County Comprehensive Plan (2002)
- Harney County Zoning Ordinance-August (2002)
- Harney County Subdivision and Partitioning Ordinance
- Harney County Transportation System Plan (June 2001)
- Harney County Community Wildfire Protection Plan (December 2005)
- Harney County Emergency Operations Plan

Table 2.1 below further defines each of these plans and policies.

² Burby, Raymond J., ed. 1998. *Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities*.

Table 2.1 Harney County Existing Plans and Policies

Plan Policy and Name	Author	Purpose	Relation to Natural Hazard Mitigation
Harney County Comprehensive Plan	Harney County Planning Department Morgan, Ryan, and Associates	“The Harney County Comprehensive Plan was developed for the purpose of providing a guide for the conservation of Harney County’s land resources. It is a generalized long-range policy guide and decision-making tool, which will affect economic, social and physical development of Harney County.	The “Natural Hazards-Limitations” discusses among other things, floodplains, steep slopes, and earthquake hazards in addition to a Natural Hazards and Limitation Policies.
Harney County Zoning Ordinance	Harney County Planning Department	There are several purposes including: “to serve with the subdivision ordinance as the primary implementation tool for the Harney County Comprehensive Plan, to encourage the most appropriate use and development of land.”	Some zoning regulations may relate to natural hazards in the area, and it helps facilitate implementation of the comprehensive plan, which relates to natural hazards.
Harney County Subdivision and Partitioning Ordinance	Harney County Planning Department	The subdivision ordinance is created for several reasons, including: “to aid in the implementation of the Comprehensive Plan...to assist in the implementation of the Oregon Statewide Land use Goals and Guidelines	Some of the building/lot regulations may be related to natural hazard mitigation.
Harney County Transportation System Plan	Harney County Planning Department	To provide and encourage a safe, convenient, and economic transportation system.	Maintaining a well-functioning transportation system is necessary for the evacuation, response, and recovery periods of the disaster cycle.
Harney County Community Wildfire Protection Plan	Walsh Environmental Scientists and Engineers	The Community Wildfire Protection Plan (CWPP) “allows a community to evaluate its current situation with regards to wildfire risk for protection of human welfare and other important economic or ecological values.”	The CWPP assesses Harney County’s vulnerability to wildfires and provides a list of mitigation and response actions communities can take to reduce that risk.
Harney County Emergency Operations Plan	Harney County Health Department	To provide a plan for responding to emergencies.	The Operations Plan outlines how organizations in the County respond to emergencies. Organizations involved in response planning can coordinate with mitigation planning efforts.

Community Organizations and Programs

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, 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 on a number of issues, one of which could be natural hazard preparedness and mitigation.

The following organizations are active within the community and may be potential partners for implementing mitigation actions:

- Ashley Manor Care Center
- Boys and Girls Club of Harney County
- Dutch Apple (nursing home)
- Eastern Oregon Center for Independent Living
- Elk's Lodge #1680
- Harney County Casa
- Harney County Chamber of Commerce
- Harney County Extension Office
- Harney County Home Health and Hospice
- Harney County Senior and Community Services Center (Dial-a-Ride)
- Harney County Senior and Community Services Center
- Harney District Hospital
- Head Start of Harney County
- High Desert Medical Center
- Little Angels Preschool
- Roy's Tax Service
- Strategic Staffing Services, Inc.
- The Aspens
- Training and Employment Consortium

A table including 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 is included in Appendix E at the end of this plan. The three involvement methods 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.

Existing Mitigation Activities

Existing mitigation activities include current mitigation programs and activities that are being implemented by the community in an effort to reduce the community's overall risk to natural hazards. Documenting these efforts can assist the community in better understanding its risk and can assist in documenting successes. Although the Harney County government has not implemented any mitigation activities in terms of natural hazards, different organizations in the community have implemented mitigation activities.

Severe Weather

After a winter storm in 2003 to 2004 that damaged overhead electrical lines totaling \$33,769, the Harney Electric Cooperative received \$172,877 in mitigation funding to place power lines underground to reduce the future probability of power line damage. The Electric Cooperative has also used intermediary poles to decrease the span of the power lines to prevent them from breaking due to ice buildup.³

Wildfire

The Bureau of Land Management (BLM) has conducted public outreach campaigns to inform the public and visitors to BLM land of the natural hazards the county is susceptible to. The BLM also uses Remote Automated Weather Stations (RAWS) to monitor severe weather events as a method of providing early warning to areas in the county susceptible to natural hazards.⁴

In Forest Service lands, prescribed burns are conducted on a regular basis to prevent larger forest fires from occurring. While not eliminating the fire hazard completely, prescribed burns can reduce the intensity of a wildfire by eliminating fuels and assist in wildfire suppression.⁵

Harney County has also come one step closer to implementing mitigation activities with the creation of the Harney County Community Wildfire Protection Program (CWPP). The CWPP lists a number of mitigation measures communities and the county can implement to reduce the risk of fires on communities. This plan will also incorporate many of the actions identified in the CWPP to ensure consistency between plans.

³ Flippence, Fred, interview with A. Gregoor Passchier. March 28, 2007.

⁴ Williams, Michael, telephone interview with A. Gregoor Passchier, March 19, 2007.

⁵ Huber, William, telephone interview with A. Gregoor Passchier, March 16, 2007.

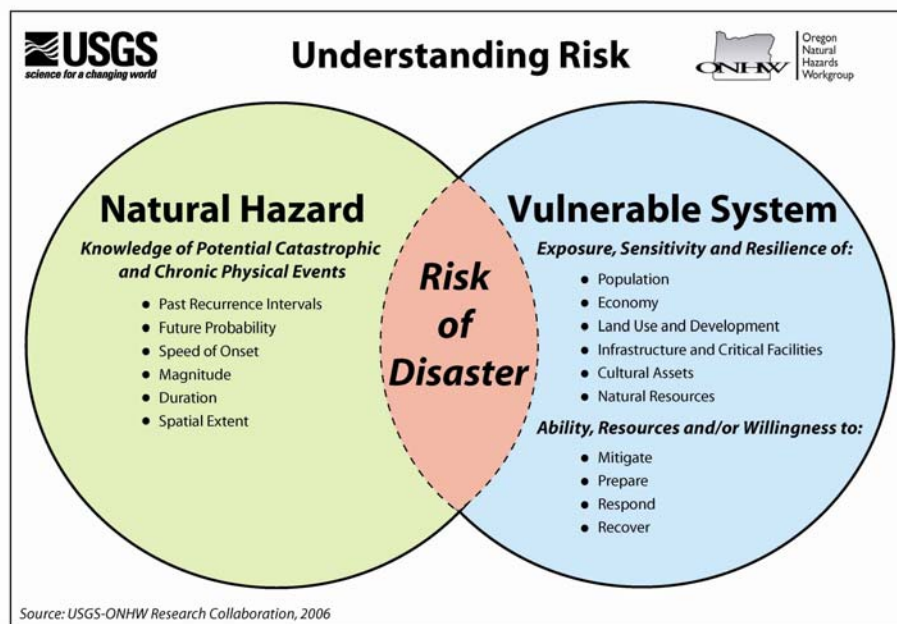
Section 3

Risk Assessment Summary

The foundation of the Harney County Natural Hazards Mitigation Plan is the risk assessment. 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.

This section identifies and profiles the location, extent, previous occurrences, and future probability of natural hazards that can impact the community, as highlighted in Figure 3.1 below. The information in this section was paired with the information in Section 2 – Community Sensitivity and Resilience during the planning process in order to identify issues and develop actions aimed at reducing the community’s overall risk, or the area of overlap in the figure below.

Figure 3.1. Understanding Risk



Source: Oregon Natural Hazards Workgroup, 2006

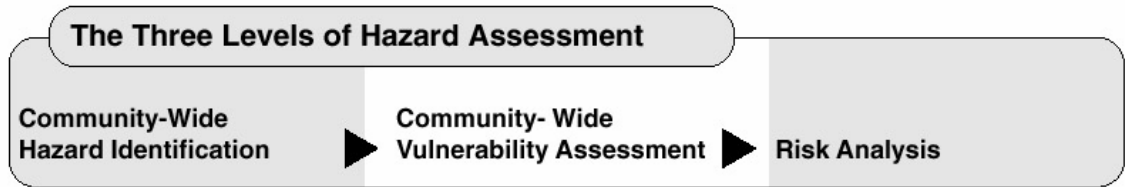
This section drills down to local level information and the understanding of the risks the community faces. In addition to local data, the information here relies upon the Regional Risk Assessment in the State Natural Hazard Mitigation Plan and the Department of Geology and Mineral Industries (DOGAMI) regional risk assessment study completed as part of the larger planning initiative. Additionally, detailed risk assessment information on existing policies, programs and reports for each hazard are included in Appendix B: Hazard Annexes located at the end of the plan.

What is a Risk Assessment?

A risk assessment consists of three phases: hazard identification, vulnerability assessment, and risk analysis, as illustrated in the following graphic.

Figure 3.1 The Three Phases of a Risk Assessment

Source: Planning for Natural Hazards: Oregon Technical Resource Guide



The first phase, hazard identification, involves the identification of the geographic extent of a hazard, its intensity, and its probability of occurrence. This level of assessment typically involves producing a map. The outputs from this phase can also be used for land use planning, management, and regulation; public awareness; defining areas for further study; and identifying properties or structures appropriate for acquisition or relocation.ⁱ

The second phase, vulnerability assessment, combines the information from the hazard identification with an inventory of the existing (or planned) property and population exposed to a hazard, and attempts to predict how different types of property and population groups will be affected by the hazard. This step can also assist communities to justify changes to building codes or development regulations, property acquisition programs, policies concerning critical and public facilities, taxation strategies for mitigating risk, and informational programs for members of the public who are at risk.ⁱⁱ

The third phase, risk analysis, involves estimating the damage, injuries, and costs likely to be incurred in a geographic area over a period of time. Risk has two measurable components: (1) the magnitude of the harm that may result, defined through the vulnerability assessment, and (2) the likelihood or probability of the harm occurring. An example of a product that can assist communities in completing the risk analysis phase is HAZUS, a risk assessment software program for analyzing potential losses from floods, hurricane winds and earthquakes. In HAZUS-MH current scientific and engineering knowledge is coupled with the latest geographic information systems (GIS) technology to produce estimates of hazard-related damage before, or after a disaster occurs.

This three-phase approach to developing a risk assessment should be conducted sequentially because each phase builds upon data from prior phases. However, gathering data for a risk assessment need not occur sequentially.

Hazard Summary

This section provides an overview of the risk assessments for the natural hazards affecting Harney County. For more detailed information on each hazard, see Hazard Annexes located in Appendix B.

The majority of the hazard description text comes from the Hazard Chapters of the State of Oregon's Natural Hazard Mitigation Plan and the Oregon Technical Resource Guide.

Please note that information on the community's probability and vulnerability rankings for the Drought and Landslide hazards, listed as either, high, moderate, or low, comes from a 2003 analysis of risk conducted by county emergency services and public safety staff for Oregon Emergency Management.

The probability and vulnerability rankings for Earthquake, Fire, Flood, Volcano, and Severe Weather hazards are derived from evaluating the 2003 risk analysis with local hazard information and with hazard information provided by DOGAMI. DOGAMI was consulted for all changes made to the probability and vulnerability rankings from the 2003 risk analysis.

The probability and vulnerability scores in the hazard summaries 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 regional 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.

The hazard analysis methodology, presented above, was developed by the Oregon Emergency Management Agency. A more detailed summary of the methodology can be found in Appendix B.

Drought Summary

Drought can be defined in several ways. The American Heritage Dictionary defines drought as "a long period with no rain, especially during a planting season." Another definition of drought is a deficiency in surface and sub-surface water supplies. In socioeconomic terms, drought occurs when a physical water shortage begins to affect people, individually and collectively and the area's economy.

Drought is typically measured in terms of water availability in a defined geographical area. It is common to express drought with a numerical index that ranks severity. The Oregon Drought Severity Index is the most commonly used drought measurement in the state because it incorporates both local conditions and mountain snow pack. The Oregon Drought Severity Index categorizes droughts as mild, moderate, severe, and extreme.

Impacts

Drought is frequently an "incremental" hazard, the onset and end are often difficult to determine. Also, its effects may accumulate slowly over a considerable period of time and may linger for years after the termination of the event.

Droughts are not just a summer-time phenomenon; winter droughts can have a profound impact on agriculture, particularly east of the Cascade Mountains. Also, below average snowfall in higher elevations has far-reaching effects, especially in terms of hydro-electric power, irrigation, recreational opportunities and a variety of industrial uses.

Drought can affect all segments of a jurisdiction's population, particularly those employed in water-dependent activities (e.g., agriculture, hydroelectric generation, recreation, etc.). Discussions with community members in Harney County during the hazard identification process indicated that drought conditions have a negative impact on cattle ranching, and have impacted tourism in the Malheur National Wildlife Refuge. Malheur and Harney Lakes are particularly susceptible to drought conditions. A long-term drought caused Malheur Lake to drop to 400 acres in 1992 from 175,000 acres six years before. Also, domestic water-users may be subject to stringent conservation measures (e.g., rationing) and could be faced with significant increases in electricity rates. The City of Hines institutes water rationing through their wasteful water ordinance that prevents residents from watering lawns from 1 to 5 pm in drought conditions.

Facilities affected by drought conditions include communications facilities, hospitals, and correctional facilities that are subject to power failures. Storage systems for potable water, sewage treatment facilities, water storage for firefighting, and hydroelectric generating plants also are vulnerable. Low water also means reduced hydroelectric production especially as the habitat benefits of water compete with other beneficial uses. In addition, water-borne transportation systems (e.g., ferries, barges, etc.) could be impacted by periods of low water.

There also are environmental consequences. A prolonged drought in forests promotes an increase of insect pests, which in turn, damage trees already weakened by a lack of water. A moisture-deficient forest constitutes a significant fire hazard (see the Wildfire summary). Discussions with community members during the Harney County hazard identification process indicate that while drought may limit the growth of fuel for wildfires, it does provide ideal conditions for wildfires to occur. Drought significantly increases the probability for lightning-caused wildfires to occur, and provides ideal conditions for the rapid spread of wildfire. In addition, drought and water scarcity add another dimension of stress to species listed pursuant to the Endangered Species Act (ESA) of 1973.

For more information on the drought hazard, please visit the state plan's Drought chapter.

Table 3.1 Local Drought Information

Location of Hazard:	Extent of Hazard at the Location:
County-wide	County-wide
<p>Previous Occurrences of the Hazard Within the Community:</p> <p>Source: Oregon State Natural Hazard Mitigation Plan Burns Times Herald Governor’s Executive Orders</p>	
<p>1904-1905 A drought period of about 18 months throughout Oregon</p> <p>1917-1931 A very dry period, punctuated by brief wet spells in 1920-21 and 1927 throughout Oregon</p> <p>1939-1941 A three-year intense drought in Oregon</p> <p>1976-1981 Intense drought in western Oregon; 1976-77 single driest year of the century</p> <p>1985-1997 Generally a dry period, capped by statewide droughts in 1992 and 1994</p> <p>1992 Drought dries up Malheur Lake, the lake declined over a six-year period from 175,000 acres to 400 acres.¹</p> <p>2000-2001 General statewide drought</p> <p>2001 Harney County Drought Declaration by Executive Order 01-12</p> <p>2002 Harney County Drought Declaration by Executive Order 02-21</p> <p>2003 Harney County Drought Declaration by Executive Order 03-05</p>	
<p>Community’s Probability of a Future Hazard Event:</p> <p>Source: Oregon State Natural Hazard Mitigation Plan</p>	
High	
<p>Community’s Vulnerability to a Future Hazard Event:</p> <p>Source: Oregon State Natural Hazard Mitigation Plan Burns Times Herald Community Steering Committee Meetings</p>	
Moderate	

¹ October 14, 1992, *Burns Times Herald*.

Earthquake Summary

Seismic events were once thought to pose little or no threat to Oregon communities. However, recent earthquakes and scientific evidence indicate that the risk to people and property is much greater than previously thought. Oregon and the Pacific Northwest in general are susceptible to earthquakes from three sources: 1) the off-shore Cascadian Fault Zone; 2) deep intra-plate events within the subducting Juan de Fuca Plate; and 3) shallow crustal events within the North American Plate.

While all three types of quakes possess the potential to cause major damage, Subduction zone earthquakes pose the greatest danger. The source for such events lies off the Oregon coast and is known as the Cascadia Subduction Zone (CSZ). A major CSZ event could generate a magnitude earthquake of 9.0 or greater resulting in devastating damage and loss of life.

The specific hazards associated with an earthquake include the following:

Ground Shaking

Ground shaking is defined as the motion or seismic waves felt on the earth's surface caused by an earthquake. Ground shaking is the primary cause of earthquake damage.

Ground Shaking Amplification

Ground shaking amplification refers to the soils and soft sedimentary rocks near the surface that can modify ground shaking from an earthquake. Such factors can increase or decrease the amplification (i.e., strength) as well as the frequency of the shaking.

Surface Faulting

Surface faulting are planes or surfaces in earth materials along which failure occurs. Such faults can be found deep within the earth or on the surface. Earthquakes occurring from deep lying faults usually only create ground shaking.

Earthquake-Induced Landslides

These landslides are secondary hazards that occur from ground shaking.

Liquefaction

Liquefaction takes place when ground shaking causes granular soils to turn from a solid into a liquid state. This in turn causes soils to lose their strength and their ability to support weight.

Impacts

Oregon is rated third highest in the nation for potential losses due to earthquakes. This is due in part to the fact that until recently Oregon was not considered to be an area of high seismicity, and consequently the majority of buildings and infrastructure were not designed to withstand the magnitude of ground shaking that would occur in conjunction with a major seismic occurrence. Experts predict that in the event of a magnitude 8.5 Cascadia Subduction Zone earthquake, losses in the Cascadia Region (Northern California, Oregon, Washington and British Columbia) could exceed \$12 billion, 30,000 buildings could be destroyed, and 8,000 lives lost.

The degree of damage to structures and injury and death to people will depend upon the type of earthquake, proximity to the epicenter and the magnitude and duration of the event. Buildings, airports, schools, dams, levees and lifelines including water, sewer, storm water and gas lines, transportation systems, and utility and communication networks are particularly at risk. Also, damage to roads and water systems will make it difficult to respond to post-earthquake fires.

Earthquake damage to roads and bridges can be particularly serious by hampering or cutting off the movement of people and goods and disrupting the provision of emergency response services. Such effects in turn can produce serious impacts on the local and regional economy by disconnecting people from work, home, food, school and needed commercial, medical and social services. A major earthquake can separate businesses and other employers from their employees, customers, and suppliers thereby further hurting the economy. The Cities of Burns and Hines are particularly susceptible to being isolated given that Highway 20, 395, and 78 are the only major transportation routes connecting the cities with the rest of the state. Should an earthquake damage any of these transportation routes, communities in Harney County can find themselves isolated. Finally, following an earthquake event, the cleanup of debris can be a huge challenge for the community.

While the probability of an earthquake occurring in Harney County is considered low to moderate, the County does remain vulnerable given the large number of unreinforced masonry buildings and unreinforced critical buildings in the county. In 2007, DOGAMI completed the Oregon Statewide Seismic Needs Assessment that looked at the potential for collapse for Oregon education and emergency services facilities. Most of Harney County's education and emergency services facilities were assessed in this report. The report indicates that 11 buildings in Burns and Hines have a high likelihood of collapse should an earthquake occur. The remaining seven buildings assessed in the report have either a low to moderate likelihood of collapse in the event of an earthquake.² Almost all the buildings assessed in the report were built prior to 1990 when seismic standards were not incorporated into building codes. Newer buildings such as the Harney District Hospital, incorporate seismic retrofit in the design to withstand earthquake events.

In addition to the Oregon Statewide Seismic Needs Report, DOGAMI conducted a HAZUS analysis for Harney County to determine potential losses resulting from a

² Oregon Statewide Seismic Needs Assessment, all sites, p. 10.

hypothetical magnitude 6.9 arbitrary crustal earthquake and a 2,500 year probable scenario magnitude 6.9 driving earthquake. The potential losses developed by the HAZUS analysis are indicated in chart 3.2 for the magnitude 6.9 arbitrary crustal earthquake. The HAZUS report can be found in Appendix B: Hazard Annex of this plan.

For more information on the earthquake hazard, please visit the state plan's Earthquake chapter or the Oregon Technical Resource Guide.

Table 3.2 Local Earthquake Information

Location of Hazard:	Extent of Hazard at the Location:
County-wide, especially near Steens Mountain	County-wide
Previous Occurrences of the Hazard Within the Community:	
Source: State of Oregon Natural Hazards Mitigation Plan	
<p>April 28, 1999 Christmas Valley 3.8 magnitude earthquake</p> <p>April 1999 Christmas Valley 1.9-3.0 magnitude earthquake, with at least six earthquakes occurring in the area during April 1999.</p> <p>June 30, 2004 SE of Lakeview 4.4 magnitude earthquake</p> <p>June 2004 SE of Lakeview 1.9 to 3.9 at least 20 earthquakes occurred in the area in June 2004.</p>	
Community's Potential Losses:	
Source: HAZUS Analysis Harney County Magnitude 6.9 Arbitrary Crustal Earthquake	
<p>Buildings: Approximately 57 buildings will be moderately damaged in the earthquake scenario, however there are 0 buildings that will be damaged beyond repair. Of the critical facilities assessed, only two schools will have less than 50% functionality in the event of the earthquake scenario. (p. 8-9). Table 12 on page 15 of the HAZUS report explains monetary costs to buildings in the earthquake scenario.</p> <p>Transportation: The expected damage from transportation infrastructure includes damage to 46 highway segments and to 106 bridges. Airport facilities will also be damaged in the earthquake scenario (p. 10). Table 13 on page 16 of the HAZUS report explains monetary losses for transportation routes.</p> <p>Casualties: The HAZUS model predicts there will be few casualties in the earthquake scenario. (p. 13-14)</p> <p>Economic Loss: HAZUS predicts a total \$41.22 million in economic losses. (p. 15)</p>	
Community's Probability of a Future Hazard Event:	
Low to Moderate	
Community's Vulnerability to a Future Hazard Event:	
High	

Flood Summary

Oregon has a detailed history of flooding with flood records dating back to the 1860s. There are over 250 flood-prone communities in Oregon.

The principal types of flood that occur in the community include: (include only the definitions of the types of flooding hazards that the community experiences. Provide specific examples when possible.)

Riverine floods

Riverine floods occur when water levels in rivers and streams overflow their banks. Most communities located along such water bodies have the potential to experience this type of flooding after spring rains, heavy thunderstorms or rapid runoff from snow melt. Riverine floods can be slow or fast-rising, but usually develop over a period of days.

The danger of riverine flooding occurs mainly during the winter months, with the onset of persistent, heavy rainfall, and during the spring, with melting of snow in the Cascade and Coast Ranges.

Flash floods

Flash floods usually result from intense storms dropping large amounts of rain within a brief period. Flash floods usually occur in the summer during thunderstorm season, appear with little or no warning and can reach full peak in only a few minutes. They are most common in the arid and semi-arid central and eastern areas of the state where there is steep topography, little vegetation and intense but short-duration rainfall. Flash floods can occur in both urban and rural settings, often along smaller rivers and drainage ways.

In flash flood situations, waters not only rise rapidly, but also generally move at high velocities and often carry large amounts of debris. In these instances a flash flood may arrive as a fast moving wall of debris, mud, water or ice. Such material can accumulate at a natural or man-made obstruction and restrict the flow of water. Water held back in such a manner can cause flooding both upstream and then later downstream if the obstruction is removed or breaks free.

Shallow area floods

These floods are a special type of riverine flooding. FEMA defines a shallow area flood hazard as an area that is inundated by a 100-year flood with a flood depth between one to three feet. Such areas are generally flooded by low velocity sheet flows of water.

Urban floods

Urban flooding occurs where land has been converted from fields or woodlands to developed areas consisting of homes, parking lots, and commercial, industrial and public buildings and structures. In such areas the previous ability of water to filter into the ground is often prevented by the extensive impervious surfaces associated with urban development. This in turn results in more water quickly running off into watercourses which causes water levels to rise above pre-development levels. During periods of urban flooding streets can rapidly become swift moving rivers and basements and backyards can quickly fill with water. Storm drains often may

back up with yard waste or other flood debris leading to further localized flooding. Another source of urban flooding is grading associated with development. In some cases, such grading can alter changes in drainage direction of water from one property to another.

Playa floods

Playa floods are caused by greater than normal runoff into a closed basin. Closed basin systems are those areas that have one or more rivers emptying into one or more lakes that have no outlet. In these situations, water leaves the system primarily through evaporation. Thus, if annual precipitation in the basin increases significantly, evaporation often is not enough to reduce water levels. This in turn causes lake levels to rise and inundate surrounding properties and roads. The best known example of playa-basin flooding in Oregon occurs in Malheur and Harney Lakes in Harney County.

Impacts

The extent of the damage and risk to people caused by flood events is primarily dependent on the depth and velocity of floodwaters. Fast moving floodwaters can wash buildings off their foundations and sweep vehicles downstream. Roads, bridges, other infrastructure and lifelines (pipelines, utility, water, sewer, communications systems, etc.) can be seriously damaged when high water combines with flood debris, mud and ice. Extensive flood damage to residences and other structures also results from basement flooding and landslide damage related to soil saturation. Surface water entering into crawlspaces, basements and daylight basements is common during flood events not only in or near flooded areas but also on hillsides and other areas far removed from floodplains. Most damage is caused by water saturating materials susceptible to loss (e.g., wood, insulation, wallboard, fabric, furnishings, floor coverings and appliances.)

Homes in frequently flooded areas can also experience blocked sewer lines and damage to septic systems and drain fields. This is particularly the case of residences in rural flood prone areas who commonly utilize private individual sewage treatment systems. Inundation of these systems can result in the leakage of wastewater into surrounding areas creating the risk of serious water pollution and public health threats. This kind damage can render homes unlivable.

As was seen in Oregon's 1996 floods, many housing units that were damaged or lost were mobile homes and trailers. Many older manufactured home parks are located in floodplain areas. Manufactured homes have a lower level of structural stability than "stick-built" (standard wood frame construction) homes. Manufactured homes in floodplain zones must be anchored to provide additional structural stability during flood events. Lack of community enforcement of manufactured home construction and anchoring standards in floodplains can contribute to severe damages from flood events.

Flood events impact businesses by damaging property and interrupting commerce. Flood events can cut off customer access and close businesses for repairs. A quick response to the needs of businesses affected by flood events can help a community maintain economic viability in the face of flood damage.

Bridges are a major concern during flood events as they provide critical links in road networks by crossing water courses and other significant natural features.

However bridges and their supporting structures can also be obstructions in flood-swollen watercourses and can inhibit the rapid flow of water during flood events.

In Harney County the areas that are most vulnerable to flooding events are the cities of Burns and Hines, the Meadowland Ranch area southeast of Burns, the area around Harney and Malheur Lakes, and the unincorporated communities of Frenchglen and Diamond. In Burns, the city's Police, Fire, and City Hall are located in a floodplain. While the City of Burns has never flooded extensively, the location of critical facilities in the floodplain increases the city's vulnerability. The Meadowland ranch area southeast of Burns is experiencing an increase in development. With the construction of new roads and driveways, the natural flow of floodwaters is blocked, increasing the areas flood vulnerability. Finally, the area surrounding Harney and Malheur Lakes has periodic flooding events, the most major one occurring in 1982. As noted above, Harney and Malheur Lakes are located in a closed basin, and any water that enters the basin can only exit through natural evaporation. In the event of heavy rain or snowfall, Harney and Malheur Lakes can flood, causing economic damage to ranches and residences near the lakes.

In the unincorporated communities of Frenchglen and Diamond, there are a number of areas vulnerable to flooding events. Frenchglen contains critical facilities, especially for fire fighting, that would be inaccessible in the event of a flood. In addition, there are several historic structures, namely the Diamond Hotel and the Frenchglen Hotel, that are susceptible to flooding events and if damaged would negatively affect the tourist economy of the area.

One limiting factor to sound development in the area is the lack of accurate floodplain maps, an issue that has larger ramifications for development in Harney County. Harney County's FIRM floodplain maps have not been updated since 1984 and the maps do not reflect current flood patterns. The lack of accurate maps prevents the county from making sound planning decisions in regards to flood management.

Harney County also has several flood loss properties listed under the National Flood Insurance Program (NFIP). There are two repetitive flood loss properties in the unincorporated areas of Harney County, with floss losses totaling \$36,280. In addition, there are 42 single loss properties totaling \$713,015. Given that there are 75 NFIP policies in place in Harney County, flooding remains a significant natural hazard within the county.

For more information on the flood hazard, please visit the state plan's Flood chapter or the Oregon Technical Resource Guide.

Table 3.3 Local Flood Information

Location of Hazard:	Extent of Hazard at the Location:
Harney and Malheur Lakes Cities of Burns, Hines, Narrows and Frenchglen	Harney County Basin
Previous Occurrences of the Hazard Within the Community:	
<p>1897 Harney County Severe flooding on Silvies River Flood of record on the Silvies River (300-yearflood)</p> <p>1904 Severe flooding on Silvies and Malheur Rivers</p> <p>1910 Severe Malheur River flooding, record on the Malheur River</p> <p>1921 Severe flooding on Silvies River</p> <p>1943 Severe flooding on Silvies River</p> <p>1952 Severe flooding on Jordan Creek, and the Silvies and Malheur rivers</p> <p>February 1957 Severe flooding on Jordan Creek, the Silvies and Malheur rivers, warm rain on snow/frozen ground</p> <p>December 1964 Entire state Severe flooding throughout region Warm rain on snow /frozen ground</p> <p>1982-1986 Severe flooding from Harney and Malheur lakes. Damage estimates from 1982 to 1985 totaled \$17,300,000³</p> <p>December 1985 Malheur County Ice jam flooding 40 miles of ice on Snake River between Farewell Bend and Ontario. At least 35 people evacuated</p> <p>March 1992 Heavy rains caused localized flooding in Burns</p> <p>March 1993 Malheur and Harney counties, widespread flooding in rural areas. Highways closed. Warm rain on heavy snow pack. Flood of Record on Owyhee River. Roads flooded in Burns and Hines.</p> <p>May 1998 Malheur and Harney counties Widespread flooding. Persistent rain on mountain snow pack</p> <p>February-April 1999 Malheur Lake levels rise above historic norms threatening public and private lands.</p> <p>May 2005 Harney County flooding on Blitzen River, Page Springs Campground flooded</p>	
Community's Probability of a Future Flood Event:	
Moderate	
Community's Vulnerability to a Future Flood Event:	
Moderate to High	

³ Malheur Lake Flood Damage Reduction Study, p. 3-2.

Landslides Summary

Landslides are a major geologic threat in almost every state in the United States. In Oregon, a significant number of locations are at risk from dangerous landslides and debris flows. While not all landslides result in property damage, many landslides do pose serious risk to people and property. Increasing population in Oregon and the resultant growth in home ownership has caused the siting of more development in or near landslide areas. Often these areas are highly desirable owing to their location along the coast, rivers and on hillsides.

Landslides are fairly common, naturally occurring events in various parts of Oregon. In simplest terms, a landslide is any detached mass of soil, rock, or debris that falls, slides or flows down a slope or a stream channel. Landslides are classified according to the type and rate of movement and the type of materials that are transported.

In understanding a landslide, two forces are at work: 1) the driving forces that cause the material to move down slope, and 2) the friction forces and strength of materials that act to retard the movement and stabilize the slope. When the driving forces exceed the resisting forces, a landslide occurs.

Landslides can be grouped as “on-site” and “off-site” hazards. An “on-site” slide is one that occurs on or near a development site and is slow moving. It is slow moving slides that cause the most property damage in urban areas. On-site landslide hazards include features called slumps, earthflows and block slides. “Off-site” slides typically are rapid moving and begin on steep slopes at a distance from homes and development. A 1996 “off-site” slide in southern Oregon began a long distance away from homes and road, traveled at high velocity and killed five people and injured a number of others.

Landslides are classified based on causal factors and conditions and exist in three basic categories.

Falls

This type of landslide involves the movement of rock and soil which detaches from a steep slope or cliff and falls through the air and/or bounces or rolls down slope. This type of slide is termed a rock fall and is very common along Oregon highways where they have been cut through bedrock in steep canyons and along the coast.

Slides

This kind of landslide exists where the slide material moves in contact with the underlying surface. Here the slide moves along a plane and either slumps by moving along a curved surface (called a rotational slide) or along a flat surface (called a translational slide). While slow-moving slides can occur on relatively gentle slopes are less likely to cause serious injuries or fatalities, they can result in very significant property damage.

Flows

In this case the landslide is characterized as plastic or liquid in nature in which the slide material breaks up and flows during movement. This type of landslide occurs when a landslide moves down slope as a semi-fluid mass scouring or partially scouring rock and soils from the slope along its path. A flow landslide is typically

rapid moving and tends to increase in volume as it moves down slope and scours out its channel.

Rapidly moving flow landslides are often referred to as debris flows. Other terms given to debris flows are mudslides, mudflows, or debris avalanches. Debris flows frequently take place during or following an intense rainfall on previously saturated soil. Debris flows usually start on steep hillsides as slumps or slides that liquefy, accelerate to speeds as high as 35 miles per hour or more, and travel down slopes and channels onto gentle sloping or flat ground. Most slopes steeper than 70 percent are at risk from debris flows.

The consistency of a debris flow ranges from watery mud to thick, rocky, mud-like, wet cement which is dense enough to carry boulders, trees and cars. Separate debris flows from different starting points sometimes combine in canyons and channels where their destructive energy is greatly increased. Debris flows are difficult for people to outrun or escape from and present the greatest risk to human life. Debris flows have caused most of their damage in rural areas and were responsible for most of landslide-related deaths and injuries during the 1996 storm in Oregon.

Conditions Affecting Landslides

Natural conditions and human activities can both play a role in causing landslides. Certain geologic formations are more susceptible to landslides than others. Locations with steep slopes are at the greatest risk of slides. However, the incidence of landslides and their impact on people and property can be accelerated by development. Developers who are uninformed about geologic conditions and processes may create conditions that can increase the risk of or even trigger landslides.

There are four principal factors that affect or increase the likelihood of landslides:

- Natural conditions and processes including the geology of the site, rainfall, wave and water action, seismic tremors and earthquakes and volcanic activity.
- Excavation and grading on sloping ground for homes, roads and other structures.
- Drainage and groundwater alterations that are natural or human-caused can trigger landslides. Human activities that may cause slides include broken or leaking water or sewer lines, water retention facilities, irrigation and stream alterations, ineffective storm water management and excess runoff due to increased impervious surfaces.
- Change or removal of vegetation on very steep slopes due to timber harvesting, land clearing and wildfire.

Impacts

Depending upon the type, location, severity and area affected, severe property damage, injuries and loss of life can be caused by landslide hazards. Landslides can damage or temporarily disrupt utility services, roads and other transportation systems and critical lifeline services such as police, fire, medical, utility and communication systems, and emergency response. In addition to the immediate damage and loss of services, serious disruption of roads, infrastructure and critical facilities and services may also have longer term impacts on the economy of the community and surrounding area. While Harney County has rarely experienced

major landslides, there are areas in the county that are potentially vulnerable. Community members identified the following areas as susceptible to landslide events:

1. Highway 205 near the Malheur National Wildlife Refuge
2. Wright's Point
3. Highway 395 at Divine Canyon
4. County Road 47 northwest of Burns
5. Highway 20 east to Vale

Increasing the risk to people and property from the effects of landslides are the following three factors:

Improper excavation practices, sometimes aggravated by drainage issues, can reduce the stability of otherwise stable slopes.

Allowing development on or adjacent to existing landslides or known landslide-prone areas raises the risk of future slides regardless of excavation and drainage practices. Homeowners and developers should understand that in many potential landslide settings that there are no development practices that can completely assure slope stability from future slide events.

Building on fairly gentle slopes can still be subject to landslides that begin a long distance away from the development. Sites at greatest risk are those situated against the base of very steep slopes, in confined stream channels (small canyons), and on fans (rises) at the mouth of these confined channels. Home siting practices do not cause these landslides, but rather put residents and property at risk of landslide impacts. In these cases, the simplest way to avoid such potential effects is to locate development out of the impact area, or construct debris flow diversions for the structures that are at risk.

For more information on the landslide hazard, please visit the state plan's Landslide chapter or the Oregon Technical Resource Guide.

Table 3.4 Local Landslide Information

Location of Hazard:	Extent of Hazard at the Location:
Highway 205 near the Malheur National Wildlife Refuge Wright’s Point Highway 395 at Divine Canyon County Road 47 northwest of Burns Highway 20 east to Vale	Landslides are site-specific, however along highway 205 at the Malheur National Wildlife Refuge there is a 20 mile stretch that experiences weekly falls.
Previous Occurrences of the Hazard Within the Community:	
Highway 205 near the Malheur National Wildlife Refuge Wright’s Point Highway 395 at Divine Canyon County Road 47 northwest of Burns Highway 20 east to Vale	
Community’s Probability of a Future Landslide Event:	
Moderate	
Community’s Vulnerability to a Future Landslide Event:	
Low	

Volcanic Event Summary

The Cascade Range of the Pacific Northwest has more than a dozen active volcanoes. These familiar snow-clad peaks are part of a 1,000 mile-long chain of mountains which extend from southern British Columbia to northern California. Cascades volcanoes tend to erupt explosively, and have occurred at an average rate of 1-2 per century during the last 4,000 years. Future eruptions are certain. Seven Cascades volcanoes have erupted since the first U.S. Independence Day slightly more than 200 years ago. Four of those eruptions would have caused considerable property damage and loss of life had they occurred today without warning. The most recent events were Mt. St. Helens in Washington (1980-86) and Lassen Peak in California (1914-1917). The existence, position and recurrent activity of Cascades volcanoes are generally thought to be related to the convergence of shifting crustal plates. As population increases in the Pacific Northwest, areas near volcanoes are being developed and recreational usage is expanding. As a result more and more people and property are at risk from volcanic activity.

To identify the areas that are likely to be affected by future events, pre-historic rock deposits are mapped and studied to learn about the types and frequency of past eruptions at each volcano. This information helps scientists to better anticipate future activity at a volcano, and provides a basis for preparing for the effects of future eruptions through emergency planning,

Impacts

The effects of a major volcanic event can be widespread and devastating. The Cascade Range in Washington, Oregon and northern California is one of the most volcanically active regions in the United States. Volcanoes produce a wide variety of hazards that can destroy property and kill people. Large explosive eruptions can endanger people and property hundreds of miles away and even affect the global climate. Some volcano hazards such as landslides can occur even when a volcano is not erupting.

The specific hazards produced by volcanic activity include the following:

Eruption Columns and Clouds

An explosive eruption blasts solid and molten rock fragments called tephra and volcanic gases into the air with tremendous force. The largest rock fragments called bombs usually fall back to the ground within two miles of the vent. Small fragments (less than 0.1 inch across) of volcanic glass, mineral and rock (ash) rise high into the air forming a huge, billowing eruption column. Eruption columns creating an eruption cloud can grow rapidly and reach more than 12 miles above a volcano in less than 30 minutes. Volcanic ash clouds can pose serious hazards to aviation. Several commercial jets have nearly crashed because of engine failure from inadvertently flying into ash clouds.

Large eruption clouds can extend hundreds of miles downwind resulting in ash fall over enormous areas. Ash from the May 18, 1980 Mt. St. Helens eruption fell over an area of 22,000 square miles in the western U.S. Heavy ash fall, particularly when mixed with rain, can collapse buildings and even a minor ash fall can damage crops, electronics and machinery.

For Harney County, the largest vulnerability in terms of volcanic hazards lies in ash fallout from a volcanic event in the Cascades. Ash can disrupt the engines of motor

vehicles and can affect vulnerable populations such people with asthma. However, while Harney County may not be directly affected by a volcanic event, should an event force highway 20 to close, the County will be isolated from the rest of the state.

Volcanic Gases

Volcanoes emit gases during eruptions. Even when a volcano is not erupting, cracks in the ground allow gases to reach the surface through small openings called fumaroles. More than ninety percent of all gas emitted by volcanoes is water vapor (steam), most of which is heated ground water. Other common volcanic gases are carbon dioxide, sulfur dioxide, hydrogen sulfide, hydrogen and fluorine. In higher concentrations, these gases can cause corrosion, contaminate domestic water supplies and harm or even kill vegetation, livestock and people.

For more information on the volcanic hazard, please visit the state plan’s Volcano chapter.

Table 3.5 Local Volcanic Event Information

Location of Hazard:	Extent of Hazard at the Location:
County-wide	County-wide
Previous Occurrences of the Hazard Within the Community:	
May 18, 1980 Eruption of Mount St. Helens causing significant environmental and economic damage in the Pacific Northwest.	
Community’s Probability of a Future Volcanic Event:	
Low	
Community’s Vulnerability to a Future Volcanic Event:	
Moderate	

Wildfire Summary

Fire is an essential part of Oregon's ecosystem, but it is also a serious threat to life and property particularly in the state's growing rural communities. Wildfires are fires occurring in areas having large areas of flammable vegetation that require a suppression response. Areas of wildfire risk exist throughout the state with areas in central, southwest and northeast Oregon having the highest risk. The Oregon Department of Forestry has estimated that there are about 200,000 homes in areas of serious wildfire risk.

The impact on communities from wildfire can be huge. In 1990, Bend's Awbrey Hill fire destroyed 21 homes, causing \$9 million in damage and costing over \$2 million to suppress. The 1996 Skeleton fire in Bend burned over 17,000 acres and damaged or destroyed 30 homes and structures. Statewide that same year, 218,000 acres were burned, 600 homes threatened and 44 homes were lost. The 2002 Biscuit fire in southern Oregon affected over 500,000 acres and cost \$150 million to suppress.

To reduce the impact of wildfire on the county, Harney County adopted the Harney County Community Wildfire Protection Plan (CWPP) in 2005. The CWPP provides detailed information on the vulnerability and history of wildfire in the County, and provides a series of mitigation actions the county can implement to reduce the impact of wildfire. The CWPP is included in the wildfire annex at the end of this plan.

Wildfire can be divided into three categories: interface, wildland, and firestorms.

Interface Fires (include locations in the communities for the various types of interface the community may have.)

Essentially an interface fire occurs where wildland and developed areas come together with both vegetation and structural development combining to provide fuel. The wildland/urban interface (sometimes called rural interface in small communities or outlying areas) can be divided into three categories.

The classic wildland/urban interface exists where well-defined urban and suburban development presses up against open expanses of wildland areas.

The mixed wildland/urban interface is more typical of the problems in areas of exurban or rural development: isolated homes, subdivisions, resorts and small communities situated in predominantly in wildland settings.

The occluded wildland/urban interface is where islands of wildland vegetation exist within a largely urbanized area.

Wildland Fires

A wildland fire's main fuel source is natural vegetation. Often referred to as forest or rangeland fires, these fires occur in national forests and parks, private timberland, and on public and private rangeland. A wildland fire can become an interface fire if it encroaches on developed areas.

Firestorms

Firestorms are events of such extreme intensity that effective suppression is virtually impossible. Firestorms often occur during dry, windy weather and

generally burn until conditions change or the available fuel is consumed. The disastrous 1991 East Bay Fire in Oakland, California is an example of an interface fire that developed into a firestorm.

Conditions Contributing to Wildfires

Ignition of a wildfire may occur naturally from lightning or from human causes such as debris burns, arson, careless smoking, and recreational activities or from an industrial accident. Once started, four main conditions affect the fire's behavior: fuel, topography, weather and development.

Fuel is the material that feeds a fire. Fuel is classified by volume and type. As a western state, Oregon is prone to wildfires due to its prevalent conifer, brush and rangeland fuel types.

Topography influences the movement of air and directs a fire's course. Slope and hillsides are key factors in fire behavior. Unfortunately, hillsides with steep topographic characteristics are also desirable areas for residential development.

Weather is the most variable factor affecting wildfire behavior. High risk areas in Oregon share a hot, dry season in late summer and early fall with high temperatures and low humidity.

The increase in residential development in interface areas has resulted in greater wildfire risk. Fire has historically been a natural wildland element and can sweep through vegetation that is adjacent to a combustible home. New residents in remote locations are often surprised to learn that in moving away from built-up urban areas, they have also left behind readily available fire services providing structural protection.

Impacts

The effects of fire on ecosystem resources can include damages, benefits, or some combination of both. Ultimately, a fire's effects depend largely on the characteristics of the fire site, the severity of the fire, its duration and the value of the resources affected by the fire.

The ecosystems of most forest and wildlands depend upon fire to maintain various functions. These benefits can include, depending upon location and other circumstances, reduced fuel load, disposal of slash and thinned tree stands, increased forage plant production, and improved wildlife habitats, hydrological processes and aesthetic environments. Despite these potential benefits, fire has historically been suppressed for years because of its effects on timber harvest, loss of scenic and recreational values and the obvious threat to property and human life.

At the same time, the effects of a wildfire on the built environment, particularly in the face of a major wildfire event, can be devastating to people, homes, businesses and communities. As noted above, fuel, topography, weather and the extent of development are the key determinants for wildfires. A number of other factors also have been identified which affect the degree of risk to people and property in identified wildfire interface areas. These include:

- Combustible roofing material (for example cedar shakes)
- Wood construction
- Homes and other structures with no defensible space

Roads and streets with substandard width, grades, weight-load and connectivity standards making evacuation and fire response more difficult

Subdivisions and homes surrounded by heavy natural fuel types

Structures on steep slopes covered with flammable vegetation

Limited on-site or community water supply

Locations with normal prevailing winds over 30 miles per hour

One of the significant problems associated with wildfire events in Harney County is the increased probability of flash floods due to the lack of vegetation. This is especially a prevalent on property in the BLM District where much of the land is sagebrush. Without vegetation to hold soil in place and to absorb rainwater, flash flooding can be a significant problem.

For more information on the wildfire hazard, please visit the state plan's Wildfire chapter or the Oregon Technical Resource Guide. A map showing Harney County's 10-year wildfire history can be found in Appendix B: Hazard Annex of this plan.

Table 3.6 Local Wildfire Information

Location of Hazard:	Extent of Hazard at the Location:
County-wide	County-wide
Previous Occurrences of the Hazard Within the Community:	
<p>August 1990 Pine Springs Basin Complex Fire burned over 70,000 acres and came within 3 miles of the City of Hines</p> <p>August 1992 Catlow Valley Fire, burned 1,595 acres of private lands and some BLM land, started by lightening 7 miles south of Roaring Springs.</p> <p>July 1992 Big Rock Creek Fire, burned 1,100 acres north of Buchanan on BLM and private lands.</p> <p>September 1994 Jordan Spring fire about 25 miles northeast of Burns burned 5,894 acres costing a total of \$2.6 million to suppress.</p> <p>July 1994 Red Point Fire near Denio, burned 4,889 acres.</p> <p>September 1995 Iron Mountain Fire 2,500 acres burned of sage and grass, 12 miles west of Harney Lake</p> <p>August 1995 Warm Springs Creek Fire Burns 1,900 acres 3 miles SW of the Warm Springs Reservoir</p> <p>September 1996 Fires in the BLM Burns District burned a total of 31,951 acres with a total of 94 lightening fires.⁴</p> <p>August 1996 Bartlett Mountain Fire burns 2,448 acres 12 miles northeast of Buchanan</p> <p>August 1997 Cottonwood Creek Fire, burns 2,100 acres of BLM and private land, 27 miles north of Fields⁵</p> <p>August 1999 Stonehouse Fire caused by lightening burns 4,544 acres 30 miles northwest of Fields.</p> <p>August 2000 Diamond Craters Fire caused by lightening, burns 2,000 acres.</p> <p>August 2000 Alvord Peak Fire caused by lightening burned 1,600 acres, 10 miles north of Fields, threatened wilderness areas and power lines.</p> <p>July 2002 Paulina Ranger District Fire burns 8,800 acres in the Ochoco National Forest</p> <p>August 2005 Hamilton Ranch and Egypt Wells Complex fire burns 450 acres and costing \$319,000 to extinguish⁶</p> <p>July 2007 Bartlett Mountain Fire near Drewsey, caused by lightening, 32,312 acres burned.</p> <p>July 2007 Egley Complex Wildfire near Riley, 140, 390 acres burned caused by lightening, cost \$7.2 million to suppress. Ranchers were impacted as well as wildlife and hunting.</p>	
Community's Probability of a Future Wildfire Event:	
High	
Community's Vulnerability to a Future Wildfire Event:	
High	

⁴ September 4, 1996, *Burns Times Herald*.

⁵ August 27, 1997, *Burns Times Herald*.

⁶ NICC Incident Management Report, 11 August 2005, <http://cidi.org/wildfire/0508/ix110.html>, accessed August 8, 2007.

Severe Weather Summary

Severe weather events occur throughout Oregon, however there are some events that are more prevalent to eastern Oregon and Harney County than other areas in Oregon. The most prevalent severe weather events include wind and winter storm. In addition, lightening and hail often associated with large windstorms have a significant impact on communities, especially in eastern Oregon.

Windstorm Summary

Extreme winds occur throughout Oregon. The most persistent high winds take place along the Oregon Coast and in the Columbia River Gorge. High winds in the Columbia Gorge are well documented. The Gorge is the most significant east-west gap in the Cascade Mountains between California and Canada. Wind conditions in southeast Oregon are not as dramatic as those along the coast or in the Gorge yet can cause dust storms or be associated with severe winter conditions such as blizzards. A majority of the destructive surface winds striking Oregon are from the southwest. Some winds blow from the east but most often do not carry the same destructive force as those from the Pacific Ocean.

The Columbus Day storm in 1962 was the most destructive windstorm ever recorded in Oregon in terms of both loss of life and property. Damage from this event was the greatest in the Willamette Valley. The storm killed 38 people and left over \$200 million in damage. Hundreds of thousands of homes were without power for short periods, while others were without power for two to three weeks. More than 50,000 homes suffered some damage and nearly 100 were destroyed. Entire fruit and nut orchards were destroyed and livestock killed as barns collapsed and trees blew over. In Portland, the highest gusts were 116 miles per hour.

Although rare, tornados can and do occur in Oregon. On September 15, 1997, a small tornado struck the ranch of Rick and Judy Hoyt near Burns, Oregon. The short lived tornado twisted and snapped a pine tree, threw large bails of hay, broke a window and damaged power lines around the homestead.⁷

Impacts

Windstorms can have significant impacts on life and property. Debris carried along by extreme winds can contribute directly to injury and loss of life and indirectly through the failure of protective structures (i.e., buildings) and infrastructure. Windstorms have the ability to cause damage more than 100 miles from the center of storm activity. High winds can topple trees and break limbs which in turn can result in power outages and disrupt telephone, computer, and TV and radio service.

In addition to the immediate effects of wind damage, the loss of power due to windstorms can have widespread impacts on business and economic activity. A sustained loss of power can also seriously strain provision of emergency services and the operation of water and sewer facilities and transportation systems.

For more information on the windstorm hazard, please visit the state plan's Windstorm chapter.

⁷ NOAA Satellite and Information Service.

Winter Storm Summary

Destructive winter storms that produce heavy snow, ice, rain and freezing rain, and high winds have a long history in Oregon. Severe storms affecting Oregon with snow and ice typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from October through March.

Ice storms are comprised of cold temperatures and moisture, but subtle changes can result in varying types of ice formation which may include freezing rain, sleet and hail. Of these, freezing rain can be the most damaging of ice formations.

Outside of mountainous areas significant snow accumulations are much less likely western Oregon than on the eastside of the Cascades. However, if a cold air mass moves northwest through the Columbia Gorge and collides with a wet Pacific storm then a larger than average snow fall may result.

An example of this type of snowstorm occurred in January 1980 when snow, ice, wind and freezing rain struck Oregon statewide. In the Portland area alone, 200,000 utility customers were left without power and phone service for several days.

Impacts

Severe winter weather can be a deceptive killer. Winter storms which bring snow, ice and high winds can cause significant impacts on life and property. Many severe winter storm deaths occur as a result of traffic accidents on icy roads, heart attacks which shoveling snow, and hypothermia from prolonged exposure to the cold. The temporary loss of home heating can be particularly hard on the elderly, young children and other vulnerable individuals.

Property is at risk due to flooding and landslides that may result if there is a heavy snowmelt. Additionally, ice, wind and snow can affect the stability of trees, power and telephone lines and TV and radio antennas. Down trees and limbs can become major hazards for houses, cars, utilities and other property. Such damage in turn can become major obstacles to providing critical emergency response, police, fire and other disaster recovery services.

In Harney County, ice storms occur on a frequent basis and cause significant damage, especially to local utilities. For example, from December 2003 to January 2004, ice storms caused \$33,769 in damage to the Harney Electric Cooperative. Harney Electric's power lines are especially vulnerable due to the age of the lines. The older lines have wider spans between poles, and when ice accumulates on them, they are heavily weighed down. When the ice melts, the lines snap up and wrap around other overhead lines, causing a short and significant structural damage.

As was noted above under windstorms, severe winter weather also can cause the temporary closure of key roads and highways, air and train operations, businesses, schools, government offices and other important community services. Below freezing temperatures can also lead to breaks in uninsulated water lines serving schools, businesses, and industry and individual homes. All of these effects if lasting more than several days can create significant economic impacts for the communities affected as well for the surrounding region, and even outside of Oregon. In the rural areas of Oregon severe winter storms can isolate small communities, farms and ranches and create serious problems for open range cattle operations such as those in southeastern Oregon.

For more information on the winter storm hazard, please visit the state plan's Winter Storm chapter.

Table 3.7 Local Severe Weather Information

Location of Hazard:	Extent of Hazard at the Location:
County-wide	County-wide
Previous Occurrences of the Hazard Within the Community:	
<p>Winter Storm:</p> <p>December 1861 Entire state Storm produced between 1 and 3 feet of snow throughout Oregon</p> <p>December 1892 Northern counties Between 15 and 30 inches of snow fell throughout the northern counties</p> <p>January 1916 Entire state Two storms. Heavy snowfall, especially in mountainous areas</p> <p>January- February 1937 Entire state Deep snow drifts</p> <p>January 1950 Entire state Record snow falls; Property damage throughout state.</p> <p>March 1960 Entire state Many automobile accidents; Two fatalities</p> <p>January 1969 Entire state Heavy snow throughout state</p> <p>January 1980 Entire State Series of string storms across state. Many injuries and power outages.</p> <p>February 1985 Entire state Two feet of snow in northeast mountains; Downed power lines. Fatalities</p> <p>February 1986 Central / Eastern Oregon Heavy snow. Traffic accidents; Broken power lines</p> <p>March 1988 Entire state Strong winds; Heavy snow</p> <p>February 1990 Entire state Heavy snow throughout state</p> <p>Nov., 1993 Cascade Mountains Heavy snow throughout region</p> <p>Feb., 1994 Southeastern Oregon Heavy snow throughout region</p> <p>Winter 1998-99 Entire state One of the snowiest winters in Oregon history (Snowfall at Crater Lake: 586 inches)</p> <p>Winter 2004 A winter storm caused \$33,769 in damage to the Harney Electric Cooperative damaging power lines.</p> <p>Windstorm:</p> <p>April 1931 N.E. Oregon Unofficial wind speeds reported at 78 mph. Damage to fruit orchards and timber.</p> <p>November 1951 Statewide widespread damage, transmission and utility lines, wind speed 40-60 mph, gusts 75-80 mph.</p> <p>December 1951 Statewide Wind speed 60 mph in Willamette Valley. 75 mph gusts. Damage to buildings and utility lines.</p> <p>December 1955 Statewide wind storm. Wind speeds 55-65 mph with 69 mph guest. Considerable damage to buildings and utility lines.</p> <p>November 1958 Statewide Wind speeds at 51 mph with 71 mph gusts. Every major highway blocked by fallen trees</p> <p>October 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</p> <p>March 1971 Most of Oregon Greatest damage in Willamette Valley. Homes and power lines destroyed by falling trees. Destruction to timber in Lane Co.</p> <p>November 1981 Statewide 60 mph winds common throughout state</p> <p>January 1990 Statewide Severe wind storm</p>	

<p>January 1991 Most of Oregon Severe wind storm December 1991 NE and Central Oregon Severe wind storm May 1994 Eastern Oregon Strong winds in Treasure Valley area (Ontario). Blowing dust caused many car accidents. September 1997 Small, short-lived tornado hit a ranch near Burns, causing \$15,000 worth of damage February 2000 High winds of up to 70 mph caused considerable damage in Southeast Oregon</p>
<p>Community's Probability of a Future Severe Weather Event:</p>
<p>Moderate to high</p>
<p>Community's Vulnerability to a Future Severe Weather Event:</p>
<p>Moderate</p>

ⁱ Burby, R. 1998. Cooperating with Nature. Washington, DC: Joseph Henry Press. Pg. 126.

ⁱⁱ Burby, R. 1998. Cooperating with Nature. Washington DC: Joseph Henry Press. Pg. 133.

Section 4:

Mission, 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.

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

Mitigation Plan Mission

The mission statement for the Harney County Mitigation Plan is intended to be a timeless statement that is adaptable to any future changes made to the plan. ONHW, together with the Harney County Steering Committee members, developed the following mission statement for the plan:

To create a disaster-resilient Harney County.

Steering committee members agreed at the June 28, 2007 Steering Committee meeting that this was an appropriate statement for the mitigation plan and that it adequately defines why Harney County is developing the plan.

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.

The goals for the plan were developed based on the needs identified in the community. Goals focused on the following priorities:

- Saving lives and property
- Increasing community cooperation

- Reducing the economic impact of natural hazards
- Protecting natural and cultural resources.

Using these priorities as a foundation, ONHW, together with Steering Committee members, developed the following goals for the Harney County Natural Hazard Mitigation Plan:

- Save lives and reduce injuries.
- Minimize and prevent damage to public and private buildings and infrastructure.
- Increase cooperation and coordination among local, state, and federal agencies.
- Reduce economic loss.
- Protect natural resources.
- Protect cultural resources.

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. Action items can be developed through a number of sources. The figure below illustrates some of these sources. A description of how the plan's mitigation actions were developed is provided below.

Figure 4.1 Action Item Sources



Source: Oregon Natural Hazards Workgroup, 2006

The action items presented in this plan were developed by ONHW together with Steering Committee members and are derived from a variety of different sources. The action items address the following natural hazards found in Harney County:

- Flood
- Wildfire
- Landslide
- Severe Weather
- Drought
- Earthquake
- Multi-Hazard

In addition, the plan includes actions that address Plan Implementation. Most of the actions were derived using information gathered from the asset and hazard identification meetings as well as from stakeholder interviews. Most of the wildfire actions are derived from the Community Wildfire Protection Plan (CWPP), which presents a number of wildfire mitigation actions for the county. Local information, as well as federal and state sources, were used to support each action item. The actions items found in this plan were reviewed by the Harney County Mitigation Steering Committee at the June 28, 2007 meeting, as well as individually by steering committee members. One natural hazard that does not

have any action items is the volcano hazard, which has no cost effective projects for the County, given its low probability of occurring in Harney County.

The Harney County 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. Harney County currently addresses statewide planning goals and legislative requirements through its comprehensive land use plan, capital improvements plan, mandated standards and building codes. To the extent possible, Harney 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, Harney County should implement the Natural Hazard Mitigation Plan's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.¹ Implementing the Natural Hazard Mitigation Plan's action items through such plans and policies increases their likelihood of being supported and implemented.

Plans that can incorporate mitigation action items include the Harney County Comprehensive Plan, the Harney County Subdivision Ordinance, the Community Wildfire Protection Plan (CWPP), and the Harney County Emergency Operations Plan. Because these plans are used on a regular basis, incorporating mitigation actions into these plans will likewise facilitate their implementation.

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. Finally, while the action items are numbered, the numbering is for identification purposes only and does not prioritize the action items.

Rationale or Key Issues Addressed

Action items should be fact-based and tied directly to issues or needs identified throughout the planning process. Action items can be developed 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.

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.

Flood Action # 1

Proposed Action Item:		Alignment with Plan Goals:	
Update the FEMA FIRM floodplain maps for Harney County.		<ul style="list-style-type: none"> • <i>Save lives and reduce injuries.</i> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The floodplain maps for Harney County were last completed in 1984 and do not reflect current floodplain patterns, especially around the major population centers of Burns and Hines. Results from the Harney County hazard identification meeting indicate that the Harney County Planning Department does not have accurate information to make sound planning decisions regarding development in the floodplain. The paper FIRM maps do not reflect the reality present in the floodplain. • The Meadowland ranch area adjacent to the City of Burns is an area subject to frequent flooding problems, and with more development occurring in that area, there needs to be accurate floodplain information to make sound planning decisions. • Interviews with the Harney County Planner indicate updating the FIRM maps is the first priority to enabling the Planning Department to make sound decisions regarding floodplain issues. • The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of a natural hazard on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Updating the FIRM flood maps is the first step to understanding the flood hazard in Harney County and implementing appropriate mitigation actions to reduce the potential impact of a flood on new and existing development. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Coordinate efforts with the Oregon Department of Land Conservation and Development (DLCDC) and FEMA to update FIRM floodplain maps for Harney County. 			
Coordinating Organization:		Harney County Planning Department	
Internal Partners:		External Partners:	
Burns, Hines, Harney County, Paiute Tribe		DLCDC, FEMA, OEM	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	2-3 years		
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Flood Action # 2

Proposed Action Item:		Alignment with Plan Goals:
Update regulations in the Harney County floodplain ordinance that incorporate no adverse impact (NAI) practices and address the construction of driveways and culverts in new developments.		<ul style="list-style-type: none"> • <i>Save lives and reduce injuries.</i> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> • <i>Protect natural resources.</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> • Information gathered from the Harney County Hazard Identification meetings indicate that construction of driveways and roads in flood-prone areas to service new development amplifies the flood risk in an area, especially for existing buildings. This is especially problematic in the Meadowlands ranch area southeast of Burns. New driveways or roads without adequate culverts can disrupt the natural flow of floodwaters and significantly amplify flooding for existing development. • Floodplain ordinances should incorporate “No Adverse Impacts” (NAI) practices, which according to the Association of State Floodplain Managers is an approach that ensures the action of any community or property owner, public or private, does not adversely impact the property rights of others. NAI practices will ensure that flooding is reduced to a minimum. • New development can affect ranchers’ ability to obtain rainwater, and proper regulations should be in place to ensure the natural flow of rainwater is maintained. • 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)]. By incorporating No Adverse Impacts (NAI) practices into local floodplain ordinances to address the natural flow of rainwater, the impact of flooding on existing properties will be significantly diminished and the natural flow of floodwaters can be maintained. • Goal 7 of Oregon’s Statewide Planning Goals states that local governments shall “adopt or amend, as necessary...plan policies and implementing measures [to]...avoid development in hazard areas where the risk to people and property cannot be mitigated...” Incorporating flood mitigation regulations into the floodplain ordinance will regulate development in the floodplain to ensure it damage from floods is minimized. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> • Coordinate planning efforts with property owners and local ranchers to update the current floodplain ordinance to maintain the natural flow of rainwater. • Incorporate No Adverse Impacts (NAI) practices as outlined by the Association of State Floodplain Managers into local floodplain ordinances to maintain the natural flow of rainwater and reduce the impact of flooding on existing buildings. • Include floodplain information through brochures for new residents to Harney County. 		
Coordinating Organization:	Harney County Planning Department	
Internal Partners:	Burns, Hines, County landowners, Harney County Watershed Council, Paiute Tribe, Cattleman Association, Harney County Watermaster	External Partners:
		FEMA, DLCD
Timeline:	If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	
<u>2 years</u>		
Form Submitted by:	Harney County Natural Hazard Mitigation Steering Committee	

Flood Action # 3

Proposed Action Item:		Alignment with Plan Goals:
Educate current homeowners and prospective buyers of property in Harney County about potential floodplain issues on their property and actions they can implement to mitigate the impacts of a flood.		<ul style="list-style-type: none"> • <i>Save lives and reduce injuries.</i> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> • Steering Committee members at the Harney County Hazard Identification meeting indicated that current homeowners and recent purchasers of property in Harney County are unaware of the potential flooding hazards found on their property. Educating current property owners, as well as recent arrivals and prospective buyers, about the floodplain hazard on their property will enable property owners to be better prepared in the event of a flooding event. In addition, providing mitigation actions property owners can take will significantly reduce the impact of a flooding event. • The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of a natural hazard on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. By educating current homeowners and potential buyers of property in Harney County about flood hazards and mitigation actions they can implement, they will be better prepared to reduce the impacts of a flood event. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> • Include floodplain information online so it is readily available to the public. • Conduct a public awareness campaign targeting residents in the floodplain to educate them about the potential flood hazard their property faces. • Make floodplain information available at the Harney County building permit counter and at the cities of Burns and Hines. 		
Coordinating Organization:	Harney County Planning Department	
Internal Partners:		External Partners:
Burns, Hines, Paiute Tribe		DLCD, FEMA
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	
<u>1-2 years</u>		
Form Submitted by:	Harney County Natural Hazard Mitigation Steering Committee	

Flood Action # 4

Proposed Action Item:		Alignment with Plan Goals:	
Explore the possibility of joining the National Flood Insurance Program (NFIP) Community Rating System (CRS) to reduce NFIP premiums.		<ul style="list-style-type: none"> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, insurance premiums under the NFIP are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote the awareness of flood insurance. • The unincorporated area of Harney County has two repetitive flood loss properties that totaled \$36,280. In addition, there were 42 single loss events that totaled \$713,015. Implementing mitigation activities through the NFIPs CRS program will diminish the impact of flooding events on these properties and reduce total property losses. • The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address existing buildings and infrastructure [201.6(c)(3)(ii)]. Inclusion into the Community Rating System program can help communities in Harney County to enhance mitigation efforts and decrease the vulnerability to floods. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Coordinate with the Department of Land Conservation and Development (DLCD) and FEMA to join the Community Rating System. • Educate businesses and homeowners currently under the NFIP program about the CRS program and any mitigation actions they can implement to reduce their insurance premiums. • Identify homes not in the NFIP that could use the flood insurance. 			
Coordinating Organization:		Harney County Planning Department	
Internal Partners:		External Partners:	
Burns, Hines, Paiute Tribe		DLCD, FEMA	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
<u>2 years</u>			
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Flood Action # 5

Proposed Action Item:		Alignment with Plan Goals:	
Develop mitigation actions for repetitive flood loss properties and single loss properties that will reduce the impact of floods.		<ul style="list-style-type: none"> <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The unincorporated area of Harney County has two repetitive flood loss properties that totaled \$36,280. In addition, there were 42 single loss events that totaled \$713,015. Developing mitigation actions for these repetitive flood loss properties and single loss events can significantly reduce the impact of flooding on these properties. Mitigation actions, such as requiring homes to have a flood elevation certificate two feet above grade, can effectively reduce the impact of floods, especially on repetitive flood loss and single loss properties. 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)]. Developing mitigation actions for flood loss properties can significantly reduce the impact of future flooding events. The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Coordinate with FEMA and the Oregon OEM to identify flood loss properties and mitigation actions that will reduce the impact of flooding on these properties. Educate flood loss property owners about the impact of flooding events on their county and potential mitigation actions they can implement to reduce the impact of flooding. 			
Coordinating Organization:		Harney County Planning Department	
Internal Partners:		External Partners:	
Burns, Hines, Paiute Tribe		DLCD, FEMA	
Timeline:		If available, estimated cost:	
Short Term (0-2 years)			
Long Term (2-4 or more years)			
		2-3 years	
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Wildfire Action # 1

Proposed Action Item:		Alignment with Plan Goals:	
Revise and update subdivision/partition ordinances to incorporate wildfire mitigation measures to prevent future losses from wildfire.		<ul style="list-style-type: none"> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> • <i>Reduce economic loss.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Currently the Harney County Subdivision and Partition Ordinance includes some provisions for fire protection and safety. However, including more stringent mitigation measures in the Ordinance, such as encouraging property owners to create a defensible space or constructing homes out of fire-resistant materials, will reduce wildfire vulnerability in a community. • Harney County is vulnerable to wildfires throughout the county. In 2007 the Egley Complex Fire closed Highway 20 and forced evacuations of residents in rural areas near Hines and Riley. Fires in 1991/1992 came within seven miles of the Burns city limits. By incorporating wildfire mitigation actions into subdivision and partition ordinances, especially for areas in the wildland-urban interface wildfire zone, the county’s vulnerability to wildfires can be significantly reduced. • Goal 7 of Oregon’s Land Use Planning Goals requires that local governments “adopt or amend, as necessary, based on the evaluation of risk, plan policies and implementing measures...[that avoid] development in hazard areas where the risk to people and property cannot be mitigated.” Including mitigation measure in subdivision and partition ordinances can reduce the impact of wildfires on new development and help to prevent future wildfire losses. • 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)]. Incorporating wildfire mitigation actions into subdivision and partition ordinances can help to reduce the impact of wildfires on new development. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Use IBHS and Firewise pamphlets as a guide to incorporate fire mitigation ideas into the subdivision and partition ordinance. • Use subdivision ordinances from other communities as a model. 			
Coordinating Organization:		Harney County Planning Department	
Internal Partners:		External Partners:	
Burns, Hines, Paiute Tribe		DLCD, Oregon Department of Forestry (ODF)	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)			
<u>Long Term</u> (2-4 or more years)			
1 year			
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Wildfire Action # 2

Proposed Action Item:		Alignment with Plan Goals:	
Continue cooperation among the Burns Interagency Fire Zone (BIFZ), Oregon Department of Forestry (ODF), Burns and Hines Fire Departments, US Fish and Wildlife Service, Burns Paiute Indian Reservation, the Rangeland Fire Protection Associations, (RFPA), and private landowners concerning wildfire issues as outlined in the CWPP.		<ul style="list-style-type: none"> • <i>Save lives and reduce injuries.</i> • <i>Increase cooperation and coordination among local, state, and federal agencies.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The Harney County Community Wildfire Protection Plan states that coordination among different agencies involved in fire fighting is necessary to reduce the threat of wildfire in the county. Through annual meetings and newspaper releases, the public will be informed of projects implemented in the last year and future actions to be proposed for the future. Regular annual meetings also ensure that different agencies continue to coordinate with each other. • Increased cooperation among different agencies will ensure that fire safety and mitigation programs are coordinated efficiently and implemented on a regular basis. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Continue CWPP monitoring and evaluation through regular meetings with the Harney County CWPP Core Team and continued public involvement. 			
Coordinating Organization:		Harney County CWPP Core Team	
Internal Partners:		External Partners:	
Harney County, Burns, Hines, Paiute Tribe, Rural Fire Protection Association		ODF, United States Fish and Wildlife Service (USFWS)	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)			
<u>Long Term</u> (2-4 or more years)			
<u>1 year</u>			
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Wildfire Action # 3

Proposed Action Item:		Alignment with Plan Goals:	
Conduct the Community Firewise Outreach program annually, as outlined in the Harney County CWPP, to encourage residents to create a defensible space around their residences and teach residents about the long-term investment to increase fire safety.		<ul style="list-style-type: none"> • <i>Save lives and reduce injuries.</i> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The Harney County CWPP outlines the following objectives for the Community Firewise Program: <ul style="list-style-type: none"> ○ Provide information on ways to reduce human-caused fires. ○ Urge landowners to take action to construct and maintain defensible space around their homes and structures. ○ Encourage the use of non-flammable roofs and siding on new construction and the retrofit of existing houses. ○ Increase the awareness of the natural role of fire in ecosystems and the need for hazardous fuel management. • The “Firewise Clean-Up Week” is usually held in spring or October in association with the national Fire Prevention Week, and works to create a defensible space around residents’ homes. In addition, demonstration projects could be used to educate residents about longer-term investments to increase fire-safety. • Information gathered from the Harney County Hazard Identification meetings indicate that the entire county is at risk to wildfire and that the general trend in Harney County is that fire and fuel developments are on the rise, as is rural development and rural populations, significantly increasing the wildfire risk in the community. Finally, wildfires can also amplify the flooding risk because once a fire has burned out all the vegetation, then there is nothing to hold the earth and the water when it rains, increasing the likelihood of flash floods. • Harney County currently does not have any rural fire districts for county property, and the cities of Burns and Hines provide limited fire services in surrounding areas. Conducting a public outreach campaign to inform residents about fire mitigation will greatly reduce the wildfire risk and help to ease pressure to fight wildfires in the rural areas of the county. • The Disaster Mitigation Act of 2000 requires communities to identify comprehensive mitigation actions to address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Conducting a Community Firewise outreach program will inform property owners about their risk to fires and mitigation measures they can implement to increase fire safety on their property. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Use Firewise and Institute for Business Home Services (IBHS) outreach materials to develop a wildfire outreach campaign to teach homeowners about creating a defensible space. • Distribute fire safety materials at public events and at city and county offices. • Coordinate with the BLM and the Forest Service to conduct home assessments and wildfire mitigation actions to teach property owners about the risk involved with a wildfire. 			
Coordinating Organization:		Harney County CWPP Core Team	
Internal Partners:		External Partners:	
Harney County, Burns, Hines, Paiute Tribe		BLM, Forest Service	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)			
<u>Long Term</u> (2-4 or more years)			
		<u>2 or more years</u>	
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Wildfire Action # 4

Proposed Action Item:		Alignment with Plan Goals:	
Strengthen the Rangeland Fire Protection Associations (RFPAs) capacity to ensure the quality of fire protection service throughout Harney County as detailed in the CWPP.		<ul style="list-style-type: none"> • <i>Save lives and reduce injuries.</i> • <i>Increase cooperation and coordination among local, state, and federal agencies.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The Harney County Community Wildfire Protection Plan states that the Burns Interagency Fire Zone (BIFZ) and the four Rangeland Fire Protection Associations (RFPAs) provide nearly all the wildfire protection in Harney County. However, while the BIFZ is fully staffed and equipped for wildfire and fuels management, the RFPAs are volunteer, non-profit organizations. Yet the RFPAs provide firefighting service for almost 50% of the county. • The RFPAs need the following to be fully capable of handling a fire: <ul style="list-style-type: none"> ○ Basic training in wildfire fighting procedures, fiscal management, and wildfire preparedness ○ Annual review of equipment needs among RFPAs ○ Inventory of water resources of private landowners to determine available water resources and where to refill their wells ○ Improved communication among volunteer firefighters and the BLM through handheld radios. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Conduct regular meetings with the Harney County CWPP Core Team to prioritize projects and needs for RFPAs • Seek funding sources to pay for the RFPAs needs 			
Coordinating Organization:		Harney County CWPP Core Team	
Internal Partners:		External Partners:	
Harney County, Burns, Hines, Paiute Tribe		ODF, National Fire Protection Association (NFPA)	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)			
<u>Long Term</u> (2-4 or more years)			
<u>2 years</u>			
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Wildfire Action # 5

Proposed Action Item:		Alignment with Plan Goals:	
Provide supplemental water supply tanks in key locations to ensure availability of water throughout the county.		<ul style="list-style-type: none"> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> • <i>Protect natural resources.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The Harney County CWPP states that both the cities of Burns and Hines expressed the need for supplemental water supplies. • Four 25-35,000 gallon underground tanks strategically located throughout the county will allow tankers to refill with water quickly without have to go to a station or having to pump water from a stream or a pond. • Water sources with farmers and ranchers are needed for RFPAs to have supplemental water resources available. • Availability of water is essential to effectively suppress wildfires in Harney County. • The Disaster Mitigation Act of 2000 requires communities to create actions that will reduce the impact of natural hazards on the community [201.6(c)(3)(ii)]. Providing supplemental water supply tanks in key locations will enhance fire-fighting capabilities to reduce the impact of a wildfire on the community. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Prioritize water needs based on local fire vulnerability and current water capacity. • Seek funding opportunities for pay for supplemental water storage tanks. • Explore common valves with irrigation wells, as used in some areas in Nevada, to allow for quick water access in the event of a fire. 			
Coordinating Organization:		Harney County CWPP Core Team	
Internal Partners:		External Partners:	
Harney County, Burns, Hines, Paiute Tribe		FEMA, ODF	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	<u>2 years</u>		
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Wildfire Action # 6

Proposed Action Item:		Alignment with Plan Goals:	
Use the Community Wildfire Protection Plan’s Core Team to coordinate response efforts among federal, state, and county agencies to ensure that wildfire response efforts are effective in the county.		<ul style="list-style-type: none"> • <i>Increase cooperation and collaboration among local, state, and federal agencies.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Response efforts are an essential component to fighting fires that can harm people and property. Federal, state, and county agencies need to coordinate efforts with each other to ensure that a response is conducted efficiently and cost-effectively. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Conduct regular meetings with the CWPP Core Team and other important community stakeholders to ensure that response efforts are effectively coordinated. 			
Coordinating Organization:		Harney County CWPP Core Team	
Internal Partners:		External Partners:	
Harney County, Hines, Burns, Paiute Tribe		BLM, Forest Service, FEMA, ODF	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	<u>2 or more years</u>		
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Wildfire Action # 7

Proposed Action Item:		Alignment with Plan Goals:
Develop and implement fuel reduction strategies to manage forest health and reduce the likelihood of large-scale wildfires in the Emigrant Creek Ranger District and the Burns BLM District lands.		<ul style="list-style-type: none"> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> • <i>Reduce economic loss</i> • <i>Protect Natural Resources</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> • Fuel reduction strategies, such as building fire-resistant corridors, can reduce the likelihood of large-scale wildfires and help protect structures around the Emigrant Creek Ranger District and Burns District BLM lands. • Reducing large acreage fires will also protect the cities of Burns and Hines from fires events similar to the ones that occurred in the 1980s and almost reached both cities. • Actively managing the forest will have the increased benefit of reducing forest stands to historic levels, eliminating infested tree stands, and can have additional economic benefits by creating jobs in the county. • Wildfires increase the potential for flash floods in the county. Thinning the forest will reduce the likelihood and intensity of wildfires, thereby reducing the potential for flash floods. • The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that reduce the impact of natural hazards, especially on new and existing buildings. [201.6(c)(3)(ii)] Conducting fuel reduction activities in the Emigrant Creek Ranger District and the Burns BLM District lands will reduce the likelihood of large-scale wildfires, and protect buildings in those areas as well as and adjacent county lands. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> • Secure funding, such as through the National Fire Plan or grants through forest health, to pay for a NEPA environmental analysis. • Identify areas that are vulnerable to large scale wildfires and strategies that can be used to reduce this vulnerability. • Collaborate with the Nature Conservancy to develop strategies for funding and sustainable forest management. 		
Coordinating Organization:		Harney County
Internal Partners:		External Partners:
Harney County, Burns, Hines, Paiute Tribe		Nature Conservancy, Forest Service, BLM
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	\$200,000 to \$1,000,000
	<u>2-3 years</u>	
Form Submitted by:		Steve Grasty, Harney County Judge

Wildfire Action # 8

Proposed Action Item:	Alignment with Plan Goals:
Construct fuel breaks and manage hazardous fuels as delineated in the Community Wildfire Protection Plan (CWPP) to break up the continuity of wildland fuel near major population centers.	<ul style="list-style-type: none"> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> • <i>Reduce economic loss.</i>
Rationale for Proposed Action Item:	
<ul style="list-style-type: none"> • Harney County is susceptible to wildfire events, and there have been instances where fire nearly reached the cities of Burns and Hines and other unincorporated communities. Constructing fuel breaks and managing hazardous fuels around population centers can offer a protective buffer from wildfires. • The Community Wildfire Protection Plan (CWPP) outlines where fuel breaks should be established throughout the county. Locations include: <ul style="list-style-type: none"> • Burns • Hines • Paiute Indian Reservation • Crane • Drewsey • Frenchglen/Jack Pine Place • Fields • Diamond • Andrews • Riley • The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that protect new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Constructing fuel breaks around major population centers will help protect buildings and infrastructure from wildfires and help to diminish communities' vulnerability to wildfire events. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 	
Ideas for Implementation:	
<ul style="list-style-type: none"> • Coordinate efforts with the CWPP Core Team and communities to develop a strategy for constructing fuel breaks. • Seek funding to help pay for construction of fuel breaks around communities. 	
Coordinating Organization:	CWPP Core Team
Internal Partners:	External Partners:
Burns, Hines, Harney County, Paiute Tribe	FEMA, Forest Service, BLM
Timeline:	If available, estimated cost:
<u>Short Term</u> (0-2 years)	
<u>Long Term</u> (2-4 or more years)	
<u>2 years</u>	
Form Submitted by:	Harney County Natural Hazard Mitigation Steering Committee

Wildfire # 9

Proposed Action Item:		Alignment with Plan Goals:	
Construct barriers on pole power transformers to prevent birds from building nests on them, thereby reducing the chance of wildfires from transformer shorts.		<ul style="list-style-type: none"> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Discussions during the Harney County Hazard Identification meeting indicated that birds making nests on transformers attached to power poles can cause power shorts which often lead to wildfires. Installing barriers on power transformers to prevent birds from nesting on them will reduce the electrocution risk to birds, decrease the amount of power outages, and reduce the chance of sparking a wildfire. • The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions and projects that will reduce the effects of hazards on the community, particularly to critical infrastructure [201.6(c)(3)(ii)]. Constructing barriers on power transformers will assist in reducing the potential for power outages, while also protecting wildlife and reducing the likelihood of wildfires. The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Coordinate with the nature organizations such as the Audubon Society or the Nature Conservancy to develop appropriate barriers that will prevent wildlife from nesting on power transformers. 			
Coordinating Organization:		Harney Electric Cooperative	
Internal Partners:		External Partners:	
County, Burns, Hines, Paiute Tribe		Audubon Society, Harney County National Wildlife Refuge, Nature Conservancy	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	<u>2-3 years</u>		
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Landslide Action # 1

Proposed Action Item:		Alignment with Plan Goals:	
<p>Make ODOT aware of the landslide issues on Highway 205 at the NWR near Frenchglen, Highway 395 at Divine Canyon, and County Road 47.</p>		<ul style="list-style-type: none"> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> • <i>Reduce economic loss.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Community members in the Harney County Hazard Identification meetings identified Highway 205 at the NWR, Highway 395 at Divine Canyon, and County Road 47 as areas that are potentially susceptible to landslides. Landslides along these roads could significantly impact access to communities in these areas. Making ODOT and County road officials aware of these hazards will help to stabilize these areas to prevent future landslides from occurring. • The Disaster Mitigation Act of 2000 requires communities to identify comprehensive mitigation actions to protect critical infrastructure [201.6(c)(3)(ii)]. Making ODOT aware of landslide issues along state highways can help protect these roads by making them a higher priority for ODOT to conduct stabilization work. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Work with ODOT to raise awareness of landslide issues in Harney County. • Coordinate efforts with the Harney County Public Works department responsible for maintaining county roads. 			
Coordinating Organization:		Harney County Road Department	
Internal Partners:		External Partners:	
Harney County		Oregon Department of Transportation (ODOT)	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
<u>1 year</u>			
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Severe Weather Action # 1

Proposed Action Item:		Alignment with Plan Goals:	
Educate residents and visitors to Harney County about the dangers of lightening strikes, flash floods, and severe weather in the high desert.		<ul style="list-style-type: none"> • <i>Save lives and reduce injuries.</i> • <i>Reduce economic loss.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The high desert can be unpredictable and dangerous if residents and visitors do not take the necessary precautions to protect themselves against severe weather events. Severe weather events include extreme cold, extreme heat, and sudden lightening and winter storms. • Every year lightening strikes injure or kill visitors to Steens Mountain from sudden thunderstorms. Conducting public education and outreach campaigns to educate visitors to the Steens Mountain and other areas in Harney County about the dangers of severe weather events can significantly reduce the number of injuries due to severe weather in Harney County. • In 1992 and again in 2005, flash floods caused by heavy rains inundated the Page Springs campground leaving campers stranded. Educating visitors about potential natural hazards such as flash floods can help visitors to take mitigating actions before an event occurs to reduce the impact of a natural hazard. • Frostbite in extreme cold can be a major problem because the combination of dry air and the sun in the winter can give people the false perception the air is warmer than it really is. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Provide informational brochures at the annual Burns Hunter’s Booth to educate hunters about extreme weather events found in the high desert. • Provide information to new residents in Harney County about the effects of severe weather events in the high desert. • Include severe weather information on Harney County’s GIS hunting maps to inform hunters of potential hazardous areas and the risks associated with severe weather events. 			
Coordinating Organization:		Harney County Chamber of Commerce	
Internal Partners:		External Partners:	
Harney County Planning Department, Hunter’s Booth Coordinators		BLM, Forest Service, Oregon Hunter’s Association	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
1-2 years, ongoing			
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Severe Weather Action # 2

Proposed Action Item:		Alignment with Plan Goals:
Replace primary electrical overhead lines to mountaintop communication services with underground lines.		<ul style="list-style-type: none"> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> • <i>Reduce economic loss.</i>
Rationale for Proposed Action Item:		
<ul style="list-style-type: none"> • Overhead electrical lines are subject to high winds and winter storm damage. The risk is higher on the lines going to a mountaintop or peak. Most of the services at the top are communication sites. The communication sites are used by ODOT, State Police, county sheriff, emergency services, telephone utilities and cell phone companies. During a disaster the sites are vital for communication. During winter storm access to the line by the utility is difficult and this difficulty delays the time for restoration of power to the services. The utility company has experienced costs each year to repair and maintain the lines. Changing the lines to underground would remove the risk of damage from wind and winter storm. • The Disaster Mitigation Act of 2000 requires communities to develop comprehensive actions to reduce the impacts of natural hazards, with an emphasis on new and existing buildings and infrastructure.[201.6(c)(3)(ii)] Replacing primary electrical overhead lines to mountaintop communication services with underground lines will reduce the impact of severe weather on power lines, and will continue power service to rural customers as well as ODOT, State Police, county sheriff, emergency services, telephone utilities, and cell phone companies. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 		
Ideas for Implementation:		
<ul style="list-style-type: none"> • The utility company would be responsible to identify all the mountaintops and apply for grants to put the lines underground. 		
Coordinating Organization:	Harney Electric Cooperative, Inc.	
Internal Partners:		External Partners:
Oregon Trail Electric Cooperative		Companies which are served by the utility and the utility company, Malheur County, Lake County
Timeline:		If available, estimated cost:
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	n/a
	3-4 years	
Form Submitted by:	Fred Flippence, Office Manager, Harney Electric Cooperative, Inc.	

Severe Weather Action # 3

Proposed Action Item:		Alignment with Plan Goals:	
Shorten spans and anchor poles on utility lines in high wind or heavy icing areas.		<ul style="list-style-type: none"> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • High wind storms or winter icing storms can cause damage to long spans between power poles and create power outages during storms. If poles are inserted between spans this reduces the risk of outages. Also by anchoring certain poles this can reduce the amount of line which would go down in a storm. Both items reduce the cost of repair and replacement. • Winter storms have a significant impact on the Harney County Electric Cooperative, causing power outages when ice forms on the power lines. This is especially a problem with older power lines constructed in the 1950s that have a larger line span between poles. Placing intermediary poles between these spans cuts the span in half and reduces the likelihood of a power line breaking. • The Disaster Mitigation Act of 2000 requires communities to develop comprehensive actions to reduce the impacts of natural hazards, with an emphasis on new and existing buildings and infrastructure.[201.6(c)(3)(ii)] Shortening the spans between long lines and anchoring poles will reduce the likelihood of lines breaking during wind and winter icing storms. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • The utility company would be responsible to identify high wind and icing areas from previous outages and apply for grants to strengthen the areas by pole inserts and anchoring. 			
Coordinating Organization:		Harney Electric Cooperative, Inc.	
Internal Partners:		External Partners:	
Oregon Trail Electric Cooperative		Malheur County, Lake County	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	N/A	
	<u>2-4 years</u>		
Form Submitted by:		Fred Flippence, Office Manager, Harney Electric Cooperative, Inc.	

Earthquake # 1

Proposed Action Item:		Alignment with Plan Goals:	
Inventory and identify critical facilities for seismic retrofit.		<ul style="list-style-type: none"> <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> According to DOGAMI's Seismic Needs Assessment of buildings in Harney County, the Burns City Hall, the Burns High School, the Henry L Slater Elementary School, the Crane Elementary School, and the Hines Middle School all have a high vulnerability for seismic events. Seismically retrofitting these buildings will significantly reduce their vulnerability in the event of an earthquake. Oregon Senate Bill 3 (2005) enables the Oregon Office of Emergency Management to develop a grant program to seismically rehabilitate critical public facilities. While the grant program is still being developed, conducting an inventory of critical facilities early will assist communities in obtaining funding once the grant program is in place. The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that protect new and existing buildings [201.6(c)(3)(ii)]. Seismically retrofitting existing critical facilities will help communities in Harney County reduce their vulnerability to seismic events. The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Use DOGAMI's Seismic Needs Assessment of buildings in Harney County to identify and prioritize buildings vulnerable to seismic events. Coordinate with OEM and FEMA to determine funding for conducting seismic retrofit of buildings. 			
Coordinating Organization:		Harney County School District No. 3	
Internal Partners:		External Partners:	
Burns, Hines, Harney County, Crane School District		DOGAMI, OEM.	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	<u>3-4 years</u>		
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Drought Action # 1

Proposed Action Item:		Alignment with Plan Goals:	
Conduct public outreach campaigns to raise awareness about drought hazards and mitigation actions residents can take to reduce the impact of drought on the county.		<ul style="list-style-type: none"> • <i>Protect natural resources.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The Oregon Office of Emergency Management has declared three droughts in Harney County over the past eight years. Drought is a frequent problem in Harney County, and residents should be informed about the risks that drought poses to their homes, such as the increase in wildland fire risk. In addition, homeowners should be aware of controlling water use during drought conditions to conserve water. • The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions and projects that reduce the effects of a hazard on the community [201.6(c)(3)(ii)], such as actions protecting natural resources. Conducting public outreach campaigns that raise awareness about drought hazards and mitigation actions they can implement can significantly reduce the impact of drought on the county. The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Conduct on outreach program to inform residents of the drought status in their community, the importance of conserving water in drought periods, and strategies residents can use to limit water usage. • Develop an education outreach program to encourage homeowners to install water-efficient devices in their homes. • Use current mailing, such as the one developed by the City of Hines, to inform residents about measures they can take to mitigate against drought. • Develop wasteful water ordinances, such as the one developed by the City of Hines, to minimize water waste in drought conditions. 			
Coordinating Organization:		Harney County Watershed Council	
Internal Partners:		External Partners:	
Burns, Hines, Harney County, Paiute Tribe		Natural Resources Conservation Services, Oregon Department of Agriculture	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
<u>1 year</u>			
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Multi-Hazard Action # 1

Proposed Action Item:		Alignment with Plan Goals:	
Educate residents about preparing emergency kits and stocking a 14-day supply of food to adequately prepare for a natural hazard event.		<ul style="list-style-type: none"> • <i>Save lives and reduce injuries.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Several natural hazards, such as severe weather, earthquakes, and floods, have the potential for disrupting transportation services and isolating rural residents from basic services and needs. Harney County has a high number of rural residents, and they need to be educated about the dangers that natural hazards pose and what actions they can take to mitigate the impact hazards on the community. Preparing emergency kits and stocking a 14-day supply of food can significantly reduce the impacts of a natural hazard event on rural residents. • The Disaster Mitigation Act of 2000 requires communities to identify actions that reduce the impacts of natural hazards [201.6(c)(3)(ii)]. Educating residents about preparing emergency kits and stocking a 14-day supply of food will enable residents in Harney County to withstand the impacts of a natural hazard on their community. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Conduct public outreach campaigns, such as articles in the newspaper or through brochures instructing residents about the risks natural hazards pose and mitigation actions they can implement. • Coordinate with other groups conducting other emergency management activities, such as the response and preparedness efforts being undertaken by the Harney County Health Department, to assist in conducting public outreach campaigns, developing emergency kits, and educating residents about other mitigation activities 			
Coordinating Organization:		Harney County Health Department	
Internal Partners:		External Partners:	
Burns, Hines, Paiute Tribe, Harney County, Senior Center (food bank)		OEM	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
1-2 years			
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Multi-hazard # 2

Proposed Action Item:		Alignment with Plan Goals:	
Work with local businesses to develop business continuity plans.		<ul style="list-style-type: none"> • <i>Reduce economic loss</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • According to Daniel Alesch from the Public Entity Risk Institute, business continuity plans assist businesses in planning for future recovery efforts. In addition, research has shown that most small businesses are unable to recover after a disaster. Business continuity plans allow businesses and their employees to be better prepared for a disaster. Having plans in place may reduce the impact on the business, allowing employees to continue to work or get back to work faster. • Many small businesses in Burns and Hines, and farmers located across Harney County, are located in areas that are susceptible to natural hazards, such as flooding or severe weather events. Preparing business continuity plans for these small enterprises can significantly reduce the impact of a natural hazard and help businesses to recover from a disaster. • Ranchers in Harney County can be particularly susceptible to severe weather events. A winter storm can make it difficult for cattle to find feed and can harm a rancher’s livestock. Incorporating these hazards into a business continuity plan, and developing steps to continue business activities, will help a business recover faster from a natural disaster. <p>The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities.</p>			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Coordinate with the local Chamber of Commerce to help develop business continuity plans • Use the monthly Chamber of Commerce Business Roundtable as an informational forum to teach businesses the importance of developing business continuity plans • Coordinate with ONHW to help conduct workshops with local businesses and farmers to help develop business continuity plans 			
Coordinating Organization:		Harney County Economic Development (HCED)	
Internal Partners:		External Partners:	
Harney County Chamber of Commerce, Oregon Cattleman’s Association		Oregon Natural Hazards Workgroup (ONHW)	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	<u>3 years</u>		
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Multi-Hazard # 3

Proposed Action Item:		Alignment with Plan Goals:	
Inventory historic and cultural resources, with an emphasis on unreinforced masonry buildings, and identify their vulnerabilities to natural hazards to develop mitigation actions for their protection.		<ul style="list-style-type: none"> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> • <i>Protect cultural resources.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Unreinforced masonry buildings are particularly vulnerable to seismic events. Many older commercial buildings in Harney County are unreinforced masonry and are vulnerable to damage in the event of an earthquake. This could have significant impacts on local economies in the event of an earthquake. Identifying mitigating measures for retrofitting masonry buildings will reduce the vulnerability of the buildings to an earthquake event and improve the resiliency of the local economy. • The National Register of Historic Places indicates that Harney County has seven resources, including buildings and archeological sites, listed on the National Register. These sites serve as important cultural and historic resources for Harney County and are worthy of additional protection. Identifying mitigation measures for resources listed on the National Register will help protect Harney County’s historical heritage and ensure their long-term viability. • Tourism is a significant component of Harney County’s economy and many tourists come to visit Harney County’s historic and cultural resources. Identifying mitigating actions to help preserve these historic and cultural resources from damaging hazard events will preserve the cultural heritage of the county and maintain heritage tourism as a significant component in the County’s economy. • The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community, particularly to buildings and infrastructure [201.6(c)(3)(ii)]. Inventorying important historic and cultural resources and identifying their vulnerability to natural hazards will help to develop mitigation actions that reduce their overall vulnerability to natural hazards. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Identify significant cultural and historic resources, whether on the national register or not, that are worthy of additional protection • Determine vulnerabilities of these resources to natural hazards • Identify appropriate mitigation measures to help preserve historic and cultural resources. 			
Coordinating Organization:		Harney County Chamber of Commerce	
Internal Partners:		External Partners:	
Burns, Hines, Paiute Tribe, Harney County		Oregon State Historic Preservation Office (SHPO), Forest Service, BLM, USFWS	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	3 years		
Form Submitted by:	Harney County Natural Hazard Mitigation Steering Committee		

Multi-Hazard # 4

Proposed Action Item:		Alignment with Plan Goals:	
Develop a Continuity of Operations Plan (Coop) for Harney County.		<ul style="list-style-type: none"> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> • <i>Reduce economic loss.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Harney County is vulnerable to a number of different natural hazards that could affect the administration and management of local government. Developing continuity of operations plans for the county will assist in maintaining a basic level of government to continue to provide needed services within the community. • According to the Florida Division of Emergency Management, continuity of operations is accomplished through the development of plans, comprehensive procedures, and provisions for alternate facilities, personnel, resources, interoperable communications, and vital records/databases. The plan establishes policy and guidance to ensure the execution of the organization’s most essential functions in any event which requires the relocation of selected personnel and functions to an alternate facility. • Research conducted by Richard Wilson has shown that staff turnover is likely to occur after a disaster. Veteran staff is critical after a disaster. It is important to prevent turnover so that existing personnel do not have to take on extra responsibilities during an already stressful time. Continuity planning can also help lessen turnover by ensuring competitive salaries and benefits and by reducing the amount of stress staff will have to endure. • The Disaster Mitigation Act of 2000 requires communities to develop actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Developing a continuity of operations plan will diminish the effects of a natural disaster by providing Harney County with a framework for continuing operations in a potentially chaotic situation. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, developing a COOP is considered a multi-jurisdictional action that will benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Research and review completed continuity of operations plans to provide a foundation of expected content and issues to review. • The COOP should ensure shelter housing for critical staff and family members such as city officials, public works employees, emergency response, and others. • Assess and prioritize critical positions and resources vital to the continuance of important city functions. • Incorporate COOP into the existing Emergency Operations Plans where applicable. 			
Coordinating Organization:		Harney County	
Internal Partners:		External Partners:	
Burns, Hines, Paiute Tribe		OEM, FEMA	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	3-4 years		
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Plan Implementation # 1

Proposed Action Item:		Alignment with Plan Goals:	
The Harney County Natural Hazards Mitigation Steering Committee will be the coordinating body responsible for implementing the Harney County Natural Hazards Mitigation Plan.		<ul style="list-style-type: none"> • <i>Increased cooperation and coordination among local, state, and federal agencies.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The Harney County Natural Hazards Mitigation Steering Committee identified itself, with the inclusion of other members, to be the main body to implement the Harney County Natural Hazards Mitigation Plan. • The Disaster Mitigation Act of 2000 requires Mitigation Plans to include a maintenance section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle [201.6(c)(4)(i)]. A key component to effective maintenance is to have a coordinating body responsible for both the maintenance implementation of the plan to ensure that it remains relevant to Harney County’s needs. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Convene the Hazard Mitigation coordinating body on a semi-annual basis to discuss Plan actions and methods for their implementation. • After natural hazard events occur, convene the coordinating body to discuss action items for implementation or strategies for amending the plan to incorporate new action items. 			
Coordinating Organization:		Harney County Natural Hazard Mitigation Coordinating Body	
Internal Partners:		External Partners:	
Burns, Hines, Harney County Planning Department, Harney County Court, Paiute Tribe		US Forest Service, BLM, USFWS	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
0-1 years			
Form Submitted by:	Harney County Natural Hazard Mitigation Steering Committee		

Plan Implementation # 2

Proposed Action Item:		Alignment with Plan Goals:	
Coordinate mitigation planning activities with existing planning activities to incorporate mitigation actions and avoid duplicating efforts.		<ul style="list-style-type: none"> • Increase cooperation and coordination among local, state, and federal agencies. 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • There are a number of organizations in Harney County that conduct activities related to emergency management or public health and safety. These organizations include the Harney County District Hospital, the Harney County Health Department, the US Forest Service, the Bureau of Land Management, the US Fish and Wildlife Service, the Harney County office of Emergency Management, and the Community Wildfire Protection Program (CWPP) Core Team, among others. Coordinating mitigation planning activities with other emergency management or public health and safety activities will avoid duplicating efforts and increase cooperation among different entities striving to improve disaster resilience in Harney County. • The Harney County Health Department is in the process of updating the Emergency Operations Plan for the County, especially the health annex of the plan. Incorporating mitigation planning with other emergency management planning activities will assist in taking a comprehensive and integrated approach to emergency management and avoid duplicating efforts within the county. • The Disaster Mitigation Act of 2000 requires communities to maintain the Hazard Mitigation Plan by having local governments incorporate the requirements of the mitigation plan into other planning mechanisms [201.6(c)(4)(ii)]. Coordinating mitigation activities with other emergency management or public health and safety planning activities will help local governments incorporate mitigation into other plans and policies currently being developed. Coordination will also reduce duplication of planning efforts, strengthening the overall mitigation planning process. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Include representatives from the Hazard Mitigation Coordinating Body in other emergency management and public health and safety planning efforts to ensure a link between mitigation and other planning activities. • Invite members of other committees to Hazard Mitigation Coordinating Body meetings. 			
Coordinating Organization:		Harney County Hazard Mitigation Coordinating Body	
Internal Partners:		External Partners:	
Harney County, Burns, Hines, Paiute Tribe, CWPP Core Team, Harney County Health Department		Forest Service, BLM, Oregon Department of Health	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)			
<u>Long Term</u> (2-4 or more years)			
1 year			
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

Plan Implementation # 3

Proposed Action Item:		Alignment with Plan Goals:	
Use the services of the Harney County Emergency Manager to assist in coordinating hazard mitigation meetings and in implementing mitigation action items.		<ul style="list-style-type: none"> • <i>Increase cooperation and coordination among local, state, and federal agencies.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Currently Harney County does not have a full-time Emergency Manager, however it is in the process of hiring a new Emergency Manager for the county. Once hired, the Emergency Manager can assist the convener in coordinating hazard mitigation meetings and in implementing hazard mitigation action items. The convener identified in the Hazard Mitigation Plan is currently the Harney Electric Cooperative, and having assistance from the Emergency Manager will provide the coordinating body with important information on natural hazard-related activities currently underway. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Once hired, involve the Harney County Emergency Manager in coordinating body meetings. 			
Coordinating Organization:		Harney County Hazard Mitigation Coordinating Body	
Internal Partners:		External Partners:	
Harney County, Burns, Hines, Paiute Tribe		OEM	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
0-1 year			
Form Submitted by:		Harney County Natural Hazard Mitigation Steering Committee	

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

Section 5:

Plan Implementation and Maintenance

This section details the formal process that will ensure that Harney County's Natural Hazards Mitigation Plan remains an active and relevant document. The plan implementation and maintenance process includes a schedule for monitoring and evaluating the Plan annually, as well as producing an updated plan every five years. 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 Harney Electric Cooperative 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 the 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

On June 28, 2007 the Harney County Mitigation Steering Committee identified the Harney Electric Cooperative as the convener organization for the Harney County Natural Hazards Mitigation Plan. Responsibilities of the convener include the following:

- 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 and key plan stakeholders;
- Identify emergency management-related funding sources for natural hazard mitigation projects;
- Incorporate, maintain, and update the County's natural hazard risk GIS data elements; and
- Utilize the Risk Assessment as a tool for prioritizing proposed natural hazard risk reduction projects.

Coordinating Body

On June 28, 2007, the Harney County Mitigation Steering Committee identified itself as the coordinating body for the mitigation plan. Roles and responsibilities for the coordinating body include the following:

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

Members

The following organizations were represented and served on the Steering Committee during the development of the Harney County Natural Hazards Mitigation Plan:

- Harney County Court;
- Harney County Planning Department;
- Harney Electric Cooperative;
- City of Burns;
- City of Hines;
- United States Forest Service;
- Bureau of Land Management;
- US Fish and Wildlife Service; and
- Paiute Native American Tribe.

These organizations will also serve as members of the coordinating organization. To make the coordination and review of Harney County's 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.

Plan Maintenance

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

Semi-Annual Meetings

The Committee will meet on a semi-annual basis to complete the following tasks. During the first meeting the Committee will:

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

During the second meeting of the year the Committee will:

- Review existing and new risk assessment data;
- Discuss methods for continued public involvement; and
- Document successes and lessons learned during the year.

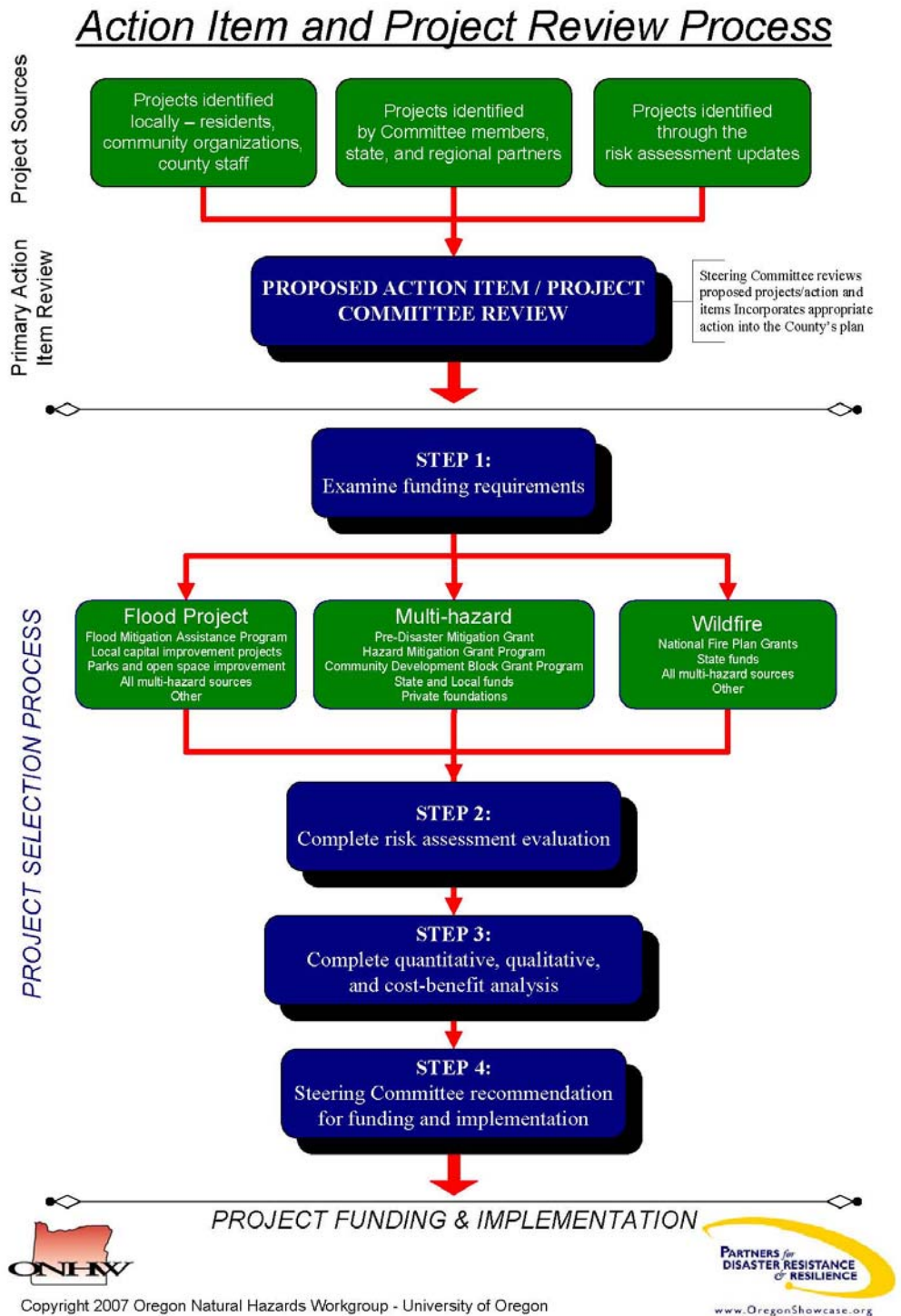
The convener will be responsible for documenting the outcome of the semi-annual meetings. The process the Committee will use to prioritize mitigation projects is detailed in the section below. The plan's format allows the County to review and update sections when new data becomes available. New data can be easily incorporated, resulting in a natural hazards mitigation plan that remains current and relevant to Harney County.

Project Prioritization Process

The Disaster Mitigation Act of 2000 (via the Pre-Disaster Mitigation Program) requires that the 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 program (FMA), National Fire Plan (NFP), Community Development Block Grants (CDBG), local general funds, and private foundations. Some of these examples are used in Figure 5.1 on the next page to illustrate the project development and prioritization process.

Figure 5.1: Project Prioritization Process



Source: Oregon Natural Hazards Workgroup, 2006.

Step 1: Examine funding requirements

The Steering Committee will identify how best to implement individual actions within 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 organizations about the project's eligibility.

Step 2: Complete risk assessment evaluation

The second step in prioritizing the plan's action items is 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, vulnerable community assets at risk, and the probability of future occurrence documented in the Plan. To rank the hazards, the community's natural hazard risk assessment was utilized. The risk assessment identified various hazards that may threaten community infrastructure and population and ranked them accordingly into the following categories:

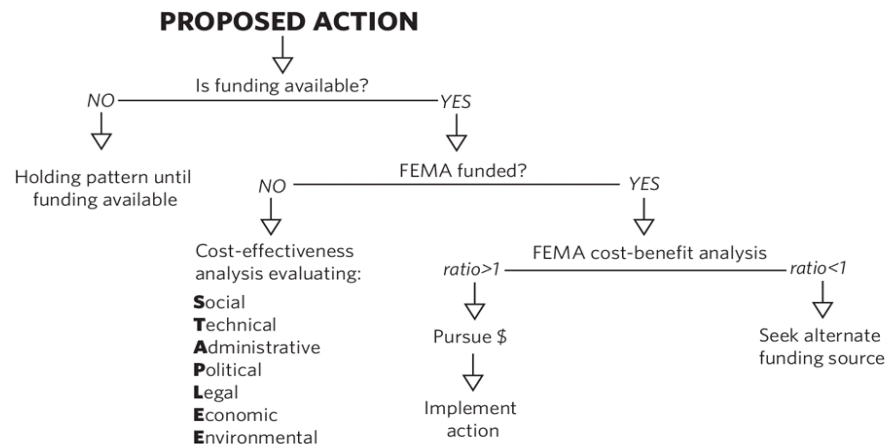
- Low
- Medium
- High

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

Step 3: Complete quantitative and qualitative assessment, and economic analysis

The third step is to identify the costs and benefits associated with natural hazard mitigation strategies, measures or projects. Two categories of analysis that are used in this step are: (1) benefit/cost analysis, and (2) cost-effectiveness analysis. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating natural hazards can provide decision makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects. Figure 5.2 shows decision criteria for selecting the method of analysis.

Figure 5.2: Benefit Cost 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 use in natural hazard action item prioritization by the University of Oregon’s Oregon Natural Hazards Workgroup. See Appendix C: 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 on the action item form 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 to share knowledge and/or resources. This process will afford greater coordination and less competition for limited funds. When the Committee selects a project for inclusion in the plan, a letter of support will be signed by all members of the Committee. This letter can be utilized in grant applications to show community support for the mitigation action.

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 the highest priority. This methodology is used by the Committee to prioritize the plan's action items during the annual review and update process.

Continued Public Involvement & Participation

Harney 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 and development process. To ensure that these opportunities will continue, the County will advertise the semi-annual meetings of the coordinating body to the general public. The public involvement strategy used in developing the plan was to use community members to participate in Steering Committee meetings. This practice will continue, and by advertising meetings to the general public, more opportunities for public involvement will occur. In addition, copies of the Harney County Natural Hazards Mitigation Plan will be made available in the local library for citizens to review. The County will also provide a copy of the mitigation plan on the County's website. By making the plan available to the public, and providing the public with information on committee meetings, the public will have the opportunity to continue to be involved in the mitigation planning process.

Finally, in addition to the involvement activities listed above, the county's mitigation plan will also be archived and posted on the Partnership website via the University of Oregon Libraries' Scholar's Bank Digital Archive.

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. The update process for the Plan will begin in December 2011, one year prior to the end of the five year cycle. During this plan update process, 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's 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?
- 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.

Volume II: Addendums

City of Burns Addendum

City of Hines Addendum

Harney Electric Cooperative Addendum

City of Burns

Hazard Mitigation Addendum

Risk Assessment and Action Items

Attachments:

Hazard Identification Memorandum and Worksheets
May 3, 2007 Burns Telephone Interview Agenda and Notes

Introduction

The Burns addendum to the Harney County Natural Hazards Mitigation Plan provides asset and hazard information specific to the City of Burns, as well as action items that address those natural hazards. This addendum is part of the multi-jurisdictional Harney County Natural Hazards Mitigation Plan that also includes addendums for the City of Hines and the Harney Electric Cooperative. While the Harney County Mitigation Plan provides a comprehensive range of actions for all communities in the county, action items written for the City of Burns are necessary to address hazards specific to the city.

Methodology

The Oregon Natural Hazards Workgroup (ONHW) gathered information from a variety of sources to identify community assets and natural hazards affecting the city. The asset identification meeting held on March 28, 2007, and the Hazard Identification meeting held on March 29, 2007 provided ONHW with a preliminary list of community assets and natural hazards found in the City of Burns. In addition, on May 3, 2007, ONHW held a phone interview with the Burns City Manager to identify additional assets and hazards. Finally, ONHW consulted with the Burns Public Works Director to identify specific areas in the City of Burns susceptible to natural hazards.

Using the information gathered from interviews, ONHW and the City of Burns developed a series of action items to address natural hazards found in the city. The Burns City Manager, together with representatives from the Public Works Department and Public Safety Department reviewed each action item to determine the appropriateness of each action. The action items address the following range of natural hazards:

- Wildfire
- Flood
- Severe Weather
- Multi-Hazard

Asset Identification

The following assets identified for the City of Burns were gathered from the Asset Identification meetings held with community members on March 28, the Hazard Identification meeting held on March 29, and the telephone interview with the Burns City Manager held on May 3. The City of Burns has the following community assets:

Population

- Students
- Assisted Living Centers
- Disabled Populations
- Native American Populations: Paiute Indians

Economy

- Downtown small businesses
- Local city government

Cultural and Historic Resources

- Fairgrounds
- County Library
- Harney County Museum
- Hospital

Infrastructure and Facilities

- City Police
- City Fire
- Burns City Hall
- Highway 20
- Water Storage and Treatment Plants located in floodplain
- Burns municipal airport located in the floodplain
- Hospital and EMS
- Harney County Senior Center
- 911 Center
- Newspaper and radio stations
- County Courthouse
- Fire Guard Station
- Waste disposal facilities
- Oregon Trail Electric Cooperative
- Harney Electric Cooperative

Environmental Assets

- Community growth in Burns
- Public Park in the City

Hazard Identification

The hazard identification information for the City of Burns was gathered through a telephone interview with the Burns City Manager, Justin Boone, conducted on May 3, 2007, and through email correspondence with the Director of Public Works, Dave Cullens. The memorandum and worksheets sent to Dave Cullens are attached with this addendum.

In the May 3 telephone interview with the Burns City Manager, ONHW went through each natural hazard event and asked questions about the vulnerability and/or probability of each natural hazard occurring in the City of Burns. Information gathered from the Hazard Identification Steering Committee was also presented to the City Manager for additional comments. The worksheets sent to Dave Cullens followed the same format, individually addressing each natural hazard event. Information from both sources is compiled in the natural hazard summaries below.

Earthquake

The probability and vulnerability ratings for earthquake for the City of Burns are adequately addressed by the Harney County portion of the Natural Hazards Mitigation Plan. The probability of an earthquake occurring is considered low, and the vulnerability is considered high. In discussions with the City Manager and the Public Works Director, there was agreement that the probability for a sizeable magnitude earthquake is low. However, given that 70% of the downtown consists of unreinforced masonry buildings, should an earthquake occur, then the vulnerability for the City of Burns to an earthquake is high. However, the Burns City Hall, as well as the Post Office, are located in reinforced masonry buildings that will suffer less damage in an earthquake than reinforced masonry buildings. In addition, the City of Burns is susceptible to being isolated given that Highway 20, 395, and 78 are the only major transportation routes connecting the cities with the rest of the state. Should an earthquake damage any of these transportation routes, Burns can find itself isolated.

Flooding

The probability and vulnerability ratings for flood for the City of Burns are adequately addressed by the information presented in the Harney County portion of the Natural Hazards Mitigation Plan. The probability of a flood occurring in Burns is considered moderate, and the vulnerability is considered moderate as well. A large portion of Burns is located in the floodplain, including the business district and City Hall, however, flooding is not considered a big issue because it happens infrequently. The Burns City Manager indicated that there is a moderate impact of flooding to the business district. In addition, a portion of the city is located on a hill, and will not be impacted by any floods. Nevertheless, there are certain areas that are vulnerable to floods. Both the City Manager and the Public Works Director indicated that the subwater from the Silvies River has impacted houses along Riverside Drive. The last time there was any significant flooding was last spring when there was a high winter snowpack and rain. This flooding event affected some crawlspaces and front yards but not many houses. The Public Works Director also identified West Monroe Street and Highway 20 between N Broadway and N Egan as being areas that are affected by flash flooding. Flood loss data provided by the National Flood Insurance Program also indicates that there were ten single loss properties with insurance claims that totaled \$92,822.

Drought

The drought hazard history, as well as the probability and vulnerability ratings for drought in the City of Burns, is adequately addressed in the Harney County portion of the Mitigation Plan. The probability of a future drought occurring is high, and vulnerability of a drought recurring is moderate.

Landslide

The landslide hazard history, as well as the probability and vulnerability ratings for landslide in the City of Burns, is adequately addressed in the Harney County portion of the Mitigation Plan. The probability of a future landslide is moderate, while the vulnerability is low. Landslide events would most likely impact Burns if a landslide closed Highway 20, especially between Burns and Ontario. Any landslide

event would significantly impact commerce in Burns. However, there are no steep slopes that would directly affect the city of Burns.

Volcano

The volcano hazard history, and the probability and vulnerability ratings for the volcano hazard are adequately addressed in the Harney County portion of the Mitigation Plan. The probability of a volcanic event affecting the City of Burns is low, and the vulnerability is moderate. While a volcanic event may not have a direct impact on the City of Burns, the ash fallout from an event in the Cascades could potentially affect Burns, especially for people with respiratory problems. There is also potential for people in the area to be evacuated to the west should an eruption occur.

Wildfire

The wildfire probability and vulnerability ratings for the City of Burns are adequately addressed in the wildfire part of Section 3 of the Mitigation Plan. The probability of a wildfire occurring in the City of Burns is high, and the vulnerability is high. According to the City Manager, the core of the city would not be significantly impacted by wildfire, however, the areas on the outskirts of the city would be impacted significantly. Examples of vulnerable areas include homes along the Silvies River, along Riverside Drive because they are built close to the brush, and in 1991 residents on the west side of Burns were instructed to evacuate because a wildfire was approaching. Wildfire remains an issue, and the Community Wildfire Protection Plan (CWPP) does provide actions for addressing these issues.

Severe Weather

The probability and vulnerability ratings for severe weather for the City of Burns are addressed in the severe weather part Section 3 of the Mitigation Plan. The probability for a severe weather event to occur in Burns is rated as moderate to high, while the vulnerability is rated as moderate. Severe weather has affected Burns in the form of windstorms, heavy winter storms that can leave heavy amounts of snow on the ground, and lightening storms that can affect local utilities such as the Harney Electric Cooperative. The City Manager did note that some of the homes in Burns are old, and their roof structures may not be able to support heavy snowfall. The Public Works Director did note that the City does have the capability to clear snow from city streets should heavy snowfall occur.

Mission, Goals, and Action Items

The mission and goals for the Burns City Addendum are the same as the mission and goals written in the Harney County Natural Hazard Mitigation Plan. The mission for the Plan and the Burns addendum is the following:

- To develop a disaster-resilient Harney County

The goals are the following:

- Save lives and reduce injuries.
- Minimize and prevent damage to public and private buildings and infrastructure.
- Increase cooperation and coordination among local, state, and federal agencies.
- Reduce economic loss.
- Protect natural resources.
- Protect cultural resources.

Using the community asset and the hazard identification information described above, ONHW in consultation with the City of Burns developed the following list of action items for the City. The City of Burns' action items are organized according to the following hazards:

- Wildfire
- Flood
- Severe Weather
- Multi-hazard

The action items for the Burns addendum are listed below.

Wildfire Action # 1

Proposed Action Item:		Alignment with Plan Goals:	
Coordinate with the Community Wildfire Protection Plan (CWPP) core team to construct fuel breaks and create defensible space in and around the City of Burns to reduce the vulnerability of wildfire in the community.		<ul style="list-style-type: none"> • <i>Save lives and property.</i> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> • <i>Increase cooperation and coordination among local, state, and federal agencies.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Steering committee members at the Harney County Hazard Identification meeting identified wildfire as Harney County’s most significant natural hazard. Coordinating with the CWPP Core Team to construct fuel breaks around the City of Burns will diminish the vulnerability of wildfire on the community. • In 1991/1992 a wildfire came within seven miles of the City of Burns. Constructing a fuel break in strategic locations around the City of Burns will help diminish the vulnerability of wildfire on the community. • Stakeholder interviews with City staff indicate that that the west side of Burns is particularly vulnerable to wildfire events and residents had to evacuate in the past to avoid wildfire danger. Constructing fuel breaks on the west side of Burns can significantly reduce Burns’ vulnerability to wildfire events. • The Harney County CWPP outlines specific actions for the City of Burns to mitigate against wildfires. Recommendations are to develop fuel breaks around the cities of Burns and Hines, develop a defensible space for areas within 300 feet of juniper and sagebrush covered slopes, and conduct weed abatement to reduce the likelihood of spot fires in both communities. • The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that address new and existing buildings [201.6(c)(3)(ii)]. Coordinating wildfire mitigation efforts, such as constructing fuel breaks and conducting weed abatement, with the CWPP core team will ensure proper coordination of efforts to reduce the City of Burns’ vulnerability to wildfire. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely heavily on 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:			
<ul style="list-style-type: none"> • Coordinate meetings with the City of Burns and the CWPP core team to discuss wildfire mitigation efforts • Seek funding sources for the construction of fuel breaks around the City of Burns. 			
Coordinating Organization:		CWPP Core Team	
Internal Partners:		External Partners:	
Burns, City of Hines, Paiute Tribe, Harney County		BLM, Forest Service	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	3 years		
Form Submitted by:	City of Burns		

Wildfire Action # 2

Proposed Action Item:		Alignment with Plan Goals:	
Distribute public outreach materials informing residents about wildfire hazards and mitigation actions they can take to protect their property.		<ul style="list-style-type: none"> • <i>Save lives and reduce injuries.</i> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Steering committee members at the Harney County Hazard Identification meeting identified wildfire as Harney County’s most significant natural hazard. Conducting public outreach campaigns will inform residents about wildfire hazards and mitigation actions they can implement to reduce their vulnerability to wildfire. • In 1991 a wildfire came within seven miles of the City of Burns. Conducting public outreach campaigns about the hazards that wildfires pose will inform the public about the community’s risk to wildfires and actions they can implement to reduce that risk. • The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Conducting public outreach campaigns to inform residents about the risks that wildfires pose and mitigation actions they can implement will protect their property from future wildfire damage. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely heavily on 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:			
<ul style="list-style-type: none"> • Use the Institute for Business Home and Safety (IBHS) brochures as outreach materials. • Provide wildfire mitigation information at City and County offices. 			
Coordinating Organization:		CWPP Core Team	
Internal Partners:		External Partners:	
Burns, City of Hines, Paiute Tribe, Harney County		BLM, Forest Service	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
1-2 years			
Form Submitted by:		City of Burns	

Flood # 1

Proposed Action Item:		Alignment with Plan Goals:	
Incorporate flood hazards information and mitigation activities into existing public outreach materials.		<ul style="list-style-type: none"> • <i>Save lives and reduce injuries.</i> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The City of Burns currently provides information and mitigation strategies to residents susceptible to floods, such as installing sump pumps in crawl spaces, to reduce the impacts of floods. Incorporating additional flood mitigation activities into existing public outreach materials will help diminish flooding impacts on the community and enhance flood mitigation strategies. • Interviews with City staff indicate that the Riverside Drive area is susceptible to low water flooding events that can flood crawl spaces in homes. Informing residents of flood hazards in their communities and mitigation activities they can implement to reduce the impact of floods will help to minimize damage to their property. • The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that address new and existing buildings [201.6(c)(3)(ii)]. Incorporating flood hazards information and mitigation activities into existing public outreach materials will help residents in Burns to mitigate against flooding events. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely heavily on 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:			
<ul style="list-style-type: none"> • Provide flood hazard information and mitigation activities in City and County offices. • Incorporate mitigation action items into existing public outreach materials. 			
Coordinating Organization:		Burns Public Works	
Internal Partners:		External Partners:	
Hines, Paiute Tribe, Hines Planning Department		FEMA, DLCD, BLM, Oregon Office of Emergency Management (OEM), Forest Service	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
1 year			
Form Submitted by:		City of Burns	

Flood # 2

Proposed Action Item:		Alignment with Plan Goals:	
Upgrade culverts on West Monroe on Highway 20/395 between North Broadway and North Egan to reduce flash flooding events.		<ul style="list-style-type: none"> • <i>Save lives and reduce injuries.</i> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • West Monroe Street between North Egan and North Broadway is subject to flash flooding events and has worn out asphalt as a result. Improving culverts on West Monroe and the asphalt pavement can reduce the effects of flash flooding events on West Monroe St. • West Monroe Street is a major thoroughfare in Burns and the portion that has flash flooding problems is part of Highway 20/395, a major east-west highway for southeast Oregon. Improving culverts along this street can reduce the flooding vulnerability the well-trafficked highway. • The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that address critical infrastructure [201.6(c)(3)(ii)]. Enhancing culverts on West Monroe Street can reduce the effects of flash flooding and protect West Monroe Street from further damage. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely heavily on 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. Upgrading culverts will benefit Burns and Hines as well as the County which is heavily dependent on Highway 20. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Coordinate efforts with the City of Burns Public Works and ODOT to reduce flash flooding events on West Monroe Street. 			
Coordinating Organization:		Burns Public Works	
Internal Partners:		External Partners:	
Harney County Planning Department		FEMA, OEM, Watershed Council, ODOT	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
2 years			
Form Submitted by:		City of Burns	

Flood # 3

Proposed Action Item:		Alignment with Plan Goals:	
Update the FEMA FIRM floodplain map for the City of Burns.		<ul style="list-style-type: none"> <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The City of Burns' FIRM floodplain maps were last updated in 1989. Updated floodplain maps incorporate new data and will help to reduce flood problems in developing areas in the City of Burns. The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that address new and existing buildings [201.6(c)(3)(ii)]. Updating the FEMA FIRM floodplain maps will enable the City of Burns to make informed decisions regarding flood elevation requirements for new buildings and reduce the impacts of future flooding events. The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely heavily on 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. Updated floodplain maps for Burns will help ensure County operations and activities will continue. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Coordinate efforts with the Oregon Department of Land Conservation and Development (DLCD) and FEMA to update FIRM floodplain maps for Harney County. 			
Coordinating Organization:		Burns Planning Department	
Internal Partners:		External Partners:	
Hines, Paiute Tribe, Harney County		FEMA	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	<u>3-4 years</u>		
Form Submitted by:	City of Burns		

Flood # 4

Proposed Action Item:		Alignment with Plan Goals:	
Include flood elevation certificates as part of the development permit process.		<ul style="list-style-type: none"> <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> Elevation certificates are effective means of ensuring that buildings are in compliance with local floodplain ordinances. In addition, elevation certificates are an important component of the National Flood Insurance Program (NFIP) and are useful in determining NFIP eligibility. Currently the City of Burns does not use elevation certificates as part of their development permit process. As a participant in NFIP, the City of Burns can use flood elevation certificates to monitor floodplain ordinance compliance and maintain its status in the NFIP. The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Elevation certificates can provide the City of Burns with the means to ensure compliance with the local floodplain ordinance and help in monitoring the elevation of buildings in the floodplain. The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely heavily on 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. Including flood elevation certificates for Burns and Hines will make planning efforts consistent with the County which also requires flood elevation certificates. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Coordinate development of elevation certificates with the Oregon Office of Emergency Management (OEM) and FEMA. 			
Coordinating Organization:		Burns Planning Department	
Internal Partners:		External Partners:	
Hines, Harney County, Paiute Tribe		OEM, FEMA	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
<u>2 years</u>			
Form Submitted by:	City of Burns		

Flood # 5

Proposed Action Item:		Alignment with Plan Goals:	
Ensure continued compliance with the National Flood Insurance Program.		<ul style="list-style-type: none"> • Save lives and reduce injuries. • Minimize and prevent damage to public and private buildings and infrastructure. • Prevent economic loss. 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The Disaster Mitigation Act of 2000 requires communities to identify a comprehensive range of mitigation actions to reduce the impact of a natural hazard, especially to buildings and infrastructure [201.6(c)(3)(ii)]. Ensuring continued compliance with the National Flood Insurance Program will assist the community in mitigating the impact of a natural hazards to buildings and infrastructure. • Ensuring that the city remains in compliance with the National Flood Insurance Program will assist the community in continuing to maintain eligibility for the Flood Mitigation Assistance Program. • At this time, the City of Burns has no repetitive loss properties. However, the City of Burns does have 10 single flood loss properties with insurance claims that totaled \$92,822. Continuing participation in the National Flood Insurance Program may help ensure that repetitive and single loss properties are mitigated and that future development does not become repetitive loss property. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Partner with Harney County on continuing compliance activities. • If new FIRM maps become available, explore opportunities to update floodplain ordinances based on new hazard knowledge provided by new FIRM. 			
Coordinating Organization:		City of Burns	
Internal Partners:		External Partners:	
Hines, Harney County, Paiute Indian Tribe		FEMA, OEM	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
1 year			
Form Submitted by:	City of Burns		

Multi-Hazard # 1

Proposed Action Item:		Alignment with Plan Goals:	
Develop a continuity of operations plan (COOP) for the City of Burns.		<ul style="list-style-type: none"> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> • <i>Reduce economic loss.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Burns is vulnerable to a number of different natural hazards that could affect the administration and management of local government, including wildfires, flooding, and severe weather events. Developing continuity of operations plans for the City will assist in maintaining a basic level of government to continue to provide needed services within the community. • According to the Florida Division of Emergency Management, continuity of operations is accomplished through the development of plans, comprehensive procedures, and provisions for alternate facilities, personnel, resources, interoperable communications, and vital records/databases. The plan establishes policy and guidance to ensure the execution of the organization's most essential functions in any event which requires the relocation of selected personnel and functions to an alternate facility. • Research conducted by Richard Wilson has shown that staff turnover is likely to occur after a disaster. Veteran staff is critical after a disaster. It is important to prevent turnover so that existing personnel do not have to take on extra responsibilities during an already stressful time. Continuity planning can also help lessen turnover by ensuring competitive salaries and benefits and by reducing the amount of stress staff will have to endure. • The Disaster Mitigation Act of 2000 requires communities to develop actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Developing a continuity of operations plan will diminish the effects of a natural disaster by providing Burns with a framework for continuing operations in a potentially chaotic situation. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely heavily on 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. By having a continuity of operations plan for the Cities of Burns and Hines, basic County operations can also continue. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Research and review completed continuity of operations plans to provide a foundation of expected content and issues to review. • The COOP should ensure shelter housing for critical staff and family members such as city officials, public works employees, emergency response, and others. • Assess and prioritize critical positions and resources vital to the continuance of important city functions. • Incorporate COOP into the existing Emergency Operations Plans where applicable 			
Coordinating Organization:		Harney County Economic Development	
Internal Partners:		External Partners:	
Harney County, Hines, Paiute Tribe		FEMA, OEM	
Timeline:		If available, estimated cost:	
Short Term (0-2 years)	Long Term (2-4 or more years)		
	3-4 years		
Form Submitted by:		City of Burns	

Severe Weather # 1

Proposed Action Item:		Alignment with Plan Goals:	
Distribute public outreach materials to Burns residents about severe weather events and potential mitigation actions they can implement to reduce the impact of a severe weather event.		<ul style="list-style-type: none"> • <i>Save lives and reduce injuries.</i> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Severe weather events occur frequently in Burns and can have a significant impact on the community. Severe weather events include heavy rain, lightening, extreme cold, heavy snowfall, and ice storms. Distributing public outreach materials about severe weather events and mitigation actions that residents can implement will inform residents about the potential impacts of severe weather and what they can do to reduce the impact on their property. • Potential mitigation actions include pruning trees around power lines to avoid high winds or snowstorms from damaging lines and buildings, stocking a 14-day supply of food, and improving drainage in and around homes to avoid flooding events in times of heavy rain. • The Disaster Mitigation Act of 2000 requires communities to develop actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Informing the public about severe weather events and mitigation actions they can implement can help reduce the impact of a potential severe weather event. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely heavily on 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:			
<ul style="list-style-type: none"> • Use existing public outreach materials, such as community brochures or newsletters, to educate the public about the impacts of severe weather and mitigation actions the public can implement. • Provide outreach information to new residents in Harney County. • Make materials available in County and City offices and the Visitor Relocation Information Guide. 			
Coordinating Organization:		Harney County Planning Department	
Internal Partners:		External Partners:	
Hines, Paiute Tribe, Harney County		Oregon Trail Electric Cooperative (OTEC) ODOT	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
1 year			
Form Submitted by:	City of Burns		

Memo

To: Dave Cullens, Director, City of Burns Public Works
From: Oregon Natural Hazard Workgroup at the University of Oregon
Date: May 29, 2007
Re: Request for City of Burns Natural Hazard Information

Background

The Oregon Natural Hazards Workgroup (ONHW) is asking for your assistance in providing natural hazard information and issues for the City of Burns to use as an addendum to the Harney County Natural Hazards Mitigation Plan. ONHW, based at the University of Oregon, is currently developing a Hazard Mitigation Plan together with the Harney Electric Cooperative and the County. The Mitigation Plan will assess the natural hazards affecting Harney County, such as flood and wildfire, as well as provide a series of mitigation actions the county and communities can implement to reduce the impact of those natural hazards.

An important element to the Plan is that it will be multi-jurisdictional, in that it addresses hazard issues for the county as well as the cities of Burns and Hines. To understand the hazards that affect the City of Burns, ONHW is asking for your local input into hazards that have affected Burns in the past, but also may impact the city in the future. Your input is important to the planning process and is essential to develop the City of Burns addendum to the Hazard Mitigation Plan.

Hazard Information Request

The Mitigation Plan covers information for the following natural hazards:

- Earthquake
- Flood
- Wildfire
- Drought
- Volcano
- Landslide
- Severe Weather events (i.e. windstorm, winter storm, lightning)

For each of these hazards we would like you to provide information of how these hazards, if any, have affected your community. We are looking for specific information, such as dates, locations, and damage assessments that would be useful to include in the plan. Of particular interest are locations that suffer repeated hazard events, and hazards that have affected or can affect critical infrastructure such as roads or police and fire stations. I have enclosed a Hazard Identification form which you can use to input specific hazard information for your community.

If you have further questions, I am available to discuss any information you want to provide. I can be reached at (541) 346-0259 or by email at adriaanp@uoregon.edu. If you would prefer to discuss these issues over the phone, I can so as well. Once again, your assistance is greatly appreciated and I look forward to working with you.

Hazard Identification Form

Please use the tables in this form to input events for each hazard that has affected the City of Burns. Some hazards may not be addressed at all, while others, such as floods, have several instances where the City of Burns has been affected. Any information you can provide will be helpful, such as dates they occurred, specific locations, any damages. An example for flood would be: Homes along Riverside Drive in Burns are subject to repeated flooding events. The last flooding event occurred in 2004 where 5 homes were flooded.

Your input in this process will provide valuable information to develop the City of Burns' portion of the Harney County Natural Hazard Mitigation Plan. If you would like to contact me, I can be reached at 541-346-0259, or by email at adriaanp@uoregon.edu. Thank you.

-A. Gregoor Passchier

Earthquake

Have there been previous earthquake events that have affected the City of Burns?

Date	Location	Damages	Remarks
N/A			

Flood

Are there specific flooding events that have affected the City of Burns in the past? If so, where did they occur and when? If known, what were the damages? Are there areas susceptible to floods?

Date	Location	Damages	Remarks
Feb. 2006	Riverside dr. area, sub water	unknown	Very wet spring
	W. Monroe/hwy 20-395, between N. Broadway and N. Egan	None, asphalt decay	Affected by flash flooding.

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Wildfire

Have wildfires significantly impacted areas in the City of Burns? Are there areas that are particularly vulnerable to wildfire that should be addressed?

Date	Location	Damages	Remarks
1991	West of Burns and Hines	None, in city	Fire was controled 7 miles from town.

Drought

How has drought affected the City of Burns, especially in regards to water supply? Have there been instances when water supplies have been limited due to drought?

Date	Location	Damages	Remarks
			Not scince 1978

Landslide

Are there particular areas in Burns that are susceptible to landslide hazards?

Date	Location	Damages	Remarks
N/A			

Volcanic

Have there been any volcanic events that have impact Harney County in the past? For example, did the eruption of Mt. St. Helens have a negative impact on Harney County?

Date	Location	Damages	Remarks
N/A			

Severe Weather Events

Have severe weather events, such as wind, winter, and lightening storms, affected the City of Burns in the past? What are some of the precautions that the City of Burns undertakes to reduce the impacts of those hazards?

Date	Location	Damages	Remarks
Jan. 1, 2004	City wide	Not known, extra labor and equipment.	Reported to F.E.M.A.



Meeting: City of Burns Asset and Hazard Identification
Date: May 3, 2007
Time: 10 am
Location: Phone bridge interview, City of Burns, University of Oregon

AGENDA

- | | |
|---|---------------|
| 1. Introductions | 1 minute |
| 2. Background: Hazard Mitigation Planning | 10 minutes |
| a. Oregon Natural Hazards Workgroup (ONHW) | |
| b. Hazard mitigation planning process and City of Burns involvement | |
| c. Community activities completed so far | |
| 3. Asset Identification Worksheets | 10 minutes |
| a. Purpose | |
| b. Questions | |
| 4. Hazard Impacts for the City of Burns | 30-45 minutes |
| a. Earthquake | |
| b. Flood | |
| c. Drought | |
| d. Landslides | |
| e. Volcano | |
| f. Wildfire | |
| g. Severe Weather (i.e. windstorm, winter storm, lightening) | |

Phone Interview Notes with City of Burns City Manager David Justin Boone

May 3, 2007

- 1) Krista: explained ONHW and what they do
 - a. Discussion of the Federal Planning Requirements for a natural hazard mitigation plan
 - b. There is funding available with PDM because of mitigation plan
 - c. HMGP funding also becomes available, an example is Hood River, OR
 - d. There will also be an addendum to this plan that addresses the City of Hines and the City of Burns
- 2) Krista: Federal requirements for the plan addendum:
 - a. Community Participation
 - b. Discussion on cities' level of risk to natural hazards that affect the county
 - c. The City should identify city-specific projects
 - d. The City Council needs to adopt the addendum that shows the hazards and the projects that the city really wants to see.
- 3) Gregoor: explanation of the Asset Identification Worksheets
 - a. What the purpose is
 - b. Any questions
- 4) Gregoor: Hazard Impacts for the City of Burns (explained a little about the hazards and what we discussed at our community meetings, and then asked him for his point of view of potential impacts of hazards on the City of Burns)
 - a. Earthquake
 - i. Steens Mountain last week had a 2.9 magnitude earthquake
 - ii. Any critical infrastructure located in unreinforced masonry buildings?
 1. City Hall, in a reinforced building, and everything is located in the same building, except the Post Office which is in an unreinforced masonry building
 - iii. The potential for a sizeable magnitude earthquake is minimal, however should one occur, the downtown district would be severely impacted, because about 70% of the downtown is in unreinforced masonry buildings, and it would have a sizeable impact
 - b. Flooding
 - i. A large area of Burns is in the floodplain
 - ii. Flooding isn't really too big an issue in the town because there hasn't been a flood in a while
 - iii. Also a portion of the city is located high up in the hills, and won't be impacted by any floods
 - iv. The business district is located in the 100 year floodplain as is the city hall.

- v. A moderate impact of flooding on the district
- vi. There are certain areas that are vulnerable to floods
 - 1. The subwater from the Silvies River has impacted houses along Riverside Dr. The west side of the road is city, and the east side is county
- vii. Last time there was a flooding event was last spring when they had a pretty good winter snowpack and rain, and water would flood in the front yard and get into crawl spaces, but not really impact houses. Some of these areas include Riverside Dr.
- viii. The City does have some education programs that discuss the importance of sump pumps
- ix. The City contracts out planning work with the County Planner and building inspector as well
- c. Drought
 - i. Impacts of drought on the community would not be too difficult, they have a strong aquifer with plenty of water so a drought may not affect the City very much
- d. Landslide
 - i. The city would be affected by landslide events if the highways were shut down. Highway 20 could be affected between Burns and Ontario especially since that area is susceptible to landslide events.
 - ii. Any landslide event would significantly impact commerce
 - iii. There are no steep slopes in the city that are subject to landslide events.
- e. Volcano
 - i. The impacts would largely be ash fallout from the Cascade mountain range (Sisters)
 - ii. Some of the effects in Burns would be similar to what Yakima and Spokane felt in the 1980's with the eruption of Mt. St. Helens.
 - 1. People in the area evacuated when the eruption occurred
 - 2. There is a potential for people from the west to evacuate to Burns
 - iii. Elderly population, with two nursing homes, would have to have specific provisions for evacuation
- f. Wildfire
 - i. The core of the city would really not be impacted by wildfire, however the areas on the outskirts of the city would be impacted significantly
 - ii. The homes along the Silvies River would be a potential buffer, but the river is not very wide, and a fire could easily spread from there.
 - iii. Along Riverside Drive, there are potential fire hazards because they are close to the brush.
 - iv. On the Westside of Burns near the Slate School (?) they were almost preparing people to evacuate because the fire was coming

down fast. On the west side of town it's all sage brush for 70 miles, which is a significant hazard exposure

- v. ****Potential Action**** The Westside would need some buffering with fire breaks
- g. Severe Weather
 - i. Explained a little about some of the impacts that severe weather had on the county, especially on electric utilities
 - ii. Burns has OTEC, Oregon Trail Electric, and severe weather could significantly impact power lines
 - iii. Windstorms have brought up dust in the past
 - iv. Also lightening and thunderstorms have caused a lot of wind in the past
 - v. A major impact could be a heavy winter storm that left 4-5 feet of snow piled up on Main Street which would be difficult to remove
 - vi. Also, some of the homes are old, and their roof structures may not be able to support a heavy snowfall, they may not have been maintained well
 - vii. Lightening storms have the potential to spark brush fires
 - viii. Public works does have capabilities of clearing snow
- 5) Other notes
 - a. The Public Works director has information on past events
 - i. Dave Cullens- 541-573-6711

City of Hines

Hazard Mitigation Addendum

Risk Assessment and Action Items

Attachments:

Hazard Identification Memorandum and Worksheets

Introduction

The Hines addendum to the Harney County Natural Hazards Mitigation Plan provides asset and hazard information specific to the City of Hines, as well as action items that address those natural hazards. This addendum is part of the multi-jurisdictional Harney County Natural Hazards Mitigation Plan which also includes addendums for the City of Burns and the Harney Electric Cooperative. While the Harney County Mitigation Plan provides a comprehensive range of actions for all communities in the county, action items written for the City of Hines are necessary to address hazards specific to the city.

Methodology

The Oregon Natural Hazards Workgroup (ONHW) gathered information from a variety of sources to identify community assets and natural hazards affecting the city. The asset identification meeting held on March 28, 2007, and the Hazard Identification meeting held on March 29, 2007 provided ONHW with the primary source of community asset and natural hazard information for the City of Hines. In addition, ONHW submitted a written memo, attached with this addendum to the City of Hines to identify specific problem areas susceptible to natural hazards.

Using the information gathered from interviews, ONHW and the City of Hines developed a series of action items to address natural hazards found in the city. The Hines City Administrator, together with representatives from the Public Works Department, reviewed each action item to determine the appropriateness of each action. The action items address the following range of natural hazards:

- Wildfire
- Flood
- Severe Weather
- Multi-Hazard

Asset Identification

The following assets identified for the City of Hines were gathered from the Asset Identification meeting held with community members on March 28 and the Hazard Identification meeting held on March 29. The City of Hines identified the following community assets:

Population

- Group resident homes
- Assisted Living Homes
- Mobile Home Parks
- Disabled Populations

- Native American Populations: Paiute Indians

Economy

- LP/Monaco
- Residential Development
- The Truck Stop
- Motels/Hotels
- Small businesses
- Bulk Plants
- School System

Cultural and Historic Resources

- Smoke stack at the Industrial Site
- The Gray Ghost

Infrastructure and Facilities

- City Police
- City Fire
- Hines Middle School
- Burns City Hall
- Highway 20
- Sewage Lagoon
- Water Storage and Treatment Plants located in floodplain
- Utilities-City water system, city sewer system

Environmental Assets

- City Parks
- Golf Course
- Open Space

Hazard Identification

The hazard identification information for the City of Hines is derived from the March 29 Hazard Identification Steering Committee meeting, and through email correspondence with the Hines City Administrator Pam Mather. The memorandum and worksheets sent to Pam Mather are attached with this addendum.

During the March 29 Hazard Identification Meeting, Steering Committee members discussed the vulnerability and the impacts of the major natural hazards addressed in this plan. Since both Hines and Burns are susceptible to many of the same natural hazards as Harney County, the probability and vulnerability assessments can be extended to the City of Hines as well.

Earthquake

The probability and vulnerability ratings for earthquake for the City of Hines are adequately addressed in the earthquake part of Section 3 of the Mitigation Plan. The probability of an earthquake occurring is low. However, given that there are several critical buildings that are built of unreinforced masonry buildings, such as the Hines Middle School, Hines is highly vulnerable to an earthquake event.

Flooding

The probability and vulnerability ratings for flood for the City of Hines are adequately addressed in the flood part of Section 3 of the Mitigation Plan. The probability of a flood occurring in the City of Hines is moderate. The City of Hines is moderately vulnerable to flooding events. The March 28 Asset Identification Meeting noted that the City of Hines, like the City of Burns, is located in a floodplain as are critical infrastructure such as the water and sewage treatment plants.

Drought

The probability and vulnerability ratings for drought for the City of Hines are adequately addressed in the drought part of Section 3 of the Mitigation Plan. The probability that a drought event will occur in Hines is high, while the vulnerability for drought is moderate. To address the drought hazard, the City of Hines institutes water rationing through their wasteful water ordinance that prevents residents from watering lawns from 1 to 5 pm in drought conditions.

Landslide

While the City of Hines has a low probability to landslide events, there is a moderate vulnerability should Highway 20 be shut down, especially between Hines and Ontario where landslide events occur more frequently. Any landslide event would significantly impact commerce in Hines, however, there are few steep slopes that could affect Hines significantly.

Volcano

The probability and vulnerability ratings for volcano for the City of Hines are adequately addressed in the volcano part of Section 3 of the Mitigation Plan. The probability of a volcanic event affecting the City of Hines is low, however, the vulnerability is moderate. While a volcanic event may not have a direct impact on the Hines, the ash fallout from an event in the Cascades could potentially affect Hines, especially for people with respiratory problems. There is also potential for people in the area to be evacuated to the west should an eruption occur.

Wildfire

The probability and vulnerability ratings for wildfire for the City of Hines are adequately addressed in the wildfire part of Section 3 of the Mitigation Plan. As indicated in the March 29 Hazard Identification Steering Committee, wildfire came within seven miles of the City of Hines in 1991, forcing residents to evacuate. While the central part of Hines may not be affected by wildfire, the outlying areas of the city remain highly vulnerable. Wildfire remains an issue in Hines as well as in Harney County, and the Community Wildfire Protection Plan (CWPP) does provide actions for addressing these issues.

Severe Weather

The probability and vulnerability ratings for severe weather for the City of Hines are adequately addressed in the severe weather part of Section 3 of the Mitigation Plan. The probability a severe weather event will occur in Hines is rated as moderate to high, while the vulnerability is rated as

moderate. Severe weather has affected Hines in the form of windstorms, heavy winter storms that can leave heavy amounts of snow on the ground, and lightening storms that can affect local utilities such as the Oregon Trail Electric Cooperative and the Harney Electric Cooperative. The Hines City Administrator noted in the Hazard Identification memo that during a winter storm in 2005 there was an added expense to remove excess snow, and occasionally there is damage to personal residences due to falling trees.

Mission, Goals, and Action Items

The mission and goals for the Hines City Addendum are the same as the mission and goals written in the Harney County Natural Hazard Mitigation Plan. The mission for the Plan and the Hines addendum is the following:

- To develop a disaster-resilient Harney County

The goals are the following:

- Save lives and reduce injuries.
- Minimize and prevent damage to public and private buildings and infrastructure.
- Increase cooperation and coordination among local, state, and federal agencies.
- Reduce economic loss.
- Protect natural resources.
- Protect cultural resources.

Using the community asset and the hazard identification information described above, ONHW in consultation with the City of Hines developed the following list of action items for the City. The City of Hines' action items are organized according to the following hazards:

- Wildfire
- Flood
- Severe Weather
- Multi-hazard

The action items for the Hines addendum are listed below.

Wildfire # 1

Proposed Action Item:		Alignment with Plan Goals:	
Coordinate with the Community Wildfire Protection Plan (CWPP) core team to construct fuel breaks and create defensible space in and around the City of Hines to reduce the vulnerability of wildfire in the community.		<ul style="list-style-type: none"> • <i>Save lives and property.</i> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> • <i>Increase cooperation and coordination among local, state, and federal agencies.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Steering committee members at the Harney County Hazard Identification meeting identified wildfire as Harney County's most significant natural hazard. Coordinating with the CWPP to construct fuel breaks around the City of Hines will diminish the vulnerability of wildfire on the community. • In 2007 the Egley Complex fire forced the evacuation of rural residents near the City of Hines. In the 1990 a wildfire came within one mile of the City of Hines. Constructing a fuel break around the City of Hines will help diminish the vulnerability of wildfire on the community and prevent potential wildfire damages. • The Harney County CWPP outlines specific actions for the City of Hines to mitigate against wildfires. Recommendations are to develop fuel breaks around the cities of Burns and Hines, develop a defensible space for areas within 300 feet of juniper and sagebrush covered slopes, conduct fuels mitigation and defensible space for the Canyon Road houses, and conduct weed abatement in Burns and Hines to reduce the likelihood of spot fires in both communities. • The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that address new and existing buildings [201.6(c)(3)(ii)]. Coordinating wildfire mitigation efforts, such as constructing fuel breaks and conducting weed abatement, with the CWPP core team will ensure proper coordination of efforts to reduce the City of Hines' vulnerability to wildfire. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely heavily on 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:			
<ul style="list-style-type: none"> • Coordinate meetings with the City of Hines and the CWPP core team to discuss wildfire mitigation efforts. • Seek funding sources for the construction of fuel breaks around the City of Hines. 			
Coordinating Organization:		CWPP Core Team	
Internal Partners:		External Partners:	
Burns, City of Hines, Paiute Tribe, Harney County		BLM, Forest Service	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	3 years		
Form Submitted by:	City of Hines		

Wildfire # 2

Proposed Action Item:		Alignment with Plan Goals:	
Distribute public outreach materials informing residents about wildfire hazards and mitigation actions they can take to protect their property.		<ul style="list-style-type: none"> • <i>Save lives and reduce injuries.</i> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Steering committee members at the Harney County Hazard Identification meeting identified wildfire as Harney County’s most significant natural hazard. Conducting public outreach campaigns will inform residents about wildfire hazards and mitigation actions they can implement to reduce their vulnerability to wildfire. • In 2007 the Egley Complex fire forced the evacuation of rural residents near the City of Hines. In addition, in 1980 wildfire came within one mile of the City of Hines. Conducting public outreach campaigns about the hazards that wildfires pose will inform the public about the community’s risk to wildfires and actions they can implement to reduce that risk. • The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that address new and existing buildings [201.6(c)(3)(ii)]. Conducting public outreach campaigns to inform residents about the risks that wildfires pose and mitigation actions they can implement will protect their property from future wildfire damage. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely heavily on 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:			
<ul style="list-style-type: none"> • Use the Institute for Business Home and Safety (IBHS) brochures as outreach materials. • Provide wildfire mitigation information at City and County offices. 			
Coordinating Organization:		CWPP Core Team	
Internal Partners:		External Partners:	
Burns, City of Hines, Paiute Tribe, Harney County		BLM, Forest Service	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
1-2 years			
Form Submitted by:	City of Hines		

Flood # 1

Proposed Action Item:		Alignment with Plan Goals:	
Incorporate flood hazards information and mitigation activities into existing public outreach materials. .		<ul style="list-style-type: none"> • <i>Save lives and reduce injuries.</i> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The City of Hines provides community information through biennial newsletters. Incorporating flood hazards information and mitigation activities in newsletters will help to diminish flooding impacts on the community and enhance flood mitigation strategies. • The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that address new and existing buildings [201.6(c)(3)(ii)]. Incorporating flood hazards information and mitigation activities into existing public outreach materials will help residents in Hines to mitigate against flooding events. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely heavily on 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:			
<ul style="list-style-type: none"> • Incorporate mitigation activities into existing public outreach materials such as the City of Hines newsletter residents receive with their utility bills. 			
Coordinating Organization:		City of Hines	
Internal Partners:		External Partners:	
Burns, Paiute Tribe, Hines Planning Department		FEMA, DLCD, BLM, Oregon Office of Emergency Management (OEM), Forest Service	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
1 year			
Form Submitted by:	City of Hines		

Flood # 2

Proposed Action Item:		Alignment with Plan Goals:	
Upgrade culverts along Lottery Lane to improve water flow.		<ul style="list-style-type: none"> <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> In Hazard Identification meetings, Steering Committee members identified Lottery Lane as an area needing further improvements to avoid flooding problems. There are two culverts currently on Lottery Lane, and the water usually flows down to the industrial park. However, with the sewer pond and the railroad grade blocking water, most of the water floods back onto Lottery Lane during heavy rains. Culverts are needed in the blockages to improve water flow. The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address protecting critical infrastructure [201.6(c)(3)(ii)]. Improving culverts along Lottery Lane will significantly improve water flow and reduce the likelihood of flooding on the street. The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely heavily on 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:			
<ul style="list-style-type: none"> Seek funding to improve culverts along Lottery Lane to improve water flow. 			
Coordinating Organization:		City of Hines Public Works	
Internal Partners:		External Partners:	
Hines Planning Department		FEMA, OEM, Watershed Council	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
2 years			
Form Submitted by:	City of Hines		

Flood # 3

Proposed Action Item:		Alignment with Plan Goals:	
Update the FEMA FIRM floodplain map for the City of Hines.		<ul style="list-style-type: none"> <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> The City of Hines' FIRM floodplain maps were last updated in 1989. Updated floodplain maps incorporate new data and will help to reduce flood problems in developing areas in the City of Hines. The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that address new and existing buildings [201.6(c)(3)(ii)]. Updating the FEMA FIRM floodplain maps will enable the City of Hines to make informed decisions regarding flood elevation requirements for new buildings and reduce the impacts of future flooding events. The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely heavily on 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. Updated floodplain maps for Hines will help ensure County operations and activities will continue. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Coordinate efforts with the Oregon Department of Land Conservation and Development (DLCD) and FEMA to update FIRM floodplain maps for Harney County. 			
Coordinating Organization:		City of Hines Planning Department	
Internal Partners:		External Partners:	
Burns, Paiute Tribe, Harney County		FEMA	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	<u>3-4 years</u>		
Form Submitted by:	City of Hines		

Flood # 4

Proposed Action Item:		Alignment with Plan Goals:	
Include flood elevation certificates as part of the development permit process.		<ul style="list-style-type: none"> <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> Elevation certificates are effective means of ensuring that buildings are in compliance with local floodplain ordinances and are useful in maintaining records of ordinance compliance. In addition, elevation certificates are important components of the National Flood Insurance Program (NFIP) and are useful in determining NFIP eligibility. Currently the City of Hines does not use elevation certificates as part of their development permit process. As a participant in NFIP, the City of Hines can use flood elevation certificates to monitor floodplain ordinance compliance and maintain its status in the NFIP. The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Elevation certificates can provide the City of Burns with the means to ensure compliance with the local floodplain ordinance and help in monitoring the elevation of buildings in the floodplain. The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely heavily on 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. Including flood elevation certificates for Burns and Hines will make planning efforts consistent with the County which also requires flood elevation certificates. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> Coordinate development of elevation certificates with the Oregon Office of Emergency Management (OEM) and FEMA. 			
Coordinating Organization:		City of Hines Planning Department	
Internal Partners:		External Partners:	
Burns, Harney County, Paiute Tribe		OEM, FEMA	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
2 years			
Form Submitted by:	City of Hines		

Flood # 5

Proposed Action Item:		Alignment with Plan Goals:	
Ensure continued compliance with the National Flood Insurance Program.		<ul style="list-style-type: none"> • Save lives and reduce injuries. • Minimize and prevent damage to public and private buildings and infrastructure. • Prevent economic loss. 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • The Disaster Mitigation Act of 2000 requires communities to identify a comprehensive range of mitigation actions to reduce the impact of a natural hazard, especially to buildings and infrastructure [201.6(c)(3)(ii)]. Ensuring continued compliance with the National Flood Insurance Program will assist the community in mitigating the impact of a natural hazards to buildings and infrastructure. • Ensuring that the city remains in compliance with the National Flood Insurance Program will assist the community in continuing to maintain eligibility for the Flood Mitigation Assistance Program. • At this time, the City of Hines has no repetitive loss properties. Continuing participation in the National Flood Insurance Program may help ensure that repetitive loss properties are mitigated and that future development does not become repetitive loss property. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Partner with Harney County on continuing compliance activities. • If new FIRM maps become available, explore opportunities to update floodplain ordinances based on new hazard knowledge provided by new FIRM. 			
Coordinating Organization:		Hines Planning Department	
Internal Partners:		External Partners:	
Burns, Harney County, Paiute Indian Tribe		FEMA, OEM	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
1 year			
Form Submitted by:		City of Hines	

Multi-Hazard # 1

Proposed Action Item:		Alignment with Plan Goals:	
Develop a continuity of operations plan (COOP) for the City of Hines.		<ul style="list-style-type: none"> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> • <i>Reduce economic loss.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Hines is vulnerable to a number of different natural hazards that could affect the administration and management of local government, including wildfires, flooding, and severe weather events. Developing continuity of operations plans for the City will assist in maintaining a basic level of government to continue to provide needed services within the community. • According to the Florida Division of Emergency Management, continuity of operations is accomplished through the development of plans, comprehensive procedures, and provisions for alternate facilities, personnel, resources, interoperable communications, and vital records/databases. The plan establishes policy and guidance to ensure the execution of the organization's most essential functions in any event which requires the relocation of selected personnel and functions to an alternate facility. • Research conducted by Richard Wilson has shown that staff turnover is likely to occur after a disaster. Veteran staff is critical after a disaster. It is important to prevent turnover so that existing personnel do not have to take on extra responsibilities during an already stressful time. Continuity planning can also help lessen turnover by ensuring competitive salaries and benefits and by reducing the amount of stress staff will have to endure. • The Disaster Mitigation Act of 2000 requires communities to develop actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Developing a continuity of operations plan will diminish the effects of a natural disaster by providing Hines with a framework for continuing operations in a potentially chaotic situation. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely heavily on 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. By having a continuity of operations plan for the Cities of Burns and Hines, basic County operations can also continue. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • Research and review completed continuity of operations plans to provide a foundation of expected content and issues to review. • The COOP should ensure shelter housing for critical staff and family members such as city officials, public works employees, emergency response, and others. • Assess and prioritize critical positions and resources vital to the continuance of important city functions. • Incorporate COOP into the existing Emergency Operations Plans where applicable 			
Coordinating Organization:		Harney County Economic Development	
Internal Partners:		External Partners:	
Harney County, Burns, Paiute Tribe		FEMA, OEM	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
	3-4 years		
Form Submitted by:	City of Hines		

Severe Weather # 1

Proposed Action Item:		Alignment with Plan Goals:	
Distribute public outreach materials to Hines residents about severe weather events and potential mitigation actions they can implement to reduce the impact of a severe weather event.		<ul style="list-style-type: none"> • <i>Save lives and reduce injuries.</i> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Severe weather events occur frequently in Hines and can have a significant impact on the community. Severe weather events include heavy rain, extreme cold, heavy snowfall, and ice storms. Conducting public outreach campaigns about severe weather events will inform residents about the potential impacts of severe weather, but can also inform them of mitigation actions they can take to reduce the impact of a severe weather event. • Potential mitigation actions include pruning trees around power lines to avoid high winds or snowstorms from damaging lines and homes, stocking a 14-day supply of food, and improving drainage in and around homes to avoid flooding events in times of heavy rain. • The Disaster Mitigation Act of 2000 requires communities to develop actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Informing the public about severe weather events and mitigation actions they can implement can help reduce the impact of a potential severe weather event. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely heavily on 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:			
<ul style="list-style-type: none"> • Use existing public outreach materials, such as community newsletters, to educate the public about the impacts of severe weather and mitigation actions the public can implement. • Provide outreach information to new residents in Hines. • Make materials available in County and City offices and the Visitor Relocation Information Guide. 			
Coordinating Organization:		City of Hines	
Internal Partners:		External Partners:	
Burns, Paiute Tribe, Harney County		Oregon Trail Electric Cooperative (OTEC), ODOT	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)		
1 year			
Form Submitted by:	City of Hines		

Memo

To: Pam Mather, City of Hines Administrator

From: Oregon Natural Hazard Workgroup at the University of Oregon

Date: May 29, 2007

Re: Request for City of Hines Natural Hazard Information

Background

The Oregon Natural Hazards Workgroup (ONHW) is asking for your assistance in providing natural hazard information and issues for the City of Hines to use as an addendum to the Harney County Natural Hazards Mitigation Plan. ONHW, based at the University of Oregon, is currently developing a Hazard Mitigation Plan together with the Harney Electric Cooperative and the County. The Mitigation Plan will assess the natural hazards affecting Harney County, such as flood and wildfire, as well as provide a series of mitigation actions the county and communities can implement to reduce the impact of those natural hazards.

An important element to the Plan is that it will be multi-jurisdictional, in that it addresses hazard issues for the county as well as the cities of Hines and Burns. To understand the hazards that affect the City of Hines, ONHW is asking for your local input into hazards that have affected Hines in the past, but also may impact the city in the future. Your input is important to the planning process and is essential to develop the City of Hines addendum to the Hazard Mitigation Plan.

Hazard Information Request

The Mitigation Plan covers information for the following natural hazards:

- Earthquake
- Flood
- Wildfire
- Drought
- Volcano
- Landslide
- Severe Weather events (i.e. windstorm, winter storm, lightning)

We would like you to provide information of how these hazards, if any, have affected your community. We are looking for specific information, such as dates, locations, and damage assessments that would be useful to include in the plan. Of particular interest are locations that suffer repeated hazard events, and hazards that have affected, or can affect, critical infrastructure such as roads or police and fire stations. I have enclosed a Hazard

Identification form which you can use to input specific hazard information for your community.

If you have further questions, I am available to discuss any information you want to provide. I can be reached at (541) 346-0259 or by email at adriaanp@uoregon.edu. If you would prefer to discuss these issues over the phone, I can so as well. Once again, your assistance is greatly appreciated and I look forward to working with you.

Hazard Identification Form

Please use the tables in this form to input events for each hazard that has affected the City of Hines. Some hazards may not be addressed at all, while others, such as floods, have several instances where the City of Hines has been affected. Any information you can provide will be helpful, such as **dates** they occurred, specific **locations**, and any **damages** incurred. An example for flood would be: Homes along Riverside Drive in Burns are subject to repeated flooding events. The last flooding event occurred in 2004 where 5 homes were flooded.

Your input in this process will provide valuable information to develop the City of Hines' portion of the Harney County Natural Hazard Mitigation Plan. If you would like to contact me, I can be reached at 541-346-0259, or by email at adriaanp@uoregon.edu. Thank you.

A. Gregoor Passchier

Earthquake

Have there been previous earthquake events that have affected the City of Hines ?

Date	Location	Damages	Remarks

Flood

Are there specific flooding events that have affected the City of Hines in the past? If so, where did they occur and when? If known, what were the damages?

Date	Location	Damages	Remarks

Wildfire

Have wildfires significantly impacted areas in the City of Hines? Are there areas that are particularly vulnerable to wildfire that should be addressed?

Date	Location	Damages	Remarks
1980	Fire came within 1 mile of West City Limits of Hines	None to City	

Drought

How has drought affected the City of Hines, especially in regards to water supply? Have there been instances when water supplies have been limited due to drought?

Date	Location	Damages	Remarks

Landslide

Are there particular areas in Hines that are susceptible to landslide hazards?

Date	Location	Damages	Remarks

Volcanic

Have there been any volcanic events that have impact Harney County in the past? For example, did the eruption of Mt. St. Helens have a negative impact on Harney County?

Date	Location	Damages	Remarks

Severe Weather Events

Have severe weather events, such as wind, winter, and lightening storms, affected the City of Hines in the past? What are some of the precautions that the City of Hines undertakes to reduce the impacts of those hazards?

Date	Location	Damages	Remarks
2005	Hines	Added Expense for Heavy Snow Removal- No Damage	
Occasionally	Hines	Personal residences from falling trees due to wind	

Harney Electric Cooperative Hazard Mitigation Addendum

Risk Assessment and Action Items

Introduction

The Harney Electric Cooperative addendum to the Harney County Natural Hazards Mitigation Plan provides hazard information specific to the Harney Electric Cooperative as well as two action items the Electric Cooperative has submitted to mitigate against natural hazard events. The Harney Electric Cooperative has been closely involved in the process of developing the Harney County Natural Hazards Mitigation Plan and has been identified as the convener for the Mitigation Plan. This addendum is part of the multi-jurisdictional Harney County Natural Hazards Mitigation Plan which also includes addendums for the City of Burns and the City of Hines. While the Harney County Mitigation Plan provides a comprehensive range of actions for all communities in the county, action items written for the Harney Electric Cooperative are necessary to address hazards specific to the company.

Methodology

The Oregon Natural Hazards Workgroup (ONHW) gathered information from a variety of sources to identify natural hazards affecting the Electric Cooperative. The asset identification meeting held on March 28, 2007, and the Hazard Identification meeting held on March 29, 2007 provided ONHW with the primary source natural hazard information for the Electric Cooperative. In addition, conversations with Office Manager for the Harney Electric Cooperative provided important information regarding how natural hazards affect the Electric Cooperative.

The Electric Cooperative submitted two action items addressing severe weather events, which are attached at the end of this addendum.

Company Profile

The Harney County Electric Cooperative is non-profit cooperative that provides electric power to an area covering 20,000 square miles. Their service area includes most of rural Harney County and extends into Malheur and Lake counties as well as Nevada. The cooperative is headquartered in Burns and has provided power to the area since the 1950s.

Hazard Identification

Although the cooperative provides reliable service to its customers, there are issues with older infrastructure that make the company more susceptible to natural hazard events.

Severe Weather: Ice and Wind Storms

One of the recurring problems the cooperative faces are ice and wind storms that often disrupt service. Areas of concern include older power lines that have long spans between poles and which have the tendency to sag when ice accumulates on the lines. When the ice melts, the lines snap up quickly, wrapping themselves around other lines and causing a power outage. Wind storms also have the capacity to knock down power lines, causing further power outages. The areas more susceptible to ice and wind storms are hilltops where ice tends to accumulate. A winter storm that lasted from December

2003 to January 2004 caused \$33,769 in damage to lines, however the Cooperative was able to obtain \$172,877 in mitigation funding to put the lines that were damaged underground.

Wildfire

Conversations with the Harney Electric Cooperative indicate that wildfire also poses a significant threat to the Electric Cooperative's power lines. Many of the older wooden power poles are highly vulnerable to wildfire because they are dry timber that burns very easily. Should a wildfire pass through an area with wooden power poles, then the Electric Cooperative can sustain significant damage. A wildfire that passed through Fields in August 2006 caused approximately \$150,000 in damage. In the 1980s fires caused approximately \$50,000 in damage. The Electric Cooperative has mitigated for wildfires by putting some of the lines underground.

Flood

Flooding also remains a significant natural hazard that has damaged power lines owned by the cooperative. A flood in 1987 caused approximately \$600,000 in damages. To mitigate against flood hazards, the Electric Cooperative has reinforced the base of powerlines to prevent future damage to them.

Mission, Goals, and Action Items

The mission and goals for the Harney Electric Cooperative Addendum are the same as the mission and goals written in the Harney County Natural Hazard Mitigation Plan. The mission for the Plan and the Electric Cooperative addendum is the following:

- To develop a disaster-resilient Harney County

The goals are the following:

- Save lives and reduce injuries.
- Minimize and prevent damage to public and private buildings and infrastructure.
- Increase cooperation and coordination among local, state, and federal agencies.
- Reduce economic loss.
- Protect natural resources.
- Protect cultural resources.

The Electric Cooperative wrote the following two action items to be included in the mitigation plan. These actions are also included in Section 3 of the Harney County Natural Hazard Mitigation Plan.

Severe Weather Action # 1

Proposed Action Item:		Alignment with Plan Goals:	
Replace primary electrical overhead lines to mountaintop communication services with underground lines.		<ul style="list-style-type: none"> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> • <i>Reduce economic loss.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • Overhead electrical lines are subject to high winds and winter storm damage. The risk is higher on the lines going to a mountaintop or peak. Most of the services at the top are communication sites. The communication sites are used by ODOT, State Police, county sheriff, emergency services, telephone utilities and cell phone companies. During a disaster the sites are vital for communication. During winter storm access to the line by the utility is difficult and this difficulty delays the time for restoration of power to the services. The utility company has experienced costs each year to repair and maintain the lines. Changing the lines to underground would remove the risk of damage from wind and winter storm. • The Disaster Mitigation Act of 2000 requires communities to develop comprehensive actions to reduce the impacts of natural hazards, with an emphasis on new and existing buildings and infrastructure.[201.6(c)(3)(ii)] Replacing primary electrical overhead lines to mountaintop communication services with underground lines will reduce the impact of severe weather on power lines, and will continue power service to rural customers as well as ODOT, State Police, county sheriff, emergency services, telephone utilities, and cell phone companies. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • The utility company would be responsible to identify all the mountaintops and apply for grants to put the lines underground. 			
Coordinating Organization:		Harney Electric Cooperative, Inc.	
Internal Partners:		External Partners:	
Oregon Trail Electric Cooperative		Companies which are served by the utility and the utility company, Malheur County, Lake County	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	n/a	
	3-4 years		
Form Submitted by:		Fred Flippence	

Severe Weather Action # 2

Proposed Action Item:		Alignment with Plan Goals:	
Shorten spans and anchor poles on utility lines in high wind or heavy icing areas.		<ul style="list-style-type: none"> • <i>Minimize and prevent damage to public and private buildings and infrastructure.</i> 	
Rationale for Proposed Action Item:			
<ul style="list-style-type: none"> • High wind storms or winter icing storms can cause damage to long spans between power poles and create power outages during storms. If poles are inserted between spans this reduces the risk of outages. Also by anchoring certain poles this can reduce the amount of line which would go down in a storm. Both items reduce the cost of repair and replacement. • Winter storms have a significant impact on the Harney County Electric Cooperative, causing power outages when ice forms on the power lines. This is especially a problem with older power lines constructed in the 1950s that have a larger line span between poles. Placing intermediary poles between these spans cuts the span in half and reduces the likelihood of a power line breaking. • The Disaster Mitigation Act of 2000 requires communities to develop comprehensive actions to reduce the impacts of natural hazards, with an emphasis on new and existing buildings and infrastructure.[201.6(c)(3)(ii)] Shortening the spans between long lines and anchoring poles will reduce the likelihood of lines breaking during wind and winter icing storms. • The two incorporated cities in Harney County –Burns and Hines- rely on the county for certain services and public facilities. Because the cities rely on the County for services, this action is considered to be a multi-jurisdictional action since it benefits both the County and all the participating cities. 			
Ideas for Implementation:			
<ul style="list-style-type: none"> • The utility company would be responsible to identify high wind and icing areas from previous outages and apply for grants to strengthen the areas by pole inserts and anchoring. 			
Coordinating Organization:		Harney Electric Cooperative, Inc.	
Internal Partners:		External Partners:	
Oregon Trail Electric		Malheur County, Lake County	
Timeline:		If available, estimated cost:	
<u>Short Term</u> (0-2 years)	<u>Long Term</u> (2-4 or more years)	N/A	
	<u>2-4 years</u>		
Form Submitted by:		Fred Flippence	

Volume III: Resources

Appendix A: Planning and Public Process

Appendix B: Hazard Annexes

Appendix C: Economic Analysis

Appendix D: Household Survey

Appendix E: Community Organizations

Appendix F: Resource Directory

Appendix G: Success Template

Appendix A: Planning and Public Process

Harney County Steering Committee Meeting Kickoff: February 9, 2007

Agenda

Sign-in sheet

Harney County Asset Identification Workshop March 28, 2007

Agenda

Sign-in sheet

Asset Identification Notes

Harney County Hazard Identification Workshop March 29, 2007

Agenda

Sign-in sheet

Hazard Identification Notes

Harney County Goals and Action Items Meeting June 28, 2007

Agenda

Sign-in sheet

Agenda

Harney County Introductory Steering Committee Meeting

February 9, 2007
Harney County Courthouse
450 N Buena Vista Avenue, Burns, OR

- I. Introductions
- II. Partnership Overview
- III. Project Overview
- IV. Steering Committee Roles and Responsibilities
- V. Timeline
- VI. Region 8 Profile Reviews

Harney County Introductory Steering Committee Meeting

Introducing Steering Committee members to the
Harney County Natural Hazards Mitigation Planning Process

February 9, 2007, 9 am

Harney County Courthouse
450 N Buena Vista Avenue, Burns, Oregon

Name	Title	Organization Representing	Time In	Time Out	Location coming from (City)	Signature certifying this information is correct
Burdow NEWLON	HARNEY COUNTY PLANNING DIRECTOR		9:00	10:15	BURNS	<i>Burdow Newlon</i>
SAM MATHER	CITY ADMIN.	CITY OF HINES	9:00A	10:30	HINES	<i>Sam Mather</i>
Steve Grasty	County Judge	Harney County	9:00AM	10:00	BURNS	<i>Steve Grasty</i>
William Huber	Facility Safety	USDA-USFS	9:00	10:30	Hines	<i>William Huber</i>
Fred Flippence	HARNEY ELECTRIC OFFICE MANAGER	Harney Electric Cooperative	9:00	10:30	BURNS	<i>Fred Flippence</i>



Meeting: Harney County Issue Identification Workshop

Date: March 28, 2007

Time: 9 am – 12 pm

Location: Hines City Hall, 101 E Barnes St, Hines, OR 97738

AGENDA

1. Introductions (5 minutes)
2. Project Background and Purpose (15 minutes)
3. Group worksheet exercise: Community Asset Identification (10 minutes/theme)
 - a. Human Population
 - b. Economic Assets
- Break* (15 minutes)
 - c. Cultural and Historic Resources
 - d. Infrastructure and Critical Facilities
 - e. Land Use and Environmental Assets
4. Wrap up-Next Steps (20 minutes)

Harney County Issue Identification Meeting

To conduct a community-wide issue identification workshop with Harney County community members

to complete the Harney County Natural Hazards Mitigation Plan

March 28, 2007, 9 am to 12 pm

Hines City Hall

101 E Barnes St, Hines, Oregon 97738

Name	Title	Organization Representing	Time In	Time Out	Location coming from (City)	Signature certifying this information is correct
Michael Kahlions	Safety Mgr	Bureau of Land Mgt	08:45	11:00	Hines (5mi)	William Kahlions
William Heber	Safety/Facility coord	Emigrant Creek Range Dist	09:00	11:00	Hines (1)	William Kahlions
CAREY BOSS	PAUL PANGEL	MAITHEUR NW R	09:00	11:00	PRINCETON 35m	Carey
Brandon M. McMillen	Harney County Planning Director	Harney County	9:00	11:00	BURNS (5mi)	Brandon M. McMillen
Bryce Mertz	GIS	Harney County	9:00	11:00	Burns 5min	Bryce Mertz
Randy Clark	POLICE CHIEF	CITY OF HINES	9:00A	11:00	HINES	Randy Clark
Dave Courtney	School Superintendent	Schools	9:05	11:00	Burns	Dave Courtney
Ramona Hofman	Secretary	City of Hines	9:00	11:00	Hines	Ramona Hofman
FAM MATHER	CITY ADMIN	City of Hines	8:45	11:00	Hines	Fam Mather
Ruth Schultz	Hines Mayor	City of Hines	8:50	11:00	Hines	Ruth Schultz
Jim Keirsten	Emergency Plan Director	Harvey County	8:50	11:00	Hines	James W. Keirsten

Harney County Community Assets Workshop Notes
March 28, Hines, OR

Population

- Students
- Assisted Living
- Rural Populations
- Mobile homes in floodplain
- Ranchers/agriculture
- Agricultural operations
- Rural School Districts
- Tourists
 - Hunters
 - Birders
 - Steens Mountain visitors
- Elderly and medical facilities
- Disabled populations: home-bound
- Response Staff
- New populations, they may not know what to do
- Young families
- Incarcerated population
- Native American populations: Paiute Indians
- Spanish-speaking populations

Economy

- Federal government agencies
 - BLM
 - Forest Service
- Local governments
 - Burns
 - Hines
 - County Governments
- Recording of data, the school system
- Community-wide continuity of operations plan needed
- Agriculture
 - Hay
 - Cattle Ranching
- Small business
 - Hotels
 - Local stores
 - Preparation for a natural hazard event
 - Coordination with suppliers to ensure continuous operation
- Two bulk plants in Hines
- Resources that benefit the economy:

- Frenchglen hotel
- Diamond Hotel
- Round Barn
- Infrastructure, such as highways, are an essential part of the local economy
- Tourism-hunting
- The hospital
- Windfarms

Cultural and Historic Resources

- Round Barn
- Hotel Frenchglen
- Hotel Diamond
 - All three are subject to Flooding, Fire, and Wind damage
- Library-The County Library in Burns
- Allison Guard Station
- Forest Service lookouts
- Paiute Indian tribes
 - Resources such as seasonal camps
 - Trails
 - European and American homesteads
- Sodhouse Ranch
- Civilian Conservation Corps structures
- The Long Barn
- Fairgrounds, which are subject to flooding
- The Harney County Museum in Burns
- The High School
- The Fire tower smokestack
- BLM lands
 - Riddle Brothers Ranch
 - Lookouts
 - Structures related to the timber industry history
 - Structures related to the ranching industry history
- The Hines Park
- Old Hines guest house
- Hospital
- Military sites

Infrastructure and Facilities

- Police and Fire
- All the highways
 - 395
 - 20
 - 78

- 205
- Water storage and treatment plants, are located in the floodplain
- Communications centers
- Local interagency type 3 team, also known as the high desert type 3 team
- Burns municipal airport located in the floodplain
- The hospital and EMS
- National Guard facility
- The senior center
- Schools
 - High School
 - Middle School
- Radio stations
- Utilities
- Cell phone towers
- Telephone lines
- Communities in Harney County are one-road in and out, especially in rural areas
- The wood cooler
- Newspaper and radios
- Local TV and cable
- Veterinary Office
- 911 centers
- County Courthouse
- City Halls of Burns and Hines
- Jails
 - Youth facility
- Fairgrounds
- Waste disposal facilities
- Fuel storage facilities
- Fire guard stations (Frenchglen/Burns and Hines)
 - These are useful in order to respond effectively, but they must be protected
- Hospital

Environmental Assets

- Isolated County Parcels
- Limited road access
- Little regulation of buildings when being built in the floodplain
- Growth occurring in the NW of Burns/Hines
- Grazing allotments on Federal land (4 million acres), many ranchers depend on this.
- Steens Mountain
- Malheur refuge
- Low density population and open space an environmental asset
- Impoundments

- Chickahominy
- Allison Warm Springs
- Hunting resources-wildlife
- Hot Springs
- Superb water quality in Harney County
- Meadow Land Ranch subdivision
- Important to keep native hay meadows intact
- Golf course
- The park system
- Forests
- Septic tanks a problem in flooding
- Geothermal resources
- Wind resources
- Solar resources
- Geologic stability and/or vulnerability
- Mineral deposits
- Wind farm



Meeting: Harney County Hazard Identification Steering Committee
Date: March 29, 2007
Time: 9 am - 12 pm
Location: Harney County Courthouse, 450 N Buena Vista Ave, Burns, OR

AGENDA

1. Introductions (5 minutes)
2. Project Background (10 minutes)
3. Discussion: Emergency Operations Plan (20 minutes)
4. Group Exercise: Hazard Identification (15 minutes/hazard)
 - a. Earthquake
 - b. Flood
 - c. Landslide
 - d. Volcanic
- Break* (10 minutes)
 - e. Fire in urban/wildland interface
 - f. Winter storms
 - g. Windstorms
 - h. Drought
5. Discussion: Regional Profile (10 minutes)
6. Hazard Ranking (10 minutes)
7. Next Steps (20 minutes)
 - a. Future meetings

Harney County Hazard Identification Steering Committee Meeting

To conduct a hazard identification workshop with the Harney County Mitigation Steering Committee
to complete the Harney County Natural Hazards Mitigation Plan

March 29, 2007, 9 am to 12 pm

Harney County Courthouse

450 N Buena Vista Ave, Burns, Oregon

Name	Title	Organization Representing	Time In	Time Out	Location coming from (City)	Signature certifying this information is correct
Ruth Schultz	Mayor	City of Hines	8:55	11:40	Hines	Ruth Schultz
Sam Mather	City Admin.	"	"	11:40	"	Sam Mather
CAPEY BOSS	PARK RANGER	WALTER NWR	0900	11:40	PRINCETON 35m	Conroy
Michael K. Williams	SAFETY MGR	Burns Dist. BLM	0845	11:40	BLM-6m	Michael Williams
Fred Flippen	Office Manager	Harvey Electric Corporation	9:15	11:40	Burns	Fred Flippen
William Huber	Safety Facilities Coord	United States Forest Service	"	11:40	Hines 3m	William Huber
Brandon McMillen	Planning Director	Harney County	9:00	11:40	Burns	Brandon McMillen
Bill Bunn	Engineering Geologist	DOG AM I	8:30	11:40	PDX	Bill Bunn
Steve Garassy	County Judge	Harney County	9:00	11:40	Burns	Steve Garassy
				11:40		

Harney County Hazard Impacts Notes
March 29, 2007, Burns, OR

Earthquake

Impacts from an earthquake include:

Power:

- Power loss is a potential impact because power comes from the City of Redmond or Idaho. If there is an earthquake there, then that could have a potential impact on Harney County
- County power for the Harney Electric Cooperative comes from the local substation and they may be able to get electric power from Nevada, but only in the winter
- In NW Riley and SW Frenchglen, there are higher risk populations as farm dwellings grow in that direction
- The Frenchglen hotel is a vulnerable area, with visitors who are potentially vulnerable populations
- Harney Electric Cooperative has a transmission switch in Frenchglen which if damaged could impact power distribution
- Substation north of Fields is also a critical facility
- The Steens Mountain Fault is the longest in Oregon, and does have a substantial earthquake potential

Any unreinforced masonry buildings?

- Downtown Burns could be negatively impacted, given the many unreinforced masonry buildings
- The Hines Middle School is also unreinforced, and could potentially fall in the event of an earthquake
- Better Risk assessments need to be completed
- Education and outreach programs should be implemented depending on the risk assessment
- As far as earthquake goes, Burns and Hines have one of the lowest risks in Oregon
- Earthquakes that occur on the west side of OR also pose a different risk because the food supply comes from the west. Potential mitigation measures include creating 72 hour kits and conducting education and outreach activities among the public.
- Also the 911 communications building in the sheriff's office is an unreinforced masonry building.

Flood

Potential impacts of a flooding event on Harney County are:

- The City of Burns Fire and emergency stations are in floodzone A

- In Hines, two culverts on lottery lane at highway 93, the water usually flows down to the industrial park, however, with the sewer pond and the railroad grade blocking water, most of the water will now kick back onto lottery lane. Culverts are needed in the blockages to improve water flow.
- Meadow land ranch in the south west is a potential area for flooding problems.
 - These are non-ranch dwellings, but the roads and driveways being put there to access the houses block the natural flow of water, and this is an issue for flood mitigation
- Another problem for utilities is the cost of the transmission line and bringing power out to the rural areas.
 - Real estate is growing out in the basin, people want to have power out there, but the electric companies can't guarantee continuous power because of hazards.
- One potential solution is to provide education programs to inform the existing public and newcomers to Harney County the impact and the type of flooding that can occur in Harney County
- With the Malheur Natural Wildlife Refuge, the construction of roads has a significant impact, dikes are built to protect private property which can affect the natural water flow.
- The NWR headquarter building is also built on a hill to diminish the impact of flooding
- In the NWR, too much water can be a problem, but an average amount of water is positive for the refuge
- For utilities, flash floods can down power poles, but this usually doesn't happen until water in the winter turns to ice, and movement of the ice then breaks down the poles and fences, etc.
- Of the Steens Mountain, Page Springs can be impacted, which affects BLM tourism to the hot springs.

Are there any roads that can cut off communities should a flood occur?

- P Lane in the NWR can isolate the NWR
- Firms essentially need to be updated to reflect the reality of the floodplain
- Building permits have regulations for floodplain, but there really is not floodplain ordinance
- The Planning department tried once to create a floodplain ordinance, but failed due to a lack of human resources
- Last spring, on Experiment Road, residents (cane??) came to the county to complain about flooding, but not much the county could do
- For out of state land purchases, there is little hazard disclosure, so people purchase land without knowing the impacts natural hazards can have on the property
- A potential action item includes letting people know about the floodplain issue, or at least making sure as much information is available, which would take the liability off the county

- Harney Electric Cooperative always has a flood disclosure statement when they provide power that states that they don't guarantee service in a flooding event, and if a house floods, they won't fix the feeder wire and the house is pretty much out of power.
- During initial development of an area, the planning department does provide developers or residents with information on the zone and what the specific regulations are.
- It is the seller's responsibility for disclose to a developer and to real estate agents the flooding potential of a property so that buyers can be more informed
- The FIRM maps for the county should really be online
- Hazmat information should also be included online
- The County does regulate flood insurance under the NFIP, however if households don't have financing, then they are not required to have NFIP flood insurance
- NWR headquarters, these are critical facilities to get equipment in an area in the event of a natural hazard
- Major facilities are located on Sod House land and highway 205, however, depending on the level of the flood, equipment may not be available.
- Frenchglen also contains critical facilities, and they are also at risk to a large flooding event.
- The Fields store is also susceptible to flash flooding
- Historical buildings in Diamond and Frenchglen are particularly susceptible to floods
- In diamond valley, there are only two ways out
- The OO Road (??) is continually washedout
- In Burns there is a ditch on the road between highway 20 and Fillmore susceptible to flooding

Landslides

Areas affected by landslides (see map for reference):

- Highway 205 at the NWR, there's a 20 mile stretch that experiences weekly falls
- Wright's Point susceptible to landslides
- 395-Divine Canyon
- 395 (??) at Malheur-Star Ridge, they collaborated together with Malheur County to fix a landslide problem
- Drewsey area
- County Road 47, could be backed-up in a landslide, (47 is NW of Burns and Hines)
- Hwy 20 east to Vale, landslide potential
- In Hines, behind the Big Bear, or Hines Road, a new development, and along Horseshoe Ridge where there is a potential for landslides
- The location of the water tower near Hines has a potential for landslides

Volcanic

- The greatest hazard threat from volcanoes are the ash fallouts which could reach the cities of Burns and Hines. Ash has the potential to disrupt transportation systems, and because the food supply comes from the West, there could be a significant disruption
- Ash may not have direct impacts in Harney County, but there are significant potential secondary impacts that could be just as harmful to the county
- When an ash deposit happens on Harney County, almost instantaneously countywide there could be significant impacts in Harney County
- Air filters in vehicles become clogged during an ash fallout, and a potential action could be to have extra air filters on hand
- Alternative lifelines need to be established for food, fuel, and water to ensure operability in Harney County
- The Cities need generators for water systems
- A potential action item would be to have more education and outreach efforts among community members for them to have more than three days food supply
- An ash fallout could also have a significant impact on livestock in Harney County because the grasses and other vegetation may die out. With 114,000 cattle in the county, there could be potential problems in the short term
- There are potential medical problems during an ash fallout, especially for people with respiratory problems

Wildfire

- Mike Williams' Wildfire map shows actual fire events in Harney County over the past 10 years. Green fires represent contained fires at 1000 acres or more, and red contained 1000 acres or less.
- Between Vale and Harney County, the fire potential is significantly higher there
- The single biggest exposure is located along that route, and some of the exposure factors include the fire suppression that has taken place over the past 50 years.
- The trends for the region are:
 - Fires and fuel development are on the rise, and rural development and rural populations continue to grow, increasing the amount of risk.
- In 2006, over a 9-day period, over 100,000 acres burned
- The entire county is equally at risk for wildfire
- Some issue with power lines are that wildfires get started in forest service lands, without paying attention to where power lines are distributed. Fire fighter safety is also compromised.
- For Harney County Electric, vegetation clearing and ROW clearing are essential to maintaining fire safety.
- In the 2006 fields fire, the cedar poles lit up like matchsticks, and this was due to back burning done by the forest service and the blm. When the power was burned out, there was no power for powering the water pumps.

- Another major issue with fires is that downstream, there is an increased potential for flooding after a fire has burned out the vegetation. An important action to implement is to mitigate the impacts of flooding after a fire.
- Potential action item is to use vegetation and forest management to ensure that cattle have the proper amount of grazing needed.
- For the forest, it must be managed or it will burn
- Fire suppression efforts have created large vegetation issues, which has increased the need for prescribed burning
- An important issue is that firemen need to know where the electric infrastructure is, increase education and collaboration among firemen
- The alfalfa crops also become vulnerable when power is lost because the crops can't be irrigated

What is the prevalence of downed power lines sparking fires?

- Line sparking is often started by birds that build nests on transformers and poles.
 - Solutions include using rubberguards around power lines so that birds do not get electrocuted when they land on the wires
 - Ravens are the biggest problems on the lines, and HEC regularly has to take down nests and there isn't much that can be done about it
 - You also can't go underground because you end up losing a lot of power
 - The birds always come back to the same place
 - There should be options that the farmers can implement, maybe contacting the Audobon society in Bend for potential solutions
 - Should eagles get electrocuted, then HEC is responsible for reporting each incident because the eagles are protected.
 - FWS requires an avian plan to protect the species
 - HEC does not have the capital to address birds unless they increase rates, and that's not feasible
 - In 2006, FWS received a grant of \$300,000 to protect eagles, but the issue is only there for a few months because the birds move on.

Winter storm

- Some of the main issues for winter storms are the county's ability to remove snow, the access for emergency vehicles is restricted, and drifting snow can be a problem
- Also, new residents to Harney County don't know about the hazard problem and what should be done
- It's important to also inform the tourist population of the hazard that a winter storm brings
- Education is an important element for new residents to inform them of the hazards that winter storms can bring
- Potential educational scenarios include:
 - Listing of available services

- Getting information of what to do in the event of a winter storm
 - Information about frostbite, the air can be so dry in the winter and with the sun out people don't realize the danger that the extreme cold can provide
 - Positively educate people on the hidden dangers of the high desert
- Winter storms are a countywide issue, Harney County is on the frontier and should be regarded as such
 - Efforts should be focused on people that are moving to Harney County and people that are just visiting
- Winter storms pose a special problem for utilities, especially when a cold inversion occurs, where cold air stays remains on the ground
 - Ice builds up on the lines, the weight draws the lines down to the ground, and when the wind knocks the ice off, the power lines snap up like a rubber band, and wrap themselves around the line above, causing a power short. Unwrapping the lines are dangerous for the linemen, and usually the linemen go out with hot sticks to knock the ice off.
- Another problem is livestock and guaranteeing their food supply
 - Cattle need to graze, and a winter storm can make it difficult for the cattle to get feed, and they are also constantly moving around and may not be near where the food supply is.
- Fall snow events increase the risk for exposure
- In some parts of Harney County it can snow every month of the year
- For individuals involved in recreation, there are always hunters that are not prepared, and education is key to getting these people properly prepared for a winter storm event. 95% of the hunters are prepared, it's just the 5% that aren't that they need to worry about
- A hunters booth in Burns can provide a great deal of education
- The Harney County website can also have a link to the ODFW website informing hunters of the importance to dress and prepare accordingly.

Wind Storms

- Every year there are summer thunderstorms that impact Harney County with severe winds of up to 70 mph. There are also tornadoes that strike in Harney County.
- The BLM has a remote weather station that provides RAWS data on wind and rainstorms.
- HEC also anchors poles and lines in high wind areas, often every third pole to avoid downed power lines, because one power line down creates a chain reaction
- Another problem from windstorms is blowing dust, downed trees
- Every year there is minimal damage in Hines due to trees falling down on Homes
- Lightening has a big impact on the county, especially with lightening strikes on power lines and on residences
- Lightening also starts numerous wildfires as shown by the WF map
- On Steens Mountain, more people are struck by lightening than any location in Oregon
- One incident a lightening storms caused 88 fires in 2 days
- Extreme cold can also be a problem, historically temperatures can get to 30 to 40 degrees below zero
- In Hines, the City Manager distributes information in the newsletter on what to do during an extreme cold event
- In a 48-hour period, there were approximately 28,000 lightening strikes in 2006

Drought

- Harney County Emergency Management had three drought declarations in the past 8 years
- The OSU Agricultural research center provides important data on drought conditions in Harney County
- Drought really affects 95% of the livestock industry in Harney County, affecting the economy and revenue
- Drought does reduce fuel for wildfires, however, drought does create conditions for wildfires to occur
- A drought can impact the NWR because animals move on to find another place, impacting the number of tourists that come to the NWR
- Drought has also shut down logging in the forest because of limited water resources
- Drought also shuts down hunting in the area, because animals move on if there is no food.



Meeting: Goals and Action Items/Plan Implementation
Date: June 28, 2007
Time: 9 am to 12 pm
Location: Burns City Hall, 242 S Broadway Ave, Burns OR

AGENDA

Mission, Goals, and Action Items

1. Introduction (5 min)
2. Mission and Goals Discussion (15 min)
3. Presentation of Action Items and Discussion (3 min/action, 75 min total)

- Break* (10 min)

Plan Implementation

4. Plan Implementation Discussion (15 min)
 - a. Identify Convener
 - b. Identify Coordinating Body and members
5. Plan Maintenance/Implementation Discussion (15 min)
6. Next Steps
 - a. Action item revisions and plan review process

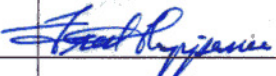

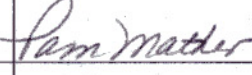


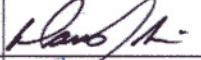
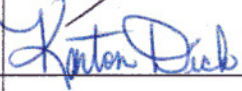
Harney County Mission, Goals, Action Items, and Plan and Implementation Meeting

To conduct a meeting with the Harney County Natural Hazards Mitigation Steering Committee
to discuss the Mission, Goals, and Action Items for the Harney County Natural Hazards Mitigation Plan
and the Plan Implementation/Maintenance process

June 28, 2007, 9 am to 12 pm

Burns City Hall

242 S Broadway Avenue, Burns, Oregon

Name	Title	Organization Representing	Time In	Time Out	Location coming from (City)	Signature certifying this information is correct
Fred Flippence	Office Manager	Harney Electric Cooperative, Inc.	9:00	11:45	Burns	
DAVID J. BOONE	CITY MANAGER	CITY OF BURNS	9:00	11:45	BURNS	
Pam MATHER	CITY ADMIN.	city of Hines	9:00	11:45	HINES	
Ruth Schultze	Mayor - Hines	City of Hines	9:00	11:45	Hines	
Steve Gresty	County Judge	Harney County	9:00	10:00	Rural	
DARWIN THASON	County Planning Assistant	HARNEY COUNTY	9:00	11:45	Rural	
Kenton Dick	TRANSPORTATION PLANNER	Burns Paiute Tribe	9:00	11:45	Rural	

Appendix B: Hazard Annexes

The Hazard Annexes appendix provides additional information for natural hazards addressed in the mitigation plan.

Earthquake Hazard Annex.....	B-1
Earthquake Summary: Lake, Harney, and Malheur Counties.....	B-2
Harney County Earthquake HAZUS Analysis.....	B-15
Flood Hazard Annex.....	B-65
Flood Summary: Lake, Harney, and Malheur Counties.....	B-66
NFIP Flood Loss Data.....	B-71
Landslide.....	B-73
Landslide Summary: Lake, Harney, and Malheur Counties.....	B-74
Volcano.....	B-83
Volcano Summary: Lake, Harney, and Malheur Counties.....	B-84
Wildfire.....	B-90
Map: Harney County 10-year Fire History.....	B-91
Wildfire Summary: Lake, Harney, and Malheur Counties.....	B-92
Harney County Community Wildfire Protection Plan (CWPP)	

Earthquake Hazard Annex

This annex covers the earthquake hazard and includes detailed information on the hazard that is specific to the County. The annex includes some actual documents when digital copies were available. Annex materials include supplemental information for Section 3 hazard vulnerabilities, and potential losses when local data is available.

Hazard Resources

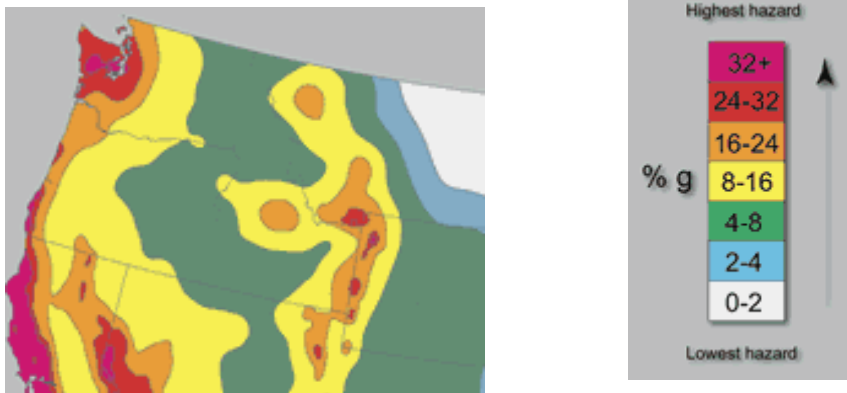
This section documents the existing resources that were used to develop the risk assessment for this hazard. They include:

- *Earthquake Summary: Lake, Harney, and Malheur Counties.* This summary is a supplement to the Region 8 Profile and Hazard Assessment found in the State of Oregon Natural Hazards Mitigation Plan. The summary was completed by DOGAMI in 2007 and is included in this annex.
- *Harney County Earthquake HAZUS Analysis.* In 2007, DOGAMI prepared HAZUS Global Reports for Crustal and Probabilistic Scenarios for Harney County. These reports provide a comprehensive cost assessment of two potential earthquake scenarios which could impact the county. The full text of the report is included in this annex.
- *Statewide Seismic Needs Assessment.* In 2007, DOGAMI released the Statewide Seismic Needs Assessment Using Rapid Visual Screening (RVS), which contains a preliminary assessment of the seismic resilience of critical infrastructure in each Oregon County. A spreadsheet of Harney County buildings can be accessed at:
<http://www.oregongeology.com/sub/projects/rvs/default.htm>

EARTHQUAKE SUMMARY: Lake, Malheur, and Harney Counties, Oregon

Overview

The earthquake hazard in this region is displayed on the USGS National Seismic Hazard Map shown below. As displayed in the map, most of eastern Oregon is in a moderate seismic zone (green-yellow), while western Oregon is in a high seismic zone (orange-red).



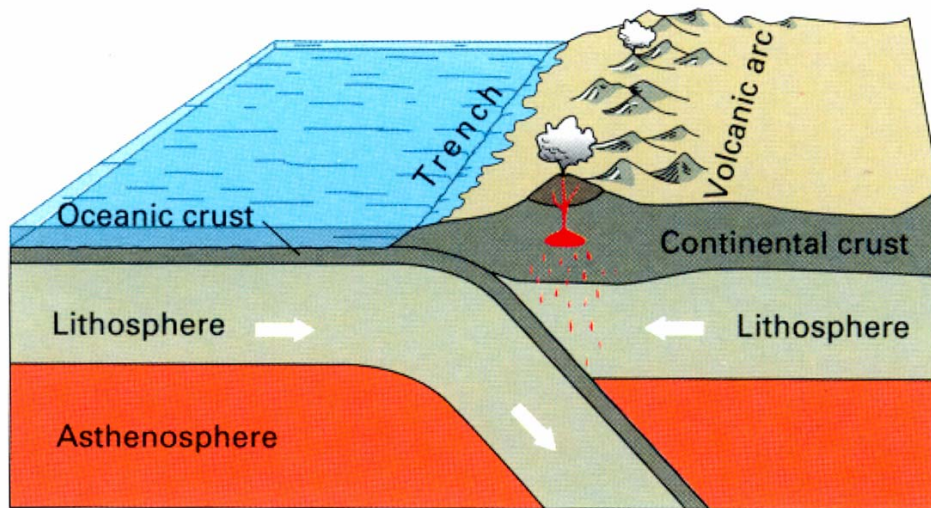
Map of peak acceleration (percent g) with a 2% probability of exceedance in 50 years on rock (Frankel, A.D., Petersen, M.D., Mueller, C.S., Haller, K.M., Wheeler, R.L., Leyendecker, E.V., Wesson, R.L., Harmsen, R.C., Cramer, C.H., Perkins, D.M., and Rukstales, K.S., 2002. 2002 Update of the National Seismic Hazard Maps. USGS Open File Report OFR 02-420).

Thus, the earthquake hazard is a significant threat in the region. This hazard can come from any one of three types of sources: subduction zone, intraplate, and crustal events. The map below displays a schematic three dimensional diagram with the generalized locations of the three types of earthquake sources.



Schematic 3-D map showing the general source areas for subduction zone, intraplate, and crustal earthquakes (Image from the Oregon Department of Geology and Mineral Industries).

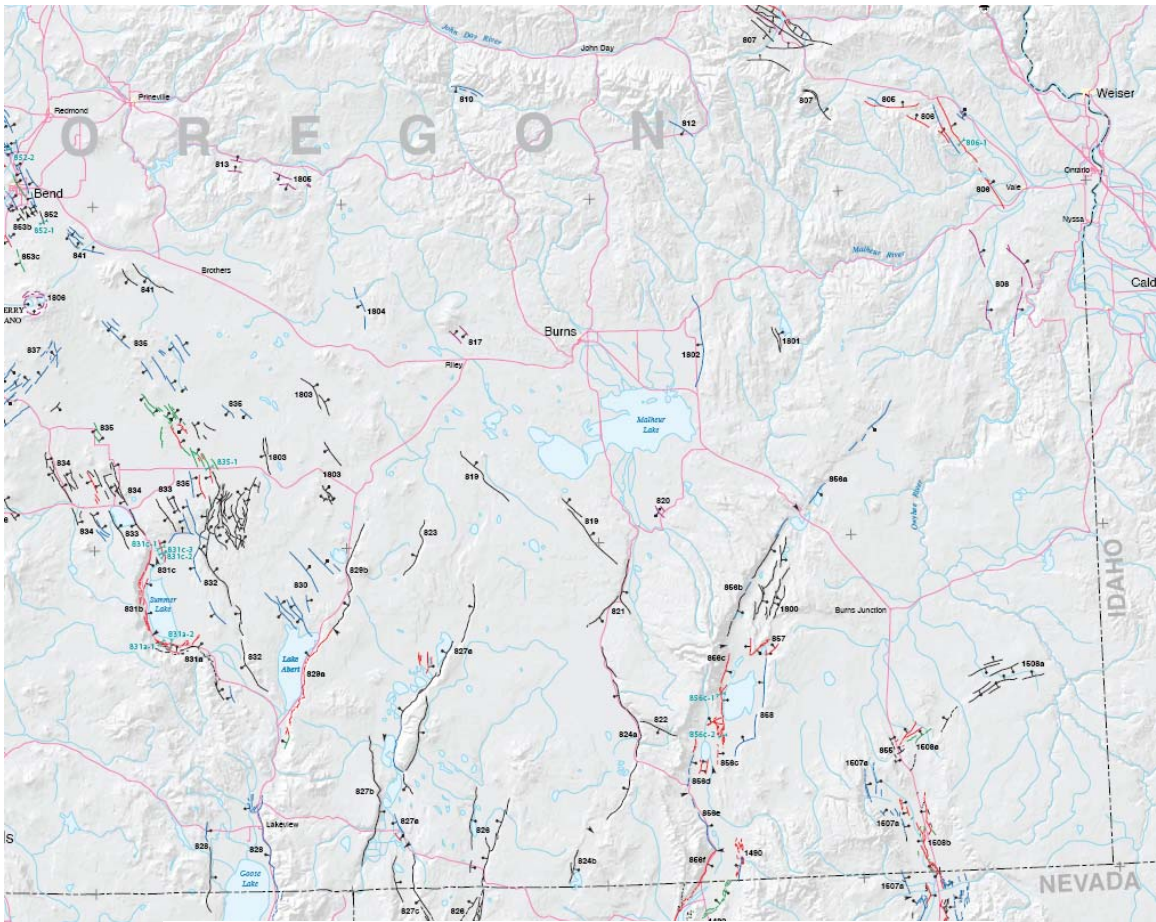
Great *subduction zone earthquakes* occur around the world where two tectonic plates meet and move towards one another, with one sliding underneath the other. In these subduction zones one plate is shoved (“subducts”) beneath the other, where it is melted and reabsorbed into the mantle. The huge faults that separate the plates in these zones produce some of the most powerful earthquakes ever recorded, often having moment magnitudes of 8.0 to over 9.0. The 1960 Chilean (M 9.5) and the 1964 Great Alaska (M 9.2) earthquakes were subduction zone earthquakes which both produced large tsunamis (Kanamori, H., 1977, The energy release in great earthquakes: Journal of Geophysical Research, v. 82, p. 2981-2987).



Schematic 3-D diagram of the converging plate margin displaying the relationship between the subducting plate and the resulting volcanic arc (Image from the Oregon Department of Geology and Mineral Industries).

Intraplate earthquakes occur within the remains of the Juan de Fuca plate as it subducts beneath the North America plate. Intraplate earthquakes have caused damage in the Puget Sound region in 1949, 1965, and in the 2001 M 6.8 Nisqually Earthquake. These types of earthquakes typically occur at depths of 40–60 km (25–37 mi).

Crustal earthquakes occur in the North American plate at relatively shallow depths of 10–20 km (6–12 mi) below the surface. Earthquakes related to volcanic activity can also affect the region.



TIME OF MOST RECENT SURFACE RUPTURE

- Holocene (<10,000 years) or post last glaciation (<15,000 years; 15 ka);
no historic ruptures in Oregon to date
- Late Quaternary (<130,000; post penultimate glaciation)
- Late and middle Quaternary (<750,000 years; 750 ka)
- Quaternary, undifferentiated (<1,600,000 years; <1.6 Ma)
- Class B structure (age or origin uncertain)

SLIP RATE

- >5 mm/year
- 1.0-5.0 mm/year
- 0.2-1.0 mm/year
- <0.2 mm/year

TRACE

- Mostly continuous at map scale
- Mostly discontinuous at map scale
- Inferred or concealed

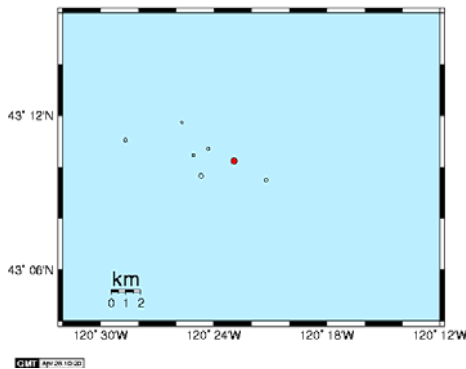
Map of Quaternary Faults and Folds in the region. Details on the faults and folds such as fault type, slip rate, and most recent event are available by fault id number in the original USGS publication (Personius, S.F., Dart, R.L., Bradley, L.A., Haller, K.M., 2003. Map of Quaternary Faults and Folds in Oregon. USGS Open File Report 03-095, v1.1).

This part of Oregon has experienced many earthquakes as shown in the map and table below. Several earthquake sequences (swarms) have occurred in the region within the last 10 years. There are also identified faults in the region 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.

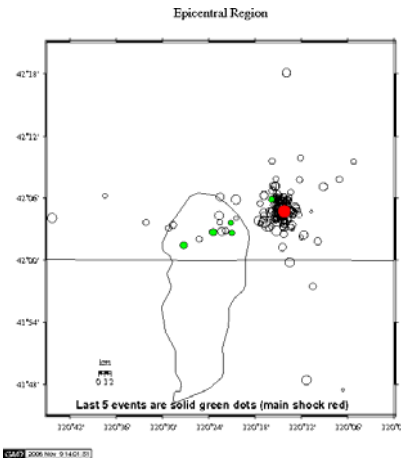
Summary of recent notable earthquake sequences (swarms)(Pacific Northwest Seismic Network).

Date	Location	Magnitude	Comments
April 28, 1999	Christmas Valley	3.8	
April 1999	Christmas Valley	1.9-3.0	At least 6 earthquakes occurred in the area during April 1999
June 30, 2004	SE of Lakeview	4.4	
June 2004	SE of Lakeview	1.9-3.9	At least 20 earthquakes occurred in the area during June 2004
??	Jordan Valley	??	??

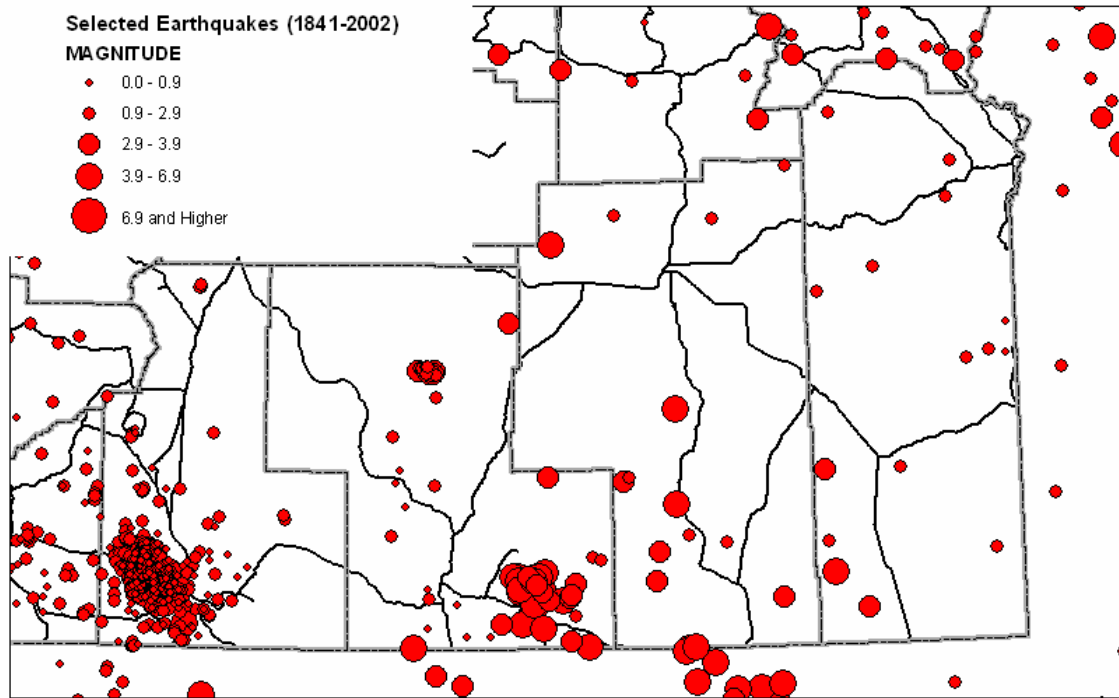
EQ History from 1998 to time of main shock



Christmas Valley Swarm 1998-1999 (PNSN)



SE of Lakeview Swarm 2004 (PNSN)



Map of selected earthquakes in the region from 1841-2002 (Niewendorp, C.A., Neuhaus, M.E., 2003. Map of Selected Earthquakes for Oregon, 1841 through 2002. Oregon Department of Geology and Mineral Industries Open File Report 03-02).

Table. Historical Earthquakes Affecting Oregon (Ivan Wong and Jacqueline D.J. Bolt, November 1995, A Look Back at Oregon's Earthquake History, 1841-1994, Oregon Geology, pp. 125-139 and Niewendorp, C.A., Neuhaus, M.E., 2003. Map of Selected Earthquakes for Oregon, 1841 through 2002. Oregon Department of Geology and Mineral Industries Open File Report 03-02)

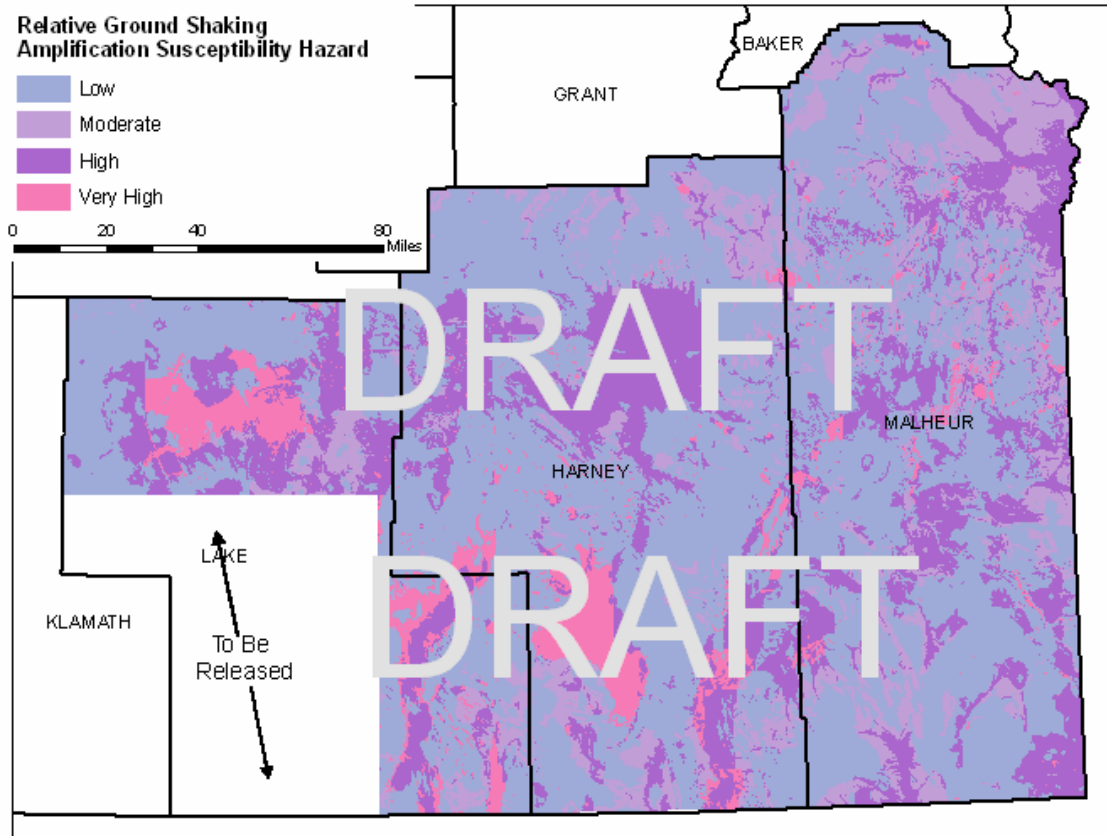
Date	Location	Magnitude	Comments
Approximate years: 1400 BCE	Offshore, Cascadia subduction zone	Probably 8-9	Researchers Brian Atwater and Eileen Hemphill-Haley have dated earthquakes and

1050 BCE 600 BCE 400, 750, 900			tsunamis at Willapa Bay, Washington; these are the midpoints of the age ranges for these six events.
January 26, 1700	Offshore, Cascadia Subduction zone	Approximately 9	Generated a tsunami that struck Oregon, Washington and Japan; destroyed Native American villages along the coast.
November 23, 1873	Oregon/California border, near Brookings	6.8	Felt as far away as Portland and San Francisco; may have been an intraplate event because of lack of aftershocks.
March, 1893	Umatilla	VI-VII (Modified Mercalli Intensity)	Damage unknown
July 15, 1936	Milton-Freewater	6.4	Two foreshocks and many aftershocks felt; \$100,000 damage (in 1936 dollars).
April 13, 1949	Olympia, Washington	7.1	Eight deaths and \$25 million damage (in 1949 dollars); cracked plaster, other minor damage in northwest Oregon.
January, 1951	Hermiston	V (Modified Mercalli Intensity)	Damage unknown
November 5, 1962	Portland/Vancouver	5.5	Shaking lasted up to 30 seconds; chimneys cracked, windows broke, furniture moved.
1968	Adel	5.1	Swarm lasted May through July, decreasing in intensity; increased flow at a hot spring was reported.
April 12, 1976	Near Maupin	4.8	Sounds described as distant thunder, sonic booms, and strong wind.
April 25, 1992	Cape Mendocino, California	7.0	Subduction earthquake at the triple-junction of the Cascadia subduction zone and the San Andreas and Mendocino faults.
March 25, 1993	Scotts Mill	5.6	On Mount Angel-Gates Creek fault; \$30 million damage, including Molalla High School and Mount Angel church.
September 20, 1993	Klamath Falls	5.9 and 6.0	Two deaths, \$10 million damage, including county courthouse; rockfalls induced by ground motion.

Notes: * BCE: Before the Common Era

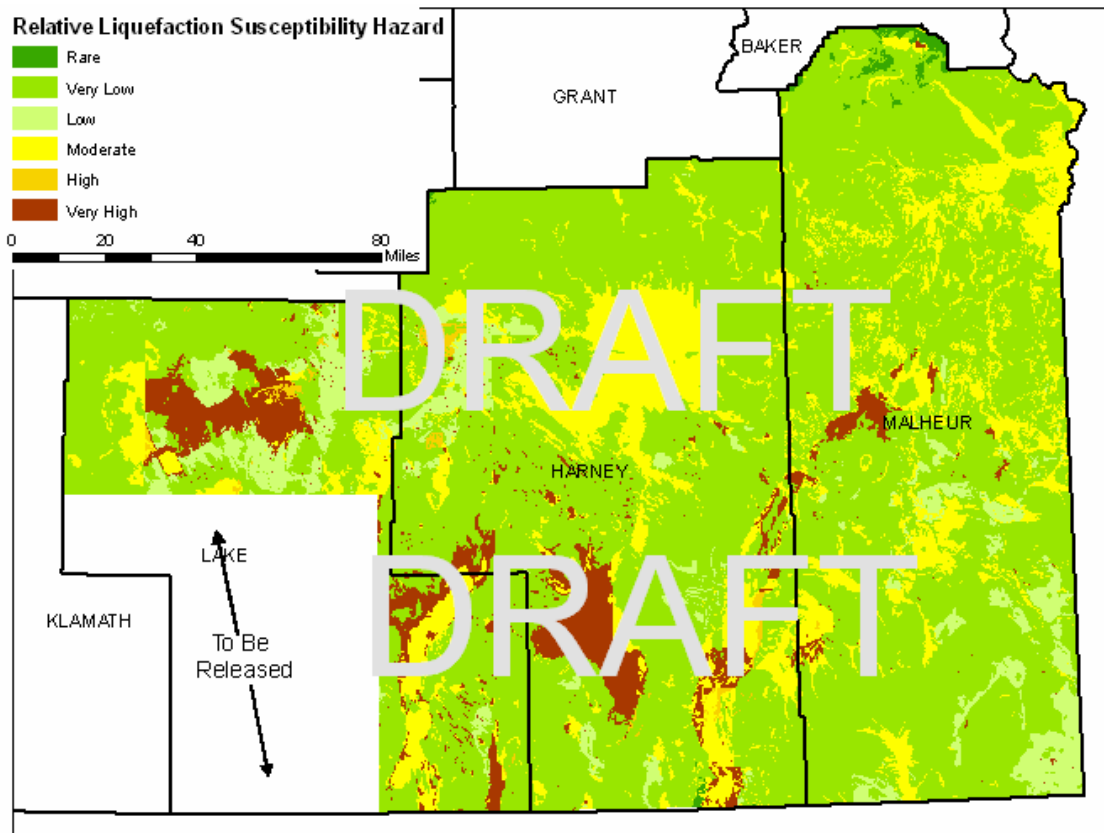
Earthquake ground motions can cause associated hazards which include the amplification of ground shaking, liquefaction of saturated soils, and landsliding.

As seismic waves travel through bedrock, some energy propagates through surface soils to the ground surface. It is during this propagation through these surface soils that the shaking can be greatly influenced. Soil deposits can either deamplify (weaken) or amplify the shaking based on the characteristics of the deposit. This phenomenon is generally referred to as ground shaking amplification (GSA).



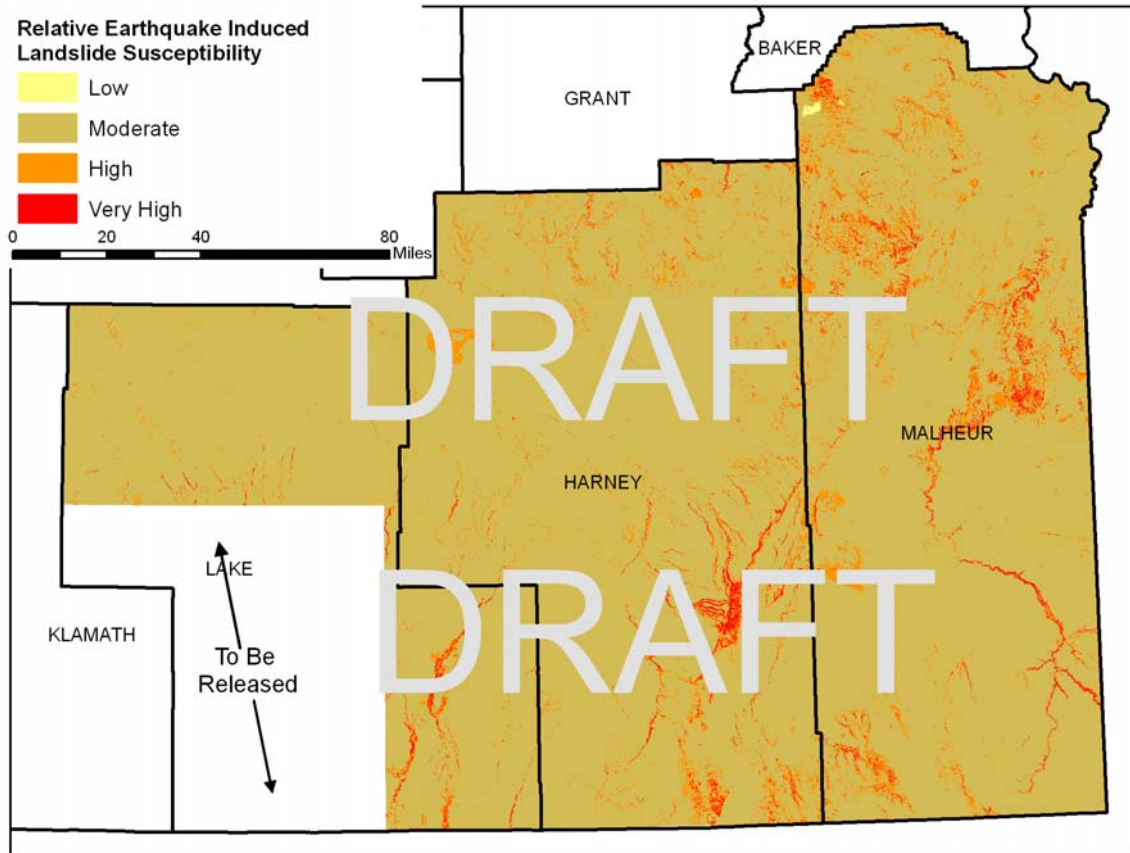
Map of the relative ground shaking amplification hazard. The five class scale of hazard generally corresponds to the NEHRP soil class scale (Burns, et al, 2007. Unpublished Report. Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage and Loss Estimates for three Counties in the southeastern Region Including Lake, Malheur, and Harney, DOGAMI Open File Report).

During seismic shaking, deposits of loose saturated sands can be subjected to contraction resulting in an increase in pore water pressure. If the increase in pore water pressure is high enough, the deposit becomes “liquefied,” losing its strength and thus its ability to hold support loads.



Map of the relative liquefaction susceptibility hazard. (Burns, et al, 2007. Unpublished Report. Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage and Loss Estimates for three Counties in the southeastern Region Including Lake, Malheur, and Harney, DOGAMI Open File Report).

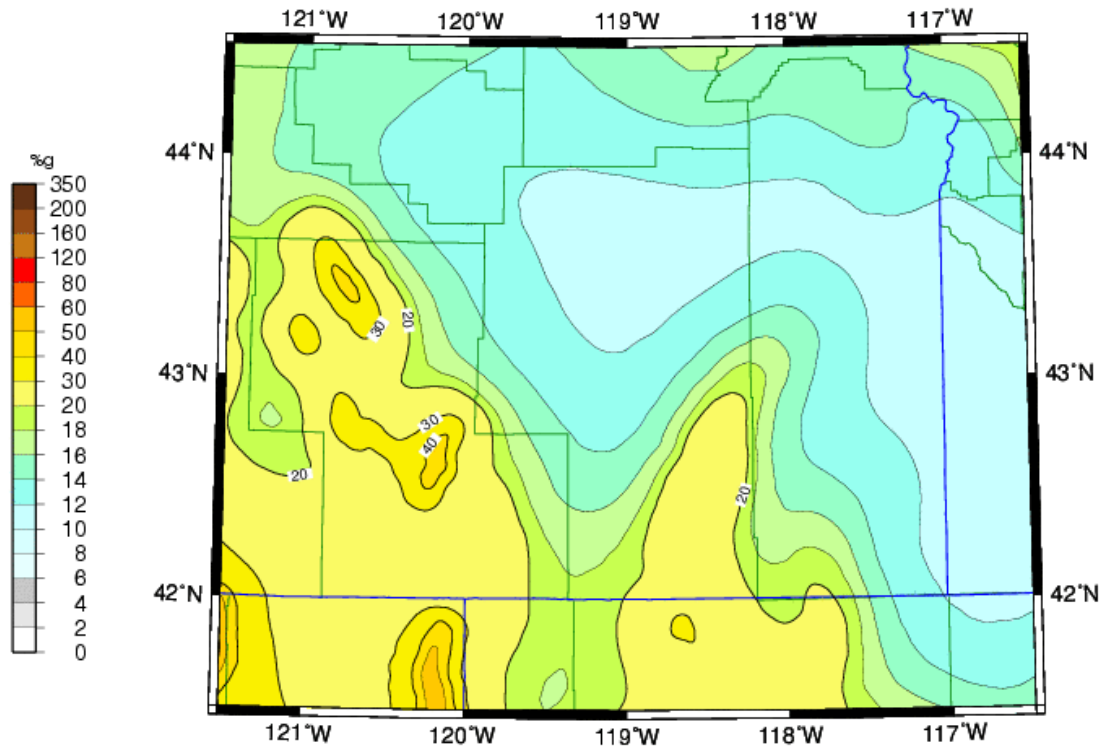
Strong ground shaking can also cause landslides and reactivate dormant landslides. Commonly, slopes that are marginally stable prior to an earthquake become unstable and fail. Some landslides result from liquefaction that causes lateral movement of soil, or lateral spread.



Map of the relative earthquake induced landslide susceptibility hazard. (Burns, et al, 2007. Unpublished Report. Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage and Loss Estimates for three Counties in the southeastern Region Including Lake, Malheur, and Harney, DOGAMI Open File Report).

Hazard

The general earthquake hazard in the region is reflected in the USGS national seismic hazard maps. On the 2% probability of exceedance in 50 years map of peak ground acceleration (PGA), most of the region is between roughly 10% to 40% g. Since Oregon adopted the International Building Code 2003, it no longer uses the seismic zones to define the hazard. The IBC 2003 uses the maps from the USGS earthquake program.



Map of peak acceleration (percent g) with a 2% probability of exceedance in 50 years on rock (Frankel, A.D., Petersen, M.D., Mueller, C.S., Haller, K.M., Wheeler, R.L., Leyendecker, E.V., Wesson, R.L., Harmsen, R.C., Cramer, C.H., Perkins, D.M., and Rukstales, K.S., 2002. 2002 Update of the National Seismic Hazard Maps. USGS Open File Report OFR 02-420).

The earthquake induced hazards previously discussed including ground shaking amplification, liquefaction, and earthquake induced landslides can be overlain on the general earthquake hazard to produce an overall view of the total earthquake hazard and spatial distribution of the hazard of the region.

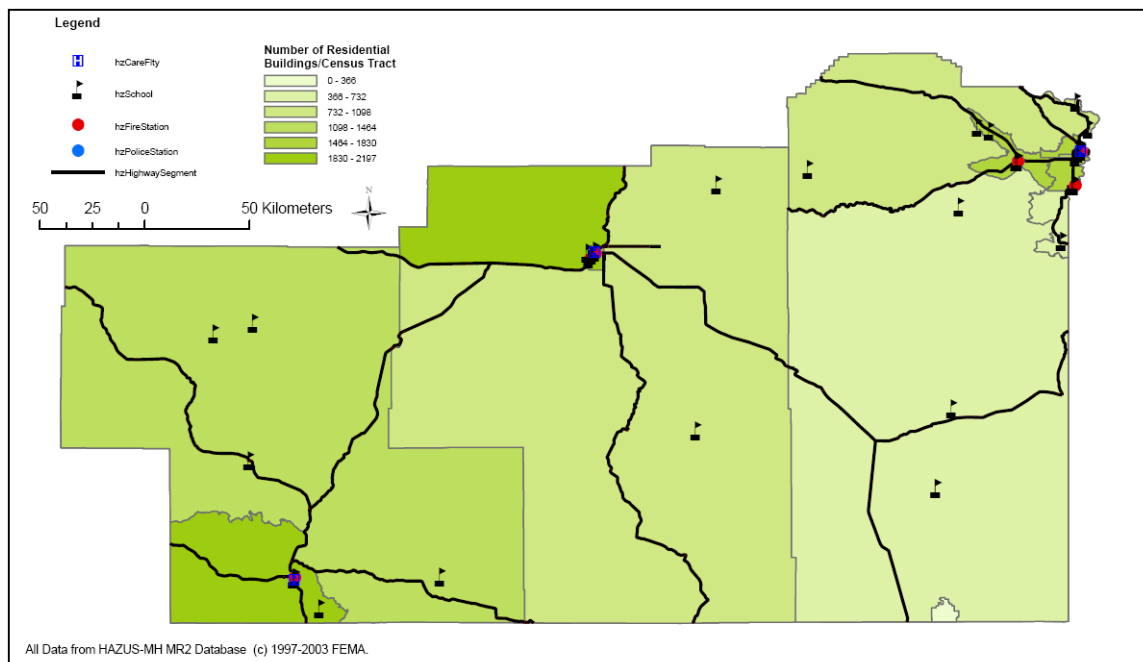
The USGS map of peak acceleration in percent gravity is predicating a 2% probability of exceedance in 50 years of the indicated ground motions in the region.

Though no earthquakes have been recorded on the Cascadia subduction zone during Oregon's short 200-year historical record, various studies have found widespread evidence that very large earthquakes occurred, most recently about 300 years ago, in January 1700. The best available evidence and observations indicate that these earthquakes occur with intervals between individual events ranging from about 200 to about 1,000 years (Atwater, B.F., and Hemphill-Haley, E., 1997, Recurrence intervals for great earthquakes of the past 3,500 years at northeastern Willapa Bay, Washington: U.S. Geological Survey Professional Paper 1576, 108 p. and Yamaguchi, D.K., Atwater, B.F., Bunker, D.E., Benson, B.E., and Reid, M.S., 1997, Tree-ring dating the 1700 Cascadia earthquake: Nature, vol. 389, p. 922).

Furthermore, as displayed in the map of historic crustal earthquakes from 1841-2002, the region is seismically active.

Exposure

The region is exposed to earthquakes and earthquake-induced hazards. Most of the people and infrastructure are located in one of the major cities in the region which are located along an interstate (I-84) and/or the regional highways (HWY 20 and HWY 395).



Map of the generalized vulnerability of the region (Burns, et al, 2007. Unpublished Report. Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage and Loss Estimates for three Counties in the southeastern Region Including Lake, Malheur, and Harney, DOGAMI Open File Report).

The geographical size of the region is 28,456 square miles and contains 13 census tracts. There are over 16 thousand households in the region and it has a total population of 46,646 people (2000 Census Bureau data). There are an estimated 16 thousand buildings in the region with a total building replacement value (excluding contents) of 2,352 (millions of dollars). Approximately 99.00 % of the buildings (and 84.00% of the building value) are associated with residential housing. The replacement value of the transportation and utility lifeline systems is estimated to be 9,248 and 264 (millions of dollars), respectively.

Risk

The Oregon Department of Geology and Mineral Industries (DOGAMI) performed an earthquake risk analysis of the region based on the 2500 year return interval ground motions. The analysis was performed in HAZUS-MH MR2, a software program,

currently used by the Federal Emergency Management Agency (FEMA) as a means of determining potential losses from earthquakes. The analysis does not look at a single earthquake, instead it encompasses many faults and potential earthquake sources, each with a 2% chance of producing an earthquake in the next 50 years. The analysis assumes that each fault will produce a single “average” earthquake during this time.

DOGAMI investigators caution that the analysis contains a high degree of uncertainty and should be used only for general planning purposes. Despite their limitations, the analysis does provide some approximate estimates of damage. Results are found in tables below.

Table. Building, transportation, and losses summary (Burns, et al, 2007. Unpublished Report. Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage and Loss Estimates for three Counties in the southeastern Region Including Lake, Malheur, and Harney, DOGAMI Open File Report).

	Building Exposure	Transportation Exposure	Total Exposure
Harney	448,745	2,281,862	2,730,607
Lake	463,194	2,569,852	3,033,046
Malheur	1,441,002	4,396,877	5,837,879
Region Total	2,352,941	9,248,592	11,601,533
	Building Losses	Transportation Losses	Total Losses
Harney			
Lake			
Malheur			
Region Total			

*All values are in thousands of dollars

Table. Critical facility functionality summary (Burns, et al, 2007. Unpublished Report. Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage and Loss Estimates for three Counties in the southeastern Region Including Lake, Malheur, and Harney, DOGAMI Open File Report).

	Fire Station	Police Station	School	Hospital Beds	Hospital Beds	Hospital Beds
	Functionality (%)	Functionality (%)	Functionality (%)	Available	Available Day 1	Available Day 30
Harney						
Lake						
Malheur						
Region Total						
Region Average Functionality						

Table. Social impact summary (Burns, et al, 2007. Unpublished Report. Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage and Loss Estimates for three Counties in the southeastern Region Including Lake, Malheur, and Harney, DOGAMI Open File Report).

	Number of Displaced Households	Number of People Needing Shelter	Number of Injuries at 5pm (S1 to S3)	Number of Fatalities at 5pm (S4)
Harney				
Lake				
Malheur				
Region Total				

Summary

Most of the region is within a relative moderate seismic area. Most of the people and infrastructure are located in one of the major cities in the region which are located along an interstate (I-84) and/or the regional highways (HWY 20 and HWY 395). The regions total exposure value for buildings and transportation systems alone is roughly 11.5 billion dollars. If the exposure and losses data is examined, a percent of the assets likely to be affected can easily be calculated. The percent likely to be affected for buildings and transportation in the region ranges from ??% to ??% with an average total of ~??%.

Analyses indicate a high likelihood of damage and losses from future earthquakes in the region. Action should be taken to reduce the damage and losses through predisaster mitigation and prepare for effective emergency response after the disaster. Special action should be taken for critical facilities including schools and emergency facilities.

Harney County

Crustal Earthquake Scenario Details and Ground Motion Map

**Probabilistic Earthquake Scenario Details and Ground Motion
Map**

Relative Ground Shaking Amplification Susceptibility Map

Relative Liquefaction Hazard Susceptibility Map

Relative Earthquake Induced Landslide Susceptibility Map

Identified Landslide Areas Map

**HAZUS Global Reports for
Crustal and Probabilistic Scenarios**

Crustal Earthquake Scenario Details

Crustal Earthquake Scenario: A magnitude 6.5 earthquake on an Arbitrary Crustal Fault.

For the magnitude 6.5 earthquake on the Arbitrary Fault scenario, we defined the fault source using the “Arbitrary Seismic Source” option within HAZUS (Figure ?-1) (FEMA, 2005). The fault and earthquake event was chosen by examination of USGS data and data in the Geomatrix report (1995) titled *Seismic Design Mapping State of Oregon* prepared for the Oregon Department of Transportation (USGS, 2004). In general, a likely worst-case scenario was selected. Figure ?-1 has the location of the fault, shown as the maroon line. Figure ?-2 displays the PGA for the crustal scenario.

Scenario Name	Harney Arbitrary Crustal M6.9
Type of Earthquake	Source
Fault Name	Harney_Arbitrary
Historical Epicenter ID #	-
Probabilistic Return Period	NA
Longitude of Epicenter	-118.9450
Latitude of Epicenter	43.5980
Earthquake Magnitude	6.5
Depth (km)	0.00
Rupture Length (km)	57
Rupture Orientation (degrees)	0.00
Attenuation Function	WUS Shallow Crustal Event Extensional

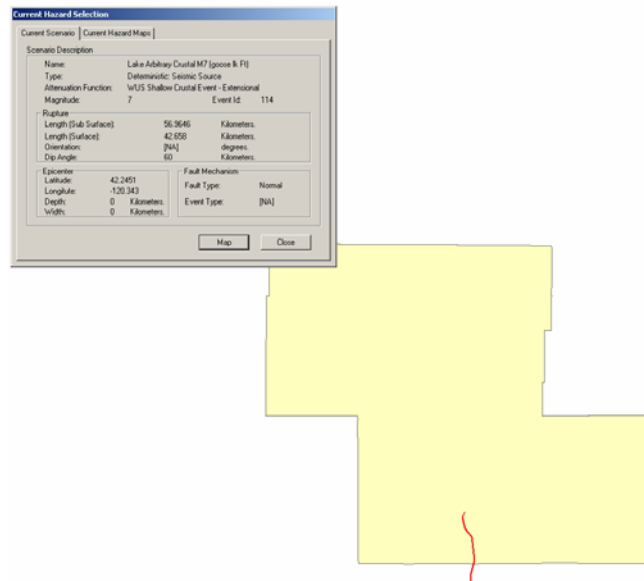


Figure ?-1. Arbitrary Fault details from HAZUS-MH (FEMA, 2005)

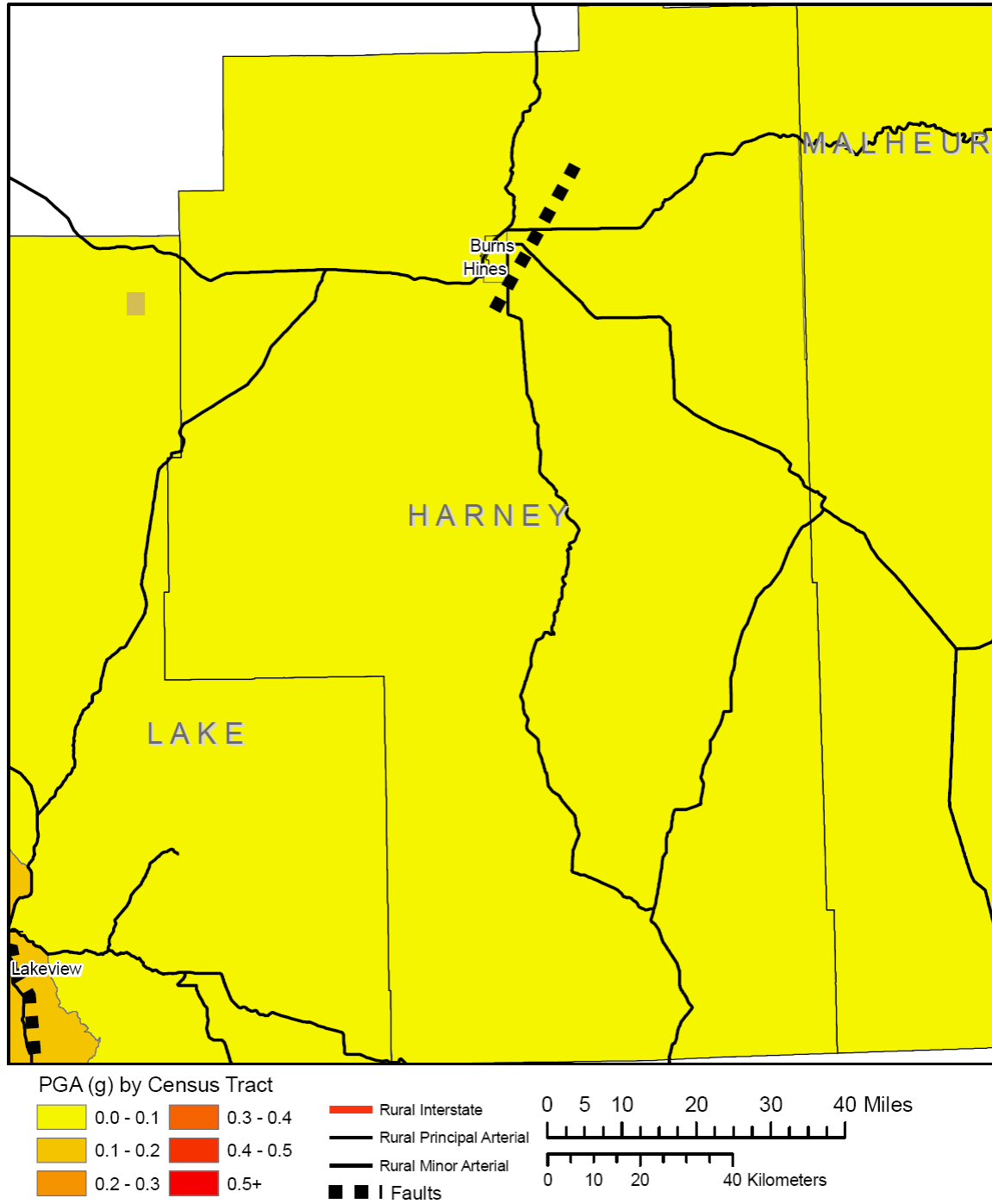


Figure ?-2. Peak ground acceleration (PGA) by census tracts map for crustal scenario, Harney County, Oregon (FEMA, 2005).

Probabilistic Earthquake Scenario Details

Probabilistic Earthquake Scenario: A 2500 year mean return period probabilistic earthquake scenario was selected.

For the probabilistic earthquake scenario, we used the “Pre-defined event” option within HAZUS to incorporate ground motion maps developed by USGS to model damage and loss from a magnitude 6.5 driving probabilistic earthquake scenario (Figure ?-3). The maps were developed based on ground motion data provided by the U.S. Geological Survey. The Methodology includes probabilistic seismic hazard contour maps developed by the USGS for the 2002 update of the National Seismic Hazard Maps (Frankel et al., 2002). The USGS maps provide estimates of PGA and spectral acceleration at periods of 0.3 second and 1.0 second, respectively.

Ground shaking with a 2500 year mean return period or 2% probability of being exceeded in 50 years was used. Figure ?-4 displays the PGA for the probabilistic scenario.

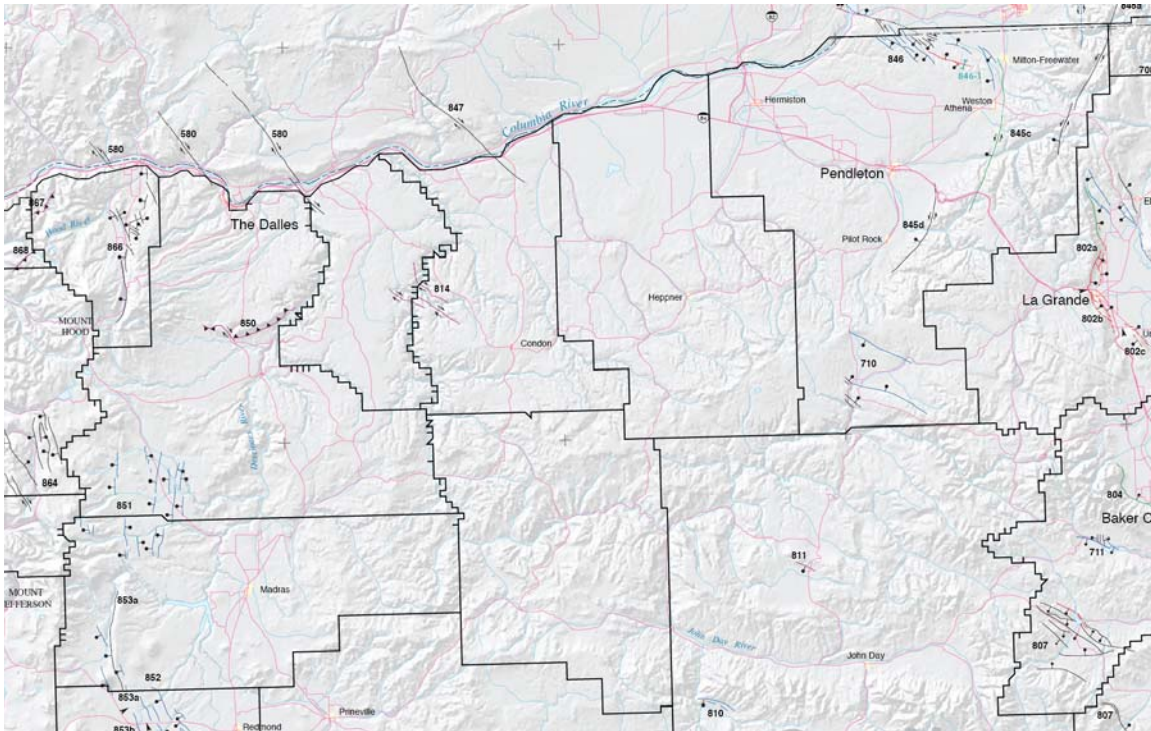


Figure ?-3. Location of the primary faults used to develop the 2500 year return ground motion maps (USGS, 2002).

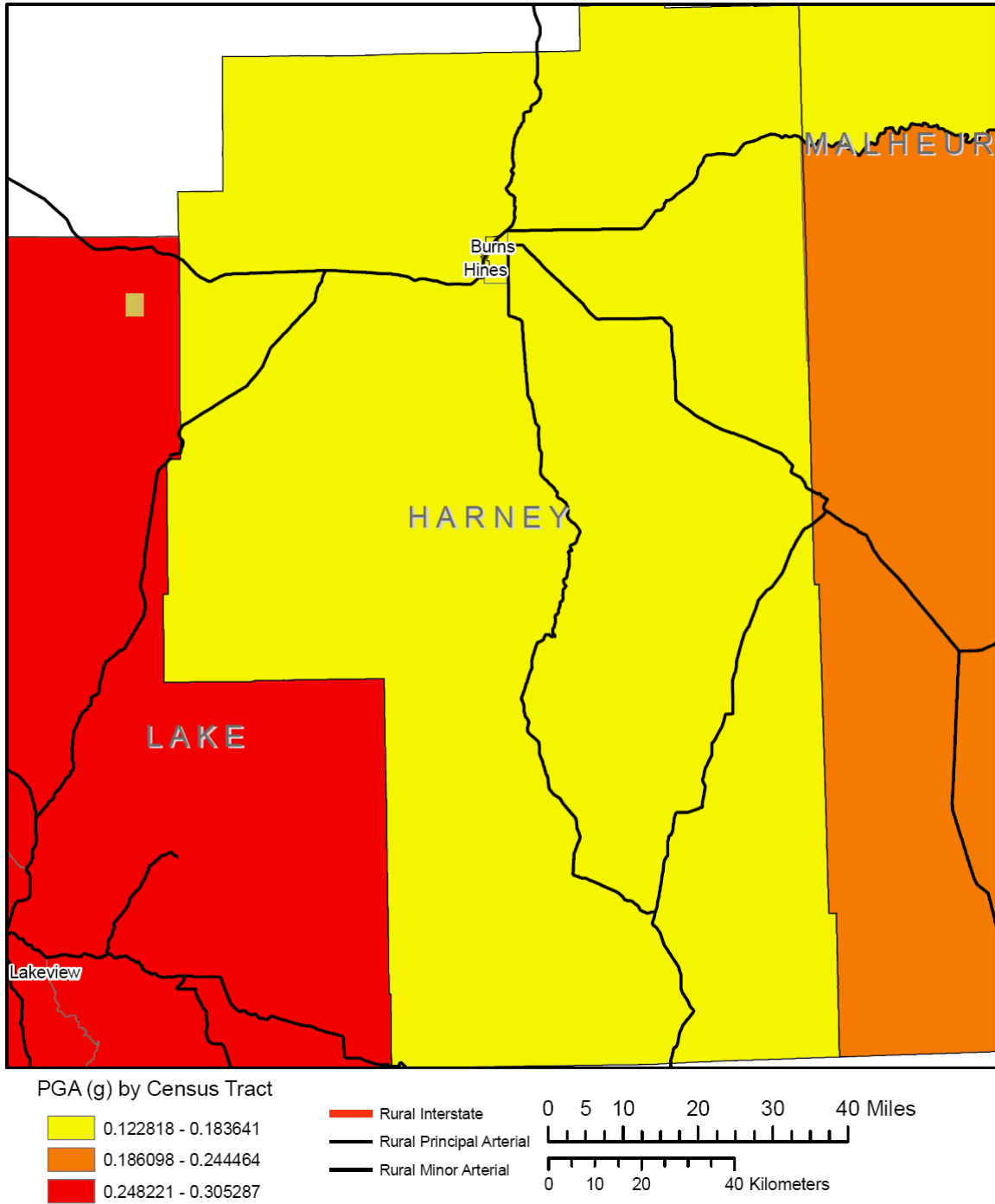


Figure ?-4. Peak ground acceleration (PGA) by census tracts map for probabilistic scenario, Harney County, Oregon (FEMA, 2005).

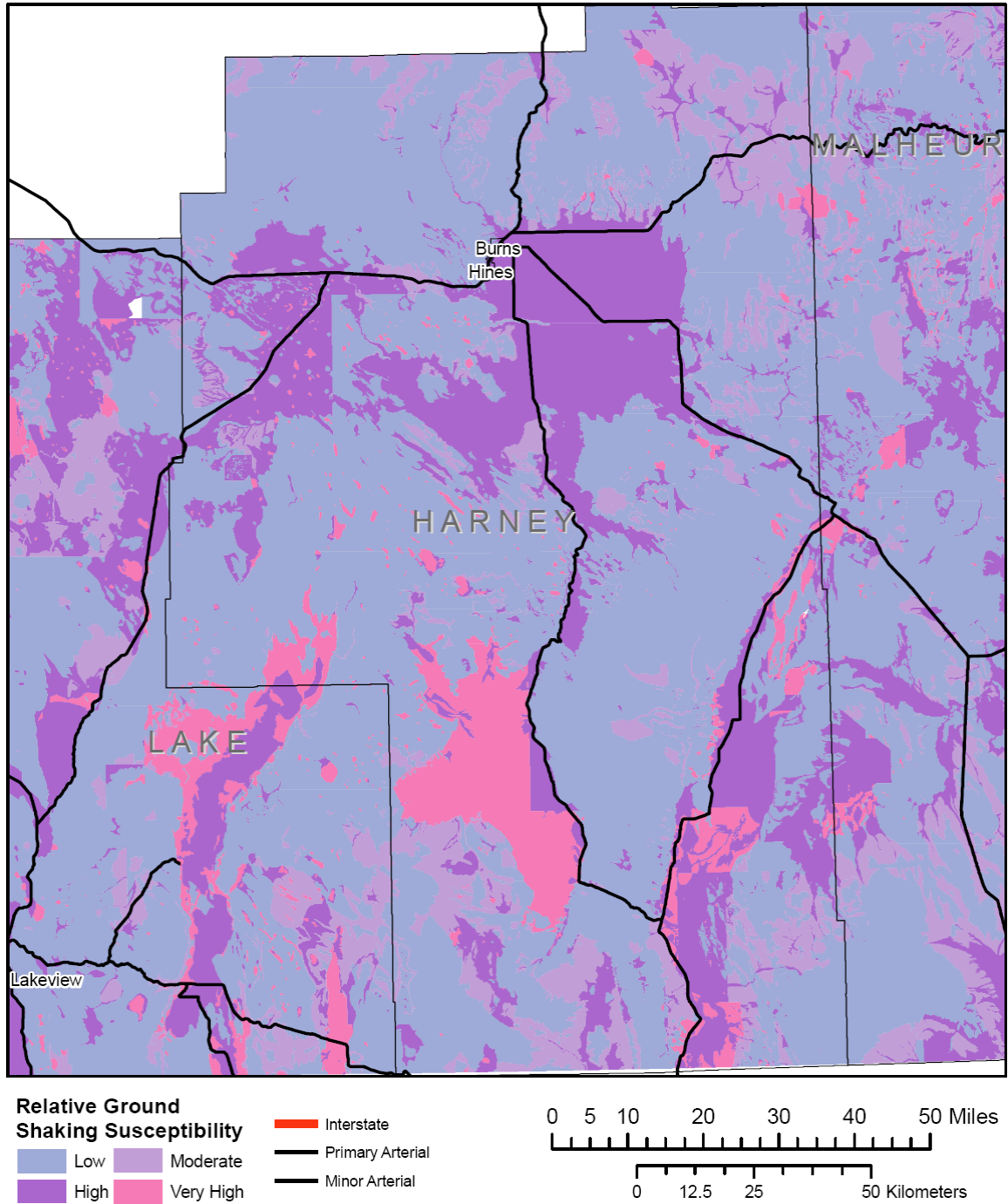


Figure 7-5. Relative ground shaking amplification susceptibility map for Harney County, Oregon.

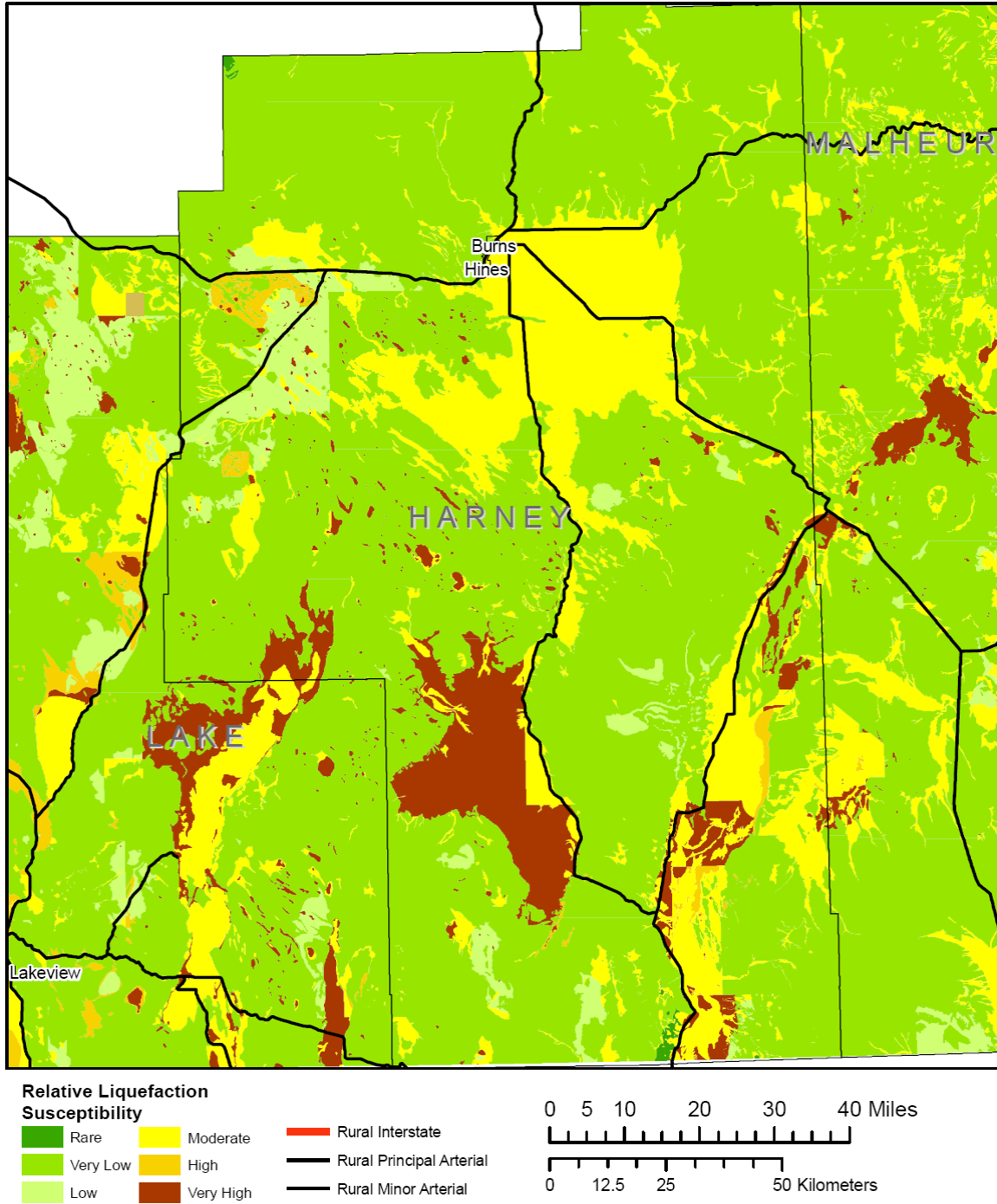


Figure 7-6. Relative liquefaction susceptibility map for Harney County, Oregon.

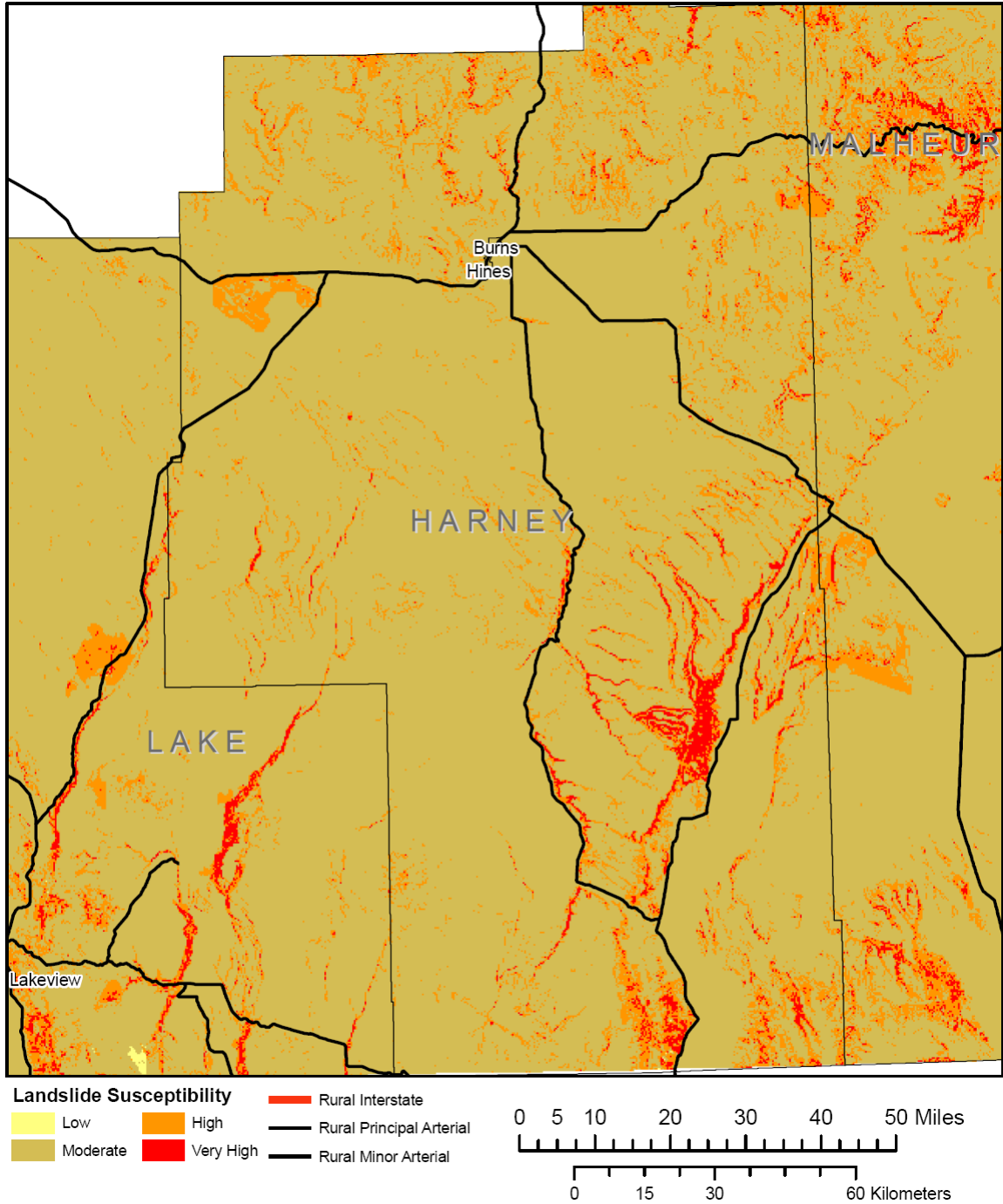


Figure ?-7. Relative earthquake induced landslide susceptibility map for Harney County, Oregon.

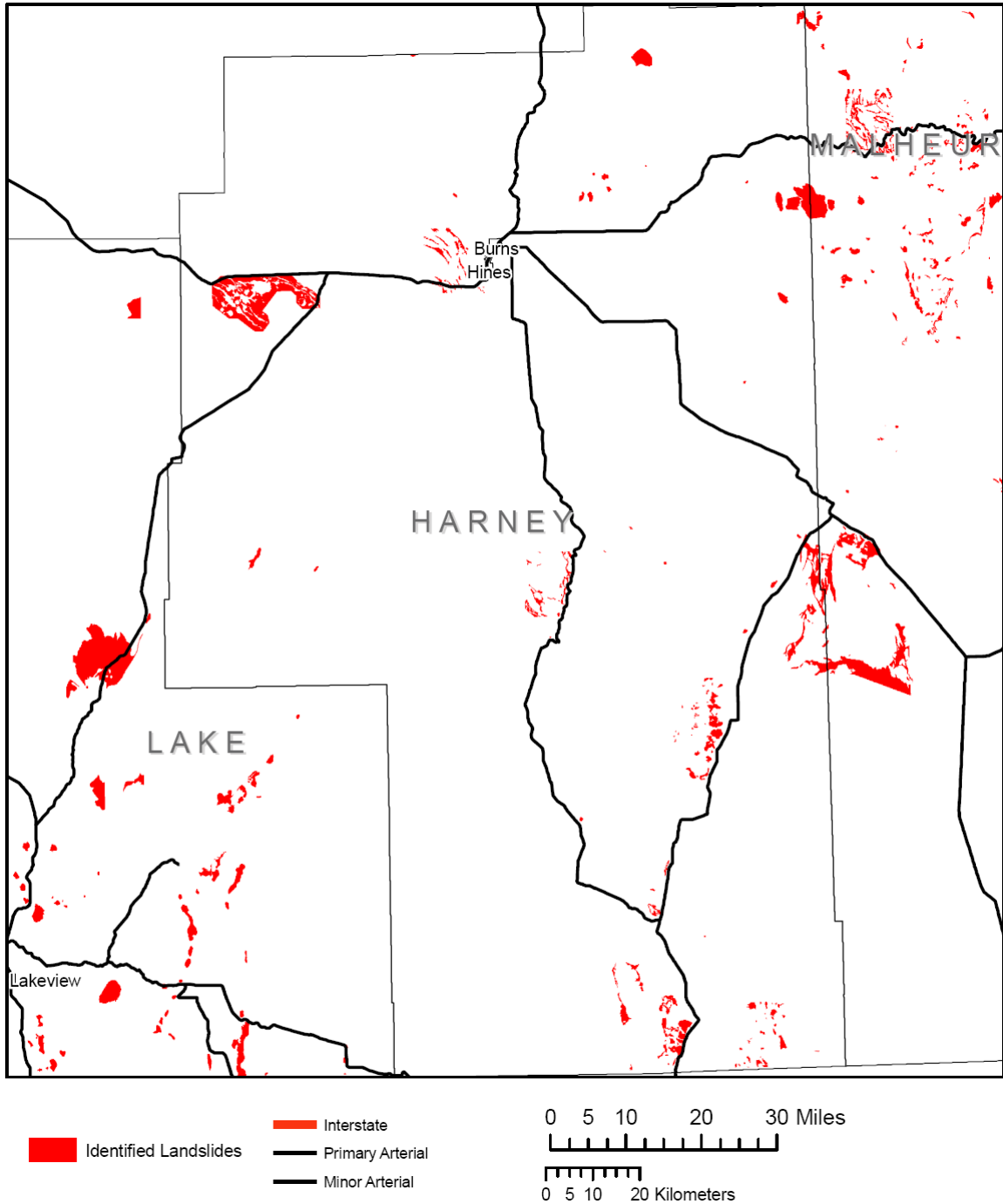


Figure ?-8. Identified landslide map for Harney County, Oregon.

**HAZUS Global Reports for
Crustal and Probabilistic Scenarios**



HAZUS-MH: Earthquake Event Report

Region Name: *Harney County*

Earthquake Scenario: *Harney Arbitrary Crustal M6.9*

Print Date: *May 30, 2007*

Disclaimer:

The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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General Description of the Region

HAZUS is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Oregon

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 10,205.61 square miles and contains 2 census tracts. There are over 3 thousand households in the region and has a total population of 7,609 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 3 thousand buildings in the region with a total building replacement value (excluding contents) of 448 (millions of dollars). Approximately 99.00 % of the buildings (and 83.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 2,281 and 0 (millions of dollars), respectively.

Building and Lifeline Inventory

Building Inventory

HAZUS estimates that there are 3 thousand buildings in the region which have an aggregate total replacement value of 448 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 72% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

HAZUS breaks critical facilities into two (2) groups: essential facilities and high potential loss (HPL) facilities. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 44 beds. There are 7 schools, 2 fire stations, 2 police stations and 0 emergency operation facilities. With respect to HPL facilities, there are 50 dams identified within the region. Of these, 1 of the dams are classified as 'high hazard'. The inventory also includes 2 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 2 and 3.

The total value of the lifeline inventory is over 2,281.00 (millions of dollars). This inventory includes over 510 kilometers of highways, 111 bridges, 36,649 kilometers of pipes.

Table 2: Transportation System Lifeline Inventory

System	Component	# locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	111	251.70
	Segments	46	1,662.40
	Tunnels	0	0.00
	Subtotal		1,914.00
Railways	Bridges	0	0.00
	Facilities	1	2.50
	Segments	0	0.00
	Tunnels	0	0.00
	Subtotal		2.50
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
	Subtotal		0.00
Bus	Facilities	0	0.00
	Subtotal		0.00
Ferry	Facilities	0	0.00
	Subtotal		0.00
Port	Facilities	0	0.00
	Subtotal		0.00
Airport	Facilities	8	49.30
	Runways	9	316.10
	Subtotal		365.40
		Total	2,281.90

Table 3: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	366.50
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	366.50
Waste Water	Distribution Lines	NA	219.90
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	219.90
Natural Gas	Distribution Lines	NA	146.60
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	146.60
Oil Systems	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	0.00
Electrical Power	Facilities	0	0.00
		Subtotal	0.00
Communication	Facilities	2	0.20
		Subtotal	0.20
		Total	733.20

Earthquake Scenario

HAZUS uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	Harney Arbitrary Crustal M6.9
Type of Earthquake	Arbitrary
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	-118.95
Latitude of Epicenter	43.60
Earthquake Magnitude	6.90
Depth (Km)	10.00
Rupture Length (Km)	35.97
Rupture Orientation (degrees)	30.00
Attenuation Function	WUS Shallow Crustal Event - Extensional

Building Damage

Building Damage

HAZUS estimates that about 57 buildings will be at least moderately damaged. This is over 2.00 % of the total number of buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS technical manual. Table 4 below summaries the expected damage by general occupancy for the buildings in the region. Table 5 summaries the expected damage by general building type.

Table 4: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	3	0.10	0	0.10	0	0.13	0	0.45	0	0.82
Commercial	12	0.41	1	0.43	0	0.62	0	2.18	0	6.37
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	3	0.09	0	0.11	0	0.14	0	0.42	0	1.18
Industrial	1	0.03	0	0.03	0	0.05	0	0.14	0	0.26
Other Residential	706	24.64	92	54.24	45	81.66	2	72.40	0	62.30
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Single Family	2,141	74.72	76	45.09	10	17.39	1	24.41	0	29.07
Total	2,866		169		55		3		0	

Table 5: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	2,140	74.67	75	44.15	9	15.67	0	17.10	0	0.00
Steel	6	0.20	0	0.19	0	0.26	0	0.60	0	0.87
Concrete	4	0.15	0	0.18	0	0.20	0	0.33	0	0.12
Precast	2	0.06	0	0.07	0	0.16	0	0.70	0	0.25
RM	0	0.02	0	0.01	0	0.03	0	0.10	0	0.00
URM	25	0.86	3	1.65	1	2.44	0	9.98	0	39.39
MH	689	24.05	91	53.74	45	81.24	2	71.18	0	59.37
Total	2,866		169		55		3		0	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 44 hospital beds available for use. On the day of the earthquake, the model estimates that only 13 hospital beds (31.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 65.00% of the beds will be back in service. By 30 days, 96.00% will be operational.

Table 6: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	1	0	0	0
Schools	7	0	0	2
EOCs	0	0	0	0
PoliceStations	2	0	0	0
FireStations	2	0	0	0

Transportation and Utility Lifeline Damage

Table 7 provides damage estimates for the transportation system.

Table 7: Expected Damage to the Transportation Systems

System	Component	Locations/ Segments	Number of Locations_			
			With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	46	0	0	46	46
	Bridges	111	2	0	109	109
	Tunnels	0	0	0	0	0
Railways	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	1	1	0	1	1
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	8	1	0	8	8
	Runways	9	0	0	9	9

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 8-10 provide information on the damage to the utility lifeline systems. Table 8 provides damage to the utility system facilities. Table 9 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, HAZUS performs a simplified system performance analysis. Table 10 provides a summary of the system performance information.

Table 8 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	2	1	0	2	2

Table 9 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	18,325	30	7
Waste Water	10,995	24	6
Natural Gas	7,330	25	6
Oil	0	0	0

Table 10: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	3,036	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

HAZUS estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0.00 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 64.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 0 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 7,609) will seek temporary shelter in public shelters.

Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 11 provides a summary of the casualties estimated for this earthquake

Table 11: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	1	0	0	0
2 PM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	1	0	0	0
5 PM	Commercial	0	0	0	0
	Commuting	0	1	1	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	0	0	0	0
	Single Family	0	0	0	0
	Total	1	1	1	0

Economic Loss

The total economic loss estimated for the earthquake is 41.22 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 1.60 (millions of dollars); 14 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 66 % of the total loss. Table 12 below provides a summary of the losses associated with the building damage.

Table 12: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.02	0.06	0.00	0.01	0.09
	Capital-Related	0.00	0.01	0.05	0.00	0.00	0.06
	Rental	0.01	0.03	0.03	0.00	0.00	0.08
	Relocation	0.00	0.00	0.00	0.00	0.00	0.00
	Subtotal	0.01	0.05	0.15	0.00	0.01	0.23
Capital Stock Losses							
	Structural	0.09	0.09	0.09	0.01	0.03	0.31
	Non_Structural	0.43	0.23	0.12	0.02	0.03	0.83
	Content	0.11	0.04	0.05	0.01	0.02	0.23
	Inventory	0.00	0.00	0.00	0.00	0.00	0.01
	Subtotal	0.63	0.36	0.26	0.04	0.08	1.38
	Total	0.65	0.42	0.41	0.04	0.09	1.60

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, HAZUS computes the direct repair cost for each component only. There are no losses computed by HAZUS for business interruption due to lifeline outages. Tables 13 & 14 provide a detailed breakdown in the expected lifeline losses.

HAZUS estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 15 presents the results of the region for the given earthquake.

Table 13: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	1,662.39	\$13.18	0.79
	Bridges	251.65	\$16.65	6.61
	Tunnels	0.00	\$0.00	0.00
	Subtotal	1914.00	29.80	
Railways	Segments	0.00	\$0.00	0.00
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	2.46	\$0.80	32.49
	Subtotal	2.50	0.80	
Light Rail	Segments	0.00	\$0.00	0.00
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	0.00	
Bus	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	0.00	
Ferry	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	0.00	
Port	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	0.00	
Airport	Facilities	49.27	\$7.04	14.28
	Runways	316.08	\$1.57	0.50
	Subtotal	365.40	8.60	
	Total	2281.90	39.20	

Table 14: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Distribution Line	366.50	\$0.13	0.04
	Subtotal	366.49	\$0.13	
Waste Water	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Distribution Line	219.90	\$0.11	0.05
	Subtotal	219.89	\$0.11	
Natural Gas	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Distribution Line	146.60	\$0.11	0.08
	Subtotal	146.60	\$0.11	
Oil Systems	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	\$0.00	
Electrical Power	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	\$0.00	
Communication	Facilities	0.20	\$0.04	16.90
	Subtotal	0.23	\$0.04	
	Total	733.21	\$0.39	

Table 15. Indirect Economic Impact with outside aid
 (Employment as # of people and Income in millions of \$)

	LOSS	Total	%
First Year			
	Employment Impact	0	0.00
	Income Impact	0	-0.06
Second Year			
	Employment Impact	0	0.00
	Income Impact	0	-0.18
Third Year			
	Employment Impact	0	0.00
	Income Impact	0	-0.23
Fourth Year			
	Employment Impact	0	0.00
	Income Impact	0	-0.23
Fifth Year			
	Employment Impact	0	0.00
	Income Impact	0	-0.23
Years 6 to 15			
	Employment Impact	0	0.00
	Income Impact	0	-0.23

Appendix A: County Listing for the Region

Harney,OR

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Oregon	Harney	7,609	372	76	448
Total State		7,609	372	76	448
Total Region		7,609	372	76	448



HAZUS-MH: Earthquake Event Report

Region Name: *Harney County*

Earthquake Scenario: *2500yr Probable Scenario M6.5 Driving*

Print Date: *May 30, 2007*

Disclaimer:

The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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General Description of the Region

HAZUS is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Oregon

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 10,205.61 square miles and contains 2 census tracts. There are over 3 thousand households in the region and has a total population of 7,609 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 3 thousand buildings in the region with a total building replacement value (excluding contents) of 448 (millions of dollars). Approximately 99.00 % of the buildings (and 83.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 2,281 and 0 (millions of dollars), respectively.

Building and Lifeline Inventory

Building Inventory

HAZUS estimates that there are 3 thousand buildings in the region which have an aggregate total replacement value of 448 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 72% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

HAZUS breaks critical facilities into two (2) groups: essential facilities and high potential loss (HPL) facilities. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 44 beds. There are 7 schools, 2 fire stations, 2 police stations and 0 emergency operation facilities. With respect to HPL facilities, there are 50 dams identified within the region. Of these, 1 of the dams are classified as 'high hazard'. The inventory also includes 2 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 2 and 3.

The total value of the lifeline inventory is over 2,281.00 (millions of dollars). This inventory includes over 510 kilometers of highways, 111 bridges, 36,649 kilometers of pipes.

Table 2: Transportation System Lifeline Inventory

System	Component	# locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	111	251.70
	Segments	46	1,662.40
	Tunnels	0	0.00
	Subtotal		1,914.00
Railways	Bridges	0	0.00
	Facilities	1	2.50
	Segments	0	0.00
	Tunnels	0	0.00
	Subtotal		2.50
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
	Subtotal		0.00
Bus	Facilities	0	0.00
	Subtotal		0.00
Ferry	Facilities	0	0.00
	Subtotal		0.00
Port	Facilities	0	0.00
	Subtotal		0.00
Airport	Facilities	8	49.30
	Runways	9	316.10
	Subtotal		365.40
		Total	2,281.90

Table 3: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	366.50
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	366.50
Waste Water	Distribution Lines	NA	219.90
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	219.90
Natural Gas	Distribution Lines	NA	146.60
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	146.60
Oil Systems	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	0.00
Electrical Power	Facilities	0	0.00
		Subtotal	0.00
Communication	Facilities	2	0.20
		Subtotal	0.20
		Total	733.20

Earthquake Scenario

HAZUS uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	2500yr Probable Scenario M6.5 Driving
Type of Earthquake	Probabilistic
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	2,500.00
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	6.50
Depth (Km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Building Damage

Building Damage

HAZUS estimates that about 285 buildings will be at least moderately damaged. This is over 9.00 % of the total number of buildings in the region. There are an estimated 1 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS technical manual. Table 4 below summaries the expected damage by general occupancy for the buildings in the region. Table 5 summaries the expected damage by general building type.

Table 4: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	2	0.09	0	0.10	0	0.13	0	0.29	0	0.50
Commercial	9	0.38	2	0.48	2	0.61	0	1.04	0	2.45
Education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Government	2	0.08	1	0.11	0	0.16	0	0.28	0	0.54
Industrial	1	0.03	0	0.03	0	0.05	0	0.08	0	0.14
Other Residential	442	19.26	196	38.18	179	71.56	27	81.01	1	75.61
Religion	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Single Family	1,840	80.16	313	61.11	69	27.48	6	17.30	0	20.76
Total	2,295		512		250		33		2	

Table 5: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	1,840	80.18	312	60.83	67	26.59	5	14.86	0	12.00
Steel	4	0.18	1	0.18	1	0.33	0	0.51	0	0.89
Concrete	3	0.14	1	0.18	1	0.27	0	0.41	0	0.32
Precast	1	0.05	0	0.05	0	0.13	0	0.41	0	0.34
RM	0	0.01	0	0.01	0	0.03	0	0.07	0	0.02
URM	18	0.80	6	1.09	4	1.52	1	3.38	0	11.89
MH	428	18.64	193	37.66	178	71.14	26	80.37	1	74.53
Total	2,295		512		250		33		2	

*Note:

RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 44 hospital beds available for use. On the day of the earthquake, the model estimates that only 30 hospital beds (69.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 93.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

Table 6: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	1	0	0	1
Schools	7	0	0	7
EOCs	0	0	0	0
PoliceStations	2	0	0	2
FireStations	2	0	0	2

Transportation and Utility Lifeline Damage

Table 7 provides damage estimates for the transportation system.

Table 7: Expected Damage to the Transportation Systems

System	Component	Locations/ Segments	Number of Locations_			
			With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	46	0	0	46	46
	Bridges	111	0	0	111	111
	Tunnels	0	0	0	0	0
Railways	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	1	0	0	1	1
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	8	0	0	8	8
	Runways	9	0	0	9	9

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 8-10 provide information on the damage to the utility lifeline systems. Table 8 provides damage to the utility system facilities. Table 9 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, HAZUS performs a simplified system performance analysis. Table 10 provides a summary of the system performance information.

Table 8 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	0	0	0	0	0
Oil Systems	0	0	0	0	0
Electrical Power	0	0	0	0	0
Communication	2	0	0	2	2

Table 9 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	18,325	168	42
Waste Water	10,995	133	33
Natural Gas	7,330	142	35
Oil	0	0	0

Table 10: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	3,036	0	0	0	0	0
Electric Power		0	0	0	0	0

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

HAZUS estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0.00 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 53.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 2 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 7,609 will seek temporary shelter in public shelters.

Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 11 provides a summary of the casualties estimated for this earthquake

Table 11: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	0	0	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	2	0	0	0
	Single Family	1	0	0	0
	Total	3	0	0	0
	2 PM	Commercial	2	0	0
Commuting		0	0	0	0
Educational		1	0	0	0
Hotels		0	0	0	0
Industrial		0	0	0	0
Other-Residential		0	0	0	0
Single Family		0	0	0	0
Total		4	1	0	0
5 PM		Commercial	2	0	0
	Commuting	0	0	0	0
	Educational	0	0	0	0
	Hotels	0	0	0	0
	Industrial	0	0	0	0
	Other-Residential	1	0	0	0
	Single Family	0	0	0	0
	Total	3	0	0	0

Economic Loss

The total economic loss estimated for the earthquake is 32.83 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 9.26 (millions of dollars); 13 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 66 % of the total loss. Table 12 below provides a summary of the losses associated with the building damage.

Table 12: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.09	0.32	0.01	0.03	0.44
	Capital-Related	0.00	0.04	0.26	0.01	0.01	0.31
	Rental	0.09	0.16	0.18	0.00	0.01	0.44
	Relocation	0.01	0.01	0.01	0.00	0.00	0.03
	Subtotal	0.10	0.29	0.77	0.02	0.05	1.23
Capital Stock Losses							
	Structural	0.50	0.44	0.44	0.04	0.18	1.60
	Non_Structural	2.53	1.21	0.75	0.10	0.22	4.82
	Content	0.81	0.22	0.37	0.06	0.12	1.58
	Inventory	0.00	0.00	0.02	0.01	0.01	0.04
	Subtotal	3.84	1.87	1.57	0.22	0.53	8.03
	Total	3.95	2.16	2.34	0.23	0.58	9.26

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, HAZUS computes the direct repair cost for each component only. There are no losses computed by HAZUS for business interruption due to lifeline outages. Tables 13 & 14 provide a detailed breakdown in the expected lifeline losses.

HAZUS estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 15 presents the results of the region for the given earthquake.

Table 13: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	1,662.39	\$10.84	0.65
	Bridges	251.65	\$3.49	1.39
	Tunnels	0.00	\$0.00	0.00
	Subtotal	1914.00	14.30	
Railways	Segments	0.00	\$0.00	0.00
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	2.46	\$0.31	12.75
	Subtotal	2.50	0.30	
Light Rail	Segments	0.00	\$0.00	0.00
	Bridges	0.00	\$0.00	0.00
	Tunnels	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	0.00	
Bus	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	0.00	
Ferry	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	0.00	
Port	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	0.00	
Airport	Facilities	49.27	\$6.91	14.03
	Runways	316.08	\$0.02	0.01
	Subtotal	365.40	6.90	
	Total	2281.90	21.60	

Table 14: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Distribution Line	366.50	\$0.75	0.21
	Subtotal	366.49	\$0.75	
Waste Water	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Distribution Line	219.90	\$0.60	0.27
	Subtotal	219.89	\$0.60	
Natural Gas	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Distribution Line	146.60	\$0.64	0.44
	Subtotal	146.60	\$0.64	
Oil Systems	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	\$0.00	
Electrical Power	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	\$0.00	
Communication	Facilities	0.20	\$0.01	4.65
	Subtotal	0.23	\$0.01	
	Total	733.21	\$2.00	

Table 15. Indirect Economic Impact with outside aid
 (Employment as # of people and Income in millions of \$)

	LOSS	Total	%
First Year			
	Employment Impact	0	0.00
	Income Impact	0	-0.34
Second Year			
	Employment Impact	0	0.00
	Income Impact	0	-1.02
Third Year			
	Employment Impact	0	0.00
	Income Impact	0	-1.31
Fourth Year			
	Employment Impact	0	0.00
	Income Impact	0	-1.31
Fifth Year			
	Employment Impact	0	0.00
	Income Impact	0	-1.31
Years 6 to 15			
	Employment Impact	0	0.00
	Income Impact	0	-1.31

Appendix A: County Listing for the Region

Harney,OR

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Oregon	Harney	7,609	372	76	448
Total State		7,609	372	76	448
Total Region		7,609	372	76	448

Flood Hazard Annex

This annex covers the flood hazard and includes detailed information on the hazard that is specific to the County. The annex includes some actual documents when digital copies were available. Annex materials include supplemental information for Section 3 hazard vulnerabilities, and potential losses when local data is available.

Hazard Resources

This section documents the existing resources that were used to develop the risk assessment for this hazard. They include:

- *State Natural Hazard Risk Assessment: Flood.* The state risk assessment for flood provides a useful overview of flood in Oregon and documents statewide historic events. This assessment also outlines several state-scale action items that are relevant to flood mitigation in Harney County. The State Natural Hazard Risk Assessment is available online at: <http://www.oregonshowcase.org/index.cfm?mode=stateplan&page=part3>
- *Flood Summary: Lake, Harney, and Malheur Counties.* This summary is a supplement to the Region 8 Profile and Hazard Assessment found in the State of Oregon Natural Hazards Mitigation Plan. The summary was completed by DOGAMI in 2007 and is attached to this annex.
- *National Flood Insurance Program Flood Loss Data.* The NFIP flood loss data provides an overview of single loss properties and repetitive loss properties since the NFIPs inception and is included in this annex.
- *Maps.* FEMA floodplain FIRM maps are available in hard copy form only at the Harney County Planning Department.

FLOOD SUMMARY: Lake, Malheur, and Harney Counties, Oregon

Overview

Although flooding occurs throughout Oregon, the climate, local geology and the relatively low population of the region lessen its effects. Southeast Oregon contains a variable landscape that greatly influences flood conditions. The region is subject to a variety of flood conditions, including:

- 1) spring run-off from rain and melting snow
- 2) warming and rain during the winter months (rain-on-snow)
- 3) ice-jam flooding
- 4) local flash flooding
- 5) closed basin playa flooding

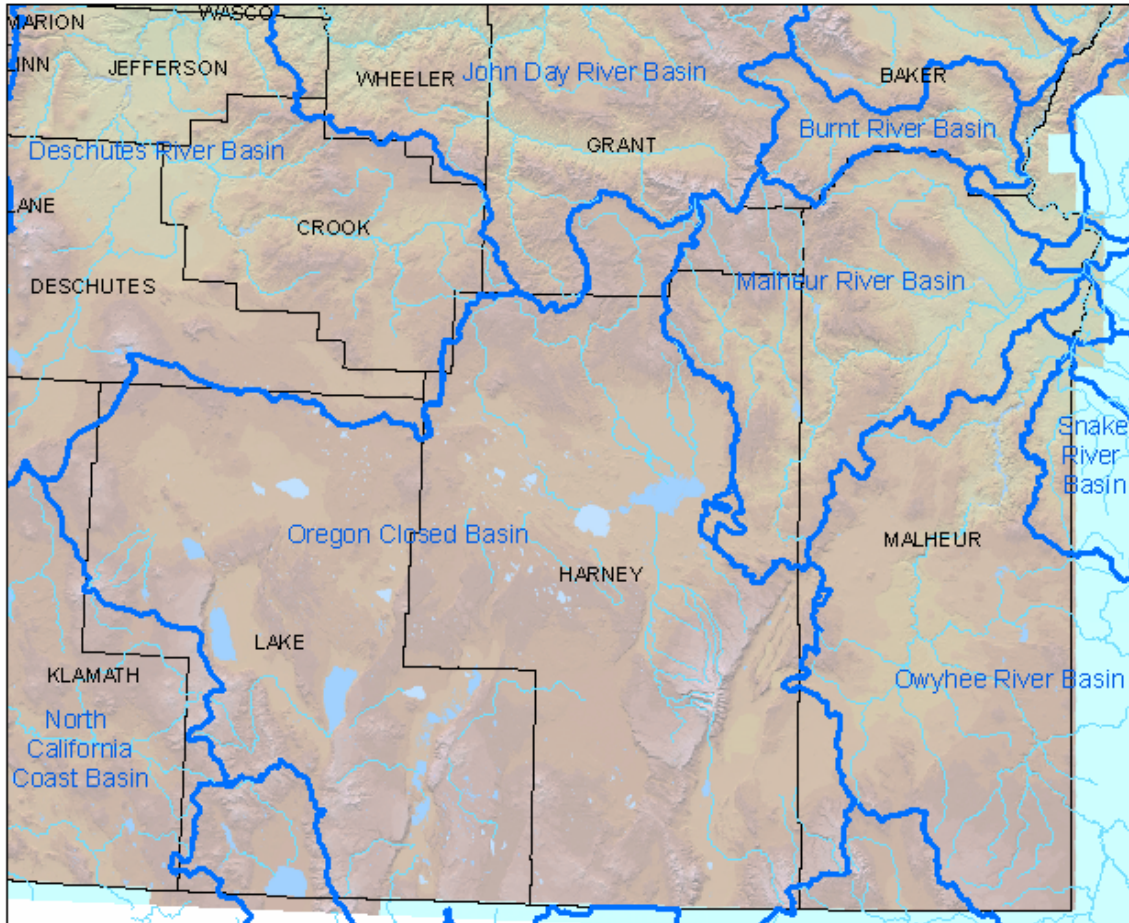
Flooding throughout the region is most commonly linked to the spring cycle of melting snow. However, rain-on-snow floods, common in western Oregon, also occur east of the Cascades. The weather pattern that produces these floods occurs during the winter months and has come to be associated with La Nina 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 (4,000-5,000 feet). Some of Oregon's most devastating floods are associated with these events.

Ice jams on the Snake and Malheur rivers have created flood conditions in the past and will continue to do so. Ice jams commonly happen during the winter and early spring, while the river is still frozen. Sudden warming at higher altitudes can melt waters resulting in increased runoff and floating of large reaches of frozen river below. On the way downstream, the ice can "jam" in a narrow reach of the drainage or against a road crossing, causing a dam affect of the melting water and then subsequent breach and release of the water.

Summer thunderstorms are common throughout the region. During these events, normally dry gulches can quickly become raging torrents, a flash flood. Some of the principal flood sources and significant flood events in the region are listed in the tables below. Although flash flooding occurs throughout Oregon, local geology in the region can increase this hazard. Bedrock, composed mostly of igneous rocks, are exposed at the surface throughout much of the region. Consequently, runoff is increased significantly.

Many parts of Lake, Harney, and Malheur Counties are characterized by interior drainage or closed basins as shown in the map below. Some of the basins (playas) contain lakes that grow and diminish with the seasons and from year to year. Harney and Malheur lakes are good examples. At times, they are almost dry, but this condition changes. These large lakes also have a long history of flooding. Most of the lake water originates from high mountain snow pack above the basin. Flooding follows winters with deep snow

accumulation. Such was the case in 1982 and subsequent years, when high lake levels have caused economic damage within the region (especially in Harney County).



Map of major drainage basins, lakes, streams, and rivers in the region (Oregon Bureau of Land Management - BLM, Portland, Oregon).

With some exceptions, Malheur County is physically different. This area contains the Owyhee uplands and the Snake River plains, whose streams flow into the Snake River, a tributary of the Columbia. Several reaches of the Snake River have flood control structures. Consequently, it is less of a problem than other rivers in the region.

PRINCIPAL FLOOD SOURCES

HARNEY COUNTY	MALHEUR COUNTY	LAKE COUNTY
Silvies River	Snake River	Chewaucan River
Silver Creek	Malheur River	N. Goose Lake Basin
Silver Lake	Bully Cr	
Cow Creek	Willow Cr	
Donner u. Blitzen River	Jordan Cr	
McCoy Creek	Indian Cr	

Trout Creek	Clover Cr	
Whitehorse Creek	Owyhee River	
Harney Lake	Cottonwood Cr	
Malheur Lake		

Sources: FEMA, Malheur County Flood Insurance Study (FIS), 09/29/86; FEMA, Harney County FIS, 12/22/98; ; FEMA, Lake County FIS, 12/05/89

SIGNIFICANT FLOOD EVENTS

DATE	LOCATION	DESCRIPTION	REMARKS
1897	Harney County	Severe flooding on Silvies River	Flood of record on the Silvies River (300-year flood)
1904	Harney and Malheur counties	Severe flooding on Silvies and Malheur Rivers	
1910	Malheur County	Severe Malheur River flooding	Flood of record on the Malheur River
1921	Harney County	Severe flooding on Silvies River	
1943	Harney County	Severe flooding on Silvies River	
1952	Harney and Malheur counties	Severe flooding on Jordan Creek, the Silvies and Malheur rivers	
Feb., 1957	Harney and Malheur counties	Severe flooding on Jordan Creek, the Silvies and Malheur rivers	Warm rain on snow / frozen ground
Dec., 1964	Entire state	Severe flooding throughout region	Warm rain on snow / frozen ground
1982	Harney County	Severe flooding from Harney and Malheur lakes	Long history. Not the first lake floods. Also, others followed.
Dec., 1985	Malheur County	Ice jam flooding	40 miles of ice on Snake River between Farewell Bend and Ontario. At least 35 people evacuated
June, 1989	Malheur County	Flash flood . Crops damaged. High winds	Vicinity of Nyssa
Mar., 1993	Malheur and Harney counties	Widespread flooding in rural areas. Highways closed.	Warm rain on heavy snow pack. Flood of Record on Owyhee River

May, 1998	Malheur and Harney counties	Widespread flooding. Mudslides in Malheur County	Persistent rain on mountain snow pack
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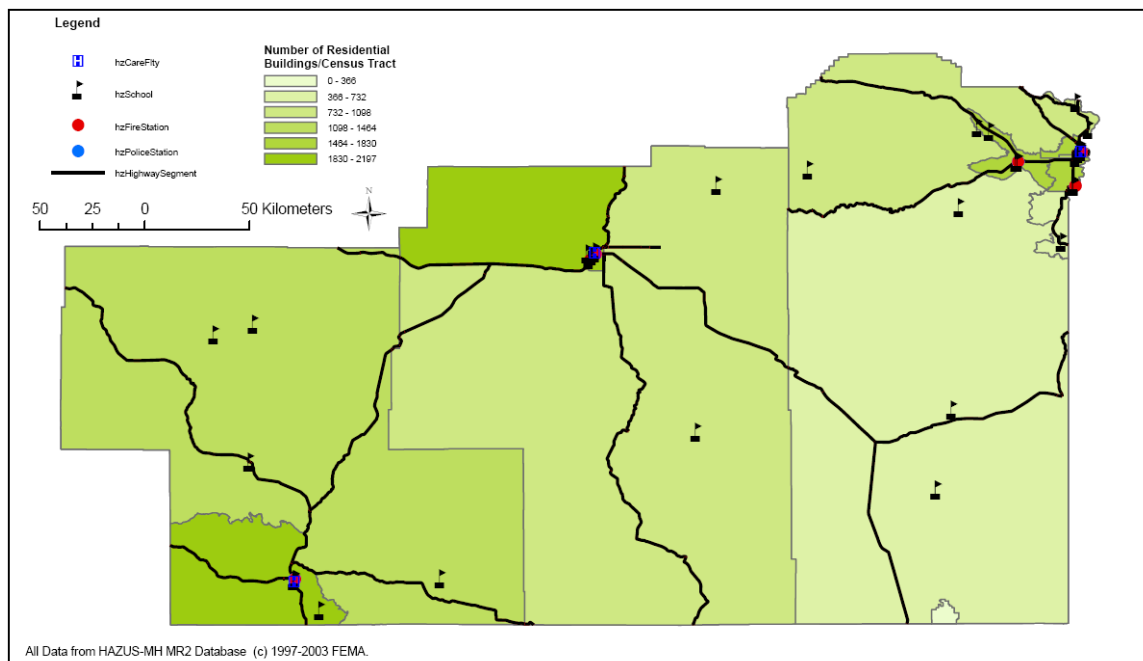
Sources: FEMA, Malheur County Flood Insurance Study (FIS), 09/29/86; Harney County FIS, 12/22/98; Taylor and Hatton. (1999). The Oregon Weather Book, p. 96-103

Hazard

The hazard is primarily located with the 100 year and 500 year flood zones on the FEMA flood insurance rate maps. The probability of the hazard occurring within these zones is 1 in 100 years and 1 in 500 years. Base flood elevations have also been determined for the 100 year flood zone. The extent of the hazard can be viewed spatially on the flood hazard maps (FIRM).

Exposure

The region is exposed to flooding. Most of the people and infrastructure are located in one of the major cities in the region which are located along an interstate (I-84) and/or the regional highways (HWY 20 and HWY 395).



Map of the generalized vulnerability of the region (Burns, et al, 2007. Unpublished Report. Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage and Loss Estimates for three Counties in the southeastern Region Including Lake, Malheur, and Harney, DOGAMI Open File Report).

The geographical size of the region is 28,456 square miles and contains 13 census tracts. There are over 16 thousand households in the region and it has a total population of 46,646 people (2000 Census Bureau data). There are an estimated 16 thousand buildings

in the region with a total building replacement value (excluding contents) of 2,352 (millions of dollars). Approximately 99.00 % of the buildings (and 84.00% of the building value) are associated with residential housing. The replacement value of the transportation and utility lifeline systems is estimated to be 9,248 and 264 (millions of dollars), respectively.

Risk

Many parts of Oregon, including this region are susceptible to flooding, particularly in the portions along streams and rivers. Flooding poses significant threats to people and infrastructure. The level of risk from flooding can be determined through the comparison of the overlap of hazard and exposure. The risk to the hazard can be examined through the spatial relationship of the infrastructure within the 100 yr and 500 yr flood zones.

Summary

Most of the people and infrastructure are located in one of the major cities in the region which are located along an interstate (I-84) and/or the regional highways (HWY 20 and HWY 395). The regions total exposure for buildings and transportation systems alone is roughly 11.5 billion dollars. The level of risk from flooding can be determined through the comparison of the overlap of hazard and exposure.

Action should be taken to reduce the damage and losses through predisaster mitigation and prepare for effective emergency response after the disaster. Special action should be taken for critical facilities including schools and emergency facilities and infrastructure such as roadways.

NFIP Flood Loss Data Eastern Oregon

Community	ID	Repetitive		Single Losses		Policies in Force (as of 4/200)	
		Count	\$	Count	\$	Count	Value
Malheur County							
Malheur, unincorp.	410149	0	0	15	\$30,229.00	93	\$10,824,900.00
Jorden Valley	410150	0	0	0	0	15	\$1,413,800.00
Nyssa	410151	0	0	0	0	1	106,400.00
Ontario	410152	0	0	2	\$39,762.00	42	\$3,936,100.00
Vale	410153	0	0	7	\$13,036.00	6	\$1,057,500.00
Adrian	410285	0	0	0	\$0.00	4	\$631,000.00
Harney County							
Burnes Paiute Res	410281	0	0	0	\$0.00	12	\$738,200.00
Harney, unincorp	410083	2	\$36,280.68	42	\$713,015.00	75	\$7,303,700.00
Burns	410084	0	0	10	\$92,822.00	200	\$14,465,300.00
Hines	410085	0	0	0	\$0.00	16	\$2,572,300.00
Lake County							
Lake County	410115	3	\$21,024.70	5	\$128,554.00	45	\$5,178,900.00
Lakeview	410116	0	0	4	\$14,411.00	6	\$546,200.00
Paisley	410117	0	0	1	\$392.00	1	\$280,000.00
Jefferson County							
Culver City	410290	0	0	0	\$0.00	36	\$3,886,500.00
Jefferson County, unincorp	410101	0	0	3	\$10,148.00	51	\$14,259,700.00
Madras	410103	0	0	3	\$2,493.00	81	\$12,493,400.00
Warm Springs Res	410291	0	0	0	\$0.00	0	\$0.00
Wasco County							
The Dalles	410237	0	0	3	\$35,847.00	23	\$4,953,400.00
Hood River							
Cascade Locks	410087	0	0	1	\$3,476.00	2	\$560,000.00
Baker County							
Baker City	410002	0	0	2	\$25,491.00	136	\$15,521,200.00
Baker County, uninc	410001	0	0	0	\$0.00	37	\$4,813,300.00

Green Horn	410265	0	0	0	\$0.00	0	\$0.00
Haines	410003	0	0	0	\$0.00	2	\$280,000.00
Halfway	410004	0	0	0	\$0.00	0	\$0.00
Grant County							
Canyon City	410075	0	0	0	\$0.00	5	\$506,700.00
Dayville	410076	0	0	0	\$0.00	0	\$0.00
Granite	410264	0	0	0	\$0.00	0	\$0.00
Grant County	410074	0	0	0	\$0.00	23	\$1,797,200.00
John Day	410077	2	\$16,643.56	6	\$47,684.00	49	\$5,038,100.00
Long Creek	410078	0	0	0	\$0.00	2	\$26,000.00
Monument	410079	0	0	0	\$0.00	0	\$0.00
Union County							
Cove	410217	0	0	0	\$0.00	0	\$0.00
Elgin	410218	0	0	0	\$0.00	9	\$690,300.00
Island City	410220	0	0	0		10	\$1,677,400.00
La Grande	410260	0	0	4	\$38,334.00	66	\$10,866,200.00
North Powder	410221	0	0	0	\$0.00	0	\$0.00
Summerville	410222	0	0	0	\$0.00	1	\$140,000.00
Union County	410216	2	\$7,276.36	2	\$7,276.00	40	\$6,577,000.00
Wallowa County							
Enterprise	410225	0	0	0	\$0.00	62	\$7,196,400.00
Joesph	410226	0	0	0	\$0.00	3	\$683,700.00
Lostine	410227	0	0	0	\$0.00	2	\$480,000.00
Wallowa County	410224	0	0	2	\$15,788.00	26	\$3,829,200.00
Wallowa City	410228	0	0	0	\$0.00	3	\$768,900.00

Landslide Hazard Annex

This annex covers the landslide hazard and includes detailed information on the hazard that is specific to the County. The annex includes some actual documents when digital copies were available. Annex materials include supplemental information for Section 3 hazard vulnerabilities, and potential losses when local data is available.

Hazard Resources

This section documents the existing resources that were used to develop the risk assessment for this hazard. They include:

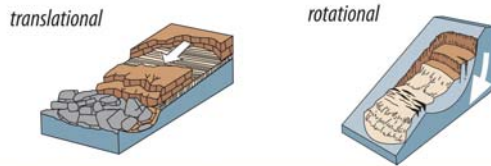
- *State Natural Hazard Risk Assessment: Landslide.* The state risk assessment for landslide provides a useful overview of landslide in Oregon and documents statewide historic events. The State Natural Hazard Risk Assessment is available online at:
<http://www.oregonshowcase.org/index.cfm?mode=stateplan&page=part3>
- *Landslide Summary: Lake, Harney, and Malheur Counties.* This summary is a supplement to the Region 8 Profile and Hazard Assessment found in the State of Oregon Natural Hazards Mitigation Plan. The summary was completed by DOGAMI in 2007 and is included in this annex.

LANDSLIDE SUMMARY: Lake, Harney, and Malheur Counties, Oregon

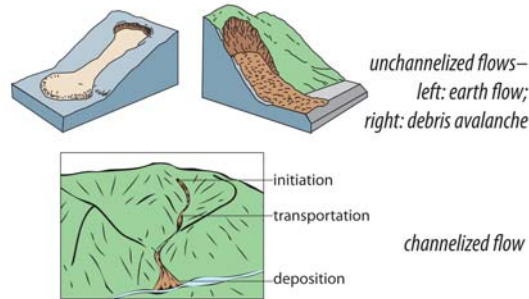
Overview

The general term *landslide* refers to a range of geologic failures including slides, flows, falls, topples, and spreads. Most slope failures in the region are complex combinations of these distinct types, but the generalized groupings provide a useful means for framing discussion of slide characteristics, identification methods, and potential mitigation alternatives. These basic types are combined with the type of geologic material to form the common landslide names such as debris flow and rock fall.

SLIDES — downslope movement of soil or rock on a surface of rupture (failure plane or shear-zone). Commonly occurs along an existing plane of weakness or between upper, relatively weak and lower, stronger soil and/or rock. The main modes of slides are translational and rotational.



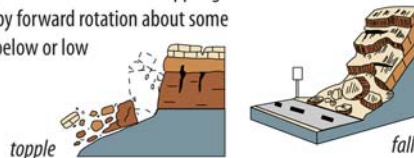
FLOWS — mixtures of high concentrations of water and soil, rock, and/or debris that have become a liquefied slurry and commonly move rapidly down slope. The main modes of flows are unchanneled and channelized. Avalanches and lahars are flows.



SPREADS — extension and subsidence of commonly cohesive materials overlying liquefied layers.



TOPPLES / FALLS — near vertical, rapid movements of masses of materials, such as rocks or boulders. Toppling failures are distinguished by forward rotation about some pivotal point, below or low in the mass.



Schematic diagrams of the five common landslide types (Oregon Department of Geology and Mineral Industries, Landslide Fact Sheet, 2006).

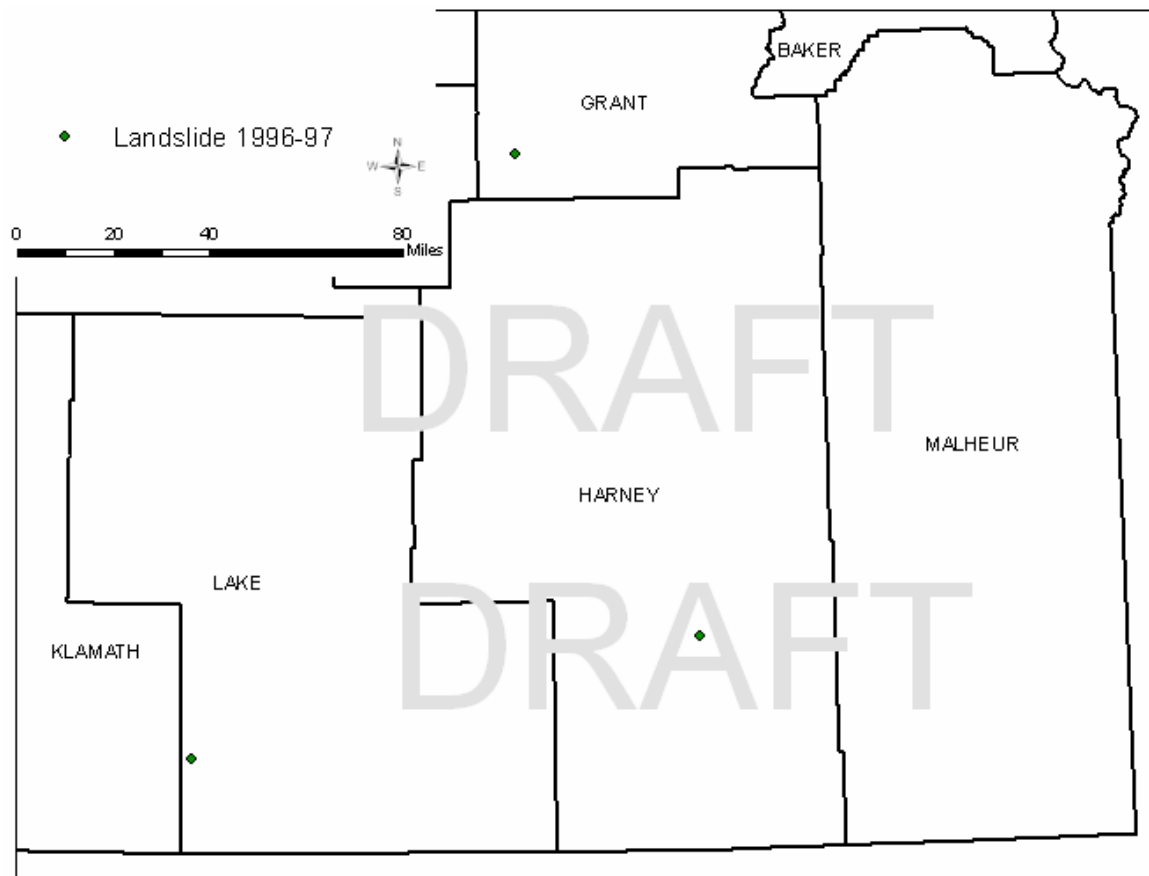
Prior to a landslide, the slope may be affected by several factors that reduce the stability without causing failure. Some of the most common factors include:

- Relatively weak materials (e.g. loose silt)
- Steep slopes
- Degree of weathering and/or fracturing
- Existing landslides
- Removal of vegetation (e.g. fire or timber harvest)
- Existing moisture content (e.g. from months of rainfall)
- Existing planes of weakness (e.g. paleosols or bedding planes)

Once the slope reaches a critical state of stability, it usually can be easily triggered into a landslide. Some common triggering factors include:

- Intense rainfall
- Rapid snowmelt
- Freeze thaw
- Human-induced:
 - Grading/removing material from bottom/toe of slope
 - Adding fill/loads to the top/crest of the slope
 - Concentration of water onto a slope (agriculture/landscape irrigation roof downspouts, broken water/sewer lines)
- Earthquakes
- Volcanic eruptions

Most of Oregon's landslide damage has been associated with severe winter storms where landslide losses can exceed \$100 million in direct damage such as the February 1996 event. Landslides in Oregon were particularly noteworthy in 1964, 1982, 1966, 1996, 1997, and 2006. Annual average maintenance and repair costs for landslides in Oregon are over \$10 million (Wang et al. 2002). During 1996 and 1997, heavier than normal rains caused thousands of landslides throughout Oregon of which roughly 9,500 were identified and added to a database. Some of these slides were the reactivation of ancient and historically active landslides and some were new failures.

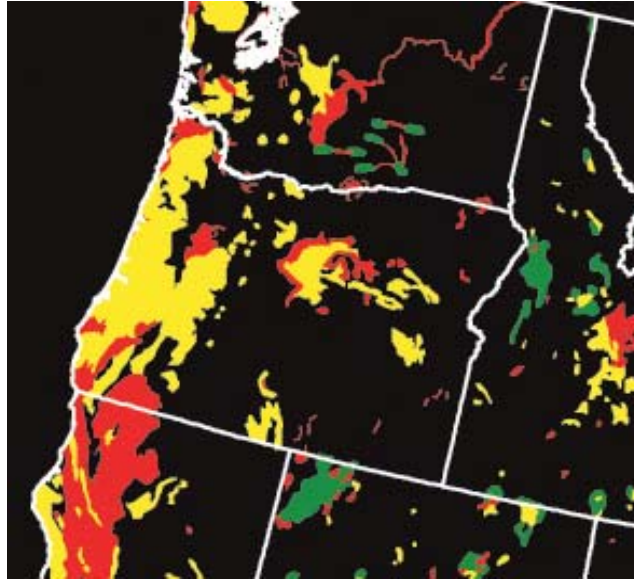


Map of landslides impact points inventoried from three storm events during 1996-1997. (Hofmeister, R.J., 2000, Slope failures in Oregon: GIS inventory for three 1996/97 storm events: Oregon Department of Geology and Mineral Industries Special Paper 34, 20 p., 1 compact disc).

Some landslides can move at rapid rates and thus pose life threats. These are commonly channelized debris flows, debris avalanches, and rock falls. These types of rapidly moving landslides are common in areas with steep slopes.

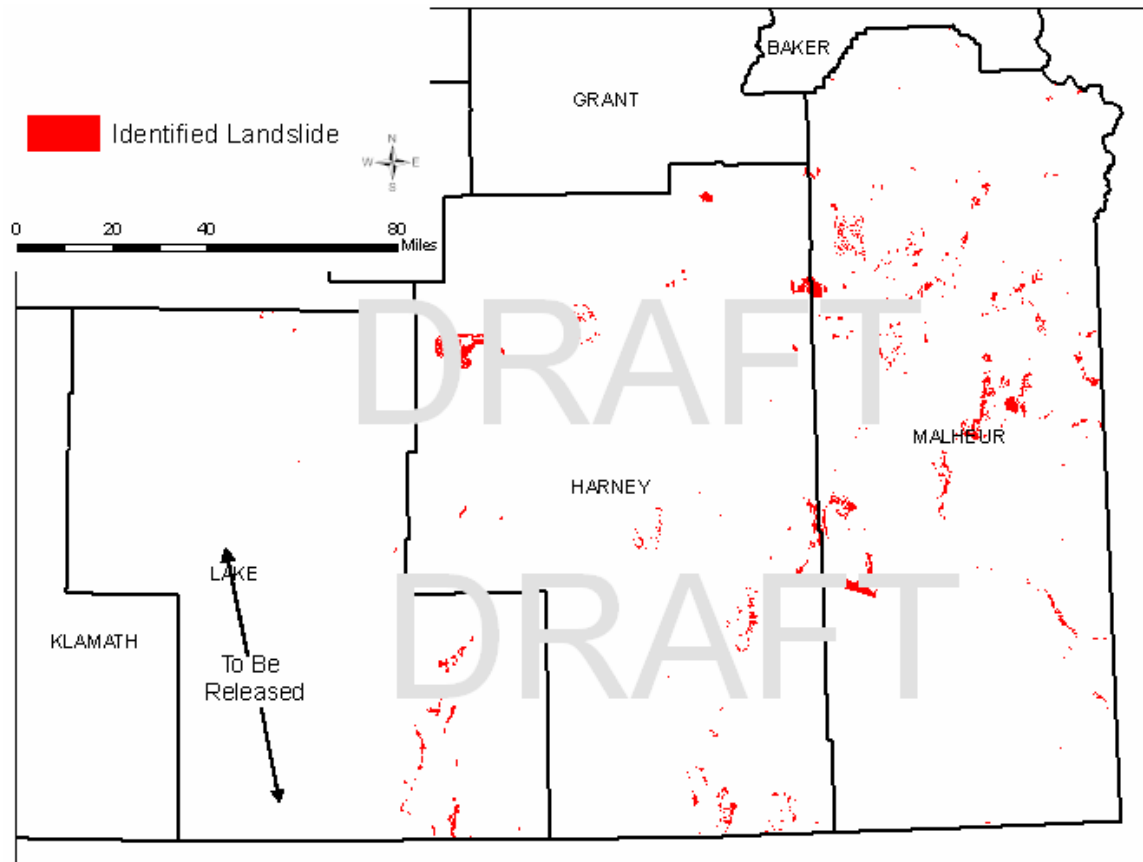
Hazard

Since the region has experienced landslides throughout geologic time and in historic time, it is likely the landslides will continue to occur in the future. The USGS National Landslide Hazard Map shows most of the region in a low to moderate landslide potential zone with some isolated areas in the moderate and high potential categories.



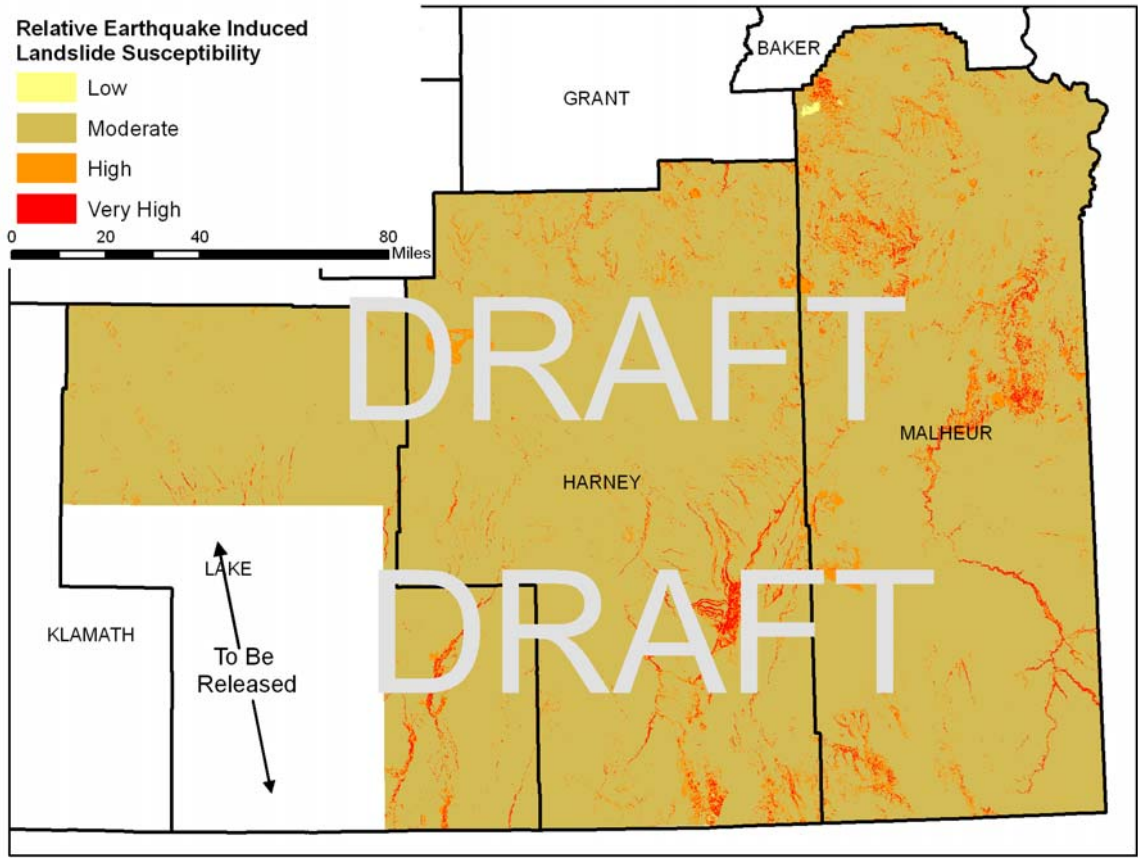
*USGS national landslide hazard map of landslide potential (U.S. Geological Survey Fact Sheet 2005-3156, *Landslide Hazards—A National Threat*). Red areas have very high potential, yellow areas have high potential, and green areas have moderate potential. Landslides can and do occur in the black areas, but the potential is low.*

The probability of an area to have a landslide is increased depending on the factors that reduce the stability without causing failure (previously discussed). When several of these factors are combined, such as an area with steep slopes, weak geologic material, and previous landslide movement, the probability of future landsliding is increased. In order to reduce the risk of impact from future landslides, identification of the areas with these factors that reduce the stability of slopes is a crucial step. One of these factors, existing identified landslides, is displayed spatially on the map below.



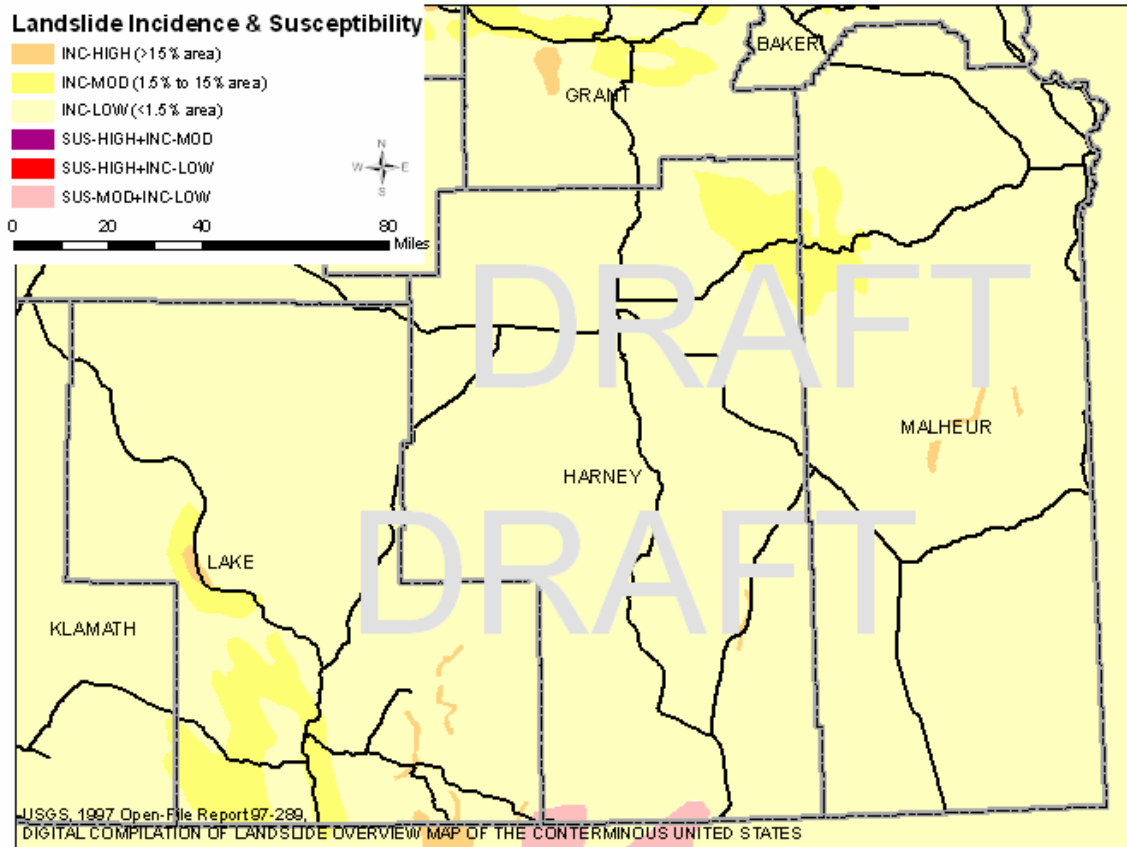
Compilation map of identified landslides from previous geologic and hazard maps in the region. (Burns, 2007. Unpublished Report. Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage and Loss Estimates for three Counties in southeast Oregon Including Lake, Harney, and Malheur, DOGAMI Open File Report).

A way to view the general landslide susceptibility is by combining the slope with the relative strength of the underlying geologic material. This was done in the map below for earthquake induced landslide susceptibility, which also displays the general landslide susceptibility of the region.



Map of the relative earthquake induced landslide susceptibility hazard. (Burns, 2007. Unpublished Report. Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage and Loss Estimates for three Counties in southeast Oregon Including Lake, Harney, and Malheur, DOGAMI Open File Report).

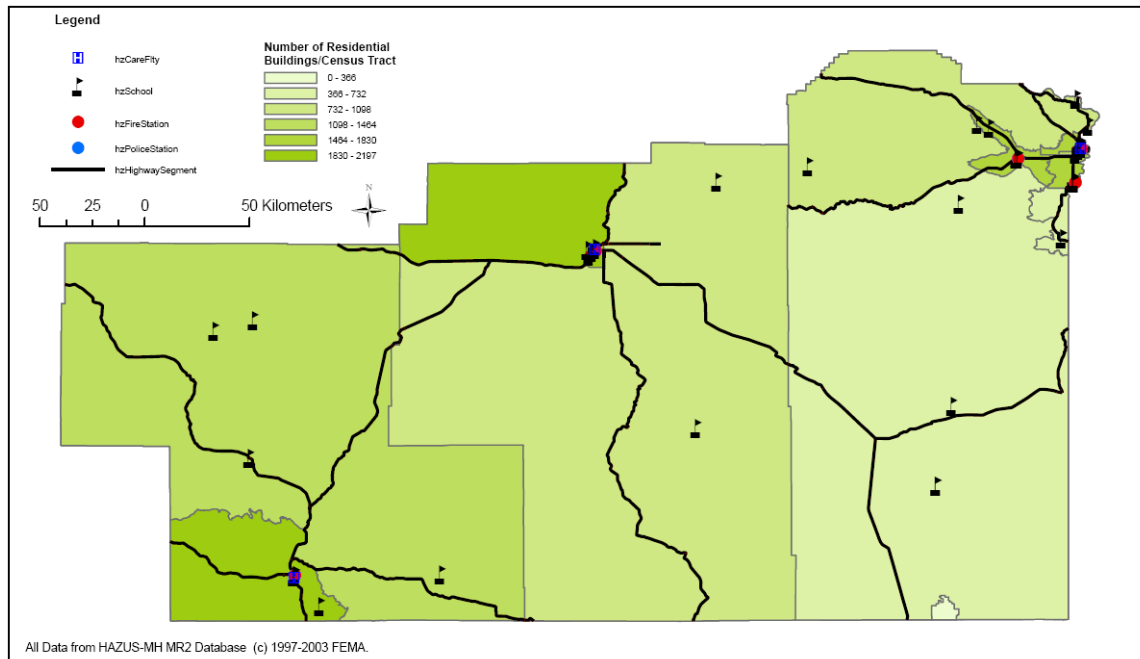
In 1982, the USGS created a landslide overview map of the conterminous United States, shown below. The map displays areas of landslide incidence and susceptibility. Three incidence categories according to the percentage of the area involved in landslide processes were defined. Susceptibility to landsliding was defined as the probable degree of response of formations to natural or artificial cutting, loading of slopes, or to anomalously high precipitation. The susceptibility categories are delimited by the same percentages given for classifying the incidence. Susceptibility is not indicated where the same as or lower than incidence. The effect on slope stability caused by earthquakes was not included in this evaluation.



U.S. GEOLOGICAL SURVEY, DIGITAL COMPILATION OF “LANDSLIDE OVERVIEW MAP OF THE CONTERMINOUS UNITED STATES” By Dorothy H. Radbruch-Hall, Roger B. Colton, William E. Davies, Ivo Lucchitta, Betty A. Skipp, and David J. Varnes, 1982 by Jonathan W. Godt. 1997. Open-File Report 97-289

Exposure

The region is exposed to landslide hazards. Most of the people and infrastructure are located in one of the major cities in the region which are located along an interstate (I-84) and/or the regional highways (HWY 20 and HWY 395).



Map of the generalized vulnerability of the region (Burns, et al, 2007. Unpublished Report. Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage and Loss Estimates for three Counties in the southeastern Region Including Lake, Malheur, and Harney, DOGAMI Open File Report).

The geographical size of the region is 28,456 square miles and contains 13 census tracts. There are over 16 thousand households in the region and it has a total population of 46,646 people (2000 Census Bureau data). There are an estimated 16 thousand buildings in the region with a total building replacement value (excluding contents) of 2,352 (millions of dollars). Approximately 99.00 % of the buildings (and 84.00% of the building value) are associated with residential housing. The replacement value of the transportation and utility lifeline systems is estimated to be 9,248 and 264 (millions of dollars), respectively.

Risk

Many parts of Oregon, including this region are susceptible to landslides, particularly in the portions with moderate to steep slopes and a wetter climate or potential for flash flooding. Landslides pose significant threats to people and infrastructure. Landslides have caused damage and loss in the region and it is very likely that they will again. As population growth continues to expand and development into steeper terrain occurs, greater losses from landslides are likely to result. The level of risk from landslides can be determined through the comparison of the overlap of hazard and exposure.

Summary

The generalized landslide hazard for the region is low to moderate, however there are areas within the region that have very high hazard. Most of the people and infrastructure

are located in one of the major cities in the region which are located along an interstate (I-84) and/or the regional highways (HWY 20 and HWY 395). The regions total exposure for buildings and transportation systems alone is roughly 11.5 billion dollars. The level of risk from landslides can be determined through the comparison of the overlap of hazard and exposure.

Preliminary analyses indicate a high likelihood of damage and losses from future landslides in the region. Action should be taken to reduce the damage and losses through predisaster mitigation and prepare for effective emergency response after the disaster. Special action should be taken for critical facilities including schools and emergency facilities and infrastructure such as roadways.

Volcano Hazard Annex

This annex covers the volcano hazard and includes detailed information on the hazard that is specific to the County. The annex includes some actual documents when digital copies were available. Annex materials include supplemental information for Section 3 hazard vulnerabilities, and potential losses when local data is available.

Hazard Resources

This section documents the existing resources that were used to develop the risk assessment for this hazard. They include:

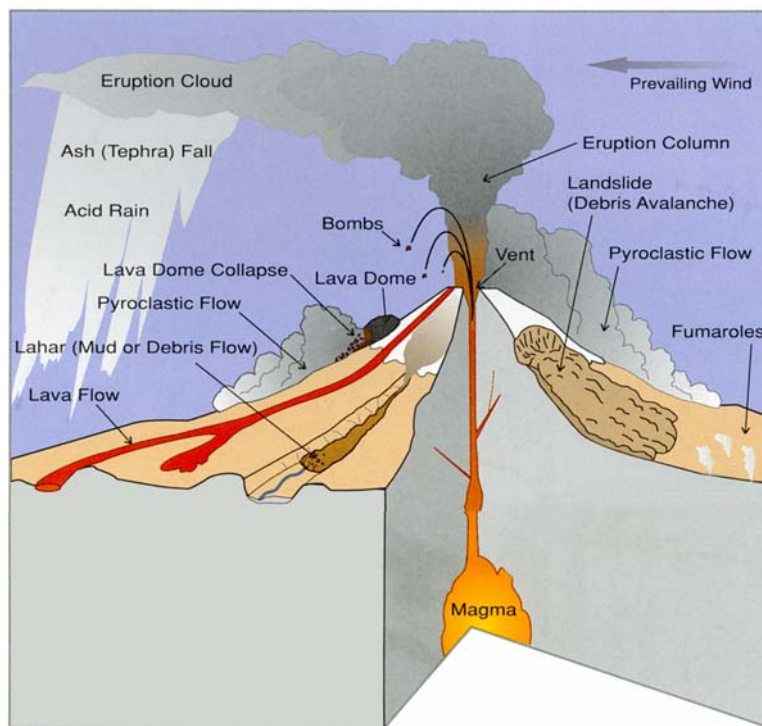
- *State Natural Hazard Risk Assessment: Volcano.* The state risk assessment for volcano provides a useful overview of volcano in Oregon and documents statewide historic events. The State Natural Hazard Risk Assessment is available online at:
<http://www.oregonshowcase.org/index.cfm?mode=stateplan&page=part3>
- *Volcano Summary: Lake, Harney, and Malheur Counties.* This summary is a supplement to the Region 8 Profile and Hazard Assessment found in the State of Oregon Natural Hazards Mitigation Plan. The summary was completed by DOGAMI in 2007 and is included in this annex.

VOLCANO HAZARDS SUMMARY: Lake, Harney and Malheur Counties, Oregon

Overview

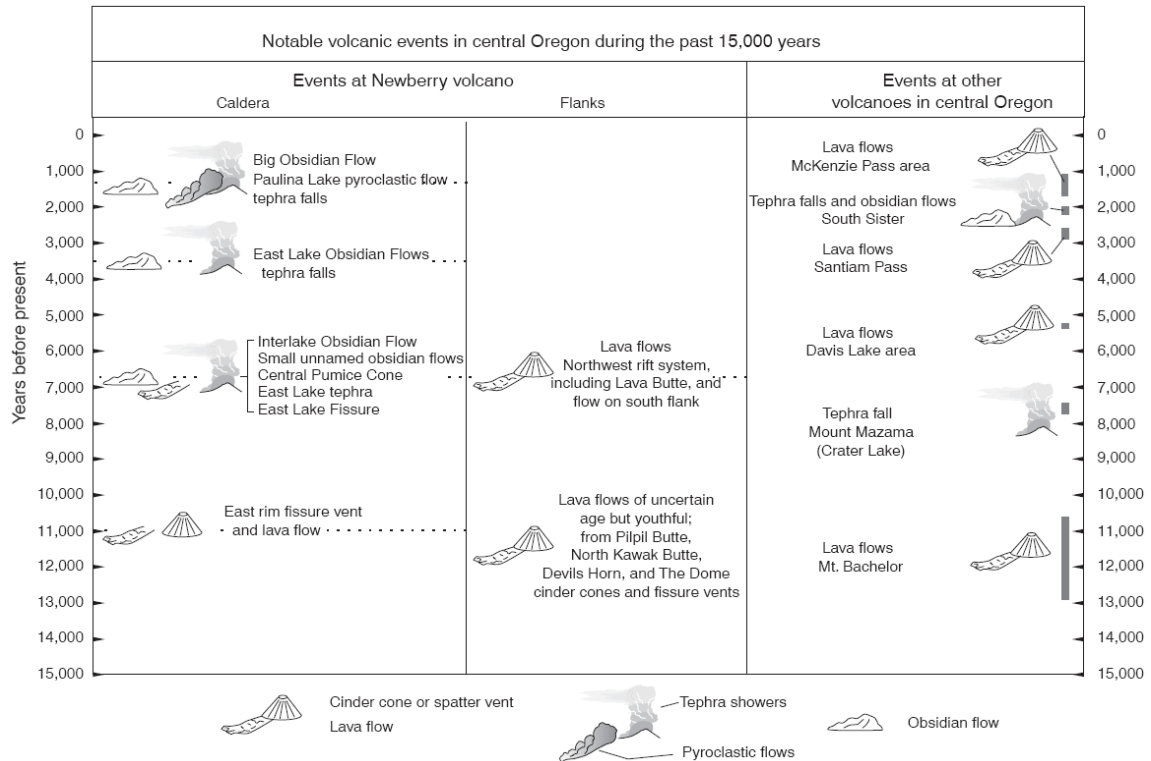
The western boundary of the region coincides with the Cascade Range, which are mountains derived from volcanic activity. Within this range of mountains are several active and potentially active volcanoes. Mount Saint Helens is an active volcano in this chain, which erupted violently in 1980 and began erupting steam and ash again during fall 2004 and spring 2005. Newberry Volcano, the Three Sisters region which includes Mt. Bachelor and Broken Top, and Crater Lake, also called Mt. Mazama, are all potentially active volcanoes in Oregon that are relatively close to the region.

Volcanic activity can produce many types of hazardous events including landslides, fallout of tephra (volcanic ash), lahars, pyroclastic flows, and lava flows (Scott and others, 1999). Pyroclastic flows are fluid mixtures of hot rock fragments, ash, and gases that can move down the flanks of volcanoes at speeds of 50 to more than 150 kilometers per hour (30 to 90 miles per hour)(Scott and others, 1999). Lahars or volcanic debris flows are water-saturated mixtures of soil and rock fragments and can travel very long distances (over 100 km) and travel as fast as 80 kilometers per hour (50 miles per hour) in steep channels close to a volcano (Scott and others, 1999). These hazards can affect very small local zones (only meters across) to areas hundreds of kilometers downwind (Walder and others, 1999).



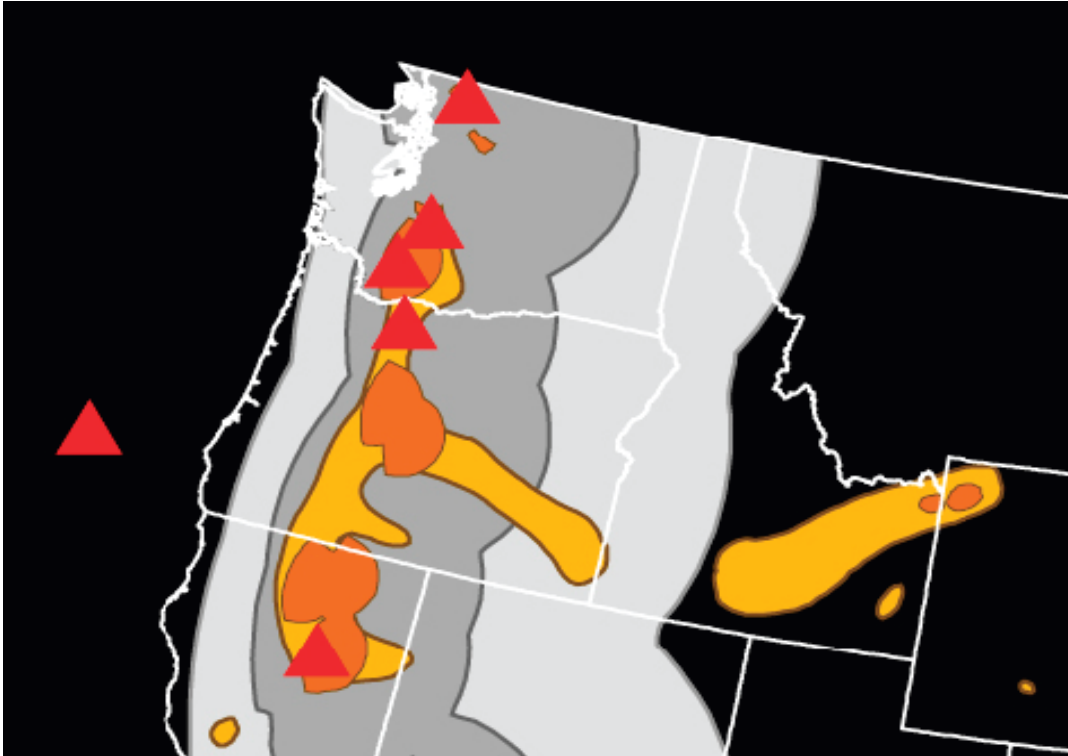
Volcanic hazard from a composite type volcano (Scott and others, 1999 and Walder and others, 1999).

Volcanoes in the Cascade Range have been erupting for hundreds of thousands of years. Newberry Volcano, for example, has had many events in the last 15,000 years as shown in the table below. The Three Sisters region has also had some activity during this time while the last major eruptive activity at Mt. Mazama happened about 7,700 years ago, forming Crater Lake in its wake. Some of the most recent events include Big Obsidian Flow at Newberry Volcano. 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.



Notable events at Newberry volcano and in central Oregon during the past 15,000 years (Sherrod and others, 1997)

Communities which are closer to the volcanoes may be at risk to the proximal hazards, as well as the distal hazards, such as lahars, lava flows and ash fall. The communities which are farther away, such as Burns and Ontario, are only at risk from the distal hazards, mainly, ash fall. The image below shows the locations of some of the Cascade volcanoes (red triangles) with relative volcanic hazard zones.



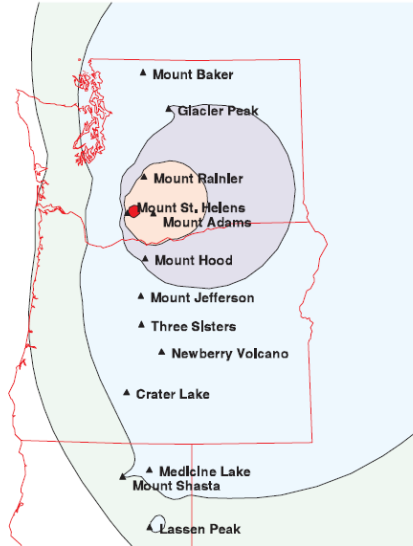
National Volcanic Hazard Map. Dark orange areas have a higher volcanic hazard; light-orange areas have a lower volcanic hazard. Dark-grey areas have a higher ash fall hazard; light-grey areas have a lower ash fall hazard. (Image modified from USGS Fact Sheet 2006-3014)(map not to scale).

Geologic hazard maps have been created for most of the volcanoes in the Cascade Range by the USGS Volcano Program at the Cascade Volcano Observatory in Vancouver, WA and are available at http://vulcan.wr.usgs.gov/Publications/hazards_reports.html.

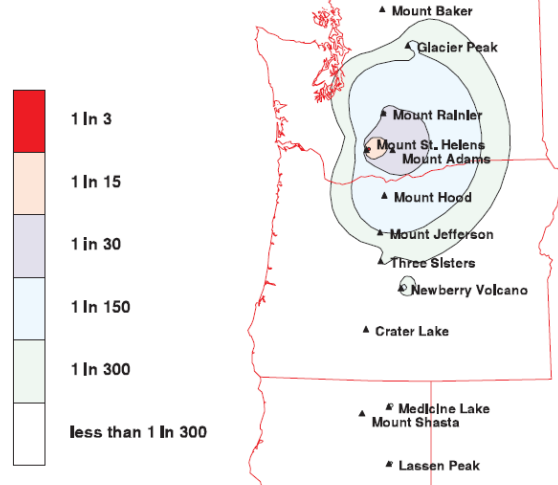
Hazard

Mt. St. Helens remains a probable source of air borne tephra as shown in the map below. It has repeatedly produced voluminous amounts of this material and has erupted much more frequently in recent geologic time than any other Cascade volcano. It blanketed Yakima and Spokane, Washington during the 1980 eruption and again, in 2004. The location, size and shape of the area affected by tephra are determined by the vigor, and duration of the eruption and the wind direction.

Map showing 30-year probability of accumulation of 1 centimeter (0.4 Inch) or more of tephra from eruptions of volcanoes in the Cascade Range.



Map showing 30-year probability of accumulation of 10 centimeters (4 Inches) or more of tephra from eruptions of volcanoes in the Cascade Range.

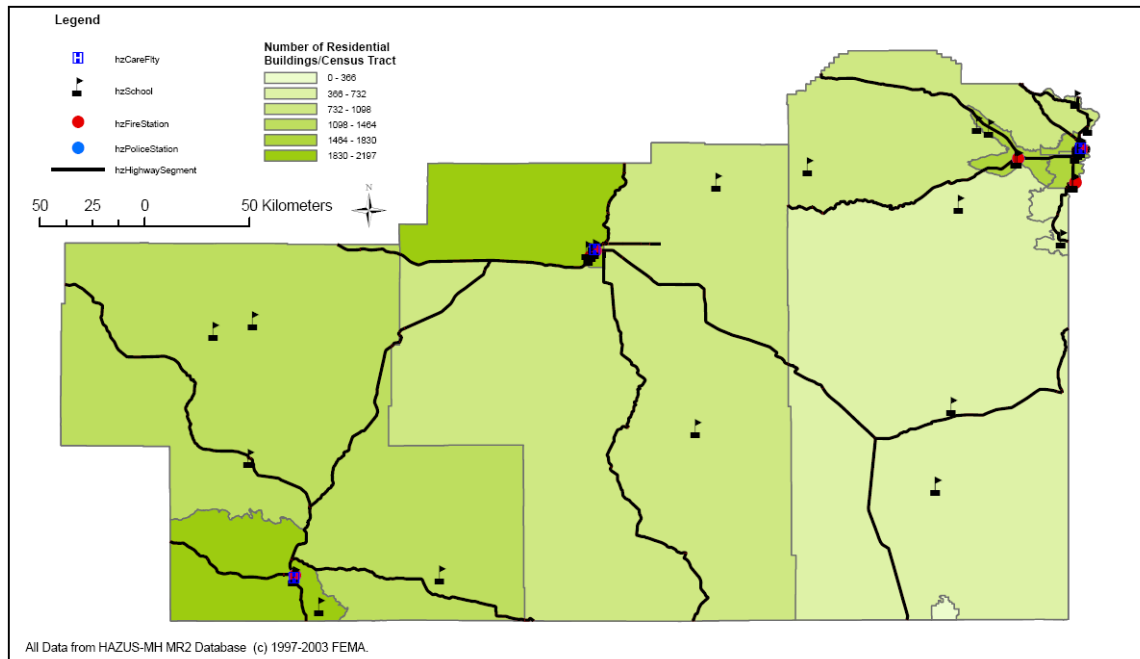


The eruptive history of the nearby Cascade volcanoes to this region can be traced to late Pleistocene times (approximately 700,000 years ago) and will no doubt continue. But the central question remains: When? The most recent series of events at Newberry Volcano, which occurred about 1,300 years ago, consisted of lava flows and tephra fall. Newberry Volcano's recent history also includes pyroclastic flows and numerous lava flows. Volcanoes in the Three Sisters region, such as Middle and South Sister, and Crater Lake have also erupted explosively in the past. These eruptions have produced pyroclastic flows, lava flows, lahars, debris avalanches, and tephra. Any future eruptions at these volcanoes would most likely resemble those that have occurred in the past.

Geoscientists have provided some estimates of future activity in the vicinity of Newberry Caldera and its adjacent areas. They estimate a 1 in 3000 chance that some activity will take place in a 30-year period. The estimate for activity at Crater Lake for the same time period is significantly smaller at 0.003 to 0.0003. In the Three Sisters region, the probability of future activity is roughly 1 in 10,000 but any restlessness would greatly increase this estimate.

Exposure

The region is exposed to volcanic hazards. Most of the people and infrastructure are located in one of the major cities in the region which are located along an interstate (I-84) and/or the regional highways (HWY 20 and HWY 395).



Map of the generalized vulnerability of the region (Burns, et al, 2007. Unpublished Report. Geologic Hazards, Earthquake and Landslide Hazard Maps, and Future Earthquake Damage and Loss Estimates for three Counties in the southeastern Region Including Lake, Malheur, and Harney, DOGAMI Open File Report).

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Risk

Many parts of Oregon, including this region are susceptible to volcanic hazards, particularly in the portions close to the volcano centers of the Three Sisters region, Newberry Crater and Crater Lake. Volcanoes can pose significant threats to people and infrastructure. As population growth continues to expand and development becomes closer to the potentially active volcanoes, greater losses from volcanic hazards are likely to result. The level of risk from volcanic hazards can be determined through the comparison of the overlap of hazard and exposure.

Summary

The volcanic hazard in the region is reflected in the USGS volcanic hazard maps of the Three Sisters region, Newberry Volcano and Crater Lake, which are all potentially active

volcanoes relatively close to the region. Most of the people and infrastructure in the region are along the Highway 20 corridor, which runs along most of the northern portion of the region, and/or along one of the major north-south corridors. The regions total exposure for buildings and transportation systems alone is roughly 15 billion. The level of risk from volcanic hazards can be determined through the comparison of the overlap of hazard and exposure.

References

- D.R. Sherrod, L.G. Mastin, W.E. Scott, and S.P. Schilling, 1997, Volcano Hazards at Newberry Volcano, Oregon: U.S. Geological Survey Open-File Report 97-513*
- C.R. Bacon, L.G. Mastin, K.M. Scott, and M. Nathenson, 1997, Volcano and Earthquake Hazards in the Crater Lake Region, Oregon: U.S. Geological Survey Open-File Report 97-487*
- W.E. Scott, R.M. Iverson, S.P. Schilling, and B.J. Fischer, 2001, Volcano Hazards in the Three Sisters Region, Oregon: U.S. Geological Survey Open-File Report 99-437, 14p.*
- USGS Fact Sheet 2006-3014, Volcano Hazards--A National Threat*

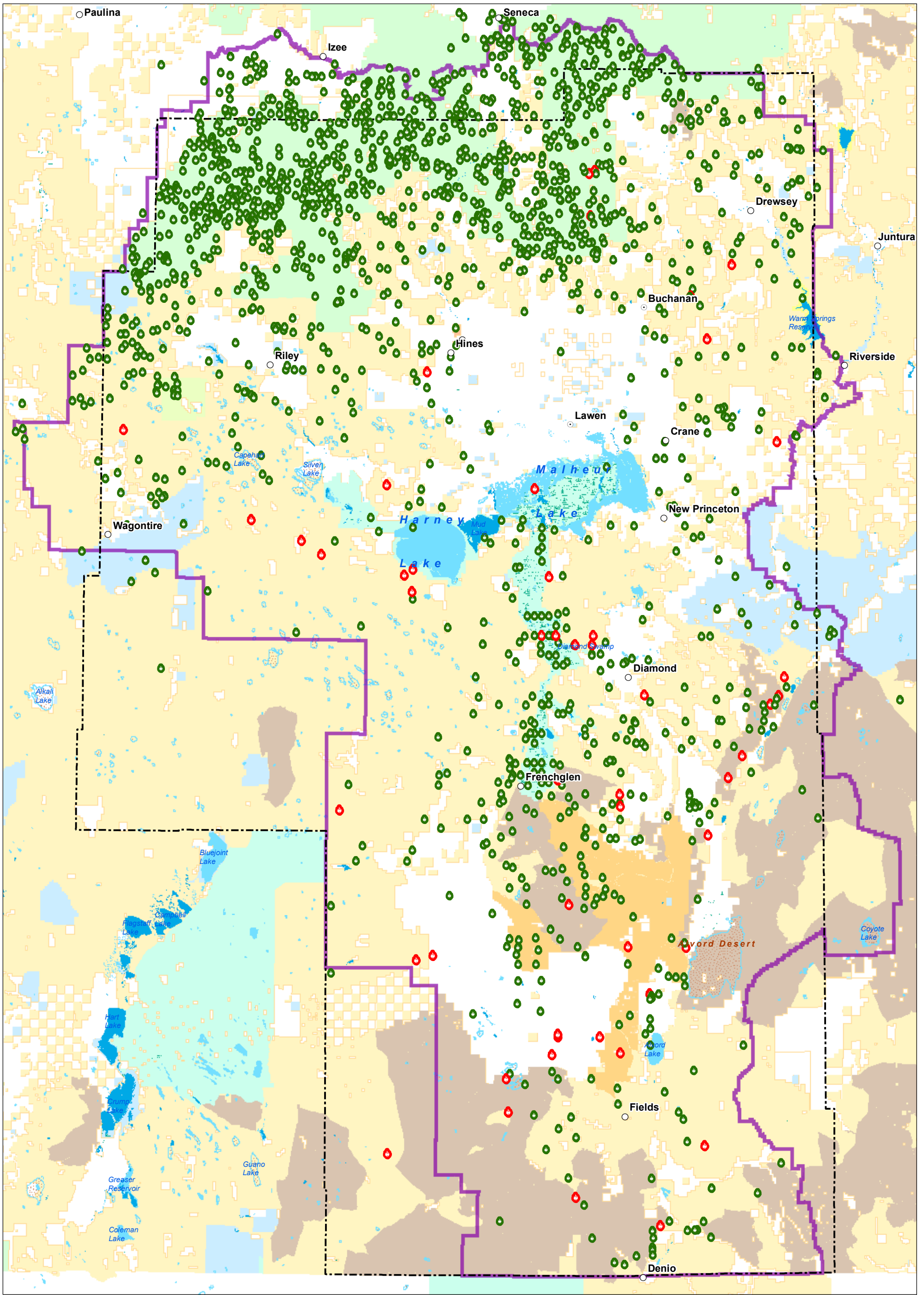
Wildfire Hazard Annex

This annex covers the wildfire hazard and includes detailed information on the hazard that is specific to the County. The annex includes some actual documents when digital copies were available. Annex materials include supplemental information for Section 3 hazard vulnerabilities, and potential losses when local data is available.

Hazard Resources

This section documents the existing resources that were used to develop the risk assessment for this hazard. They include:

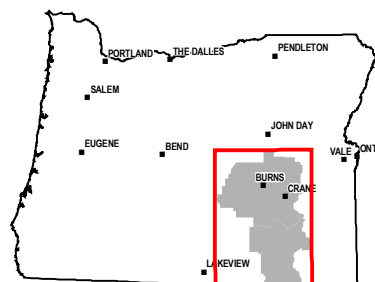
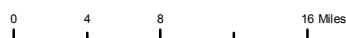
- *Wildfire Summary: Lake, Harney, and Malheur Counties.* This summary is a supplement to the Region 8 Profile and Hazard Assessment found in the State of Oregon Natural Hazards Mitigation Plan. The summary was completed by DOGAMI in 2007 and is included in this annex.
- *Maps.* The Bureau of Land Management Burns District has mapped a 10-year fire history of Harney County. The map is included in this annex.
- *Newspaper Articles.* Information gathered from the Burns-Times Herald provided detailed information on wildfire history in Harney County since 1990.
- *NICC Incident Management Report.* The National Interagency Coordination Center (NICC) provided detailed information on past wildfires in Harney County.
- *Harney County Community Wildfire Protection Plan.* The CWPP provided wildfire hazard history for Harney County and action items to be included in the plan. The Harney County CWPP is included in this annex.



10 Year Fire History Harney County

Legend

- | | | | | | |
|-------------------------|------------------------|--------------------------------------|----------------------------|---------------------|---|
| Fire Starts | Less Than 1000 Acres | Burns Interagency Fire Zone Boundary | Land Administration | State | Northern Great Basin Experimental Range |
| Greater Than 1000 Acres | Harney County Boundary | Bureau of Land Management | U.S. Fish and Wildlife | U.S. Forest Service | Indian Reservation |
| | | BLM Wilderness Study Area | Bureau of Reclamation | Private | BLM Wilderness |



Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual or aggregate use with other data. Original data was compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

US DEPARTMENT OF THE INTERIOR
Bureau of Land Management
Burns District, Oregon



sfenton/mxd/10YrFireHistory.mxd
3/20/07

WILDFIRE HAZARDS SUMMARY: Lake, Harney and Malheur Counties, Oregon

Overview

Oregon has a very lengthy history of wildfires in undeveloped wildlands but also in the developing wildland/urban interface (WUI), areas of forested land with residents and other structures within the reach of wildfire. There are large areas in this region that make up the WUI which is susceptible to wildfire. Other areas that are less forested or are covered by brush and grassland also creates susceptibility. As the population in this region grows, development in the WUI increases, posing a larger threat to life and property. Below is a table showing WUI communities in this region.

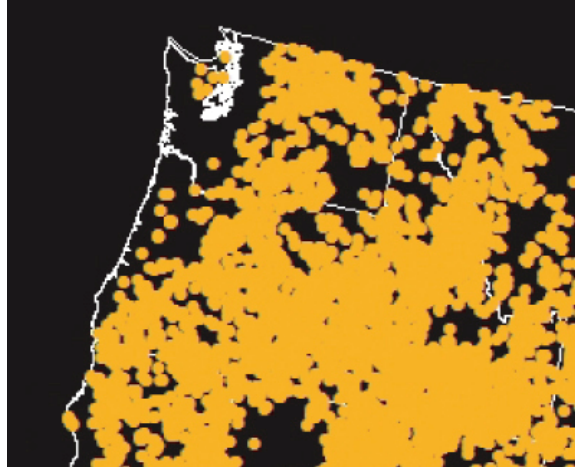
WILDLAND/URBAN INTERFACE COMMUNITIES

COUNTIES		
Lake	HARNEY	MALHEUR
Adel	Andrews	Adrian
Christmas Valley	Blitzen	Arock
Drew's Gap	Burns-Hines	Brogan
Lakeview Basin	Crane	Danner
New Pine Creek	Diamond	Harper
Paisley	Drewsey	Jamieson
Plush	Fields	Jordan Valley
Silver Lake	Frenchglen	Juntura
South Drews	Narrows	McDermitt
Summer Lake	Double O	Nyssa Heights
Valley Falls / Chandler		Ontario Heights
		Oregon Slope
		Vale
		Ironside

Source: *Federal Register*, 08/17/01, v 66, n.160

Wildfires are defined as an uncontrollable burning of forest, brush, or grassland. It has always been a part of these ecosystems and sometimes with devastating effects. They usually start naturally (e.g. lightning strikes) but, now, most are human-induced from carelessness (e.g. unattended campfire, debris burning, or arson). Wildfires can create hazardous situations, due to its intensity and behavior, depending on factors such as fuel and fuel distribution, topography of the area, weather conditions, and density of development.

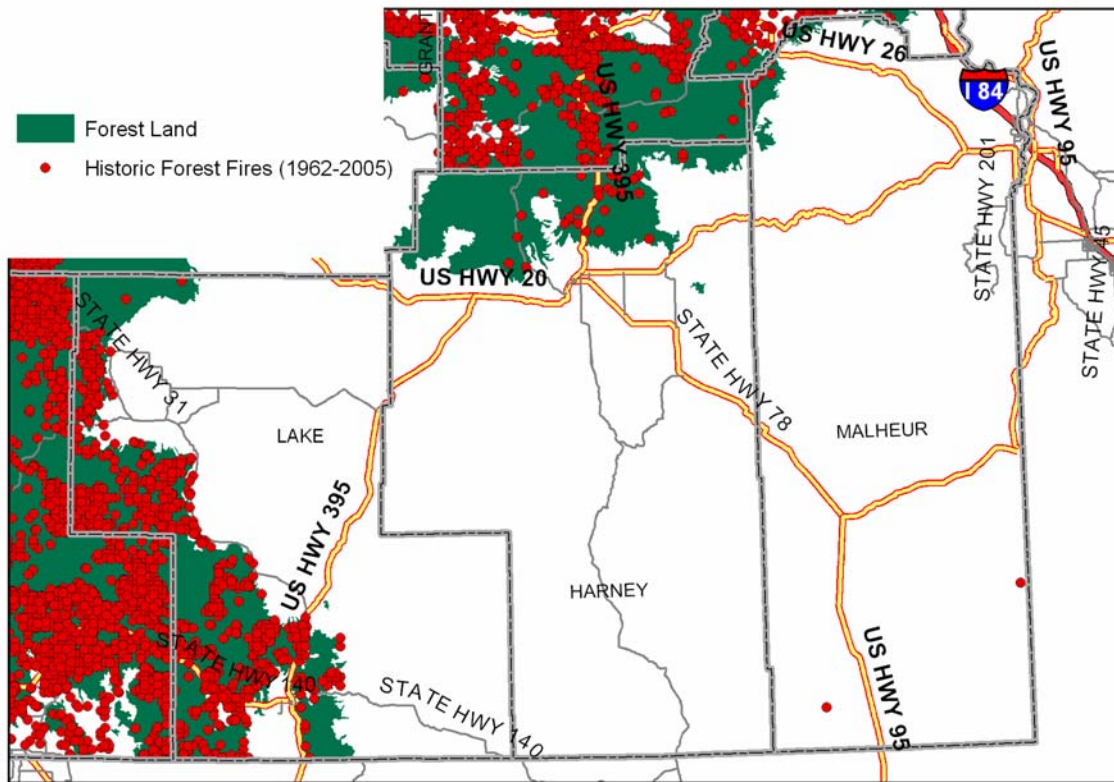
Communities located in areas near forests or a WUI may be at risk to wildfire hazards. Other communities located in areas with any type of brush or grassland can also be at risk to wildfire. Based on historic data, wildfires have occurred in this region and are likely to happen again.



National map of locations that experienced wildfires greater than 250 acres, from 1980 to 2003. Map not to scale. Sources: Bureau of Land Management, U.S. Forest Service, U.S. Fish and Wildlife Service, Bureau of Indian Affairs, National Park Service, and the USGS National Atlas. (Image modified from USGS Fact Sheet 2006-3015)

Hazard

The presence of a vegetative fuel is one of the major components necessary for wildfires to exist, along with oxygen and heat. Any type of vegetation will remain as a source to igniting wildfires and also keeping them aflame. Wildfires are commonly associated with forest fires due to their frequent occurrence in forested lands, however, other vegetation such as agricultural crops or brush and grass such as juniper, bitterbrush and sage, also provides fuel for wildfires to occur. Forested lands provide a larger fuel source to wildfires than other vegetated lands due to the presence of large amounts of timber and other dense vegetation in these areas. This region contains large tracts of ponderosa pine forests, primarily in the northern part of Harney County and the western side of Lake County. Less extensive forests occur in Malheur County near Ironside and in scattered mountain ranges throughout the region. Grasslands, which naturally cover most of the region, also are problematic.



Point locations for ODF statistical fires from 1962 to 2005. The point locations for the fires were derived from ODF's FIRES database. Data from the Oregon Department of Forestry.

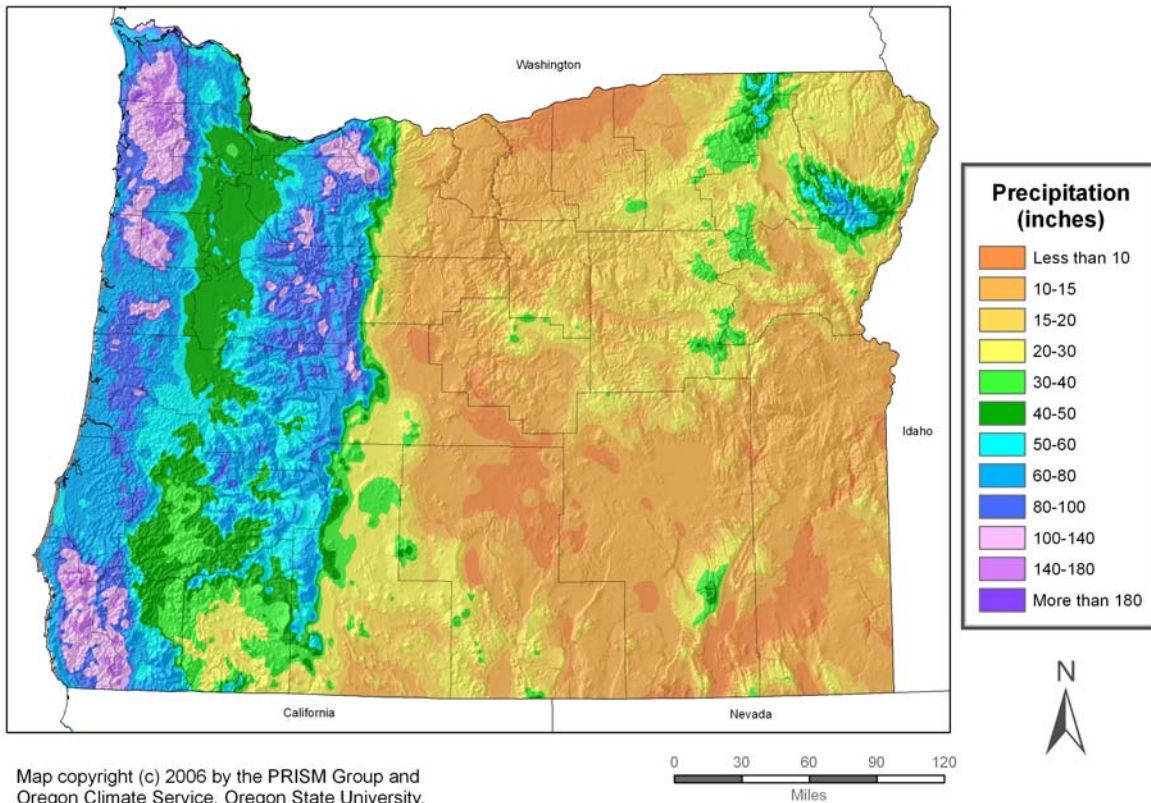
Map of historic Forest Fires from the Oregon Department of Forestry Database and extent of forested land (<http://egov.oregon.gov/ODF/GIS>).

SIGNIFICANT WILDFIRES

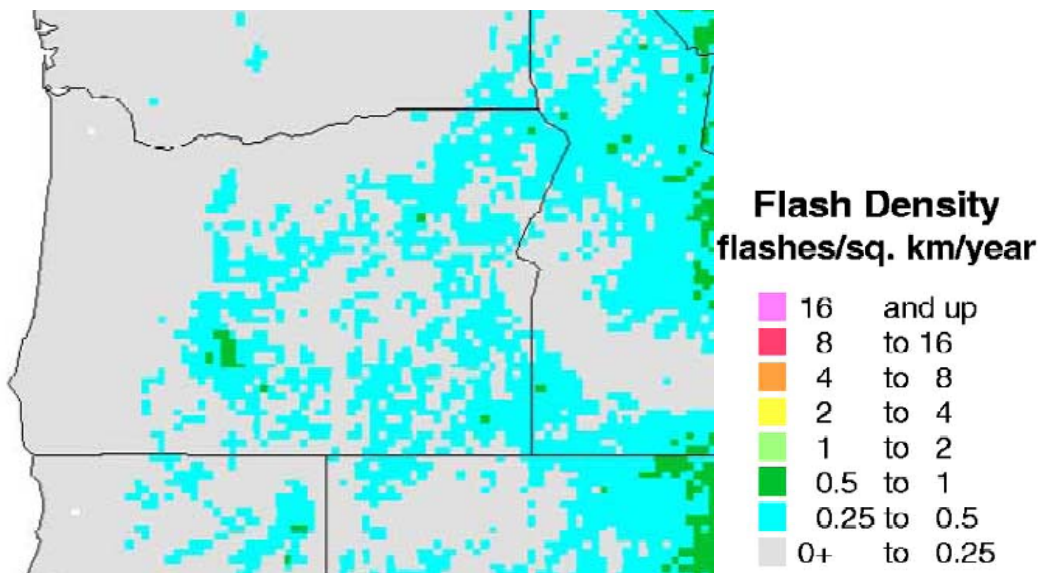
DATE	NAME OF FIRE	LOCATION	ACRES BURNED	REMARKS
1998	Ontario	Malheur County		
2000	Jackson	Malheur County		
2002	Winter	Lake County	35,779	

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

The natural ignition of wildfires is largely a function of weather and fuel; human-caused fires add another dimension to the probability. Lightning strikes in areas of forest or rangeland combined with any type of vegetative fuel source will always remain as a source for wildfire. Thousands of lightning strikes occur each year throughout much of the region. Fortunately, every strike does not ignite a wildfire. High speed winds and the lack of rain can cause adverse effects for firefighters trying to contain a wildfire.



Oregon Average Annual Precipitation (1971-2000)
(<http://www.ocs.orst.edu/prism/index.phtml>)



National Lightning Map. Average lightning density recorded from 1996-2000. The average amount of lightning that occurs within any given year can vary significantly. (Data from NOAA <http://www.lightningsafety.noaa.gov/images/map.pdf>).

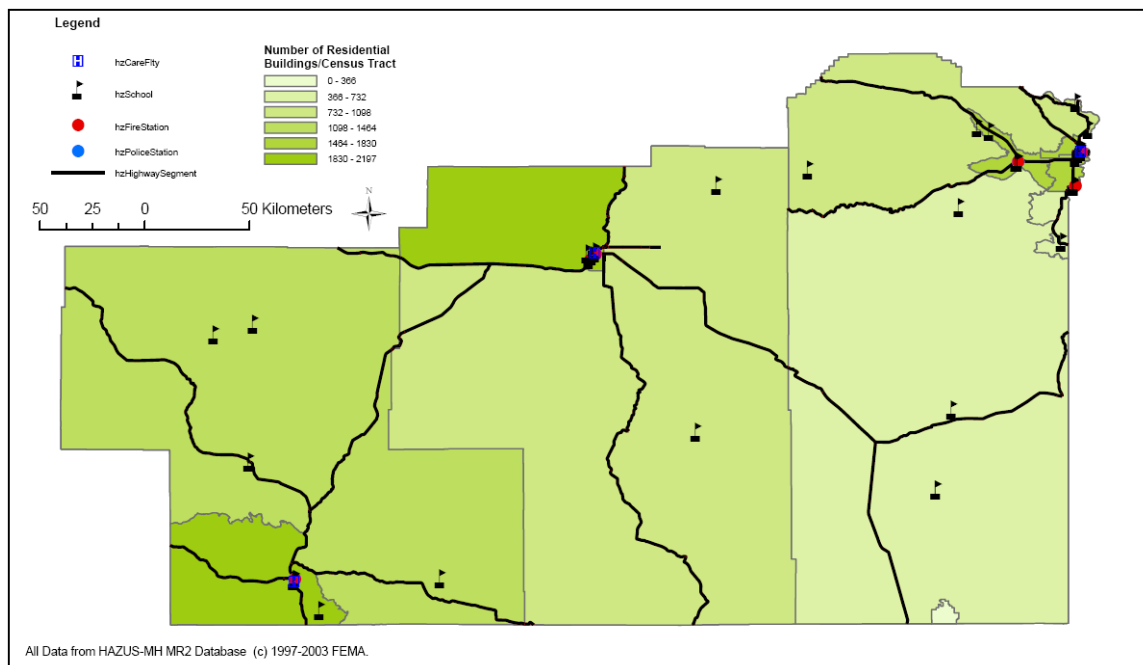
Despite the continual occurrence of lightning throughout the year, a majority of wildfires are more often started from human carelessness or lack of concern. Many human-related

causes, such as leaving campfires unattended or building them too large, burning debris, smoking and arson, are just a few activities that have resulted in wildfires. Other man-made wildfires have resulted from the use of machinery or faulty equipment and children playing with fire or fireworks, among many other causes.

In this region, much of the topography is hilly or mountainous which also can induce wildfire hazards. These areas can cause a wildfire to spread rapidly and burn larger areas in a shorter period of time, especially, if the fire starts at the bottom of a slope and migrates uphill as it burns. Wildfires tend to burn more slowly on flatter lying areas but this does not mean these areas are exempt from a rapidly moving or spreading fire. Other hazards that can affect these areas after the fire has been extinguished include landslides or debris flows and erosion.

Exposure

The region is exposed to wildfire hazards. Most of the people and infrastructure are located in one of the major cities in the region which are located along an interstate (I-84) and/or the regional highways (HWY 20 and HWY 395).



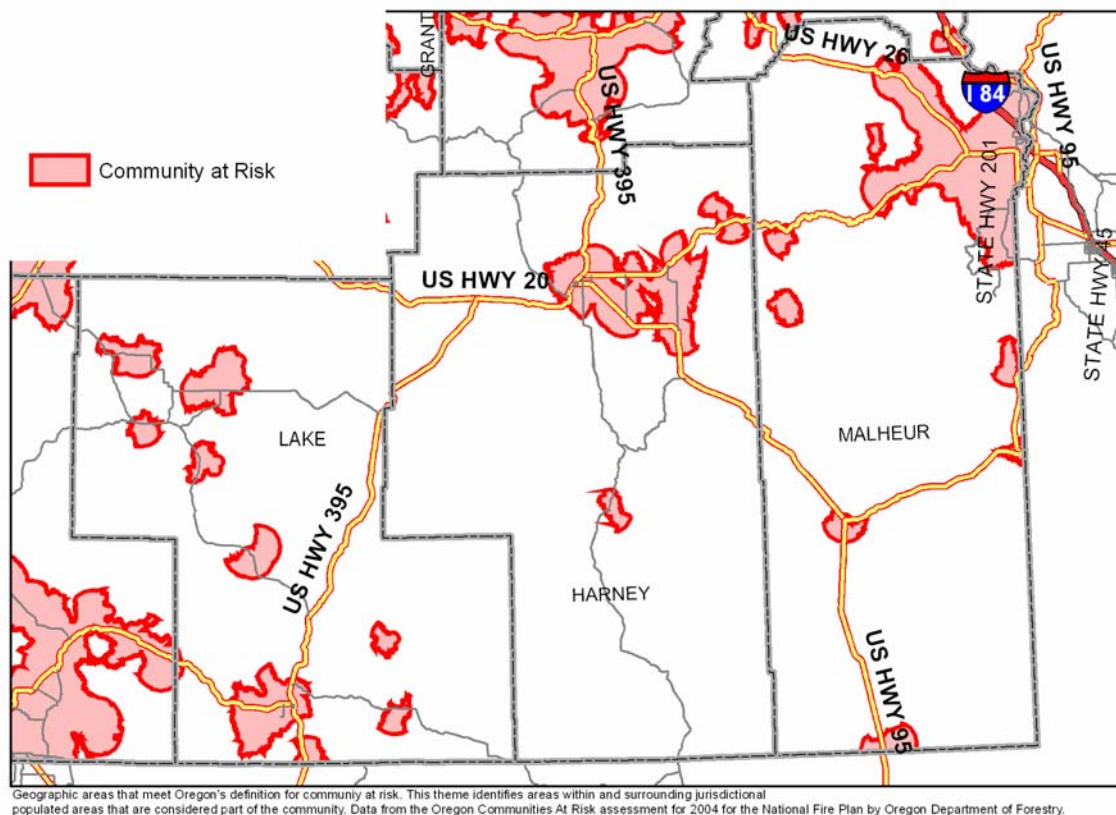
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in the region with a total building replacement value (excluding contents) of 2,352 (millions of dollars). Approximately 99.00 % of the buildings (and 84.00% of the building value) are associated with residential housing. The replacement value of the transportation and utility lifeline systems is estimated to be 9,248 and 264 (millions of dollars), respectively.

Risk

Many parts of Oregon, including this region are susceptible to wildfire hazards. Wildfires pose a significant hazard to those living in or near a WUI and have caused damage and loss in the region and it is very likely that they will again. Each forest is different and consequently has different probability/recurrence estimates. As population growth continues to expand and development increases in the WUI, the threat to life and property increases and ultimately, greater losses to are likely to result. Each year a significant number of people build homes within or on the edge of the forest (WUI), thereby increasing wildfire hazards. Many Oregon communities (incorporated and unincorporated) are within or abut areas subject to serious wildfire hazards. The level of risk from wildfire can be determined through the comparison of the overlap of hazard and exposure.



Map of Oregon Communities at risk to wildfire. Oregon Communities At Risk assessment for 2004 for the National Fire Plan. Community boundaries shows the area within and

surrounding populated jurisdictions that meet the Oregon's definition for Community At Risk.

Summary

The generalized wildfire hazard for the region is moderate to high, however there are areas within the region that have very high hazard. Most of the people and infrastructure are located in one of the major cities in the region which are located along an interstate (I-84) and/or the regional highways (HWY 20 and HWY 395). The regions total exposure for buildings and transportation systems alone is roughly 11.5 billion dollars. The level of risk from wildfires can be determined through the comparison of the overlap of hazard and exposure.

Preliminary analyses indicate a high likelihood of damage and losses from future wildfire in the region. Action should be taken to reduce the damage and losses through predisaster mitigation and prepare for effective emergency response after the disaster. Special action should be taken for critical facilities including schools and emergency facilities and infrastructure such as roadways.

Harney County Community Wildfire Protection Plan

WALSH Project Number: 6224-010
December 23, 2005

HARNEY COUNTY COMMUNITY WILDFIRE PROTECTION PLAN

December 23, 2005

Prepared for: Harney County Planning Department
450 North Buena Vista Avenue
Burns, Oregon 97220
541-573-6655

Prepared by: _____
Jerry R. Barker, Ph.D.
Rangeland and Fire Ecologist

Prepared by: _____
Angela Glenn
Natural Resource Management Specialist

Submitted by
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WALSH Project Number: 6224-010

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MAP 10	FRENCHGLEN MITIGATION MAP
MAP 11	FIELDS MITIGATION MAP
MAP 12	DIAMOND MITIGATION MAP
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LIST OF ACRONYMS AND ABBREVIATIONS

BIFZ	Burns Interagency Fire Zone
BLM	Bureau of Land Management
CRP	Conservation Reserve Program
CWPP	Community Wildfire Protection Plans
EQIP	Environmental Quality Incentives Program
FEMA	Federal Emergency Management Agency
FEPP	Federal Excess Personal Property
FRCC	Fire Regime Condition Class
GIS	Geographic Information System
HFRA	Healthy Forests Restoration Act
IMT	Incident Management Team
IRP	Ignition Risk Potential
NAPA	National Academy of Public Administration
NEPA	National Environmental Protection Act
NFPA	National Fire Protection Association
NWCG	National Wildfire Coordinating Group
ODF	Oregon Department of Forestry
OFPA	Oregon Forest Protection Act
OWEB	Watershed Improvement Grants
RFA	Rural Fire Assistance
RFPA	Rangeland Fire Protection Associations
USFWS	US Fish and Wildlife Service
USFS	US Forest Service
VFA	Volunteer Fire Assistance
WFU	Wildland Fire Use
WHIP	Wildlife Habitat Incentives Program

EXECUTIVE SUMMARY

The Healthy Forests Restoration Act (HFRA) of 2003 provides the impetus for wildfire risk assessment and planning at the county and community level. HFRA refers to this level of planning as Community Wildfire Protection Plans (CWPP). The CWPP allows a community to evaluate its current situation with regards to wildfire risk and devise ways to reduce risk for protection of human welfare and other important economic or ecological values. The CWPP may address issues such as community wildfire risk, structure flammability, hazardous fuels mitigation, and non-fuels mitigation, community preparedness, and emergency procedures. The Core Team provides oversight to the development of the CWPP and its implementation in Harney County.

The focus of the Harney County CWPP is county-wide with emphasis on the communities of Burns, Hines, Drewsey, Crane, Diamond, Frenchglen, Fields, Andrews, Riley, and rural residences throughout the County. Human life and welfare are values at risk to wildfire because of the buildup of hazardous fuels around communities and structures, poor emergency vehicle ingress and egress, a large area to cover with the fire authorities, and inadequately trained and/or equipped fire suppression authorities. Throughout the County, there are scattered small communities and ranches with houses and out-buildings without structural fire protection because they are outside the Burns or Hines Fire Departments districts. Other economic values at risk include businesses, farmland, ranchland, grazing land, hunting and other recreational land, historic and cultural sites, and critical infrastructure.

Wildland fire is a common occurrence in Harney County. During the 12 year period of 1993 to 2004, there were 1,174 wildfires for an average of 98 per year. Lightning caused 78 percent of wildfires, while 22 percent were human-caused. Approximately, 60 percent of all wildfires burn less than 0.25 acres regardless of ignition source, while less than 1 percent burn over 5,000 acres. The 1990 Pine Springs Basin Conflagration that burned 73,700 acres and threatened Burns, Hines, and Riley was lightning-caused.

Natural resource management policy and changing ecological conditions have interacted in ways that have resulted in hazardous fuel situations throughout Harney County. These forces include historic fire suppression policy, juniper invasion into sagebrush and grasslands, overstocked forests and rangelands, invasive weeds, and changing climatic patterns. The accumulation of hazardous fuels may set the stage for catastrophic wildfire occurrence, resulting in the loss of important economic and ecological values.

There are varieties of fuels around communities, ranches, and structures that create problems for fire protection. Fuels include ponderosa pine and juniper forests, sagebrush habitat, grasslands, and weed fields. Many of these fuels, such as dried grass and weeds, are highly flammable, burn rapidly, and resist control. A coordinated effort among all fire authorities and private landowners in the County is needed to manage hazardous fuels and reduce the risk of wildfire.

Currently, fire suppression authorities in the County include the Central Oregon Forest Protection District, Burns and Hines Fire Departments, four Rangeland Fire Protection Associations (RFPA), Burns Interagency Fire Zone (BIFZ), U.S Fish and Wildlife Service (USFWS), Oregon Department of Forestry (ODF), and the Burns Paiute Indian Reservation. Mutual Aid Agreements exist among the fire authorities for mutual aid and support in the event of a wildfire incident. However, each fire authority operates under regulations that dictate their area of responsibility and specify limitations.

Field surveys, Core Team meetings, interviews, questionnaires, and a public meeting were used to obtain various types of information to assess the risk of wildfire in Harney County. All information was gathered, analyzed, and prepared in the CWPP format by Walsh Environmental Scientists and Engineers, LLC. A project website was maintained by the Harney County Planning Department and provided project updates and information to promote public awareness and outreach.

A direct mailing occurred on October 6, 2005 to 1,059 rural Harney County addresses. The direct mailing consisted of a cover letter from the Planning Director, a questionnaire, and a Firewise pamphlet. The cover letter explained the risk assessment project, announced an upcoming public meeting, and requested that homeowners complete and return the questionnaire. The purpose of the questionnaire was to judge public opinion on the level of wildfire risk in the county, evaluate values at risk, and assess mitigation practices needed to reduce risk (Appendix C). The Firewise brochure explained proper home construction and landscaping practices to reduce the risk of wildfire loss.

A public meeting was convened on December 1, 2005 at 7:00 pm in the Burns Senior Center. Newspaper and radio releases announced the meeting in addition to the direct mailing. The purpose of the meeting was to explain the purpose of the wildfire risk assessment, present the findings of the risk assessment, and provide an opportunity for the public to participate in the process, review of findings, and comment on proposed mitigation possibilities such as hazardous fuels management and non-fuel projects. A draft report of the wildfire risk assessment and mitigation plan was posted on the Harney County website to encourage public review and comment.

The National Fire Protection Association (NFPA) Form 1144, *Standard for Protection of Life and Property from Wildfire 2002 Edition*, was used to assess the level of risk and hazard to communities and individual houses. The evaluation consisted of rating attributes such as means of access, surrounding vegetation (fuels), presence of defensible space, topography, roofing and other construction materials, available fire protection, and placement of utilities. Scores were assigned to each element and then totaled to determine the level of risk. Low, moderate, and high hazard were determined based on the total score. Field surveys were conducted during September 2005 to assess the level of risk and hazard to the 9 communities and 210 rural houses located throughout the County.

Seven of the nine communities received a high-hazard rating because of issues with hazardous fuels proximity, the use of combustible construction material, inadequate emergency ingress and egress, and the lack of structure fire protection.

Community Hazard Rating and Contributing Factors

Community	Hazard Rating	Contributing Factors
Burns/Hines East	Moderate Hazard	<ul style="list-style-type: none"> Fuels of dried grass and weeds in proximity to structures Lack of defensible space around some homes Combustible roof or siding on some homes
Burns/Hines West	High Hazard	<ul style="list-style-type: none"> Fuels of sagebrush, juniper, dried grass and weeds in proximity to structures Surrounding terrain Lack of defensible space around some homes Combustible roof or siding on some homes
Riley	Moderate Hazard	<ul style="list-style-type: none"> Fuels of sagebrush, dried grass and weeds in proximity to structures Lack of structure defensible space Lack of structure fire protection
Drewsey Crane Diamond Frenchglen	High Hazard	<ul style="list-style-type: none"> Fuels of dried grass and weeds, sagebrush, juniper in proximity to structures Surrounding terrain Lack of structure defensible space Limited emergency ingress and egress Combustible roof or siding on some homes Lack of structure fire protection
Andrews Fields	High Hazard	<ul style="list-style-type: none"> Fuels of dried grass, weeds, sagebrush in proximity to structures Lack of structure defensible space Downslope winds and surrounding terrain Combustible roof or siding on some homes Limited emergency ingress and egress Lack of structure fire protection

There were 210 structures evaluated throughout rural Harney County. These structures did not include those in the Central Oregon Protection District, which were separately evaluated by the Oregon Department of Forestry (ODF). There was no apparent pattern to hazard classification within the County. High-hazard structures were just as likely to be associated with low-hazard structures as with moderate-hazard structures.

Rural Harney County Structure Classification as to Hazard Rating and Contributing Factors

Hazard Class	Percent of Structures	Contributing Factors
Low	16	<ul style="list-style-type: none"> Two or more roads in/out Main access road is wide, all season, less than 300 ft. long with turnaround Fuel type is predominately grass or other crop Defensible space of 71–100 ft. Terrain is generally flat Non-combustible roof and/or siding Heating and electrical utilities placed underground
Moderate	58	<ul style="list-style-type: none"> One road in/out Access road is moderately wide, non-surfaced with grade < 5%, < 300 ft. with turnaround Fuel type is predominately grass or other crop Defensible space of 30–70 ft. Terrain is such to adversely affect wildfire behavior Non-combustible roof with combustible siding

Hazard Class	Percent of Structures	Contributing Factors
		<ul style="list-style-type: none"> • Electrical utilities usually below ground but heating fuel is above ground
High/Extreme	26	<ul style="list-style-type: none"> • One road in/out • Access road is narrow, non-surfaced with grade > 5%, < than 300 ft. long and without turnaround • Fuel type is predominately sagebrush, rabbitbrush, and/or juniper; weeds are abundant • Defensible space < 30 ft. • Terrain is such to adversely affect wildfire behavior • Combustible roof and siding • Heating and electrical utilities above ground

Structure hazard for 41 homes in the Central Oregon Protection District was evaluated by ODF using the presence of a defensible space, water availability, and surrounding fuel type as criteria. ODF found that 61, 15, and 24 percent of the homes could be classified as low, moderate, and high hazard, respectively.

Based on the interviews with fire authority officials, field observations, and questionnaire responses, the following mitigation actions are proposed to reduce their risk of wildfire:

- Continue to strengthen the cooperation among the BIFZ, Burns and Hines Fire Departments, RFPAs, Burns Paiute Tribe, USFWS, and private landowners.
- Strengthen the firefighting ability of the RFPAs through motivation, training, and improved equipment. Work with the RFPAs to maintain adequate funding for insurance, fuel, and equipment repair. Handheld, federal compatible radios are needed to improve communication within and among the RFPAs, and with federal agencies.
- Encourage weed abatement and the development of defensible spaces around homes and other important structures throughout the County.
- Re-construct the fuelbreak northwest of Burns and Hines that was installed for the 1990 Pine Springs Basin Conflagration.
- Develop strategically located fuelbreaks around Drewsey, Crane, Diamond, Frenchglen, Andrews, and Fields.
- Reduce fuels classified as Fire Regime Condition Class (FRCC) 3 to a FRCC 1 category using appropriate management practices.
- Create additional water storage points for fire suppression within the bounds of the Hines and Burns Fire Districts and throughout the RFPAs.
- Distribute educational materials to residents in order to promote knowledge and understanding in implementing proper Firewise activities such as landscaping, use

of fire resistant building materials, proper access roads, and emergency evacuation procedures.

Implementing and sustaining the CWPP is key to success. This is the responsibility of the Core Team. Building partnerships among community-based organizations, fire protection authorities, local governments, public land management agencies, and private landowners is necessary in identifying and prioritizing measures to reduce wildfire risk. Maintaining this cooperation is a long-term effort that requires the commitment of all partners involved. The CWPP encourages citizens to take an active role in identifying needs, developing strategies, and implementing solutions to address wildfire risk by assisting with the development of local community wildfire plans and participating in countywide fire prevention activities.

The Core Team will oversee the implementation of and monitoring of the CWPP by working with fire authorities, community organizations, private landowners, and public agencies to coordinate hazardous fuels management and other mitigation projects.

HARNEY COUNTY COMMUNITY WILDFIRE PROTECTION PLAN

1 INTRODUCTION

1.1 CWPP Purpose and Process

The Healthy Forests Restoration Act (HFRA) of 2003 provides the impetus for wildfire risk assessment and planning at the county and community level. HFRA refers to this level of planning as Community Wildfire Protection Plans (CWPP). The purpose of the CWPP is for communities to take full responsibility and advantage of wildland fire and hazardous fuel management opportunities offered under HFRA legislation. The CWPP provides for the US Forest Service (USFS) and the Bureau of Land Management (BLM) to give consideration to the priorities of local communities for forest and rangeland management as well as hazardous fuel reduction projects.

The CWPP allows a community to evaluate its current situation with regards to wildfire risk and plan ways to reduce risk for protection of human welfare and other important economic or ecological values. The CWPP may address issues such as community wildfire risk, structure flammability, hazardous fuels and non-fuels mitigation, community preparedness, and emergency procedures. The CWPP should be tailored to meet the needs of the community. The CWPP process consists of the following steps:

- Organize the CWPP Committee – The committee should consist of city and county government, local fire authority, and state agencies responsible for forest management.
- Federal Agency Involvement – Representatives from the USFS and/or BLM should be engaged in the CWPP process as consultants.
- Community Interested Parties – The CWPP committee must involve interested community members, private landowners, business, stakeholders, and interest groups in the planning process.
- Community Base Map – A community base map should be developed that may illustrate important features such as landownership, structures, roads, surface water, fire districts, or major utility corridors. The map's importance is that it illustrates community values from which recommendations concerning wildfire planning can occur.
- Develop a Community Wildfire Risk Assessment – The risk assessment will provide critical information to the CWPP committee to make informed decisions. Members should be actively involved in this step. Items that may be addressed include such things as risk of wildfire occurrence, structure hazard and risk, economic and ecological values at risk, local fire authority, preparedness and capability, and hazardous fuels.

- Hazard Reduction Priorities and Recommendations to Reduce Structure Flammability – Mitigation projects are identified and designed to reduce the risk of wildfire loss to the community and other values. Mitigation projects should be prioritized and may include such things as hazardous fuels management, improving the wildfire suppression capability of the local fire authority, developing a permanent water supply, reducing structure flammability, improving emergency procedures, and increasing public education.
- Develop an Action Plan and Assessment Strategy – The action plan should identify who will do what by when. Identify areas of concern and integrate common values. Community funds for hazard reduction projects through grants need to be obtained. The finished CWPP is essential for seeking grant money. Also, an assessment strategy needs to be in place to insure that the CWPP remains current and relevant for future years.
- Finalize the CWPP – The committee needs to agree and approve the CWPP and make sure that the recommend actions are implemented in timely manner.

1.2 Harney County need for CWPP

The focus of the Harney County CWPP is county-wide with emphasis on the communities of Burns, Hines, Drewsey, Crane, Diamond, Frenchglen, Fields, Andrews, Riley, and rural residences. The Burns Interagency Fire Zone (BIFZ) is in the process of developing a five-year fuels management plan for public lands under its fire protection authority. The Harney County CWPP will provide critical information for the BIFZ fuel plan.

Wildland fire is a common occurrence in Harney County. Historic fire occurrence was a major ecological influence in shaping the natural vegetation. The threat of wildfire continues today. However, wildfire risk to human welfare and economic and ecological values is more serious today than in the past because of the buildup of hazardous fuels, construction of houses in proximity to forests and rangelands, increased outdoor recreation, and a lack of public appreciation of wildfire. Lightning-caused fires have been the dominant ignition source for hundreds of years and continue to be the main cause of fire. However, human-caused fires have occurred and their frequency will likely become more numerous as the County's population grows and outdoor recreation increases.

Natural resource management policy and changing ecological conditions have interacted in ways that resulted in hazardous fuel situations throughout the County. These forces include historic fire suppression policy, juniper invasion into sagebrush and grasslands, overstocked forests and rangelands, invasive weeds, and changing climatic patterns. The accumulation of hazardous fuels may set the stage for catastrophic wildfire occurrence in the County, resulting in the loss of important economic and ecological values.

There are varieties of fuels around communities, ranches, and structures that create problems for fire protection. Fuels include ponderosa pine and juniper forests, sagebrush habitat, grasslands, and weed fields. Many of these fuels such as dried grass and weeds are highly flammable, burn rapidly, and resist control. A coordinated effort among all fire authorities and private landowners in the County is needed to manage hazardous fuels and reduce the risk of wildfire.

Currently, fire suppression authorities include the Central Oregon Forest Protection District, Burns and Hines Fire Departments, four Rangeland Fire Protection Associations (RFPAs), BIFZ (USDA Forest Service and USDI Bureau of Land Management), U.S. Fish and Wildlife Service (USFWS), and the Burns Paiute Indian Reservation. Mutual Aid Agreements exist among the fire authorities for mutual aid and support in the event of a wildfire incident. However, each fire authority operates under regulations that dictate their area of responsibility and specify limitations. The CWPP provides the means to identify wildfire risk, prioritize mitigation projects, improve public awareness, and improve fire authority coordination to better manage wildfire.

1.3 Wildland Fire Management Primer

Wildland fire, defined as any non-structure fire occurring in the wildland, includes prescribed fire, wildland fire use, and wildfire. Prescribed fires are planned fires ignited by land managers to accomplish resource objectives. Fires that occur from natural causes, such as lightning, that are then used to achieve management purposes under carefully controlled conditions with minimal suppression costs is known as wildland fire use (WFU). Wildfires are unwanted and unplanned fires that result from natural ignition, unauthorized human-caused fire, escaped WFU, or escaped prescribed fire.

Prescribed fire in Harney County could be used to accomplish a number of resource management purposes, such as reducing the amount of hazardous fuels, improving plant species diversity, increasing livestock forage production, abating noxious and invasive weeds, and improving wildlife habitat. Multiple resource management objectives are often achieved concurrently.

Prescribed fire could occur either in a defined area or in localized burn piles. Area prescribed fires are used to burn vegetation in place and can vary in the number of acres burned. Burn piles are heaps of woody fuel that are accumulated after a mechanical treatment. Consistency with Oregon State fire and air pollution laws and BLM would occur. Oregon Department of Forestry (ODF) and County policy would be maintained during prescribed fires. Acceptable burn days would be determined in consultation with ODF and local agencies.

Fire risk is the probability that wildfire will start from natural or human-caused ignitions. Fire hazard is the presence of ignitable fuel coupled with the influences of terrain and weather. The nature of fuels, terrain, and weather conditions combine to dictate fire behavior, rate of spread, and intensity. Wildland fuel attributes refer to both dead and live vegetation and include such factors as density, bed depth, continuity, loading, vertical arrangement, and moisture content. Structures are also a fuel source. Fire tends to burn more rapidly and intensely upslope than on level terrain. However, evening “sundowner” winds may rapidly drive wildfire downslope. Weather conditions such as high ambient temperatures, low relative humidity, and windy conditions favor fire ignition and erratic fire behavior.

Natural and human-caused fire has long been an integral part of vegetation communities in the County. Lightning-ignited fire is a natural component of Harney County ecosystems, and its occurrence is important to maintaining the health of forest and rangeland ecosystems. Native Americans used fire for such things as hunting, improving wildlife habitat, land clearing, and

warfaring. As such, many of the plant species and communities are adapted to recurring fire through phenological, physiological, or anatomical attributes. Some plants such as lodge pole pine and western wheatgrass require reoccurring fire to persist.

European settlers, land use policy, and changing ecosystems have altered fire behavior and fuels accumulation from their historic setting. European settlers into Harney County changed the natural fire regime in several interrelated ways. The nature of vegetation (fuel) changed due to land use practices such as homesteading, livestock grazing, agriculture, water development, and road construction. Livestock grazing reduced the amount of fine fuels such as grasses and forbs, which carried low-intensity fire across the landscape. In addition, continuous stretches of forest and rangeland fuels were broken-up by land-clearing activities. The removal of the natural vegetation allowed introduced weedy plants to colonize and occupy—in many instances—large expanses of land. The establishment of cheatgrass and other annual weeds are examples. Many of these weedy plants become flashy fuels as they age, causing fires to burn faster and hotter than with normal wildland fuels. The invasion of western juniper into big sagebrush stands and grasslands has also increased fuel loads and changed the nature of fire in these ecosystems. In addition, more than a century of fire-suppression policy has resulted in an unusually large accumulation of hazardous fuels such as big sagebrush and western juniper in many forest and rangeland ecosystems. The presence of flashy fuels coupled with the large accumulation of naturally occurring fuels has created hazardous situations for public safety and fire management.

Modern-day land managers continue the use of fire by using prescribed fire as a tool to improve livestock grazing, wildlife habitat, control noxious weeds, or to reduce hazardous fuels. Their primary efforts in managing fuels and fire are to protect human life, economic values, and ecological values. Proactive and vigilant fire and fuels management is necessary to protect human welfare, as well as economic and ecological values from fire loss.

Wildfire behavior and severity are dictated by fuel type, weather conditions, and terrain. Fuel is the only variable that can easily be managed by reducing such attributes as load, continuity, or size class distribution. Such things as fuelbreaks, tree and shrub thinnings, defensible space, grass mowing or grazing, and green strips are ways to manipulate fuels to reduce the chances of fire occurrence or limit its severity. The CWPP focuses on fuel management on both private and public lands as a means to reduce its risk throughout Harney County.

1.4 Regulator Framework

There are several Federal and State legislation acts and local committees that set policy and provide guidance to the development of the CWPP for Harney County:

- Healthy Forest Restoration Act (2003) – Federal legislation to promote healthy forest and rangeland management, hazardous fuels reduction on federal land, community wildfire protection planning, and biomass energy production.
- National Fire Plan and 10-year Comprehensive Strategy (2001) – Interagency plan that focuses on firefighting coordination, firefighter safety, post-fire rehabilitation, hazardous fuels reduction, community assistance, and accountability.

- Oregon Statewide Land Use Planning Goal 7 – Directs local government to adopt plans for minimizing risk from natural hazards.
- Federal Emergency Management Agency (FEMA) Disaster Mitigation Act (2000) – Provides Criteria for state and local multiple-hazard and mitigation planning.
- Grant-Harney Fire Prevention Co-op – Formed in 1980 to coordinate fire prevention efforts in the counties. The cooperative facilitates interagency coordinating in mass-media, information and education programs, and participation in county fairs. All general fire prevention is coordinated through the Co-op.

1.5 Harney County Wildfire Management Goals and Objectives

The goals and objectives for the CWPP process are several and include (Table 1):

Table 1 Harney County Goals and Objectives for Wildfire Management Planning

Goals	Objectives
Facilitate a CWPP in Harney County	<ul style="list-style-type: none"> • Provide oversight to all activities related to the CWPP. • Ensure representation and coordination among agencies and interest groups. • Develop a long-term framework for sustaining CWPP efforts.
Conduct a wildfire risk assessment	<ul style="list-style-type: none"> • Conduct a county-wide wildfire risk assessment. • Identify communities at risk and contributing factors. • Determine the level of risk that structures in the rural county are to wildfire and contributing factors.
Develop a mitigation plan	<ul style="list-style-type: none"> • Identify and prioritize hazardous fuel treatment projects. • Identify and prioritize non-fuels mitigation needs.
Manage hazardous fuels	<ul style="list-style-type: none"> • Sustain a long-term, landscape approach to fuels management that focuses on high wildfire risk areas. • Identify priority fuel treatments based on risk assessment and apply for National Fire Plan grants and other funding sources. • Focus strategic hazardous reduction projects on communities at high risk.
Facilitate emergency planning	<ul style="list-style-type: none"> • Develop strategies to strengthen emergency management, response and evacuation capabilities for wildfire. • Build relationships among county government, fire authorities, and communities.
Facilitate public outreach	<ul style="list-style-type: none"> • Develop strategies to increase citizen awareness and action for Firewise practices. • Promote public outreach and cooperation for all fuels reduction projects to solicit community involvement and private landowner cooperation.

2 HARNEY COUNTY PROFILE

2.1 County Setting

Harney County was established in 1889 with a land base of 10,228 square miles (Map 1). The County population is estimated at 7,000 people. There are approximately 3,200 and 2,000 people living in the incorporated cities of Burns and Hines, respectively. Harney County is located in southeast Oregon and is famous for its century-old ranches and a variety of natural resource attractions such as the Malheur National Forests, Malheur National Wildlife Refuge, Alvord Desert, and Steens Mountain. Elevation ranges from 4,148 feet at Burns to the 9,733-foot peaks of Steens Mountain. Vegetation throughout the county is diverse and varies from ponderosa pine forest in the north to sagebrush shrub lands and grasslands in the south intermixed throughout with wetlands.

The economy of Harney County is primarily supported by ranching, manufacturing, and lumber. The ecological resources such as Steens Mountain and Malheur National Wildlife Refuge draw hikers, geologists, bird watchers, and rock climbers from around the Country. Large, expansive ranches are leading producers of cattle and hay. Harney County cattle production ranks ninth in the Country. The two incorporated cities, Burns and Hines, are a transportation hub for the region and business centers for Oregon's largest county.

2.2 Communities

Burns and Hines are the two incorporated cities, and Andrews, Crane, Diamond, Drewsey, Fields, Frenchglen, and Riley are the rural, unincorporated communities that are considered in the Harney County CWPP (Table 2). Burns and Hines are protected by their respective fire departments, which consist of fulltime fire chiefs and volunteer staff. The unincorporated communities are located in areas protected by Rangeland Fire Protection Associations. Burns and Hines are the business center of the County and US Highway 20, which services southeastern Oregon. The seven rural communities are ranching and farming communities located throughout the County. Recreation is also important to these communities. These communities service their respective surrounding areas and usually consist of a hotel, service station, post office, school and/or church, and a few residences. Private landowners in the outlying areas come in for commodities and services.

Table 2 Community Summary Information

Community	Location	Fire Authority	Surrounding Fuels
Burns	US Highway 20	Burns Fire Department	Sagebrush/grass on west and south, and agricultural land on east and north, weeds in town
Hines	Immediately west of Burns on US Highway 20	Hines Fire Department	Sagebrush/grass on west and south, and agricultural land on east and north, weeds in town
Andrews	East Steens Road, 16 miles north of Fields	Andrews RFPA ¹	Sagebrush, grass, agricultural land, weeds in town
Crane	State Highway 78, 32 miles southeast of Burns	Crane-Drewsey RFPA	Sagebrush, grass, agricultural land, weeds in town
Diamond	Off of State Road 205,	Crane-Drewsey	Sagebrush, grass,

Community	Location	Fire Authority	Surrounding Fuels
	52 miles south of Burns	RFPA	agricultural land, weeds in town
Drewsey	Off of US Highway 20, 45 miles east of Burns	Crane-Drewsey RFPA	Juniper, sagebrush, grass, agricultural land, weeds in town
Fields	State Road 205, 115 miles south of Burns	Fields RFPA	Sagebrush, grass, agricultural land, weeds in town
Frenchglen	State Road 205, 59 miles south of Burns	No Authority	Juniper, sagebrush, grass, agricultural land, weeds in town
Riley	US Highway 20, 58 miles west of Burns	Silver Creek RFPA	Sagebrush, grass, agricultural land, weeds in town
Rural, dispersed dwellings	Throughout the county	Various RFPAs	Juniper, sagebrush, grass, agricultural land, weeds

¹Rangeland Fire Protection Association

2.3 Climate

Harney County climate is semi-arid with long, severe winters and short, dry summers (Table 3). With a typical high desert climate, the County experiences over 300 days of sunshine per year and receives an average of 11 inches of annual precipitation. Warm, sunny days of summer record highs in the eighties with cool nights. Winter temperatures are typically in the low thirties. Temperatures at Burns for January, which are typical of the open valleys, average 25 degrees Fahrenheit (F). In July, it is typically 70 degrees F, with an annual average temperature, of 47 degrees F. In the north central part of the Malheur Basin (elevation 4,666 feet), the January average is 22 degrees F. In July, it is typically 60 degrees F., with an annual average of 40 degrees F. At P-Ranch Refuge, near Frenchglen, the January average is 30 degrees F. In July, it is typically 66 degrees F. with an annual average of 48 degrees F. The frost-free period extends from the last day of spring with a minimum temperature of 32 degrees F or below, to the first day of fall with a minimum temperature of 32 degrees F or below. The average annual precipitation ranges from under 10 inches for the lower elevations to more than 40 inches at the higher elevations. Within the Refuge, Burns receives about 11.0 inches and P-Ranch gets about 12.0 inches. At all stations, the low precipitation months are July, August, and September.

Table 3 Monthly Climate Summary for Burns City, Oregon for the Years of 1971–2000

Climate Attribute	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Maximum Temperature (F °)	35.5	42.0	48.7	56.4	66.2	75.3	84.2	82.1	73.7	62.8	44.9	37.1	59.3
Average Minimum Temperature (F °)	16.6	21.6	25.6	30.0	37.7	45.2	52.6	50.4	41.6	32.9	23.0	17.4	33.0
Average Total Precipitation (inches)	1.67	1.17	1.21	0.78	0.63	0.46	0.45	0.59	0.51	0.60	1.29	1.68	11.04

2.4 County Vegetation

The vegetation of Harney County is diverse and typical for the northern Great Basin. The vegetation varies from ponderosa pine forest in the north to expansive sagebrush and grasslands in the south (Map 2). Wetlands are widespread. Cropland and hay fields are common throughout the County. These fields may be considered hazardous fuels in the late summer and fall as the crops and hay dry out. Irrigated fields are not a hazardous fuel. Vegetation types such as ponderosa pine, aspen, juniper, big sagebrush, and the different grasses can all be hazardous fuels given the accumulation of dead plants, unnaturally high plant density and cover, and/or low water content of tissues. Annual grasslands are widespread and dominated by cheatgrass. Cheatgrass is a highly flammable, flashy fuel when it dries in early summer. Thus, it can extend the fire season by one to two months. Cheatgrass is highly competitive with native vegetation and may readily become established on disturbed sites.

2.5 Water Resources

Surface water is located in many of the low lying areas in Harney County in the form of lakes, ponds, rivers, and streams. Abundant water is essential for wildfire suppression and structure protection. Water sources are needed for re-filling tanker trucks as close to fires as possible to reduce travel time. Available surface waters include lakes, ponds, rivers, and streams such as Malheur Lake, Harney Lake, Alvod Lake, Tum Tum Lake, Delintment Lake, Trout Creek, Warm Springs Reservoir, and Malheur River. Many agriculture fields are irrigated and sprinkler systems can be used as water sources.

2.6 Fire Protection Authorities

Various lands in Harney County receive wildland fire management from the BIFZ, Burns Fire Department, Hines Fire Department, Burns Paiute Indian Reservation, Oregon Department of Forestry (ODF), USFWS, and four Rangeland Fire Protection Associations, depending on land ownership (Map 1). Mutual Aid Agreements exist among the various fire authorities for support and help as needed. However, each authority has its regulations and limitations which dictate its area of responsibility for fire management activity. Map 1 shows the boundaries of the fire protection authorities.

Burns Interagency Fire Zone (BIFZ) – The BIFZ is formed by the BLM and US Forest Service, with mutual and offset agreements with ODF. The BIFZ is responsible for wildland fire and fuels management on public and some private lands (through contract arrangements) within the County. These lands include federal land in the BLM Burns District, the Malheur National Forests, Oregon State Land, and contracted private land. BIFZ provides fire protection on certain lands in the Central Oregon Forest Protection District through a yearly “offset” agreement. Firefighters are trained to National Wildfire Coordinating Group (NWCG) standards. The BIFZ supports are a 22-person hand crew that works on wildland fire and fuel management issues in the BIFZ. During the fire season, the following equipment is available to the BIFZ:

- Seven type 4 heavy engines
- Ten type 6 light engines
- One D7 tractor and trailer

- One helicopter Type III
- One single engine air tanker

The majority of the vehicles are stationed at the USFS compound in Hines. However, two Type 6 Engines and two Type 4 Engines are stationed at the BLM compound in Frenchglen. The BIFZ works with the RFPAs through written agreements in providing equipment and training.

Oregon Department of Forestry – Responsible for protection in Forest Protection Districts. BIFZ provides protection in the District through mutual aid and offset agreements. ODF administers forest practices on private lands and is responsible for enforcement of the Forest Protection Status (ORS 477). During the fire season, one type 6 engine is stationed in Burns.

Burns Fire Department – The Burns Fire Department has responsibility for structure, grass, and vehicle fires within the City of Burns and will respond to fires within a five-mile radius through private contract agreements. Response time is under 10 minutes given optimal conditions. The department consists of a full-time fire chief and volunteer members. The volunteers are trained at the Firefighter I level and some have specialist’s skills. Major equipment consists of two, triple-combination fire engines, a 2,500 gallon water tender, and a brush truck with a 250 gallon tank. The one fire station includes offices and training facilities. The fire department provides burning permits, community structure, prevention, education, and wildfire safety outreach.

Hines Fire Department District – The Hines Fire Department has responsibility for structure, grass, and vehicle fires within the City of Hines. However, they will respond to fires within five-mile radius around Hines. Optimal response time is under 10 minutes. The department consists of a full-time fire chief and volunteer members. The volunteers are trained at the Firefighter I level with some working on Firefighter II level with specialist’s skills. Major equipment consists of two, triple-combination fire engines and one brush truck with a 250 gallon tank. The only fire station includes offices and training facilities. The fire department provides burning permits, community structure, prevention, education, and wildfire safety outreach.

U.S. Fish and Wildlife Service – This agency provides dedicated wildland fire protection and fuels management on the Malheur National Wildlife Refuge. The USFWS will also respond to wildfire on BIFZ land as requested through a Mutual Aid Agreement. Fuels on the Refuge include marsh vegetation, irrigated meadows, and upland sagebrush and grasses. Prescribed fire is used to manage hazardous fuels and for vegetation improvement. Strategically located, permanent fuelbreaks are maintained throughout the year to reduce the chance of wildfire burning onto or leaving the Refuge. The fuelbreaks include mowed vegetation, mineral soil, and water. There are two permanent USFWS staff that oversee the fire program and are trained as NWCG Burn Bosses. As funds permit, the Refuge will also station up to four additional temporary staff trained at the Firefighter I level during the fire season. Dedicated firefighting equipment includes:

- One bulldozer
- One heavy engine
- One medium engine

- One light engine

Temporary firefighting equipment that is available as needed includes:

- One bulldozer
- Two graders
- One tanker
- One transport truck

Rangeland Fire Protection Associations – The RFPAs in Harney County include Fields FPA, Andrews FPA, Crane-Drewsey RFPAs, and Silver Creek RFPAs. RFPAs operate under ORS 477-305 to provide wildfire protection on private lands within their jurisdiction and have a contractual relationship with the BIFZ to provide wildfire protection as first responders. The BIFZ is responsible for wildland fire management on public lands within the RFPAs areas. The associations were formed to provide wildfire protection because protection was not available elsewhere. The RFPAs do not provide structure fire protection. The RFPAs operate as non-profit corporations with volunteer membership. Dues are assessed to RFPAs residences for membership. Dues and grant money are sources for funding. Expenses are incurred for insurance, fuel, and equipment repair. Equipment consists of donated, loaned, or secured-by-grant wildfire fighting vehicles such as brush trucks and tenders. Response times to a wildfire are variable depending on fire location, accessibility, and availability of volunteers.

Fields/Andrews RFPAs – The Fields and Andrews RFPAs function together as one unit. The Fields and Andrews RFPAs consist of 59,061 and 30,997 acres, respectively, and provide first response wildfire protection to five miles on either side of East Steen Road. The population of the area RFPAs is approximately 150 people. Major equipment consists of three pickup truck tankers with 200 gallon capacity and a 1,000 gallon pumper. The Alvor Ranch will lease its fire fighting equipment to the RFPAs, which consist of truck pumpers, a bulldozer, and a skidder. Twenty volunteers are trained at the Firefighter I level by BLM.

Silver Creek RFPAs – The Silver Creek RFPAs is centered around the community of Riley in the northwest part of the County. The RFPAs provides first response wildfire protection to 33,198 acres. Equipment consists of two pickup truck tankers with 250 gallon capacity and a 2,000 gallon tender. There are four volunteers that are trained at the Firefighter I level by BLM.

Crane-Drewsey RFPAs – The Crane-Drewsey RFPAs consists of 170,374 acres. Approximately 435 properties are served. Only 50 members have paid dues. Crane and Drewsey combine efforts under one RFPAs for financial reasons to reduce insurance rates. Currently, Drewsey does not have a fire chief or association president. Crane provides fire protection through a Mutual Aid Agreement. Firefighting equipment is strategically located around the RFPAs to provide quick response to wildfire. Major equipment includes pickup trucks with slip-in 200 gallon tanks, a flatbed truck with a 200 gallon tank, and a 500 gallon pumper. BLM stations a small pumper truck at Crane. Two small pumper trucks are stationed at Diamond.

Burns Paiute Indian Reservation – The Paiute Indian Reservation is located immediately northwest of Burns and consists of 760 acres. The Reservation provides structure and wildfire

response with a Type 6,280 gallon engine. Two volunteers are working on Firefighter I certification through BLM.

2.7 Values at Risk

Human life and welfare are at risk to wildfire in Harney County because of the buildup of hazardous fuels around communities and structures, poor emergency vehicle ingress and egress, and inadequately trained and/or equipped fire suppression authorities. Throughout the County, there are scattered small communities and ranches with houses and outbuildings without structural fire protection because they are outside the Burns or Hines Fire Departments Districts. Other economic values at risk include businesses, farmland, ranchland, grazing land, hunting and recreational land, and critical infrastructure. The communities of Burns, Hines, Andrews, Crane, Diamond, Drewsey, Fields, Frenchglen, and Riley are at risk to wildfire for one or more of the following reasons:

- Buildup of hazardous fuels such as juniper, sagebrush, annual weeds, or seasonal dry grasses
- No jurisdictional responsibility for structure suppression
- Lack of wildfire suppression authority
- Poor or limited response time
- Limited access
- In the RFPA and VFD, there are inadequately trained volunteer staff
- In the RFPA and VFD, there is a lack of proper equipment (personal protective equipment, trucks, dozers, etc.)
- Not adhering to county approved fire-use procedures and restrictions for such things as burn barrels or burn piles

In addition, numerous individual structures throughout the County are at risk to wildfire for one or more of the following reasons:

- Hazardous fuels in vicinity of structure and along private access roads
- Poor emergency ingress or egress
- Lack of defensible space
- Lack of use of non-combustible building materials
- Lack of available or sufficient water for firefighting

Ecological values within Harney County are important for continued economic growth and human welfare. The degree of loss will depend on wildfire severity and time of recovery. Wildfire is a natural part of the Harney County ecology and normally occurring fire is necessary to maintain many desirable attributes such as wildlife habitat and livestock forage. Under a normally occurring fire regime, many ecological values will recover within a few years. Air quality should recover within days after a fire but wildlife habitat may take years. However, catastrophic wildfire may change wildlife habitat beyond its capacity to recover if the biophysical nature of the soil, vegetation, and watershed are altered. In addition, wildfire may produce conditions conducive to the spread of noxious and invasive weeds such as cheatgrass, which will further the degradation of rangeland. Ecological values at risk to wildfire include such things as:

- Wildlife and aquatic habitat
- Rangeland and forests
- Watersheds
- Scenic areas
- Water quality
- Air quality
- Natural vegetation communities
- Cultural and historic sites

3 CWPP PROCESS

3.1 Harney County CWPP Requirements

The eight steps to developing the Harney County CWPP are listed in Table 4. These steps are defined in the pamphlet, *Preparing a Community Wildfire Protection Plan*.

Table 4 The Eight Steps to Developing a CWPP for Harney County

Step	Task	Explanation
One	Convene Decision makers	Form a core team made up of representatives from local governments, fire authorities, and Oregon Department of Forestry.
Two	Involve Federal Agencies	Engage local representatives of the BLM and USFS and other land management agencies as appropriate.
Three	Engage Interested Parties	Contact and encourage participation from a broad range of interested organizations and stakeholders.
Four	Establish a Community Base Map	Develop a base map of the County base map that defines communities at risk, critical infrastructure, and forest/rangeland at risk.
Five	Develop a Community Risk Assessment	Develop a county risk assessment that considers fuel hazards, risk of wildfire occurrence, homes, business, and at risk infrastructure and other values, and preparedness capability. Rate the level of risk and incorporate into the base map as appropriate.
Six	Establish Community Priorities and Recommendations	Use the risk assessment and base map to facilitate a collaborative public discussion that prioritizes fuel treatments and non-fuel mitigation practices to reduce fire risk and structural ignitability.
Seven	Develop an Action Plan and Assessment Strategy	Develop a detailed implementation strategy and a monitoring plan that will ensure long-term success.
Eight	Finalize the CWPP	Finalize the County CWPP and communicate the results to interested parties and stakeholders.

3.2 Harney County CWPP Core Team

The initial step in developing the Harney County CWPP is to organize a core decision-making team. The members of this team have the responsibility for CWPP implementation and oversight. The Harney County team is composed of representatives from local government, local fire authorities, and an Oregon Department of Forestry representative (Table 5). Representatives from organizations such as communities, utilities, Chamber of Commerce, hunting clubs, water districts, and homeowners associations may choose to participate as appropriate.

Table 5 Harney County CWPP Core Team Members

Team Member	Organization	Phone Number
Steven Grasty	Harney County Judge	573-6356
Richard Jennings	Harney County Planning Director	573-6655
Chris Briels	Burns Fire Chief	573-2320
Bob Spence	Hines Fire Chief	573-4404
Bob Barclay	Fields/Andrews FPA	495-2223
John Williams	Fields/Andrews FPA	495-2344
Don Lindner	Crane/Drewsey FPA	495-2300
Phil Peterson	Silver Creek FPA	493-2806
Gordon Perlot	Silver Creek FPA	589-1058
Gordon Foster	Oregon Department of Forestry	541-575-1139
Kenton Dick	Burns Paiute Indian Tribe	573-2088 ex. 250

3.3 Federal Agency Collaboration

Federal agencies such as the BLM, USFS, and USFWS (Malheur National Wildlife Refuge) participate in the CWPP planning process as interested stakeholders. The BIFZ has a major interest in the implementation and success of the Harney County CWPP because of their invested concern in wildfire fuels management. The BIFZ provides wildland fire and fuels management on BLM, USFS, and Oregon State Lands in the County. Wildfire does not respect political boundaries so all fire authority organizations must work together to reduce the risk of wildfire. BIFZ advisories to the Harney County CWPP are Jeff Rose (573-4450) and Dan Ridenour (573-4410).

4 WILDLIFE RISK ASSESSMENT

4.1 Approach to the Wildfire Risk Assessment

Field surveys, Core Team meetings, interviews, questionnaires, and a public meeting were used to obtain various types of information to assess the risk of wildfire in Harney County. All information was gathered, analyzed, and presented in the CWPP format by Walsh Environmental Scientists and Engineers, LLC. A project website was maintained by the Harney County Planning Department that provided project updates and information to promote public awareness and outreach.

The National Fire Protection Association (NFPA) Form 1144, *Standard for Protection of Life and Property from Wildfire 2002 Edition*, was used to assess the level of risk and hazard to communities and individual homes (See Appendix B for NFPA Form 1144). NFPA Form 1144 is adaptable for communities or individual structures. The evaluation consisted of rating attributes such as means of access, surrounding vegetation (fuels), presence of defensible space, topography, roofing and other construction materials, available fire protection, and placement of utilities. Scores were assigned to each element and then totaled to determine the level of risk. Low, moderate, high, and extreme hazard were determined based on the total score.

Field surveys were conducted during September 2005 to assess the level of risk to wildfire loss to the 10 communities and 210 rural houses located throughout the County. Community's evaluations consisted of scoring the entire community using NFPA Form 1144. Notes were taken on the type of fuels and terrain surrounding the community because these attributes—in addition to weather—dictate wildfire behavior. At times, fuel and terrain observations were made several miles from a community.

Approximately 20 percent of the homes in rural Harney County were evaluated. The evaluations were conducted through observation of the house from the driveway or road leading to the home. Only homes that appeared to be inhabited were assessed. The survey was not statistically sufficient because a random sample of all possible structures did not occur. The approach was to evaluate every third or fourth house along a road. However, an attempt was made to evaluate homes throughout the County, except those in the Central Oregon Forest Protection District. ODF evaluated these homes at another time. Therefore, the inferences that are drawn concerning structure hazard cannot be extracted to all structures in Harney County, but are limited to those surveyed. However, the results are still useful for evaluating the level of structure hazard in Harney County and determining ways to reduce the hazard.

Two meetings with the Core Team were convened to discuss the approach to the risk assessment. Also presented were findings of the risk assessment as to assessing wildfire risk in the County. One meeting occurred September 1, 2005 to initiate the project. A second meeting was held on September 19th.

Specific interviews were held with several members of the Core Team. The interviews included the Burns and Hines Fire Chiefs, representatives of the RFPAs, representatives from BIFZ, and the Burns Paiute Indian Fire Chief. Information obtained during the interview included such

things as level of preparedness, existing equipment, level of training for volunteer staff, equipment needs, training needs, concerns, hazardous fuels and situations, and mitigation opportunities.

A direct mailing occurred on October 6, 2005 to 1,059 rural Harney County addresses. The direct mailing consisted of a cover letter from the Planning Director, a questionnaire, and a Firewise pamphlet. The cover letter explained the risk assessment project, announced an upcoming public meeting, and requested that homeowners complete and return the questionnaire. The purpose of the questionnaire was to judge public opinion on the level of wildfire risk in the County, assess values at risk, and evaluate mitigation practices needed to reduce risk (See Appendix C for questionnaire). The Firewise brochure explained proper home construction and landscaping practices to reduce the risk of wildfire (See Appendix D).

A public meeting was convened on December 1, 2005 at 7:00 pm in the Burns Senior Center. Newspaper and radio releases announced the meeting, as did the direct mailing. The reason for the meeting was to explain the purpose of the wildfire risk assessment, present the findings of the risk assessment, and provide an opportunity for the public to participate in the process, review of findings, and comment on proposed mitigation possibilities such as hazardous fuels management and non-fuel projects. The draft report of the wildfire risk assessment and mitigation plan were posted on the Harney County website to encourage public review and comment.

The requirements to complete a comprehensive CWPP calls for a baseline map to be developed that conveys information such as communities at risk, critical infrastructure, water supplies, utilities, and mitigation opportunities. In order to present complex information in a readily understandable manner, several maps were developed at the same scale and reference. The different maps are Harney County Base Map (landownership, roads, surface water, fire protection authorities), fire history, historic fire regime, fire regime condition class, fire spread potential, community and structure risk level, and fuels management and mitigation opportunities. The maps were produced based on geographic information system (GIS) data obtained from Harney County Planning Department and ODF. All maps are sequentially presented in Appendix A.

4.2 Wildfire History

Wildfires have historically occurred in Harney County from lightning and Native American ignitions sources. The natural fire regime of an area is the role that fire would play across a landscape in the absence of modern human mechanical intervention, including Native American burning. The different natural (historical) fire regimes are classified based on average number of years between fires (fire frequency), combined with the severity (amount of vegetation killed or damaged) of the fire on the dominant overstory vegetation. There are seven historic fire regime classes that occur in Harney County (Map 3). Fire frequency and severity varied throughout the County depending on vegetation type and elevation. The most common fire regime occurred with a return frequency of 35-100+ years and with low severity.

Fire regime condition class (FRCC) measure the degree of departure from reference (historic) conditions, possibly resulting in changes to key ecosystem components, such as vegetation characteristics, fuel composition, fire frequency, severity, and pattern, and other associated

disturbances, such as insect and disease mortality, grazing, and drought. The FRCC in Harney County is complex (Map 4). The FRCC 1 is the most common class, but both FRCC 2 and 3 also occur throughout the County. FRCC 1 represents current conditions that are the same as the historic fire regime. FRCC 2 represents a moderate departure from the historic fire regime, which represents moderate changes in fuel attributes such as continuity, composition, amount, and changes in the fire return interval and/or severity. FRCC 3 represents a high departure from the historic fire regime, which means major changes in fuel attributes such as continuity, composition, and amount, and changes in the fire return interval and/or severity. For the purposes of this CWPP, the FRCC classes 1, 2, and 3 represent low-, moderate-, and high-hazardous fuel situations, respectively.

Ignition risk potential (IRP) is the potential for either lightning or human-caused fire to start and is defined as the number of wildfires per 1,000 acres per 10 years (Map 5). The classes are low (0-0.1 fires per 1,000 acres per 10 years), moderate (0.1-1.1 fires per 1,000 acres per 10 years), and high (> 1.1 fires per 1,000 acres per 10 years). The IRP varies throughout Harney County. The low class is the most common while the high class is the least common. The high class is associated with juniper and ponderosa pine woodlands and forest in the northwest part of the County. Assessing ignition risk involves evaluating the potential for wildfire ignition from human uses, activities, or events in combination with the actual historical fire occurrence resulting from these uses and from lightning.

As would be expected based on the IRP, wildfires occur throughout Harney County, but with a high preponderance in the northwest section associated with the juniper and ponderosa pine woodland and forests (Map 6). Most fires occur during late summer and fall months. Data on wildfire size, number, and ignition source for the years 1993–2004 are presented in Table 6. Approximately 59 percent of all wildfires in Harney County burn less than 0.25 acres regardless of ignition source, while less than 1 percent of all fires burn over 5,000 acres. Lightning caused 78 percent of wildfires while 22 percent were human-caused. Human-caused wildfire resulted mainly from escaped fire (e.g., trash burning, field burning, land clearing, or slash burning) and campfires.

Many of the significant fire events occur from lightning storms. There are an estimated 50–70,000 lightning strikes per year in Harney County. Widespread, dry lightning is fairly frequent, occurring approximately every one to three years. Occasionally, multiple dry storms occur in a given season. These episodes can cause 50–100 ignitions daily which require suppression. The high frequency of lightning-caused fires illustrates that wildfire is a natural component of Harney County ecosystems. The 1990 Pine Springs Basin Conflagration, which burned 73,700 acres and threatened Burns, Hines, and Riley, was lightning-caused. However, human-caused fire is significant because these fires usually occur close to structures and other important infrastructure.

Even though the vast majority of wildfires in Harney County are suppressed before they burn large areas, wildfire risk to communities and structures is considerable given the number of annual fires that occur. During this 12-year period, there were 1,174 wildfires for an average of 98 per year. The moderate occurrence of wildfire means that county residences need to be vigilant with Firewise practices. Although the risk of wildfire is high in Harney County, within

recent history, wildfire has had little impact on residences. The CWPP process is a preventative tool to reduce the risk of catastrophic fires to property and life.

Table 6 Wildfire History for the Years 1993–2004

Fire Size Class (Acres)	Acres Burnt	Number of Fires	Fire Ignition Source	
			Lightning	Human
A 0 – 0.25	71	690	555	135
B 0.25 – 9.9	525	292	224	68
C 9.9 – 99.9	3,345	89	62	27
D 100 – 299.9	7,062	40	29	11
E 300 – 999.9	14,725	25	16	9
F 1,000 – 4,999.9	70,627	29	23	6
G 5,000 – 9,999.9	116,070	9	8	1

4.3 Questionnaire Summary

Questionnaires were sent to 1,059 rural addresses and posted on the Harney County Planning Department’s website to obtain information on perceived wildfire risks and hazards (Appendix C). Seventy-seven questionnaires and three letters were returned to the Harney County Planning Department. Generally, the respondents said that wildfire risk is moderate to extreme, vegetation represents the greatest hazard, and its reduction is important for mitigation (Tables 7, 8, and 9).

Table 7 Questionnaire Summary

Question		Percent of Total
1. What community do you live in or are closest to?	Burn/Hines	30%
	Andrews	3%
	Buchman	10%
	Crane	14%
	Diamond	11%
	Drewsey	11%
	Fields	3%
	Frenchglen	8%
	Riley	2%
	Other	8%
2. How great of risk do wildfires pose to your property and community?	Extreme	28%
	Moderate	40%
	Low	25%
	No	7%
3. What areas do you think are at extreme fire hazard and pose a risk to homes or property?	Forestlands	17%
	Grasslands	23%
	Sagebrush	30%
	Juniper	13%
	Farmland	2%
	Other	15%
4. What do you think would be the best way to mitigate or reduce these hazardous?	Reduce Vegetation	58%
	Increase Equipment	18%
	Increase Volunteers	10%
	Increase available water	14%
5. Do you know of recent actions taken to reduce the risk of wildfires or to protect residents from wildfire spreading from public lands onto private lands or visa versa?	No	63%
	Yes	37%

6. Have there been recent fire education programs in your community?	No	78%
	Yes	22%
7. Do you think that the community in which you live is prepared to combat wildfire? (See Table 8)	No	22%
	Yes	40%
	I do not know	38%
8. What actions do you think need to be taken to reduce wildfire risk?	See Table 9.	

Table 8 Written Responses to Question 7

Comment Number	Number Received	Comment	
1	6	no	Need more equipment and personnel
2	2	no	Not in a rural fire protection district
3	1	no	Available training
4	5	no	No comment
5	15	yes	Areas protected by fire departments, area associations, state government, and federal government.
6	1	yes	Up to a certain size
7	1	yes	Controlled burns already in place
8	1	yes	On private property
9	1	yes	Everyone knows the risk
10	2	yes	No comment
11	1	I don't know	New to the area
12	1	I don't know	Get rid of sagebrush and dry grasses
13	22	I don't know	No comment

Table 9 Summary of Responses to Question Number 8

Comment	Number Received	Comment
1	4	Cut or mow grasses near structures and along roadways.
2	1	Use firewood cutting to help reduce fuel loading (dead and down).
3	9	Utilize grazing to reduce fuels around structures.
4	3	Maintain a 10'-20" fuelbreak (fire guards) around all structures.
5	15	Utilize logging, thinning, and other fuel treatment techniques.
6	3	Acquire and update equipment
7	4	Provide more training/education
8	2	Recruit more volunteers
9	10	Utilize prescribed fire (controlled burns) to reduce fuel loading and risk.
10	2	Work together to eliminate weeds on both public and private lands
11	1	Create rural fire protection district
12	1	Let nature decide
13	1	Status quo – no change.
14	1	Join efforts to coordinate the risk of wildland fires.
15	4	Reduce brush around structures
16	1	Property tax incentive for fire prevention efforts
17	1	Clean up empty lots in town
18	1	Plant evergreen forage

4.4 Wildfire Risk to Communities

The NFPA Form 1144 was used to evaluate community risk to wildfire and assign each to a hazard class (Table 10). Burns and Hines were evaluated together because of their close proximity to each other and similarity in the surrounding terrain and fuels, structure composition, and landscaping. The Burns/Hines community was also divided into east and west because of similarities in terrain and fuels associated with the two sections.

Table 10 Community Hazard Rating and Contributing Factors

Community	Hazard Rating	Contributing Factors
Burns/Hines East	Moderate	<ul style="list-style-type: none"> • Fuels of dried grass and weeds in proximity to structures • Lack of defensible space around some homes • Combustible roof or siding on some homes
Burns/Hines West	High	<ul style="list-style-type: none"> • Fuels of sagebrush, juniper, dried grass and weeds in proximity to structures • Surrounding terrain • Lack of defensible space around some homes • Combustible roof or siding on some homes
Riley	Moderate	<ul style="list-style-type: none"> • Fuels of sagebrush, dried grass and weeds in proximity to structures • Lack of structure defensible space • Lack of structure fire protection
Drewsey	High	<ul style="list-style-type: none"> • Fuels of dried grass and weeds, sagebrush, juniper in proximity to structures • Surrounding terrain • Lack of structure defensible space • Limited emergency ingress and egress • Combustible roof or siding on some homes • Lack of structure fire protection
Crane	High	<ul style="list-style-type: none"> • Fuels of dried grass, weeds, sagebrush, juniper in proximity to structures • Lack of structure defensible space • Surrounding terrain • Combustible roof or siding on some homes • Limited emergency ingress and ingress • Lack of structure fire protection
Diamond	High	<ul style="list-style-type: none"> • Fuels of dried grass, weeds, sagebrush in proximity to structures • Lack of structure defensible space • Surrounding terrain • Combustible roof or siding on some homes • Lack of structure fire protection
Frenchglen	High	<ul style="list-style-type: none"> • Fuels of dried grass, weeds, sagebrush in proximity to structures • Lack of structure defensible space • Surrounding terrain • Combustible roof or siding on some homes • Limited emergency ingress and egress • Lack of structure fire protection
Andrews	High	<ul style="list-style-type: none"> • Fuels of dried grass, weeds, sagebrush in proximity to structures • Lack of structure defensible space • Surrounding terrain • Evening downslope winds • Combustible roof or siding on some homes • Limited emergency ingress and egress • Lack of structure fire protection
Fields	High	<ul style="list-style-type: none"> • Fuels of dried grass, weeds, sagebrush in proximity to structures • Lack of structure defensible space • Evening downslope winds • Combustible roof or siding on some homes • Lack of structure fire protection

Seven of the nine communities received a high-hazard rating because of issues with hazardous fuels proximity, the use of combustible construction material, inadequate emergency ingress and egress, and the lack of structure fire protection. An action that can be taken immediately to reduce the hazard ratings is the development of defensible spaces around homes and other structures. Briefly, a functional defensible space consists of non-flammable vegetation no closer than 30 feet to the structure, the use of low flammability landscaping plants, mowed grass, lack of firewood stacks, and fuel tanks (See Appendix D for complete instructions). The defensible space should be larger for structures built on slopes.

Dried grass and weeds were prevalent in and around all communities. Dried grass and weeds are a serious fuel concern during the late-summer and fall months. These flashy fuels are highly flammable and cause fire to spread rapidly. Grasses and weeds should be mowed in the late summer to reduce the risk of wildfire loss.

The nature of the wildland fuel (i.e., vegetation) around a community will influence its risk to wildfire. Fuels management must consider not only the area immediately around a community but also for several miles out. Wildfire can spread rapidly given flammable fuels (e.g., juniper, dried grass, and sagebrush), windy conditions, and sloping terrain. The FRCC around the communities was used to assess hazardous fuels (Map 4).

4.5 Wildfire Risk to Rural Structures

The NFPA Form 1144 was used to evaluate structure risk to wildfire and assign each to a hazard class (Table 11). The structures evaluated were limited to rural Harney County and are not those located in the Central Oregon Forest Protection District (FPD). The structures located in the FDP were previously surveyed by ODF. Structures are defined as houses used for human occupancy. Outbuildings such as barns, sheds, stables, or other similar buildings were not assessed. Two-hundred and 10 homes were assessed throughout rural Harney County that occurred mainly in the RFPAs. Homes were also assessed on the west side of Burns and Hines. There is no apparent pattern to hazard classification within the County (Map 4). High hazard structures are just as likely to be associated with low hazard structures as with moderate hazard structures.

Table 11 Rural Harney County Structure Classification as to Hazard Rating and Contributing Factors

Hazard Class	Percent of Structures	Contributing Factors
Low	16	<ul style="list-style-type: none"> • Two or more roads in/out • Main access road is wide, all season, less than 300 ft. long with turnaround • Fuel type is predominately grass or other crop • Defensible space of 71–100 ft. • Terrain is generally flat • Non-combustible roof and/or siding • Heating and electrical utilities placed underground
Moderate	58	<ul style="list-style-type: none"> • One road in/out • Access road is moderately wide, non-surfaced with grade < 5%, < 300 ft. with turnaround • Fuel type is predominately grass or other crop • Defensible space of 30–70 ft.

Hazard Class	Percent of Structures	Contributing Factors
		<ul style="list-style-type: none"> • Terrain is such to adversely affect wildfire behavior • Non-combustible roof with combustible siding • Electrical utilities usually below ground but heating fuel is above ground
High/Extreme	26	<ul style="list-style-type: none"> • One road in/out • Access road is narrow, non-surfaced with grade > 5%, < than 300 ft. long and without turnaround • Fuel type is predominately sagebrush, rabbitbrush, and/or juniper; weeds are abundant • Defensible space < 30 ft. • Terrain is such to adversely affect wildfire behavior • Combustible roof and siding • Heating and electrical utilities above ground

Structure hazard for 41 homes in the FPD was evaluated by the ODF using the presence of a defensible space, water availability, and surrounding fuel type as criteria. ODF found that 61, 15, and 24 percent of the homes could be classified as low, moderate, and high hazard, respectively (Map 4).

5 WILDFIRE MITIGATION PLAN

5.1 Approach to Mitigation Planning

Wildfire mitigation is defined as a means of reducing the chances of the occurrence or the loss of structures and other important community values. Hazardous fuels management, non-fuels mitigation projects, and public outreach are ways to mitigate the risk of wildfire. For maximum effectiveness, the three should be implemented concurrently.

Hazardous fuels and non-fuels mitigation projects were identified based on field surveys (completed when assessing community and structure risk to wildfire), interviews with county fire suppression experts, and through a questionnaire that was mailed to 1,059 rural addresses. Fuels mitigation projects were identified and prioritized based on proximity to community, hazardous fuel load and continuity, terrain, and professional experience.

The Harney County CWPP is not a legal document; but rather a planning document. The wildfire mitigation recommendations are for planning purposes—implementation is not required by law. Actions on public lands will be subject to federal, state, and county policies and procedures such as adherence to HFRA, National Environmental Protection Act (NEPA), and Oregon Forest Protection Act (OFPA). Action on private land may require compliance with such policies as OFPA, as well as county zoning laws and building codes. However, to be most effective in reducing wildfire risk, cooperation among federal, state, county, and private landowners is essential. Wildfire does not respect landownership boundaries. Any action taken will be limited in its effectiveness if either public land managers or private landowners choose not to take complementary action on their property.

5.2 Suggested Actions to Achieve Desired Results

The CWPP provides recommendations for hazardous fuels reduction, defensible space, building materials, education, outreach, infrastructure needs, water availability, and access. There is only so much fire authorities can do to protect individual life and property from wildland fires. The most effective form of mitigation is education and outreach. The purpose of a community-wide education program is to 1) educate the public to the risks of wildfire to property and life (during the summer months); 2) urge property owners to take responsibility in reducing the risk of wildfire and to create defensible space around their structures; 3) teach the benefits of different types of fire resistant building materials; and 4) increase awareness of the natural role of low-intensity fire in grassland and woodland ecosystems and make known the benefits from thinning fuel loaded areas. Education makes other mitigation programs possible.

Defensible space: Defensible space is a fuelbreak with a minimum 30-foot area around structures (Appendix C). The purpose of the defensible space is to reduce rate of fire spread and intensity so that it may burnout or firefighters may have a chance of suppression. The defensible space also provides room for firefighters to maneuver safely around the structure.

Hazardous Fuel Management: The chance that a wildfire will start on public or private lands and burn onto private or public lands, respectively, is high. Communities, homeowners, and other private lands in the assessment area are at risk. The USFS and BLM are partners in a nationwide fuels reduction and forest health project. The objectives of these vegetative treatments are to manage the buildup of hazardous fuels to alter fire behavior (i.e., rate of spread and burning intensity) and allow firefighters a chance of suppression. Hazardous fuels, such as those classified as FRCC 3, need to be managed to restore forest or rangeland health and manage vegetation to FRCC 1. Private landowners and the federal agencies may choose to enter into agreements to reduce the accumulation of hazardous fuels in the assessment area. Long-term and project-specific planning is required to ecologically, economically, and effectively manage hazardous fuels within the assessment area.

There are a variety of tools available for hazardous fuel treatments including prescribed fire, mechanical (brush-beating), hand crews, herbicides, livestock grazing, or a combination of the above. Specific planning is needed for each treatment area to determine the best ecological and economical approach. Treatments will depend on fuel location, terrain, spatial extent, proximity to values at risk, and fuel attributes. Hazardous fuels management will potentially result in large amounts of woody plant materials that will need to be disposed. Appropriate disposal practices will depend on the amount of woody material generated and they may include spreading the debris over a large area, burning, chipping and spreading, or burying in a landfill facility. Economical use of the woody debris such as small-diameter wood products or biomass energy production should be explored. Livestock grazing should be used to reduce herbaceous plant materials to the greatest extent possible.

All treatments would be implemented following federal, state, and local policy. Post-treatment management may be necessary to ensure that a productive plant community will establish and not weeds. Post-treatments may include seeding with desirable grasses and forbs and/or erosion control. Monitoring will determine the need for additional management.

Hazardous fuels management can be resource intensive. Coordination with the BLM and USFS, and project planning will allow resources to be used in the most efficient manner possible. This CWPP will allow the County to apply for grant money for fuels reduction projects (see Section 8)

Water storage facilities: Within the assessment area there are numerous streams, ponds, lakes, and irrigation systems available as water sources for wildfire suppression. In areas where water is not readily available, wells, underground storage tanks, or portable water storage systems, as appropriate, could be established. All water-refilling sites should be identified and maintained.

Access: Many of the routes to the structures in the assessment area are not adequate to provide easy access to the sites. There is typically a one-lane driveway in and out of the property and sometimes with a locked gate. In the areas where access is difficult, encourage property owners to have firefighting equipment and water availability. Identify properties with access issues and work with owners on improving access for firefighting personnel.

Emergency response: Improving the infrastructure of the existing fire protection departments and fire departments will improve response time to an incident. The quality of wildland fire response is dependant on staff training, distance to fire, equipment, personnel, and facilities.

Based on the interviews with community officials, field observations, and questionnaire responses, the following prioritized actions should occur in Harney County:

- Continue to strengthen the cooperation among the BIFZ, ODF, Burns and Hines Fire Departments, RFPAs, Burns Paiute Tribe, USFWS, and private landowners.
- Strengthen the firefighting ability of the RFPAs through motivation, training, and improved equipment. Work with the RFPAs to maintain adequate funding for insurance, fuel, and equipment repair.
- Continue to encourage the development of defensible spaces around homes and other important structures throughout the County. Recent research has demonstrated that houses with a non-flammable roof and sufficient defensible space have a significantly higher probability of surviving a wildfire than those lacking one or both defense mechanisms
- Re-construct the fuelbreak northwest of Burns and Hines that was installed for the 1990 Pine Springs Basin Conflagration.
- Develop strategically-located, Finney fuelbreaks around Drewsey, Crane, Diamond, Frenchglen, Andrews, and Fields.
- Reduce fuels classified as FRCC 3 through appropriate management action to the FRCC 1 category on federal and private lands.

- Create additional water storage points for fire suppression within the bounds of the Hines and Burns Fire Districts.
- Continue the distribution of educational materials to residents in order to promote knowledge and understanding in implementing proper Firewise activities such as landscaping, use of fire resistant building materials, proper access roads, and emergency evacuation procedures.
- Work with local ranchers to develop grazing plans to reduce fuels around structures and hay stock piles.
- Work with the BIFZ to create a prescribed natural fire program in Harney County. A prescribed natural fire program allows for natural occurring fires to burn when property and life are not at risk.
- Work with the BIFZ, Burns and Harney County Fire Departments, RFPAs, Burns Paiute Tribe, USFWS, and private landowners to develop strategies for post-fire management to reduce erosion and invasive weeds. Actions may include planting and building erosion control structures.

5.3 Hazardous Fuel Projects and Priority

The following are proposed hazardous fuel projects for Harney County. The projects are associated with communities and are present in priority based on wildfire risk, potential for loss, structure flammability, and resources protected.

The first line of defense is weed abatement and defensible space installation within and around communities and structures. Strategically placed fuelbreaks located within the WUI and within 1–3 miles of the community would be constructed. Given ideal fuel and weather conditions, wildfire can spread rapidly through dry grass, weeds, and shrubs. The fuelbreaks would provide a chance for the fire to be controlled. However, firebrands may loft over the fuelbreaks and cause spot fires in or near communities or structures. Thus, the need for weed abatement and defensible space installation is evident.

The intent of the fuelbreaks is to break up the continuity of the wildland fuel such as juniper, sagebrush, grass, and weeds in order to reduce wildfire rate of spread and severity to allow firefighters a chance for suppression. The suggested locations of the fuelbreaks are presented below. On the ground reconnaissance will be necessary to specify locations. Fire behavior models such as BehavePlus2, FARSITE, and FlamMap can help predict fuelbreaks locations given historic weather patterns, terrain, fuels, and proposed fuels management. The software and user manuals for these fire behavior models are available at <http://farsite.org>. Federal and state fire managers may have to work with private landowners in some areas to establish fuelbreaks.

Compliance with federal and state policy will be followed for fuelbreak construction. Also, funding will need to be secured. This process will take time. However, wildfire mitigation can occur immediately within all communities with the construction of defensible spaces around

structures and mowing grasses and weeds as they dry in the late-summer. This action alone will greatly reduce the risk of wildfire.

Fuelbreaks would be constructed using hand crews, mowers, brush choppers, livestock grazing, prescribed fire, or bulldozer depending on the vegetation type and terrain. Appropriate best management practices would be followed in fuelbreak implementation. The fuelbreaks would be at least 30–50 feet wide or wider on slopes with length varying according to placement and terrain. The intent of the fuel treatment is to reduce the kind and/or amount of vegetation and to minimize soil disturbance. Fuelbreaks would not restrict appropriate land uses such as livestock grazing. Care is needed to ensure minimal vegetation removal so the fuelbreak does not become potential habitat for annual weeds such as cheatgrass and tumble-mustard. Annual weeds are flashy fuels that would exacerbate fire spread. For this reason, the use of bulldozers should be minimal unless the seeding of perennial grasses occurs after treatment. Likewise, post-fire rehabilitation and monitoring will be necessary on-site where prescribed fire is used. All sites will require yearly monitoring to ensure that the fuelbreak is still functional. Fuelbreaks would require maintenance by mowing, livestock grazing, hand crews, or herbicide use, as appropriate.

In areas where sagebrush or bitterbrush ground cover is greater than 50 percent, efforts would be to reduce the cover to 15–25 percent. Hand crews or a shrub chopper could be used for this purpose. This level of sagebrush or bitterbrush cover would still provide adequate wildlife habitat for species such as sage grouse and provide soil protection. Established perennial grass stands should be mown or grazed annually to a height of no less than 6 inches. Mowing or grazing during the late summer would allow the plants to set seed and maintain vigor.

Concurrently with the establishment of the fuelbreaks around communities, there should be hazardous fuel management on those areas designated as FRCC 3 (Map 4). The objective would be to reduce FRCC 3 vegetation to FRCC 1. Prescribed fire, hand crews, grazing, and/or mechanical treatments would be used to achieve the FRCC improvement. The type of treatment would depend of proximity of structure, slopes, and fuel type. Ground reconnaissance would identify high-priority areas. Focus would first be on the fuels within one mile of communities. Areas classified as FRCC 2 also need treatment but would be lower priority than the FRCC 3 vegetation. Communities with FRCC 3 fuels within one mile include Hines, Riley, Crane, Burns, Andrews, and the Paiute Indian Reservation.

Burns and Hines – The fuelbreak that was bull dozed into place to protect the cities from the Pine Springs Basin Fire should be re-established northwest of Burns and Hines running from T23S R30E section 35 through Hines South Logging Road to the Paiute Reservation through T23S R30E sections 27, 22, 15 and 11 (Map 7). In addition, strategically located fuelbreaks should be located further west and north of the main fuelbreak to provide an area for firefighters to safely work. Another fuelbreak should be established northwest of the small development along Turnout Road in T22S R31E sections 28, 29, and 32. Defensible space and non-flammable roofs should be encouraged for all structures and houses on the west and south sides of Burns and Hines that are within 300 feet of juniper and sagebrush covered slopes. Firebrands from a fire could blow on to these structures and cause fire. Fuels mitigation and defensible space construction for the Canyon Road houses is needed. This area is at extreme risk for wildfire.

Fuels such as sagebrush and juniper need to be considerably reduced with defensible space construction around homes. Weed abatement by mowing is needed throughout Burns and Hines. Firebrands from wildfire could ignite these weeds and cause spot fires in the towns. FRCC 3 fuels occur in T23S R30E sections 14, 15, and 22; and in T22S R31E sections 21, 28, and 29.

Paiute Indian Reservation – A fuelbreak should be constructed along its boundaries as appropriate to reduce the chance of fire spreading onto or from the Reservation (Map 7). Existing roads on the north and east can be used as the bases for the fuelbreaks. FRCC 3 fuels are located in T22S R30E sections 25, 26, 35, and 36.

Crane – A series of 2–3, strategically placed fuelbreaks should be constructed on the hill slopes on the north and south of town in T25S R3E sections 5, 6, 7, and 8 and perhaps sections 17 and 18 depending on the FARSITE modeling results (Map 8). Dried grass and weeds within the community need to be mowed during the fall. The use of non-flammable roofs and defensible spaces should be encouraged. FRCC 3 fuels occur in T25S R33E sections 13 and 24.

Drewsey – A series of 3–4, strategically placed fuelbreaks should be constructed on the west and east sides of town in the sagebrush vegetation of T20S R35E section 22, 24, 25, 26, and 27. Existing roads may be used as the basis for the fuelbreaks (Map 9). The Malheur River is a natural fuelbreak given that the grass and weeds between the river and town are mowed or grazed. The amount of sagebrush, dried grass, and weeds in town should be reduced. Hand crews or pesticide use could reduce the sagebrush cover. The grass and weeds within the community need to be mowed as they dry out. The use of non-flammable roofs and defensible spaces should be encouraged especially for those houses adjacent to the sagebrush-covered slopes.

Frenchglen/Jack Pine Place – A series of 3–4, strategically placed fuelbreaks should be constructed on all sides of Frenchglen in T32S R32E sections 1, 2, 11, and 12 (Map 10). Grass, weeds, and marsh vegetation should be annually mowed or grazed. Strategically placed fuelbreaks should be constructed between marshlands and towns specifically for the years when the USFWS imposes an artificial drying cycle to manage wetland vegetation. Juniper and sagebrush tree density on the west side of town should be reduced by hand crews. The same actions should occur for the Jack Pine Place in sections 7, 8, 17, and 18. Grass and weeds within the community need to be mowed as they dry out. The use of non-flammable roofs and defensible spaces should be encouraged especially for those houses adjacent to the juniper and sagebrush-covered slopes.

Fields – A series of 3–4, strategically placed fuelbreaks should be constructed on all sides of Fields in T38S R34E sections 23, 24, 25, and 26; T37S R332E section 13 and 14; and T38S R35E sections 18 and 19 (Map 11). However, the west and northwest side is of high concern because of the heavy sagebrush fuel within approximately one mile of town. The greasewood stands further away from town to the west may serve as a fuelbreak because its succulent leaves reduce its flammability. Grass and weeds within the community need to be mowed as they dry out. The use of non-flammable roofs and defensible spaces should be encouraged especially for those houses adjacent to the juniper and sagebrush-covered slopes.

Diamond – A series of 2–3, strategically placed fuelbreaks should be constructed around the town mainly in T29S R 33E section 32 (Map 12). The sagebrush-covered slope immediately north of the town is a concern because of its steepness and heavy fuel. Sagebrush cover needs to be greatly reduced by hand crews, shrub chopper, or with herbicide use. Grass and weeds within the community need to be mowed as they dry out. The use of defensible spaces should be encouraged especially for those houses adjacent to the sagebrush-covered slopes.

Andrews – A series of 2–3, strategically placed fuelbreaks should be located mainly to the west in sections T35S R33E sections 27 and 34 (Map 13). East Steens Road may be a sufficient fuelbreak to the east. “Sundowner” winds are common in the evening. Grass and weeds within the community need to be mowed as they mature. The use of defensible spaces should be encouraged. High priority FRCC 3 fuels are located around the community in T35S R33E sections 27, 33, 34, and 35; and in T36S R33E section 3.

Riley – Grass and weeds need to be mowed or grazed as they dry in the late-summer within the community and the surrounding area (Map 14). Strategically set fuelbreaks should occur on east and southeast of the community in T23S R27 E sections 29 and 32. FRCC 3 fuels occur in T23S R27E section 28

5.4 Non-fuels Mitigation Needs

For the most part, the proposed non-fuels mitigation needs are not specific projects like the hazardous fuel needs but, instead, are needs that are on-going and need to occur concurrently. The following are the proposed non-fuels mitigation needs presented in order of priority:

Fire Protection Authority Communication and Coordination - Continue the cooperation and communication among BIFZ, ODF, Burns and Hines Fire Departments, US FWS, Burns Paiute Indian Reservation, the RFPAs, and private landowners concerning wildfire issues. Collective action is needed to reduce the threat of wildfire through implementation of this plan. Yearly meetings and/or newspaper releases are needed to inform the public of projects implemented in the last year and of proposed action for the near future. This type of teamwork and coalition building among Federal, State, Counties, and private landowners is supported by the National Fire Plan and HFRA.

Community Firewise Outreach - The purposes of the community Firewise program are to:

- Provide information on ways to reduce human-caused fires
- Urge landowners to take action to construct and maintain defensible space around their homes and structures
- Encourage the use of non-flammable roofs and siding on new construction and the retrofit of existing houses
- Increase the awareness of the natural role of fire in ecosystems and the need for hazardous fuel management

An annual “Firewise Clean-Up Week” held in the spring and/or in October in association with National Fire Prevention Week is recommended to encourage residents to create defensible space

around their residence. In conjunction with the Firewise Clean-Up Week, specific demonstration projects may be designed and utilized to educate residents about longer-term investments they could make to increase fire safety. The clean-up week would occur in conjunction with public demonstrations, education programs, and speakers on wildfire and Firewise practices.

Strengthen the RFPAs – The BIFZ and the four RFPAs provide nearly all the wildfire protection in Harney County. The BIFZ is fully staffed and equipped for wildfire and fuels management in their area of jurisdiction. However, the RFPAs are not. Given that the RFPAs are non-profit, volunteer organizations, the same level of wildfire preparedness cannot be expected as with the BIFZ. However, the RFPAs provide a valuable service for almost 50 percent of the County. Efforts should be made to strengthen the RFPAs through public awareness, economic aid appreciation, and proper equipment and training. All members of the RFPAs should have basic training in wildfire fighting procedures, fiscal management, and wildfire preparedness. Support for the RFPAs should come from the County, ODF, and BLM. The RFPAs should be responsible for Firewise outreach in their respective areas. The RFPAs currently have sufficient vehicles as first responders but equipment needs should be reviewed annually as many pieces are aging and will need replacement. The RFPAs should inventory the private landowners to determine available water resources and what equipment they may have for firefighting. Improved communication among the volunteer firefighters and with BLM is needed. Handheld, BLM compatible radios would be appropriate for this need.

Supplemental Water Supplies – The Burns and Hines Fire Departments both expressed the need for supplemental water supplies. Four, 25–30,000 gallon, underground tanks strategically located in the districts would allow tankers to quickly refill without returning to the station or taking time to pump from a pond, stream, or irrigation pipe. Also, water sources throughout the RFPAs need to be developed. This could occur by contracting with farmers and ranchers to obtain water from their irrigation systems.

5.5 Protection of Homes and Structures

The first important principle concerning structure ignitability and protection is that structures are a source of fuel and may burn just as readily as juniper or sagebrush given the conditions for combustion. Structure loss to wildfire can occur by conduction, convection, or firebrand. Conduction is the fire flame coming in contact with the structure. Convection occurs where the structure becomes hot enough to combust without direct flame contact. Firebrands are embers or burning pieces of limbs, leaves, or twigs that are blown onto a structure. Firebrands may lodge in crevices of roofs, eaves, or side paneling and smolder for several hours before causing combustion. Firebrands ride on air currents resulting from the fire and may be carried over several hundred feet to a mile from the fire front. Recent studies have shown that structure ignitability is the principle cause of structure loss during a wildland fire and not the character of the wildland fuel or fire intensity *per se*.

Fire spread occurs by a propagating process, not as a moving mass such as water in a flood. For fire to spread, material such as a tree, shrub, or structures in the flame front must meet the conditions of ignitability. The conditions needed are the presence of oxygen, flammable fuel, and heat. Oxygen in a wildland fire situation is almost never limiting. Heat is supplied by the flame front. Potential fuel in the path of the flame that meets the conditions of combustion will

ignite. If fuel does not meet the conditions of combustion, it will not ignite. This explains why some trees, patches of vegetation, or structures may survive a wildland fire and others in the near vicinity are completely burned.

Structure ignitability and not the nature of wildland fuels, is the main cause of structure loss during wildfires. Critical factors that increase the chances of structure loss are flammable roofing materials (e.g., cedar shingles), and flammable fuels (e.g., ornamental trees, shrubs, and debris/wood piles) near the structure. A wildland fire does not burn a structure unless it meets fuel and heat requirements sufficient for ignition and continued combustion. With this understanding of fire behavior, the flammability of the structure and its immediate surroundings can be managed to reduce the chances of ignition and loss during a fire incident. The primary and ultimate responsibility for structure protection during wildland fire lies with the owner. The following are two actions that homeowners can take to reduce the chances of wildfire burning their structures:

- Develop a defensible space around the structure that is at least 30 feet wide, use low-combustible plant material for landscaping, and remove woodpiles (Appendix D). If the structure occurs on a slope, the defensible space must be greater on the downslope side of the house corresponding to the steepness of the slope.
- Use non-combustible construction material to the highest extent possible. The minimum is using non-combustible roofing material.

5.6 Need for Action

Wildfire occurrence in Harney County is common. Ignition usually results from natural causes, although human-caused fire potential is high. The hazard of wildland fire is high because of the ladder fuels and overstock ponderosa pine stands, juniper invasion into sagebrush and grasslands, overstock sagebrush stands, and the pervasiveness of weeds. Fire risk is extreme during the late-summer and fall months when grasses and weeds are dry. These flashy fuels are easily ignited and burn rapidly, especially on windy days.

Both general and specific actions are needed to mitigate wildfire risk, improve forest and rangeland health, and enhance vegetative diversity. General actions include the adherence to Firewise practices on a continual basis. Sagebrush, weeds, and grasses growing around many structures and along roads need to be maintained at an acceptable level. The recommended Firewise distance to achieve a survivable space is a 30-foot perimeter around a home or structure, which should also be properly landscaped with fire-resistant vegetation. Greater distances are needed if the structure is located on a slope. Prescribed methods to maintain the vegetation are the use of hand tools, mechanical removal, or herbicidal treatments (limited use). All vegetation removed should be piled and burned or transported to a designated landfill. These Firewise practices are general, but long-term in nature, because they require continual adherence to reduce the hazard of wildfire.

6 EMERGENCY OPERATIONS

6.1 County Wildfire Preparedness and Outreach

The County should continue its efforts to strengthen the RFPAs and work closely with the BIFZ. The RFPAs need continual encouragement, wildfire training, and updating of equipment. Emergency evacuation routes, evacuation centers, and other considerations need to be in place. Consideration should be given for structure fire suppression training for the RFPAs. The County should continue to work closely with the BIFZ, USFWS, and the Paiute Indian Tribe for hazardous fuel management and wildfire protection. Good communication and cooperation among all fire authorities are essential for reducing wildfire risk throughout the County.

County preparedness occurs before a wildfire emergency with appropriate Firewise building codes for new construction and encouragement for retrofits for existing structures. Briefly, these codes include the use of non-flammable building materials, access roads suitable for emergency vehicles, available water for structure protection, and the development of a defensible space. Community outreach can occur through appropriate activities such as Firewise construction and landscaping demonstrations, mailers in the spring as reminders for landowners to prepare for the fire season, or educational programs during the fire awareness month of October.

6.2 Emergency Procedures and Evacuations Routes

In the event that the County Sheriff orders a community to evacuate because of threatening wildfire, residents should leave in an orderly manner. The Sheriff would proclaim the preferred evacuation routes and safe sites. However, the need for evacuation can occur without notice when conditions for wildfire are favorable. Homeowners should be prepared to evacuate without formal notice.

Before residents leave, they should take every precaution to reduce the chance of structure loss as time allows. Human safety is the number one concern in an evacuation. Action could include thoroughly irrigating the defensible space, watering down the roof, and removing all debris from rain gutters. Remove all flammable materials 30 feet or more from the house such as woodpiles, leaves, debris, and patio furniture. Windows and doors should be closed but not locked. Other openings should be covered. A ladder should be placed for roof access by firefighters. A fully charged hose that reaches around the house should also be available for firefighter use.

Families should have meeting locations in place and phone numbers to call in case family members are separated. Families should take with them important papers, documents, pets, food, water, and other essential items. The exterior of the house should be monitored for smoke for several hours after return. Embers may lodge in small cracks and crevices and smolder for several hours before flaming.

Major evacuation routes for each community are listed in Table 12. The emergency roads listed are Federal, State, or County roads and do not require specific fuels reduction along them as long as regular roadside vegetation management occurs. However, homeowners need to evaluate evacuation routes from their property to a major road and determine the need for fuels treatment.

Even though some communities such as Andrews have only one road, it is unlikely that wildfire would threaten both directions.

Table 12 Emergency Evacuation Routes

Community	Evacuation Route
Burns/Hines	US Highway 20, US Highway 395
Drewsey	US Highway 20, Van Road
Crane	State Road 78, Venator Road, Buchanan Road
Diamond	Diamond Road
Frenchglen	County Road 205
Andrews	East Steens Road, Alvord Desert
Fields	County Road 205, East Steens Road
Riley	US Highway 20

6.3 Wildfire Suppression Operations

Currently, all wildfires in Harney County are aggressively suppressed regardless of cause. A Mutual Aid Agreement exists among the various county fire authorities to aid and support suppression activities as appropriate. Fire authorities responsible for wildfire suppression in Harney County are:

- Burns Interagency Fire Zone
- Paiute Indian Tribe
- U.S. Fish and Wildlife Service
- Fields/Andrews Fire Protection Association
- Crane-Drewsey Fire Protection Association
- Silver Creek Fire Protection Association
- Oregon Department of Forestry

Air and land are the two modes for initial suppression efforts on a wildfire. The location of the fire dictates the mode of initial attack. An air operation would most likely occur in roadless or limited access areas. Air tankers are located in Boise. The BIFZ has a helicopter and single engine air tanker at its disposal. Smoke jumpers and a retardant base are located in Redmond. An air tanker base resides at LaGrande. In addition, the John Day Airport has a helibase equipped with rappellers and a small engine air tanker. All of these fire support facilities are fully capable of initial attack on fires that are not obtainable by roads.

Initial attack on land to suppress a wildfire would depend on its location in the County. A RFPA could provide a first response to wildfire occurring in their jurisdiction. The BIFZ would respond to wildfire on BLM, USFS, State land, and contracted private land. The USFWS would provide initial attack on the Malheur National Wildlife Refuge. The Paiute Tribe would respond to wildfire on their Reservation. All of these fire authorities are equipped for initial land attack.

If the wildfire escapes initial attack, then the other county fire authorities may be called to action through the Mutual Aid Agreement. If conditions warrant, the BIFZ can call in more support from other areas. The USFS has seven engines working out of John Day and five working out of

Prairie City. The BLM has three engines located at Dayville. The ODF has 15 engines scattered throughout locations such as John Day, Long Creek, Monument, and Burns. The National Park Service also has an engine stationed at Fossil Beds. Federal resources are available through the Northwest Coordination Center (NWCC) located in Portland. State resources are coordinated through the ODF-Salem Coordination Center. Indian tribal resources are available through existing Bureau of Indian Affairs/Tribal Cooperative agreements. ODF has an agreement with Oregon Department of Corrections for the use of inmate resources to fight fires and support fire suppression activities. In addition, a very large private work force can be activated through contractual arrangements to support wildfire suppression. Contracting equipment consists of dozers, Lowboys, water tenders, engines and 20 person crews, and personnel with specialized firefighting skills.

Extended attack on fires would be handled through an Incident Management Team (IMT). The IMT has the ability to activate all resources needed to suppress wildfire. The IMT would set up a small city-type camp with the capabilities of feeding and housing all personnel. The IMT supports the crews with equipment and supplies to safely suppress the fire. The important factor is that the IMT uses outside agency help and contractors so local firefighting personnel can be released to their regular initial attack duties. The size of the IMT and suppression forces depends on many aspects such as fire size, location, management objectives, and values at risk. The Central Oregon IMT, Blue Mountain IMT, Oregon Department of Forestry IMTs, and Pacific Northwest National IMTs are available and all partially staffed by local agency personnel.

Structural fires are handled much differently than wildfires because specialized training and equipment are needed. The Burns and Hines Fire Departments are the only fire authorities in Harney County trained and equipped for structure fire fighting. The RFPA volunteers are not trained or equipped for structure fire suppression. Although BIFZ personnel are not trained, equipped, or organized to fight structure fires, they will assist the fire departments in protecting exposures and surrounding vegetation by cleaning around houses, setting up pumps, and locating and constructing fire lines.

In the event that numerous structures are threatened by wildfire in the cities of Burns or Hines, the County Court can request the Governor to declare an emergency and invoke the Conflagration Act. This will make available additional resources to protect structures. However, all local structural resources must first be depleted.

7 HARNEY COUNTY CWPP MONITORING AND EVALUATION

7.1 CWPP Plan Adoption

A meeting was convened on December 1, 2005 at the Harney County Senior Center to present the Harney County CWPP to the Core Team, fire authorities, stakeholders, and public. The draft CWPP was posted on Harney County's website to allow public review and response. A 10-day public response period occurred before the CWPP was finalized and presented to the Core Team.

The Harney County CWPP provides the foundation and resources for understanding wildfire risk

and presents opportunities to reduce potential losses from wildfire. Individual communities, RFPAs, and private landowners can take action by developing specific fire plans or by participating in countywide activities for prevention and protection.

The HFRA authorities for Community Wildfire Protection Plans require adoption of this plan, as does the FEMA Disaster - Mitigation Act of 2000. With formal adoption of this plan by the Core Team and Harney County Court, the County will become competitive for hazardous fuels and non-fuels mitigation funding that may assist with plan implementation. Furthermore, adoption of this plan highlights the partnerships among fire districts, local government, community-based organizations, and public agencies.

7.2 Sustaining CWPP Efforts

Implementing and sustaining the CWPP is key to success. This is the responsibility of the Core Team. Building partnerships among community-based organizations, fire protection authorities, local governments, public land management agencies, and private landowners is necessary in identifying and prioritizing measures to reduce wildfire risk. Maintaining this cooperation is a long-term effort that requires commitment of all partners involved. The CWPP encourages citizens to take an active role in identifying needs, developing strategies, and implementing solutions to address wildfire risk by assisting with the development of local community wildfire plans and participating in countywide fire prevention activities.

Harney County is committed to supporting the RFPAs in their fire protection efforts, both short and long-term. The County will continue to provide support in maintaining countywide risk assessment information and emergency management coordination. The Core Team will work on implementing the fire plan by working with fire authorities, community organizations, private land owners, and public agencies to coordinate hazardous fuels management and other mitigation projects.

7.3 CWPP Oversight, Monitoring and Evaluation

The Core Team will be responsible for CWPP monitoring and evaluation through regular meetings, public involvement, and coordination with all fire protection authorities (Table 13). Monitoring is the collection and analysis of information to assist with decision-making and accountability, and to provide the basis for change. Evaluation will include the effectiveness of past fuels reduction and non-fuels mitigation projects, as well as recent wildfire suppression efforts. Monitoring and evaluation measures should progress overtime in a way that will determine if the CWPP goals and objectives are being obtained.

Table 13 Monitoring and Evaluation Tasks

Objective	Tasks	Timeline
Risk Assessment	<ul style="list-style-type: none"> • Use reliable data that is compatible among the partner agencies • Update the CWPP as new information becomes available • Continue to assess wildfire risk to communities and private landowners 	Annual Annual Bi-annual
Fuels Reduction	<ul style="list-style-type: none"> • Identify and prioritize fuels treatment projects on public land through development of a 5-year plan • Track fuels reduction projects and defensible space projects on private land 	Annual Bi-annual

Objective	Tasks	Timeline
	<ul style="list-style-type: none"> Monitor fuels reduction projects on evacuation routes Track grants and other funding sources and make appropriate application 	Annual On-going
Emergency Management	<ul style="list-style-type: none"> Review suitability and the need for fuels reduction along evacuation routes 	Annual
Public Outreach	<ul style="list-style-type: none"> Plan and hold Firewise education week Provide Firewise pamphlets at public events Evaluate techniques used to motivate and educate private landowners. 	Annual Annual Annual

8 FUNDING SOURCES AND TECHNICAL RESOURCES

Financial resources that provide support for various wildland fire mitigation action items include various State and Federal grants administered through Oregon Department of Forestry, the Bureau of Land Management, the Natural Resource Conservation Service, and the Federal Emergency Management Agency. Some funding sources are not targeted directly at fuel management; but many times, multiple resource management objectives can be achieved when the focus is on only one. Funding requests should be coordinated with ODF, BLM, and the USFS. Potential funding sources include but are not limited to the following:

- Rural Fire Assistance/Volunteer Fire Assistance: Assistance is funded 90/10 by USFS grants to State Forester.
- Federal Excess Property: Federal equipment loan to State Foresters. Recipients include State Forestry Programs and Rural and Wildland Fire Services.
- Economic Action Programs (EAP): A USFS, State, and Private program that can assist in diversification for uses of forest products, including utilization of hazardous fuels byproducts; 80 percent federal funding, 20 percent nonfederal funding (<http://www.fs.fed.us/r3/spf/community/>).
- Assistance to Fire Fighters: The FEMA and US Fire Administration Program can improve firefighting operations, services, and equipment; 90 percent federal funding, 10 percent nonfederal funding (www.usfa.fema.gov).
- Pre-Disaster Mitigation Program: A FEMA program delivered through the state's emergency management agency to be used for emergency management and assistance to local governments to develop all hazard mitigation plans.
- Hazardous fuels reduction grants for Harney County can be combined from developments in the County and applied for through ODF. Grant administration costs should be included into countywide grant requests.

The following information was summarized from "Incentive Programs for Resource Management and Conservation" (OSU Extension Publication #EC1119) and other sources. This

publication lists the major incentive programs available to assist communities and landowners with the management of their lands. These programs are not limited to the issues of Communities at Risk and are able to provide similar types of cost-share opportunities on private lands in all areas of Harney County. Landowners need to check with their participating agency for applicability to their property and needs:

- Forest Stewardship Program (FSP): Cost-shares consultant written/ODF approved stewardship plans — apply with your local ODF Stewardship Forester using FLEP application form.
- Forest Resource Trust (FRT): Loan/grant to cover costs (normally 100 percent of costs) to convert under-producing forest land or marginal agricultural land into conifer forest. Applies only to DF “high” Site 4 or better sites. Apply by completing FRT application form at local ODF offices.
- Forest Land Enhancement Program (FLEP): Cost-shares a variety of upland forestry practices (site prep, tree planting, non-commercial thinning, release, etc.). Apply with local ODF Stewardship Forester using FLEP application form. Projects are funded from one "pot" of funds in Salem. Funds are allocated to applications that arrive in Salem on a first come, first served basis, by priority. Current funding available is \$6,300. Unused funds continually recycle back into the "pot" as projects are completed or cancelled. In addition, we anticipate that "new" funds will be made available to Oregon in late 2005.
- Oregon 50 percent Under producing Forest Land Conversion Tax Credit: State tax credit on the cost of converting under-producing forestland (brush land and low value/low volume forest) to well stocked forest. Apply by completing a tax credit form and submitting it to the local ODF Stewardship Forester (The form is available on the ODF/Private & Community Forests web site or at the local ODF office). The state tax credit is available to qualified landowners and projects on a continuous basis. Proposed projects should be pre-qualified by the local ODF Stewardship Forester.
- Afforestation Incentive (OAR 629-611 Forest Practices Rules): Provides landowners an incentive to convert parcels of idle land or land in other uses to commercial forest use. Provides assurance that no state forest practices regulation will prohibit harvesting most of the planted timber established and grown as the first crop rotation. Contact the local ODF Stewardship Forester for more information.
- Federal (10 percent) reforestation tax credit: Federal tax credit on cost of most afforestation or reforestation projects is available for project work completed before October 22, 2004. For reforestation/afforestation work done after October 21, 2004, landowners can “deduct” a certain amount of project expenses (Note: The 10 percent federal tax credit has been repealed but landowners will be able to deduct some reforestation/afforestation expenses going forward from now). Landowners need to contact the IRS or their tax professional to get the required forms and properly utilize this incentive. Additional information can be found at: www.timbertax.org

- Environmental Quality Incentives Program (EQIP): Cost-shares a wide variety of agricultural and forestry practices. *However, availability of funding for upland forestry practices depends on a number of woodland owners applying for EQIP funding and actively participating in local EQIP working group.* Apply for EQIP funds at local NRCS (Natural Resource Conservation Service) office.
- Watershed Improvement Grants (OWEB): Cost-shares riparian (usually near stream or in-stream) work-check with local watershed counsel and/or SWCD (Soil & Water Conservation District). Grant applications are available on-line at OWEB or at the local SWCD office.
- Wildlife Habitat Incentives Program (WHIP): Cost-shares a variety of wildlife enhancement practices which can include forest establishment and thinning for wildlife purposes. Apply with local NRCS office.
- Conservation Reserve Program (CRP): Cost-shares a variety of conservation practices on agricultural land, including forest establishment and thinning. Pays rental on acres enrolled for ten to fifteen years. Apply at local FSA (Farm Services Agency) office.
- Conservation Reserve Enhancement Program (CREP): Cost-shares primarily riparian and wetland improvement projects on agricultural land. Practices include riparian forest buffer establishment. Pays rental on acres enrolled for ten to fifteen years. Apply at local FSA office.

8.1 Community Fire Assistance

- Volunteer Fire Assistance (VFA): Assistance to Volunteer Fire Departments for equipment & supplies. Contact the local ODF office.
- Rural Fire Assistance (RFA): Assistance to Rural Fire organizations for equipment and supplies. Contact the local ODF office.
- Federal Excess Personal Property program (FEPP): Provides federal excess equipment and supplies to city & rural fire departments for firefighting purposes. Contact the local ODF office.
- Special funding for Insect & Disease control: The cost-share amount varies depending on the acreage owned. It varies from 33 to 50 percent, with the larger landowners being eligible for only 33 percent of the costs. Contact the local ODF office.
- Title II: Funding is available from the County Court for projects to enhance forest objectives. Contact the County Court.
- Title III: Funding is available and can be used on private lands adjacent to or direct benefit to federal lands.

Numerous technical resources are available for wildfire mitigation. Internet home pages of ODF, the U.S. Forest Service, the Bureau of Land Management, and NFPA can be accessed for additional information:

- Oregon Department of Forestry (ODF), internet address for information about Oregon forests and lands; Website: www.odf.state.or.us
- Federal Wildland Fire Policy, Wildland/Urban Interface Protection Federal report describing areas that need improvement nationally; Website: www.fs.fed.us/land/wildfire
- National Academy of Public Administration (NAPA), Wildfire Suppression: Strategies for containing costs; Website: www.napawash.org
- Bureau of Land Management (BLM), National Fire Plan, and links; Website: www.blm.gov
- USFS Fire Sciences Laboratory, structure protection information; Website: www.firelab.org
- Firewise, community wildfire planning and outreach tools and information, construction and landscaping practices; Website: www.firewise.org
- Federal Emergency Management Agency (FEMA), information on emergency planning , protection, and funding; Website: www.fema.gov

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APPENDIX A

MAPS

MAP 1	HARNEY COUNTY LAND OWNERSHIP
MAP 2	HARNEY COUNTY VEGETATION
MAP 3	HARNEY COUNTY HISTORIC FIRE CONDITION CLASS
MAP 4	HARNEY COUNTY CURRENT FIRE REGIME CONDITION CLASS
MAP 5	HARNEY COUNTY IGNITION RISK POTENTIAL
MAP 6	HARNEY COUNTY FIRE HISTORY
MAP 7	BURNS-HINES MITIGATION MAP
MAP 8	CRANE MITIGATION MAP
MAP 9	DREWSEY MITIGATION MAP
MAP 10	FRENCHGLEN MITIGATION MAP
MAP 11	FIELDS MITIGATION MAP
MAP 12	DIAMOND MITIGATION MAP
MAP 13	ANDREWS MITIGATION MAP
MAP 14	RILEY MITIGATION MAP

APPENDIX B

WILDLAND FIRE RISK AND HAZARD SEVERITY ASSESSMENT

FORM

APPENDIX C
QUESTIONNAIRE ON HARNEY COUNTY WILDLAND FIRE
ASSESSMENT

APPENDIX D BROCHURE

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Appendix C:

Economic Analysis of Natural Hazard Mitigation Projects

This appendix was developed by the Community Service Center's Oregon Natural Hazards Workgroup at the University of Oregon. It has been reviewed and accepted by the Federal Emergency Management Agency as a means of documenting how the prioritization of actions shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

The appendix outlines three approaches for conducting economic analyses of natural hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies. Information in this section is derived in part from: The Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan*, (Oregon State Police – Office of Emergency Management, 2000), and Federal Emergency Management Agency Publication 331, *Report on Costs and Benefits of Natural Hazard Mitigation*. This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to 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 three 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, avoiding 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 or 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 purchases. 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

Considering detailed benefit/cost or cost-effectiveness analysis for every possible mitigation activity could be very time consuming and may not be practical. 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 those methods is the STAPLE/E approach.

Using STAPLE/E criteria, mitigation activities can be evaluated quickly by steering committees in a synthetic 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?

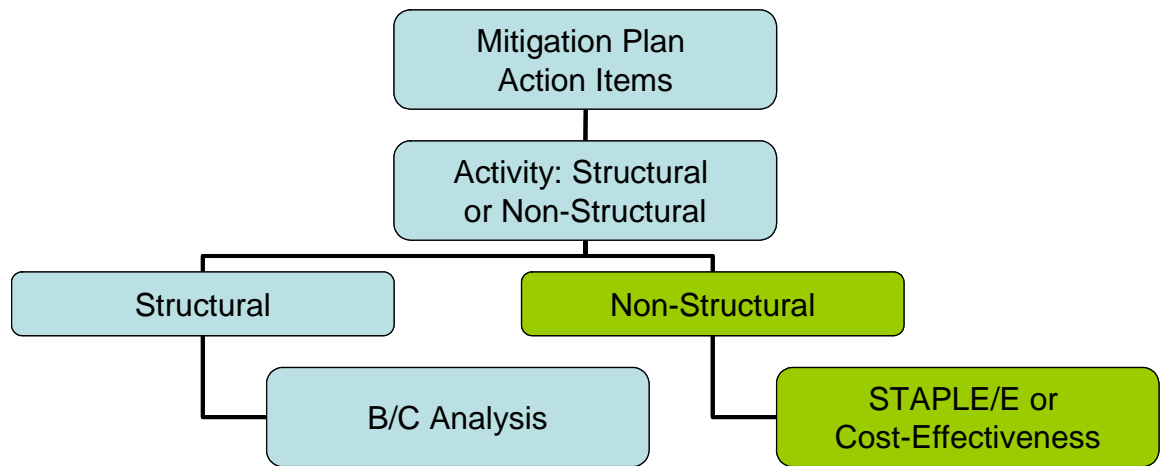
- Are endangered or threatened species likely to be affected?

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 projects 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 the expected future cost expressed in today's dollars. If the net present value is greater than the projected 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. 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. Eiding, G&E Engineering Systems; Kenneth A. Goettel, Goettel and Associates, Inc.; and Gerald L. Horner, Hazard Mitigation Economics Inc., 1997

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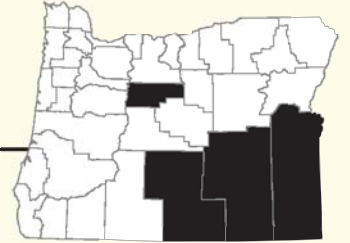
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Household Preparedness Survey

Jefferson, Harney, Lake and Malheur Counties



Household Natural Hazards Preparedness Survey

Survey Report for:

Jefferson County, Oregon
Harney County, Oregon
Lake County, Oregon
Malheur County, Oregon

Prepared by:

Oregon Natural Hazards Workgroup

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Natural Hazard Household Preparedness Survey

Background

The *Partners for Disaster Resistance and Resilience: Oregon Showcase State Program* was established in 2000 to provide a more coordinated approach to addressing risks from natural hazards in Oregon.

Establishing disaster safety as a public value is a shared objective among the partners involved with the Program. This Program strives to reduce deaths, injuries, property damage, economic losses and human suffering caused by natural disasters. The next flood, earthquake or wildfire cannot be avoided. However, we can make a comprehensive and concentrated effort to reduce the effects of these natural forces on our economic, social and environmental stability. The Program provides a comprehensive framework for government and the private sector to prepare for and minimize risk and impact of natural hazards.

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.

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

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.

comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

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

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

The survey helps the counties of the Southeastern region, made up of Jefferson, Harney, Lake and Malheur Counties, realize Bierle's five benefits of citizen involvement in the natural hazard mitigation planning process. As part of the PDM Program, ONHW is assisting the Southeastern region of Oregon with the citizen involvement components of the natural hazard mitigation planning process.

Methodology

To conduct the household survey, ONHW modified the eight page survey administered statewide in 2002 to a five page survey. The purpose of the survey is 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) The primary goal of the survey was to gauge the overall perception of natural disasters and determine a baseline level of loss reduction activity for residents in the community. 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 Southeastern region, which includes: Jefferson, Harney, Lake and Malheur Counties. The households were randomly selected and population weighted based on registered voter lists provided to ONHW by each of the counties.

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

The mailing contained a cover letter, the survey instrument, an entry raffle form for a gift certificate to a local hardware store, 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 277 valid responses, for a 23% response rate.

Limitations

The study identifies key issues about how members of the Southeastern Oregon 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 or 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.

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, age, and length of time as an Oregon resident.

Perception of Risk: This section identifies the general level of concern over natural hazards risk.

Household Preparedness and 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 summarizes the responses of the open-ended questions and comments.

Characteristics of Survey Respondents

Demographic survey 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 277 people who responded to the survey, giving the survey a 23% response rate. Of the four counties the survey was mailed to, the majority of surveys returned came from residents of Jefferson and Malheur Counties (Table 1). This is not surprising as Jefferson and

Malheur have the greatest number of residents in the region with 50,339 of the 65,370 total residents (2000 U.S. Census). Zip codes provide a more specific location of the survey respondents than the county level data. Of the 30 different zip codes indicated, the most respondents live in the 97914 zip code (City of Ontario) followed by 97741 (City of Madras) (Table 2).

Table 1. Percent of Surveys Received Per County

County	Percent of Surveys Received
Harney	14%
Lake	15%
Jefferson	33%
Malheur	38%

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

Table 2. Percent of Surveys Per Zipcode

Zip code	Percent of Surveys
97914	21%
97741	15%
97630	10%
97760	9%
97918	8%
97913	6%
97738	6%
97720	6%
97734	4%
Other	16%

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

Gender and Age

Women accounted for 57% of survey respondents even though they represented just less than 50% of the population in the Southeastern region according to the 2000 Census. The mean age of survey respondents was 58 years. This is considerably higher than the average median age, 40 years, of residents in Southeastern Oregon according to the U.S. Census 2000. Table 3 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 3. Percentage of Southeastern Oregon Population and Survey Respondents by Age Category (persons 20 and over)

Age Category	Mid & Southeastern Oregon³	Survey Respondents
20 - 24	6.0%	1.1%
25 - 34	12.3%	6.2%
35 - 44	14.4%	11.8%
45 - 54	13.3%	23.2%
55 - 59	5.2%	14.1%
60 - 64	4.6%	9.9%
65 - 74	7.5%	18.1%
75 - 84	4.7%	13.1%
85+	1.7%	1.1%

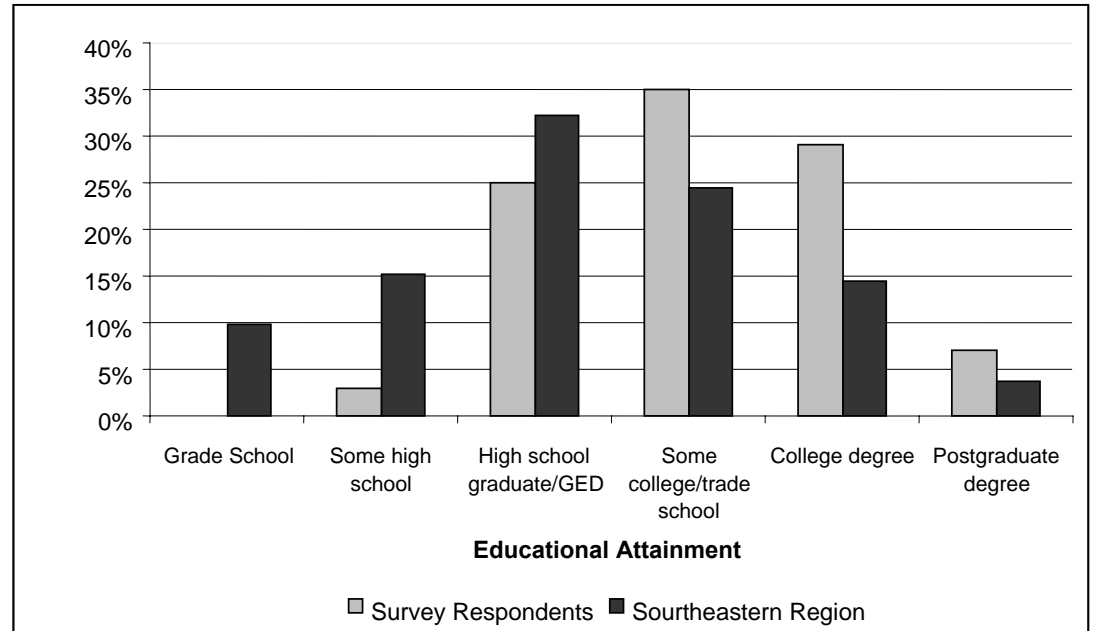
Source: U.S. Census Bureau: www.census.gov (2000) and Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (Nov. 2006).

Level of Education

In general, survey respondents were relatively well educated. Figure 1 compares the level of education of survey respondents with the 2000 U.S. Census. About 71% of survey respondents have attended some college or gone to a trade school, obtained a college degree, or have a postgraduate degree. In contrast, figures from the Census show that an average of 43% of Southeastern residents have achieved this level of educational attainment. Survey respondents were much more likely to have completed a higher educational level than the overall population of the Southwestern region.

³ The age categories are percentages of the total number of people in each age group for all four counties as reported by the US Census 2000

Figure 1. Level of Education of Southeastern Oregon Population and Survey Respondents

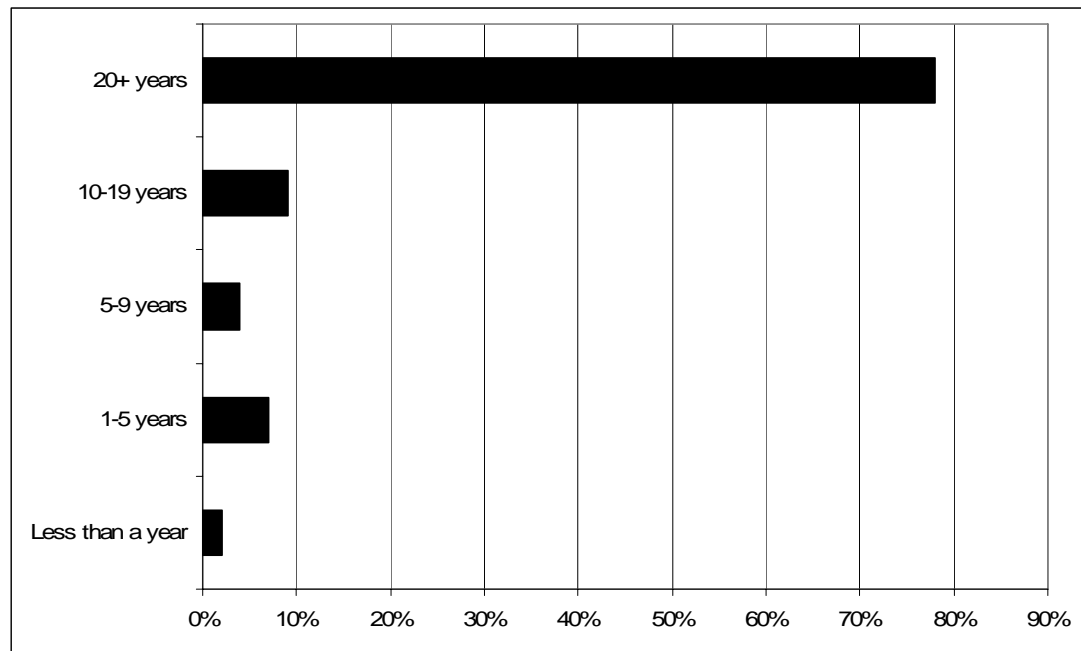


Source: U.S. Census Bureau: www.census.gov (2000) and Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (Nov. 2006)

Oregon Residency

Approximately 78% 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 (13%) and Idaho (13%).

Figure 2. Length of Time Survey Respondents Have Lived in Oregon



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

Housing Characteristics

Housing characteristics are important variables in creating effective education and outreach programs. Knowledge of the percentage of homeowners in a community can help target the programs and homeowners might be more willing to invest time and money in making their homes more disaster resistance. Due to a data collection error, homeownership rates of survey respondents can not be reported. However, the US Census 2000 reports an average of 67% of Southeastern Oregon residents are homeowners.

Almost 66% of survey respondents live in single-family homes, 24% live in manufactured homes, 2% in apartments, and 3% live in duplexes. In addition, 76% said they have access to the internet.

Perception of Risk

It is helpful to understand community members' experiences and their perceptions of risk to natural hazards to make informed decisions about natural hazard risk reduction activities. The survey asked respondents about their level of concern for specific hazards in the Southeastern region. The primary objective of this question was to create a "natural hazard profile" of respondents to better understand how Southeastern residents perceive natural hazards.

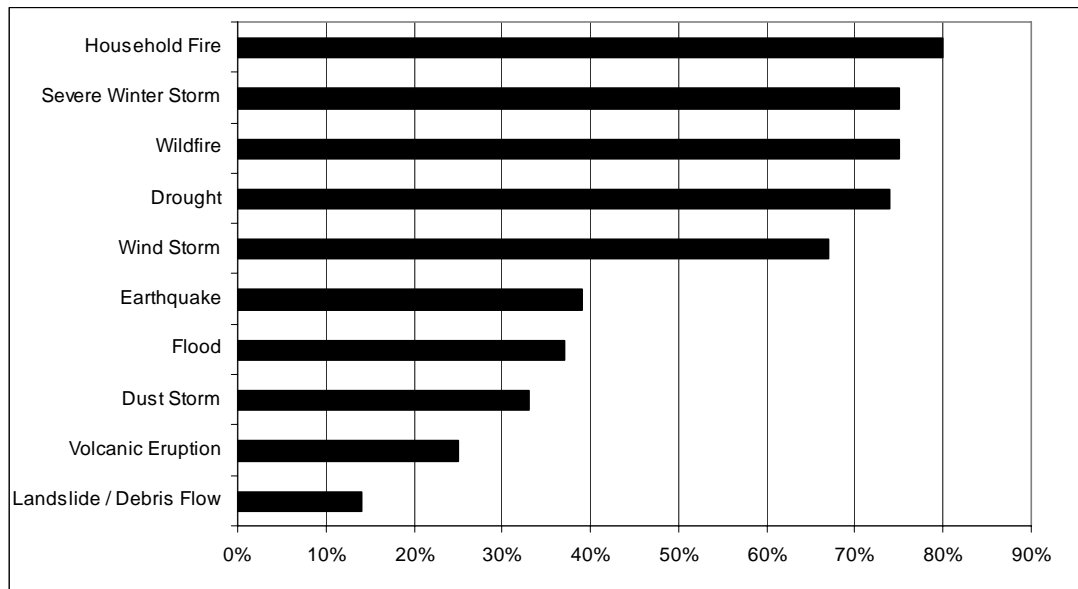
The survey asked respondents to rank their personal level of concern for specific natural disasters affecting their community. The results show that respondents were most concerned about household fire, wildfire, severe winter storm, drought and windstorm. The respondents are least concerned about landslide/debris flows. Figure 3 shows the percent of respondents that identified their level of concern as either "Very Concerned" or "Somewhat Concerned".

Table 4. Survey Respondents' Level of Concern Regarding Natural Hazards in the Southeastern Region

	Very Concerned	Somewhat Concerned	Neither Concerned nor Unconcerned	Not Very Concerned	Not Concerned
Drought	22%	52%	12%	9%	6%
Dust Storm	7%	26%	27%	22%	19%
Earthquake	11%	28%	21%	26%	14%
Flood	8%	29%	17%	23%	23%
Landslide / Debris Flow	4%	10%	23%	29%	34%
Wildfire	40%	35%	11%	8%	6%
Household Fire	31%	49%	11%	7%	2%
Volcanic Eruption	5%	20%	18%	20%	37%
Wind Storm	13%	54%	15%	11%	7%
Severe Winter Storm	23%	52%	14%	7%	4%

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

Figure 3. Percentage of Survey Respondents' Who Are "Very Concerned" or "Somewhat Concerned" about Natural Hazards



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

Household Preparedness and Risk Reduction

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.

Property Protection

Only 37% of the respondents considered the possible occurrence of a natural hazard when they bought or moved into their current homes. The need to have adequate provisions for financial and property recovery when natural disasters do occur is a necessary component of natural hazard preparedness. Fourteen percent of the respondents indicated they have flood insurance leaving 86% without it. However, 53% of those who don't have flood insurance indicated the reason is because their home is not located in the floodplain and 17% felt it was not necessary. Approximately the same amount of respondents (15%) indicated they have earthquake insurance. The top two reasons given by those who don't have earthquake insurance were that it is not necessary (37%) or that they never considered it (32%).

Table 5. Survey Respondents' Reasons For Not Having Flood and/or Earthquake Insurance

Flood Insurance		Earthquake Insurance	
Not located in the floodplain	53%	Not necessary	37%
Not necessary	17%	Not familiar with it/don't know	32%
Not familiar with it/don't know	9%	Not available	11%
Too Expensive	8%	Too Expensive	11%
Not available	6%	Deductible too high/not worth it	5%
Other	4%	Other	5%
Deductible too high/not worth it	3%		

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

Sixty percent of respondents have used fire-resistant building or roofing materials and have secured their homes to its foundation. Fifty-six percent of respondents talked with members of their households about what to do in the case of a natural disaster or emergency. Table 6 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 6. Survey Respondents' Household Disaster Preparedness Activities

	Have Done	Plan To Do	Not Done	Unable To Do	Does Not Apply
Attended meetings or received written information on natural disasters or emergency preparedness?	27%	7%	61%	5%	
Talked with members in your household about what to do in case of a natural disaster or emergency?	56%	14%	27%	2%	
Developed a "Household/Family Emergency Plan" in order to decide what everyone would do in the event of a disaster?	39%	19%	40%	2%	
Prepared a "Disaster Supply Kit" (Stored extra food, water, batteries, or other emergency supplies)?	41%	23%	36%	1%	
In the last year, has anyone in your household been trained in First Aid or Cardio-Pulmonary Resuscitation (CPR)?	38%	6%	55%	1%	
Have you secured your water heaters, cabinets and bookcases to the wall?	26%	5%	62%	5%	4%
Have you fit your gas appliances with flexible connections?	24%	1%	14%	3%	58%
Used fire-resistant building or roofing materials?	60%	5%	22%	6%	7%
Secured your home to its foundation?	60%	3%	18%	9%	10%
Braced unreinforced masonry, concrete walls, and chimney?	22%	3%	27%	7%	41%
Elevated your home in preparation for floods?	19%	0%	20%	11%	50%

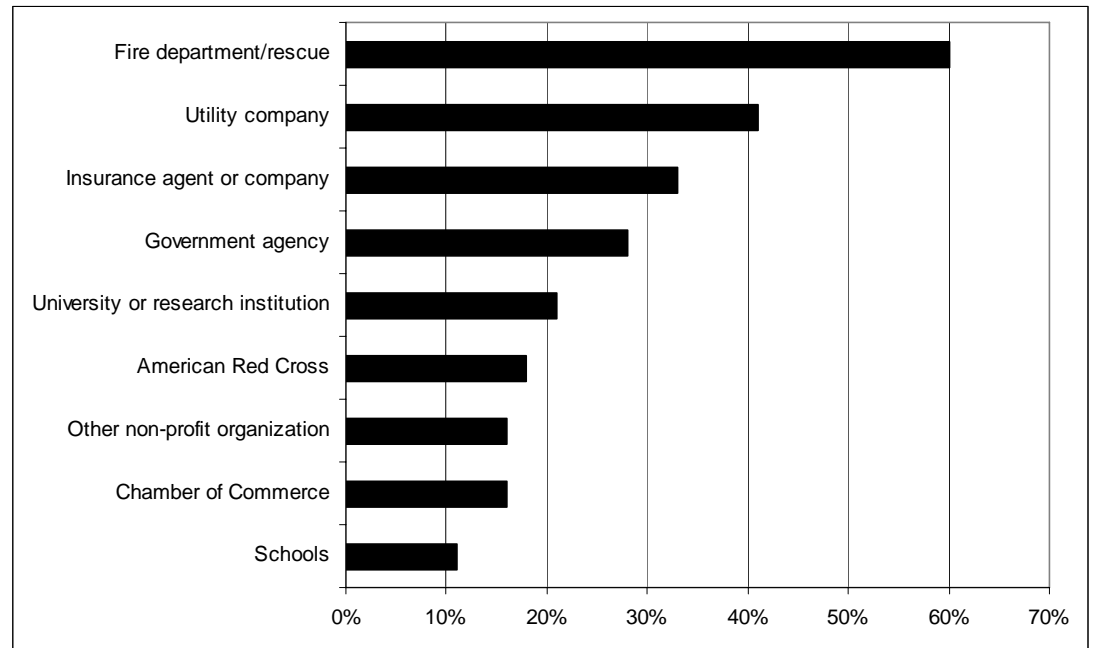
Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

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. Of the listed organizations that might provide information to households about household preparedness for natural disasters, respondents most frequently preferred the fire department or

rescue organization. Figure 4 shows that schools were the least preferred organization to be the primary information source.

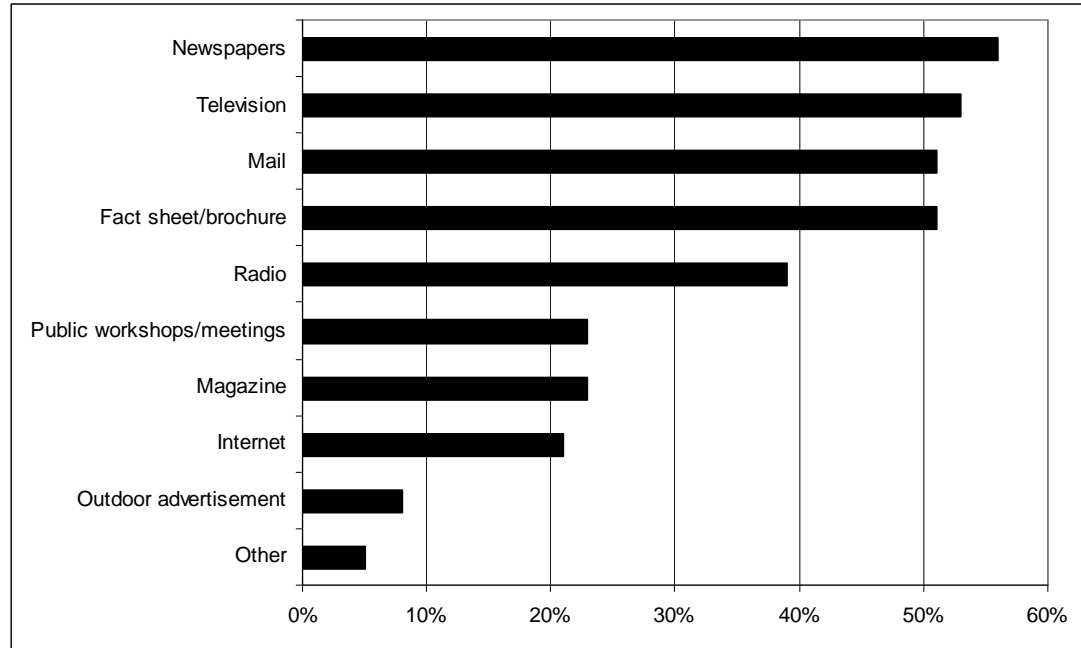
Figure 4. Survey Respondents' Preferred Sources of Information Regarding Household Preparedness



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

When asked what the most effective way was to receive information, respondents indicated that the local newspaper (56%), television news (53%), fact sheet/brochure (51%), and mail (51%) were the most effective. Figure 5 shows how survey respondents rated the effectiveness of dissemination methods presented in the survey.

Figure 5. Survey Respondents' Ranking of Effectiveness of Selected Preparedness Outreach Methods



Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (September 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 Southeastern 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. Table 7 illustrates the importance respondents placed on each potential natural hazard goal.

Over 95% of respondents indicated that it is very important or somewhat important to protect private property, protect critical facilities, protect and reduce damage to utilities, strengthen emergency services. The statement with the lowest priority (78%) is to protect historical and cultural landmarks.

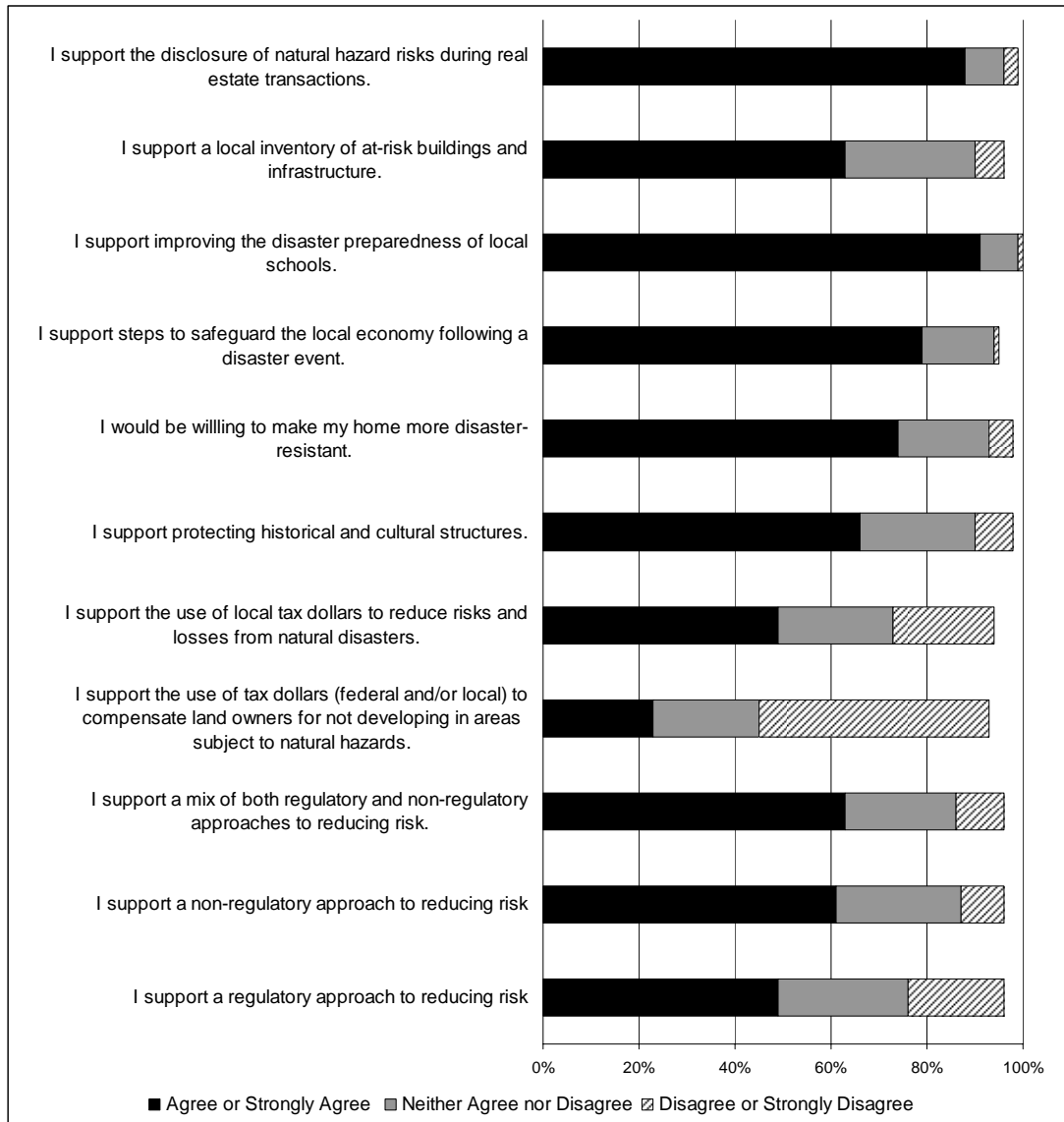
Table 7. Survey Respondents' Goal Prioritization

	Very Important	Somewhat Important	Neither Important nor Unimportant	Not Very Important	Not Important
Protecting private property	71%	24%	3%	1%	1%
Protecting critical facilities (e.g., transportation networks, hospitals, fire stations)	86%	12%	1%	0%	1%
Preventing development in hazard areas	46%	39%	10%	3%	2%
Enhancing the function of natural features (e.g., streams, wetlands)	37%	41%	14%	4%	4%
Protecting historical and cultural landmarks	31%	43%	19%	5%	2%
Protecting and reducing damage to utilities	70%	27%	3%	1%	0%
Strengthening emergency services (e.g., police, fire, ambulance)	68%	28%	3%	1%	1%
Disclosing natural hazard risks during real estate transactions	62%	29%	6%	2%	2%

Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (Nov. 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 and Table 8 shows respondents' general level of agreement regarding the community-wide strategies included in the survey.

Figure 6. Survey Respondents' General Level of Agreement Regarding Community-wide Strategies



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

Table 8. Survey Respondents' General Level of Agreement by Percentage Regarding Community-wide Strategies

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Not Sure
I support a regulatory approach to reducing risk	13%	36%	27%	16%	4%	4%
I support a non-regulatory approach to reducing risk	18%	43%	26%	8%	1%	5%
I support a mix of both regulatory and non-regulatory approaches to reducing risk.	23%	40%	23%	8%	2%	4%
I support the use of tax dollars (federal and/or local) to compensate land owners for not developing in areas subject to natural hazards.	6%	17%	22%	32%	16%	6%
I support the use of local tax dollars to reduce risks and losses from natural disasters.	6%	43%	24%	16%	5%	6%
I support protecting historical and cultural structures.	13%	53%	24%	6%	2%	1%
I would be willing to make my home more disaster-resistant.	16%	58%	19%	4%	1%	3%
I support steps to safeguard the local economy following a disaster event.	17%	62%	15%	0%	1%	4%
I support improving the disaster preparedness of local schools.	34%	57%	8%	0%	1%	0%
I support a local inventory of at-risk buildings and infrastructure.	15%	48%	27%	4%	2%	4%
I support the disclosure of natural hazard risks during real estate transactions.	45%	43%	8%	2%	1%	1%

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

As shown in Figure 6 and Table 8, 91% of respondents indicated that it is very important or somewhat important for the community to improve the disaster preparedness of local schools. In addition, over 91% indicated that it is very important or somewhat important to disclosure natural hazard risks during real estate transactions.

Open-ended Survey Responses

Q3.1 If “NO” for flood, what is the main reason your household does not have insurance for flood events?

- Only through government agencies
- Haven't looked into it
- Not in flood zone
- We live on a hill (2)
- Refused by insurance company
- We rent
- House flood, not natural flood
- High desert
- No one will pay out even if you have flood insurance
- Told I didn't need it
- Wasn't suggested by agent

Q4.1 If “NO” for earthquake, what is the main reason your household does not have insurance for earthquake events?

Other

- Not offered in this area
- Didn't think there were earthquakes here
- Not sure, will find out. I think we do.
- Not in high risk area
- We rent
- Didn't think of it
- Probably not
- Looking into it/will consider
- Small chance of earthquake
- Not my home

Q6. Who is your preferred information source and what is the preferred way for you to receive information about how to make your household and home safer from natural disasters?

Other

- Want to talk to
- We called Andy Seebart and was told there was nothing available
- Our church has an excellent program to help w/preparedness
- Public service announcements over media: radio, TV
- Church
- Search & rescue meetings
- Church organization's meetings
- Landlord responsible
- Common sense
- Training in disaster
- Going to insurance agency & asking about coverage

Q 12. County

- Harney (37)
- Jefferson (84)
- Lake (38)
- Malheur (98)

Q16. Please indicate your level of education

- Lifetime of experience
- "5th" term college sr.
- Navy

Q17 Do you rent/own

- Mobile home 12' wide
- Acreage & shop
- Commercial bldg w/apartment
- Mobile home (2)
- Log home
- Apt. over store

Q18. If you have lived in Oregon for less than 20 years, in what state did you live before you moved to Oregon?

- Alaska (2)
- Arkansas
- Colorado (3)
- Illinois (2)
- Michigan
- Tennessee
- Wyoming (2)
- Arizona, Florida, Montana, Wyoming, Michigan, & Kansas
- North Carolina & Pennsylvania
- So. Dakota & Arizona

Please feel free to provide any additional comments.

- Some questions don't apply to me as I rent rather than own my residence!
- We always have extra food – in case of emergency. We have generator to keep refrigeration units & well operating, Lanterns & portable stove. The more information available will be good for everyone to get together to help in event of disaster.
- All is well – thank you.
- I think our rivers should be dredged so the high waters have a place to flow.
- Make the “Community Emergency Response Training” available to all residents in the state. It is an excellent program. It educates people in how to prepare themselves, family, & friends for disasters. It provides emergency response personnel with backup help.
- Of course because of global warming, the destruction of habitats, pollution, oil dependency, and people who either don't care or can't grasp what the consequences are of destroying all our resources, I am deeply concerned about eminent world-wide disasters.
- I am probably not a very good example to be completing this form – I'm a widow & live alone & was very unsure about how to answer most of these questions. I've only lived in this house about 2.5 years & it was new when I moved in, although it had a previous owner for a few months.

- Thank you for the time spent preparing, distributing, & utilizing citizens' input.
- 1) I would very much enjoy a final copy of survey results. 2) Civil servants are more & more forgetting who/whom. They work for why, they are on the personal list.
- I think we need less regulation.
- Home is located about 50 feet above 100 year flood plain and I am unaware of any history of earthquake history. It does concern me when I see construction (building) on steep slopes, or in areas prone to heavy runoffs.
- Tax dollars should not be used to restore homes/bldg built in known flood zones – flood zones should be clearly identified and public disclosure should be required. Give public information so they can make common sense discussion – regulations are too costly!
- We live on the rim of the Crooked River Gorge. The river is 100 feet out and 350 feet down.
- The more non-profit organizations (Red Cross) and churches are used the better. These have shown a great history of being closer to their communities, more compassionate, more sincere, and non-threatening. And they will be right there when a disaster occurs.
- Whatever approaches are used to assist us in making wiser choices regarding preparation for any emergencies, I believe they must be balanced – both regulatory & non-regulatory. One size does not fit all! For example, fire is a very real and present danger where we live, but flooding is not. So efforts need to be focused on what the most likely natural hazard(s) by area. Thank you for asking. Blessings on your work!
- My area is not subject to much by way of hazard – the Silvies River has flooded in the past, but I can't imagine it was more than 6-8 inches of water. Since this area is electric dependent, I have considered a small generator – not much else.
- In disaster preparedness I much prefer a non-regulated approach. But, to also have some regulations in place so that there is at least some disaster readiness in place should a disaster occur.
- Good luck. Most folks don't like being told what to do until there is an emergency & even then not! Compensating land owners to "not develop" seems an open unknown for a bottomless drain on the economy. Anyone can say "I want to build a huge [money-making] something" and you need to compensate them for their pipe dreams.
- It is hard for me to do these things, but family can do them. And I live with family. On Crooked River Ranch, over 4600 residents

reside. We have only one exit/access road. The BLM & State of Oregon have offered no solutions or help.

- Here in Summer Lake, we survived the winter fire, which became a firestorm due to inept state & federal performance. There was no common sense during the 1st 3 days of the fire, and the very agencies who should have been helping were exacerbating the situation. The best help came from local volunteers, friends, & neighbors. WE are now prepared & no longer count on state or federal help!!!
- People should depend on themselves and not expect the government to bail them out.
- Education is the main key to preparedness, not regulations. Some questions misleading, i.e. 8G, 7E. Historical & cultural protection is not necessarily the job of gov't, however, private & non-profit organizations can do this. *f – how would tax \$ be used?
- I am 89 years old and live in a rented duplex so some of my answers are left blank or I don't know correct answer! I believe this is a very important project. Good luck!
- I live alone, so not all apply directly.
- I believe it is each person's responsibility to determine what hazards are likely to happen in an area and then act accordingly.
- Everyone should have an emergency plan. My plan I keep my camp trailer ready and cleaned up to use for an emergency.
- I never vote for more taxes.
- I'm never in support of more taxes. And I'm reluctant for allowing government to interfere in our private lives. More rules always means less freedom.
- Encourage people to use common sense.



September 20, 2006

Dear Resident:

We need your help! The Counties of Jefferson, Harney, Lake, and Malheur are currently engaged in a cooperative planning process to reduce the risks and losses associated with natural disasters. As a part of this process, the *Partners for Disaster Resistance and Resilience* and the Oregon Natural Hazards Workgroup at the University of Oregon are conducting a household survey. This survey provides an opportunity for you to share your opinions about preparing for and reducing your household's and your community's risks from natural disasters. The information you provide about your household's needs for disaster preparedness could help the Mid and Southeast Region improve local disaster preparedness and risk reduction activities.

Your opinions are important to us! Please complete the enclosed survey and return it in the postage-paid envelope. The survey will take 15-20 minutes to complete. Please complete and return this survey by **Thursday, October 12, 2006**.

We will also enter your name in a drawing to win a gift certificate at Stunz Lumber Company, True Value Hardware, Big R Ranch Farm Home Supply, or Parr Lumber Company. Please fill out the enclosed form and return with your survey, or mail the gift certificate preference form in a separate envelope to be entered into the drawing.

Your returned survey indicates your willingness to take part in the study. Your participation in this study is voluntary. If you have questions regarding your rights as a research participant, please contact the Office of Human Subjects Compliance, Riverfront Research Park, Suite 106, University of Oregon, Eugene, OR 97403-5219, or call (541) 346-2510. All individual survey responses are strictly confidential and are for research purposes only.

If you have questions regarding the survey, please contact the Oregon Natural Hazards Workgroup at the University of Oregon at (541) 346-3588.

If you have questions about the regional planning process, please contact:

Jefferson County: Rena Thompson, 541-475-4462

Harney County: Andy Seebart, 541-573-5961

Lake County: Phil McDonald, 541-947-6027

Malheur County: Craig Smith, 541-473-5120

For information on *Partners for Disaster Resistance: Oregon Showcase State*, please visit <http://www.OregonShowcase.org>.

Thank you for your participation! We look forward to hearing your opinions!

Andre LeDuc, State Coordinator
Partners for Disaster Resistance & Resilience

Household Natural Hazards Preparedness Questionnaire

This questionnaire is designed to help gauge household preparedness for disasters, and knowledge of tools and techniques that assist in reducing risk and loss from natural hazards. The questionnaire should be completed by an adult, preferably the homeowner or head of household. The information you provide about your needs for disaster preparedness could help improve public/private coordination of preparedness and risk reduction activities within your community. We ask that you please take a few minutes to complete this questionnaire.

Natural Hazard Household Risk Reduction

Households can do many things to prepare for a natural disaster or emergency. What you have on hand or are trained to do when a disaster strikes can make a big difference in your comfort and safety in the hours and days following a natural disaster or emergency. In addition, modifications to your home, including retrofits to strengthen your home's structure, can protect your home and its contents. The following questions focus on your household's preparedness for disaster events.

1. How concerned are you about the following natural disasters affecting your community?

(Check the corresponding box for each hazard)

Natural Disaster	Very Concerned	Somewhat Concerned	Neither Concerned nor Unconcerned	Not Very Concerned	Not Concerned
Drought	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dust Storm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Earthquake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Landslide / Debris Flow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wildfire	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Household Fire	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Volcanic Eruption	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wind Storm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Severe Winter Storm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Did you consider the possible occurrence of a natural hazard when you bought/moved into your current home?

Yes No

3. Does your household have insurance coverage for flood events?

- Yes No

If you answered Yes, please skip to Question 4.

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

(Please check one)

- Not available Deductibles too high/not worth it Not necessary
 Not located in the floodplain Not familiar with it/don’t know Too expensive
 Other: _____

4. Does your household have insurance coverage for earthquake events?

- Yes No

If you answered Yes, please skip to Question 5.

4.1 If “NO” for earthquake, what is the main reason your household does not have insurance for earthquake events? *(Please check one)*

- Not available Deductibles too high/not worth it Too expensive
 Not necessary Not familiar with it/don’t know Other: _____

5. In the following list, please check those activities that you have done in your household, plan to do in the near future, have not done, or are unable to do. For Questions F-K, there is also the option to check does not apply, if the preparation action does not apply to a feature of your home. *(Please check one answer for each preparedness activity)*

In your household, have you or someone in your household:	Have Done	Plan To Do	Not Done	Unable To Do	Does Not Apply
A. Attended meetings or received written information on natural disasters or emergency preparedness?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
B. Talked with members in your household about what to do in case of a natural disaster or emergency?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
C. Developed a “Household/Family Emergency Plan” in order to decide what everyone would do in the event of a disaster?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
D. Prepared a “Disaster Supply Kit” (Stored extra food, water, batteries, or other emergency supplies)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
E. In the last year, has anyone in your household been trained in First Aid or Cardio-Pulmonary Resuscitation (CPR)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
F. Have you secured your water heater, cabinets and bookcases to the wall?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G. Have you fit your gas appliances with flexible connections?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H. Used fire-resistant building or roofing materials?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I. Secured your home to its foundation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
J. Braced unreinforced masonry, concrete walls, and chimney?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
K. Elevated your home in preparation for floods?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Household Risk Reduction

6. Who is your preferred information source and what is the preferred way for you to receive information about how to make your household and home safer from natural disasters? (*Please check all that apply*)

Information Sources:

- Chamber of Commerce
- University or research institution
- Schools
- Fire Department/Rescue
- Utility company
- Insurance agent or company
- University or research institution
- Government agency
- American Red Cross
- Other non-profit organization

Methods:

- Fact Sheet/brochure
- Internet
- Mail
- Outdoor advertisements (signs, etc.)
- Radio
- Television
- Magazine
- Public workshops/meetings
- Newspapers
- Other (please explain):

Community Risk Reduction

7. Natural hazards can have a significant impact on a community, but planning for these events can help lessen the impacts. The following statements will help determine citizen priorities for planning for natural hazards. Please tell us how important each one is to you.

Statements	Very Important	Somewhat Important	Neither Important nor Unimportant	Not Very Important	Not Important
A. Protecting private property	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Protecting critical facilities (e.g., transportation networks, hospitals, fire stations)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. Preventing development in hazard areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. Enhancing the function of natural features (e.g., streams, wetlands)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E. Protecting historical and cultural landmarks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G. Protecting and reducing damage to utilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H. Strengthening emergency services (e.g.,- police, fire, ambulance)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I. Disclosing natural hazard risks during real estate transactions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

General Household Information

9. Please indicate your age: _____

10. Gender: Male Female

11. Zip Code: _____

12. County: _____

13. Do you have access to the internet?

- Yes
 No

14. Do you rent or own your home?

- Yes
 No

15. Please indicate your level of education:

- Grade School/No Schooling
 Some high school
 High school graduate/GED
 Some college/trade school

- College degree
 Postgraduate degree
 Other, please specify: _____

16. How long have you lived in Oregon?

- Less than a year
 1-5 years
 5-9 years
 10-19 years
 20 years or more

17. Do you rent/own

- Single-family home
 Duplex
 Apartment (3-4 units in structure)
 Apartment (5 or more unit structures)
 Condominium / townhouse
 Manufactured home
 Other: _____

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

- Not Applicable
 California
 Idaho
 Washington
 Other _____

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

THANK YOU VERY MUCH FOR PROVIDING THIS INFORMATION

The Oregon Natural Hazards Workgroup at the University of Oregon's Community Service Center prepared this survey. Implementation of this survey is made possible by funding from the Federal Emergency Management Agency, Oregon Emergency Management and the Public Entity Risk Institute.

*For more information, please contact Oregon Natural Hazards Workgroup
at 1209 University of Oregon, Eugene, OR 97403-1209,
call (541) 346-3889, or visit www.OregonShowcase.org*

Appendix E: Harney County Community Organizations

Name and Contact Information	Description	Service Area	Populations Served							Involvement with Natural Hazard Mitigation	
			Businesses	Children	Disabled	Elders	English Second Language	Families	Low Income		
Ashley Manor Care Ctr 475 Shasta Pl Burns, OR 97720 - 2383 Tel: 541-573-3029	Assisted Living	Harney County			✓	✓			▪	▪	<ul style="list-style-type: none"> • Information dissemination
Boys & Girls Club of Harney County 267 South Egan St Burns, OR Tel: 541.573.7036 Fax: 541.573.7036 Email: info@clubharneycounty.com	To inspire and enable all young people, especially those from disadvantaged circumstances, to realize their full potential as productive, responsible, and caring citizens	Harney County		✓	▪	▪			▪	✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination
Dutch Apple 80 E Adams St Burns, OR 97720 – 1712 Tel: 541-573-3430	Nursing Home	Harney County				✓				▪	<ul style="list-style-type: none"> • Information dissemination

<p>Eastern Oregon Center for Independent Living 114 South Oregon Ontario, OR 97914 Tel: 541-889-3119 Fax: 541-889-4573 Email: eocil@eocil.org</p>	<p>Eastern Oregon Center for Independent Living (EOCIL) is a nonprofit community-based resource and advocacy center that promotes independent living and equal access for all persons with disabilities. The desired outcome of all EOCIL independent living services is to improve the individual's ability to function, continue functioning, or move toward functioning independently in his or her family or community.</p>	<p>Baker, Gilliam, Grant, Harney, Malheur, Morrow, Umatilla, Union, Wallowa and Wheeler Counties</p>		▪	✓	▪		▪	▪	<ul style="list-style-type: none"> • Education and outreach • Information dissemination
<p>Elk's Lodge #1680 118 N. Broadway Burns, OR 97720 Tel: 541-573-6170</p>	<p>The Benevolent and Protective Order of Elks of the United States of America will serve the people and communities through benevolent programs, demonstrating that <i>Elks Care and Elks Share</i>.</p>	<p>Harney County</p>	▪	✓	✓	✓		✓	✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination
<p>Harney County Casa 835 S. Canyon Blvd. John Day, OR 97845 Tel: 541-575-5574</p>	<p>Social Services, Social and Welfare Services</p>	<p>Harney and Grant Counties</p>		✓	✓	✓		✓	✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination

Harney County Chamber of Commerce 76 E. Washington St. Burns, OR 97720 Tel: (541) 573-2636 Fax: (541) 573-3408	Provide economic development assistance to local businesses.	Harney County	✓								<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation
Harney County Extension Office 450 N Buena Vista Ave. Burns, OR 97720 Tel: (541) 573-2506 Fax: (541) 573-8387	Provides research-based knowledge and education that focus on strengthening communities and economies, sustaining natural resources, and promoting healthy families and individuals.	Harney County	✓								<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation
Harney County Home Health and Hospice 420 N. Fairview Burns, OR 97720 Tel: 541-573-8360 Fax: 541-573-8389	Hospice Care for people suffering from advanced illnesses and their families	Harney County		✓	✓	✓			✓	✓	<ul style="list-style-type: none"> • Information dissemination
Harney County Senior and Community Services Center (Dial-A-Ride) 17 S. Alder Burns, OR 97720 Tel: 541-573-6024 Fax: 541-573-6025	Public Transportation	Harney County		✓	✓	✓			✓	✓	<ul style="list-style-type: none"> • Information dissemination

<p>Harney County Senior and Community Services Center 17 S. Alder Burns, OR 97720 Tel: 541-573-6024 Fax: 541-573-6025</p>	<p>Shall act as a focal point for the planning coordination of a comprehensive service delivery system, designated to meet the needs of the sixty (60) years of age and over population, with emphasis on low-income minority individuals in Harney County. As partners in our communities, we will provide leadership for seniors and persons with disabilities through programs that enhance independence, dignity, choice, and individual well-being. It is also a food bank</p>	<p>Harney County</p>	<p>▪</p>	<p>▪</p>	<p>✓</p>	<p>✓</p>	<p>✓</p>	<p>▪</p>	<p>✓</p>	<ul style="list-style-type: none"> • Education and outreach • Information dissemination • Plan/project implementation
<p>Harney District Hospital 557 W Washington Burns OR 97720 Tel: 541-573-7281</p>	<p>Medical services. The first responder program is potentially very helpful for hazard mitigation planning</p>	<p>Harney County</p>	<p>▪</p>	<p>✓</p>	<p>✓</p>	<p>✓</p>	<p></p>	<p>✓</p>	<p>✓</p>	<ul style="list-style-type: none"> • Education and outreach • Information dissemination
<p>Head Start of Harney County 450 N Buena Vista Burns, OR 97720 Tel: 541-573-6461</p>	<p>Oregon Head Start PreKindergarten</p>	<p>Harney County</p>	<p>▪</p>	<p>✓</p>	<p>▪</p>	<p>▪</p>	<p></p>	<p>▪</p>	<p>▪</p>	<ul style="list-style-type: none"> • Education and outreach • Information dissemination

High Desert Medical Center 559 W. Washington Burns, OR 97720 Tel: 541-573-2074 Fax: 541-573-8893	High Desert Medical Center is a full service family practice clinic	Harney County	•	✓	✓	✓		✓	✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination
Little Angels Preschool 503 S Diamond Ave Burns, OR 97720 – 2237 Tel: 541-573-2252	Preschool	Harney County		✓						<ul style="list-style-type: none"> • Information dissemination
Roy's Taxi Svc 90 W Johnson St Burns, OR 97720 - 9335 Tel: 541-573-6160	Taxicab service/public transportation	Harney County		✓	✓	✓		✓	✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination
Strategic Staffing Services, Inc. 113 W. Washington Burns, OR 97720 Tel: 541-573-1622 Fax: 541-573-1646	To provide temporary staffing for different businesses in Harney County	Harney County	✓		•	•		•	•	<ul style="list-style-type: none"> • Information dissemination
The Aspens 210 Roe Davis Avenue Hines, OR 97738 Tel: 541-573-2222 Fax: 541-573-2224	Assisted Living Facility	Harney County				✓				<ul style="list-style-type: none"> • Education and outreach • Information dissemination
Training and Employment Consortium 113 W. Jefferson Burns, OR 97720 Tel: 541-573-6676 Fax: 541-573-5432	To contribute to the economic vitality of the regions by being a valuable resource for education, vocational training, employment and childcare	Harney County	✓					•	✓	<ul style="list-style-type: none"> • Education and outreach • Information dissemination

Appendix F: 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

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, The National Weather Service provides flood watches, warnings, and informational statements for rivers in Harney County. The Boise, ID Bureau serves Harney County.

Contact: National Weather Service, Boise, ID Bureau
Address: NIFC Building 3807, Boise, ID 83705-5354
Phone: (208) 334-9860
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. <http://www.redcross.org/where/chapts.html#OR>

Contact: American Red Cross, Oregon Mountain River Chapter
Address: 2680 Twin Knolls Drive
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/>

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

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

measures taken under the EWP must be environmentally and economically sound and generally benefit more than one property.

<http://offices.sc.egov.usda.gov/locator/app?agency=nrsc>

Contact: USDA-NRCS
Address: Condon Service Center, 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.shtml>

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/Oregon%20Laws%20on%20Fire%20Protection)
http://159.121.82.250/SFM_Admin/firelaws.htm
Email: Oregon.sfm@state.or.us

Federal Resources and Programs

Federal Wildland Fire Policy, Wildland/Urban Interface Protection

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

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

National Fire Protection Association (NFPA)

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

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

National Interagency Fire Center (NIFC)

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

Contact: National Interagency Fire Center
Address: 3833 S. Development Avenue, Boise, Idaho 83705-5354
Phone: (208) 387-5512
Website: <http://www.nifc.gov/>

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

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

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

United States Forest Service (USFS)

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

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

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

Additional Resources

FireFree Program to Promote Home Safety

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

Contact: FireFree
Address: 63377 Jamison St., Bend, OR 97701

Phone: (541) 318-0459
E-mail: dcrfpd2@dcrfpd2.com
Website: <http://www.firefree.org>

Firewise – The National Wildland/Urban Interface Fire program

Firewise maintains a Website designed for people who live in wildfire- prone areas, but it also can be of use to local planners and decision makers. The site offers online wildfire protection information and checklists, as well as listings of other publications, videos, and conferences.

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

Publications

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

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

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

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

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

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

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

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

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

To obtain this resource:

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

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

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

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

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

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

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

Severe Weather Event Resource Directory

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.shtml>

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 representatives working together to improve the ability of Cascadia Region communities to reduce the effects of earthquake events. Members are from Oregon, Washington, California, and British Columbia. Goals are to:

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

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

Additional Resources

Publications

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Appendix G: State NHMP, Hazard Mitigation Success Template

Instructions

(August 2005)

When adding a success template to an existing chapter, probably the easiest way to do so is to use the “insert, file” option from the pull-down menu. In the template documents you will find that some text boxes do not have borders (i.e., “No Line”), but the text boxes are there all the same. Please keep your entries within the text boxes and please keep the form to a single page. While the font should always be Arial, if needed, feel free to use a slightly smaller font size. Some categories on the template may not apply to all situations and can be deleted. Additional instructions are on the template itself.

HAZARD^{Safe}: Replace the word “HAZARD” with the hazard being successfully mitigated, e.g., dust storm, earthquake, flood, etc.

LOCATION (COUNTY NAME), OREGON: This is the place for the main text telling the story about the success (within the limitations of the space available) which might include the range of alternatives considered, perhaps a bit of background on the state NHMP action that led to the success, key elements of success, etc. Part of the story should be the date and nature of the hazard event that prompted the mitigation. Creative use of the grey box will provide additional room for text.

Towards State NHMP Goal(s): #___ Note the state NHMP goal(s) to which this success is tied.

State NHMP Action Met: Note the number of the short or long-term action that was met in whole or part. See Part IV, Appendix 11 for numbering format.

Lead Agency(ies): Note the lead agency(ies), using our standard state NHMP acronyms (Appendix 13). Contact information would become “stale” over time, so we probably want to use agencies instead of people, but we might consider the agency acronym hyper-linking to current contact information for each agency for hazard mitigation. For example, right now the acronym “OEM” would link to contact information for Dennis, Jay, and Joseph.

Support Agency(ies): Note the support agency(ies) using our standard state NHMP acronyms.

Project Type: Key-in one of the following; elevation, relocation, acquisition, building codes, land use, planning, retrofitting (non-structural), retrofitting (structural), disaster resistant universities, floodproofing, education/outreach/public awareness/training, utility protective measures, vegetation management, wetland restoration, several, numerous, or other.

Project Start Date: Enter the month and year the project started (MM/YYYY).

Project End Date: Enter the month and year the project was completed (MM/YYYY) or ongoing.

Year(s) Project Tested: Enter the years that the mitigation effort was tested by disaster (YYYY).

Funding Source(s): Key-in the source(s) of funds for the project from the following list; Cooperating Technical Partners (CTP), environmental/historical preservation, Flood Mitigation Assistance (FMA) Program, Hazard Mitigation Technical Assistance Program (HMTAP), National Earthquake Hazards Reduction Program (NEHRP), Hazard Mitigation Grant Program (HMGP), National Earthquake Technical Assistance Program (NETAP), National Flood Insurance Program (NFIP), Pre-Disaster Mitigation (PDM), U.S. Small Business Administration (SBA), private sector funds, private nonprofit organization, state funds, numerous, or other.

Project Cost: Enter the total cost of the project, all shares.

Project Benefits: Enter the bottom line in terms of dollars (if known) and other values preserved due to the mitigation action. Dollar amount is either from the benefit-cost analysis calculation or from an actual hazard event, post-mitigation. Dollar amount is optional here, but a strong statement about losses avoided should always be included.

Hazard Mitigation Success-EXAMPLE

Comment: This is the name of the hazard, e.g., flood, earthquake, etc.

disaster avoided through hazard mitigation

Reducing Damage, Maintaining Electrical Service

By undergrounding the overhead electric line called the Emerald Circuit, the Springfield Utility Board (SUB) has strengthened their capability for future delivery of services and increased their capacity to respond to other emergency problems.

SPRINGFIELD (LANE COUNTY), OREGON: During the late December 2003, early January 2004 wind, snow, and ice storms in the Willamette Valley, what was once a sure bet for power outages is now a mitigation success. The Emerald Circuit is a main distribution line among three substations serving approximately 800 homes; assorted businesses, a fire station and two SUB water reservoirs. As a backup, this line provides power to another 400 homes, schools, a shopping center, and numerous traffic signals.

Towards State NHMP Goal: #2

State NHMP Action Met: W-ST-1



Photos above and to the left are OEM. The photo below is courtesy of SUB.



Problem: Emerald Circuit right-of-way showing 25' easement within 50'-90' tall wooded corridor. Note leaning small tree hazard left of line.

Solution: Underground lines will minimize future emergency repairs on this steep terrain. Trench with conduit in place next to existing poles and line (left). Same project section (below) as above, with fallen tree. Underground line did not sustain damage from broken trees during 2003/04 winter storms.



Lead Agency: Oregon Emergency Management as grantee for FEMA's Hazard Mitigation Grant Program

Project Cost: \$163,642

Project Benefits: \$180,000 (infrastructure, only)

It is estimated that a major storm damaging all poles and lines would cost \$180,000 for replacement, which does not include loss of electrical service to the homes, businesses, and essential facilities this circuit serves.

Hazard Mitigation Success

disaster avoided through hazard mitigation

Title of the Success Story in Title Case

Bla, bla, bla about the success, using a “catchy phrase” in bold italics, and perhaps also “plugging” a resource (an agency, funding, etc).

LOCATION (COUNTY NAME), OREGON: _____

Towards State NHMP Goal(s): # _____

State NHMP Action Met: _____

Lead Agency(ies): _____

Support Agency(ies): _____

Project Type: _____

Project Start Date: _____

Project End Date: _____

Year(s) Project Tested: _____

Funding Source(s): _____

Project Cost: _____

Project Benefits: _____

“Before” image goes here... in rare cases for which images are completely lacking, either or both of these boxes could be filled instead with graphs, a sample from the success, a tip box, quote, blurb, etc.

Problem: A photo credit and problem statement about the image above goes here... example text, example text, example text, example text, example text, example text, example text, example text, example text, example text, example text, example text, example text, example text, example text.

Solution: A photo credit and summary statement about the solution achieved via this hazard mitigation success goes here, tied to the image below... example text, example text, example text, example text, example text, example text, example text, example text, example text, example text, example text, example text.

“After” image goes here...

Hazard Mitigation Success

disaster avoided through hazard mitigation

Title of the Success Story in Title Case

Bla, bla, bla about the success, using a “catchy phrase” in bold italics, and perhaps also “plugging” a resource (an agency, funding, etc).

LOCATION (COUNTY NAME), OREGON: _____

Towards State NHMP Goal(s): # _____

State NHMP Action Met: _____

“Before” image goes here... in rare cases for which images are completely lacking, these boxes could be filled instead with graphs, a sample from the success, a tip box, quote, blurb, etc.

Either another “before” or “after” image or other visual information goes here...

Problem: A photo credit and problem statement about the image above goes here... example text, example text, example text, example text, example text, example text, example text, example text.

Solution: A photo credit and summary statement about the solution achieved via this hazard mitigation success goes here, tied to the image below... example text, example text, example text, example text, example text, example text, example text.

Lead Agency(ies): _____

Support Agency(ies): _____

Project Type: _____

Project Start Date: _____

Project End Date: _____

Year(s) Project Tested: _____

Funding Source(s): _____

Project Cost: _____

Project Benefits: _____

“After” image goes here...