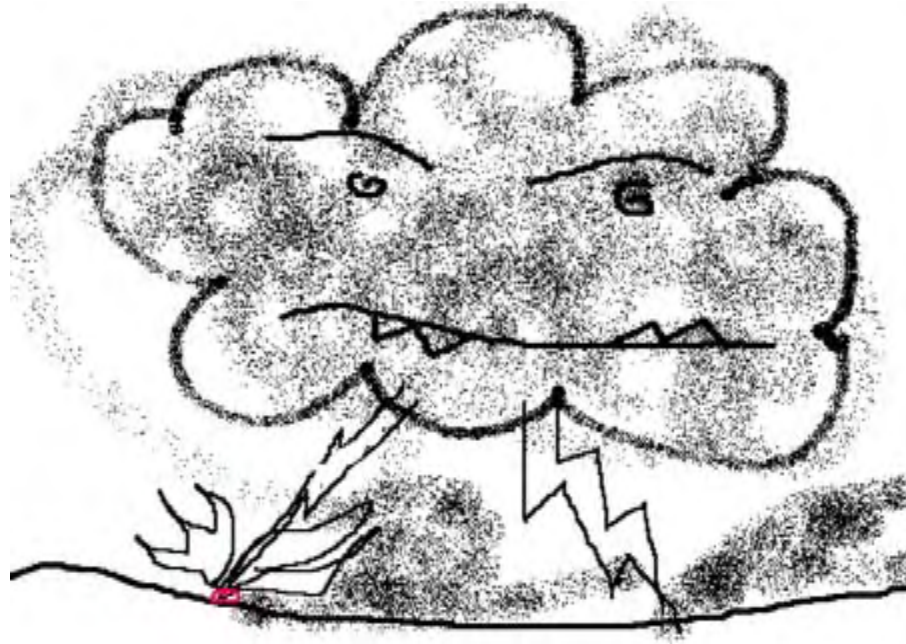


# MORROW COUNTY PRE-DISASTER MITIGATION PLAN



This Natural Hazard Mitigation Plan was developed through a regional partnership funded by the Federal Emergency Management Agency's (FEMA) Pre-Disaster Mitigation Competitive Grant Program. The Mid-Columbia Region grant was awarded in the fall of 2005 to support the development of natural hazard mitigation plans for communities in the region. The County utilized a planning process, plan framework, and plan development support provided by the Oregon Natural Hazards Workgroup (ONHW) at the University of Oregon's Community Service Center.



**FEMA**

December 15, 2006

Honorable Terry Tallman, Chair  
Honorable John Wenzholz  
Honorable Ray Grace  
Morrow County Board of Commissioners  
P.O. Box 788  
Heppner, Oregon 97836

Dear Commissioners Tallman, Wenzholz, and Grace:

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has approved the Morrow 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 through December 15, 2011:

**Morrow County**  
**City of Boardman**  
**City of Heppner**

**City of Ione**  
**City of Irrigon**  
**City of Lexington**

The plan's approval provides eligibility to apply for hazard mitigation projects through your state. Grant applications will be evaluated individually according to the specific eligibility and other requirements of the particular hazard mitigation grant program. For example, a mitigation project identified in the approved plan may or may not meet the eligibility requirements for Hazard Mitigation Grant Program funding.

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

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

Sincerely,

A handwritten signature in black ink that reads "Carl L. Cook, Jr." with a stylized flourish at the end.

Carl L. Cook, Jr., Director  
Mitigation Division

cc: Dennis Sigrist, OEM

Enclosure

# MORROW COUNTY PRE-DISASTER MITIGATION PLAN

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## List of PDMP documents not in electronic form.

Morrow County Resolution R-23-2006 Adoption Resolution

### THE PLAN

Section 1 – none

Section 2 – none

Section 3 – none

Section 4 – none

Section 5 – none

### ANNEXES

Drought – National Climatic Data Center, NOAA Satellite and Information Service,  
<http://www.ncdc.noaa.gov/oa/climate/research/2005/sep/st035dv08pcp200509.html>

Office of the Governor State of Oregon Executive Order NO. 05-05  
Determination of a State of drought emergency in Crook, Gilliam, Hood  
River, Morrow, Sherman, and Umatilla counties due to drought and low  
water tables.

Environmental Assessment Emergency Withdrawal for Irrigation, Willow  
Creek Lake Morrow County, Oregon

Newspaper Article: East Oregonian, 5/15/2005: Parched soil, low crop  
yields nothing new in Morrow County

Newspaper Article: East Oregonian, 4/09/2005: Drought declared for  
Umatilla, Morrow Counties

Newspaper Article: East Oregonian, 6/30/2004: Census: Local Farmers  
Struggling

Newspaper Article: East Oregonian, 12/23/2002: Morrow County  
Drought Hits Man, Beast Alike

Earthquake - Map: DOGAMI 7/2006 Preliminary, Morrow County Ground Shake  
Amplification

Map: DOGAMI 7/2006 Preliminary, Morrow County Relative Earthquake  
Induced Landslide Susceptibility

Map: DOGAMI 7/2006 Preliminary, Morrow County Liquefaction  
Susceptibility

Map: Selected Earthquakes for Oregon 1841 through 2002, DOGAMI,  
2003

Newspaper Article: East Oregonian, 08/13/2006: Small Quakes Shake  
Northwest

Newspaper Article: The Hermiston Herald, 04/13/2004: Is Another Major  
Quake Coming?

Morrow County Emergency Management News Release, 3/24/1997:  
Earthquake reports sought in Morrow County  
Oregon State Police Emergency Management Division report of a 3.9  
magnitude earthquake near Maupin, Oregon 3/21/1997

University of Washington Seismology Lab, Earthquake Notification  
Summary 03/21/1997 near Maupin, Oregon

Oregon Emergency Response System advisory of an earthquake in the  
Pine City area: 02/13/1996

Newspaper Article: Heppner Gazette Times, 07/16/1936: Temblor Rocks  
Houses, Rattles Chinaware in Nocturnal Visit

Flood - Morrow County Emergency Management website instructions. The  
website is: <http://www.csepp.org>

The Heppner Flash Flood Emergency Plan as Amended May 23, 2006

Flood Hazards, from the website  
<http://www.heppner.net/city/docs/1999plan.html>

Map: FEMA Preliminary Draft of the 100 and 500 year flood zones for the  
Boardman area

Map: FEMA Preliminary Draft of the 100 and 500 year flood zones for the  
Heppner area

Map: FEMA Preliminary Draft of the 100 and 500 year flood zones for  
lone area

Map: FEMA Preliminary Draft of the 100 and 500 year flood zones for the  
Irrigon area;

Map: FEMA Preliminary Draft of the 100 and 500 year flood zones for the  
Lexington area;

Graph: Morrow County Percent of City Area within the 100 year and 500  
year Flood Zone;

Executive Order EO-97-09: Determination of a State of Emergency in  
Coos, Curry, Douglas, Gilliam, Hood River, Marion, Lincoln, Linn, Morrow,  
Multnomah, Polk, Sherman, Tillamook, Umatilla, Wasco, Washington,  
Wheeler and Yamhill Counties due to heavy rains caused flooding,  
landslides and erosion throughout these counties: 01/24/1997

Newspaper Article: Tri-City Herald, 01/04/1997: Flood Losses Add Up  
While Rivers Recede

Executive Order EO-96-13: Determination of a State of Emergency in  
Morrow County Due to Heavy Rains and Subsequent Flooding:  
02/12/1996

Newspaper Article: East Oregonian, 05/26/1971: Flash Flood Roars Through Heppner

Newspaper Article: Heppner Gazette, 06/18/1903: Days of Sorrow in Heppner

Landslide – Map: DOGAMI Preliminary Compilation of Previously Identified Landslides in Morrow County

Volcano - Map: USGS Pacific Northwest Volcanics from website:  
<http://vulcan.wr.usgs.gov/Volcanoes/PacificNW/Maps>

Article: “Chicken Little Was Right – Sometimes the Sky DOES Fall” by Katharine Cashman, Phi Kappa Phi Forum/Vol. 86.No.1

Maps: Map of Washington and Oregon showing the percentage probability of accumulation of ten or more centimeters of tephra from a large eruption of Mount St. Helens and the annual probability of accumulation of ten or more centimeters of tephra in Washington and Oregon from eruptions throughout the Cascade Range.  
<http://vulcan.wr.usgs.gov/lmgs/Gif>

Wildfire - Army Wildland Fire Policy Guidance, August 2002

Interagency Fire Management Plan Template, signed by the USDA Forest Service, Indian Affairs, Bureau of Land Management, Fish and Wildlife Service, and the National Park Service

Executive Order EO-00-18, Determination of Emergency Conflagration Act Due to Fire in Morrow County: 07/22/2000

Executive Order EO-00-24, Determination of Emergency Conflagration Act Due to Fire in Gilliam and Morrow Counties: 08/10/2000

Newspaper Article: Heppner Gazette, 07/22/1987: Wind-whipped Blaze Challenges Volunteer Firefighters

Newspaper Article: Heppner Gazette, 07/30/1970: Blaze Takes Grass and Grain Lands

Wind Storms - Newspaper Article: East Oregonian, 05/20/2006: Severe Weather Strikes Area

Newspaper Article: Hermiston Herald, 05/23/2006: Depot Loses Power Due to Wind Storm

NOAA Damage Report of the May 19, 2006 wind storm from website:  
<http://www.wrh.noaa.gov/pdt/reference/20060519/lsr.php>

Article: “The Oregon Weather Book, A State of Extremes” by George H. Taylor & Raymond R. Hatton

Newspaper Article: The Oregonian, 06/14/2006: May Tornado Lashed Morrow County

Newspaper Article: Oregonian, 09/28/1999: Seventh Victim Dies as Result of Highway Crash

Newspaper Article: East Oregonian, 11/20/1999: Freak of Nature? Proper steps would have helped during I-84 pileup, but not much

Newspaper Article: East Oregonian, 10/02/2002: Lawsuit Seeks \$31 Million for 1999 Dust Storm Death

I-84 Dust Storm Community Solutions Team Final Report – June 1, 2000

Winter Storm – none

**CITY ANNEXES** (All Action Item Proposals can be viewed in the Action Item Matrix)

Boardman - City of Boardman Resolution 8-2006 Adoption Resolution  
Action Item Proposal 5.28  
Action Item Proposal 5.26

Heppner - City of Heppner Resolution 651-06 Adoption Resolution  
Action Item Proposal 2.6  
Action Item Proposal 2.3, 7.10  
Action Item Proposal 7.6  
The Heppner Flash Flood Emergency Plan as Amended May 23, 2006

Ione - City of Ione Resolution 6-2006 Adoption Resolution  
Action Item Proposals 2.2 and 1.1

Irrigon - City of Irrigon Resolution 06-25 Adoption Resolution  
Action Item Proposals 1.2, 5.27 and 5.25

Lexington – Town of Lexington Resolution 06-08 Adoption Resolution  
Action Item Proposals 5.30, 4.2, and 5.31

**APPENDICES**

A – none

B - Steering Committee sign-in sheet, April 25, 2006  
Stakeholder Forum sign-in sheet, May 16, 2006  
Steering Committee sign-in sheet, July 11, 2006  
Steering Committee sign-in sheet, August 22, 2006  
Steering Committee sign-in sheet, September 12, 2006  
Flyers for the Open for Business Workshop

C – none

D – none

E – Morrow County Telecommunications Plan, January 2001

F – none

G – none

H – none

I –

J – All of the original Action Item Proposal Forms are in this appendix  
Maps of the County and city community assets and functions. This includes one county-wide map and one each of the 5 incorporated municipalities.

# Section 1

## Introduction

**“On Sunday, June 14, 1903, at about 5:00 p.m., a cloudburst broke over the hills south of the small farming community of Heppner. Overloaded creeks rushed toward the town, picking up debris from the farms through which they passed. At the south end of Heppner, a steam laundry crossed the path of the water. Debris built up behind the laundry, effectively damming the water until the building could not withstand the pressure. When the water broke free, it hit Heppner with a force unmatched in the history of the state.**

**After the floodwaters subsided, the task of finding and burying the dead began. Bodies were dug out of the debris and, in some cases, brought back to town from several miles downstream. A temporary morgue was set up in the stone Roberts Building, one of the few structures left relatively unscathed on Main Street. Fatality counts varied; some people simply disappeared and were never accounted for, some bodies were never identified. The final count was "approximately 250 dead."** (Reprinted from the website: [www.rootsweb.com/morrow/HeppnerFlood.htm](http://www.rootsweb.com/morrow/HeppnerFlood.htm))

## Why Develop a Mitigation Plan?

Morrow County developed this Natural Hazards Mitigation Plan in an effort to reduce future loss of life and property resulting from natural disasters such as the flood event mentioned above. The Heppner Flood was the worst flood, in terms of loss of life, ever to occur in Oregon. It is impossible to predict exactly when these disasters will occur, or the extent to which they will affect the County. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize the losses that can result from natural disasters.

A natural disaster occurs when a natural hazard impacts people or property and creates adverse conditions within a community. This plan focuses on the primary natural hazards that could affect Morrow County, Oregon, which include drought, wildfire, flooding, windstorms, winter storm, and to a lesser extent, landslides, seismic and volcanic events. The dramatic increase of the costs associated with natural disasters over past decades has fostered interest in identifying and implementing effective means of reducing vulnerability. This Natural Hazards Mitigation Plan is intended to assist



Morrow County in reducing its risk from natural hazards by identifying resources, information, and strategies for risk reduction.

The plan is non-regulatory in nature, meaning that it does not set forth any new policy. It does, however, provide: (1) a foundation for coordination and collaboration among agencies and the public in the County; (2) identification and prioritization of future mitigation activities; and (3) assistance in meeting federal planning requirements and qualifying for assistance programs. The mitigation plan works in conjunction with other County, city and state plans and programs, which are:

- The Natural Hazards Element of the Morrow County Comprehensive Plan;
- Flood Hazard Overlay Zone of the Morrow County Zoning Ordinance;
- City Flood Ordinances
- Morrow County Community Wildfire Protection Plan;
- Mutual Aid Agreements for fire and emergency services between Morrow and Umatilla Counties; and
- State of Oregon Natural Hazards Mitigation Plan.

The plan provides a set of actions to prepare for and reduce the risks posed by natural hazards through education and outreach programs, the development of partnerships, and implementation of preventative activities such as land use or watershed management programs. The resources and information within the mitigation plan establish a foundation for coordination and collaboration among agencies and the public in Morrow County, identify and prioritize future mitigation projects, and assist in meeting qualifications for federal assistance programs. The actions described in the plan are intended to be implemented through existing plans and programs within the County.

## **What is Natural Hazard Mitigation?**

What is natural hazard mitigation? Natural hazard mitigation is defined as permanently reducing or alleviating the losses of life, property, and injuries resulting from natural hazards through long and short-term strategies. Example strategies include planning, policy changes, programs, projects, and other activities. Mitigation is the responsibility of individuals, private businesses and industries, state and local governments, and the federal government.<sup>1</sup>

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

## **Policy Framework for Natural Hazards in Oregon**

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

this network of local plans coordinated in response to the changing conditions and needs of Oregon communities.

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

The primary responsibility for the development and implementation of risk reduction strategies and policies lies with local jurisdictions. However, resources exist at the state and federal levels. Some of the key agencies in this area include Oregon Emergency Management (OEM), Oregon Building Codes Division (BCD), Oregon Department of Forestry (ODF), Oregon Department of Geology and Mineral Industries (DOGAMI), and the Department of Land Conservation and Development (DLCD).

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

## **How was the Plan Developed?**

Morrow County Planning Department Staff utilized the University of Oregon Community Service Center's Oregon Natural Hazards Workgroup, partnered with the Department of Geology and Mineral Industries (DOGAMI) to develop this Pre-disaster Mitigation Plan. The County joined the Partnership for Disaster Resistance and by signing (through the County Commission) a Memorandum of Understanding for this project. FEMA awarded the Mid-Columbia Gorge Region, of which Morrow County is a part, a grant to support the development of the natural hazard mitigation plans for the seven counties in the region.

The planning process used to create Morrow County's Natural Hazards Mitigation Plan was developed by the Community Service Center's Oregon Natural Hazard Workgroup at the University of Oregon.<sup>ii</sup> 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 following is a summary of major activities included in the planning process.

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

Morrow County prepared and developed the Plan with dedicated time of Planning Department Staff. A Steering Committee to help guide the development of the mitigation plan was appointed by the County Court on

March 15, 2006. The Steering Committee was comprised of ten people representing various agencies and organizations in Morrow County, including:

- Gary Neal and Ron McKinnis, Port of Morrow;
- Larry Burns, Irrigon Rural Fire Protection District;
- Linda Curtis, American Red Cross;
- Billie Jean Morris, Boardman Chamber of Commerce;
- David DeMayo, City of Heppner;
- Mark Burrows, Morrow County School District;
- Steve Rhea, Heppner Rural Fire Protection District;
- Janet Greenup, Morrow Soil and Water Conservation District;
- Ken Grieb, Morrow County Planning Commissioner; and
- Brett Cook, Morrow County Building Official

Additional Morrow County staff input came from the Public Works Department and Morrow County Emergency Management. The Committee was instrumental in ensuring the success of the development of the Plan as the Committee helped to guide the development of the plan by setting goals, identifying appropriate activities, and developing a process for public participation.

The Steering Committee held the following meetings at the following dates and locations:

- April 25, 2006      Boardman City Council Chambers  
    Agenda items:      Introductions  
                            Purpose and Objectives  
                            Review of Morrow County's Scope of Work  
                            PDMP Seven Step Process  
                            Review of "The Plan"  
                            Adjournment
- June 6, 2006      City of Heppner, Petty John Building  
    Agenda items:      Election of Officers  
                            Re-cap of the Stakeholder Event on May 16  
                            Discussion of the May 19 storm event  
                            Goals and Mission Statement  
                            Review of Plan progress  
                            Stakeholder Event – Ratification of  
                            Information

Next Meeting Date and Place  
Adjournment

- July 11, 2006      Port of Morrow Sand Hollow Room  
    Agenda items:      Review of Plan Progress: Section 1  
                            Review of Plan Progress: Section 2  
                            Review of Plan Progress: Section 3  
                            Vision Statement Discussion
  
- August 22, 2006    City of Heppner, Pettyjohn Building  
    Agenda items:      Selection of the Vision Statement  
                            Review and discussion of the Action Items  
                            Review of the Draft Plan, Sections 1 - 5  
                            Review of Plan Appendices and Annexes
  
- September 12, 2006    Port of Morrow Sand Hollow Room  
    Agenda items:      The Plan – Where we are and What’s Next  
                            What is needed to complete the Plan  
                            Motion to Submit Plan for Review

**Step 2: Involving the Community:**

Citizen involvement in local planning efforts is required by the state of Oregon and during the development of this Plan the citizens of Morrow County provided their expertise, time, and commitment to the process. Community involvement was represented in the form of the Steering Committee, the Stakeholder Forum, and the Stakeholder interviews. The Stakeholder Forum was held on May 16, 2006. At the Stakeholder Forum, each participant provided firsthand, detailed knowledge that was pertinent to risk and hazard identification within each citizen’s area of knowledge.

Attendees at the Stakeholder Forum:

Representatives from:

- Tidewater Barge Lines
- Finley Buttes Landfill
- U.S. Army Corps of Engineers
- Bonneville Power Administration
- Union Pacific Rail Road

- Columbia River Processing
- Cascade Natural Gas
- Department of Environmental Quality
- Oregon Department of Transportation
- Department of Geology and Mineral Industries
- U.S. Forest Service
- Town of Lexington, Morrow county Public Works
- Morrow County Health District Morrow County Helarth Department
- Morrow County Assessor
- City of Boardman
- Morrow Soil and Water Conservation District
- Morrow County Sheriff's Office
- Heppner, Irrigon and Boardman Rural Fire Protection Districts

Morrow County Staff also conducted various Stakeholder Interviews. Each interview was intended to obtain specific information about critical infrastructure or other community assets from Morrow County natural hazard stakeholders listed below:  
Stakeholder Interviews:

- Bonneville Power Administration – May 16, 2006
- West Extension Irrigation District – June 13, 2006
- City of Irrigon – June 15, 2006
- City of Boardman – June 15 and July 20, 2006
- City of Lone – July 10, 2006
- Town of Lexington – June 26, 2006
- City of Heppner– June 26, 2006
- Oregon Department of Transportation – July 13, 2006
- Irrigon Chamber of Commerce – August 2, 2006
- Heppner Chamber of Commerce – August 10, 2006
- Trans Canada Pipeline – August 22, 2006
- Portland Gas and Electric – August 29, 2006

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

The Oregon Natural Hazards Workgroup (ONHW), with commitment from the Institute for Business and Home Safety (IBHS), provided individuals in the Region with access to, and use of, the IBHS interactive, web-based *Open for Business* property protection and disaster recovery planning tool. The purpose of the planning tool is to: (1) create understanding of the importance of disaster planning; (2) teach local businesses how to navigate the interactive, web-based *Open for Business* property protection and disaster recovery planning tool; (3) Assist small businesses develop their own plans during the training; and (4) teach businesses how to communicate the importance of developing and utilizing plans for property protection and recovery from business interruption. In May, 2006 the ONHW conducted the Open for Business Workshop for local businesses in The Dalles and Hermiston. The summary of this workshop can be found in Appendix B.

### **Step 3: Describing the Community:**

The County developed a community profile in an effort to gain a better understanding of the County assets that might be at risk from natural hazards. Using data gleaned from Portland State University Population Research Center, Oregon Department of Revenue, and Oregon Employment Department, and the Morrow County Comprehensive Plan, a profile of the County population was formulated which proved to be invaluable sources for creating an accurate profile of the County's population. Local data about critical infrastructure and human and natural resources came from the detailed and extensive knowledge of the stakeholders and pre-existing plans and documents. This information can be found in Section 2.

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

With information gathered from local and State records, the Morrow County Planning Department identified eight natural hazards that have the potential to affect Morrow County. These hazards include drought, earthquake, flooding, landslides, volcano, wildfire, windstorms, and winter storms. These hazards were also identified by the Partners for Disaster Resistance & Resilience, the Oregon Department of Geology and Mineral Industries (DOGAMI), the Oregon Department of Emergency Management, and the experience of Morrow County Emergency Management, the Planning Department, Public Works Department, and the Rural Fire Protection Districts.

The assessment of these risks to Morrow County was conducted by the community participants during the steering committee and stakeholder meetings who analyzed the particular hazards in the County and their likely locations. The Committee and Planning Staff was aided by the Planning for Natural Hazards: Oregon Technical Resource Guide and the State's Natural Hazard Management Plan Risk Assessment and regional profile. The regional profile was compared against local data, but the County's vulnerability to natural hazard risk was the result of local expert input and the State resources mentioned above. The Planning Staff used this information to determine vulnerabilities and provide the factual basis for proposed mitigation actions. Section 3, Risk Assessment Summary contains the assessments of Morrow County's vulnerabilities to natural hazard risk in this Plan.

## **Step 5: Developing Plan Goals:**

The basis for Morrow County's goals concerning mitigation of natural hazard risks lies in the Comprehensive Plan, which directs the County to protect life and property from natural disasters and hazards. This goal of the Natural Hazards Element exists in harmony with many other County planning programs from the Transportation System Plan to the ordinances, plans and policies of the Health Department, Planning Department, Public Works Department and other entities such as Morrow County Emergency Management. The Steering Committee, with the support of the Planning Department and guidance of the Oregon State's Hazard Mitigation Plan Goals along with examples of goals from other Oregon counties, considered and developed the natural hazard mitigation plan goals. Section 4, Mission, Goals and Action Items lists Morrow County's goals for natural hazard mitigation.

## **Step 6: Developing Solutions:**

The Steering Committee and Planning Department staff evaluated a broad set of mitigation action items for the Plan's identified natural hazards that could impact the County. These "action items" are recommendations for pre-disaster mitigation given to the County in the PDMP process. Members of the Planning Department Staff, Steering Committee, Public Works Department and the Morrow County Stakeholders identified the action items during the Steering Committee meetings, the Stakeholder event, Stakeholder interviews, and by the PDMP Staff in response to needs identified after the May 19, 2006 storm event. Other sources of Action Items are listed as follows:

Other Action Item Sources:

1. City Meetings
2. Meetings with city Chambers of Commerce

All of the Action Items can be found in Section 4, Mission, Goals and Action Items and Appendix I of this Plan.

## **Step 7: Setting the Plan in Motion:**

Planning staff have responsibility for the Plan development through its adoption by resolution by the County Court and each of the respective communities in Morrow County. Once the Plan is adopted the Morrow County Emergency Management Department will take over maintenance of the Plan and implementation of the recommendations (Action Items). The Emergency Management Department will maintain the Plan on the County Emergency Management web site and will be responsible for holding, at a minimum, annual meetings of the Steering Committee. The Public Works Department will assist with the maintenance and the Planning Department will be available as needed. Planning staff will, of course, be responsible for implementing those Action Items relative to the Comprehensive Plan, Zoning Ordinance and Subdivision Ordinance.

The Steering Committee, at their September 12, 2006, meeting did recommend that the Plan be submitted for review to the Oregon Office of Emergency Management (OEM) and the Federal Emergency Management Agency (FEMA) for review. Planning staff will make adjustments to the Plan as deemed necessary by the review process. At the time both OEM and FEMA have approved the Plan Planning staff will work with the County Court and each City or Town Council to adopt by resolution the Plan.

# How is the Plan Organized?

Each section of the mitigation plan provides specific information and resources to assist readers in understanding the hazard-specific issues facing Morrow County citizens, businesses, and the environment. Combined, the sections work together to create a mitigation plan that:

- furthers the County's mission to identify and reduce risk, and
- works to prevent loss and protect life, property and the environment from natural hazards.

This plan structure enables stakeholders to use the section(s) of interest to them.

## **Section 1: Introduction**

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

## **Section 2: Community Profile**

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

## **Section 3: Risk Assessment Summary**

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

## **Section 4: Mitigation Plan Goals and Action Items**

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

## **Section 5: Plan Maintenance**

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

## **Hazard Specific Annexes**

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

- Drought;



- Earthquake;
- Flood;
- Landslide/Debris Flow;
- Volcanic Event;
- Wildfire;
- Windstorm; and
- Winter Storm.

### **City Annexes**

This annex contains the summaries of participation by the cities, special hazard information particular to the cities, the city Action Items, and copies of the cities' Resolutions of Adoption of this Plan.

### **Resources Appendices**

The resource appendices are designed to provide users of the Morrow 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. The resources include:

#### **Resource Directories for State and County Multi-Hazard, Flood, Wildfire and Landslides Mitigation Resources**

This 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. The Community Service Center's Oregon Natural Hazards Workgroup at the University of Oregon Natural Hazards Workgroup at the University of Oregon developed this appendix.

#### **Planning and Public Process**

This appendix includes evidence of the public process involved in the development of this Plan. Steering Committee attendance, meeting minutes, agendas are included. The Stakeholders and stakeholder interview summaries, as well as the Open for Business Workshop summary are all included.

#### **Regional Household Preparedness Survey**

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

#### **Economic Analysis of Natural Hazard Mitigation Projects**

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

### **Existing Plans, Policies, and Programs**

The existing plans, policies and programs in Morrow County are listed in this appendix. The first section covers plans and policies on the books for the County and the second section covers social service providers.

### **Tools**

This appendix describes various tools and techniques that can help communities reduce risk from natural hazards. A brief examination of the effectiveness and limitations for each tool is included.

### **List of Acronyms**

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

### **Mid-Columbia Natural Hazard Risk Profile**

This report is part of the State's enhanced natural hazard mitigation plan. It is intended to be used as a planning process document by communities developing local natural hazard mitigation plans and during periodic review and update processes.

### **Action Items**

Located in this appendix are the original Action Items submitted to the County during the development of the Plan.

### **Maps**

This appendix holds the maps used by the Stakeholders and the Steering Committee to identify Morrow County Assets and Functions pertinent to the County's natural hazard risks. The Assets and Function are divided as follows: human population, economic assets, cultural & historic resources, infrastructure & critical facilities, and environmental.

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

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

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

# Section 2

## Community Profile

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

### Geography and Climate

Morrow County lies along the Columbia River with 35 miles of shoreline, almost midway between the eastern and western boundaries of Oregon. Morrow County has an elevation at its highest point of 6000 feet in the mountains south of Heppner to 260 feet above sea level at the Columbia River to the north. The County contains 1,321,600 acres of land of which 40 percent is range land, 35 percent cropland and 18 percent is forested. It is part of the 100,000 square-mile Columbia Basin Plateau between the Rocky Mountains and the Cascade Range in Washington, Oregon, and Idaho. Most of Morrow County is underlain by the Miocene Columbia River Basalt Group rocks, which were deposited in large lava flows sometimes hundreds of feet thick. The Columbia Basin was also the scene of the Missoula Floods which were the greatest catastrophic floods ever documented in the geologic record. The area that became north Morrow County participated in this event, as the Columbia River was the drainage for these catastrophic floods.

The climate is relatively dry because the Cascade Mountains serve as an effective moisture barrier causing storms to dump much of their moisture west of the peaks leaving areas to the east, including Morrow County, in a "rain shadow." This region has a definite winter rainfall climate. The months of November through February generally receive the most precipitation due to winter storms, which bring rain to lower elevations and snow to higher areas characteristic to the southern portion of the County. Annual totals vary and are proportional to elevation; the average annual rainfall for Boardman in the northern and lower portion of the County is 8.61 inches while Heppner, which is a part of the higher areas, receives 10.44 inches annually. Occasional summer thunderstorms bring localized, occasionally heavy rain.

The County is part of the Umatilla Drainage Basin, which flows into the Columbia River. The Butter Creek in Morrow County is tributary to the Umatilla River, which flows into the Columbia River. The Willow Creek, whose headwaters are in the mountains above Heppner, flow through the communities of Heppner, Lexington and Lone, and joins the Columbia River just outside of Morrow County to the west. There are other minor drainages, which flow into the Willow Creek, which have been locally renowned for periodic flash flooding such as Balm Fork, Hinton Creek, Rhea Creek, and Shobe Creek.

The County has sedimentary deposits generally less than 100 feet thick, some of which are wind-deposited loessial soil which support extensive wheat farming. Where the deposits are thin or discontinuous, they provide grazing for cattle and sheep. In the northern portion of the county are deposits left during the glacial melt water transport of the Missoula Floods. They are the primary type of sedimentary deposits present there and are generally less than 100 feet thick and support the extensive irrigated agriculture present in the northern portion of the County.

## Population and Demographics

Permanent settlements in what would become Morrow County were established in the canyons of Willow and Butter Creek before 1870. In August of 1872 Henry Heppner and Jackson Lee Morrow opened a store on Stansbury Flat near the forks of Willow Creek to service the needs of the stockmen settled on Willow Creek, Balm Fork, and Rhea Creek. These stockmen were tired of hauling goods themselves from the Columbia at Umatilla Landing or Castle Rock. Sheep were the chief product of the Morrow County rangelands which eventually changed to a grain-based economy after the establishment of National Forest lands, grazing restrictions and the spread of sagebrush onto the grasslands. The population slowly grew through the twentieth century despite economic hard times in the 1930s and the need for the young people to look for work outside of the County if they weren't interested in the farming profession. During the 1950s and 1960s Heppner's population grew due to the post WWII baby boom and employment opportunities at the sawmill. The next two decades saw the introduction of irrigated agriculture and the formation of the Port of Morrow in the northern portion of the County. Portland Gas and Electric developed a coal fired power plant in the Boardman area and the population in the northern part of the County began to rise due to the need for agricultural and industrial workers. Morrow County experienced a higher growth rate than the overall Umatilla/Morrow County region, which averaged 1.8 percent from 1998 to 2004. During the same time period, Morrow County managed a population growth rate of 2.4 percent, which meant an increase of more than 3,900 residents in that time period, pushing its total to 11,750 in 2004. Morrow County's growth over the past 16 years was well above the 1.19 percent Oregon trend. Most of the population in the County has remained within the boundaries of the incorporated cities (average 60%) over the last 25 years.

Morrow County has four incorporated cities and one town as listed below:

City of Heppner	Population in 2004:	1420
City of Boardman		3120
City of Lone		340
City of Irrigon		1790
Town of Lexington		260

The cities of Boardman and Irrigon are situated in the northern portion of the County next to the Columbia River and contain 42 percent of the County's population. The cities of Heppner, Lone and the Town of Lexington are situated in the southern portion of the County along Willow Creek and contain 17 percent of the County's population. This points to the fact that most of the population of Morrow County lives in the northern third of the County.

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

### Population By Age

The Morrow/Umatilla County region aged considerably during the 1990s, with the baby-boom generation – ages 40 to 59 years – swelling its ranks by nearly 7,000 (+48%) from 1990 to 2000. Young adults, however, posted tepid growth, and the region's 20-to-29 age group was up just 2,095 people (+10.5%). Those 60 and older gained only 996 (+8.3%) over the decade. Children and teens aged 19 and under grew by nearly 4,700 over the 10-year period, for an increase of 22.5 percent. Compared with the state's 2003 age class distribution, this region had a noticeable lead in children and teens, which represented 30.4 percent of its population total, compared with 27.1 percent for the state. Oregon had a slight lead over the Morrow/Umatilla region in retirement age groups and young adults. The state was nearly two percentage points ahead of the region in the 40-to-59 group, which represented 28.5 percent of Oregon's 2003 population total compared with 26.7 percent in the region.

### Minorities

The Morrow County region's population diversified greatly during the 1990s. The biggest change was in the Hispanic ethnic group, which gained population. Hispanics represented about 9 percent in 1990 and in 1999 their share had grown to 24.5 percent. The Hispanic population in 2003 had grown to 27.6 percent. The White racial group declined from an 89.1 percent share of the region's 1990 population to 74.9 percent in 2000. The White population in 2003 was down to 70 percent. The black group showed a total of 35 which represented about .3 percent in 2003.

#### Morrow County race/ethnicity (2003):

White	70.0%
Black	0.3%
American Indian	1.7%
Asian/Pacific Islander	.6%
Hispanic	27.6%

### Poverty rates and Disabled populations

According to the 2000 Census, Morrow County grew 44.2 percent between 1989 and 1999. The U.S. Census Bureau determined the poverty status of 10,910 County residents and found that 14.8 percent (1,617 people) lived below the poverty threshold. This was an increase of 10.1 percent in the number of persons living in poverty (1,141 people) since 1989. The overall percent of Morrow County's population living in poverty remained relatively constant from 1989 to 1999, but the number of people living in poverty did not. In the 20 years after 1979, the poverty rate in Morrow county increased from 10.5 percent of the population to 14.8 percent. The number of persons in poverty rose from 782 people to 1,617 people. Morrow County's poverty rates were higher than the state and national poverty rates from 1989 to 1999 due to increases from 1979 to 1989.

White residents comprised the majority of people in poverty at 57.6 percent but when examining poverty based on race, the poverty rate among the total white population in Morrow County was 11.4 percent. Hispanics below the poverty level were 45.3 percent and 27.4 percent of the Hispanic population as a whole.

According to the Social Security Administration data on the December 2003 beneficiaries as a percentage of County Population, 1,660 people received Social Security benefits in Morrow County. That represents 14 percent of the County population as a whole. Of this group, 71 percent are Retired Workers, 13 percent are Survivors and 16 percent are Disabled. Seven percent of the beneficiaries are children.

Total	Retired Workers	Survivors	Disabled
1660	1179	216	265

## Employment and Economics

The first entrepreneurs in Morrow County were the sheep herders who took advantage of the virgin grasslands in the area as open pastureland in the early 1870s. Not long afterward, Henry Heppner and Jackson Lee Morrow opened a store and a real economy was born. The portion of Morrow County first settled were the areas around the Oregon Trail and Willow Creek. The Oregon Trail came almost straight west from Pendleton through what would later become north central Morrow County. Commercial and financial establishments proliferated in Heppner during the decade of the 1870s and the census-taker counted 318 citizens in the city in 1880. The Oregon-Washington Railroad & Navigation Company, which would eventually become the Union Pacific Railroad, completed their The Dalles to Wallula line in April of 1881 and a branch to Heppner was put in by 1889. When Morrow County was established in 1885 Heppner won the contest with Lexington for County seat. The economic basis of the Heppner area continued to be sheep production with the addition of logging from the 1880's until the Depression in the 1930s when all but the largest grazing operators went away. By 1939 Highway 74, the Heppner Highway, from Lexington and Heppner along Willow Creek through Lena east towards Pendleton had been built. The rail spur going north from Heppner to the Willow Junction at the Columbia River helped to encourage wheat farming and the farmers began to look to the north for more land but the northern portion of the County was, in the early years, relatively unpopulated.

The economics of the County began to change when irrigated agriculture was developed in the northern portion of the County and the Port of Morrow opened for business in 1957. The Cities of Boardman and Irrigon started to expand as the demand for workers at the Port and on the farms began to grow.

### Current Economic Base

Northern Morrow County is dependent on large-scale corporate agri-business, which can be traced to 1963 when the Boeing Company leased 100,000 acres of land south of Boardman and pioneered circle irrigation in this region. This property continues to

be in agricultural production, which includes the production of wheat, potatoes, alfalfa and milk. The Port of Morrow also hosts many large agri-businesses including those for the production of French fries, dried onion production and dairy products. Other significant contributors to the County’s tax base are the regional solid waste landfill located in north Morrow County and the PG&E coal fired electrical plant south of Boardman and co-generation plant at the Port of Morrow. According to the Oregon Employment Department Regional Profile Occupational Employment in Region 12, Morrow and Umatilla Counties workforce analysis, the service industry, health care and farm workers were the top growing occupations. Declining occupations were found in the blue-collar occupations reflecting the restructuring of work places and processes and the loss of manufacturing jobs. The service industry represented the largest percentage of the employment in Region 12. According to the U.S. Bureau of the Census, Census 2000, there are 4,635 employed civilian workers ages 16 and over in Morrow County. Of this pool of workers, 69.7 percents of them are private wage and salary workers; 19.4 percent are government workers, and 10.6 percent are self-employed workers in own, not incorporated businesses.

## Housing in Morrow County

Housing development types and year-built dates are important factors in mitigation planning. Certain housing types tend to be less disaster resistant and warrant special attention: mobile homes, for example, are generally more prone to wind and water damage than standard stick-built homes. Generally the older the home is, the greater the risk of damage from natural disasters. This is because stricter building codes have been developed following improved scientific understanding of plate tectonics and earthquake risk. For example, structures built after the late 1960s in the Northwest and California use earthquake resistant designs and construction techniques. In addition, FEMA began assisting communities with floodplain mapping during the 1970s, and communities developed ordinances that required homes in the floodplain to be elevated to one foot above Base Flood Elevation. Housing characteristics provided by the U.S. Bureau of the Census, Profile of Housing Characteristics 2000 for Morrow County are listed as percentages as follows: Single Family: 51%, Multi-Family: 10%, Manufactured Homes: 36%, and Other: 3%. Local data collected from the County Assessor’s office has the information as follows:

### Housing Type

Single Family	Multi-Family	Manufactured Homes	Other
48.5%	2%	49.5%	0%

### Housing – Year Built

Pre-1939- 1959	1960 - 1979	1980 - 2000
25%	40%	35%

Local data collected from Zoning Approvals in the unincorporated areas of the County suggest the ratio of manufactured homes to stick-built homes is higher in north Morrow County. Eighty four percent of the new dwelling approvals were for manufactured homes in Morrow County in the years 1990 through 2005 and most of them were in the northern portion of the County. The southern portion of the County has the highest ratio of pre-1939 to 1959 built houses with the majority of the houses being stick-built. In general, the housing in the southern portion of the county is older and stick-built versus the northern portion of the County where the housing is newer and has a higher manufactured home ratio.

## **Land and Development**

Morrow County has an acknowledged Comprehensive Plan and Zoning and Subdivision Ordinances, which are in compliance with Oregon's land use laws. Morrow County's Comprehensive Plan and land use Ordinances provide opportunities for citizens to achieve their land use and property development objectives in accordance with Oregon State law.

### **Potential for Rural and Urban Development:**

The latest Oregon Office of Economic Analysis data, based on the 2000 census, estimates that the population in the County will increase by 54 percent to 18,100 by the year 2025, an average annual increase of about 2.5 percent. The Office of Economic Analysis publishes population estimates by County out to the year 2040. In percentage terms, Morrow County ranks in the top three counties in the state for projected population growth over five of the eight 5-year periods from 2000 to 2040, and no lower than the top five over the entire 40-year period.

In evaluating potential development of existing land uses and population as well as its distribution, two types of development are considered. One is growth in residential housing development. This will likely take the form of new subdivisions on currently vacant land within an Urban Growth Boundary. These vacant parcels are distributed largely south and west of Irrigon and south and west of Boardman. Additional residential development outside of the Urban Growth Boundaries will be limited because the County enforces a two-acre minimum for residential development in rural residential zones.

The other opportunity for growth is through economic development led by expansion of Port of Morrow industrial facilities throughout the County. The Port, through its 30-year history, has developed a significant inventory of developable land at its three industrial park sites: The Boardman Industrial Park, located east of Boardman and north of U.S. Highway 730; the Airport Industrial Park, located west of Tower Road; and the South Morrow County Industrial Park, located at the Kinzua sawmill complex just outside of the City of Heppner. The City of Heppner is currently evaluating the need for an expansion of its urban growth boundary to accommodate more industrial lands along the Highway 74/207 corridor.



## Development Trends

Building permit data for the last four years has averaged about 85 structural building permits per year. This number includes new manufactured home installation and all other structures including commercial buildings, and stick-built houses. The trend has been as follows:

Building Permits Issued:

2001	2002	2003	2004	2005
102	128	102	88	66

Generally, development in the southern portion of the County has been driven by recreation activities such as hunting and use of the off-road-vehicle park operated by the County. Morrow County expects to see further interest in development with focus on the recreation industry.

The northern portion of the County is expected to see further agri-industrial and energy related development. There is interest in the expansion of the dairy industry, biofuels, and wind energy development. The northern portion of the County will also see continued interest in the development and/or further use of the Boardman Bombing Range and the Umatilla Army Depot.

## Natural Hazards and Development

The natural hazards that could affect the developing areas of Morrow County are most likely to be wildfire, winter storms and drought in the southern portion of the County. It is expected that as people establish residences in the County's forested lands, there will be a significant increase in threats to life and property in these areas. During winter storms, the roads and highways of southern Morrow County can become temporarily impassible due to snow or ice accumulation.

The farmers, as well as local businesses that rely on the well being of the local farming economy of north and south Morrow County, are affected by a prolonged regional drought. The farmers experience reductions on water use imposed by water right restrictions and lowered water tables. Dryland farmers without access to irrigation systems have to rely on assistance programs in order to survive prolonged drought situations. In turn, the local businesses feel the belt-tightening by the farmers as they buy fewer products and services in the local area.

Development in the northern portion of Morrow County is less affected by natural hazards. Wildfire would be within undeveloped shrub-steppe areas and in dry wheat fields. Drought would worsen a wildfire situation. Flooding in the northern portion of Morrow County is controlled by the dam systems on the Columbia River, but the road systems have not been immune to local flooding situations due to summer and spring storm events. The movement of agricultural and industrial products from Morrow County on the transportation systems leading to the west and east could be potentially affected by winter storms or other events such as a volcanic event occurring in the wider mid-Columbia region.

# Transportation and Commuting Patterns

## Road and Highway Transportation

Morrow County is connected to the federal interstate highway system via Interstate 84, which parallels the Columbia River in the north end of the County. Interstate 84 links the County to I-5 to the west through Portland, and to I-80 and I-15 to the south and east to Boise and Salt Lake City. Interstate 84 also links the County to I-82 north to the Tri-Cities in Washington State. Other state highways within the county include:

- U.S. 730 serving Irrigon and the Port of Morrow and providing a link between I-84 and I-82 at Umatilla;
- State Highway 74, the Heppner Highway, which crosses the middle of the County from east to west serving Lone, Lexington, and Heppner;
- State Highway 207, which cross the County from north to south through Butter Creek Junction, Lexington, Heppner, and Hardman and into Wheeler County;
- State Highway 206, which crosses the southern portion of the County from Gilliam County through Ruggs to Heppner.

Bridges:

The following table represents Morrow County's bridge inventory:

State Highway Bridges	County Highway Bridges	City/Municipal Bridges	Historic Bridges
60	51	12	1

The historic bridge is the Spring Hollow Road bridge on Upper Rhea Creek, which was built in the early 1900s. This bridge continues to provide a link for farmers to highways 207 and 74. It is estimated that approximately 60,000 bushels of grain and 1,000 head of cattle move over this bridge annually.

Morrow County residents use the highway system to drive to work either in the local economy or within the larger "laborshed." A laborshed is the area or region from which an employment center draws its commuting workers irrespective of natural or political boundaries. In this case the regional commuting area includes Gilliam County, Umatilla County and Benton and Franklin Counties across the Columbia River in Washington State. According to the 2000 U.S. Census, Morrow County sent 1,305 workers to Umatilla County, which was a significant 28.9 percent share of its 4,517 resident workers.

Not only do workers travel to other regional areas to their jobs, shopping opportunities are extremely limited in the County for all but basic necessities. Most people travel

out of the County for the more varied shopping opportunities offered in Hermiston in Umatilla County and the Tri-Cities area in Washington State.

The road system in Morrow County generally follows drainage corridors in the southern portion of the County and is straight and rolling in the northern portion of the County. The Morrow County Transportation System Plan identifies safety issues for the transportation network in the County. The first is the need for an alternative to U.S. 730 for circulation between Irrigon and Boardman in the event of an emergency at the Umatilla Army Depot or the Port of Morrow. The second is the need for an additional north/south connection between Boardman and Lone in addition to Bombing Range Road, which is the only existing connection that wholly lies within the County. A second north/south route would provide an alternate for emergency vehicles and a fire break in the middle portion of the County where there is the potential for large losses due to a wildfire in the wheat fields and desert grasslands pushed by prevailing easterly winds.

There is no community bus service in the County, but the Greyhound Bus service traverses the County on Interstate 84. Local travelers who wish to use a Greyhound bus must board in Stanfield in Umatilla County or Pasco in Washington State. The closest stop to the west is in Hood River.

## Evacuation Routes

Morrow County participates in the Chemical Stockpile Emergency Preparedness Program (CSEPP). This federal program is in response to the need in this region to have a response plan for the activities at the Umatilla Chemical Depot, an ordnance facility for storing conventional and chemical munitions. The Morrow County Emergency Operations Plan, designed for emergencies during the incineration of the munitions stored at the Depot, includes response planning for manmade and natural disasters. This Plan includes evacuation routes in the northern portion of the County during an emergency at the Chemical Depot.

## Rail Transportation

Morrow County is served by one national freight rail carrier, the Union Pacific Railroad. Union Pacific provides freight rail service from Chicago west to the Pacific Ocean. The Port of Morrow operates a rail spur at their Boardman location, which is serviced by Union Pacific.

## River Transportation

Morrow County's location on the Columbia River provides direct access to the Columbia River transportation system, one of the most modern intermodal transportation networks in the country. This commercial waterway extends from the Pacific Ocean over 465 miles into eastern Washington and Idaho, and includes eight dam and lock complexes. This transportation system is accessed through the Port of Morrow in the Boardman area and the Morrow County Grain Growers access at the end of Paterson Ferry Road.

## Air Transportation

Morrow County has two public airports. The Lexington Airport is approximately one-half mile from the center of the Town of Lexington on a plateau approximately 200 feet above town. Highway 207 passes immediately east of the airport and serves as the primary surface access route to the airport. According to information contained in the 2001 Airport Layout Plan Report, the Lexington Airport site has been in aviation use since early 1945. The Lexington Airport has been a base for agricultural spraying operators for many years in addition to accommodating general aviation, business, medevac, and charter activities. The Lexington Airport has one paved, lighted runway (8-26), which is oriented on a 080-260 degree magnetic alignment and is approximately 4,300 feet long. The airport has been owned and operated by Morrow County since 1960.

The Boardman Airport is located approximately five miles west of Boardman and is accessed from Tower Road off of Interstate 84. The Boardman Airport has a single paved and lighted runway, which is oriented on a 040-220 degree magnetic alignment and is approximately 4,200 feet long. Historically the Boardman Airport has served military aviation and a variety of general aviation users including agricultural aviation. The Boardman Airport sits directly under the Boardman Military Operations Area and Restricted Area which means that aircraft operating at Boardman Airport must avoid flying into these areas of controlled airspace unless permission is granted in advance by the controlling agency (U.S. Navy). Three major electrical Bonneville Power Authority (BPA) transmission lines are located between the runway and Interstate 84 along a 300-foot wide easement. The Boardman Airport is owned and operated by the Port of Morrow.

## Natural Hazards and Transportation Patterns

Morrow County experiences disruptions to the transportation system due to the following factors:

1. flooding due to heavy rain storms on roads and highways;
2. impassable conditions due to winter ice/snow storms and extreme cold weather;
3. heavy tumbleweed (Russian thistle) accumulation in roads due to windstorms over agricultural areas with heavy growth of tumbleweeds.

## Critical Facilities and Infrastructure

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

Hospitals	Hospital Beds	Police Stations	Fire & Rescue Stations	School Districts	Power Plants	# of Dams	# of Dams with Threat Potential
1	12	2	5	2	2-1050 MW	10	1 high threat

Pioneer Memorial Hospital is located in Heppner, which is also the location of the Morrow County Health District's Emergency Medical Services. The Morrow County Emergency Medical Services include six ambulance vehicles located at four separate dispatch sites. Two vehicles are located in Heppner, two in Boardman, and one each in Irrigon and Lexington. The community of Lone has a First Response Vehicle. In a medical emergency, south Morrow County residents are transported to Pioneer Memorial Hospital in Heppner where Trauma Level IV services are available. If necessary, patients can be flown via helicopter or fixed-wing aircraft to higher levels of trauma care in: Bend, Oregon; Portland, Oregon; or Walla Walla, Washington. Patients in the north end of the county can be transported to Trauma Level III services in Hermiston, or to higher level care centers if needed.

The Morrow County Sheriff's office is located in Heppner. Law enforcement services are provided by the County Deputies to the Cities of Heppner, Lexington, Lone, and Irrigon. The Sheriff's office has two satellite locations, one in Irrigon and one in Boardman. The City of Boardman provides law enforcement services for its citizens within the Boardman city limits.

Within Morrow County there are two incorporated cities with fire departments, Heppner and Lexington. Both are operated with volunteer fire fighters. In addition, there are six rural fire protection districts within the County which are Heppner, Lone, Irrigon, Boardman, S. Gilliam, and Pilot Rock Rural Fire Districts. In the Rural Fire Districts, there are only three paid full time fire fighters, the rest are strictly volunteer. The Oregon Department of Forestry, Morrow County and the U.S. Forest Service and Bureau of Land Management protect the forested portions of southern Morrow County under a "closest forces" concept. The Oregon Department of Forestry and the U.S. Forest Service have mutual aid agreements with the rural fire districts within Morrow County that allows for assistance to be provided regardless of jurisdiction.

The power generation plants in Morrow County are coal-fire plant about 20 miles south of Boardman and the Coyote Springs co-generation facility at the Port of Morrow site near Boardman. Both are owned and operated by Portland General Electric. The Boardman facility coal fired plant is a 348.2 MW coal fired facility and Coyote Springs is a 241 MW, natural gas-fired generating facility.

Among the dams in Morrow County, the Willow Creek dam is the most well-known. It's construction was completed in 1983 and was the first major dam constructed in the United States using the roller compacted concrete technique. Built to prevent the reoccurrence of the disastrous 1903 flood, it controls the flow of Willow Creek and Balm Fork above Heppner. Other dams in Morrow County include the Carty West Dam, which provides water to the PGE Boardman coal fired plant, Cutsforth Dam, and Lake Penland Dam.

## Historic and Cultural Resources

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

The locations in Morrow County that are on the National Register of Historic Places are:

- Gilliam & Bisbee Building in Heppner
- Heppner Hotel in Heppner
- Morrow County Courthouse in Heppner
- Oregon Trail, Wells Springs Segment

### Parks and Recreational Facilities

- Morrow County Off Highway Vehicle (OHV) Park has over 6,200 acres in south Morrow County adjacent to Highway 207. This park has many miles of off-road trails and is available for winter use by snowmobile and cross-country ski enthusiasts. The OHV park also has spaces for recreational vehicles (RVs) and small cabins. The OHV park is owned and operated by Morrow County.
- Cutsforth Park is located in the southern Morrow County 22 miles south of Heppner. Located along the Blue Mountain Scenic Byway, it offers horseshoe pits, a campground, walking the nature trails, and equestrian trails on adjacent USFS property. Cutsforth Park is owned and operated by Morrow County.
- Anson Wright Memorial Park is located 26 miles southwest of Heppner on State Highway 207. It opened in 1967 on land originally owned and then donated by the Wright family. The park has full and partial RV hook-ups as well as tent sites. It also offers restrooms with showers, a stocked fishing pond, horseshoe pits, and day use areas for picnicking. Anson Wright Park is owned and operated by Morrow County.
- Quesnel Park is located on the Columbia River on the north side of the Threemile Canyon Exit from Interstate 84. It contains about 265 acres and offers boating and other water sport activities as well as camping and fishing opportunities. It is owned and operated by the U.S. Army Corp of Engineers.
- City Parks in Morrow County include the Boardman Park in Boardman, the Irrigon Skate Park and Park/Marina in Irrigon, Hager Park, City Park and the 1903 Park in Heppner. Ione has a City Park and Lexington has a dirt bike park and a small park at the Oddfellows Hall. The parks in Boardman and Irrigon offer marine access to the Columbia River as well as picnicking and day use activities. Hager Park in Heppner offers a swimming pool along with day use activities.
- Morrow County, in cooperation with Boardman, Irrigon, The U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, the Port of Morrow and other local interests developed the concept of the Heritage Trail, which is a continuous trail approximately 25 miles long, for walkers, bicyclists and other non-motorized travelers and recreationists that loosely parallels the Columbia River and spans the full width of north Morrow County.

- The Blue Mountain Scenic Byway, designated in 1989 under the National Scenic Byway Program, allows east-west highway travelers an alternate route between the Columbia River near Arlington and Baker City. This scenic byway covers 130 miles of paved, two-lane road, which crosses Morrow County on Highway 74 from Cecil through Lone, Lexington, and Heppner. At Heppner the byway continues on Willow Creek Road, then Forest Service Road 53 as it climbs into the Umatilla National Forest.

### Wildlife Refuges and Management Areas

- Umatilla National Wildlife Refuge

The Umatilla National Wildlife Refuge was established in 1969 to restore Columbia River wildlife habitat lost to construction of the John Day Dam. The Refuge is located on the Washington and Oregon sides of the river from Irrigon to Crow Butte across from Boardman. It includes the McCormack Slough west of Paterson Ferry Road and a portion of land west of Boardman on the river. The Refuge is managed to meet its wildlife objectives to produce Great Basin Canada geese, to provide habitat for mallards and Canada geese during spring and fall migrations, and to provide habitat for other migratory birds. Mallards and Canada geese are the most numerous waterfowl on the refuge during spring and fall migrations. During their peak in mid-to late November there are about 300,000 mallards and nearly 30,000 Canada geese on the refuge. Public recreation activities are also available on the Refuge. Among the many activities available are fishing, boating, and observation and photography of wildlife.

- Umatilla Hatchery, Irrigon

Located just west of Irrigon, the Fish Hatchery was authorized by the Northwest Power Planning Council with funding provided by the Bonneville Power Administration on land owned by the U.S. Army Corp of Engineers. Operated by the U.S. Fish and Wildlife Service, the hatchery began operations in 1991. The Hatchery is used for egg incubation and rearing of spring Chinook, fall Chinook, and summer steelhead. The young fish are reared for release into the Umatilla and Snake Rivers in order to contribute to the sustainability of naturally produced native fish populations and to partially mitigate for fish losses caused by hydroelectric dams on the Columbia River system.

- Irrigon Hatchery, Irrigon

The Oregon Fish and Wildlife Department runs a fish hatchery also on the west side of Irrigon adjacent to the Umatilla Hatchery. This hatchery rears steelhead as well as offering wildlife viewing for visitors.

- Three Mile Canyon Conservation Area

In 2000 the owners of the 93,000 acre Threemile Canyon Farm agreed to set aside 23,000 undeveloped acres as a conservation area. The area is located northeast of Cecil on the western side of the County. The conservation area, managed by The Nature Conservancy in conjunction with the U.S. Fish and Wildlife Service and the Oregon Department of Fish and Wildlife, protects the burrowing Washington ground squirrel, the loggerhead shrike, the ferruginous hawk, the sage sparrow and the shrub-steppe environment they inhabit.

## Historic Locations

### Cemeteries

Morrow County has many old cemeteries, most of which were established in the late 1800s and early 1900s by the first settlers of the County. Some of the more well known are listed below:

- Cecil Cemetery, Cecil
- Desert Lawn Memorial Cemetery, Irrigon
- Gooseberry Cemetery, Gooseberry
- Hardman IOOF and Hardman Cemeteries, Hardman
- Highview Cemetery, Ione
- Irrigon Cemetery, historical, Paterson
- Lexington Cemetery, Lexington
- Morgan Cemetery, Cecil
- Petteys Cemetery, Ione North
- River View Cemetery, Boardman
- Valby Cemetery, at the Valby Lutheran Church 12 miles west of Ione
- Well Spring Cemetery, on the old Emigrant Road

### Oregon Trail

As the emigrants heading west arrived in what is now Morrow County they were getting close to their destination, nevertheless, they had to endure desert heat, dry low hills and sandy washes. This segment of the Oregon Trail has one of the best uninterrupted stretches of pristine Oregon Trail ruts in the State of Oregon. It starts in the Butter Creek area and goes west to the eastern boundary of the Boardman Bombing Range and continues west across farm and ranch lands, through Cecil and west into Gilliam County. Located halfway across this segment is Lower Well Spring. It was a water source which made travel across this dry stretch possible. The spring was always a meager source of water but one eagerly sought by the emigrants, since this portion of the trail was usually traveled in late August or early September when all the intermittent streams were normally dry. This portion of the trail is registered on the National Register of Historic Places.

### Columbia River, Route of the Lewis and Clark Expedition (1883–1805)

The story of the Lewis and Clark Expedition is a significant chapter in the history of the United States. The route of the Lewis and Clark party has been designated a National Historic Trail by Congress and included is their route through Morrow County along the Columbia River. On October 19, 1805 the Expedition camped very near Irrigon on Sand Island, now inundated by Lake Umatilla formed by McNary Dam on the Columbia River.



# Section 3

## Risk Assessment Summary

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

The risk assessment builds off the Community Profile by assessing the vulnerability and risk of various community assets including those identified in Section 2. The assessment outcomes are used to develop goals and identify potential activities aimed at reducing the risks identified through the risk assessment process.

### What is a Risk Assessment?

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

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

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

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

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

- 5) ***Assessing Vulnerability/Analyzing Development Trends*** provides a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions. This plan provides a comprehensive description of the characteristics of Morrow County in Section 2: Community Profile. The profile includes a description of the community's land use and development trends.

## **Risk Assessment Methodology**

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

### Gathering Local Data:

Public Comment was collected through the Stakeholder Meetings, the Steering Committee, and the Household Preparedness Survey conducted by the University of Oregon. As part of the Stakeholder Meetings, the planning staff solicited input from professionals in emergency management, fire services, health services, law enforcement, planning, education, community development, transportation, utilities and others in public and private sectors.

### State Natural Hazard Risk Assessment Information:

Using the Oregon State Natural Hazards Assessments for Region 5 - the Mid-Columbia Region, Planning staff characterized the recurrence, vulnerability, and probability assessment of each listed natural hazard. Planning staff used this risk assessment to identify potential hazards and their impact on Morrow County to include human population, economic assets, cultural & historic resources, infrastructure & critical facilities, and environmental assets.

### Processing the Data:

The Steering Committee reviewed and ratified the local data collected during the Stakeholder Event and through the Stakeholder meetings conducted separately from the actual Stakeholder Event. The State data was also reviewed and accepted during the Steering Committee review process during the Steering Committee meetings.

### Outcomes and Action Items:

The processed County risk assessment data has been documented within the Hazard Annex for each listed natural hazard. The Action Items identified by Planning staff and the Steering Committee during this process are included in Section 4, Mission, Goals and Action Items.

## **Risk Assessment Summary**

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

### **Drought Summary**

#### Drought Impacts in Morrow County

Drought is a normal, recurrent feature of the climate in eastern Oregon. The environment and economy of Morrow County is vulnerable to the impact drought can have when there is a deficiency of precipitation over an extended period of time, usually a season or more. Also, the impacts of drought are often exacerbated by the demand placed on the water supply in the region's aquifers, high temperatures, high winds and low humidity. These are all conditions that exist in Morrow County during the summer months. Drought in Morrow County has a serious effect on the local agricultural economy and the associated businesses that depend on the success of the local economy. During times of low regional snowpack in the mountains the resulting restrictions on water wells for irrigation cause losses to farmers who cannot irrigate their crops as usual, as well as for dryland wheat farmers who are coping with lack of local rainfall.

#### Drought History and Location in Morrow County:

Morrow County has had a State of Drought Emergency and was declared a Disaster Area by the U.S. Department of Agriculture in September 2001 and experienced another Drought Emergency in April 2005. According to the National Climatic Data Center of the U.S. Department of Commerce, the northeast corner of Oregon has been experiencing persistent drought conditions since 1999. Precipitation in Oregon since October 2000 is only 76 percent of the 60-month normal. The 60-month period ending September 2005 was among the driest such October –

September 60 month periods in the last 111 years. There was no recorded precipitation in the region in August and September, which is unprecedented in 100 years of record.

To assess the severity of the drought, tree ring data from a 275-year tree-ring reconstruction (1705–1979) of water year precipitation was consulted. The most significant feature in the last 100 years is a severe and extended drought in the 1930s. The precipitation was below normal for 10 years in a row (1928–1937). The 1999–2005 drought is similar to the 1930s drought in terms of duration and severity. The worst drought years of 2001 and 1977 were probably exceeded in severity by only a few years in the two preceding centuries.

The Long-Term Drought Indicator generated by the Climate Prediction Center for the U.S. Department of Commerce has seasonally variable data based on the ever-changing current conditions but the Objective Long-Term Drought Indicator shows Morrow County as in “Moderate Drought” in December 2005 and “Abnormally Dry” in June 2006. The long-term map approximates impacts that respond to precipitation over the course of several months to a few years, such as reservoir content, groundwater depth, and lake levels.

#### Regions of Drought Hazard:

Although the Climate Prediction Center gives one set of drought data for the region, drought has variable risks across the County:

- South – The conifer forests of southern Morrow County suffer in drought conditions and become more vulnerable to pests and wildfire. Drought affects the recreation economy in that summertime visitors who come to the Off-Road Vehicle Park and other recreation facilities are restricted from full use of the facility due to fire bans.
- North – drought in this region of Morrow County has a clearly detrimental effect on agriculture, which must adjust to low water tables and irrigation restrictions or rely on government support programs and crop insurance. Ranges and pastures become stressed and often over grazed in drought conditions. The usual watering areas may disappear or be negatively affected. Wildfire risks are elevated and reservoir levels and aquifers diminish. During drought conditions the wildfire risk becomes elevated in the agricultural lands set aside as conservation reserve areas, extensive pastures and ranges, undeveloped shrub-steppe, the Boardman Bombing Range and on the Army Depot.

#### Vulnerability and Probability Assessment of Drought:

The Oregon Emergency Management has not assessed the vulnerability and probability of drought in Morrow and Umatilla Counties. Given that Morrow County as experienced drought as part of the greater region and participated in historical droughts and the drought emergencies of 2002 and 2005, the probability exists of one incident of drought within a 10 to 35 year period (assuming similarity to all of the counties surrounding Morrow County). This probability represents a high likelihood of a future major drought emergency or disaster to occur in Morrow County. The vulnerability to the population of Morrow County’s assets to be affected by a major drought emergency or disaster is moderate (1 – 10 percent affected).

The State of Oregon deals with drought response in the Drought Annex to the State Emergency Operations Plan. Local drought issues and are handled through the local Farm Service Agency (FSA) office.

Location of Hazard:	Extent of Hazard at the Location:
<ul style="list-style-type: none"> <li>Morrow County</li> </ul>	<ul style="list-style-type: none"> <li>Agricultural economy and associated businesses</li> </ul>
Previous Occurrences of the Hazard Within the Community	
Extensive Regional Drought 1999 – present Drought Emergency Declaration – Executive Order 05-05 April 7, 2005	
Local Community's Self-Completed Drought Hazard Risk Rating:	
N/A	
Community's Probability a Future Hazard Event	
Not rated	
Community's Vulnerability to a Future Hazard Event:	
Not assessed	
Previous Mitigation Efforts:	
<ul style="list-style-type: none"> <li>Conservation Reserve Program (CRP) can provide for emergency grazing opportunities during drought conditions.</li> <li>Mitigation suggestions for farmers provided through the local U.S. Department of Agriculture Farm Service Agency (FSA).</li> </ul>	

## Earthquake Summary

The earthquake hazard in Morrow County has been evaluated by the State and the USGS. There are no identified fault lines lying in the County but residents have felt shaking from nearby fault activity. Still, a major earthquake hazard event has been determined to have a small likelihood of occurrence in Morrow County.

### Earthquake History and Location in Morrow County

The Pacific Northwest Seismograph Network records roughly 1,000 earthquakes per year in Washington and Oregon. Between one and two dozen of these cause enough ground shaking to be felt by residents. Most are located in the western side of the Cascade Mountains. This part of Oregon has experienced four historic earthquakes of significance that were centered in the eastern Oregon region: the 1893 Umatilla earthquake, the 1936 Milton-Freewater earthquake, the 1951 Hermiston earthquake, and the 1976 Deschutes Valley earthquake. All were shallow crustal earthquakes. 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.

Impacts, Vulnerability and Probability Assessment of Risk of Earthquake

According to the Oregon Department of Geology and Mineral Industries (DOGAMI) publication “Earthquake damage in Oregon: Preliminary Estimates of Future Earthquake Losses,” Morrow County could have significant economic losses due to damage to buildings, communication systems, highways and airports. The study in the publication called the “500 year return interval” used faults across Oregon and projected an average earthquake on each one, each with a 10% chance of producing an earthquake in the next 50 years. Every county in Oregon is at risk of earthquake damage in this scenario. The study estimates that Morrow County will have relatively few losses due to injuries, deaths and few short-term shelter needs. Nevertheless, damages to structures would be high in terms of dollar losses. The study estimates that the economic losses for buildings would be ten million dollars, losses to highways \$550,000, airports \$392,000, and communication systems \$46,000 (1999 dollars). Additionally, the study does not take unreinforced masonry buildings into consideration, which are typically older brick buildings often concentrated in an older downtown area such as Heppner. The likelihood of a huge earthquake in Morrow County is small, but the shaking we do experience from time to time has the potential to cause extensive damage. Emergency managers in Morrow County have assessed the probability of earthquake to be low, that is one incident within a 75 to 100 year period. Vulnerability has been assessed as “high.” This means that in the event of an earthquake, more than 10 percent of the population or region assets would likely be affected.

As shown on the Ground Shake Amplification map provided by DOGAMI, the peak ground acceleration (shaking) tends to be highest in the northern portion of the County where the soil types are typically alluvial and will move more easily in an earthquake situation. This indicates that the northern portion of the County and the Cities of Boardman and Irrigon will likely experience the most shaking and, therefore, the most structural damage to buildings.

Location of Hazard:	Extent of Hazard at the Location:
<ul style="list-style-type: none"> <li>Morrow County</li> </ul>	<ul style="list-style-type: none"> <li>County-wide. The risk is slightly higher in the northern portion of the County</li> </ul>
Previous Occurrences of the Hazard Within the Community:	
Rare shaking events, although mostly unfelt	
Local Community's Self-Completed Earthquake Hazard Risk Rating:	
None	

Community's Probability a Future Hazard Event
low
Community's Vulnerability to a Future Hazard Event
high
Previous Mitigation Efforts:
<ul style="list-style-type: none"> <li>• Building Code Requirements enforced for all new construction</li> </ul>

## Flood Summary

According to the National Oceanographic and Atmospheric Agency (NOAA), flash floods in the United States are responsible for more deaths than any other storm event phenomena. Flash flooding usually is the byproduct of very heavy rains in a short period of time over a small geographic area, all of which combine to cause small streams to turn violent. Flooding as a natural hazard is a long-recognized and historically significant event in parts of Morrow County. Flash flooding, which is the prevalent flooding event in Morrow County, can be poorly predicted by weather reports because most often the floods are a result of a microburst, which simply overwhelms both natural and constructed drainage systems. These failures can cause damage to downtowns and farms in the floodplain areas. Emergency services, transportation, power, water and wastewater services, business and hazardous materials storage may be substantially disrupted and can affect the population located in or near the flooded area.

### Flood History, Locations and Impacts in Morrow County:

In addition to many localized floods in the Willow Creek drainage through the years, to include the 1903 flood in which many lives were lost, Morrow County participated in emergency declarations for flooding in February 1996 and January 1997. The County suffered damages to roadways and private property on Rock Creek, Willow Creek, Hinton Creek, and Upper Butter Creek roads in 1997 and the cost was estimated to be at least \$250,000.

- South Morrow County

The Willow Creek in southern portion of the County is famous in Oregon for the 1903 flash flood that caused the death of more than 200 people. It was a summer thunderstorm flood and was caused by a large amount of concentrated rainfall and a lack of vegetation in the watershed to slow it down. The City of Heppner, where the flood occurred, lies in a valley surrounded by steep slopes and sits at the confluence of four streams: Willow Creek, Hinton Creek, Balm Fork, and Shobe Creek. The steep slopes of the hills surrounding these creeks, along with the prevalence of severe thunderstorms in the area, contribute to the likelihood of flash flooding. According to the Heppner City Plan (1999), there was one flood per 4.6 years on average between 1883 and 1971. Due to this high incidence of flash flooding on the Willow Creek and other streams, the City of Heppner and the U.S. Army Corps of Engineers built the Willow Creek Dam across Willow Creek. This dam was completed in 1982 and the area subject to flooding was significantly reduced. However, since the Willow Creek Dam was constructed to intercept the waters from Willow Creek and Balm Fork only, the major flood hazard reduction occurred

between the face of the dam and the confluence with Shobe Creek. Below Shobe Creek, an extensive area of the valley floor is still considered by FEMA as a designated flood hazard area. The flooding that occurred in 1971 was documented to have originated in the Shobe Creek watershed. As a result of the 1971 Shobe Creek flood, extensive work was done to construct a series of diversions in the Shobe Creek drainage, along with the conversion of cropland to the Conservation Reserve Program (CRP) under a program sponsored by the Soil Conservation Service. Since the construction of the Willow Creek Dam and the work done on the Shobe Creek drainage, no significant flooding has been documented within the City of Heppner.

Lexington and lone are also located on Willow Creek and experience localized flash flooding events. The U.S. Army Corps of Engineers has indicated that several of the tributaries of Willow Creek below the Willow Creek dam have the potential for flashfloods and warrant consideration toward providing a degree of flood protection. The drainages are Blackhorse Creek at Lexington, Reitmann and Lorraine Canyons at lone, and Rhea Creek at Ruggs. The Corps recommended that protection be investigated and provided if found to be feasible.

The new Flood Insurance Study for FEMA completed in 2004 on the Willow Creek and tributaries detailed new determinations of the 10, 50 and 100 year discharges to be used in the Morrow County Flood Insurance maps. The new study proposed smaller flood discharges due to the construction of the Willow Creek Dam and drainage work on the Shobe Creek. But, the study revealed an increase in discharges coming from the drainages near lone.

- North Morrow County

The Columbia River is not one of concern as far as extreme flood conditions because it is regulated by up-stream dams that it does not present a problem in Morrow County. There are, however, other flash flooding incidents in the northern portion of the County that do cause damage and disruption for the citizens and businesses of the County. The May 19, 2006 storm event is a good example of how a summer thunderstorm event can cause damage. The storm precipitated record-breaking hail and rain enough to wash out areas of local roads such as Bombing Range Road and portions of Highway 730.

Vulnerability and Probability Assessment of Flooding in Morrow County:

Morrow County emergency managers have assessed the probability that the County will experience flooding as “high”, that is, one incident likely within a 10 to 35 year period. The vulnerability for flooding is also rated as “high.” A high vulnerability means that the percentage of the population or region’s assets likely to be affected by a major flood is more than ten percent.

Location of Hazard:	Extent of Hazard at the Location:
<ul style="list-style-type: none"> <li>• Southern Morrow County</li> <li>• Northern Morrow County</li> </ul>	<ul style="list-style-type: none"> <li>• Willow Creek watershed</li> <li>• Various low lying roads</li> </ul>



Previous Occurrences of the Hazard Within the Community:
1903 Willow Creek Flood Flooding Emergency Declaration - Executive Order EO-97-09 Heavy rain and Flooding Emergency Declaration – EO-96-13
Local Community's Self-Completed Flood Hazard Risk Rating
N/A
Community's Probability a Future Flood Event
High
Community's Vulnerability to a Future Flood Event
Medium
Previous Mitigation Efforts:
<ul style="list-style-type: none"> <li>• Morrow County Flood Hazard Overlay Zone</li> <li>• Construction of Willow Creek Dam and Shobe Creek drainage work</li> <li>• Heppner Flash Flood Plan</li> </ul>

## Landslides Summary

Landslides, including rock fall and other debris flow, as a natural hazard exist in every state in the U.S., and can be a serious geologic hazard. They sometimes present a threat to human life, but most often result in a disruption of everyday services, including emergency response capabilities. Landslides can and do block transportation routes, dam creeks and drainages and contaminate water supplies. When these hazards affect transportation routes they are frequently expensive to clean up and can have significant economic impact to the county. The Federal Emergency Management Agency (FEMA) describes debris flows, sometimes referred to as mudslides, mudflows, lahars, or debris avalanches, as common types of fast-moving landslides. These flows most frequently occur during or after periods of intense rainfall or rapid snow melt and have been linked to forest management practices, soil types and the underlying soil structure.

### Landslide History and Location in Morrow County

Morrow County Public Works Department clears the County roads from landslide debris in the rugged terrain of the south County areas. These landslides often occur after rain events and are generally not significant enough to block traffic, although along Rhea Creek and Willow Creek Roads landslide events have been most numerous and have been known to temporarily block traffic.

### Vulnerability and Probability Assessment of Landslides

According to The Oregon Department of Geology and Mineral Industries (DOGAMI) map of the landslide areas in Morrow County, the landslide risk areas are in the southern portion of The County where the terrain is rugged and forested.

The Oregon Department of Emergency Management has assessed the vulnerability scores, which address the percentage of population or regional assets likely to be

affected by a major landslide event is “moderate” which means that 1 – 10 percentage of the population will be affected. One percent of the population of 11,750 is around 117 people. If a landslide were to occur on Highway 207, it is conceivable that 117 people (or one percent) could be kept from their daily routines if the Oregon Department of Transportation is slow about clearing the roadway.

The probability of a landslide occurring in Morrow County has been assessed as “high.” This means that one incident is likely within a 10 to 35 year period. These numbers appear to be fairly high, but landslides in the steep, forested areas of southern Morrow County can conceivably occur at this rate. Given landslide occurrence within this context, a “high” probability of a landslide occurrence may be very accurate. Nevertheless, these landslides may not be considered to be the type of landslide this Plan is mitigating for. The Department of Geology and Mining Industries (DOGAMI) has provided a general landslide map for Morrow County which is located in the Landslide Annex of this Plan.

Location of Hazard:	Extent of Hazard at the Location:
<ul style="list-style-type: none"> <li>Southern Morrow County</li> </ul>	Isolated areas in Townships 4 and 5 South, along Rhea Creek Road, Willow Creek Road
Previous Occurrences of the Hazard Within the Community:	
Temporary traffic blockages on Rhea Creek Road and Willow Creek Road.	
Local Community's Self-Completed Landslide Hazard Risk Rating	
N/a	
Community's Probability a Future Landslide Event	
High	
Community's Vulnerability to a Future Landslide Event:	
Medium	
Previous Mitigation Efforts:	
<ul style="list-style-type: none"> <li>None</li> </ul>	

### Volcanic Event Summary

The western boundary of the Cascade Range is within 150 miles of Morrow County. The Cascade Range has been an active volcanic area for about 36 million years as a result of the convergence between the North American and Juan de Fuca crustal plates. According to most interpretations, volcanism in the Cascades has been discontinuous in time and space, with the most recent episode of activity beginning about 5 million years ago and resulting in more than 3,000 vents. This activity is

observable today as scientists monitor closely ongoing activity at Mount. St. Helens in Washington, the South Sister in Oregon and other locations.

History of Volcanism in Morrow County:

As evidenced by all of the basalt that underlies Morrow County, this region has been mightily influenced by volcanic activity. Despite the scary image of liquid basalt flowing over the central basin area, there has been no such activity since more than 15 million years ago. Today, any risk to Morrow County is perceived as coming from the volcanic Cascade Range to the west. There is no history of volcanic impacts in Morrow County, although volcanic history in the wider region, notably the Mt. St. Helens eruption in 1980, does show that a volcano could affect the County if a volcano in the Cascade Range were to erupt.

Vulnerability and Probability Assessment of a Volcanic Event

For the citizens of Morrow County the probability of damage and disruption due to the result of a volcanic eruption in the Cascade Range is considered low. The probability of 1 centimeter or more of ash fallout from an eruption anywhere in the Cascade Range is less than 1 in one thousand in any given year. This probability reflects the interplay of two important variables: wind direction and the variability in the thickness of ash that could be deposited at various downwind distances (size/volume of the eruption).

The risk from volcanoes increases further west of Morrow County and, especially of interest to us is the fact that this area contains a major transportation corridor. This corridor runs from the metropolitan area around Portland, Oregon and Vancouver, Washington to the east via the Columbia River, the Union Pacific Railroad, and the I-84 highway. A volcanic event unfortunate enough to close this corridor would have economic impacts on Morrow County, which have not been evaluated. Additionally, in the event of a blockage of the Columbia River to the west of Morrow County, the dam system would be able to contain the water flowing down its course for a limited time only. Thereafter, flooding of the low-lying areas along the river would be an inevitability.

Location of Hazard:	Extent of Hazard at the Location:
<ul style="list-style-type: none"> <li>• Morrow County</li> </ul>	<ul style="list-style-type: none"> <li>• Whole County</li> </ul>
Previous Occurrences of the Hazard Within the Community:	
none	
Local Community's Self-Completed Volcanic Event Hazard Risk Rating)	
N/a	
Community's Probability a Future Volcanic Event:	

Not rated
Community's Vulnerability to a Future Volcanic Event:
Not rated
Previous Mitigation Efforts:
<ul style="list-style-type: none"> <li>• none</li> </ul>

## Wildfire Summary

### Wildfire History and Location in Morrow County

Morrow County, along with much of eastern Oregon has had experience with wildfires in the past several years. The prevailing easterly wind and the drought conditions, which exist throughout the western U.S., have exacerbated wildfires in this region. The number of fires in Morrow County, from 1984 to 2003, ranged from 13 in 1993 to 105 in 1999 with a total of 873 fires during this time period burning more than 213,000 acres. Twenty-nine fires burned 300 acres or more during that period and of those, six were 5,000 acres or more. In July and August of 2000 the Governor signed a Determination of Emergency Conflagration Act Due to Fire in Morrow County. The fire that occurred at this time was the "Willow Creek Fire" which started at the junction of Eight Mile Road and Four Mile Canyon in Gilliam County and spread out of control to Morrow County.

### Wildfire Impacts in Morrow County Regions

- The southern one-third of the County is forested with the southeast corner of the County within the Umatilla National Forest. The topography of this part of the County is rugged as it is a part of a northwest spur of the Blue Mountains. The precipitation over this higher portion of the County does support conifer forests. These conifer stands, which cover some 205,000 acres, form an almost solid cover over the ridges and slopes of this area. About one thousand acres is juniper or scrub timber. The major species of conifers are ponderosa pine, Douglas-fir and western larch. The fire protection officials in this area characterize the fuel for wildfire potential in this region as very high. There are residential developments in the forested zone, which are the Blake Ranch area and the residential development around Penland Lake and around Cutsforth Park. The potential for life and property loss is high in the event of a fire due to lack of proximity to any rural fire protection district. Increasingly, people are using this area for recreational use at the County run Off-Highway-Vehicle Park and more people spend holiday time during weekends and vacation periods here. The residents and visitors to these areas are often inadequately educated or prepared for the inferno that could sweep through the brush and timber, affecting safety and destroying property in minutes.
- In the middle third of the County, precipitation is too low for tree growth without the support of irrigation. Nevertheless, the fire protection districts respond to fires in this area more than in the forested southern region. The middle region of the County is mostly dryland ranges for the pasture of cattle

and dryland wheat. The fire protection districts respond to wildfires in this location as a result of lightning strike (70 percent) and human caused (30 percent) fires. The fires generally burn rangeland, Conservation Reserve Program (CRP) fields, and pastures. Heppner, Lexington and Lone are located within this area.

- The northern third of the County contains most of the County's economic infrastructure to include the Boardman Coal-fire plant, Finley Buttes Regional Landfill, the Port of Morrow with its associated industries, Bonneville Power Administration power lines, natural gas pipelines, to name a few. The potential for wildfire in this portion of the County is less than the rest of the County for the following reasons. The farms and fields are irrigated, which means that water is available to keeps the crops green and to lessen the ability of wildfire to spread and the area is more populated and contains two fire protection districts to respond to fires in the undeveloped shrub-steppe regions of the County. The ability of firefighters to protect this portion of the County is hampered, however, by the limited transportation network, which does not allow for quick coverage of the undeveloped areas of this portion of the County.

#### Vulnerability and Probability Assessment of Wildfire

The probability and vulnerability of fires in the Urban/wildland interface in Morrow County are discussed in Chapter 6 of the Community Wildfire Protection Plan. The most extreme risk priority for fire is in the Blake Ranch Addition and the Penland Lake residential area in the forested portion of the County, followed by the Cutsforth Park area, the OHV Park and Anson Wright Park. Infrastructure at risk in the southern portion of the County is listed as the Willow Creek Dam and the Heppner City watershed. A catastrophic wildfire in the watershed above the dam could deposit a large amount of silt, which would reduce the dam's ability to function properly. A wildfire in the forested watershed for the City of Heppner could have detrimental effects on the quality of water supplied to the City's residents.

The Morrow County Community Wildfire Protection Plan describes the communities and infrastructure at risk along with the actions identified to implement the action plan. The "community" at risk in this portion of the County is the Boardman Bombing Range managed by the U.S. Navy. The Areas of Boardman and Irrigon rate a Low/Moderate risk category. The "infrastructure" most at risk from wildfire in this portion of the County is the Conservation Area managed by the Nature Conservancy, with a "moderate" rating, followed by the wind farm, race track, poplar plantations and the PGE Coal Fire Plant each with a "low/moderate rating".

Morrow County emergency managers have assessed the overall vulnerability to fires in the interface areas as "moderate." That means that one to 10 percent of the population is likely to be affected by a major wildfire emergency. The probability score for wildfires has been assessed as "high." This means that the likelihood of a future major wildfire emergency is likely to be one incident within a 10 to 35 year period.

Location of Hazard:	Extent of Hazard at the Location:
<ul style="list-style-type: none"> <li>• Southern Morrow County</li> <li>• Northern Morrow County</li> </ul>	<ul style="list-style-type: none"> <li>• Forested Areas</li> <li>• Recreational Areas</li> <li>• Pastures and Rangelands</li> <li>• Boardman Bombing Range</li> <li>• Conservation Area</li> <li>• U.S. Army Chemical Depot</li> </ul>
Previous Occurrences of the Hazard Within the Community	
Willow Creek Fire – EO-00-18 Emergency Conflagration	
Willow Creek II Fire – EO-00-24 Emergency Conflagration	
Local Community's Self-Completed Wildfire Hazard Risk Rating	
N/a	
Community's Probability a Future Wildfire Event:	
High	
Community's Vulnerability to a Future Wildfire Event	
Medium	
Previous Mitigation Efforts:	
<ul style="list-style-type: none"> <li>• Morrow County Zoning Ordinance Building Requirements for residences in the Forest Use Zone</li> <li>• Morrow County Community Wildfire Protection Plan (see Wildfire Annex)</li> </ul>	

## Windstorm Summary

Morrow County has experienced great loss of life as the result of a severe thunderstorm that occurred on June 14, 1903. Called the Heppner Flood, it was the worst flood caused by a severe thunderstorm, in terms of loss of life, ever to occur in Oregon. Typically the greatest damage caused by severe windstorms, thunderstorms and tornadoes in Morrow County are damages to structures of light construction such as manufactured homes, road blockages and other damage due to downed trees, flooding in low areas, and blowing debris.

### Impacts of Windstorm in Morrow County

Morrow County is subject to often intense gusts of high winds and windstorms. Although they are not usually life-threatening, high winds can disrupt daily activities, cause damage to buildings and structures, and increase the potential of other hazards. Some areas with little or no ground cover such as open agricultural fields

experience blinding gusts of dust and road debris, including tumbleweeds, which become a hazard for travelers and an occasional disruption of local services. High winds sometimes cause severe transportation disruptions due to localized roadways blocked with debris, downed trees over roadways, and low areas completely filled with windblown tumbleweeds. Wildfires can be accelerated and made unpredictable by windstorms, which can cause grave danger to firefighters, emergency response personnel and residences or other structures that happen to be in the path of a wayward wildfire. Effects of the windstorms may be seen in damage to agricultural systems such as circle irrigation units, to structures such as roof damage and cracked windows, and damage to trees and landscaping. Power outages due to downed or damaged power supply lines have the potential to disrupt emergency response during and after a destructive windstorm.

#### Windstorm History and Location in Morrow County

Severe weather in the form of wind storms are part of the history of the region from the 1903 flash flood tragedy in Heppner to the 1999 dust storm which caused a multiple automobile crash on September 25, 1999 in Umatilla County on Interstate 84 east of Morrow County. Morrow County has experienced tornadoes, as reported in The Oregon Weather Book, A State of Extremes:

“In Morrow County the same day a tornado formed on the McElligott Ranch property southwest of Lone and traveled eastwards 20 miles before disappearing on the outskirts of Lexington. The twister was accompanied by heavy rains and hail, some of which, near Heppner, was golfball size. Two ranches near Lexington measured half an inch of rain in less than 10 minutes and in Sand Hollow another rancher reported 1.20 inches in less than 30 minutes. The tornado passed over rangeland, dairyland, and wheat farms and caused no structural damage.”

Tornadoes occur in Morrow County more frequently than many people realize and the severe weather that accompanies them strikes at the road system in the form of flooding, the agricultural areas in the form of damaged crops, barns, buildings, and irrigation systems and the residential areas with downed trees, roof damage and windblown debris. The storm event of May 19, 2006 had a reported funnel cloud in the Boardman area that was cause for the National Weather Service to issue a tornado warning that afternoon.

#### Vulnerability and Probability Assessment of Windstorms

Morrow County is vulnerable to high winds and rain in the form of severe thunderstorms and rainstorms. The Oregon Natural Hazard Mitigation Plan for Region 5 assesses the likelihood of a future major emergency or disaster caused by a windstorm to be “moderate” (one to ten percent affected) in Morrow County. The vulnerability, which addresses the percentage of population or the region’s assets likely to be affected by a windstorm emergency, is “high” (more than ten percent affected). The severe rain storm event on May 19, 2006 is a good example of such an emergency and the timing of the event, which occurred during the writing of this Plan, underscored for the participants the value that can be obtained from mitigating for future storm events. This tornado warning and flash flooding event yielded many Action Items for flood control on the County’s roadways and brought participants to the planning effort who may have otherwise not bothered to participate.

Location of Hazard:	Extent of Hazard at the Location:
<ul style="list-style-type: none"> <li>• Morrow County</li> </ul>	<ul style="list-style-type: none"> <li>• Morrow County</li> </ul>
Previous Occurrences of the Hazard Within the Community	
<p>May 19, 2006 Severe windstorm event</p> <p>Tornado sighting in January 1996</p>	
Local Community's Self-Completed Windstorm Hazard Risk Rating	
N/a	
Community's Probability a Future Windstorm Event	
Medium	
Community's Vulnerability to a Future Windstorm Event	
High	
Previous Mitigation Efforts:	
<ul style="list-style-type: none"> <li>• None</li> </ul>	

## Winter Storm Summary

Morrow County is vulnerable to the whims of winter storms and the associated problems. Roads can become temporarily impassable due to snow accumulation, although primary roads such as Interstate 84 are rarely closed due to snow and ice accumulation.

### Impacts of Winter Storms in Morrow County

The most common impacts of winter storms are temporary road closures and flooding due to storm events, to include mud flowing across a road from nearby agricultural fields, ice storms and tumbleweeds blocking roadways.

### Winter Storm History and Location in Morrow County

As of the writing of this Plan, Morrow County has not participated in any Emergency Declarations due to winter storm conditions. Although winter storms happen in the County, a written history is limited to the activities of the winter road crews working to keep the streets and highways safe for traffic.

### Vulnerability and Probability Assessment of Winter Storm

Emergency managers have assessed the vulnerability of the County to disastrous winter storms as "high." This means that more than ten percent of the population or



regional assets are likely to be affected by a major winter storm event. The probability assessment is also “high.” This indicates that the County will likely experience one incident of disabling winter storm within a 10 to 35 year period.

Location of Hazard:	Extent of Hazard at the Location:
<ul style="list-style-type: none"> <li>• Morrow County</li> </ul>	<ul style="list-style-type: none"> <li>• All roads and highways</li> </ul>
Previous Occurrences of the Hazard Within the Community	
None available	
Local Community's Self-Completed Winter Storm Hazard Risk Rating	
NOTE: Local communities were not asked to rate the winter storm hazard in the state plan.	
Community's Probability a Future Winter Storm Event:	
High	
Community's Vulnerability to a Future Winter Storm Event	
High	
Previous Mitigation Efforts:	
<ul style="list-style-type: none"> <li>• Winter road crew readiness in the Morrow County Public Works Department</li> <li>• Winter road crew readiness in the Oregon Department of Transportation</li> </ul>	

## Section 4:

# Mission, Goals and Action Items

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

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

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

**Figure 4.1: Action Plan Components**



Source: Oregon Natural Hazards Workgroup. 2005.

## **Natural Hazard Mitigation Vision and Mission**

The Steering Committee, with the support of the Planning Department and guidance of the Oregon State's Hazard Mitigation Plan along with examples of goals from other Oregon counties, considered and developed Morrow County's vision and mission statements as well as the natural hazard mitigation plan goals.

### **Vision**

To maximize Morrow County's resistance and resilience to natural hazards in both government and private sectors through preparedness and mitigation.

### **Mission**

To identify and reduce risk, work to prevent loss and protect life, property and the environment from natural hazard events through coordination and cooperation among public and private partners.

## **Mitigation Plan Goals**

The basis for Morrow County's goals concerning mitigation of natural hazard risks lies in the Comprehensive Plan, which directs the County to protect life and property from natural disasters and hazards. This goal

exists in harmony with many other County planning programs from the Transportation System Plan to the ordinances, plans and policies of the Health Department, Planning Department, Public Works Department and other entities such as Morrow County Emergency Management. The Steering Committee, with the support of the Planning Department and guidance of the Oregon State's Hazard Mitigation Plan Goals along with examples of goals from other Oregon counties, considered and developed the following natural hazard mitigation plan goals:

**Goal 1: Protection of Property:**

- Lessen impact from natural disaster on individual properties, businesses and public facilities by increasing awareness at the individual level and encouraging activities that can prevent damage and loss of life from natural hazards;
- Improve hazard assessment information to make recommendations for discouraging new development and encouraging preventative measures for existing development in areas vulnerable to natural hazards.

**Goal 2: Education and Outreach:**

- Further the public's awareness and understanding of natural hazards and potential risk, including economic vulnerability and mitigation efforts;
- Provide information on tools, partnership opportunities and funding resources to assist in implementing mitigation activities.

**Goal 3: Preventative:**

- Reduce the threat of loss of life and property from natural hazards by incorporating information on known hazards and providing incentives to make hazard mitigation planning a priority in land use policies and decisions, including plan implementation.

**Goal 4: Partnership and Coordination:**

Identify mitigation or risk reduction measures that address multiple areas (i.e. environment, transportation, telecommunications);

- Coordinate public/private sector participation in planning and implementing mitigation projects throughout the County;
- Seek funding and resource partnerships for future mitigation efforts; and
- Strengthen communication and coordinate participation among and within public agencies, citizens, non-profit organizations, business, and industry.

**Goal 5: Structural Projects:**

- When applicable, utilize structural mitigation activities to minimize risks associated with natural hazards.

**Goal 6: Natural Resources:**

- Preserve and rehabilitate and enhance natural systems to serve natural hazard mitigation functions (i.e. floodplains, wetlands, watersheds and urban interface areas; and
- Balance watershed planning, natural resource management, and land use planning with natural hazard mitigation to protect life, property, and the environment.

**Goal 7: Emergency Services:**

- Minimize life safety issues by promoting, strengthening and coordinating emergency response plans; and
- Coordinate and integrate natural hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

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

## **Mitigation Plan Action Items**

Short and long-term action items identified through the planning process are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. They address both multi-hazard (MH) and hazard specific issues.

The Steering Committee and Planning Department staff evaluated a broad set of mitigation action items for the Plan's identified natural hazards that could impact the County. These "action items" are recommendations for pre-disaster mitigation given to the County in the PDMP process. Members of the Planning Department Staff, Steering Committee, Public Works Department and the Morrow County Stakeholders identified the action items during the Steering Committee meetings, the Stakeholder event, Stakeholder interviews, city interviews and by the PDMP Staff in response to needs identified after the May 19, 2006, storm event.

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

### **Rationale or Key Issues Addressed:**

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

## **Ideas for Implementation:**

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

## **Coordinating Organization:**

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

## **Internal and External Partners:**

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

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

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

## **Plan Goals Addressed**

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

## **Timeline:**

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

## **Action Plan Matrix**

The Action Plan matrix portrays the overall action plan framework and identifies linkages between the plan goals, and actions. The matrix documents a description of the action, the coordinating organization, timeline, and the plan goals addressed.

## Morrow County Natural Hazard Mitigation Plan Matrix

<b>Goal 1: Protection of Property</b>		Lead Organization	Internal/External Partners
FH-ST	Action 1.1 Install simple and adequate flood control system in lone. Provide for drainage over/under county road. See AI# 5.2.	City of lone, Morrow County	State or Federal Resource Agency
MH-LT	Action 1.2 Develop U.S. A.C.E. land west of marine in Irrigon	City of Irrigon	State or Federal Resource Agency
<b>Goal 2: Education and Outreach</b>		Lead Organization	Internal/External Partners
MH-LT	Action 2.1 Provide opportunities for the Hispanic population to learn about and mitigation for natural hazards.	Emergency Management	City of Boardman
FH-ST	Action 2.2 Provide training for the citizens of lone concerning flood plain/way development.	City of lone, DLCD Floodplain Section	OEM, DLCD Floodplain Section
MH-ST, LT	Action 2.3 Recruitment and training of Red Cross volunteers.	Red Cross, Emergenc Management	Red Cross
MH-LT	Action 2.4 Landslide Risk Evaluation see AI#3.2	Public Works, ODOT	ODOT, DOGAMI, Public Works
MH-ST	Action 2.5 Drought, wind, winterstorm risk assessments see AI#4.4	Emergency Management	OEM
FH-ST, LT	Action 2.6 Continuing Public Awareness campaigns about Flash Flood Events	City of Heppner	Emergency Management
MH-ST, LT	Action 2.7 Public education for property owners and recreationsts in fire prone areas	Public Works	USFS, ODA, Fire Protection Dist's
<b>Goal 3: Preventative</b>		Lead Organization	Internal/External Partners
MH-LT	Action 3.1 Update the natural hazards section of the Comprehensive Plan and Zoning Ordinance.	County Planning	County Court
MH-LT	Action 3.2 Landslide Risk Evaluation see AI#2.4	Emergency Management	OEM

Note: Column A -  
Type of action and

MH = Multi Hazard

FH = Flood Hazard

ST = Short Term

LT = Long Term



<b>Goal 4: Partnership and Coordination</b>		Lead Organization	Internal/External Partners
MH-LT	Action 4.1 Update the Morrow County Comprehensive Plan and Zoning Ordinance	County Planning	County Court
FH-ST	Action 4.2 Develop flood control system between Clay Street and F Street in Lexington. See AI#5.1	Lexington, MCGG	ODOT, MCGG
MH-ST	Action 4.3 Install automated shut down systems at headgates and pump stations on the West Extension Irrigation Districts canals. See AI #5.32	WEID	State or Federal Resource Agency
MH-ST	Action 4.4 Drought, wind, winterstorm risk assessments see AI# 2.5	Emergency Management	OEM
MH-LT	Action 4.5 Identify potential rockfall areas and public quarry sites for use during recovery	Public Works, Planning	ODOT

<b>Goal 5: Structural Projects</b>		Lead Organization	Internal/External Partners
FH-ST	Action 5.1 Develop flood control system between Clay Street and F Street in Lexington.	Lexington, MCGG	ODOT
FH-ST	Action 5.2 Install simple and adequate flood control system in Lone. Provide for drainage over/under county road. See AI# 1.1.	City of Lone, Morrow County	State or Federal Resource Agency
FH-ST	Action 5.3 Improve drainage at Miller/Cutsforth Road #747 and 737.	Public Works	State or Federal Resource Agency
FH-ST	Action 5.4 Improve drainage at Nichols Lane #620	Public Works	State or Federal Resource Agency
FH-ST	Action 5.5 improve drainage at Piper Canyon #647	Public Works	State or Federal Resource Agency
FH-ST	Action 5.6 Improve drainage at Turner Lane #504	Public Works	State or Federal Resource Agency
FH-ST	Action 5.7 Improve drainage at Dee Cox Road #723	Public Works	State or Federal Resource Agency
FH-ST	Action 5.8 Improve drainage on Black Horse Road #719	Public Works	State or Federal Resource Agency
FH-ST	Action 5.9 Improve drainage on Shobe Canyon #713	Public Works	State or Federal Resource Agency
FH-ST	Action 5.10 Improve drainage on Stock Drive Lane #614	Public Works	State or Federal Resource Agency
FH-ST	Action 5.11 Improve drainage on Perlberg #675	Public Works	State or Federal Resource Agency
FH-ST	Action 5.12 Improve drainage on Clarks Canyon Road #966	Public Works	State or Federal Resource Agency

FH-ST	Action 5.13 Improve drainage on Fuller Canyon Road #612	Public Works	State or Federal Resource Agency
FH-ST	Action 5.14 Improve drainage on Meadow Brook Road #643	Public Works	State or Federal Resource Agency
FH-ST	Action 5.15 Improve drainage on Bert Peck Lane #616	Public Works	State or Federal Resource Agency
FH-ST	Action 5.16 Improve drainage on Lexington/Cemetery Road #645	Public Works	State or Federal Resource Agency
FH-ST	Action 5.17 Improve drainage on Strawberry Lane #588	Public Works	State or Federal Resource Agency
FH-ST	Action 5.18 Improve drainage on Loyd Road #924	Public Works	State or Federal Resource Agency
FH-ST	Action 5.19 Improve drainage on Johnson Grade #526	Public Works	State or Federal Resource Agency
FH-ST	Action 5.20 Improve drainage on Morgan East #537	Public Works	State or Federal Resource Agency
FH-ST	Action 5.21 Improve drainage on Lindstrom Lane #538	Public Works	State or Federal Resource Agency
FH-ST	Action 5.22 Improve drainage on Wells Spring Road #663	Public Works	State or Federal Resource Agency
FH-ST	Action 5.23 Improve drainage on Immigrant Road #550	Public Works	State or Federal Resource Agency
FH-ST	Action 5.24 Improve drainage in Alpine Lane #702	Public Works	State or Federal Resource Agency
MH-ST	Action 5.25 Provide back up power generation for the City of Irrigon water system.	City of Irrigon	State or Federal Resource Agency
MH-ST	Action 5.26 Provide back up power generation for the City of Boardman water system.	City of Boardman	State or Federal Resource Agency
MH-ST	Action 5.27 Provide back up power generation for City of Irrigon sewage system lift stations.	City of Irrigon	State or Federal Resource Agency
MH-ST	Action 5.28 Provide portable back up power generation for City of Boardman sewer system.	City of Boardman	State or Federal Resource Agency
MH-ST	Action 5.29 Provide back up power for communication systems for the rural fire departments.	Emergency Management	State or Federal Resource Agency
MH-ST	Action 5.30 Establish emergency evacuation location of the Town of Lexington Town office.	Town of Lexington	MCGG, MCSC
MH-ST	Action 5.31 Install alarm for the water supply system in Lexington.	Town of Lexington	State or Federal Resource Agency

MH-ST	Action 5.32 Install automated shut down systems at headgates and pump stations on the West Extension Irrigation Districts canals.	WEID	State or Federal Resource Agency
<b>Goal 6: Natural Resources</b>		Lead Organization	Internal/External Partners

<b>Goal 7: Emergency Services</b>		Lead Organization	Internal/External Partners
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MH-ST	Action 7.1 Improve emergency communication systems between the cities in the Willow Creek drainage, including emergency backup power.	Heppner RFPD	Emergency Managers
MH-ST, LT	Action 7.2 Recruitment and training of Red Cross Volunteers. See AI#2.3	Red Cross	Emergency Managers

## **Section 5:**

# **Plan Implementation and Maintenance**

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

### **Implementing the Plan**

After the Plan is locally reviewed and deemed complete the Morrow County Planning Department will be responsible for submitting it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management will then submit the Plan to the Federal Emergency Management Agency (FEMA–Region X) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA adoption via resolution will be done by the Morrow County Court, the Cities of Boardman, Irrigon, Lone, Heppner, and the Town of Lexington. 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**

Once the Plan has been reviewed and approved by FEMA the Emergency Management Department will maintain the Plan on the Emergency Management website and, working with the Public Works Department, will share the following roles and responsibilities:

- 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, County Departments and key plan stakeholders;
- Identify emergency management or other related funding sources for natural hazard mitigation projects; and

- Utilize the Risk Assessment as a tool for prioritizing proposed natural hazard risk reduction projects.

## **Coordinating Body**

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

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

## **Members**

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

- Gary Neal and Ron McKinnis, Port of Morrow;
- Larry Burns, Irrigon Rural Fire Protection District;
- Linda Curtis, American Red Cross;
- Billie Jean Morris, Boardman Chamber of Commerce;
- David DeMayo, City of Heppner;
- Mark Burrows, Morrow County School District;
- Steve Rhea, Heppner Rural Fire Protection District;
- Janet Greenup, Morrow Soil and Water Conservation District;
- Ken Grieb, Morrow County Planning Commissioner; and
- Brett Cook, Morrow County Building Official

To make the coordination and review of Morrow 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 as necessary. At meetings, held twice each year, the Steering Committee will review the Plan and work with County staff to implement Actions Items or make suggestions to update the Plan.

## **Implementation through Existing Programs**

The Natural Hazard Mitigation Plan includes a range of action items that, when implemented, will reduce loss from hazard events in the County. Within the plan, FEMA requires the identification of existing programs that might be used to implement these action items. Morrow County currently addresses statewide planning goals and legislative requirements through its Comprehensive Land Use Plan, Transportation System Plan, Zoning and Subdivision Ordinances, and Building Codes. To the extent possible, Morrow 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, Morrow County should implement the Natural Hazards Mitigation Plan's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.<sup>1</sup> Implementing the Natural Hazards Mitigation Plan's action items through such plans and policies increases their likelihood of being supported and implemented.

After the May 19, 2006, storm event here in Morrow County a number of Action Items were developed to improve, or channel, run off on roads by increasing the size of culverts or improving surface types. These Action Items can be incorporated into the County's Transportation System Plan and programmed to occur as short, medium or long range projects.

Another opportunity that is available to address several Action Items is to incorporate Disaster Mitigation Awareness as updates are done to the Comprehensive Land Use Plan and Zoning Ordinance. Map Modernization is currently under way in Morrow County and when complete changes to both the Comprehensive Plan Maps and Zoning Ordinance will need to be adopted.

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

### **Semi-Annual Meeting**

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

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

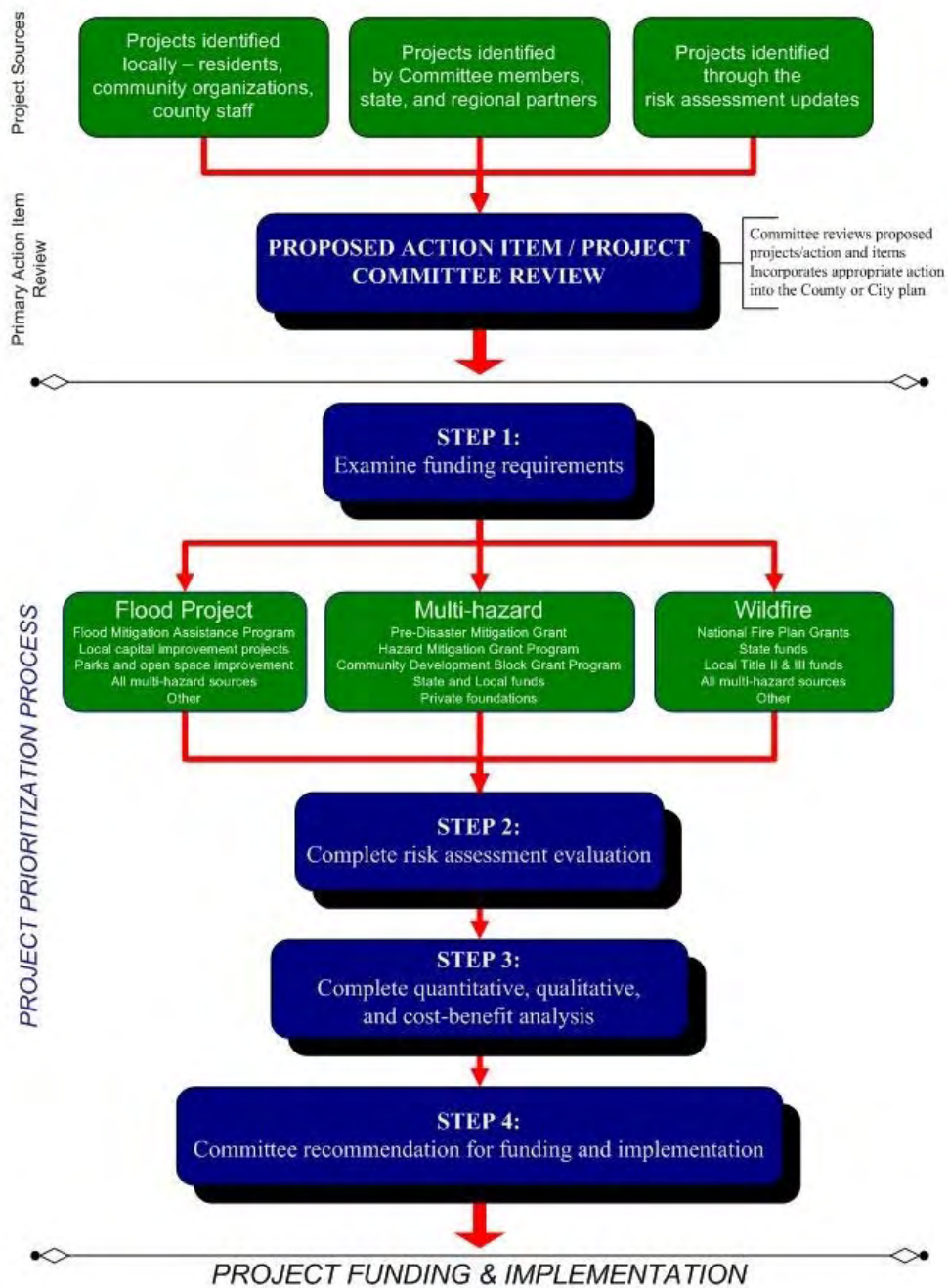
The convener will be responsible for documenting the outcome of the semi-annual meetings. The process the Committee will use to prioritize mitigation projects is detailed in the section below.

### **Project Prioritization Process**

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

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

**Figure 5.1: Project Prioritization Process Overview**



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

**Step 1: Examine funding requirements**

The Steering Committee will identify how best to implement individual actions into the appropriate existing plan, policy, or program. The committee will examine the selected funding stream's requirements to ensure that the mitigation activity would be eligible through the funding source. The Committee may consult with the



funding entity, Oregon Emergency Management, or other appropriate state or regional organization about the project's eligibility.

### **Step 2: Complete risk assessment evaluation**

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

- Low
- Medium
- High

The rank ordering of hazards by risk follows:

1. Earthquake
2. Volcano
3. Landslide/Debris Flow
4. Winterstorms
5. Wildfire
6. Drought
7. Windstorms
8. Flood

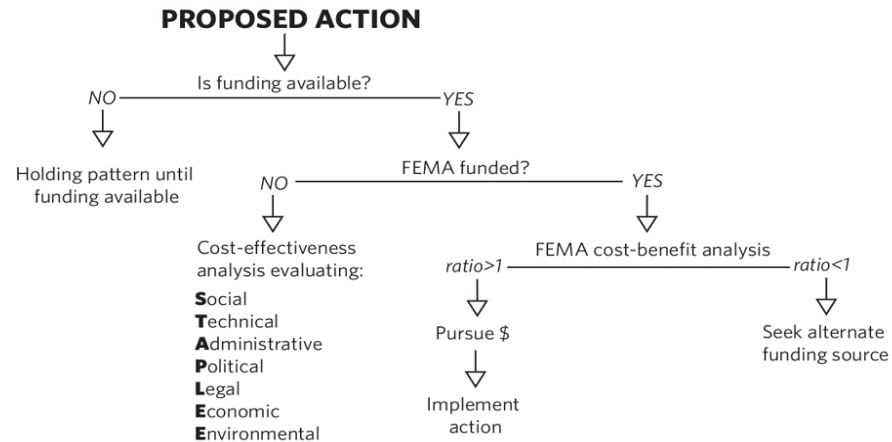
Each of the action items in the plan addresses risk from one or more of these hazards.

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

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

of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects. Figure 5.2 shows decision criteria for selecting the method of analysis.

**Figure 5.2: Project Prioritization Process Overview**



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

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

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

#### **Step 4: Committee recommendation**

Based on the steps above, the committee will recommend whether or not the mitigation activity should be moved forward. If the committee decides to move forward with the action, the coordinating organization designated for the activity will be responsible for taking further action and documenting success upon project completion.

The Committee will convene a meeting to review the issues surrounding grant applications and shared knowledge and or resources. This process will afford greater coordination and less competition for limited funds.

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

## **Annual Meeting**

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

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 Morrow County.

## **Five-Year Review of Plan**

This plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During this plan update, the following questions should be asked to determine what actions are necessary to update the plan. The convener will be responsible for convening the Committee to address the questions outlined below.

- Are the plan goals still applicable?
- Do the plan's priorities align with State priorities?
- Are there new partners that should be brought to the table?
- Are there new local, regional, state, or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the plan was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Do existing actions need to be reprioritized for implementation?
- Are the actions still appropriate given current resources?

- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

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

## **Continued Public Involvement & Participation**

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

During plan development, public participation was incorporated into every stage of the plan development process, which consisted of 3 main components:

- Steering Committee – comprised of representatives from the County and cities within Morrow County;
- Stakeholder Forum – comprised of Morrow County citizens and corporate and agency stakeholders who identified common, as well as specific concerns, and who could discuss priorities and potential mitigation actions;
- Stakeholder Interviews to garner specialized knowledge of individuals working with populations or areas at risk from the listed natural hazards.

When the initial hazard mitigation planning has been accomplished the Steering Committee's role will become that of coordinating the implementation of plan Action Items and undertaking the formal plan review process. The County will hold annual review meetings and will conduct a 5-year comprehensive review. The Committee membership will be revised as necessary by the County Court (in coordination with Morrow County Emergency Management, the Public Works Department, and the Planning Department) to assure adequate representation of citizens, cities, stakeholders and other involved entities.

Morrow County is dedicated to continuing to educate the public about hazard mitigation planning and to involving the public and encouraging feedback in the Plan and in the annual review and updates of the Pre-disaster Mitigation Plan and will:

- Post the PDMP on the State hazard mitigation websites;

- Post the Plan on the Morrow County Emergency Management website;
- Keep copies of the Plan at all of the appropriate agencies in the County and cities.

The plan also includes the address and the phone number of the designee responsible for keeping track of public comments on the Plan. Public comments should be submitted to:

Morrow County Emergency Management P.O. Box 622 Heppner, OR 97836
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During the annual plan evaluation or when deemed necessary by the Steering Committee, public meetings will be called. The meetings will provide the public a forum for which they can express their concerns, opinions, or ideas about the Plan. The Emergency Management designee will be responsible for using available resources to publicize public meetings and maintain public involvement through available informational means such as the County web page, local newspapers, flyers distributed through the Red Cross and other public education/information campaigns such as utility bill flyers and public notices.

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<sup>1</sup> Burby, Raymond J., ed. 1998. *Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities*.

# **REGION 5**

## **Mid-Columbia Region<sup>1</sup>**

### **Hazards Assessment**

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<sup>1</sup> Gilliam, Hood River, Morrow, Sherman, Umatilla and Wasco counties

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# DROUGHT

## Characteristics and Brief History

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

**TABLE 1. SIGNIFICANT DROUGHTS**

DATE	DESCRIPTION
1904-1905	A statewide drought period of about 18 months
1917-1931	A very dry period throughout Oregon punctuated by brief wet spells in 1920-21 and 1927
1939-1941	A three-year intense drought in Oregon
1959-1964	Primarily affected eastern Oregon
1985-1997	Generally a dry period, capped by statewide droughts in 1992 and 1994

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

## Recurrence

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

## Vulnerability

The probability that Region 5 will experience drought and the region’s vulnerability to their effects are depicted in Table 2 below. These scores are based on an analysis of risk conducted by county emergency program managers, usually with the assistance of a team of local public safety officials.



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

High = One incident likely within a 10 to 35 year period.

Moderate = One incident likely within a 35 to 75 year period.

Low = One incident likely within a 75 to 100 year period.

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

High = More than 10% affected

Moderate = 1-10% affected

Low = Less than 1% affected

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

**TABLE 2. Vulnerability and Probability Assessment of Drought**

	Gilliam	Hood River	Morrow	Sherman	Umatilla	Wasco
Vulnerability	M	-	-	H	-	H
Probability	H	-	-	H	-	H

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

# EARTHQUAKES

## Characteristics and History

The geographical position of this region makes it susceptible to earthquakes from four sources: (1) the off-shore Cascadia Fault Zone, (2) deep intra-plate events within the subducting Juan de Fuca plate, (3) shallow crustal events within the North America Plate, and (4) earthquakes associated with renewed volcanic activity. All have some tie to the subducting or diving of the dense, oceanic Juan de Fuca Plate under the lighter, continental North America Plate. Stresses occur because of this movement and there appears to be a link between the subducting plate and the formation of volcanoes some distance inland from the off-shore fault zone.

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

This part of Oregon has experienced three historic earthquakes of significance that were centered in the region: the 1893 Umatilla (VI or VII Modified Mercalli Intensity), the 1936 Milton-Freewater (M6), 1951 Hermiston, and the 1976 Deschutes Valley (M4.8), all shallow crustal earthquakes. 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 (Table 3). Given this history, there is good reason to believe that the most devastating future earthquakes would originate along shallow crustal faults in the region.

Earthquake associated hazards include severe ground shaking, liquefaction of fine-grained soils, and landsliding. The severity of these effects depend on several factors, including the distance from the earthquake source, the ability of soil and rock to conduct seismic energy and the degree (angle) and composition of slope materials.

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

Earthquake risk in Region 5 is reflected in the Uniform Building Code's (UBC) Earthquake Hazard maps (i.e., seismic zones 1-4). The higher

the numerical designation, the more stringent the building standards become. Region 5 is within UBC Seismic Zone 2b.

**TABLE 3. SIGNIFICANT EARTHQUAKES**

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

Notes: \* BCE: Before the Common Era

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

### Probability

The Cascadia Subduction Zone generates an earthquake on average every 500-600 years. However, as with any natural process, the average time between events can be misleading. Some of the earthquakes may have been 150 years apart with some closer to 1,000 years apart (DOGAMI, 1999). Establishing a probability for crustal earthquakes is more difficult given the paucity of historic events in the region. Earthquakes generated by volcanic activity in Oregon's Cascade Range are possible, but likewise unpredictable.

## Vulnerability

Region 5 is moderately vulnerable to earthquake hazards from earthquake-induced landslides in the Cascades and ground shaking.

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

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

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

<b>REGION 5 COUNTIES</b>	<b>ECONOMIC BASE IN THOUSANDS (1999)</b>	<b>GREATEST ABSOLUTE LOSS IN THOUSANDS (1999) FROM A M 8.5 CSZ EVENT</b>	<b>GREATEST ABSOLUTE LOSS IN THOUSANDS (1999) FROM A 500-YEAR EVENT</b>
Gilliam	\$112,000	Less than \$1,000	\$1,000
Hood River	\$1,029,000	\$3,000	\$62,000
Morrow	\$365,000	Less than \$1,000	\$10,000
Sherman	\$97,000	Less than \$1,000	\$1,000
Umatilla	\$2,998,000	Less than \$1,000	\$68,000
Wasco	\$1,260,000	Less than \$1,000	\$25,000

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

**TABLE 5. ESTIMATED LOSSES ASSOCIATED WITH A M8.5 SUBDUCTION EVENT**

<b>REGION 5 COUNTIES:</b>	<b>Gilliam</b>	<b>Hood River</b>	<b>Morrow</b>	<b>Sherman</b>	<b>Umatilla</b>	<b>Wasco</b>	<b>REMARKS</b>
INJURIES	0	0	0	0	0	0	These figures have a high degree of uncertainty and should be used only for general planning purposes.
DEATHS	0	0	0	0	0	0	
DISPLACED HOUSEHOLDS	0	0	0	0	0	0	
ECONOMIC LOSSES FOR BUILDINGS	\$5,000	\$3 million	\$97,000	\$17,000	\$236,000	\$795,000	The HAZUS run that produced these figures did not account for unreinforced masonry structures.
OPERATIONAL THE DAY AFTER THE EVENT							
Fire stations	100%	99%	100%	100%	100%	99%	
Police stations	100%	100%	100%	100%	100%	100%	
Schools	100%	98%	100%	100%	100%	100%	
Bridges	100%	95%	100%	99%	100%	99%	
ECONOMIC LOSSES TO INFRASTRUCTURE							
Highways	0	\$704,000	0	\$29,000	0	\$71,000	
Airports	0	\$76,000	0	0	0	0	
Communications	0	\$17,000	0	0	0	\$6,000	
DEBRIS GENERATED (thousands of tons)	0	1	0	0	0	1	

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

**TABLE 6. ESTIMATED LOSSES ASSOCIATED WITH A 500-YEAR MODEL<sup>1</sup>**

REGION 5 COUNTIES	Gilliam	Hood River	Morrow	Sherman	Umatilla	Wasco	REMARKS
INJURIES	0	30	3	0	19	6	<p>NA* : Because the 500-year model includes several earthquakes, the number of facilities operational the day after the quake can not be calculated.</p> <p>The HAZUS run that produced these figures did not account for unreinforced masonry structures.</p>
DEATHS	0	1	0	0	0	0	
DISPLACED HOUSEHOLDS	0	56	10	0	81	23	
ECONOMIC LOSSES FOR BUILDINGS	\$705,000	\$62 million	\$10 million	\$923,000	\$67,000	\$25 million	
OPERATIONAL THE DAY AFTER THE EVENT	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	
Fire stations	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	
Police stations	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	
Schools	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	
Bridges	N/A*	N/A*	N/A*	N/A*	N/A*	N/A*	
ECONOMIC LOSSES TO INFRASTRUCTURE			\$550,000	\$3 million	\$6 million	\$3 million	
Highways	\$350,000	\$12M	\$392,000	\$423,000	\$3 million	\$3 million	
Airports	\$440,000	\$3M	\$46,000	\$61,000	\$3 million	\$2 million	
Communications	\$29,000	\$1M				\$1 million	
Debris generated (thousands of tons)	0	41	8	0	45	16	

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

The probability that Region 5 will experience earthquakes and the region’s vulnerability to their effects are depicted in Table 7 below. These scores are based on an analysis of risk conducted by county emergency program managers, usually with the assistance of a team of local public safety officials.

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

High = One incident likely within a 10 to 35 year period.

Moderate = One incident likely within a 35 to 75 year period.

Low = One incident likely within a 75 to 100 year period.

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

High = More than 10% affected

Moderate = 1-10% affected

Low = Less than 1% affected

**TABLE 7. Vulnerability and Probability Assessment of Earthquakes**

	Gilliam	Hood River	Morrow	Sherman	Umatilla	Wasco
Vulnerability	L	M	H	L	M	H
Probability	H	M	L	L	M	L

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

# FIRES IN THE URBAN/WILDLAND INTERFACE

## Characteristics and Brief History

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

This document defines wildfire as an uncontrolled burning of forest, brush, or grassland. Wildfire always has been a part of these ecosystems and sometimes with devastating effects. Table 8 provides an overview of the significant wildfires Oregon, an important indicator of the type of fires possible in the region. Wildfire results from natural causes (e.g., lightning strikes), a mechanical failure (Oxbow Fire), or human-caused (unattended campfire, debris burning, or arson). The severe fire season of 1987 resulted in a record setting mobilization of fire fighting resources. Most wildfires can be linked to human carelessness.

Region 5 contains a variety of forest and grassland ecosystems. The Cascade Mountains form the western boundaries of Hood River and Wasco counties. Morrow and Umatilla counties contain large tracts of Blue Mountain forests and all Region 5 counties have extensive grasslands. Each ecosystem is different. Consequently, the probability and management of wildfire would differ from place to place. The build-up of fuel (e.g., brush, dead or dying trees) that leads to devastating wildfires is a very important factor and is the current focus of mitigation strategies.



**TABLE 8. SIGNIFICANT WILDFIRES**

Year	Name of Fire	Location	Acres Burned	Remarks
1977		Wasco		
1979	Pine Grove/Juniper Flat			
1983	Moro	Sherman		
1985	Maupin	Wasco		
1988		Wasco		
1991	Falls		1,100	Fire along the Columbia Gorge.
1994	Smith Canyon			
1998	Rowena	Wasco	2,208	
1998	Reith Barnhart/Coombs Canyon	Umatilla	45,000	
2000	Willow Creek	Morrow and Gilliam	27,000	
2000	Antelope	Wasco		
2001	Two Rivers	Umatilla	7,011	
2001	Bridge Creek	Umatilla	9,230	
2002	Sheldon Ridge	Wasco	12,681	

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

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

## Probability

The probability of a wildland urban interface fire occurrence in this region has been assessed at the local level; each of the counties in this region considers the likelihood of an event to be high.

## Vulnerability

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

Each year a significant number of people build homes within or on the edge of the forest (urban/wildland interface), thereby increasing wildfire hazards. In Oregon, there are about 240,000 homes worth around \$6.5 billion within the urban/wildland interface. Such development has greatly complicated firefighting efforts and significantly increased the cost of fire suppression. Interface communities at risk in Region 5 are listed in Table 9. A number of these communities are grassland communities rather than forest.

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

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

Possible mitigation practices include:

- Identify and map current hazardous forest conditions such as fuel, topography, etc.;
- Identify forest / urban interface communities - List of interface communities, Federal Register, 08/17/01. V. 66, N. 160;
- Identify and map Forest Protection Districts;
- Identify and map water sources;
- Implement effective addressing system in rural forested areas;
  
- Clearly mark evacuation routes;
- Identify and locate seasonal forest users. Initiate information program through schools, summer camps, forest camping grounds, lodges, etc;
- Identify and map bridges that can (and can not) support the weight of emergency vehicles. This is a basic requirement for fire suppression;
- Form committees to implement Oregon Senate Bill 360. This is required in Oregon Senate Bill 360; and
- Create road standards in interface areas to reflect fire suppression needs. Roads must be wide enough for fire suppression vehicles to turn around. Road grades cannot be too steep for large, heavy vehicles.

**TABLE 9. WILDLAND/URBAN INTERFACE COMMUNITIES**

GILLAM COUNTY	HOOD RIVER COUNTY	MORROW COUNTY	SHERMAN COUNTY	UMATILLA COUNTY	WASCO COUNTY
Arlington	Cascade Locks	Blake's Addition	Biggs Junction	Gibbon	Antelope
Condon	Dee	Boardman	Grass Valley	Hermiston	Bear Springs
Mayville	Hood River	Cutsforth Park	Kent	Lehman Springs	Big Muddy Ranch
	Mt. Hood	Hardman	Moro	McNary	Boyd
	Oak Grove	Heppner	Rufus	Meacham	Chenoweth
	Odell	Ione	Wasco	Meacham Lake	Cherry Heights
	Parkdale	Irrigon		Mill Creek	Clarno
	Pine Grove	Lexington		Milton-Freewater	Durur
	Rockford	Pentland Lake		Mission	Kahneeta Hot Springs
	Summit			Pendleton	Maupin
	Trout Creek			Pilot Rock	Mosier /7 Mill Hill
	Viento			Poverty Flats	North Junction
	Westside			Power City	Oak Springs
	Wyeth			Rieth	Pine Grove
				Stanfield	Rowena
				Thorn Hollow	Shaniko
				Tollgate	Sidwalter
				Ukiah	Simnasho
				Umatilla	Taylorville/Sportsmans Park
				Weston	The Dalles/Mill Cr/7 Mile Hill
				Weston Mountain	Tygh Valley
					Wamic/ Pine Hollow /
					Wapintia

Source: August 17, 2001, Federal Register, v.66, n.160.

The probability that Region 5 will experience interface fires and the region’s vulnerability to their effects are depicted in Table 10 below. These scores are based on an analysis of risk conducted by county emergency program managers, usually with the assistance of a team of local public safety officials.

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

High = One incident likely within a 10 to 35 year period.

Moderate = One incident likely within a 35 to 75 year period.

Low = One incident likely within a 75 to 100 year period.

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

High = More than 10% affected

Moderate = 1-10% affected

Low = Less than 1% affected

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

	Gilliam	Hood River	Morrow	Sherman	Umatilla	Wasco
Vulnerability	L	M	M	H	M	H
Probability	H	H	H	H	H	H

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

# FLOOD

## Characteristics and Brief Flood History

The Mid-Columbia region of Oregon is subject to a variety of flood conditions. The most common type of flooding is associated with unseasonably warm weather during the winter months, which quickly melts high-elevation snow. This condition has produced devastating floods throughout the region (Table 11). The warm weather events usually occur December through February, and can affect the entire state. Flash floods are almost always a summer phenomenon and are associated with intense local thunderstorms. The flash flood of June 1903 in the City of Heppner (Morrow County) is a benchmark event. No flood in Oregon has been more lethal: 247 fatalities. Heppner's vulnerability to flash flood hazards has since been reduced through the construction of the Willow Creek Dam. The region's other flood events are linked to normal seasonal snowmelt and run-off from agricultural fields.

There are several rivers in the region that produce extreme flood conditions. Surprisingly, the Columbia is not one of them, nor is the lower Deschutes or the John Day. The Columbia is so regulated by upstream dams that it does not present much of a problem. This is partly reflected in the federal flood insurance rate maps for the various communities along the river. However, a swollen Columbia can back up tributary streams to the point where they constitute a significant hazard. This has occurred on a number of occasions. The lower Deschutes and John Day (Columbia River tributaries) are confined to fairly deep canyons with small floodplains. Consequently, they do not present the flood problems associated with smaller rivers, such as the Umatilla, the Walla Walla, and their tributaries. Table 12 details the rivers causing principle flood hazards in the region.

**TABLE 11. SIGNIFICANT FLOODS**

<b>DATE</b>	<b>LOCATION</b>	<b>DESCRIPTION</b>	<b>TYPE OF FLOOD</b>
June, 1894	Main stem Columbia River (Region 5 communities)	Largest flood observed on the Columbia River (1,200,000 cfs). City of Umatilla inundated. Widespread damage.	Snow melt (SM)
June, 1903	Willow Creek (Morrow County)	Very devastating flash flood. Forty-foot wall of water in City of Heppner. 247 Fatalities; 141 homes destroyed.	Flash flood (FF)
Jan., 1923	Mid-Columbia region	Widespread flooding. Unusually warm weather, intense rain.	Rain-on-snow (ROS)
Jan., 1933	Mid-Columbia region	Widespread flooding. Heavy mountain snow pack followed by rain and mild temperatures.	ROS
Dec., 1955	Mid-Columbia region	Mild temperatures and rain. Farms, highways flooded.	ROS
Dec., 1964	Entire State	Record-breaking floods throughout state. Heavy snow in mountains followed by intense rain. Considerable flood damage	ROS
July, 1965	Lane / Spears Canyons (Umatilla Co.)	Thunderstorm. Eight to ten-foot wall of water from canyon. Considerable damage. One fatality; several people injured	FF
Dec., 1980	Polallie Creek (Hood River Co.)	Debris flow from vicinity of Mt. Hood. Debris dam formed a small lake that was later breached. Damage to highways and utilities.	Debris flow
Feb., 1985	Umatilla County	Warm rain on snow at higher elevations. Flooding throughout county.	ROS
Feb., 1986	Entire state	Warm rain on snow. Widespread flooding. Considerable damage	ROS
May, 1998	Central and eastern Oregon	Widespread flooding. Rain melting mountain snow.	ROS

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

**TABLE 12. PRINCIPAL FLOOD SOURCES**

<b>Gilliam County</b>	<b>Hood River County</b>	<b>Morrow County</b>	<b>Sherman County</b>	<b>Umatilla County</b>	<b>Wasco County</b>
Columbia River*	Columbia River*	Columbia River*	Columbia River*	Columbia River*	Columbia River*
Thirty Mile Creek	Hood River	Hinton Creek		Birch Creek	Spanish Hollow Creek
	Indian Creek	Little Blackhorse Canyon Cr.		McKay Creek	Fifteen Mile Creek
		Shobe Creek		Mill Creek	Mosier Creek
		Willow Creek		Patawa Creek	
		Rhea Creek		Stage Gulch	
				Tutuilla Creek	
				Umatilla River	
				Walla Walla River	
				Waterman Gulch	
				Pine Creek	
				Greasewood Creek	

Source: FEMA Flood Insurance Studies for Gilliam, Hood River, Morrow, Sherman, Umatilla, and Wasco counties.

Notes: \*The Columbia River flow is controlled by a series of up-stream dams. However, it still constitutes a flood hazard. The failure to regulate properly during high water conditions could worsen flood conditions

## Probability

The probability of an occurrence has been assessed at the county level. Each of the counties in this region considers the probability to be either high or medium. More information follows below.

## Vulnerability

The probability that Region 5 will experience flooding and the region's vulnerability to their effects are depicted in Table 13 below. These scores are based on the perceptions of area emergency managers.

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

High = One incident likely within a 10 to 35 year period.

Moderate = One incident likely within a 35 to 75 year period.

Low = One incident likely within a 75 to 100 year period.

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

High = More than 10% affected

Moderate = 1-10% affected

Low = Less than 1% affected

**TABLE 13. Vulnerability and Probability Assessment of Flood**

	Gilliam	Hood River	Morrow	Sherman	Umatilla	Wasco
Vulnerability	L	M	H	H	M	M
Probability	M	M	H	H	H	H

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



# LANDSLIDES/DEBRIS FLOWS

## Characteristics and Brief History

Landslides include any detached mass of soil, rock, or debris that moves down a slope or stream channel. They are classified according to the type and rate of movement and the kind of material that is transported. Debris flows (mudslides, mudflows, debris avalanches) are a common type of rapidly moving landslide that generally occur during intense rainfall on previously saturated ground. They usually begin on steep hillsides as slumps or slides that liquefy, accelerate to speeds as great as 35 mph or more, and flow down slopes and channels onto gently sloping ground. Their consistency ranges from watery mud to thick, rocky, mud-like wet cement --- dense enough to carry boulders, trees, and automobiles. Debris flows from different sources can combine in canyons and channels, where their destructive power is greatly increased. In general, slopes over 25%, or having a history of landslides, signal a potential problem. Landslides / debris flows occur throughout Region 5, but especially in the Columbia River Gorge (i.e., Hood River and Wasco counties).

The Columbia River Gorge is known for its landslide topography, and many of the landslides are very ancient. Landslide / debris flow conditions are worsened by the same weather conditions that produce severe flooding throughout Oregon: rain-on-snow. In short, it is not uncommon in the Pacific Northwest for mild rainy conditions to follow an abundant snowfall. Such was the case in February 1996, when similar weather conditions produced over 700 landslides/ debris flows throughout the state. During that period three landslides closed Interstate Highway 84 along the Columbia River for a period of time. The weather pattern appears to be cyclic.

Landslides / debris flows in Oregon were particularly noteworthy in 1964, 1982, 1966, 1996, and 1997. Research undertaken by the Oregon Department of Forestry has linked many of these landslides to weather and forest management practices (e.g., roads and harvesting); other research efforts have associated landslides with soil types (e.g., loess in the Blue Mountain region or marine sediments in the Columbia River Gorge) and underlying structure (i.e., type and attitude of rocks, etc.). No doubt all of these things are factors. The most universal link, however, appears to be precipitation, which is the basis of Oregon's debris flow warning system.

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

As the lead agency, ODF is responsible for forecasting and measuring rainfall from storms that may trigger debris flows. Advisories and warnings are issued as appropriate. Information is broadcast over NOAA weather radio and on the Law Enforcement Data System. DOGAMI provides additional information on debris flows to the media; ODOT provides information concerning the location of landslides / debris flows, alternate transportation routes, etc.

## Probability

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

Geo-engineers with the Oregon Department of Forestry estimate widespread activity about every 20 years; In western Oregon, landslides at a local level can be expected every 2 or 3 years.<sup>2</sup>

## Vulnerability

The probability that Region 5 will experience landslides and the region's vulnerability to their effects are depicted in Table 14 below. These scores are based on an analysis of risk conducted by county emergency program managers, usually with the assistance of a team of local public safety officials.

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

High = One incident likely within a 10 to 35 year period.

Moderate = One incident likely within a 35 to 75 year period.

Low = One incident likely within a 75 to 100 year period.

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

High = More than 10% affected

Moderate = 1-10% affected

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<sup>2</sup> Mills, 2002.

Low = Less than 1% affected

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

**TABLE 14. Vulnerability and Probability Assessment of Landslides**

	<b>Gilliam</b>	<b>Hood River</b>	<b>Morrow</b>	<b>Sherman</b>	<b>Umatilla</b>	<b>Wasco</b>
Vulnerability	-	-	M	-	-	L
Probability	-	-	H	-	-	L

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

# VOLCANO-RELATED HAZARDS

## Characteristics and Brief History

The western boundary of Hood River and Wasco counties coincide with the Cascade Range. Several of their communities are very close to Mt. Hood, a well-known volcanic peak. In addition, both counties are less than 100 miles from Mt. St. Helens and Mt. Adams in Washington State, two prominent volcanoes. The principal risks from these mountains include air borne tephra (ash), lahars, and pyroclastic flows from a Mt. Hood eruption. The primary risks from Mt. St. Helens and Mt. Adams, separated by distance and the Columbia River, include air borne tephra and the possibility of lahars reaching the Columbia River from Mt. Adams. The remaining counties in Region 5 are at risk from air borne tephra from several Cascade volcanoes.

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

## Probability

Mt. St. Helens remains a probable source of air borne tephra. 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 it continues to be a concern. The location, size and shape of the area affected by tephra fall are determined by the vigor, and duration of the eruption and the wind direction. Because wind direction and velocity vary with both time and altitude, it is impossible to predict the direction and speed of tephra transport more than a few hours in advance.<sup>3</sup>

Mt. Hood's eruptive history can be traced to late Pleistocene times (15-30,000 years ago) and will no doubt continue. But the central question remains: When? The most recent series of events (1900-2000) consisted of small lahars and debris avalanches; Steam explosions and minor tephra falls occurred between 1856 and 1865. Mt. Hood's recent history also includes tephra falls, dome building, lahars, pyroclastic flows and steam explosions. These occurred about 200 years ago. Geoscientists have provided some estimates of future activity in the vicinity of Crater Rock, a well-known feature on Mt. Hood. They estimate a 1 in 300

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<sup>3</sup> USGS Open File Report 95-247, p.6.

chance that some dome activity will take place in a 30-year period (1996-20026). For comparison, the 30-year probability of a house being damaged by fire in the United States is about 1 in 90.<sup>4</sup>

The probability of 1 cm or more of tephra fall-out from eruptions anywhere in the Cascade Range, include:

- **Gilliam County:** 1 in 1,000
- **Hood River County:** Between 1 in 500 and 1 in 1,000
- **Morrow County:** 1 in 1,000
- **Sherman County:** 1 in 1,000
- **Umatilla County:** Between 1 in 1,000 and 1 in 5,000
- **Wasco County:** Between 1 in 500 and 1 in 1,000<sup>5</sup>

## Vulnerability

The probability that Region 5 will experience volcano-related hazards and the region's vulnerability to them are depicted in Table 15 below. These scores are based on an analysis of risk conducted by county emergency program managers, usually with the assistance of a team of local public safety officials.

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

High = One incident likely within a 10 to 35 year period.

Moderate = One incident likely within a 35 to 75 year period.

Low = One incident likely within a 75 to 100 year period.

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

High = More than 10% affected

Moderate = 1-10% affected

Low = Less than 1% affected

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

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<sup>4</sup> Scott, W.E., et al., 1997.

<sup>5</sup> Sherrod, David et al, 1997

**TABLE 15. Vulnerability and Probability Assessment of Volcano-Related Hazards**

	Gilliam	Hood River	Morrow	Sherman	Umatilla	Wasco
Vulnerability	-	M	-	L	-	H
Probability	-	L	-	L	-	M

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

# WINDSTORMS

## Characteristics and Brief History

Extreme winds are experienced in all of Oregon's eight regions. The most persistent high winds occur along the Oregon Coast and the Columbia River Gorge, so much so that these areas have special building code standards. All manufactured homes in Region 5 that are within 30 miles of the Columbia River, must meet special anchoring (i.e., tie-down) standards (Section 307: Wind Resistance). High winds in this area of Oregon are legendary. The Columbia Gorge is the most significant east-west gap in the mountains between California and Canada. It serves as a funnel for east and west winds, where direction depends solely on the pressure gradient. Once set in motion, the winds can attain speeds of 80 mph, halt truck traffic, and damage a variety of structures and facilities. The average wind speed at Hood River is 13 mph, not much less than the notoriously windy Texas and Kansas plains whose wind speeds average 15 mph.<sup>6</sup>

A historic overview of windstorms affecting Region 5 is listed in Table 16.

Though their occurrence is somewhat less frequent, Region 5 has also experienced tornadoes. For the most part, these tornadoes have not resulted in major damages. Table 17, below, describes the history of tornadoes in the region.

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<sup>6</sup> Taylor, George H. and Ray Hatton, 1999, *The Oregon Weather Book*.

**Table 16. SIGNIFICANT WINDSTORMS**

<b>DATE</b>	<b>AFFECTED AREA</b>	<b>CHARACTERISTICS</b>
Apr., 1931	N. Central Oregon	Unofficial wind speeds reported at 78 mph. Damage to fruit orchards and timber.
Dec., 1935	W. Columbia Gorge	Damage to automobiles. Wind gusts at 120 mph
Nov. 10-11, 1951	Statewide	Widespread damage; transmission and utility lines; Wind speed 40-60 mph; Gusts 75-80 mph
Dec., 1951	Statewide	Wind speed 60 mph in Willamette Valley. 75 mph gusts. Damage to buildings and utility lines.
Dec., 1955	Statewide	Wind speeds 55-65 mph with 69 mph gusts. Considerable damage to buildings and utility lines
Nov., 1958	Statewide	Wind speeds at 51 mph with 71 mph gusts. Every major highway blocked by fallen trees
Oct., 1962	Statewide	Columbus Day Storm; Oregon's most destructive storm to date. 116 mph winds in Willamette Valley. Estimated 84 houses destroyed, with 5,000 severely damaged. Total damage estimated at \$170 million
Mar., 1971	Most of Oregon	Greatest damage in Willamette Valley. Homes and power lines destroyed by falling trees. Destruction to timber in Lane Co.
Nov., 1981	Statewide	Severe wind storm
Dec., 1987	Umatilla County	Damaging wind storm; 2 fatalities
Mar., 1991	Mid – Columbia / NE Oregon	Severe wind storm
Dec., 1991	N. Central Oregon	Severe wind storm; Blowing dust.
Jan., 1993	Northern Oregon	Severe wind storm. Damage to utilities
Dec., 1995	Statewide	Severe wind storm. Widespread Damage

Source: Taylor, George H., and Ray Hatton, 1999, The Oregon Weather Book, p.151-157; and FEMA-1405-DR-OR, February 7, 2002, Hazard Mitigation Team Survey Report, Severe Windstorm in Western Oregon.



**TABLE 17. SIGNIFICANT TORNADES**

DATE	LOCATION	RESULT
June, 1888	Morrow County (Lexington, Sand Hill, Pine City)	30 buildings, including two schools destroyed. Six people killed (including two children); 4 people injured
April , 1925	Gilliam County	Warehouse and automobiles destroyed in Condon. About \$10,000 in damages
April , 1957	Gilliam and Morrow Counties	Minor damage (rangeland)
April, 1970	Wasco County	Observed. No damage
May, 1991	Umatilla County	Some damage to wheat fields
July, 1995	Umatilla County	Some damage to wheat fields

Source: Taylor, George and Ray Hatton, 1999, The Oregon Weather Book, pp. 130-136.

### **Probability**

The probability of an occurrence has been assessed at the county level. Each of the counties in this region considers the probability for future windstorms to be either high or medium. More information follows below.

### **Vulnerability**

Many buildings, utilities, and transportation systems within Region 5 are vulnerable to wind damage. This is especially true in open areas, such as natural grasslands or farmlands. It also is true in forested areas, along tree-lined roads and electrical transmission lines, and on residential parcels where trees have been planted or left for aesthetic purposes. Structures most vulnerable to high winds include insufficiently anchored manufactured homes and older buildings in need of roof repair. The Oregon Department of Administrative Service's inventory of state-owned and operated buildings includes an assessment of roof conditions as well as the overall condition of the structure. Oregon Emergency Management has arranged this information by county.

Fallen trees are especially troublesome. They can block roads and rails for long periods, which can affect emergency operations. In addition, up-rooted or shattered trees can down power and/or utility lines and effectively bring local economic activity and other essential facilities to a standstill. Much of the problem may be attributed to a shallow or weakened root system in saturated ground. Uprooted trees growing next to a house have destroyed roofs when they fall as a result of

windstorms. In some situations, strategic pruning may be the answer. Prudent counties will work with utility companies in identifying problem areas and establishing a tree maintenance and removal program.

The probability that Region 5 will experience windstorms and the region’s vulnerability to their effects are depicted in Table 18 below. These scores are based on an analysis of risk conducted by county emergency program managers, usually with the assistance of a team of local public safety officials.

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

High = One incident likely within a 10 to 35 year period.

Moderate = One incident likely within a 35 to 75 year period.

Low = One incident likely within a 75 to 100 year period.

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

High = More than 10% affected

Moderate = 1-10% affected

Low = Less than 1% affected

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

**TABLE 18. Vulnerability and Probability Assessment of Windstorms**

	Gilliam	Hood River	Morrow	Sherman	Umatilla	Wasco
Vulnerability	-	H	H	M	H	M
Probability	-	H	M	H	H	M

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

# WINTERSTORMS

## Characteristics and Brief History

Within the State of Oregon, Region 5 communities are known for cold winter conditions. This is advantageous in at least one respect: in general, the region is prepared, and those visiting the region during the winter usually come prepared. However, there are occasions when preparation cannot meet the challenge.

Drifting, blowing snow has brought highway traffic to a standstill. Also, windy and icy conditions have closed Oregon's principal east-west transportation route, Interstate Highway 84, for hours. In these situations, travelers must seek accommodations --- sometimes in communities where lodging is very limited. And local residents also experience problems. During the winter, heat, food, and the care of livestock are everyday concerns. Access to farms and ranches can be extremely difficult and present a serious challenge to local emergency managers. Table 19 provides an historic overview of severe winter conditions within Region 5.

## Probability

The recurrence interval for severe winter storms throughout Oregon is about every 13 years, however, there can be many localized storms between these periods.

**TABLE 19. SIGNIFICANT WINTERSTORMS**

DATE	LOCATION	REMARKS
Dec., 1861	Entire state	Storm produced between 1 and 3 feet of snow throughout Oregon
Dec., 1884	Columbia Basin	Heavy snowfall. The Dalles received 29.5 inches in one day.
Dec., 1885	Wasco County	Most snow ever recorded (6-10 feet). Trains had difficulty reaching Portland.
Dec., 1892	Northern counties	Between 15 and 30 inches of snow fell throughout the northern counties
Jan., 1916	Entire state	Two storms. Very heavy snowfall, especially in mountainous areas
Jan., Feb., 1937	Entire state	Deep snow drifts
Jan., 1950	Entire state	Record snow falls; Property damage throughout state.
Mar., 1960	Entire state	Many automobile accidents; Two fatalities
Jan., 1969	Entire state	Heavy snow throughout state
Jan., 1980	Entire State	Series of string storms across state. Many injuries and power outages.
Feb., 1985	Entire state	Two feet of snow in northeast mountains; Downed power lines. Fatalities
Feb., 1986	Central / Eastern Oregon	Heavy snow in Deschutes Basin. Traffic accidents; Broken power lines
Mar., 1988	Entire state	Strong winds; Heavy snow
Feb., 1990	Entire state	Heavy snow throughout state
Nov., 1993	Cascade Mountains	Heavy snow throughout region
Mar., 1994	Cascade Mountains	Heavy snow throughout region
Winter 1998-99	Entire state	One of the snowiest winters in Oregon history (Snowfall at Crater Lake: 586 inches)

Source: Taylor, George and Ray Hatton, 1999, *The Oregon Weather Book*, p.118-122.

## Vulnerability

The probability that Region 5 will experience winterstorms and the region's vulnerability to their effects are depicted in Table 20 below. These scores are based on an analysis of risk conducted by county emergency program managers, usually with the assistance of a team of local public safety officials.

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

High = One incident likely within a 10 to 35 year period.

Moderate = One incident likely within a 35 to 75 year period.

Low = One incident likely within a 75 to 100 year period.

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

High = More than 10% affected

Moderate = 1-10% affected

Low = Less than 1% affected

**TABLE 20. Vulnerability and Probability Assessment of Winterstorms**

	Gilliam	Hood River	Morrow	Sherman	Umatilla	Wasco
Vulnerability	H	H	H	M	H	H
Probability	H	H	H	M	H	H

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

**COMMUNITY WILDFIRE PROTECTION PLAN**

# **MORROW COUNTY, OREGON**



Willow Cr., Morrow County, Oregon

**Adopted by the Morrow County Court on March 22, 2006**

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## Signatures:

As required by the HFRA, the undersigned representatives of the Morrow County Court, Morrow County Fire Defense Board and Oregon Department of Forestry acknowledge that they have reviewed and agree with the contents of this plan.

### Morrow County Court

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Terry Tallman, Morrow County Judge Date

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Ray Grace, Morrow County Commissioner Date

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John Wenholz, Morrow County Commissioner Date

### Morrow County Fire Defense Board Chief

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Jim Stearns, Area 9 Fire Defense Board Chief Date

### Oregon Department of Forestry

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Robert Young, District Forester, Central Oregon District Date



## **EXECUTIVE SUMMARY**

Recent fires in Oregon and across the western United States have increased public awareness over the potential losses to life, property, and natural and cultural resources that fire can pose.

The Morrow County Community Wildfire Protection Plan (CWPP) is the result of a countywide effort initiated to reduce wildland fire risk to communities and their citizens, the environment, and quality of life within Morrow County. Citizens, fire districts, county staff or elected officials, and agency representatives have worked together to create a plan that would be successful in implementing fuels reduction projects, fire prevention education campaigns, and other fire-related programs.

*See Appendix A for a list of participants of the Morrow County LCG*

### **Plan Adoption**

To ensure recognition by the public, as well as partner agencies and organizations, The Local Coordinating group presented this Morrow County Community Wildfire Protection Plan (**MCCWPP**) to the County Court for adoption on (**INSERT date**)

While the Morrow County Community Wildfire Protection Plan provides a foundation and resources for understanding wildland fire risk and opportunities to reduce potential losses from wildland fire, individual communities, fire districts and neighborhoods can take local action by developing community-specific fire plans or by participating in countywide activities for prevention and protection.

The Healthy Forests Restoration Act of 2003 recommends that communities develop a Community Wildfire Protection Plan, as does the FEMA Disaster Mitigation Act of 2000. With formal adoption of this plan, Morrow County is more competitive for funding that may assist with plan implementation. Furthermore, adoption of this plan highlights the partnerships between fire districts, local government, community-based organizations and public agencies. The result of this partnership brings direction to the federal agencies for which communities are a priority for fuel treatment on federally managed and non-federal lands.

### **Sustaining Fire Plan Efforts**

In the past, there has been limited awareness about the investment required to maintain fire protection. From fuels reduction, education and prevention to evacuation, citizens must have the information and resources to be active participants in reducing their risk to wildland fire. For many years, there has been a reliance on insurance, local government, fire service, federal agencies and many other types of organizations to aid us when disaster strikes. The **MCCWPP** encourages citizens to take an active role in identifying needs, developing strategies and implementing solutions to address wildland fire risk by assisting with the development of local community wildfire protection plans and participating in countywide fire prevention activities. Citizen action may be cleaning up brush around homes, installing new smoke detectors, volunteering to be a part of auxiliary, attending community meetings, and/or passing along information on fire prevention to neighbors and friends. With the **MCCWPP** as a foundation, community wildfire plans and local action can guide successful implementation of fire hazard reduction and protection efforts in the County.

Development of the Morrow County Community Wildfire Protection Plan has been no small task. Building a partnership and cooperative environment between “community based” organizations, fire districts, local government and the public land management agencies has been the first step in identifying and prioritizing measures to reduce wildfire risk. Maintaining this cooperation with the public is a long-term effort that requires commitment of all partners involved.

Morrow County is committed to supporting the rural fire districts and communities 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. In 2006, The Local CWPP Coordination Group will work on implementing the wildfire plan by working with fire districts, community organizations and public agencies to coordinate fuels reduction projects with existing dollars through the National Fire Plan. The **MCCWPP** will focus on public meetings, education campaign; strengthen emergency management and evacuation procedures. **MCCWPP** partners will also focus on refining long-term strategies to maintain fire protection activities in the County. Annual meetings of the local coordinating group and annual open house meetings will continue to take place.

**Morrow County Community Wildfire Protection Plan Mission, Goals, Objectives**

Developed by the local coordinating group comprised of rural fire protection districts, local government, state and federal agencies, and community-based organizations, the plan mission is to reduce the risk from wildland fire to life, property and natural resources in the County.

**Goals**

- Protect against potential losses to life, property and natural resources from wildland fire;
- Build and maintain active participation from each Fire Protection District;
- Set realistic expectations for reducing wildland fire risk;
- Identify actions for fire protection;
- Access and utilize federal and other grant dollars;
- Identify incentives for fire protection and community participation;
- Promote visible projects and program successes;
- Monitor the changing conditions of wildland fire risk and citizen action over time;
- Institutionalize fire-related programs and sustain community efforts for fire protection;
- Establish and maintain escape route and adjacent corridors.

To address the complex range of issues within the **MCCWPP**, it became clear early in the planning process that broader and diverse participation was needed for success. Through public meetings and invitations to organizations and stakeholders in the county, sub categories were formed to develop objectives and implement actions to support the plan. Objectives within sub categories are described below.

<b>Category</b>	<b>Objective</b>
<b>General</b>	<ul style="list-style-type: none"> <li>· Provide oversight to all activities related to the <b>MCCWPP</b></li> <li>· Ensure representation and coordination</li> <li>· Develop and refine goals for fire protection in Morrow County</li> <li>· Develop a long-term structure for sustaining efforts of the <b>MCCWPP</b></li> </ul>
<b>Risk Assessment</b>	<ul style="list-style-type: none"> <li>· Identify Communities-at-Risk in the Wildland-Urban Interface</li> <li>· Develop and conduct a wildland fire risk assessment</li> <li>· Identify hazardous fuels treatment projects</li> </ul>
<b>Fuels Reduction</b>	<ul style="list-style-type: none"> <li>· Identify strategies for coordinating fuels treatment projects at a landscape scale</li> <li>· Provide special need citizens with an opportunity to participate in programs</li> </ul>
<b>Emergency Management</b>	<ul style="list-style-type: none"> <li>· Strengthen emergency management, response and evacuation</li> <li>· Coordinate between County government and local fire districts</li> </ul>

<b>Information and outreach</b>	<ul style="list-style-type: none"> <li>· Develop strategies for increasing citizen awareness and action for fire prevention</li> <li>· Reach out to all citizens in the county</li> </ul>
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**County Profile**

Based on the 2000 Census, there are 10,995 people residing in Morrow County accounting for 3,776 households. This rich agricultural land can be roughly divided into three occupational zones-increasing amounts of irrigation farming in the north, vast fields of wheat yielding to cattle ranches in the center, and timber products in the south. The total area of Morrow County is approximately 2,049 square miles, a little more than 1.3 million acres of gently rolling plains and broad plateaus, of which about 130,454 acres is privately owned forestland and about 225,333 acres is managed by federal, state, and county agencies for the public good.

<b>Management</b>	<b>Acres</b>
Private Lands (Residential, Ranches, Timber Companies, etc.)	1,085,129
US Department of Interior, Bureau of Land Management	3,893
US Department of Interior, Fish & Wildlife Service	4,332
Department of Defense, Boardman Range	41,277
US Department of Agriculture, Forest Service, Umatilla NF	144,679
Morrow County	6,410
State of Oregon, Division of State Lands & Dept of Fish & Wildlife	2,182
US Corps of Engineers	22,560
<b>Total</b>	<b>1,310,462</b>

Within the county boundary there are (2) incorporated cities with fire departments, Heppner and Lexington. Both are operated with volunteer fire fighters. In addition, there are (6) rural fire protection districts within the county, Heppner, Ione, Irrigon, Boardman, S. Gilliam Rural, and Pilot Rock Rural Fire Districts. In the Rural Fire Districts, there are only (3) paid fulltime fire fighter, the rest is strictly volunteer. In 2005, Morrow County elected to cover all lands outside the Forest Protection District with rural fire protection for both structures and wildland. The County used the Zone II authority and divided the protection responsibility among the established Rural Fire Districts. This process is nearly complete. Also, there are several communities and many well populated areas that do not have fire departments including Blake’s Addition, Cutsforth Park, Lake Penland, and Reeds Mill.

There are ten (10) organizations that provide wildland fire protection, comprised of 6 Rural Fire Districts, the BLM (Bureau of Land Management), USFS (United States Forest Service), USF&W (United States Fish & Wildlife Service, and ODF (Oregon Department of Forestry). The Pendleton and John Day airports have single engine air tankers (SEATs) available during the summer fire season. There are helicopter rappel bases at Ukiah and John Day.

Oregon Department of Forestry, Morrow County, and USFS/BLM are in a partnership to suppress wildland fires, and operate under a “closest forces” concept. ODF is responsible for protection of private lands, county and State of Oregon lands within the Forest Protection District. The USFS, Umatilla National Forests, plus BLM work with the ODF to locate the closest fire crew to an ignition and dispatch

for initial attack. ODF and the USFS have mutual aid agreements with the rural fire districts within Morrow County that allow for assistance to be provided regardless of jurisdiction.

*See Land Management Map in Appendix B*

*See Morrow County Rural Fire Protection Districts Map in Appendix B*

## **Wildland Fire Risk Assessment**

The Morrow County Community Wildfire Protection Plan wildland fire risk assessment analyzes the potential losses to life, property and natural resources. Objectives of the risk assessment are to identify Communities at-Risk and the Wildland-Urban Interface, develop and conduct a wildland fire risk assessment, and identify and prioritize hazardous fuels treatment projects. The analysis takes into consideration a combination of factors defined below:

***Risk:*** Potential and frequency for wildland fire ignitions (based on past occurrences)

***Hazard:*** Conditions that may contribute to wildland fire (fuels, slope, aspect, elevation, and weather)

***Values:*** People, property, community infrastructure, natural and other resources that could suffer losses in a wildfire event.

***Protection Capability:*** Ability to mitigate losses, prepare for, respond to, and suppress wildland and structural fires.

***Structural Vulnerability:*** Characteristics influencing the vulnerability of structures during a wildland fire event (roof type and building materials, access to the structure, and whether or not there is defensible space or fuels reduction around the structure.)

## **Communities at Risk**

The Federal Register has listed cities and areas in the United States that are a risk to urban interface fires. This list includes (3) locations in Morrow County. They are; Blake's Addition, Custforth Park, and Lake Penland. These areas are very high risk for several reasons including ---

1. No jurisdictional authority for structure suppression.
2. Initial attack time to structures and wildland.
3. Lack of trained people and appropriate equipment to take action on structures.
4. Fuel loading in and around living sites.
5. Fuel loading adjacent to living areas.
6. Very poor access.
7. Location of structures (i.e. in draw bottoms, south slopes, etc.).
8. Construction of structures (combustible roofing etc.).
9. Lack of safety zones for residents and firefighters.
10. Communications and evacuation systems, plans and back-up.

In recent years the population of Morrow County has moved further and further into traditional resource

land including forested lands. This has produced a significant increase in threats to life and property and has pushed existing fire protection systems beyond their original or current design capabilities.

Many Morrow County property owners could use assistance identifying the problems they face. Information on risk reduction and mitigation to offset the fire hazards on their property is essential.

***Hazardous Fuels Reduction Objectives***

Action
1. Identify fuels treatment projects on lands using the risk data.
2. Utilize risk assessment information in applications for National Fire Plan grants and other fuels reduction dollars.
3. Review how grant dollars for fuels reduction projects are administered. Make changes to the program so that they are more directed towards landscape scale treatments.
4. Develop long-term strategies for maintenance of fuels reduction
5. Focus Strategic planning for hazardous fuels treatment projects on evacuation routes/corridors. (County Roads/FS Roads/State Hwys/Public Access Roads/Private Drives)
6. Promote information and outreach through all fuels reduction programs to ensure strong community involvement in fuels reduction and wildland fire prevention projects.

***Fuels Treatment Areas***

The State, County, Rural and City fire districts, community organizations and agency partners have worked together to identify fuel treatment areas. This process includes examining the risk assessment maps and strategic planning units and using local knowledge and information gathered during community meetings to identify the most appropriate places to prioritize for treatment. Consideration is given to areas where the federal agencies have planned fuels reduction projects in order to achieve the landscape scale treatment.

***Monitoring Strategy***

The primary objective of the local coordinating group is to provide guidance for all elements of planning and implementation of the Morrow County Community Wildfire Protection Plan. The local coordinating group will continue to provide oversight through meetings and coordination with the fire protection agencies and the communities at risk in Morrow County.

## **CHAPTER 1: INTRODUCTION**

On a normal summer day in Morrow County you can find many residents checking the skies for a building thunderhead or a plume of smoke. Wildland fire has impacted the county since long before the first settler moved into the area.

### **Environment and Natural Resources**

Morrow County, created from Umatilla County in 1885, is located east of the Cascades in north-central Oregon. It was named for J.L. Morrow, an early resident. Morrow County contains more than one-million acres of gently rolling plains and broad plateaus. This rich agricultural land can be roughly divided into three occupational zones-increasing amounts of irrigation farming in the north, vast fields of wheat yielding to cattle ranches in the center, and timber products in the south. With the advent of center pivot irrigation technology, Morrow County has become one of Oregon's fastest growing areas in terms of population, personal income, and agricultural and industrial development. The Port of Morrow, second largest in the state in terms of tonnage, serves as a gateway to the Pacific Northwest and Pacific Rim markets.

### **Strategy**

Morrow County has lived with fire since the county was first established in 1885. Fire has been a major tool in shaping the existing forest and other plant communities since long before the country was settled. Lightning and humans will always contribute to fire starts during all conditions dry or wet. Of the three fire behavior components (fuel, weather, topography), fuels are the one variable that humans can easily influence and modify. With this in mind, this plan is aimed at reducing fire effects by reducing fuel loading and to produce conditions, in case of fire, that are considered manageable during most conditions and to improve initial attack capabilities for all types of fires.

1. The number one goal of this plan is to provide for the protection of the public and create a safe work environment for fire suppression forces. With the reduction of wildland fuels we move closer to achieving the goal of all structures surviving an on-coming fire.
2. Everyone involved with this plan must work together to successfully manage hazardous fuels within and near the communities. Those included are association groups, Federal agencies, Local Agencies, local and state fire protection districts, private industrial timberland owners, and private land and home owners.
3. There are often weather conditions where high temperatures, single digit humidity's, and strong winds occur simultaneously. Under these conditions prevention through communication to reduce fire start potential is the only protection for communities from wildland fire effects. These conditions can lead to plume dominant fires which create their own burning conditions and are literally unmanageable and can become catastrophic.
4. The key to making this plan work will be increasing public awareness through informational programs. This county is a typical Eastern Oregon county with small cities scattered throughout with a population of people living in homes scattered outside the city limits. These homes are located in all fuel types. Some are snuggled in the timber adjacent to the forest. Others are in the lower elevations of grass/juniper/sagebrush climate. Distance from any type of fire protection is one of the biggest problems for these homes and access. Depending upon the day, suppression response times could be as long as 1 hour.

### **Fire Policies and Programs**

There are various local, state and federal programs and policies related to community fire planning and fire protection. Most recently, the Healthy Forests Restoration Act, signed into law by President Bush in 2003, calls for the development of Community Wildfire Protection Plans for all communities at risk from wildland fire. This section describes these requirements, as well as related County, state and federal programs.

## **Healthy Forest Restoration Act (HFRA) / Healthy Forest Initiative (HFI)**

In 2002 the President announced the Healthy Forest Initiative (HFI) designed to identify and remove barriers to the implementation of projects that were developed to restore the health of the national forests. HFI was focused on renewed efforts to be more effective and efficient in carrying out restoration projects. Under HFI, new categorical exclusions were developed to allow the federal agencies to move more quickly through National Environmental Policy Act (NEPA) under appropriate circumstances, streamlined administrative review processes for NEPA, and created new regulations under the Endangered Species Act for National Fire Plan projects to streamline consultation with federal regulatory agencies. It also set the stage for extensive discussion between the administration and Congress that resulted in new legislation addressing forest health.

Congress enacted the Healthy Forest Restoration Act in November 2003. It provides new tools and additional authorities to treat more federally-managed acres more quickly to expedite our restoration goal. It strengthens public participation and provides incentives for local communities to develop community protection plans. It limits the complexity of environmental analyses for hazard reduction projects, provides more effective appeals process and instructs the Courts that are being asked to halt projects, to balance the short-term affects of implementing the projects against the harm from undue delay and long term benefits of a restored forest.

Title I of the HFRA addresses vegetation treatments on certain types of National Forest System and Bureau of Land Management lands that are at risk of wildland fire or insect and disease epidemics.

This title:

- Encourages streamlined environmental analysis of HFRA projects;
- Provides for administrative review of proposed HFRA projects on National Forest System lands before decisions are issued;
- Contains requirements governing the maintenance and restoration of old-growth forest stands when the Forest Service and BLM conduct HFRA projects in such stands;
- Requires HFRA projects in the Forest Service and BLM to maximize retention of larger trees in areas other than old-growth stands, consistent with the objective of restoring fire-resilient stands and protecting at-risk communities and Federal lands;
- Encourages collaboration between Federal agencies and local communities when community wildfire protection plans are prepared;
- Requires using at least 50% of the dollars allocated to HFRA projects to protect communities at risk of wildland fire;
- Requires performance to be monitored when agencies conduct hazardous-fuel reduction projects and encourages multiparty monitoring that includes communities and other stakeholders; and
- Encourages courts that consider a request for an injunction on an HFRA-authorized project to balance environmental effects of undertaking the project against the effects of failing to do so.

Title III of the Act also encourages the development of Community Wildfire Protection Plans under which communities will designate their Wildland Urban Interface (WUI), where HFRA projects may take place. Half of all fuel reduction projects under the HFRA will occur in the community protection zone as defined by HFRA. HFRA also encourages biomass energy production through grants and assistance to local communities to create market incentives for removal of otherwise valueless forest material.

## **National Fire Plan and 10-Year Comprehensive Strategy**

The National Fire Plan (NFP) was established after a landmark fire season in 2000 with the intent of actively responding to severe wildland fires and their impacts to communities while assuring sufficient

firefighting capacity for the future. The NFP is a long-term commitment intended to help protect human lives, communities and natural resources, while fostering cooperation and communication among federal agencies, states, local governments, tribes and interested publics. The NFP focuses on 1) fire suppression and protection, 2) restoration/rehabilitation, 3) hazardous fuels reduction, 4) community assistance, and 5) accountability. The Oregon and Washington NFP Strategy Team sees reduction of unnatural hazardous fuel levels that threaten communities and forest ecosystems as the foundation principle for dealing with fire risks (NFP Strategy Team 2002). Most NFP funding in Oregon goes to wildland fire preparedness and hazardous fuel treatment (USDI and USDA 2003).

The National Fire Plan is a long-term investment that will help protect communities and natural resources, and most importantly, the lives of firefighters and the public. It is a long-term commitment based on cooperation, and collaboration, communication among federal agencies, states, local governments, tribes and interested publics. The federal wildland fire management agencies worked closely with these partners to prepare a 10-Year Comprehensive Strategy, completed in August 2001. The National Fire Plan calls for the development of Community Fire Plans to aid in effectively implementing NFP goals.

### **Senate Bill 360: Oregon Forestland-Urban Interface Fire Protection Act**

The Oregon Forestland-Urban Interface Fire Protection Act of 1997 (SB360) is intended to facilitate development of an effective WUI protection system in Oregon by 1) establishing policies regarding WUI protection, 2) defining the WUI in Oregon and establishing a process and system for classifying the interface, 3) establishing standards for WUI property owners so they can manage or minimize fire hazards and risks, and 4) providing the means for establishing adequate, integrated fire protections systems in WUI areas, including information and prevention efforts. This act is only pertinent to areas within ODF's protection boundaries and is going to be implemented in all of these areas across the state by 2011.

### **Oregon Statewide Land Use Planning Goal 7**

The intent of Oregon Statewide Land Use Planning Goal 7 for Areas Subject to Natural Hazards is to protect people and property from natural hazards. Goal 7 directs local governments to adopt comprehensive plans (inventories, policies and implementing measures) to reduce risk to people and property from natural hazards. Goal 7 also indicates that new hazard inventory information provided by federal and state agencies shall be reviewed by the Oregon Department of Land Conservation and Development (DLCD) in consultation with affected state and local government representatives. After such consultation, the DLCD shall notify local governments if the new hazard information requires a local response. Local governments shall respond to new inventory information on natural hazards within 36 months after being notified by the DLCD, unless extended by the Department. – <http://www.lcd.state.or.us/LCD/docs/goals/goal7> *In relationship to ODF, as new data is identified, and particularly high hazard areas identified through Senate Bill 360, local governments will need to address the provisions of Goal 7.)*

### **Federal Emergency Management Agency Disaster Mitigation Act of 2000**

Federal Emergency Management Agency (FEMA) requirements under Title 44 CFR Part 201 of the Disaster Mitigation Act of 2000. This legislation specifies criteria for state and local hazard mitigation planning which require local and Indian tribal governments applying for Pre-Disaster Mitigation (PDM) funds to have an approved local mitigation plan. These may include county-wide or multi-jurisdictional plans as long as all jurisdictions adopt the plan. Activities eligible for funding include management costs, information dissemination, planning, technical assistance, and mitigation projects.



## **CHAPTER 2: COORDINATION PROCESS**

### **Coordinating Groups**

There are two major committees that deal with all aspects of fire emergencies in Morrow County. The Area 9 (Umatilla/Morrow County) Fire Defense Board is represented by all the municipal fire departments, Oregon State Fire Marshal's office, and Rural Protection Districts. The second is under the Master Agreement and Operating Plan between the Federal Wildland Fire agencies and the States of Oregon and Washington.

Community outreach will be done through both of these groups. There are many homes and structures that are in danger from possible wildland fire. Many of these homes are situated in risk areas due to the desire for seclusion. It will be a major hurdle to contact these land owners and inform them about defensible space or convince them it is a necessary objective. Emergency operations will also cover these possibilities.

### **Gaining committee representation**

The **MCCWPP** Local Coordinating Group (LCG) began conducting outreach with community-based organizations throughout the County. The **MCCWPP** Local Coordinating Group invited all organizations, business or residents with an interest in working on fire-related issues to participate.

The LCG began by ODF conducting meetings with all of the fire districts, the Forest Service, and BLM. This process resulted in each of the agencies appointing at least one person to the **MCCWPP** Local Coordinating Group. Agencies directed field officers, fuels management specialists, fire prevention staff and others to participate.

### **Executive Committee**

The Executive Committee is responsible for Documentation and Filing of the Morrow County Community Wildfire Protection Plan. Members of the Executive Committee include:

Members Representing;

Morrow County Court  
Area 9 Fire Defense Board  
Oregon Department of Forestry

### **Local Coordinating Group**

The Local Coordinating Group is responsible for providing guidance to all elements of planning and implementation of the Morrow County Community Wildfire Protection Plan. It also coordinates the priority of communities at risk and projects. Members of the Local Coordinating Group include:

Members Representing;

Morrow County Court  
Area 9 Fire Defense Board  
Oregon Dept. of Forestry representing State Agencies: ODF&W  
Federal Agencies: USFW, DOD Navy, USFS Umatilla NF  
Community Leaders  
County Agencies

**Local Coordinating Group Responsibilities;**

<b>Actions</b>	<b>Timeline</b>	<b>Outcomes</b>
Gain representation and involvement from RFPD	Short-term	Active participation by each RFPD
Access and utilize federal dollars while they are available	Short-term	Continued federal funding for fuels reduction
Set realistic expectations for reducing wildland fire risk	Ongoing	Increased public awareness about wildland fire
Coordinate priorities for funding	Ongoing	Achieve landscape treatment and equitable distribution
Promote visible projects and program successes	Ongoing	Increased awareness
Find funding to support efforts	Long-term	Increased Funding
Identify incentives for fire protection and community participation	Long-term	Increased citizen action
Engage insurance companies	Long-term	Insurance industry investment in activities
Promote local investment (property, infrastructure, business)	Long-term	Increased economic development

**Citizen Involvement**

The heart of the Morrow County Community Wildfire Protection Plan is the interest, and long-term involvement of residents in reducing wildland fire risk around their homes and in their community. Informing citizens and providing tools and resources that enable people to prepare for wildland fire will have lasting effects to building resilience to wildland fire and capacity for communities to work together toward common goals. Providing tools, information and resources that enable citizens to understand, prepare for, recover from, and learn to live with wildfire can have long-lasting effects in building resilience to catastrophic wildfire. This can also increase the capacity for communities to work together toward common goals.

**Community Risk Assessment**

Understanding the risk of wildfire to people, property and natural resources is an essential starting point for identifying priorities for treatment. The Morrow County risk assessment includes a comprehensive analysis of risk, hazard, values, structural vulnerability, and protection capabilities. Values are defined in many ways and by many different agencies and programs (for example, the National Association of State Foresters, the Healthy Forests Restoration Act, the National Fire Plan, and the BLM Risk Assessment Model (RAMs), among others.)

## **CHAPTER 3: Wildland Fire Risk Assessment**

### **Fire Occurrence - History of fire within the community**

Fire is an important disturbance mechanism in many of the ecosystems in Morrow County. The number of these fires, from 1984 to 2003, ranged from (13) in 1993 to (105) in 1999 with a total of 873 fires during this time period burning more than 213,000 acres. (29) Fires burned 300 acres or more during that period and of those, (6) were 5000 acres or more. *(Due to inconsistent tracking of historic fire data, the chart below is incomplete for fire numbers and acreage burnt)*

Many of the significant fire events in Morrow County occur as a result of dry lightning storms. Wide spread dry lightning is fairly frequent, occurring approximately every one to three years. These episodes can cause 50-100 ignitions in one day requiring suppression.

#### **Morrow County 1984 to 2003**

Size Class	Acres	Number of Fire
A 0-.24	56 acres	435
B .25-9.9	459 acres	263
C 10-99.9	2,952 acres	94
D 100-299.9	7,530 acres	52
E 300-999.9	10,370 acres	16
F 1000-4999.9	14,796 acres	7
G 5000-9999.9	12,000 acres	2
H 10,000+	165,000 acres	4
Total	213,163 acres	873

*See Historic Fire Occurrence Map in Appendix B*

*See Previous Large Fire Map in Appendix B*

### **Wildland Urban Interface (WUI)**

The boundaries of the **Wildland Urban Interface** are based on the actual distribution of structures and communities adjacent to or intermixed with wildland fuels.

Fuel reduction treatments are designed to protect human communities from wildland fires as well as minimize the spread of fires that might originate in urban areas. The management objective in the wildland-urban interface zone is to enhance fire suppression capabilities by modifying fire behavior inside the zone and providing a safe and effective area for fire suppression activities.

*See WUI Map in Appendix B*

## Fire Regime and Condition Class

Fire Regime Code	Description
I	Less than 35 year fire return interval, low severity, usually non-lethal.
II	Less than 35 year fire return interval, stand replacement severity.
III	35 – 100 year return fire interval, mixed severity.

*Condition Class 1* = Fire frequencies are within or near the historical range, and have departed from historical frequencies by no more than one return interval.

*Condition Class 2* = Fire frequencies and vegetation attributes have been moderately altered from the historical range, and fire frequencies have departed from historical frequencies by more than one return interval.

*Condition Class 3* = Fire frequencies and vegetation attributes have been significantly altered from the historical range, and fire frequencies have departed from historical frequencies by multiple return intervals. The risk of losing key ecosystem components is high.

*See Fire Regime / Condition Class Maps in Appendix B (Due to lack of data for land exterior the National Forest Boundary, the determinations for non-USFS land within the WUI areas in these maps are based upon local knowledge and the definitions for these categories)*

## **CHAPTER 4: Emergency Operations**

### **Wildland Fire Suppression Procedures**

Currently all wildland fires in Morrow County are aggressively suppressed. This is done through a Master Cooperative Fire Protection Agreement. This agreement consists of five organizations:

John Day Unit, Central Oregon District, ODF, (with Mutual Aid Agreements with all cities and rural Fire Departments)

Umatilla National Forest, USFS

Prineville District, BLM

Vale District, BLM

USF&W Service

Wildland fire fighting organizations have a multitude of support resources. Movement of federal; resources are coordinated through local dispatch centers and the Northwest Coordination Center (NWCC) in Portland, Oregon. State resource movement is coordinated through local dispatch centers, the ODF-Salem Coordination Center and the WDNR dispatch office in Olympia, Washington

#### **Tribal Resources**

Indian tribal resources are available through the use of existing Bureau of Indian Affairs/Tribal Cooperative agreements.

#### **Inmate Resources**

Oregon Department of Forestry has an agreement with Oregon Department of Corrections for the use of inmate resources to fight fires and support fire suppression activities. The use of inmates is available through the Master Cooperative Fire Protection Agreement to other agencies.

#### **International Resources Mexico, Canada**

The use of international resources is available through the Northwest Compact and Annual Operations Guidelines and International Agreements in the National Mobilization Guide.

There are two types of initial attack available; one is by air, the other by land. There are several areas within the county, mostly on public land that are road less due to the rugged topography. Initial attack in these areas is mainly by air. Redmond, Oregon houses a smoke jumper and retardant base, also LaGrande, Oregon has an air tanker base. The John Day Airport has a helibase equipped with rappellers and a small engine air tanker (SEAT). All of these fire support facilities are fully capable of initial attack on fires that are not obtainable by any roads. Again, as conditions become worse due to drying or multiple fires, these organizations can call in more support from other areas, even outside the state/region. Areas with road system access have all types of agency people and equipment available to them. The USFS has (4) engines and (1) 5-person hand crew working out of Tupper and (4) engines and (1) 5-person hand crew working out of Ukiah. The ODF has a total of 15 engines scattered throughout the area including two in Heppner, two in Monument, two in Fossil. Morrow County, DOD Navy, and Area 9 Fire Defense Board have several engines along with personnel and heavy equipment scattered about the county for fire suppression.

There is also a very large work force in the contracting arena that can be called upon. Contracting equipment consists of dozers, lowboys, water tenders, engines and 20 person crews, and personnel with specialized talents.

If a fire goes beyond the initial attack capabilities of the local resources there are special groups that can be ordered to take over the suppression responsibilities. These are known as Incident Management

Teams, and have the ability to set up and do all the functions needed to suppress the fire in a more or less self-sufficient manner.

Central Oregon IMT, Blue Mountain IMT, Oregon Department of Forestry IMT's and Pacific Northwest National IMT's are all partially staffed by local agency personnel.

If the fire is large enough it would strip the county of all its capable initial attack resources and leave the area vulnerable to new starts. The Incident Management Team will set up a small city type camp with the capabilities of feeding and housing hundreds of resources. The "Team" supports the crews with equipment and supplies to safely suppress the fire. The important factor is the team uses outside agency help and contractors so local forces can be released back to their regular initial attack duties.

### **Conflagration Act**

In the event a large amount of structures are threatened by a Wildland fire in an area protected by a city or rural fire department, the Area 9 Fire Defense Board Chief can request of the Oregon State Fire Marshall to request the Governor to declare an emergency and evoke the Conflagration Act mobilization. In area outside of city and rural fire departments, the County Court can request of the Governor to declare an emergency and evoke the Conflagration Act mobilization. This will make available structural resources along with Structural IMT's through the Oregon State Fire Marshal's office immediately to protect those structures.

### **Structures**

The (2) city fire departments and the (5) rural departments are the organizations properly trained to do structure fire fighting. Although ODF, USFS and BLM 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. The county has the following list of current fire departments:

<b>AGENCY</b>
Heppner City FD
Lexington City FD
Heppner Rural Fire District
Ione Rural Fire District
Boardman Rural Fire District
Irrigon Rural Fire District
Pilot Rock Rural Fire District
S. Gilliam Rural Fire District

## **CHAPTER 5: Monitoring and Evaluation**

### **Assessing Benefits and Costs of Mitigation**

Many federal grant programs require benefit/cost analysis of proposed actions. This ensures that the investment will yield greater benefits than the investment costs. The benefits of planning, mitigation and preparedness for wildland fire, however, can be difficult to quantify. It can be difficult to put a monetary number to the value of human, environmental, cultural and other social resources.

The Morrow County LCG emphasizes developing priorities of action for hazardous fuels treatment, education, emergency management and biomass utilization. The process to develop these priorities has included a technical risk assessment and collection of community input on values. The plan also takes into consideration the fact that low-income, elderly, disabled and other citizens with special needs may require extra assistance or resources to take fire protection actions. All of these values should be considered in developing priorities and assessing the costs and benefits of projects.

When applying for grants that require benefit/cost analysis, there are resources available through FEMA and other agencies that can assist in quantifying these costs and benefits.

### **Plan Oversight**

The primary objective of the Local Coordinating Group is to provide guidance for all elements of planning and implementation of the Morrow County Community Wildfire Protection Plan. The Local Coordinating Group will continue to provide oversight through review of the plan and meetings with the local agencies and interested parties.

### **Monitoring**

The purpose of this monitoring strategy is to track implementation of activities and evaluate how well the goals of the **MCCWPP** are being met over time. Monitoring measures progress over time so that we can understand how well our objectives are being met. The data we gather will provide in status and trends of the **MCCWPP**.

The following are the types of monitoring:

- Implementation Monitoring: Did you do what you said you would do?
- Effectiveness Monitoring: Did treatments meet objectives?
- Verification Monitoring: Evaluates whether our objectives helped to meet broad **MCCWPP** goals. Did our actions lead to the outcomes we expected?

Each functional element of the Morrow County Community Wildfire Protection Plan (risk assessment, fuels reduction, emergency management, and education and outreach) provides monitoring tasks for recommended action items. Table 5.1 provides a summary of monitoring task for each of these functional areas that the LCG will conduct.

**Table 5.1 CWPP Summary of Monitoring Tasks**

Objective	Monitoring Tasks	Timeline
Risk Assessment	<p>Continue to use reliable and usable data that is compatible among the various partner agencies.</p> <p>Monitor changes in the Federal WUI boundaries.</p> <p>Update risk assessment with new data or changing conditions.</p> <p>Continue to reflect community input from meetings as a risk assessment.</p> <p>Inventory private, county, state and federal existing and planned fuels projects.</p> <p>Once this plan has been completed, monitor acres treated, location and relative risk rating annually.</p>	Annually
Fuels Reduction	<p>Identify and prioritize fuels treatment projects on an annual basis.</p> <p>Track grants and utilize risk assessment data in new applications.</p> <p>Track fuels reduction grants and defensible space projects occurring on homes of citizens with special needs.</p> <p>Document number of residents that maintain treatment</p> <p>Monitor number of evacuation corridors/roads treated for fire protection on county, private, state and federal roads.</p> <p>Track education programs and document how well they integrate fuels objectives.</p> <p>Track grant dollars and projects directed to citizens with special needs.</p>	<p>Annual</p> <p>Ongoing Annual</p> <p>Every 3 years</p> <p>Annual Annual</p>
Emergency Management	<p>Review emergency management policies and procedures.</p> <p>Update map illustrating arterial routes and shelter sites.</p> <p>Review evacuation procedures with the County Fire Defense Board.</p>	Annually
Information and Outreach	<p>Evaluate techniques used to mobilize and educate citizens.</p> <p>Report on techniques and lessons learned.</p> <p>Review materials available in the clearinghouse.</p> <p>Random sample of “certified” homes to measure whether or not they continue to meet standards.</p> <p>Evaluate responsiveness of citizens to campaign materials (use the annual BCC survey – are you familiar with the “Are you prepared” campaign?).</p> <p>Evaluate # and type of fire education programs delivered to youth.</p> <p>Monitor interest and actions by the Insurance industry.</p>	<p>Annual review</p> <p>Annual review</p> <p>Bi-Annual Annual Eval</p> <p>Every 3 yrs</p> <p>Annual review</p>



## **CHAPTER 6 Action Plan**

This chapter describes the Communities-at-Risk and Infrastructure-at-Risk along with the actions identified by the Local Coordinating Group to implement the Morrow County Community Wildfire Protection Plan. The action plan in this chapter will be updated by the LCG twice annually upon notification by the Oregon Department of Forestry to the other members of the LCG.

**Table 6.1 Communities-at-Risk Matrix**

*(Using the definitions and criteria from the Federal Register Vol 66, August 2001.)*

<b>Community</b>	<b>Listed on Federal Register</b>	<b>Interface Category</b>	<b>Risk Factor 1 Fire Behavior Potential</b>	<b>Risk Factor 2 Value at Risk</b>	<b>Risk Factor 3 Infra-structure</b>	<b>Composite Risk Priority</b>
Blake's Addition	Yes	2	1	1	1	Extreme
Cutsforth Park	Yes	2	1	2	1	High/Extreme
Irrigon	No	2	3	1	3	Low/Moderate
Boardman	No	2	3	1	3	Low/Moderate
Heppner	No	1	2	1	3	Low/Moderate
Ione	No	1	2	1	3	Low/Moderate
Lake Penland	Yes	2	1	1	1	Extreme
Lexington	No	1	2	1	3	Low/Moderate
Morrow CO OHV Park	No	NA	1	2	2	High
Anson Wright Park/ Reeds Mill	No	NA	1	2	2	High
DOD Boardman Range	No	NA	2	2	2	Moderate
Hardman	No	2	3	2	2	Moderate
Tupper G.S.	No	NA	1	2	2	High

### ***Risk Factor 1: Fire Behavior Potential***

*Situation 1:* In these communities, continuous fuels are in close proximity to structures. The composition of surrounding fuels is conducive to crown fires or high intensity surface fires. There are steep slopes, predominantly south aspects, dense fuels, heavy duff, prevailing wind exposure and/or ladder fuels that reduce fire fighting effectiveness. There is a history of large fires and/or high fire occurrence.

*Situation 2:* In these communities, there are moderate slopes, broken moderate fuels, and some ladder fuels. The composition of surrounding fuels is conducive to torching and spotting. These conditions may lead to moderate fire fighting effectiveness. There is a history of some large fires and/or moderate fire occurrence.

*Situation 3:* In these communities, grass and/or sparse fuels surround structures. There is infrequent wind exposure, flat terrain with little slope and/or predominantly a north aspect. There is no large fire history and/or low fire occurrence. Fire fighting generally is highly effective.

**Risk Factor 2: Values at Risk**

*Situation 1:* This situation most closely represents a community in an urban interface setting. The setting contains a high density of homes, businesses, and other facilities that continue across the interface. There is a lack of defensible space where personnel can safely work to provide protection. The community watershed for municipal water is at high risk of being burned compared to other watersheds within that geographic region. There is a high potential for economic loss to the community and likely loss of housing units and/or businesses. There are unique cultural, historical or natural heritage values at risk.

*Situation 2:* This situation represents an intermix or occluded setting, with scattered areas of high-density homes, summer homes, youth camps, or campgrounds that are less than a mile apart. This situation would cover the presence of lands at risk that are described under State designations such as impaired watersheds, or scenic byways. There is a risk of erosion or flooding in the community if vegetation burns.

**Risk Factor 3: Infrastructure**

*Situation 1:* In these communities, there are narrow dead end roads, steep grades, one way in and/or out routes, no or minimal fire fighting capacity, no fire hydrants, no surface water, no pressure water systems, no emergency operations group, and no evacuation plan in an area surrounded by a fire-conductive landscape.

*Situation 2:* In these communities, there are limited access routes, moderate grades, limited water supply, and limited fire fighting capability in an area surrounded by a scattered fire conducive landscape.

*Situation 3:* In these communities, there are multiple entrances and exits that are well equipped for fire trucks, wide loop roads, fire hydrants, open water sources (pools, creeks, and lakes), an active emergency operations group, and an evacuation plan in place in an area surrounded by a fireproof landscape. The Secretaries will work collaboratively with States, Tribes, local communities, and other interested parties to develop a ranking process to focus fuel reduction activities by identifying communities most at risk. Public input is welcome on the form a ranking system should take, as is input on measures that may be useful to assess the impacts of fuels treatment projects.

In Morrow County, there is some critical infrastructure that provides to the viability of the county but couldn't be classified as a community or part of one either. The MCCWPP LCG decided the infrastructure was important enough to the County that it should be listed in this plan in table 6.2. The same risk factor definitions as used in Table 6.1 were used in Table 6.2 but instead of communities it was infrastructure.

**Table 6.2 Infrastructure-at-Risk Matrix**

<b>Infrastructure</b>	<b>Risk Factor Fire Behavior Potential</b>	<b>Risk Factor Value at Risk</b>	<b>Risk Factor Infrastructure</b>	<b>Composite Risk Priority</b>
Wind farm	3	2	2	Low/Moderate
Race Track	3	2	2	Low/Moderate
Poplar Plantations	3	2	2	Low/Moderate
Nature Conservancy	2	2	2	Moderate
PGE Coal Fire Plant	3	2	2	Low/Moderate
Willow Cr. Dam	A large catastrophic fire were to occur in the watershed above the dam, there could be large silt deposits against the dam reducing its' ability to function properly			
Heppner City Watershed	A large fire in the forested watershed for the city of Heppner could have detrimental effects on the quality of water being supplied to the City's residents			

The transportation system in Morrow County has lots of variance in quality. Interstate 84, four lane freeway, bisects the north end of the county west to east while throughout the county there are two lane paved roads/highways connecting communities along with single lane paved roads and maintained gravel roads connecting homesteads to the paved roads/highways. In the more remote areas of the county, mostly on the south end, there are single lane gravel and native surface roads that are frequently used, some of which are maintained year round while others are only maintained seasonally or not at all. Throughout the county there is risk of wildfire and a need for well maintained and identified transportation routes to evacuate communities in a timely manner. Table 6.3 lists the evacuation routes for Morrow County communities and the improvements that are needed to make them reliable when in need.

**Table 6.3 Evacuation Routes**

Road #	Road Name	Approx. Miles	Road Description	Road Improvements
670	Sunflower Flat Rd	10.3	Highway 207 to county line.	Pave 10.3 miles.
847	East of Morphine Ln (seasonal)	10.86	Highway 207 to Tupper lane.	Add 3" lift of gravel.
673	Tupper Ln (seasonal)	3.7	Sunflower Flat road to East of Morphine lane.	Clean ditches; add 3" lift of gravel.
703	Board Creek Rd	3.5	Sunflower Flat road to USFS road #033.	Clean ditches as needed.
697	Road Canyon Rd (seasonal)	9.2	Upper Rhea Creek road to USFS road #033.	Add 3" lift of gravel; add culverts as needed and clean ditches.
ODOT	Hwy 207	7	East of Morphine lane- North	
608	Upper Rhea Creek (1.5 miles is a road closure)	24.4	Highway 207 to coalmine Hill/Ditch Creek road.	Open 1.5 mile section of road closure by county court order; add 3" lift of gravel.
799	Ritter Rd (USFS 2104) (seasonal)	10.05	Coalmine Hill/Ditch Creek road to county line.	Add 6" lift of gravel over south 1.5 miles that is currently base rock and dirt.
849	Penland Ln (seasonal)	4.42	Coalmine Hill/Ditch creek road to USFS road #5321.	
USFS 5321	USFS 5321 (seasonal)	3	Penland lane to USFS road #53	
603	Coalmine Hill/Ditch Creek (seasonal)	6.19	Cutsforth park to Ritter road (USFS road #2104)	
678	Willow Creek Rd	20.65	Highway 207 to Cutsforth Park.	
684	Blake Ranch Rd (part seasonal)	6.9	Willow Creek road to Little Butter Creek road.	Add 3" lift of gravel and widen in a few places, add culverts as needed.
USFS 5300	Western Route Rd (seasonal)	23	Coalmine Hill/Ditch creek road to Ukiah.	

798	Shaw Grade (seasonal)	4.25	Willow Creek road to Arbuckle Mountain road.	Add 3" lift of gravel. Rock has been crushed, will put in place summer 2006
793	Little Butter Creek (part seasonal)	10	Highway 74 to Shaw Grade road.	Add 3" lift of gravel to 4.5 mile section, add base rock and gravel to 5.5 mile sec
USFS 5326	USFS road # 5326 (seasonal)	4	Arbuckle Mountain road to USFS road #53	
789	Hanna Arbuckle Rd (part seasonal- 4.49 miles)	9.81	Highway 74 to Blake Ranch road.	Add 3" lift of gravel and improve drainage on 4.49 mile section.
809	Ella Rd	8.8	Immigrant lane to Highway 74.	Widen and pave length restrictive corners (2.5 miles)
596	Tower Rd (south 1.5 miles is PGE private road)	10	I-84 to PGE Coal fire plant.	Chip seal south 2.5 miles
598	Kunze Ln	5.25	Tower road to south main street in Boardman.	Will be reconstructed in 2007-2008
584	South Main (Boardman)	1.2	I-84 to Kunze lane.	Will be reconstructed in 2007-2008
ODOT	I-84	8.5	Tower road to Highway 730	
ODOT	Hwy 730	10	I-84 to county line.	
930	Patterson Ferry Rd	5	Frontage lane to Columbia lane.	
728	Frontage Ln	1	I-84 to Poleline road.	
905	Poleline Rd	5	Frontage lane to Homestead lane.	Pave with hot mix.
559	Homestead Ln	4	Bombing Range road to Poleline road.	Pave with hot mix.
490	Bombing Range (N)	10.5	Highway 730 to Finley Butte landfill road.(Finley butte maintenance section)	Pave with hot mix.
759	Bombing Range (S)	9	Finley Butte landfill road to Highway 207.	Pave south 2.5 miles with hot mix.
630	Juniper Ln	7.77	Bombing Range road to lone-Boardman road.	Widen and pave 3.5 miles on west end.
663	Wells Spring Rd	2.5	Immigrant lane to Juniper lane.	Add 3" lift of gravel, improve drainage.
550	Immigrant Ln	5.5	Wells Spring road to Ella road.	Add 3" lift of gravel.
638	lone-Boardman Rd	5.88	Juniper lane to Ella road.	Widen, improve drainage and pave with hot mix.

**MORROW COUNTY COMMUNITY WILDFIRE PROTECTION PLAN ACTION PLAN & PRIORITIES**

<b>ACTIONS</b>	<b>PROJECTS</b>	<b>COMMUNITY</b>	<b>HAZARD RATING</b>	<b>PRIORITY</b>	<b>RESPONSIBLE AGENCY</b>	<b>YEAR 2006</b>	<b>YEAR 2007</b>	<b>YEAR 2008</b>
<b>FUEL HAZARD REDUCTION</b>								
<b>On Federal Lands</b>	<b>Black Mountain</b>	Cutsforth Park Blake's Addition	<b>Extreme</b>	<b>1</b>	<b>USFS</b>	<b>X</b>	<b>X</b>	<b>X</b>
	<b>Penland WUI</b>	<b>Penland Lake</b>	<b>Extreme</b>	<b>1</b>	<b>USFS</b>	<b>X</b>	<b>X</b>	<b>X</b>
	<b>Bombing Range Fuels Breaks</b>	<b>Bombing Range Boardman</b>	<b>Moderate</b>	<b>2</b>	<b>DOD</b>	<b>X</b>	<b>*</b>	<b>*</b>
<b>On Non-Federal Lands</b>	<b>Blake's Fuel Reduction</b>	Blake's Addition Cutsforth Park Penland Lake	<b>Extreme</b>	<b>1</b>	<b>ODF</b>	<b>X</b>	<b>*</b>	<b>*</b>
	<b>Reeds Mill Fuels Reduction</b>	Reed's Mill Anson Wright Park	<b>High</b>	<b>2</b>	<b>ODF</b>	<b>X</b>	<b>*</b>	<b>*</b>
	<b>OHV Park Fuels Reduction</b>	<b>OHV Park</b>	<b>High</b>	<b>2</b>	<b>ODF &amp; County</b>	<b>*</b>	<b>*</b>	<b>*</b>
	<b>Water Source Development</b>	<b>Several Communities</b>	<b>High</b>	<b>1</b>	<b>ODF, Landowners, County</b>	<b>*</b>	<b>*</b>	<b>*</b>
<b>Defensible Space</b>	<b>Blake's Addition</b>	Blake's Addition Cutsforth Park	<b>Extreme</b>	<b>1</b>	<b>ODF &amp; Landowners</b>	<b>X</b>	<b>*</b>	<b>*</b>
	<b>Penland Lake</b>	<b>Penland Lake</b>	<b>Extreme</b>	<b>1</b>	<b>ODF &amp; Landowners</b>	<b>X</b>	<b>*</b>	<b>*</b>
	<b>Reeds Mill/ Anson Wright</b>	Reeds Mill Anson Wright	<b>High</b>	<b>2</b>	<b>ODF &amp; Landowners</b>	<b>X</b>	<b>*</b>	<b>*</b>
<b>Safety Corridors</b>	<b>Sunflower Flat</b>	<b>Several Communities</b>	<b>High</b>	<b>2</b>	<b>ODF &amp; FS</b>	<b>*</b>	<b>*</b>	<b>*</b>

<b>ACTIONS</b>	<b>PROJECTS</b>	<b>COMMUNITY</b>	<b>HAZARD RATING</b>	<b>PRIORITY</b>	<b>RESPONSIBLE AGENCY</b>	<b>YEAR 2006</b>	<b>YEAR 2007</b>	<b>YEAR 2008</b>
	USFS 53 Rd	Several Communities	High	2	ODF & FS	*	*	*
<b>SAFETY CORRIDORS</b>	Willow Cr	Several Communities	High	2	ODF & FS	*	*	*
	Hwy 207	Several Communities	High	2	ODF & FS	*	*	*
	USFS 21 Rd	Several Communities	High	2	FS	*	*	*
<b>STRATEGIC COMMUNITY FIRE BREAKS</b>	See Safety Corridors above.					*	*	*
<b>PUBLIC INFORMATION</b>								
Signing	Fire Prevention Signing, seasonally as appropriate	All	n/a	1	All	#	#	#
Media Contacts		All	n/a	1	All	#	#	#
Grade School presentation		All	n/a	1	Fire Prevention Coop	#	#	#
Outdoor School presentations		All	n/a	1	All	#	#	#
Civic Group presentations		All	n/a	1	All	#	#	#
Landowner contacts		All	n/a	1	ODF, Comm. , Rural	#	#	#
Fair displays		All	n/a	1	Fire Prevention Coop	#	#	#
Fire Free training		All	n/a	1	Fire Prevention Coop	#	#	#
Fire Prevention Newspaper Insert		All	n/a	1	Fire Prevention	#	#	#

<b>ACTIONS</b>	<b>PROJECTS</b>	<b>COMMUNITY</b>	<b>HAZARD RATING</b>	<b>PRIORITY</b>	<b>RESPONSIBLE AGENCY</b>	<b>YEAR 2006</b>	<b>YEAR 2007</b>	<b>YEAR 2008</b>
					Coop			
<b>STRUCTURE IGNITABILITY</b>		All	n/a	1				
Burning Permits		All	n/a	1	ODF, City, Rural	#	#	#
Notifications of Operation		All	n/a	1	ODF	#	#	#
Building Permit Review		All	n/a	1	County Fire Chiefs	#	#	#
Permitting		All	n/a	1	County Planning	#	#	#
Enforcement		All	n/a	1	ODF, City, Rural, Sheriff, Fire Chief	#	#	#

X Funded

\* Pending Funding

# On going

**Priorities: 1 (Highest), 2 (Moderate), 3 (Lower)**

## **City of Boardman Stakeholder Interview Summary**

Interview with Mayor, Community Development Director and Public Works Director – July 20, 2006

Staff interviewed Mayor Rex Mather, Community Development Director Barry Beyeler, and David Winters, Public Works Director. As staff introduced the five Community Asset Functions (Human Population, Economic Assets, Cultural & Historic Resources, Infrastructure & Critical Facilities, and Environmental Assets) Mr. Mather, Beyeler and Winters discussed the features, assets or resources of each category, shared Boardman's assets with Planning Staff and entered the information on a map with different colored markers indicating separate Asset Functions. The eight natural hazards analyzed in the Plan were discussed in context with the Community Asset Functions as well. The following are the important aspects of each category and how the natural hazards may affect them:

- **Human Population**  
There is a fairly high percentage of Hispanics in Boardman (50% - 2000 Census), which may affect communication especially during windstorm and winter storm events. Boardman does not have an assisted living facility but does have a senior center next to the City Hall. There is a tourism element along the river at the Boardman Park and Marina.
- **Economic Assets**  
During times of power outages or a threatened power outage, the local population may utilize the Boardman markets for battery, water, ice, food, and fuel needs. Other assets listed are the Interstate I-84 Interchange and the Port Industrial Area.
- **Cultural & Historic Resources**  
The assets listed are: the Heritage Trail and the Gazebo located at the interchange of Interstate I-84 and Main Street.
- **Infrastructure & Critical Facilities**  
The listed facilities are two water collection systems which supply the City with water, schools, Boardman Rural Fire Protection District facilities, Boardman Police Department, sewer system and boosters, and City Hall.
- **Environmental Assets**  
Boardman has the large Park and Marina on the Columbia River and three smaller parks within the City limits. Boardman also contains wetlands listed on the National Wetlands Inventory and a designated wellhead protection area.

Windstorm and winter storm have the most impact on the City. During these events the City loses trees and may have issues with local transportation blockages and tree damages to private and public property. There are no significant issues with flooding, earthquake, volcano, landslides, wildfire, and drought. Two Action Items were submitted having to do with the need for backup generation for the water system and the sewage system.



## **City of Heppner Stakeholder Interview Summaries**

### **Summary of the Heppner Flash Flood Exercise**

#### Interview with City Manager– June 26, 2006

Staff interviewed David DeMayo, Heppner City Manager. As staff introduced the five Community Asset Functions (Human Population, Economic Assets, Cultural & Historic Resources, Infrastructure & Critical Facilities, and Environmental Assets) Mr. DeMayo discussed the features, assets or resources of each category, shared Heppner's assets with Planning Staff and entered the information on a map with different colored markers indicating separate Asset Functions. The eight natural hazards analyzed in the Plan were discussed in context with the Community Asset Functions as well. The following are the important aspects of each category and how the natural hazards may affect them in Heppner:

- **Human Population**  
There is a fairly homogeneous population in Heppner (96.7% white - 2000 Census), which is distributed across the age categories as follows: 24.5% under the age of 18; 5.9% from ages 18 to 24; 24.3% from ages 25 to 44; 24.9% from ages 45 to 64; and 20.3% who were 65 years of age or older. Heppner has a senior center, an Assisted Living facility and a 12 bed hospital.
- **Economic Assets**  
Heppner hosts local and state governmental offices, which include the Morrow County government, the City of Heppner, and regional offices of the Natural Resource Conservation Service (NRCS), Oregon Department of Transportation (ODOT), and the United States Forest Service (USFS). Heppner has a traditional downtown area and is also the crossroads in the southern portion of the County for agricultural products being transported to market in the wider region and the Heppner economy reflects this agricultural/governmental identity.
- **Cultural & Historic Resources**  
The most significant cultural and historic resource in Heppner is listed as the County museum, which contains historical information about all of the County and the cities, including records of natural disasters. Heppner has three buildings listed on the National Register of Historic Places: The County Courthouse, the Gilliam & Bisbee Building, and the Heppner Hotel. Heppner has two annual celebrations: The St. Patrick's celebration in March, and the Morrow County Fair and Rodeo in August.
- **Infrastructure & Critical Facilities**  
The Willow Creek Dam, which lies above Heppner to hold back flood water and provides recreation opportunities, is among the most significant critical facilities in Heppner. Also listed are the schools, the Kinzua Mill site, the downtown area, the water and sewer system, the Heppner Fire Department, and the Hospital. The Emergency Operations Center, operated by the CSEPP program's Emergency Managers, and the Morrow County Sheriff's Department is also within the Heppner City limits.
- **Environmental Assets**  
Heppner offers recreation in the City Park, which has a swimming pool. The Willow Creek Golf Course and the Willow Creek Reservoir offer water sports

activities. Other significant land uses in the area are agriculture and timber industries, forest recreation and open space. The Blue Mountain Scenic Byway goes through Heppner.

Flash flooding has the most impact on the City. During these events the City could lose lives, houses, businesses and infrastructure as the flood waters rage through the downtown area. The City has a Flash Flood Plan, included in Appendix B, to help mitigate and plan for flash flood emergencies. There are no significant issues with the following natural hazards: earthquake, volcano, landslides, wildfire, windstorm and winterstorms. Drought affects the local economy in that the hardships of the agricultural economy are reflected in the local economy in general. The Action Items for Heppner were submitted after the Flash Flood Exercise (see below).

#### Informational Session with the Heppner Chamber of Commerce – August 7, 2006

Staff presented the Pre-disaster Mitigation Plan process to the full Heppner Chamber of Commerce. The Chamber was introduced to the risks that are being analyzed and work County Staff, the Steering Committee, the Stakeholders, and the City of Heppner had already accomplished. The Chamber was informed as to how the members could participate and what Action Items are, including how the Pre-disaster Mitigation Plan could benefit Heppner and all of Morrow County. The Board asked about the role of Emergency Management in this process and did not offer any new Action Items for inclusion in the Plan.

#### Heppner Flash Flood Exercise – July 18, 2006

The Morrow County Emergency Managers, directed by Casey Beard, hosted the Flash Flood Exercise. In a flash flood emergency the incident commander is to be the Fire Chief of the Heppner Fire Department. There are five levels of flood warning, and in an extreme flash flood emergency the population in Heppner could have only 20 minutes from initial siren warning (level 4) to life threatening flooding (level 5). When the siren warning sounds, the population in the flood risk area (which could number 300 to 400 persons) is to head immediately for high ground. There are four rally points for the evacuated population: the high school, the Columbia Basin Electric Co-op building, the U.S. Army Corp of Engineers building, and the Morrow County Annex. Staff identified three Action Items discussed during the course of the exercise. They are the need for:

- trained Red Cross Volunteers;
- improved and continuous public education as to flash flood response; and
- improved short-range communication between the City, Fire Department, Emergency Managers, and the rally points.

## City of Lone Stakeholder Interview Summary

### Interview with City of Lone Mayor – July 10, 2006

Staff interviewed Mark Bruno, City of Lone Mayor. As staff introduced the five Community Asset Functions (Human Population, Economic Assets, Cultural & Historic Resources, Infrastructure & Critical Facilities, and Environmental Assets) Mr. Bruno discussed the features, assets or resources of each category, shared Lone's assets with Planning Staff and entered the information on a map with different colored markers indicating separate Asset Functions. The eight natural hazards analyzed in the Plan were discussed in context with the Community Asset Functions as well. The following are the important aspects of each category and how the natural hazards may affect Lone:

- **Human Population**  
There is a fairly homogeneous population in Lone (97.8% white - 2000 Census) The age distribution, as of the 2000 Census is: 28.3% under the age of 18; 5.6% from ages 18 to 24; 29.6% from ages 25 to 44; 20.6% from ages 45 to 64; and 15.9% who were 65 years of age or older. The population is about 340 persons and does not have specific special needs populations. Nevertheless, over fifteen percent of the population (54 persons) is over the age of 65 and almost thirty percent (96 persons) is under the age of 18. The 150 young and old in Lone could be at risk in the event of a flash flood emergency.
- **Economic Assets**  
Lone has two restaurants, one store, a gas station and bank. The local Grain Growers Co-op operates a fertilizer plant and the Lone School District employs a significant number of people in the Lone area. Lone has a small downtown area and is also the meeting place for farmers in the area. Lone has an agricultural based economy as it is surrounded by dryland and irrigated farms.
- **Cultural & Historic Resources**  
The features that make Lone unique are the buildings that make up the heart of Lone, to include: The Woolery House Bed and Breakfast, Collier's Market, the Railroad Barn and the City Hall building. The Blue Mountain Scenic Byway runs by Lone on State Highway 74.
- **Infrastructure & Critical Facilities**  
Lone has a school, the volunteer Lone Rural Fire Protection building, City Hall, two wells and two water reservoirs. Included in the critical facilities is the existing drainage ditch that allows floodwaters to flow through the City Park and helps keep the floodwaters away from the housing area to the south.
- **Environmental Assets**  
Lone has two city parks: Mullin's Park and the City Park. The City Park is located next to State Highway 74 and hosts the annual 4<sup>th</sup> of July festivities. The significant land uses in the area are dryland and irrigated farming.

The drainages of Rietmann Canyon and Lorraine Creek are not controlled and enter Lone as a floodway. This floodway and the floodplain and floodway of Willow Creek indicate a significant potential for flash flooding in Lone. According to the Mayor there is a history of the water flooding the local businesses and homes. The existing flood control system in Lone is not adequate to control flooding. Presently, when water runoff occurs

in lone from the north, the water drains through the drainage ditch until it reaches the area around the intersection of Main Street and Green Street. There it pours over the street and is pumped with a portable pump and hose by the local citizens who notice the water accumulating. Gooseberry Road, a County road, then acts as a dam and keeps the water from draining and must be similarly pumped across the County road into a low area where it eventually reaches Willow Creek.

The City of lone requires Burning Permits within the City limits. If a person in lone burns without a Burn Permit that person becomes liable for the Fire District response costs. This prospect has reduced unpermitted burning in lone such that the incidence of uncontrolled fires is significantly reduced.

Drought has a profound affect on lone in that the hardships of the agricultural economy are reflected in the local economy in general. There are no significant issues with the remaining natural hazards: earthquake, volcano, landslides, windstorm and winterstorms.

The City of lone submitted two Action Items:

- The need for a simple and effective flood control system; and
- The need for education/training for City officials concerning floodplain, floodway development.

## **City of Irrigon Stakeholder Interview Summaries**

### Interview with City Manager and Public Works Director – July 24, 2006

Staff interviewed Jerry Breazeale, City Manager and Keith White, Public Works Director. As staff introduced the five Community Asset Functions (Human Population, Economic Assets, Cultural & Historic Resources, Infrastructure & Critical Facilities, and Environmental Assets) Jerry and Keith discussed the features, assets or resources of each category, shared Irrigon's assets with Planning Staff and entered the information on a map with different colored markers indicating separate Asset Functions. The eight natural hazards analyzed in the Plan were discussed in context with the Community Asset Functions as well. The following are the important aspects of each category and how the natural hazards may affect them:

- **Human Population**  
There is a fairly high percentage of Hispanics in Irrigon (27% - 2000 Census), This may affect communication especially during windstorm and winter storm events. The elderly and disabled population is also considered fairly significant.
- **Economic Assets**  
During times of power outages or a threatened power outage, the local population may utilize the Irrigon grocery/gas station (Huwe's) for battery, water, ice, food, and fuel needs. There was consensus that this local market should be a critical economic asset for Irrigon. In addition to Huwe's, they listed other local restaurants and the bank.
- **Cultural & Historic Resources**  
The assets listed are: the Heritage Trail, The Oregon Trail spur, Sand Island (location of an encampment of the Lewis and Clark Expedition, now inundated), and the local cemeteries.
- **Infrastructure & Critical Facilities**  
The facilities listed are: two water wells and booster stations which supply the City with water, schools, Irrigon Medical Clinic, Irrigon Rural Fire Protection District facilities, sewer system and boosters, and City Hall.
- **Environmental Assets**  
Irrigon has two parks, which include the park and marina on the Columbia River and the City Park on Main Street, which fronts State Highway 730.

Windstorm and winter storm have the most impact on the City. During these events the City loses trees and may have issues with local transportation blockages and tree damages to private and public property. There are no significant issues with flooding, earthquake, volcano, landslides wildfire, and drought. Two Action Items were submitted having to do with the need for backup generation for the water system and the sewage system.

### Interview with the Irrigon Chamber of Commerce Board of Directors – August 2, 2006

Staff interviewed Laura Clark, John Sebastian, Patti Burres, Rhiannan Zahn, and Donna Eppenbach. As staff introduced the five Community Asset Functions (Human Population, Economic Assets, Cultural & Historic Resources, Infrastructure & Critical Facilities, and Environmental Assets), and the map and information already provided by

the City Manager and Public Works Director, the Board discussed the features, assets or resources of each category. The Board added the following information:

- **Human Population**  
Due to CSEPP preparation for a chemical disaster, the community has evacuation transportation available in emergencies.
  
- **Economic Assets**  
Irrigon is a bedroom community of the larger economic region and does not have many economic assets, but there are various home based businesses, the post office and the local fruit stands in addition to the assets mentioned above.
  
- **Cultural & Historic Resources**  
The Watermelon Festival in July, the Paterson Ferry dock, the old train docking area, and the Fishing Derby in August are in addition to the assets listed above.
  
- **Infrastructure & Critical Facilities**  
The Chamber felt that the churches should be listed as critical facilities due to probability that they would provide food to persons in need during times of emergency.

The Board submitted one Action Item for inclusion in the Plan. It is in response to drought and wildfire mitigation and involves inclusion and development of the vacant land west of the marina into the existing park and marina.

## **Town of Lexington Stakeholder Interview Summary**

### Interview with Town of Lexington Representative – June 26, 2006

Staff interviewed Jean Brazell, Town Representative. As staff introduced the five Community Asset Functions (Human Population, Economic Assets, Cultural & Historic Resources, Infrastructure & Critical Facilities, and Environmental Assets) Ms. Brazell discussed the features, assets or resources of each category, shared Lexington's assets with Planning Staff and entered the information on a map with different colored markers indicating separate Asset Functions. The eight natural hazards analyzed in the Plan were discussed in context with the Community Asset Functions as well. The following are the important aspects of each category and how the natural hazards may affect them:

- **Human Population**  
There is a fairly homogeneous population in Lexington (96.9% white - 2000 Census) The population is about 260 persons and does not have specific special needs populations. Nevertheless, sixteen percent of the population (42 persons) is over the age of 65 and twenty-four percent (62 persons) is under the age of 18. The 104 young and old in Lexington could be at risk in the event of a flash flood emergency.
- **Economic Assets**  
Lexington has the Morrow County Grain Growers complex, an airport, gas station, Lexington Machine and Welding, the Morrow County Public Works office, and the Morrow County School District office. Lexington is the crossroads between the east-west and north-south routes in Morrow County. Lexington has an agricultural based economy as it is surrounded by dryland and irrigated farms.
- **Cultural & Historic Resources**  
A mammoth tusk was unearthed in the Lexington area and can be seen in the Morrow County historical museum in Heppner. Lexington also has a historical marker, the Lexington Cemetery and the old telephone building as historic resources. The Blue Mountain Scenic Byway runs by Lexington on State Highway 74.
- **Infrastructure & Critical Facilities**  
Lexington has a water well and storage system, a fire department, school district offices, airport, city offices and the Blackhorse Ditch flood control system. Lexington also has a CenturyTel and Windwave telecommunications system in the area.
- **Environmental Assets**  
Lexington has a park, the "Chili Bow," a dirt bike park, and a park at the Oddfellows Lodge. Willow Creek flows through the Town and the surrounding area is dryland and irrigated farms.

Flooding on the Willow Creek drainage has the potential to disrupt the lives of Lexington residents although Willow Creek Dam has mitigated catastrophic flooding events originating from Willow Creek and Balm Fork above Heppner. Lexington lies in the Willow Creek flood plain and could experience flooding from localized flash flood events closer to the Town.

Drought has a profound affect on Lexington in that the hardships of the agricultural economy are reflected in the local economy in general. There are no significant issues with the remaining natural hazards: earthquake, volcano, landslides, wildfire, windstorm and winterstorms.

The Town of Lexington submitted three Action Items:

- The need an alarm for their water supply system and their back up supply;
- The need for flood control work from Clay Street to F Street which floods during rain events; and
- The need for an emergency operations area for the city office, which is in the flood plain.



# **Appendix A**

## **MCCWPP Local Coordination Group Participants**

# LCG Participants:

Terry Tallman; Morrow County Judge

Dustin Gustaveson; Oregon Department of Forestry

Dale Boyd; USFS Umatilla National Forest

Burke O'Brien; Morrow County Public Works

Sandi Putman; Morrow County Public Works

Jim Stearns; Area 9 Fire Defense Board Chief,

Representing the Oregon State Fire Marshall's Office

Casey Beard; Morrow County Emergency Management

Steve Rhea; Heppner Fire Department Assistant Chief

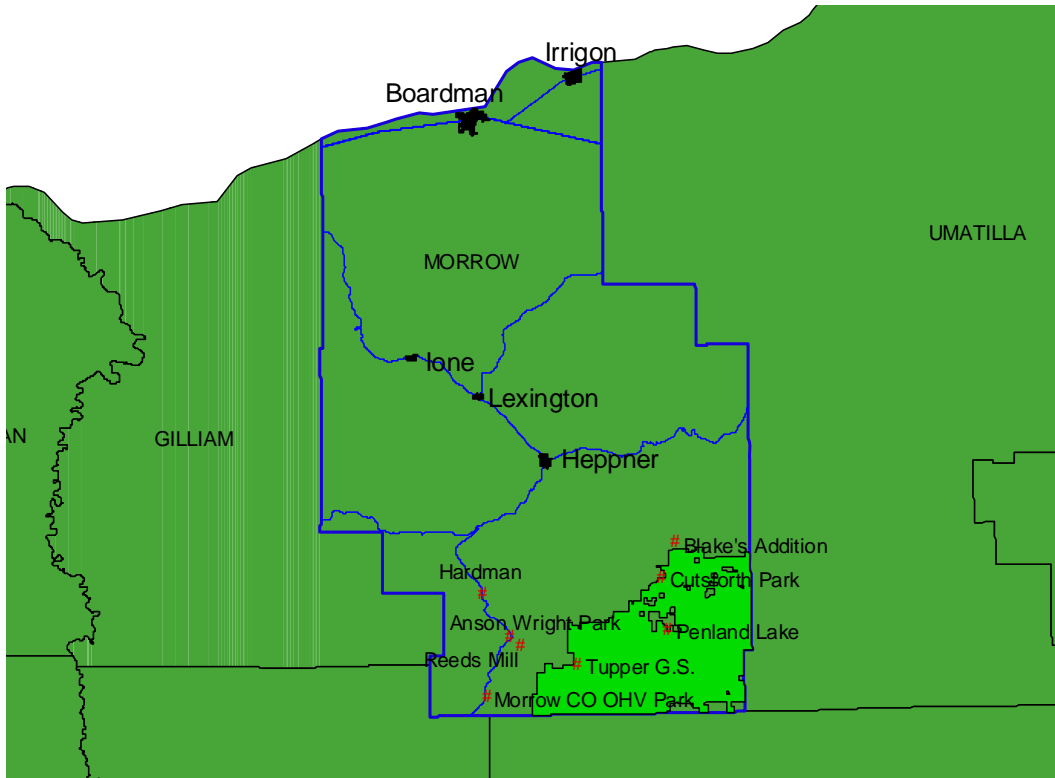
Richard Melaas; DOD Navy Whidbey Island

William McCaffrey; Oregon National Guard

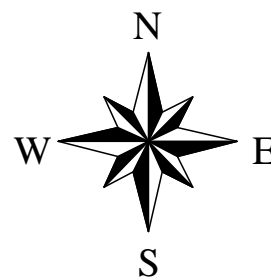
# Appendix B

## MAPS

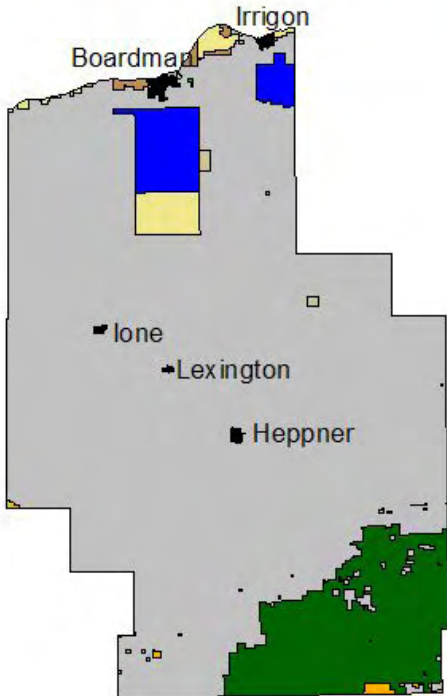
# Morrow County Cities and Communities



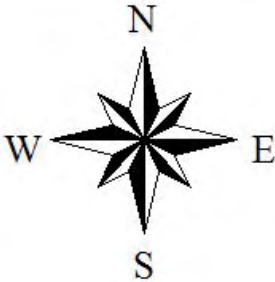
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- ▬ Highways
- USFS Umatilla NF
- ▭ Morrow County
- County.shp



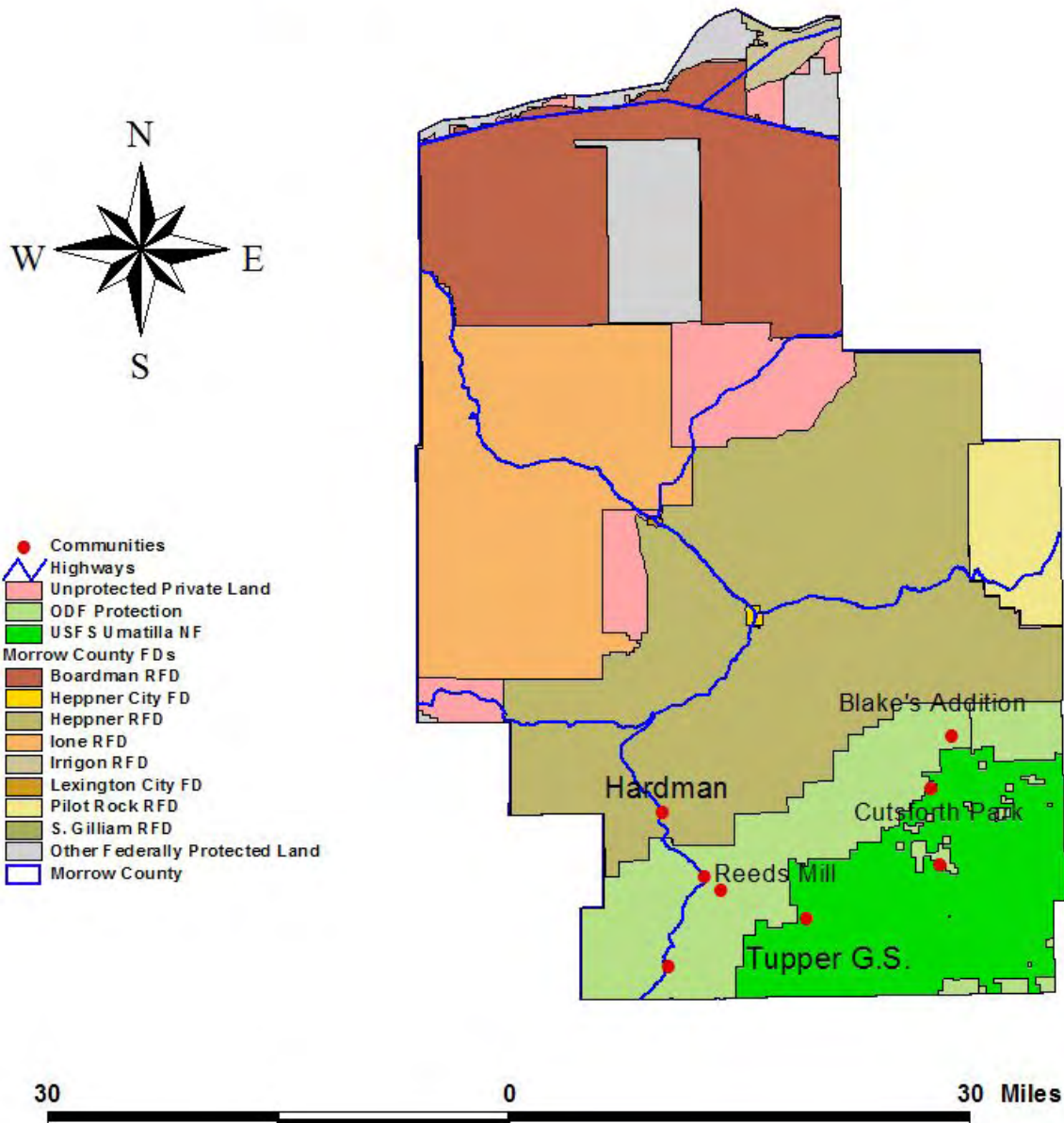
# Morrow County Land Management



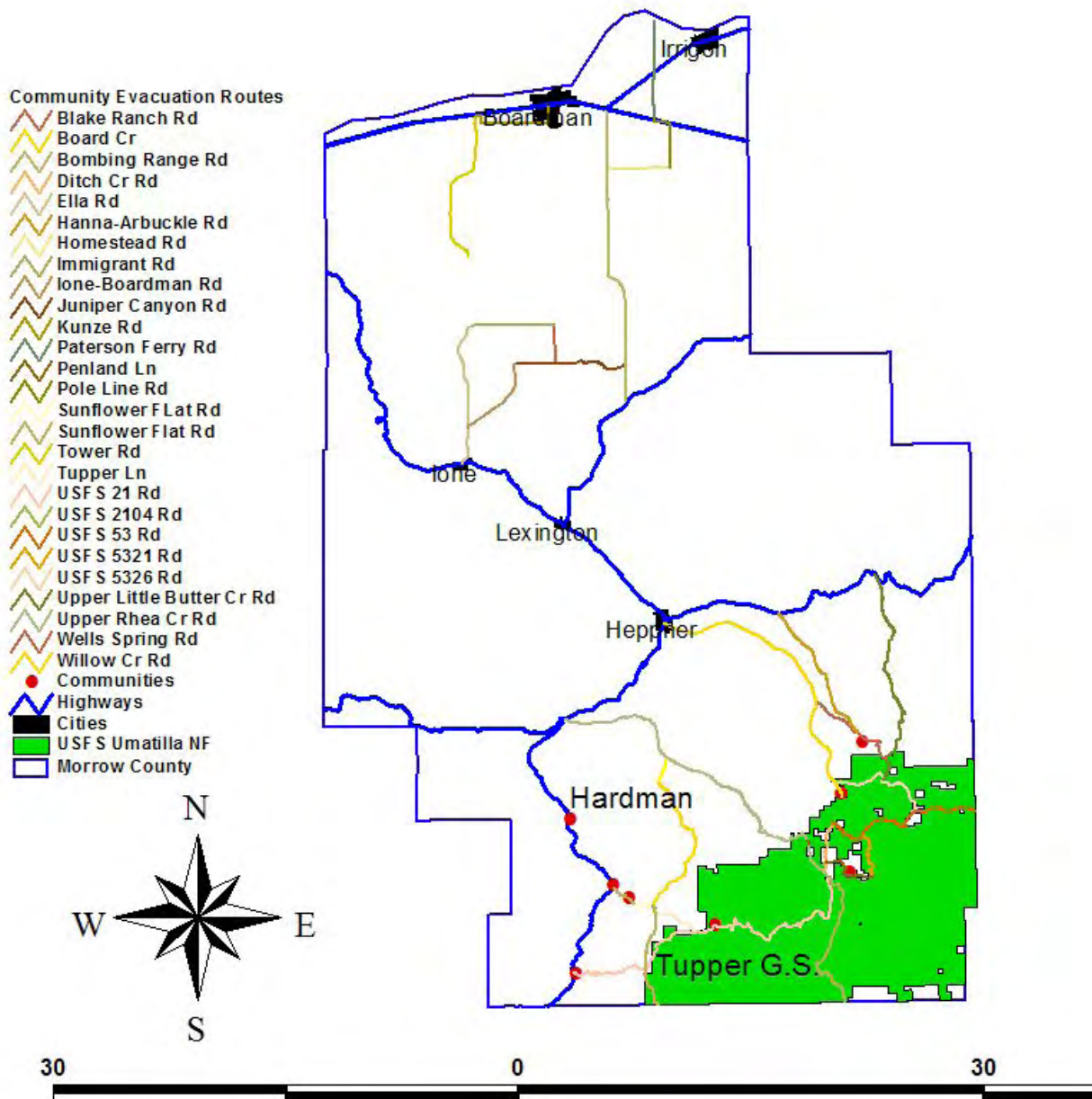
- Cities
- Land Management
  - Bureau of Land Management
  - Bureau of Reclamation
  - Department of Defense
  - Oregon Department of Fish and Wildlife
  - Oregon Department of State Lands
  - Private
  - United States Corps of Engineers
  - United States Department of Agriculture Forest Service
  - United States Fish and Wildlife Service



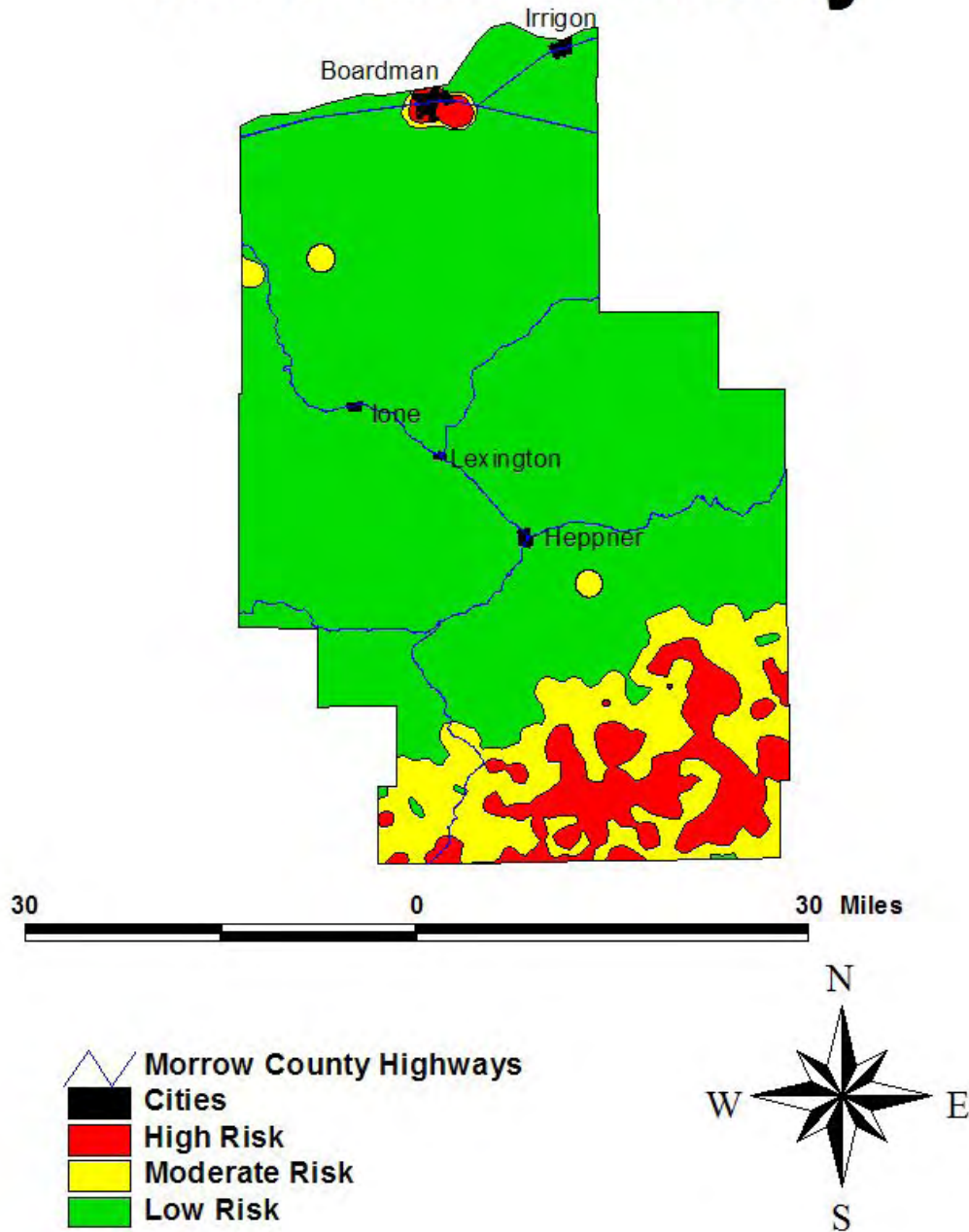
# Morrow County Fire Protection



# Morrow County Community Evacuation Routes

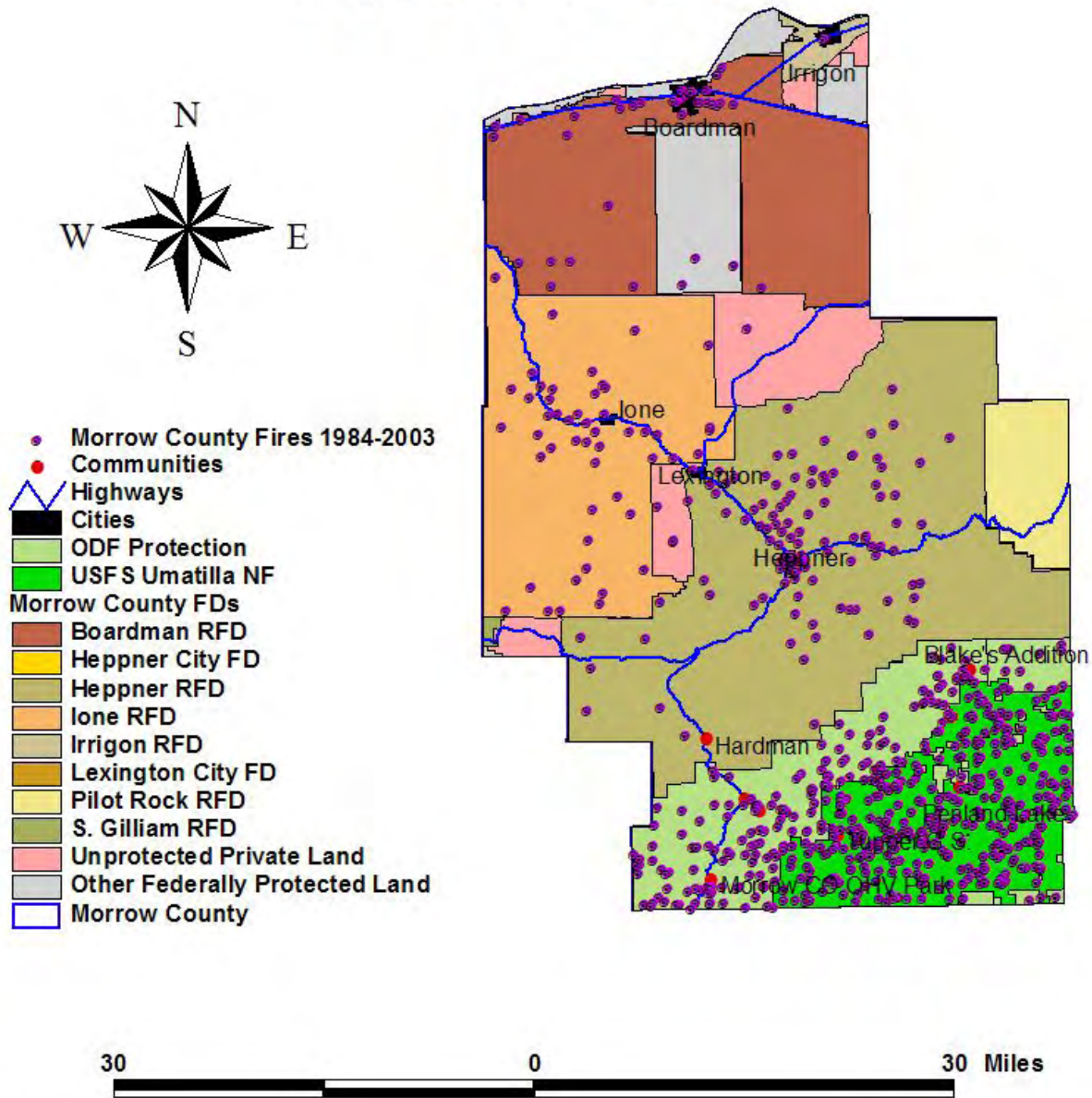


# Risk of Fire Occurance in Morrow County

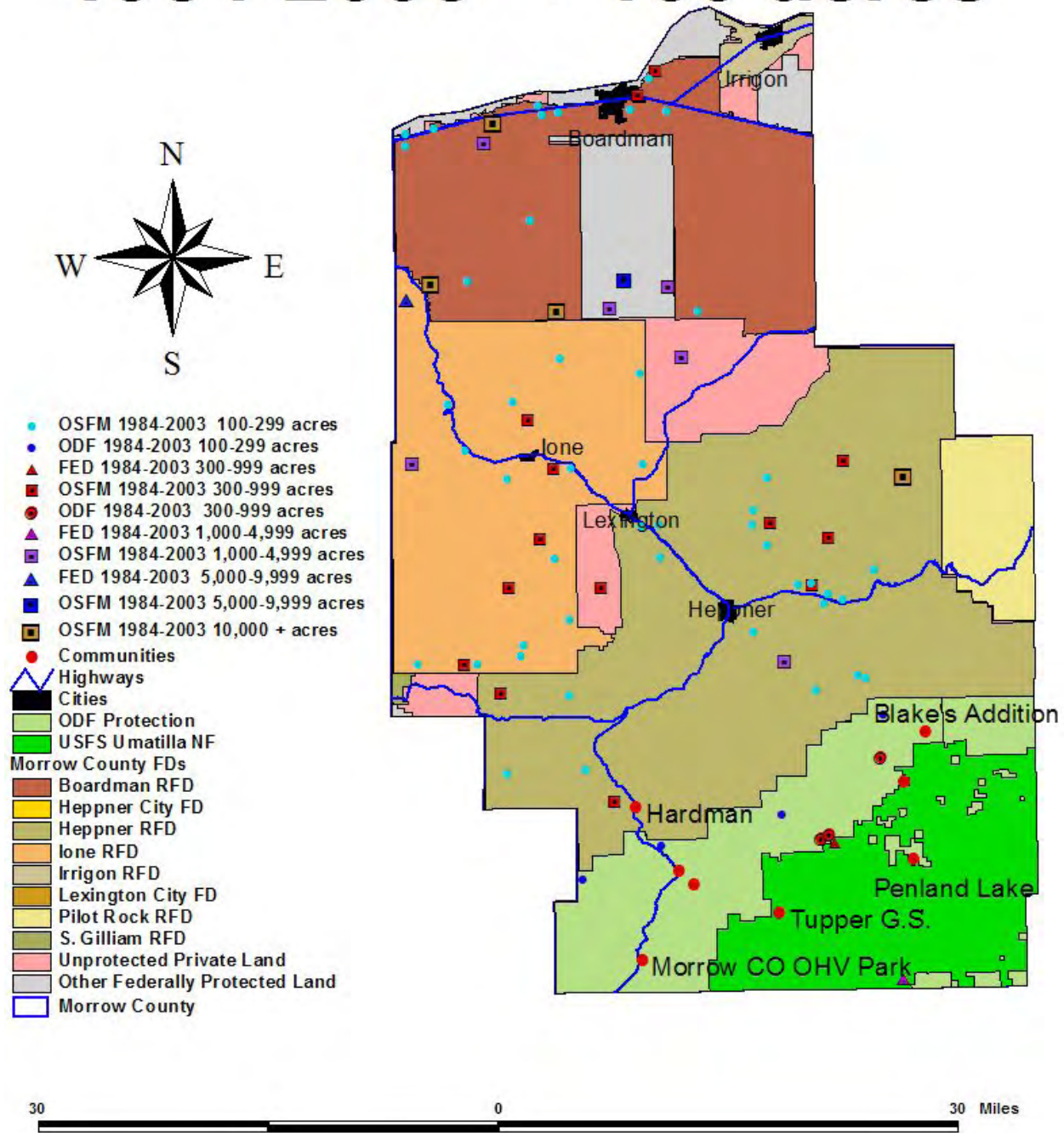


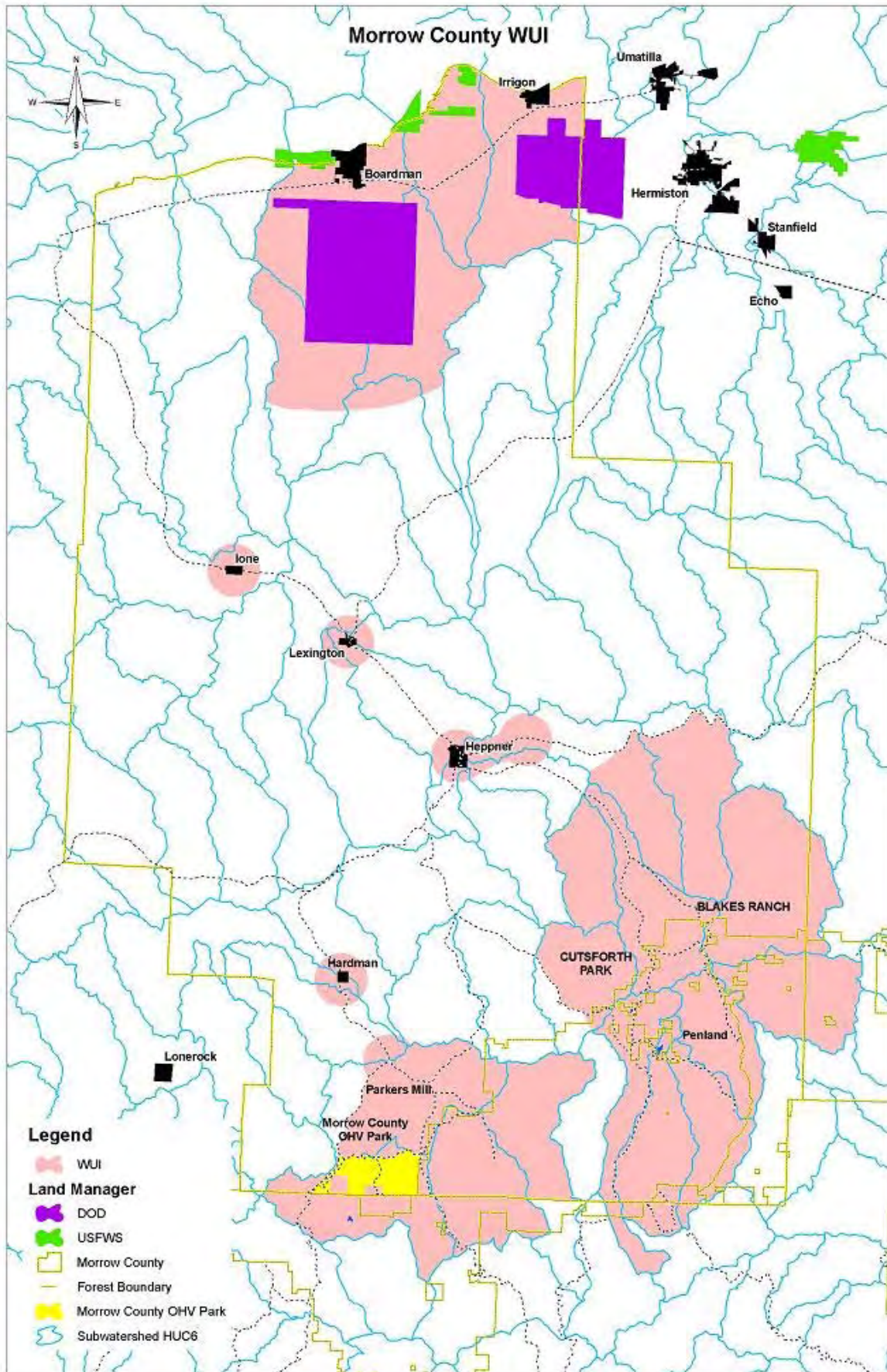


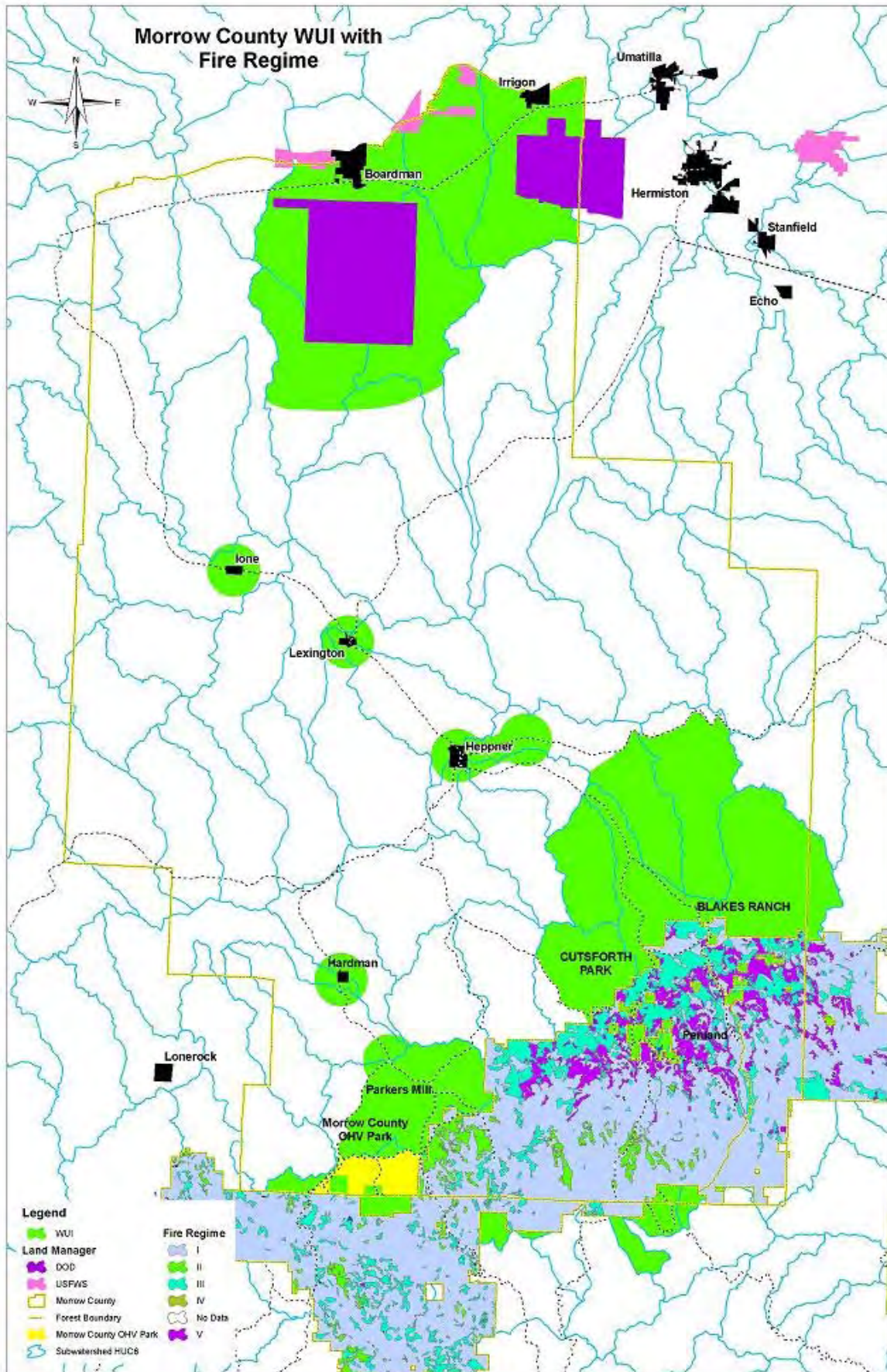
# Historic Fires 1984-2003

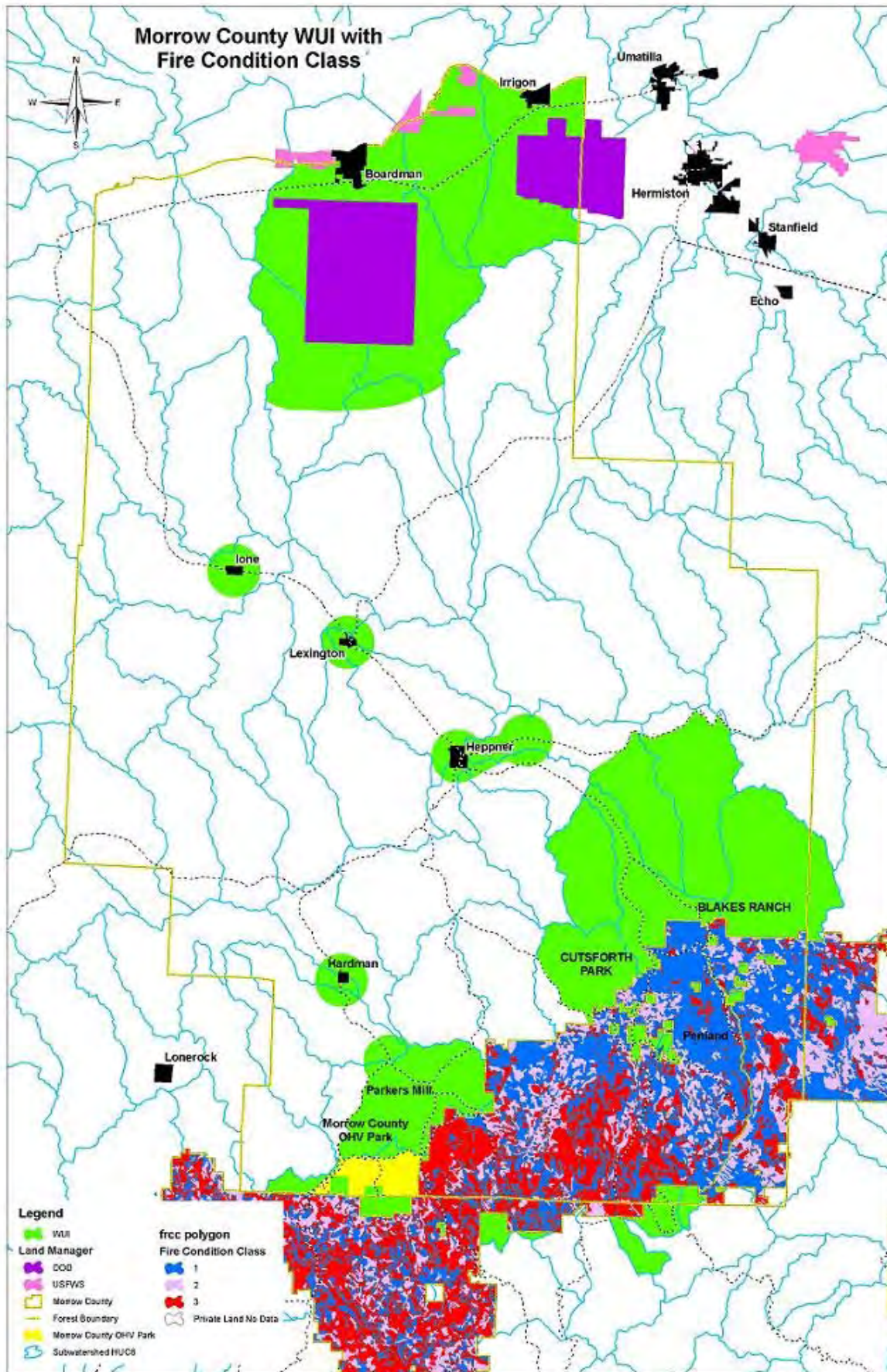


# Historic Large Fires 1984-2003 >100 acres









# Appendix C

## Glossary

# Glossary

**Definitions and Policies** - This section provides a summary of policies and definitions of Communities at Risk, wildland urban interface, and defensible space.

<b>Wildfire Risk Assessment</b>	
<b>Policy/Source</b>	<b>Definition</b>
Fire Plan	<p><b>Risk:</b> the potential and frequency for wildfire ignitions (based on past occurrences)</p> <p><b>Hazard:</b> the conditions that may contribute to wildfire (fuels, slope, aspect, elevation and weather)</p> <p><b>Values:</b> the people, property, natural resources and other resources that could suffer losses in a wildfire event.</p> <p><b>Protection Capability:</b> the ability to mitigate losses, prepare for, respond to and suppress wildland and structural fires.</p> <p><b>Structural Vulnerability:</b> the elements that affect the level of exposure of the hazard to the structure (roof type and building materials, access to the structure, and whether or not there is defensible space or fuels reduction around the structure.)</p>
<b>Communities at Risk</b>	
<b>Policy/Source</b>	<b>Definition</b>
Healthy Forests Restoration Act	<p>Title I – Hazardous Fuel Reduction on Federal Land, SEC. 101. Definitions:</p> <p>(1) AT-RISK COMMUNITY.—The term “at-risk community” means an area—</p> <p>(A) that is comprised of— (i) an interface community as defined in the notice entitled “Wildland Urban Interface Communities Within the Vicinity of Federal Lands That Are at High Risk From Wildfire” issued by the Secretary of Agriculture and the Secretary of the Interior in accordance with title IV of the Department of the Interior and Related Agencies Appropriations Act, 2001 (114 Stat. 1009) (66 Fed. Reg. 753, January 4, 2001); or (ii) a group of homes and other structures with basic infrastructure and services within or adjacent to Federal land;</p> <p>(B) in which conditions are conducive to a large-scale wildland fire disturbance event;</p> <p>(C) for which a significant threat to human life or property exists as a result of a wildland fire disturbance event.</p>
National Association of State Foresters Identifying and Prioritizing Communities at Risk	<p>In June 2003, the National Association of State Foresters developed criteria for identifying and prioritizing communities at risk. Their purpose was to provide national, uniform guidance for implementing the provisions of the “Collaborative Fuels Treatment Program.” The intent was to establish broad, nationally compatible standards for identifying and prioritizing communities at risk, while allowing for maximum flexibility at the state and regional level.</p> <p>NASF defines ‘Community at Risk’ as “a group of people living in the same locality and under the same government” (<i>The American Heritage Dictionary of the English Language</i>, 1969). They also state that ‘a community is considered at risk from wildland fire if it lies within the wildland/urban interface as defined in the federal register (<i>FR Vol. 66, No. 3, Pages 751-154, January 4, 2001</i>).’</p> <p>NASF suggests identifying communities at risk on a state-by-state basis with the involvement of all organizations with wildland fire protection responsibilities (state, local, tribal, and federal) along with other interested cooperators, partners, and stakeholders. They suggest using the 2000 census data (or other suitable means) identify all communities in the state that are in the wildland urban interface and that</p>

	are at risk from wildland fire, regardless of their proximity to federal lands.
Federal Register /Vol.66, No.160 /Friday, August 17, 2001 /Notices	<p>In January 2001, then Agriculture Secretary Dan Glickman and Interior Secretary Bruce Babbitt released a proposed list of communities eligible for enhanced federal wildfire prevention assistance. The preliminary list of over 4000 communities included many that are near public lands managed by the federal government. The initial definition of urban wildland interface and the descriptive categories used in this notice are modified from “A Report to the Council of Western State Foresters—Fire in the West—The Wildland/Urban Interface Fire Problem” dated September 18, 2000. Under this definition, “the urban wildland interface community exists where humans and their development meet or intermix with wildland fuel.”</p> <p>There are three categories of communities that meet this description. Generally, the Federal agencies will focus on communities that are described under categories 1 and 2. For purposes of applying these categories and the subsequent criteria for evaluating risk to individual communities, a structure is understood to be either a residence or a business facility, including Federal, State, and local government facilities. Structures do not include small improvements such as fences and wildlife watering devices.</p> <p><b>Category 1. Interface Community:</b> The Interface Community exists where structures directly abut wildland fuels. There is a clear line of demarcation between residential, business, and public structures and wildland fuels. Wildland fuels do not generally continue into the developed area. The development density for an interface community is usually 3 or more structures per acre, with shared municipal services. Fire protection is generally provided by a local government fire department with the responsibility to protect the structure from both an interior fire and an advancing wildland fire. An alternative definition of the interface community emphasizes a population density of 250 or more people per square mile.</p> <p><b>Category 2. Intermix Community:</b> The Intermix Community exists where structures are scattered throughout a wildland area. There is no clear line of demarcation; wildland fuels are continuous outside of and within the developed area. The development density in the intermix ranges from structures very close together to one structure per 40 acres. Fire protection districts funded by various taxing authorities normally provide life and property fire protection and may also have wildland fire protection responsibilities. An alternative definition of intermix community emphasizes a population density of between 28–250 people per square mile.</p> <p><b>Category 3. Occluded Community:</b> The Occluded Community generally exists in a situation, often within a city, where structures abut an island of wildland fuels (e.g., park or open space). There is a clear line of demarcation between structures and wildland fuels. The development density for an occluded community is usually similar to those found in the interface community, but the occluded area is usually less than 1,000 acres in size. Fire protection is normally provided by local government fire depts.</p>
A Definition of Community, James A. Kent / Kevin Preister	“A community is a geographic place that is characterized by natural systems such as watersheds, cultural attachment and human geographic boundaries. Physical, biological, social, cultural, and economic forces create natural boundaries that distinguish one community from another. The importance is in recognizing the unique beliefs, traditions, and stories that tie people to a specific place, to land and to social/kinship networks. It is a naturally defined human geographic area within



	<p>which humans and nature rely on shared resources. People from outside this place can effectively contribute to its stewardship by providing relevant information and/or participating through relating their own values associated with geographic place. Community is defined by the informal systems and to the degree the formal systems are tied to the informal it becomes part of a community definition. Both have a distinct function. Informal systems are horizontal. They maintain culture, take care of people and are concerned with survival. They thrive on openness, honesty, and the idea that people want to do what is right for each other and the broader society. Formal systems are vertical and they serve centralized political, ideological, and economic functions. They contribute resources and legal structure to community change. Formal meetings alone do not constitute community communication or decision making functions.” <a href="http://www.ntc.blm.gov/partner/community.html">http://www.ntc.blm.gov/partner/community.html</a></p>
Firewise Definition of Community	<p>“According to Webster's dictionary, a community is ‘a body of people living in one place or district...and considered as a whole’ or ‘a group of people living together and having interests, work, etc. in common’. Homeowner associations and similar entities are the most appropriate venue for the Firewise Communities/USA recognition program. These smaller areas within the wildland/urban interface offer the best opportunities for active individual homeowner commitment and participation, which are vital to achieving and maintaining recognition status.” <a href="http://www.firewise.org/usa/">http://www.firewise.org/usa/</a></p>
Executive Order NO. 04- 04 Oregon Office of Rural Policy and Rural Policy Advisory Committee	<p>Office of Rural Policy and Rural Policy Advisory Committee</p> <p><i>-Frontier Rural</i> – A geographic area that is at least 75 miles by road from a community of less than 2000 individuals. It is characterized by an absence of densely populated areas, small communities, individuals working in their communities, an economy dominated by natural resources and agricultural activities, and a few paved streets or roads.</p> <p><i>-Isolated Rural</i> – A geographic area that is at least 100 miles by road from a community of 3000 or more individuals. It is characterized by low population density (fewer than five people per square mile), an economy of natural resources and agricultural activity, large areas of land owned by the state or federal government and predominately unpaved streets.</p> <p><i>-Rural</i> – A geographic area that is at least 30 miles by road from an urban community (50,000 or more). It is characterized by some commercial business, two or fewer densely populated areas in a county, an economy changing from a natural resource base to more commercial interests and reasonable, but not immediate access to health care.</p> <p><i>-Urban Rural</i> – A geographic area that is at least 10 miles by road from an urban community. It is characterized by many individuals community to an urban area to work or shop, an economy with few natural resource and agricultural activities, easy and immediate access to health care services and numerous paved streets and roads.</p> <p><a href="http://governor.oregon.gov/Gov/pdf/ExecutiveOrder04-04.pdf">http://governor.oregon.gov/Gov/pdf/ExecutiveOrder04-04.pdf</a></p>
<b>Wildland Urban Interface</b>	
<b>Policy/Source</b>	<b>Definition</b>
Federal Register /Vol.66, No.160 /Friday, August 17,2001 /Notices	<p>The Federal Register states, "the urban-wildland interface community exists where humans and their development meet or intermix with wildland fuel." This definition is found in the Federal Register Vol.66, Thursday, January 4, 2001, Notices; and in "Fire in the West, the Wildland/Urban Interface Fire Problem", A Report for the Western States Fire Managers, September 18, 2000.</p>

10-Year Comprehensive Strategy	A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy (August 2001) “The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels” (Glossary of Wildland Fire Terminology, 1996). <a href="http://www.fireplan.gov/content/reports/?LanguageID=1">http://www.fireplan.gov/content/reports/?LanguageID=1</a>
Senate Bill 360:	Senate Bill 360: Forestland Urban Interface Protection Act of 1997. Forestland Urban Interface 477.015 Definitions. (1) As used in ORS 477.015 to 477.061, unless the context otherwise requires, "forestland-urban interface" means a geographic area of forestland inside a forest protection district where there exists a concentration of structures in an urban or suburban setting.
NFPA 1144	NFPA 1144: Standard for Protection of Life and Property from Wildfire 2002 Edition Wildland/Urban Interface is an area where improved property and wildland fuels meet at a well-defined boundary. Wildland/urban intermix is an area where improved property and wildland fuels meet with no clearly defined boundary. <a href="http://www.nfpa.org/catalog/home/OnlineAccess/1144/1144.asp">http://www.nfpa.org/catalog/home/OnlineAccess/1144/1144.asp</a>
<b>Defensible/Survivable Space</b>	
<b>Policy/Source</b>	<b>Definition</b>
Home Ignition Zones – “Wildland-Urban Fire—A different approach”	Recent research focuses on indications that the potential for home ignitions during wildfires including those of high intensity principally depends on a home’s fuel characteristics and the heat sources within 100-200 feet adjacent to a home (Cohen 1995; Cohen 2000; Cohen and Butler 1998). This relatively limited area that determines home ignition potential can be called the <i>home ignition zone</i> . <a href="http://firelab.org/fbp/fbresearch/wui/pubs.htm">http://firelab.org/fbp/fbresearch/wui/pubs.htm</a> (Jack D. Cohen)
NFPA 1144	NFPA Publication 1411 defines defensible space as “An area as defined by the AHJ (typically with a width of 9.14 m (30 ft) or more) between an improved property and a potential wildland fire where combustible materials and vegetation have been removed or modified to reduce the potential for fire on improved property spreading to wildland fuels or to provide a safe working area for fire fighters protecting life and improved property from wildland fire.
OAR 629-044-1085: Fuel Break Requirements	(1) The purpose of a fuel break is to: (a) Slow the rate of spread and the intensity of an advancing wildfire; and (b) Create an area in which fire suppression operations may more safely occur. (2) A fuel break shall be a natural or a human-made area where material capable of allowing a wildfire to spread: (a) Does not exist; or (b) Has been cleared, modified, or treated in such a way that the rate of spread and the intensity of an advancing wildfire will be significantly reduced. (3) A primary fuel break shall be comprised of one or more of the following: (a) An area of substantially non-flammable ground cover. Examples include asphalt, bare soil, clover, concrete, green grass, ivy, mulches, rock, succulent ground cover, or wildflowers. (b) An area of dry grass which is maintained to an average height of less than four inches. (c) An area of cut grass, leaves, needles, twigs, and other similar flammable materials, provided such materials do not create a continuous fuel bed and are in compliance with the intent of subsections 1 and 2 of this rule. (d) An area of single specimens or isolated groupings of ornamental shrubbery, native trees, or other plants, provided they are: (A) Maintained in a green condition; (B) Maintained substantially free of dead plant material; (C) Maintained free of ladder fuel; (D) Arranged and maintained in such a way that minimizes the possibility a wildfire can spread to adjacent vegetation; and (E) In compliance with the intent of subsections (1) and (2) of this rule.

	(4) A secondary fuel break shall be comprised of single specimens or isolated groupings of ornamental shrubbery, native trees, or other plants, provided they are: (a) Maintained in a green condition; (b) Maintained substantially free of dead plant material; (c) Maintained free of ladder fuel; (d) Arranged and maintained in such a way that minimizes the possibility a wildfire can spread to adjacent vegetation; and (e) In compliance with the intent of subsections 1 and 2 of this rule. <a href="http://arcweb.sos.state.or.us/rules/1102_Bulletin/1102_ch629_bulletin.html">http://arcweb.sos.state.or.us/rules/1102_Bulletin/1102_ch629_bulletin.html</a>																	
Senate Bill 360: Forestland Urban Interface Protection Act of 1997. Fuel Break Distance	<table border="1"> <thead> <tr> <th rowspan="2"><u>Classification</u></th> <th colspan="2"><u>Total Fuel Break Distance</u></th> </tr> <tr> <th><u>Fire Resistant Roofing</u></th> <th><u>Non-Fire Resistant Roofing</u></th> </tr> </thead> <tbody> <tr> <td>LOW</td> <td>No Requirement</td> <td>No Requirement</td> </tr> <tr> <td>MODERATE</td> <td>30 feet</td> <td>30 feet</td> </tr> <tr> <td>HIGH</td> <td>30 feet</td> <td>50 feet</td> </tr> <tr> <td>Extreme &amp; High Density Extreme</td> <td>50 feet</td> <td>100 feet</td> </tr> </tbody> </table>	<u>Classification</u>	<u>Total Fuel Break Distance</u>		<u>Fire Resistant Roofing</u>	<u>Non-Fire Resistant Roofing</u>	LOW	No Requirement	No Requirement	MODERATE	30 feet	30 feet	HIGH	30 feet	50 feet	Extreme & High Density Extreme	50 feet	100 feet
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HIGH	30 feet	50 feet																
Extreme & High Density Extreme	50 feet	100 feet																
Is Your Home Protected from Wildfire Disaster? A Homeowner's Guide to Wildfire Retrofit, Institute for Business and Home Safety	<p>A survivable space is an area of reduced fuels between your home and the untouched wildland. This provides enough distance between the home and a wildfire to ensure that the home can survive without extensive effort from either you or the fire department. One of the easiest ways to establish a survivable space is to use the zone concept.</p> <p><b>Zone 1:</b> Establish a well-irrigated area around your home. In a low hazard area, it should extend a minimum of 30 feet from your home on all sides. As your hazard risk increases, a clearance of between 50 and 100 feet or more may be necessary, especially on any downhill sides of the lot. Plantings should be limited to carefully spaced indigenous species.</p> <p><b>Zone 2:</b> Place low-growing plants, shrubs and carefully spaced trees in this area. Maintain a reduced amount of vegetation. Your irrigation system should also extend into this area. Trees should be at least 10 feet apart, and all dead or dying limbs should be trimmed. For trees taller than 18 feet, prune lower branches within six feet of the ground. No tree limbs should come within 10 feet of your home.</p> <p><b>Zone 3:</b> This furthest zone from your home is a slightly modified natural area. Thin selected trees and remove highly flammable vegetation such as dead or dying trees and shrubs.</p> <p>How far Zones 2 and 3 extend depends upon your risk and your property's boundaries. In a low hazard area, these two zones should extend another 20 feet or so beyond the 30 feet in Zone 1. This creates a modified landscape of over 50 feet total. In a moderate hazard area, these two zones should extend at least another 50 feet beyond the 50 feet in Zone 1. This would create a modified landscape of over 100 feet total. In a high hazard area, these two zones should extend at least another 100 feet beyond the 100 feet in Zone 1. This would create a modified landscape of over 200 feet total.</p> <p><a href="http://www.ibhs.org/publications/view.asp?id=130">http://www.ibhs.org/publications/view.asp?id=130</a></p>																	
Living with Fire: A Guide for the Homeowner	This guide, distributed in Oregon through the Pacific Northwest Wildfire Coordinating Group, provides information on creating effective defensible space and guidelines illustrated below. <p style="text-align: center;">Defensible Space</p>																	

	Recommended Distances – Steepness of Slope-----		
	Flat to Gently Sloping 0 to 20%	Moderately Steep 21% to 40%	Very Steep 40+%
<b>Grass:</b> Wildland grasses (such as cheatgrass, weeds, and widely scattered shrubs with grass understory)	30 feet	100 feet	100 feet
<b>Shrubs:</b> Includes shrub dominant areas	100 feet	200 feet	200 feet
<b>Trees:</b> Includes forested areas. If substantial grass or shrub understory is present use those values shown above	30 feet	100 feet	200 feet
Fire Free	A buffer zone -- a minimum 30-foot fire-resistive area around a house that reduces the risk of a wildfire from starting or spreading to the home. Although a 30-foot distance is standard, additional clearance as great as 100 feet may be necessary as the slope of your lot increases. <a href="http://www.firefree.org/ffreenew/subpages/gitz.htm">http://www.firefree.org/ffreenew/subpages/gitz.htm</a> .		

## Other Definitions

**Crown Fire:** Fire sustained in the over story or a surface fire with high fire line intensity leading to significant, scorch related over story death.

**Fire breaks---**Man made, which include defensible space through fuel reduction, roads and natural breaks such as creek beds, rock faces, etc.

**Fuel loading:** How much fuel is available to feed the fire? Other loading factors are size, compactness and fuel moisture.

**Fuels:** Fuel is that combustible material available to feed a fire. Fuel is classified by volume and type. Volume is described in terms of “fuel loading” or the amount of vegetative fuel. The type of fuel, trees. Brush, grass, etc.

**Season Ending Event:** The data of the weather event after which fires cease to pose a significant problem, in terms of spread, to fire managers.

**Surface Fire:** Burning with low intensity in the forest understory with occasional individual tree torching or scorches related mortality.

**Topography:** This is the overall layout of the land: steepness of slope and aspect.

**Vehicle access:** Is access in and out possible for the type of initial attack or protection vehicle needed including space for more than one vehicle, turn-around space, and appropriate bridges and gates capable of accommodating firefighting vehicles.

**Water sources:** Many rural residential areas lack large water storage or pumping facilities, putting a higher demand on firefighting resources which have large water tank capabilities.

**Weather:** Major concerns are: yearly moisture accumulations, humidity, wind, temperatures and lightning frequency/occurrence.

## Acronyms

**BLM:** Bureau of Land Management

**CFR:** Code of Federal Regulations

**CWPP:** Community Wildfire Protection Plan (Healthy Forests Restoration Act)

**DEQ:** Department of Environmental Quality

**DOI:** Department of Interior

**EPA:** Environmental Protection Agency

**FEMA:** Federal Emergency Management Agency

**FS:** Forest Service

**GIS:** Geographic Information System

**HFRA:** Healthy Forest Restoration Act

**HFI:** Healthy Forest Initiative

**HUC:** Hydrologic Unit Code

**ICS:** Incident Command System

**NFP:** National Fire Plan and 10-Year Comprehensive Strategy

**ODF:** Oregon Department of Forestry

**ODOT:** Oregon Department of Transportation

**OEM:** Office of Emergency Management (State)

**OSP:** Oregon State Police

**T & E:** Threatened and Endangered Species

**USDA:** United States Department of Agriculture

**USDI:** United States Department of Interior

**WFSA :** Wildland Fire Situation Analysis

# Appendix D

**“Get in the Zone”**

**Fire Free Program**

**Ten Steps to “Get in the Zone!” – FireFree Program – <http://www.firefree.org>**

**1. Define your defensible space.**

**Defensible space is a buffer zone, a minimum 30-foot fire-resistive area around your house that reduces the risk of a wildfire from starting or spreading to your home. Formed by following the critical steps outlined below, defensible space depends on clearing flammable material away from your home and replacing it with fire-resistive vegetation. Although a 30-foot distance is standard, additional clearance as great as 100 feet may be necessary as the slope of your lot increases. Defensible space not only helps protect your home in the critical minutes it takes a fire to pass, it also gives firefighters an area to work in. During a large-scale fire, when many homes are at risk, firefighters must focus on homes they can safely defend.**

**2. Reduce flammable vegetation, trees and brush around your home.**

**When needed, replace flammable landscaping with fire-resistive counterparts. Choose plants with loose branch habits, non-resinous woody material, high moisture content in leaves, and little seasonal accumulation of dead vegetation. Ask your local home and garden center about which varieties possess these and other fire-resistive traits.**

**3. Remove or prune trees.**

If you live in a wooded area, reduce the density of surrounding forest by removing or thinning overcrowded or small-diameter trees. Check with local agencies for guidelines on tree removal before clearing or thinning your property. Be sure to prune low-hanging branches to keep a ground fire from climbing into upper branches. Limbing up these "ladder fuels" cuts the chances of a ground fire climbing into tree canopies.

**4. Cut grass and weeds regularly.**

Fire spreads rapidly in dry grass and weeds. Mow grasses and other low vegetation and keep them well-watered, especially during periods of high fire danger.

**5. Relocate wood piles and leftover building materials.**

Stack all wood, building debris and other burnable materials at least 30 feet from your home and other buildings. Then clear away flammable vegetation within 10 feet of wood/debris piles as an additional safeguard against the spread of wildfire.

**6. Keep it clean. (Your roof and yard, we mean!)**

Clear pine needles, leaves and debris from your roof, gutters and yard to eliminate an ignition source for tinder-dry vegetation. Remove dead limbs and branches within 10 feet of your chimney and deck. Tidying-up is especially important during the hot, arid months of fire season when a single spark can lead to an inferno.

**7. Signs, addresses and access.**

Easy-to-read road signs and address numbers that are visible from the road allow firefighters to find your home quickly during a wildfire or other emergency. Safe, easy access to your property includes two-way roads that can accommodate emergency vehicles and give them space to turn around. Bridges should support the weight of emergency vehicles. Driveways should also be trimmed of peripheral vegetation to allow emergency equipment to reach your house. Contact your local fire agency for recommendations on access and signage.

**8. Rate your roof.**

Your roof is the most vulnerable part of your house in a wildfire. If you have a wood shake roof, consider treatment or replacement to make it more fire-resistive. If you have a fireplace or woodstove, install an approved spark arrestor on your chimney to prevent sparks from reaching

your roof or flammable vegetation.

#### **9. Recycle yard debris and branches.**

Check into alternative disposal methods like composting or recycling. Burning may be restricted or not allowed in your community, and should only be used as a last resort. Always contact your local fire agency for current burning regulations before striking a match!

#### **10. What to do when a wildfire strikes.**

Monitor your local radio and television stations for fire reports and evacuation procedures and centers. Keep an emergency checklist handy and prepare to evacuate if your neighborhood is threatened. Proper preparation includes closing all windows and doors, arranging garden hoses so they can reach any area of your house, and packing your car for quick departure.

## **Protecting Your Home from Wildland Fire**

<http://www.nifc.gov/preved/protecthome.html>

Every year many families unnecessarily lose their homes and possessions to wildland fire. These losses can be minimized if homeowners take the time to become aware of safety measures to help protect their homes and complete some effective actions.

Use Fire Resistant Building Material - "The Best Thing That You Can Do"

The roof and exterior structure of your dwelling should be constructed of non-combustible or fire resistant materials such as fire resistant roofing materials, tile, slate, sheet iron, aluminum, brick, or stone. Wood siding, cedar shakes, exterior wood paneling, and other highly combustible materials should be treated with fire retardant chemicals.

Maintain a Survivable Space - "Things you can do today"

- Clean roof surfaces and gutters of pine needs, leaves, branches, etc., regularly to avoid accumulation of flammable materials.
- Remove portions of any tree extending within 10 feet of the flue opening of any stove or chimney.
- Maintain a screen constructed of non-flammable material over the flue opening of every chimney or stovepipe. Mesh openings of the screen should not exceed 1/2 inch.
- Landscape vegetation should be spaced so that fire can not be carried to the structure or surrounding vegetation.
- Remove branches from trees to height of 15 feet.
- A fuel break should be maintained around all structures.
- Dispose of stove or fireplace ashes and charcoal briquettes only after soaking them in a metal pail of water.
- Store gasoline in an approved safety can away from occupied buildings.
- Propane tanks should be far enough away from buildings for valves to be shut off in case of fire. Keep area clear of flammable vegetation.
- All combustibles such as firewood, picnic tables, boats, etc. should be kept away from structures.
- Garden hose should be connected to outlet.
- Addressing should be indicated at all intersections and on structures.
- All roads and driveways should be at least 16 feet in width.
- Have fire tools handy such as: ladder long enough to reach the roof, shovel, rake and bucket for water.
- Each home should have at least two different entrance and exit routes.



# Appendix E

## Incentive Programs

## **General Incentives Programs**

The following information was summarized from "Incentive Programs for Resource Management and Conservation" (OSU Extension Publication #EC1119) and other sources. This lists the major incentive programs available to assist communities and landowners with the management of their communities. 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 Morrow County.

Many other programs exist in addition to those listed. There are specialized / targeted incentive programs (National Fire Plan, Blue Mt. / Pacific Coast Demonstration Projects, etc) are not covered in this general summary.

### **Major Incentive Programs available to Family Forestland Owners in Oregon:**

>**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% of costs) to convert underproducing 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. 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% Underproducing Forest Land Conversion Tax Credit** -- state tax credit on cost of converting underproducing forestland (brush land and low value / low volume forest) to well stocked forest. Apply by completing 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%) 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% 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](http://www.timbertax.org)

>**Environmental Quality Incentives Program (EQIP)** -- can cost share 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. ***Funding is available.***

>**Conservation Reserve Enhancement Program (CREP)** -- cost shares primarily riparian and wet land 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.

## **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.

## **Other Programs**

**Special funding for Insect & Disease control.** The cost share amounts varies depending on the acreage owned. It varies from 33% to 50%, with the larger landowners being eligible for only 33% 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.

## Additional Incentive Programs to assist Communities and Private Landowners

Cost Share Program	Objective	Contact Agency
Forest Stewardship Program (FSP)	Develop Stewardship/Management Plans for Private landowners	Oregon Department of Forestry
Forest Resource Trust (FRT)	Convert underproducing forestland or marginal agricultural land into conifer forest, high site 4 or better sites	Oregon Department of Forestry
Forest Land Enhancement Program (FLEP)	Cost share site prep, tree planting, non-commercial thinning, and release.	Oregon Department of Forestry
Oregon 50% Underproducing Forest Land Conversion Tax Credit	Convert underproducing forestland to well stocked forest.	Oregon Department of Forestry
Afforestation Incentive	Converts parcels of idle to commercial forest use.	Oregon Department of Forestry
Federal (10%) reforestation tax credit	Federal tax credit on cost of reforestation projects	IRS or tax professional
Environmental Quality Incentives Program (EQIP)	Wide variety of forestry practices	Natural Resource Conservation Service (NRCS)
Watershed Improvement Grants (OWEB)	Riparian work and protection of water quality which can include upland forestry work.	Soil Water Conservation District (SWCD)
Wildlife Habitat Incentives Program (WHIP)	Wildlife enhancement practices which can include forest establishment and thinning for wildlife.	Natural Resource Conservation Service (NRCS)
Conservation Reserve Program (CRP)	Conservation practices on agricultural land including forest establishment and thinning.	Farm Service Agency (FSA)
Conservation Reserve Enhancement Program (CREP)	Riparian improvement projects including forest buffer establishment.	Farm Service Agency (FSA)
Volunteer Fire Assistance (VFA)	Grant assistance to volunteer fire departments for equipment and supplies.	Oregon Department of Forestry
Rural Fire Assistance (RFA)	Grant assistance to city and rural fire departments in communities of less than 10,000 population for equipment and supplies.	Oregon Department of Forestry
Federal Excess Personal Property Program (FEPP)	Federal excess equipment and supplies to city and rural fire departments for firefighting purposes.	Oregon Department of Forestry
Special Insect & Disease Control	Cost share assistance to landowners to control insect and disease infestations.	Oregon Department of Forestry
Title II	Funding for forest health projects	County Government

The *minimum requirements* for a CWPP as described in the HFRA are:

- (1) **Collaboration:** A CWPP must be collaboratively developed by local and state government representatives, in consultation with federal agencies and other interested parties.
- (2) **Prioritized Fuel Reduction:** A CWPP must identify and prioritize areas for hazardous fuel reduction treatments and recommend the types and methods of treatment that will protect one or more at-risk communities and essential infrastructure.
- (3) **Treatment of Structural Ignitability:** A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan.

## **City of Boardman Stakeholder Interview Summary**

Interview with Mayor, Community Development Director and Public Works Director – July 20, 2006

Staff interviewed Mayor Rex Mather, Community Development Director Barry Beyeler, and David Winters, Public Works Director. As staff introduced the five Community Asset Functions (Human Population, Economic Assets, Cultural & Historic Resources, Infrastructure & Critical Facilities, and Environmental Assets) Mr. Mather, Beyeler and Winters discussed the features, assets or resources of each category, shared Boardman's assets with Planning Staff and entered the information on a map with different colored markers indicating separate Asset Functions. The eight natural hazards analyzed in the Plan were discussed in context with the Community Asset Functions as well. The following are the important aspects of each category and how the natural hazards may affect them:

- **Human Population**  
There is a fairly high percentage of Hispanics in Boardman (50% - 2000 Census), which may affect communication especially during windstorm and winter storm events. Boardman does not have an assisted living facility but does have a senior center next to the City Hall. There is a tourism element along the river at the Boardman Park and Marina.
- **Economic Assets**  
During times of power outages or a threatened power outage, the local population may utilize the Boardman markets for battery, water, ice, food, and fuel needs. Other assets listed are the Interstate I-84 Interchange and the Port Industrial Area.
- **Cultural & Historic Resources**  
The assets listed are: the Heritage Trail and the Gazebo located at the interchange of Interstate I-84 and Main Street.
- **Infrastructure & Critical Facilities**  
The listed facilities are two water collection systems which supply the City with water, schools, Boardman Rural Fire Protection District facilities, Boardman Police Department, sewer system and boosters, and City Hall.
- **Environmental Assets**  
Boardman has the large Park and Marina on the Columbia River and three smaller parks within the City limits. Boardman also contains wetlands listed on the National Wetlands Inventory and a designated wellhead protection area.

Windstorm and winter storm have the most impact on the City. During these events the City loses trees and may have issues with local transportation blockages and tree damages to private and public property. There are no significant issues with flooding, earthquake, volcano, landslides, wildfire, and drought. Two Action Items were submitted having to do with the need for backup generation for the water system and the sewage system.

## **City of Heppner Stakeholder Interview Summaries**

### **Summary of the Heppner Flash Flood Exercise**

#### Interview with City Manager– June 26, 2006

Staff interviewed David DeMayo, Heppner City Manager. As staff introduced the five Community Asset Functions (Human Population, Economic Assets, Cultural & Historic Resources, Infrastructure & Critical Facilities, and Environmental Assets) Mr. DeMayo discussed the features, assets or resources of each category, shared Heppner's assets with Planning Staff and entered the information on a map with different colored markers indicating separate Asset Functions. The eight natural hazards analyzed in the Plan were discussed in context with the Community Asset Functions as well. The following are the important aspects of each category and how the natural hazards may affect them in Heppner:

- **Human Population**  
There is a fairly homogeneous population in Heppner (96.7% white - 2000 Census), which is distributed across the age categories as follows: 24.5% under the age of 18; 5.9% from ages 18 to 24; 24.3% from ages 25 to 44; 24.9% from ages 45 to 64; and 20.3% who were 65 years of age or older. Heppner has a senior center, an Assisted Living facility and a 12 bed hospital.
- **Economic Assets**  
Heppner hosts local and state governmental offices, which include the Morrow County government, the City of Heppner, and regional offices of the Natural Resource Conservation Service (NRCS), Oregon Department of Transportation (ODOT), and the United States Forest Service (USFS). Heppner has a traditional downtown area and is also the crossroads in the southern portion of the County for agricultural products being transported to market in the wider region and the Heppner economy reflects this agricultural/governmental identity.
- **Cultural & Historic Resources**  
The most significant cultural and historic resource in Heppner is listed as the County museum, which contains historical information about all of the County and the cities, including records of natural disasters. Heppner has three buildings listed on the National Register of Historic Places: The County Courthouse, the Gilliam & Bisbee Building, and the Heppner Hotel. Heppner has two annual celebrations: The St. Patrick's celebration in March, and the Morrow County Fair and Rodeo in August.
- **Infrastructure & Critical Facilities**  
The Willow Creek Dam, which lies above Heppner to hold back flood water and provides recreation opportunities, is among the most significant critical facilities in Heppner. Also listed are the schools, the Kinzua Mill site, the downtown area, the water and sewer system, the Heppner Fire Department, and the Hospital. The Emergency Operations Center, operated by the CSEPP program's Emergency Managers, and the Morrow County Sheriff's Department is also within the Heppner City limits.
- **Environmental Assets**  
Heppner offers recreation in the City Park, which has a swimming pool. The Willow Creek Golf Course and the Willow Creek Reservoir offer water sports

activities. Other significant land uses in the area are agriculture and timber industries, forest recreation and open space. The Blue Mountain Scenic Byway goes through Heppner.

Flash flooding has the most impact on the City. During these events the City could lose lives, houses, businesses and infrastructure as the flood waters rage through the downtown area. The City has a Flash Flood Plan, included in Appendix B, to help mitigate and plan for flash flood emergencies. There are no significant issues with the following natural hazards: earthquake, volcano, landslides, wildfire, windstorm and winterstorms. Drought affects the local economy in that the hardships of the agricultural economy are reflected in the local economy in general. The Action Items for Heppner were submitted after the Flash Flood Exercise (see below).

#### Informational Session with the Heppner Chamber of Commerce – August 7, 2006

Staff presented the Pre-disaster Mitigation Plan process to the full Heppner Chamber of Commerce. The Chamber was introduced to the risks that are being analyzed and work County Staff, the Steering Committee, the Stakeholders, and the City of Heppner had already accomplished. The Chamber was informed as to how the members could participate and what Action Items are, including how the Pre-disaster Mitigation Plan could benefit Heppner and all of Morrow County. The Board asked about the role of Emergency Management in this process and did not offer any new Action Items for inclusion in the Plan.

#### Heppner Flash Flood Exercise – July 18, 2006

The Morrow County Emergency Managers, directed by Casey Beard, hosted the Flash Flood Exercise. In a flash flood emergency the incident commander is to be the Fire Chief of the Heppner Fire Department. There are five levels of flood warning, and in an extreme flash flood emergency the population in Heppner could have only 20 minutes from initial siren warning (level 4) to life threatening flooding (level 5). When the siren warning sounds, the population in the flood risk area (which could number 300 to 400 persons) is to head immediately for high ground. There are four rally points for the evacuated population: the high school, the Columbia Basin Electric Co-op building, the U.S. Army Corp of Engineers building, and the Morrow County Annex. Staff identified three Action Items discussed during the course of the exercise. They are the need for:

- trained Red Cross Volunteers;
- improved and continuous public education as to flash flood response; and
- improved short-range communication between the City, Fire Department, Emergency Managers, and the rally points.



## City of Lone Stakeholder Interview Summary

### Interview with City of Lone Mayor – July 10, 2006

Staff interviewed Mark Bruno, City of Lone Mayor. As staff introduced the five Community Asset Functions (Human Population, Economic Assets, Cultural & Historic Resources, Infrastructure & Critical Facilities, and Environmental Assets) Mr. Bruno discussed the features, assets or resources of each category, shared Lone's assets with Planning Staff and entered the information on a map with different colored markers indicating separate Asset Functions. The eight natural hazards analyzed in the Plan were discussed in context with the Community Asset Functions as well. The following are the important aspects of each category and how the natural hazards may affect Lone:

- **Human Population**  
There is a fairly homogeneous population in Lone (97.8% white - 2000 Census) The age distribution, as of the 2000 Census is: 28.3% under the age of 18; 5.6% from ages 18 to 24; 29.6% from ages 25 to 44; 20.6% from ages 45 to 64; and 15.9% who were 65 years of age or older. The population is about 340 persons and does not have specific special needs populations. Nevertheless, over fifteen percent of the population (54 persons) is over the age of 65 and almost thirty percent (96 persons) is under the age of 18. The 150 young and old in Lone could be at risk in the event of a flash flood emergency.
- **Economic Assets**  
Lone has two restaurants, one store, a gas station and bank. The local Grain Growers Co-op operates a fertilizer plant and the Lone School District employs a significant number of people in the Lone area. Lone has a small downtown area and is also the meeting place for farmers in the area. Lone has an agricultural based economy as it is surrounded by dryland and irrigated farms.
- **Cultural & Historic Resources**  
The features that make Lone unique are the buildings that make up the heart of Lone, to include: The Woolery House Bed and Breakfast, Collier's Market, the Railroad Barn and the City Hall building. The Blue Mountain Scenic Byway runs by Lone on State Highway 74.
- **Infrastructure & Critical Facilities**  
Lone has a school, the volunteer Lone Rural Fire Protection building, City Hall, two wells and two water reservoirs. Included in the critical facilities is the existing drainage ditch that allows floodwaters to flow through the City Park and helps keep the floodwaters away from the housing area to the south.
- **Environmental Assets**  
Lone has two city parks: Mullin's Park and the City Park. The City Park is located next to State Highway 74 and hosts the annual 4<sup>th</sup> of July festivities. The significant land uses in the area are dryland and irrigated farming.

The drainages of Rietmann Canyon and Lorraine Creek are not controlled and enter Lone as a floodway. This floodway and the floodplain and floodway of Willow Creek indicate a significant potential for flash flooding in Lone. According to the Mayor there is a history of the water flooding the local businesses and homes. The existing flood control system in Lone is not adequate to control flooding. Presently, when water runoff occurs

in lone from the north, the water drains through the drainage ditch until it reaches the area around the intersection of Main Street and Green Street. There it pours over the street and is pumped with a portable pump and hose by the local citizens who notice the water accumulating. Gooseberry Road, a County road, then acts as a dam and keeps the water from draining and must be similarly pumped across the County road into a low area where it eventually reaches Willow Creek.

The City of lone requires Burning Permits within the City limits. If a person in lone burns without a Burn Permit that person becomes liable for the Fire District response costs. This prospect has reduced unpermitted burning in lone such that the incidence of uncontrolled fires is significantly reduced.

Drought has a profound affect on lone in that the hardships of the agricultural economy are reflected in the local economy in general. There are no significant issues with the remaining natural hazards: earthquake, volcano, landslides, windstorm and winterstorms.

The City of lone submitted two Action Items:

- The need for a simple and effective flood control system; and
- The need for education/training for City officials concerning floodplain, floodway development.

## **City of Irrigon Stakeholder Interview Summaries**

### Interview with City Manager and Public Works Director – July 24, 2006

Staff interviewed Jerry Breazeale, City Manager and Keith White, Public Works Director. As staff introduced the five Community Asset Functions (Human Population, Economic Assets, Cultural & Historic Resources, Infrastructure & Critical Facilities, and Environmental Assets) Jerry and Keith discussed the features, assets or resources of each category, shared Irrigon's assets with Planning Staff and entered the information on a map with different colored markers indicating separate Asset Functions. The eight natural hazards analyzed in the Plan were discussed in context with the Community Asset Functions as well. The following are the important aspects of each category and how the natural hazards may affect them:

- **Human Population**  
There is a fairly high percentage of Hispanics in Irrigon (27% - 2000 Census), This may affect communication especially during windstorm and winter storm events. The elderly and disabled population is also considered fairly significant.
- **Economic Assets**  
During times of power outages or a threatened power outage, the local population may utilize the Irrigon grocery/gas station (Huwe's) for battery, water, ice, food, and fuel needs. There was consensus that this local market should be a critical economic asset for Irrigon. In addition to Huwe's, they listed other local restaurants and the bank.
- **Cultural & Historic Resources**  
The assets listed are: the Heritage Trail, The Oregon Trail spur, Sand Island (location of an encampment of the Lewis and Clark Expedition, now inundated), and the local cemeteries.
- **Infrastructure & Critical Facilities**  
The facilities listed are: two water wells and booster stations which supply the City with water, schools, Irrigon Medical Clinic, Irrigon Rural Fire Protection District facilities, sewer system and boosters, and City Hall.
- **Environmental Assets**  
Irrigon has two parks, which include the park and marina on the Columbia River and the City Park on Main Street, which fronts State Highway 730.

Windstorm and winter storm have the most impact on the City. During these events the City loses trees and may have issues with local transportation blockages and tree damages to private and public property. There are no significant issues with flooding, earthquake, volcano, landslides wildfire, and drought. Two Action Items were submitted having to do with the need for backup generation for the water system and the sewage system.

### Interview with the Irrigon Chamber of Commerce Board of Directors – August 2, 2006

Staff interviewed Laura Clark, John Sebastian, Patti Burres, Rhiannan Zahn, and Donna Eppenbach. As staff introduced the five Community Asset Functions (Human Population, Economic Assets, Cultural & Historic Resources, Infrastructure & Critical Facilities, and Environmental Assets), and the map and information already provided by

the City Manager and Public Works Director, the Board discussed the features, assets or resources of each category. The Board added the following information:

- **Human Population**  
Due to CSEPP preparation for a chemical disaster, the community has evacuation transportation available in emergencies.
- **Economic Assets**  
Irrigon is a bedroom community of the larger economic region and does not have many economic assets, but there are various home based businesses, the post office and the local fruit stands in addition to the assets mentioned above.
- **Cultural & Historic Resources**  
The Watermelon Festival in July, the Paterson Ferry dock, the old train docking area, and the Fishing Derby in August are in addition to the assets listed above.
- **Infrastructure & Critical Facilities**  
The Chamber felt that the churches should be listed as critical facilities due to probability that they would provide food to persons in need during times of emergency.

The Board submitted one Action Item for inclusion in the Plan. It is in response to drought and wildfire mitigation and involves inclusion and development of the vacant land west of the marina into the existing park and marina.

## **Town of Lexington Stakeholder Interview Summary**

### Interview with Town of Lexington Representative – June 26, 2006

Staff interviewed Jean Brazell, Town Representative. As staff introduced the five Community Asset Functions (Human Population, Economic Assets, Cultural & Historic Resources, Infrastructure & Critical Facilities, and Environmental Assets) Ms. Brazell discussed the features, assets or resources of each category, shared Lexington's assets with Planning Staff and entered the information on a map with different colored markers indicating separate Asset Functions. The eight natural hazards analyzed in the Plan were discussed in context with the Community Asset Functions as well. The following are the important aspects of each category and how the natural hazards may affect them:

- **Human Population**  
There is a fairly homogeneous population in Lexington (96.9% white - 2000 Census) The population is about 260 persons and does not have specific special needs populations. Nevertheless, sixteen percent of the population (42 persons) is over the age of 65 and twenty-four percent (62 persons) is under the age of 18. The 104 young and old in Lexington could be at risk in the event of a flash flood emergency.
- **Economic Assets**  
Lexington has the Morrow County Grain Growers complex, an airport, gas station, Lexington Machine and Welding, the Morrow County Public Works office, and the Morrow County School District office. Lexington is the crossroads between the east-west and north-south routes in Morrow County. Lexington has an agricultural based economy as it is surrounded by dryland and irrigated farms.
- **Cultural & Historic Resources**  
A mammoth tusk was unearthed in the Lexington area and can be seen in the Morrow County historical museum in Heppner. Lexington also has a historical marker, the Lexington Cemetery and the old telephone building as historic resources. The Blue Mountain Scenic Byway runs by Lexington on State Highway 74.
- **Infrastructure & Critical Facilities**  
Lexington has a water well and storage system, a fire department, school district offices, airport, city offices and the Blackhorse Ditch flood control system. Lexington also has a CenturyTel and Windwave telecommunications system in the area.
- **Environmental Assets**  
Lexington has a park, the "Chili Bow," a dirt bike park, and a park at the Oddfellows Lodge. Willow Creek flows through the Town and the surrounding area is dryland and irrigated farms.

Flooding on the Willow Creek drainage has the potential to disrupt the lives of Lexington residents although Willow Creek Dam has mitigated catastrophic flooding events originating from Willow Creek and Balm Fork above Heppner. Lexington lies in the Willow Creek flood plain and could experience flooding from localized flash flood events closer to the Town.

Drought has a profound affect on Lexington in that the hardships of the agricultural economy are reflected in the local economy in general. There are no significant issues with the remaining natural hazards: earthquake, volcano, landslides, wildfire, windstorm and winterstorms.

The Town of Lexington submitted three Action Items:

- The need an alarm for their water supply system and their back up supply;
- The need for flood control work from Clay Street to F Street which floods during rain events; and
- The need for an emergency operations area for the city office, which is in the flood plain.

# Appendix A: Resource Directory

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

## Multi-Hazard Mitigation Resources

### County Resources

**Contact:** Morrow County Emergency Management  
**Address:** P.O. Box 622, Heppner, OR 97836  
**Phone:** 541-676-5161  
**Fax:** 541-676-9454  
**Website:** <http://www.csepp.org>

**Contact:** Morrow County Public Works  
**Address:** P.O. Box 428, Lexington, OR 97839  
**Phone:** 541-989-9500  
**Fax:** 541-989-8352  
**Website:** <http://www.morrowcountyoregon.com/publicworks/index.html>

**Contact:** Morrow County Planning Department  
**Address:** P.O. Box 40, Irrigon, OR 97844  
**Phone:** 541-922-4624  
**Fax:** 541-922-3472  
**Website:** <http://www.morrowcountyoregon.com/planning/index.html>

### 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 ext. 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:** 228<sup>th</sup> 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](mailto: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](mailto:answers@noaa.gov)

#### **National Weather Service, Pendleton**

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

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

### **Additional Resources**

#### **American Red Cross**

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

**Contact:** Regional Director, American Red Cross  
**Address:** P.O. Box 1048, Pendleton, OR 97801  
**Phone:** 541-276-1211  
**Fax:** 541-276-7193  
**Website:** <http://mountainriver.redcross.org>

#### **Institute for Business & Home Safety (IBHS)**

IBHS was created as an initiative of the insurance industry to reduce damage and losses caused by natural disasters. 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](mailto:info@ibhs.org)  
**Website:** <http://www.ibhs.org/>

# Flood Mitigation Resources

## County Resources

**Contact:** Morrow County Emergency Management  
**Address:** P.O. Box 622 Heppner, OR 97836  
**Phone:** 541-676-5161  
**Fax:** 541-676-9454

**Website:** <http://www.csepp.org>

**Contact:** Morrow County Building Official  
**Address:** P.O. Box 229 Boardman, OR 97818  
**Phone:** 541-481-9252  
**Fax:** 541-481-3244

## 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 Coordinator  
**Address:** 635 Capitol St. NE, Suite 200, Salem, OR 97301-2540  
**Phone:** (503) 373-0050 ext. 250  
**Fax:** (503) 378-6033  
**Website:** <http://www.oregon.gov/LCD/HAZ/index.shtml>

### 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](mailto: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/>

#### **Morrow Soil and Water Conservation District (SWCD)**

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

**Contact:** Morrow Soil and Water Conservation District  
**Address:** P.O. Box 127  
**Phone:** 541-676-5452  
**Fax:** 541-676-9624

**Website:** <http://www.oacd.org/districts.html#MORROW>

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

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

**Contact:** USDA-NRCS  
**Address:** P.O. Box 127 Heppner, OR 97836  
**Phone:** 541-676-5021  
**Fax:** 541-676-9624  
**Website:** <http://www.or.nrcs.usda.gov/contact/morrow.html>

## **Additional Resources**

### ***The National Flood Insurance Program***

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

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

### **The Association of State Floodplain Managers**

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

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

### **USGS Water Resources**

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

**Contact:** Department of Land Conservation and Development, Natural Hazards and Floodplains Specialist  
**Address:** 635 Capitol Street NE, Suite 150 Salem OR 97301-2540  
**Phone:** 503-373-0050  
**Fax:** 503-378-5518

**Contact:** USGS Water Resources  
**Phone:** (503) 251-3200  
**Website:** <http://or.water.usgs.gov/>  
**Email:** [info-or@usgs.gov](mailto: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](mailto: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](http://www.oregon.gov/LCD/HAZ/docs/floods/localofficial_4th.pdf)

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

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

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

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

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

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

# Wildfire Resource Directory

## County Resources

**Contact:** Heppner Rural Fire Protection District  
**Address:** 61853 Hanna-Arbuckle Road - Heppner, OR 97836  
**Phone:** 541-676-9771

**Contact:** Irrigon Rural Fire Protection District  
**Address:** P.O. Box 647 - Irrigon, OR 97844  
**Phone:** 541-922-3133

**Fax:** 541-922-2331

**Contact:** Boardman Rural Fire Protection District  
**Address:** 300 SW Wilson Lane Boardman, OR 97818  
**Phone:** 541-481-3473

**Contact:** Heppner Fire Department  
**Address:** P.O. Box 743 Heppner, OR 97836  
**Phone:** 541-676-2922

## Regional Resources

**Contact:** Area 9 Fire Defense Board Chief  
**Address:** Hermiston Fire and Emergency 330 S. 1<sup>st</sup> Street, Hermiston OR 97838  
**Phone:** 541-567-8822

## 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](http://www.oregon.gov/ODF/FIRE/fire_protection.shtml)

### **Office of the State Fire Marshal (OSFM)**

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

**Contact:** Oregon State Fire Marshal  
**Address:** 4760 Portland Road NE, Salem, Oregon 97305-1760  
**Phone:** (503) 378-3473  
**Fax:** (503) 373-1825  
**Website:** <http://159.121.82.250/> Oregon Laws on Fire Protection:  
[http://159.121.82.250/SFM\\_Admin/firelaws.htm](http://159.121.82.250/SFM_Admin/firelaws.htm)  
**Email:** [Oregon.sfm@state.or.us](mailto: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](http://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](mailto: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](http://www.pfc.cfs.nrcan.gc.ca/cgi-bin/bstore/catalog_e.pl?catalog=11794)

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

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

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

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

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

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

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

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

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

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

# Severe Weather Event Resource Directory

## County Resources

**Contact:** Morrow County Emergency Management  
**Address:** P.O. Box 622, Heppner, OR 97836  
**Phone:** 541-676-5161  
**Fax:** 541-676-9454  
**Website:** <http://www.csepp.org>

**Contact:** Morrow County Public Works  
**Address:** P.O. Box 428, Lexington, OR 97839  
**Phone:** 541-989-9500  
**Fax:** 541-989-8352  
**Website:** <http://www.morrowcountyoregon.com/publicworks/index.html>

## 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](mailto:oregon@oce.orst.edu)

## Additional Resources

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

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

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

# Landslide Resource Directory

## County Resources

**Contact:** Morrow County Emergency Management  
**Address:** P.O. Box 622, Heppner, OR 97836  
**Phone:** 541-676-5161  
**Fax:** 541-676-9454  
**Website:** <http://www.csepp.org>

**Contact:** Morrow County Public Works  
**Address:** P.O. Box 428, Lexington, OR 97839  
**Phone:** 541-989-9500  
**Fax:** 541-989-8352  
**Website:** <http://www.morrowcountyoregon.com/publicworks/index.html>

## 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](http://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](http://www.oregongeology.com)  
**Email:** [info@naturenw.org](mailto: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](mailto: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](mailto: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](mailto: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

## County Resources

**Contact:** Morrow County Emergency Management  
**Address:** P.O. Box 622 Heppner, OR 97836  
**Phone:** 541-676-5161  
**Fax:** 541-676-9454  
**Website:** <http://www.csepp.org>

**Contact:** Morrow County Public Works  
**Address:** P.O. Box 428, Lexington, OR 97839  
**Phone:** 541-989-9500  
**Fax:** 541-989-8352  
**Website:** <http://www.morrowcountyoregon.com/publicworks/index.html>

## 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](mailto: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](mailto: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 provides, businesses and governmental agencies in order to improve the viability of communities after an earthquake.

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

## Additional Resources

### Publications

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

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

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

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

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

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

## Planning and Public Process

## PRE-DISASTER MITIGATION PROGRAM STAKEHOLDERS

Greg Sweek  
PO Box 279  
Heppner OR 97836  
541-676-5614  
[gsweek@co.morrow.or.us](mailto:gsweek@co.morrow.or.us)

Public Health Director  
Sheree Smith  
PO Box 799  
Heppner OR 97836  
541-676-5252  
[ssmith@co.morrow.or.us](mailto:ssmith@co.morrow.or.us)

Children and Families Director  
Arletha Brannon  
PO Box 544  
Heppner OR 97836  
541-676-9675

Morrow County Health District  
Victor Vander Does, Administrator  
P.O. Box 9  
Heppner, OR 97836

Morrow County Public Works  
Burke O'Brien, Director  
P.O. Box 428  
Lexington, OR 97839  
989-5702

Morrow County Public Works  
Bob Nairns, Deputy Director  
P.O. Box 428  
Lexington, OR 97839  
989-5704

Ken Matlack  
Morrow County Sheriff  
P.O. Box 159  
Heppner OR 97836  
[mcsheriff@co.morrow.or.us](mailto:mcsheriff@co.morrow.or.us)

Lisa Mittlesdorf  
Port of Morrow  
P.O. Box 200  
Boardman, OR 97818  
541-481-7678 Office  
541-481-2679 Fax

Casey Beard  
PO Box 622  
Heppner OR 97836  
541-676-5132  
[casey@csepp.org](mailto:casey@csepp.org)

Boardman Rural Fire Protection District  
Mark Rogelstad  
300 SW Wilson Lane  
Boardman OR 97818  
481-3473

Pilot Rock Rural Fire Protection District  
Ron Neeley  
P.O. Box 877  
Pilot Rock, OR 97868  
541-443-3473

City of Heppner Fire Department  
Rusty Estes  
P.O. Box 743  
Heppner, OR 97836  
676-2922

Heppner Rural Fire Protection District  
Don Bennett  
61853 Hanna-Arbuckle Road  
Heppner, OR 97836  
676-9771

Ione Rural Fire Protection District  
P.O. Box 6  
Ione, OR 97843  
422-7303

Irrigon Chamber of Commerce  
Laura Clark  
P.O. Box 678  
Irrigon, OR 97844  
541-564-0420  
fax: 541-564-0396

Heppner Chamber of Commerce  
Claudia Hughes  
111 North Main Street  
Heppner, OR 97836  
676-5536

The Nature Conservancy  
Columbia Plateau Office  
Leslie Nelson  
P.O. Box 314  
The Dalles, OR 97058  
Phone/Fax: (541) 298-180221  
[lnelson@tnc.org](mailto:lnelson@tnc.org)

Confederated Tribes Umatilla Indian Reservation  
Eric Quaempts, Natural Resources Director  
P.O. Box 638  
Pendleton, OR 97901  
541-276-3447 fax: 541-276-3317

## PRE-DISASTER MITIGATION PROGRAM STAKEHOLDERS

Bureau of Indian Affairs, Umatilla Agency  
Jerry Lauer, Acting Superintendent  
P.O. Box 520  
Pendleton, OR 97801-0520  
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## **Stakeholder Interview Summaries**

### Finley Buttes Landfill – email correspondence June 27, 2006

Dean Large, communicated that Finley Buttes Landfill has remained open when everything else was shutdown in the severe ice storm in the winter of 2005. The landfill manager oversaw the operation during this event and managed to keep the equipment running to make sure the solid waste arriving at the landfill had a place to go. He commented that weather conditions should not severely affect the landfill. He was not aware whether Waste Connections, the owning company of Finley Buttes Landfill, had mitigated for disaster events such as volcano or earthquake in the larger regional area, which would have an effect on how/whether the solid waste could make it to the landfill.

### Trans Canada Pipeline – telephone interview, August 22, 2006

Rob Latimer, Supervisor of Community Relations, communicated that the large natural gas pipeline transecting the County is generally not affected by wildfire, windstorm and winter storm. He did express concern that massive flash flood events in the intermittent creek drainages could affect the pipeline. He recommended that the local farmers practice wise soil conservation in order to mitigate for damaging erosion events in the area of their pipeline. The following points were offered as possible threats to the gas transmission lines:

- Major washout affecting the stream channel at Willow Creek where the pipeline crosses it immediately south and west of Lone;
- Major wind storm affecting some of their facilities such as the microwave tower and buildings at their compressor station southwest of Lone; and
- Major earthquake possibility of affecting the integrity of the pipeline.

### Bonneville Power Administration – interview, May 16, 2006

David Mayer shared that the large electrical transmission towers transecting the County are not affected by wildfire, windstorm and winterstorm, and the other listed natural hazards. He did share that a tsunami crashing into the west coast of Oregon could likely have a domino effect on the electrical systems in Morrow County. He predicted that there could be temporary power outages and possible blackouts until the system was brought under normal operations in the coastal regions.

### West Extension Irrigation District – interview, June 13, 2006

Planning Department staff interviewed Bev Bridgewater, manager of the West Extension Irrigation District. Staff explained the Pre-disaster Mitigation Plan, the need for community participation, and the actions that may be taken concerning mitigation for possible natural hazard events in the area served by the District. Ms. Bridgewater explained her concerns with windstorms and the possibility of flooding due to overflowing irrigation ditches due to weeds, mostly tumbleweeds in the canals during storms. The most canal congestion occurs in the Boardman area where the canals are narrower. Automated shut-down systems at the headgates and at the pump stations in the case of canal failure (not electrical failure) would be a potential benefit. Ms. Bridgewater recommended an Action Item be submitted for the installation of an automated shut-down system to mitigate against canal failure which could occur if the canals were completely blocked by windstorm blown weeds or damaged in an earthquake event.

### Oregon Department of Transportation – interview, July 13, 2006

Planning Department staff interviewed George Ruby, Oregon Department of Transportation (ODOT), manager of District 12 and his staff: Jim King, Heppner and

Spray section crew Manager, Allen Deaton, Hermiston and Landscape crew Manager, and Marilyn Holt, ODOT District 12, Assistant District Manager. Staff explained the Pre-disaster Mitigation Plan, the need for community participation, and the actions that may be taken concerning mitigation for possible natural hazard events in the highway system served by District 12. Mr. Ruby explained that ODOT already has mitigation procedures in place for natural hazards affecting the state highways in Morrow County.

- Wind/winter Storms

Oregon Department of Transportation has “level of service” documents, which detail how to prepare for winter operations, dealing especially with snow and icy conditions. ODOT has features in place to mitigate against extreme dust storm conditions. They have signs along Interstate 84 warning of severe dust storm conditions, they have an agreement with the Oregon State Patrol concerning implementation their program for dealing with dust storms. They have cameras at various interchanges to monitor weather conditions, there are highway advisory radios (HARs) that give messages about highway conditions, they have a variable message sign at Boardman that warns motorists of high winds, reduced visibility, smoke and other various warning messages.

- Landslides

ODOT has a standing program for addressing rock fall projects that are mostly incident driven. There is a memorandum of Agreement with Morrow County indicating that ODOT will cooperate with the County to share people and equipment if the need arises to clear a landslide on State or County roads in a timely manner.

- Volcanic and Earthquake

The Department relies on their Emergency Operations Manual, which provides guidance concerning catastrophic events such as a volcano and earthquakes. They conduct an earthquake exercise each year to keep their personnel trained as to required actions after an earthquake event.

- Wildfire

Morrow County and ODOT have agreements in place as to what role the Department will have in case of wildfire. The agreements are located in the District Office.

ODOT provides public information on proper winter driving techniques and on how to be prepared and dust storm awareness.

Portland General Electric (PGE) – telephone interview, August 29, 2006

Bob Conner, Safety and Health Consultant for PGE discussed with Staff the effect of the eight listed natural hazards to their two operations, the Boardman Coal Fired Plant and the Coyote Springs Co-generation Plant at the Port of Morrow, as outlined below:

- Drought – no effect
- Earthquake

Portland Gas & Electric (PGE) – telephone interview, August 29, 2006

Bob Conner, Safety and Health Consultant for PGE talked with Planning Staff about the eight listed hazards and how they potentially affect their operations. Portland Gas & Electric operates two electrical generation facilities in Morrow County, the Boardman Coal-fired plant and the Coyote Springs co-generation facility at the Port of Morrow. Mr. Conner indicated that PG&E has an Emergency Response Procedure they refer to

concerning natural disaster events. More specific natural hazard information was offered as listed below:

- Drought – PG&E is not impacted by drought emergencies;
- Earthquake – the facilities are built to required seismic standards. Severe earthquake situations are to be handled according to the Emergency Response Procedure;
- Flood – The reservoir at the Coal-fired plant is below the facility. There have been no flooding incidents there or at the Co-generation facility;
- Landslides – their facilities are not located in an area where landslides are a risk;
- Volcanic – severe volcanic events are to be handled according to the Emergency Response Procedure;
- Wildfire – The PG&E facilities are protected via agreement with Boardman Rural Fire Protection District. The area around the Boardman Coal-fired plant has a new auxiliary fire station, plus a wildland fire unit to address wildfire emergencies;
- Windstorm and Winterstorm – the Boardman coal-fired plant has heavy equipment that can move tumbleweeds, sand or snow as needed during wind and winterstorm emergencies.

**Draft MEETING MINUTES**  
**Pre-Disaster Mitigation Steering Committee**  
**September 12, 2006**  
**Sand Hollow Room, Port of Morrow, Heppner, Oregon**

**Members Present:** Larry Burns, Linda Curtis, Zack Barresse, Janet Greenup

**Staff Present:** Carla McLane, Lori Timmons, Sandi Putman, Darcy Bergstrom

The meeting was called to order at 8:40 a.m.

**Minutes of the August 22, 2006 Steering Committee Meeting**

Linda Curtis moved that the minutes of the August 22 meeting be approved as presented, the motion was seconded by Zack Barresse. The Committee approved the minutes as presented.

**The Plan - Where we are now and what's next**

Carla McLane presented the Draft Plan to the Committee. She explained the correspondence with Krista Mitchell of the Natural Hazards Work Group, and included the things that need to be added:

- City language for adoption
- City and County maps
- Meeting minutes for today and August 22
- Appendix H The Regional Economic and Transportation study
- Additions needed to Appendix E the Programs Plans and Policies in Morrow County
- Additions to Section 1 as far as the planning process, which is an ongoing process

Carla went through each part of the Plan and explained what was added or changed:

Section 1 - Ongoing updating as to the public process through adoption;

Section 2 - The building permits table in the Development Trends section was completed and added to in order to provide data for five years;

Section 3 - The landslide risk summary was expanded to include landslide history and location in Morrow County;

Section 4 - No changes, but the Action Item Matrix will need to be checked for accuracy one more time;

Section 5 - The rank order in Step 2 of the Project Prioritization Process (page 5-1) was re-ordered as confirmed by the Steering Committee on August 22.

**Appendices**

Appendix A - The names were taken out and page breaks put into Appendix A. The contact information for the NRCS was updated per instruction of Janet Greenup;

Appendix B - Planning Process information, such as meeting minutes, will be added as needed;

- Appendix C - No changes to the Household Natural Hazards Preparedness Survey;
- Appendix D - No changes to the Economic Analysis of Natural Hazard Mitigation Projects;
- Appendix E - The required changes to the Existing Plans, Policies, and Programs in Morrow County will be provided by the Natural Hazards Workgroup;
- Appendix F - No changes to the Tools appendix;
- Appendix G - No changes to the List of Acronyms;
- Appendix H - Still waiting for this appendix from the Natural Hazards Workgroup;
- Appendix I - No additions to the Action Items. There was some editing as requested by Krista Mitchell of the Natural Hazards Workgroup.

### **Risk Annexes**

There have been no changes made to the eight risk annexes. Planning Staff is anticipating some editing work from the Natural Hazards Workgroup concerning the Earthquake summary in that the table of Vulnerability and Probability Assessment needs to be changed from "windstorms."

### **City Annexes**

Carla introduced the City annexes and explained the content of each city section. Planning Staff added a summary in each City annex outlining city interviews and issues each city has in relation to the natural hazard risks. If the city submitted Action Items, a copy is included as well.

Carla McLane then asked the Committee if they were willing to move for forwarding the draft Plan to OEM and FEMA for review. She told the Committee about the future of the plan and who will administer it. It will be required to be looked at on a yearly basis, and after 5 years a thorough review will be needed. Emergency Management and Public Works will share the responsibility for maintaining the Plan with assistance from the Planning Department. It was moved by Linda Curtis to forward the draft plan to OEM and FEMA with the needed corrections, seconded by Sandi Putman. Motion passed.

**Adjournment:** 9:30 a.m.



**MEETING MINUTES**  
**Pre-Disaster Mitigation Steering Committee**  
**August 22, 2006**  
**Pettyjohn Building, Heppner, Oregon**

**Members Present:** David DeMayo,, Ken Grieb, Zack Barress (POM), Linda Curtis

**Staff Present:** Carla McLane, Lori Timmons, Darcy Bergstrom

The meeting was called to order at 8:40 a.m.

**Review of the Minutes of the July 11, 2006 meeting**

David DeMayo motioned and Linda Curtis seconded the minutes be approved as presented.

**Vision Statements - discussion**

Lori Timmons shared that according to Krista Mitchell of the Natural Hazards Workgroup, a vision statement is not strictly required. The Steering Committee considered the options given by the Planning Staff, and also considered not having one at all. The Steering Committee chose the second vision statement option as the Plan's Vision Statement, which states: "To maximize Morrow County's resistance and resilience to natural hazards in both government and private sectors through preparedness and mitigation."

**Action Items**

Carla introduced the Draft Plan binder to the Committee and discussed the Action Items in Tab I within the Plan Appendix. The Committee indicated that they do not wish to review each Action Item. Darcy Bergstrom shared that Lisa Mittlesdorf of the Port of Morrow is working on Homeland Security grants. Backup power has been addressed in these grants according to Zack Barress. Planning will followup with the Port concerning their possible issues and concerns and other opportunities.

**The Plan: Overview of the Sections**

**Section 1**

Carla McLane reviewed the changes and additions and what still needs to be added. As the Plan nears completion parts and pieces will be completed in this section as well.

**Section 2**

This Section was reviewed and there were a few revisions that were discussed. The Committee recommended that Planning staff check to see if the Hardman Community Center is listed on a historical register, as it had received grant money after it was damaged by a flood. The Irrigon area has two fish hatcheries, only one of which is listed in the Plan.

### Section 3 vulnerability

The Committee reviewed the Risk Assessments and recommended that an Action Item to evaluate the drought and windstorm assessments be created. David DeMayo and Carla McLane discussed how this Plan will be reflected in County policy. The County will need to review the Comprehensive Plan and make updates to it and the Zoning Ordinance as needed to put natural hazard risk work into everyday policy decisions and awareness. This Plan will be adopted by resolution of the County Court, as it is not a regulatory plan. Any regulations that may come about as a result of this plan must be separately adopted within an already existing policy framework, such as the Zoning Ordinance.

### Section 4.

Carla McLane discussed how the goals, mission and vision statements will be useful for the County Court. They will aid in the goal setting for the Court's agenda and will help clarify the natural hazard mitigation work that needs to be done.

### Section 5

This section was introduced to the Steering Committee for the first time. This section provides guidelines for post-adoption work as the years go by. Once the Planning Department is finished with the development of this Plan, the Emergency Management and Public Works Departments will be doing the work of updating the Plan. The Planning Department will work with those Departments with planning responsibilities such as Goal 7 work.

Carla discussed the rank ordering of hazards. The Committee considered the ordering and allowed them to stand.

Carla discussed the procedure for FEMA approval and the adoption by the cities.

Break: 9:35 - 9:43

The Appendices were discussed next. The Committee recommended the names be removed from the contact information in Appendix A. Carla McLane introduced and explained the other appendices, B through I. Finally, Carla McLane showed the Committee the Draft Plan Binder and described each section, including the city tabs where the cities will be required to approve the Plan by resolution.

**Next PDMP Meeting**

Port of Morrow Sand Hollow Room at 08:30 a.m. on September 12, 2006.

**Adjournment** 10:11 a.m.

**MEETING MINUTES**  
**Pre-Disaster Mitigation Steering Committee**  
**June 06, 2006**  
**Pettyjohn Building - Heppner, Oregon**

**Members Present:** Dave DeMayo, Janet Greenup, Steve Rhea

**Members Absent:** Gary Neal/Ron McKinnis, Larry Burns, Linda Curtis, Billie Jean Morris,  
Ken Grieb, Brett Cook, Mark Burrows

**Staff Present:** Carla McLane, Lori Timmons, Sandi Putman

**Staff Absent/Excused:** Darcy Bergstrom

The meeting was called to order at 8:34 a.m.

**Election of Chair and Vice-Chair**

The Committee nominated Ken Grieb as Chair and Steve Rhea as Vice-Chair, Chair nominated by Dave DeMayo and seconded by Janet Greenup.

**Review of the Minutes of the April 25, 2006 meeting**

Janet Greenup motioned and Sandi Putman seconded the minutes be approved as presented.

**Re-Cap of the Stakeholder Event of May 16**

Carla McLane discussed the meeting and the mapping exercise performed by the Stakeholders.

**Discussion of the May 19 Storm Event**

The storm event was valuable to this process because the storm event brought a large dose of natural event reality to the PDMP participants. The Public Works Department was able to document Action Items based on a real, close at hand event. There were many action items generated based on the flooding and other events on County roads.

**The Plan: Section 1**

Developing Plan Mission:

Carla McLane passed out additional handouts with samples of possible mission statements and discussed the style differences between Jackson and Clackamas Counties Pre-disaster Mitigation Plans. The Committee preferred the Jackson County example.

The Committee considered the language of the various possibilities and came up with the idea that you can't prevent loss, you can only try to reduce loss. Identifying the risks and planning for the worse and how you deal with it is the most important.

To put it as Mission Statement: **To identify and reduce risk, work to prevent loss and protect life, property and the environment from natural hazard events through coordination and cooperation among public and private partners.**

Developing Plan Goals:

The Committee considered the examples provided by the Jackson and Clackamas Countys' Goals. The Committee developed the goals for Morrow County as listed below:

- Property protection: use Jackson County 's but add the third bullet from the Clackamas County list under Protect Life and Property;
- Education and Outreach/Public Awareness: Use Jackson County's goal and Clackamas County's second bullet;
- Preventative: Use the Jackson County's goal;
- Partnership and Coordination: Use the Jackson County's goal but put in some of the the first bullet language from Clackamas County;
- Structural Projects: Use Jackson County's goal;
- Natural Resources: Use Jackson County's goal and the first bullet of Clackamas County's Natural Systems goal;
- Emergency Services: Use Jackson County's goal but add the third bullet of Clackamas County's Emergency Services goal.

### **The Plan: Section II**

The Committee reviewed and discussed this section and made several good suggestions. The drainages in the southern portion of the County subject to periodic flash flooding were added and it was suggested to add a sentence or two discussing the geologic reason for flash flooding problems in that particular portion of the County.

The Committee considered including a discussion about the Conservation Reserve Program (CRP) and how it may have contributed to flood or erosion mitigation in agricultural areas containing CRP fields. It was suggested staff contact Jay Gibbs or Skip Matthews for further information.

In the Land and Development section, Carla suggested staff research the water study conducted in the Planning Department for the Department of Water Resources for added information on rural and urban development and to do further research on building permits in the Planning Department files. Development trends need to include the possibility of the development of the racetrack and possible other development trends for the northern portion of the County near Boardman.

Action Item Proposal Forms.

Carla explained the action item information form with added information from Krista Mitchell.

### **Stakeholder Event Ratification of Information**

The Committee viewed and ratified the mapping information gathered at the Stakeholder event on May 16. The Committee recommended staff add cultural information to a finished base map with more information on cemeteries and old schools and other pertinent information gathered from the local historical society.

The next meeting is scheduled for July 11, at the Port of Morrow Sand Hollow Room at 8:30 a.m. What we hope to accomplish is polish section I, finish Section II, develop the 1st cut of Section III and Annexes with their contents identified. Staff will have coordinated with the cities and chambers.

The meeting was adjourned at 10:40 a.m.

**Meeting Minutes**  
**Pre-Disaster Mitigation Steering Committee**  
**April 25, 2006**  
**City of Boardman Council Chambers**

**Members Present:** Linda Curtis, Larry Burns, Dave DeMayo, Ken Grieb, Steve Rhea, and Janet Greenup

**Staff Present:** Carla McLane, Lori Timmons, Casey Beard for Darcy Bergstrom, and Sandi Putman

The meeting was called to order at 8:35 a.m.

**Welcome and Introductions**

Introductions were made and Carla requested that the Committee elect their own Chair and Vice-Chair. Dave DeMayo, seconded by Ken Grieb moved that we wait until the next meeting. Motion passed.

**Purpose and Objectives**

Carla discussed the Disaster Mitigation Act of 2000 which stipulates pre-disaster mitigation for all local jurisdictions. Larry Burns asked for a copy to give to the Fire Board and Carla offered to send each committee member a copy of the Act. Carla explained the pre-disaster mitigation plan process and where the County stands in this process. Larry Burns expressed concern about this plan process and its possible effectiveness. Carla explained that FEMA will not fund post-natural disaster efforts in jurisdictions without an adopted Pre-disaster Mitigation Plan. Additionally, when there are needed projects and they are listed as Action Items for pre-disaster mitigation in the Plan, these needed projects may be then funded by FEMA.

**The Tools in the Binder**

Carla explained the sections behind the tabs and introduced the section additions. The additions were the Plan Sections 1 - 5 to be put behind the tab called "The Plan." These sections are the framework for the future Plan and will be used to create what will become the Morrow County Pre-Disaster Mitigation Plan. The other additions were the local risks to be assessed. They included the categories: drought, earthquake, flood, landslide, volcano, wildfire, windstorm, and winterstorm. They were placed behind the tab called "Local Risks."

The meetings times and dates were discussed and it was decided to keep the present dates and times as they have been scheduled. We all understand that we may need to miss a meeting.

**Stakeholder Event**

Carla discussed why we are doing the Stakeholder Event which will be held May 16 at the Port of Boardman Conference Room. It is a massive effort to gather information as to cultural, historic, and infrastructure assets. The purpose of the Event is also to glean possible problems, comprehensive natural hazard risks, where they are, what they are, mitigation ideas, and transportation corridors from a large contingent of local citizens with interests and/or expertise in various informational areas. The Committee members made several suggestions for possible additions to the list such as local representatives of insurance companies.

### **Development of The Plan**

Carla explained the Steps outlined in the Scope of Work. The Plan will include the City inclusions and the steps for Plan maintenance.

Carla explained the plan templates and how we will add information. She urged the Committee to help add information. Larry asked for an Action Item Proposal Form sample and instructions. Dave DeMayo mentioned alternate power generation and that Heppner might need help with this as a response issue. The Wildfire Plan will be added to the wildfire annex. Casey informed the Committee that the Wildfire Plan is also on the internet on the CCEPP website. Larry asked if the Plan will include risks not identified in the risk annexes, such as tornados. Carla informed the Committee that we can add other risks if we identify an advantage to it. Steve Rhea asked how a drought declaration would connect with this Plan and the FSA and crop mitigation? Carla said that process is another aspect of drought mitigation but not handled through the FEMA process. Casey mentioned that Action Items could be used to mitigate possible drought situations with prior planning, such as small dams, etc.

Carla will send the link to the CCEPP Response Plan to the Committee members.

**Schedule Date for Next PDMP Meeting** May 16<sup>th</sup>, 2006 at the Port of Morrow Conference Room for the Stakeholder Event.

**Adjournment:** 11:25 a.m.

**Pre-Disaster Mitigation Program  
Steering Committee  
Meeting Agenda  
City of Heppner, Pettyjohn Building  
August 22, 2006, 8:30 a.m.**

- |      |  |           |
|------|--|-----------|
| I.   | Informal Discussion                                | 8:30 a.m. |
| II.  | Review of the Minutes of the July 11, 2006 meeting | 8:40 a.m. |
| III. | Vision Statements (Section 4)                      | 8:45 a.m. |



- In accordance with the Natural Hazard Policies of the Comprehensive Plan, Morrow County will practice hazard vulnerability reduction in the governmental jurisdictions and the private sectors with the purpose of resistance and resilience to the hazards of natural disasters.
- To maximize Morrow County's resistance and resilience to natural hazards in both government and private sectors through preparedness and mitigation.
- The vision is a future in which all communities that are vulnerable to natural hazards have the practices, policies and capabilities to minimize the negative impacts of such hazards on the private and public sectors. (From the National Pre-disaster Mitigation Plan)
- Keeping natural hazards from becoming disasters.
- To integrate resistance and resilience to natural hazards as a policy objective of all planning in Morrow County so that it becomes a normal assumption behind daily planning activities.
- To utilize the vision of the Comprehensive Plan in a manner that integrates the natural hazard mitigation goals into the daily planning activities of the public and private sectors.
- Integrate the natural hazard mitigation goals into the daily planning activities of the public and private sectors.
- Local communities, public agencies and private organizations in Morrow County have the practices, policies and capabilities to minimize the negative impacts of natural disasters through daily planning activities.

IV.	Action Items Review of submitted items and addition of any new items	9:00 a.m.
V.	The Plan: Section 1, 2 and 5 Section 1 - we keep adding information as events take place Section 2 - we have added cultural and historic resources and critical infrastructure Section 5 - all new	9:30 a.m.
	BREAK	10:15 a.m.
VI.	The Plan: Final Look What will the final document look like - Sections; Annexes; and Appendices	10:25 a.m.
VII.	Next Meeting - Adoption Recommendation September 12, 2006 8:30 a.m. Sand Hollow Room Port of Morrow Riverfront Center	11:25 a.m.
VIII.	Adjournment	11:30 a.m.

Thanks for your time. It is appreciated.

**Pre-Disaster Mitigation Program  
Steering Committee  
Meeting Agenda  
City of Heppner, Pettyjohn Building  
June 6, 2006**

- I. Election of Chair and Vice-Chair
- II. Review of the Minutes of the April 25, 2006 meeting
- III. Re-cap of the Stakeholder Event on May 16
- IV. Discussion of the May 19 storm event
- BREAK 10:00 a.m.
- V. The Plan: Section 1 10:15 a.m.
  - Selection of Mission Statement and PDMP Goals
- VI. The Plan: Section 2 10:45 a.m.
  - Community Profile

- |       |   |               |
|-------|---|---------------|
| VII.  | Stakeholder Event - Ratification of Information<br>a.m. | 11:00         |
| VIII. | Next Meeting Date and Place and Adjournment             | 11:30<br>a.m. |

Thanks for your time. It is appreciated.

Pre-Disaster Mitigation Program  
Steering Committee  
Meeting Agenda  
City of Boardman Council Chambers  
April 25, 2006

- |       |   |            |
|-------|---|------------|
| I.    | Welcome and Introductions               | 8:30 a.m.  |
| II.   | Election of a Chair and Vice-Chair      | 8:45 a.m.  |
| III.  | Purpose and Objectives                  | 8:55 a.m.  |
| IV.   | Your Binder                             | 9:10 a.m.  |
| V.    | Additions to "The Plan"                 | 9:15 a.m.  |
| VI.   | Future Meeting Dates and Places         | 9:25 a.m.  |
| VII.  | Stakeholder Event                       | 9:35 a.m.  |
| VIII. | BREAK                                   | 9:50 a.m.  |
| IX.   | Review of Morrow County's Scope of Work | 10:00 a.m. |
| X.    | PDMP Seven Step Process                 | 10:30 a.m. |
| XI.   | Review "The Plan"                       | 11:00 a.m. |
| XII.  | Adjourn                                 | 11:30 a.m. |

Thanks for your time. It is appreciated.

**MEETING MINUTES**  
**Pre-Disaster Mitigation Steering Committee**  
**July 11, 2006**  
**Port of Morrow Sand Hollow Room**

**Members Present:** Linda Curtis, Larry Burns, David DeMayo, Steve Rhea, Zachary Barresse for the Port of Morrow, Mark Burrows, Janet Greenup

**Members Absent:** Billie Jean Morris, Ken Grieb, Brett Cook

**Staff Present:** Carla McLane, Lori Timmons, Sandi Putman, Casey Beard for Darcy Bergstrom  
The meeting was called to order at 8:37 a.m.

**Minutes**

David DeMayo moved the minutes be approved as presented, Steve Rhea seconded the motion.

**Re-cap of the last Steering Committee Meeting**

Carla McLane reviewed the June 6<sup>th</sup> Steering Committee meeting for the benefit of the members who were not in attendance.

**The Plan: Section 1**

Carla McLane discussed the new additions to this Section and explained that Section 1 will be completed along with the Plan as it is completed. Larry Burns asked Casey Beard if the CSEPP readerboards could be used to respond to natural disasters. Casey said yes, if they get permission from ODOT. Each readerboard could be programmed with different messages. The problem is permission and funding. The boards are controlled in Hermiston for the north and in Heppner for the south.

**The Plan: Section 2**

There have not been many changes to Section 2. Carla discussed each part of the Section for the benefit of the Committee members. The Committee indicated the need to fill in language in the last parts of Section 2. Larry Burns suggested that we should identify each of the critical assets we have available that could be affected in a disaster. The Committee decided that a more detailed list is desirable.

**The Plan: Section 3**

Comments and suggestions are as follows:

Drought

- Change NRCS to FSA at the end of this section.

- Casey Beard informed the Committee that there have been some drought mitigation already discussed by the Bureau of Reclamation. This information should be included within the Plan. Look for the information in the Bureau of Reclamation, Boise office.
- The large incidence of Conservation Reserve Program (CRP) participants has helped the drought situation. This information should be included.

#### Earthquake

- Casey Beard informed the Committee about some additional earthquakes that have occurred in Morrow County: Martha Doherty, Emergency Management, has the information about them, as well as DOGAMI.
- Hanford has the most extensive information about fault lines in this region.
- The Willow Creek dam is most vulnerable to earthquakes. They do have some seismographs within the dam.
- There has been work done on the schools to mitigate for earthquake in Irrigon. This work has been done on AC Houghton, the Junior High, the High School, the new elementary school and the special ed school. The CSEPP building has also been designed to withstand earthquake. SCM Gill Hibbs has the information as well as CSEPP.

#### Flood

- Casey Beard discussed the ditch that helps drain Rietmann Canyon in Lone. It was cleaned and raised but there is still concern about flooding there. Many culverts have been upgraded. Rhea creek has some flooding problems still.
- Carla McLane discussed the flood map update being accomplished by FEMA and shared that Lone has an increased flood area. As an Action Item, the County and cities will need to update their Comprehensive Plans and ordinances.
- Carla discussed additional flood requirements in the CRS program. This could be an Action Item if the community thinks it would be desirable.
- Page 8 - Ruggs is located on Rhea Creek, not Willow Creek.
- Casey Beard shared that ice dams as a cause for flooding have occurred in Lone and Lexington. This would be a consequence of a winter storm.
- Repetitive losses: FEMA has few records of those but Steve Rhea indicated that the fire department has responded in Lone several times.
- Janet Greenup indicated that the Heppner watershed work needs to be clarified, that it wasn't just done on Shobe Creek. Use "Heppner watershed" instead.

#### Landslides

- Casey Beard indicated that landslides occur on Highway 207, the road into Blake Ranch, and Coal Mine Hill. He informed the Committee that if the road to Blake Ranch were to be blocked the population there would be trapped.
- Janet said the landslide map might be compatible with their soils map, which could provide additional information.

#### Volcano

- There was some discussion about the outcome of ashfall on Morrow County.

- Larry Burns asked about the chart in the volcano paragraph and why it wasn't filled in as to mitigation suggestions for ash fall over the County. Staff will fill in those blanks and discuss post-event ash fall.

#### Wildfire

- There is a mutual aid agreement with the Boardman Fire Department and the Navy Bombing Range.

#### Windstorms

- Use "Russian Thistle" when referring to tumbleweeds.
- The Committee suggested the need for an Action Item concerning backup power to provide uninterrupted power to communication systems and other critical facilities due to windstorms.
- The Plan should discuss agricultural mitigation such as grass in circle corners and weed/blizzard fences to protect roads in low areas.

#### Winter storms

- The Committee suggested the Plan identify power outages and power poles breaking during winter storms.
- As far as natural hazards, dust and ice storms have killed the most people in Morrow County due to associated traffic accidents, according to Casey Beard. Fog has also caused a fatality or two as well.
- The first set of swing barricades was erected on I-84 because of the blowing dust and associated catastrophic traffic accidents in Umatilla County.

#### **Vision Statement**

Carla McLane shared the Natural Hazards Element of the Morrow County Comprehensive Plan. The Natural Hazard Policies were suggested by Carla to help the Committee develop the Vision Statement. The Committee discussed the broad meaning of a Vision Statement. Mark Burrows mentioned that a Vision Statement identified broad, global intentions. Staff will continue to work on the Vision Statement.

**Schedule Date for Next PDMP Meeting** August 22, 2006 at the Pettyjohn Building in Heppner.

**Adjournment:** 10:45 a.m.

**Pre-Disaster Mitigation Program  
Steering Committee  
Meeting Agenda  
Port of Morrow Sand Hollow Room  
September 12, 2006**

- Informal Discussion 8:30 a.m.
- Review of the Minutes of the August 22, 2006 meeting
- The Plan - Where we are now and what's next
  - Section 1 through 5
  - Appendices
  - Annexes
  - City Tabs
- BREAK 9:30 a.m.
- What is needed to complete the Plan 9:40 a.m.



- Appendix H - Transportation Study
- Plan adoption language for the cities
  
- Motion to Submit Plan for Review 10:00  
a.m.

Thanks for your time. It is appreciated.

## **Open for Business Workshop Summary**

ONHW, with commitment from the Institute for Business & Home Safety (IBHS), provided individuals in the Mid-Columbia region with access to, and use of, the IBHS interactive, web-based *Open for Business* property protection and disaster recovery planning tool. The access was provided in two classes, one located in Hermiston, Oregon on May 24<sup>th</sup>, 2006 and the second in The Dalles, Oregon on May 25<sup>th</sup>, 2006. The following agencies and organizations were invited to attend:: agencies providing start-up and ongoing counseling services to micro and small businesses in low-income areas, such as the Statewide Small Business Development Center; agencies providing housing services to hundreds of low-income residents, such as County Housing Authorities, which also employs low-income people; and disaster assistance agencies serving at-risk populations, such as food banks and the American Red Cross. Any remaining spaces were made available to: micro- or small business start-up companies; and established micro- or small businesses.

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

### **Recruitment Process**

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

- Umatilla/Morrow County Housing Authority
- Irrigon Chamber of Commerce
- Pendleton Chamber of Commerce
- Small Business Development Center – Blue Mountain Community College
- Small Business Development Center – Columbia Gorge Community College
- Wasco County Human Services Department

*Oregon Natural Hazards Workgroup*

Community Service Center • 1209 University of Oregon

Eugene • Oregon • 97403-1209 Phone: 541.346.5833 • Fax: 541.346.2040

April 26, 2006

Greetings!

You are invited to attend the *Open for Business Toolkit* Training, co-hosted by the Oregon Natural Hazards Workgroup (ONHW) and the Institute for Business and Home Safety (IBHS).

The Open for Business Toolkit is an interactive, web-based program that businesses can follow to develop customized property protection and recovery plans (also known as contingency plans), which are then stored securely on-line for future reference and updating.

Why should your business attend the *Open for Business Toolkit* Training?

- To learn how to use the toolkit to develop disaster preparedness and recovery plans (also known as business continuity plans) to make your business better prepared for disasters;
- By preparing your business, you are helping to make the regional economy more disaster resistant; and
- It's free, the interactive toolkit is valued at \$2,000).

Who should attend the *Open for Business Toolkit* Training:

- Owners and managers;
- Risk managers; and/or
- Payroll and financial staff.

Two dates and locations are being offered for the *Open for Business Toolkit* training.

**Wednesday, May 24, 2006**

1:30 pm – 5:00 pm

Blue Mountain Community College

980 SE Columbia Drive

Hermiston, OR 97838

**Thursday, May 25, 2006**

1:30 pm – 5:00 pm

Columbia Gorge Community College

400 E. Scenic Drive

The Dalles, OR 97058

Space is limited in each session, so please RSVP as soon as possible. If you are interested in attending the training, please contact Linda White at (541) 346-3889 or [lindaw@uoregon.edu](mailto:lindaw@uoregon.edu) and indicate which training date you would prefer to attend.

# Even if the worst happens -

## **Open for Business<sup>sm</sup> -**

A Disaster Planning Toolkit  
for the Small Business Owner

### **Disaster Readiness Self-Assessment Questions**

1. Are you concerned that your normal business operations might be interrupted by a natural or human-caused disaster?
2. Have you determined what parts of your business need to be operational as soon as possible following a disaster, and planned how to resume those operations?
3. Do you and your employees have a disaster response plan in place to help assure your safety and to take care of yourselves until help can arrive?
4. Could you communicate with your employees if a disaster happened during work hours or after work hours?

5. Can your building withstand the impact of a natural disaster, and are your contents and inventory sufficiently protected so they will not be damaged?
6. Are your vital records protected from the harm that could be caused by a disaster?
7. Are you prepared to stay open for business if your suppliers cannot deliver, your markets are inaccessible, or basic needs (e.g. water, sewer, electricity, transportation) are unavailable?
8. Do you have plans to stay open for business, even if you cannot stay in or reach your place of business?
9. Have you worked with your community — public officials and other businesses — to promote disaster preparedness and plan for community recovery?
10. Have you consulted with an insurance professional to determine if your insurance coverage is adequate to help you get back in business following a disaster?

## Plan now to stay...

*Oregon Natural Hazards Workgroup*

Community Service Center • 1209 University of Oregon

Eugene • Oregon • 97403-1209 Phone: 541.346.5833 • Fax: 541.346.2040

May 2, 2006

Greetings!

You are invited to attend the *Open for Business Toolkit* Training, co-hosted by the Oregon Natural Hazards Workgroup (ONHW) and the Institute for Business and Home Safety (IBHS). The Open for Business Toolkit is an interactive, web-based program that organizations can follow to develop customized property protection and recovery plans (also known as contingency plans), which are then stored securely on-line for future reference and updating.

Why should your organization attend the *Open for Business Toolkit* Training?

- To learn how to use the toolkit to develop disaster preparedness and recovery plans (also known as business continuity plans) to make your organization better prepared for disasters;
- To use the training's information to help other businesses and organizations in your community develop their own preparedness and recovery plans; and
- There is no training fee, (the interactive toolkit is valued at \$2,000).

Who should attend the *Open for Business Toolkit* Training:

- Administrators and managers;
- Staff that provide direct assistance to businesses;
- Risk managers; and/or
- Payroll and financial staff.

Two dates and locations are being offered for the *Open for Business Toolkit* training.

**Wednesday, May 24, 2006**

1:30 pm – 5:00 pm

Blue Mountain Community College

980 SE Columbia Drive

Hermiston, OR 97838

**Thursday, May 25, 2006**

1:30 pm – 5:00 pm

Columbia Gorge Community College

400 E. Scenic Drive

The Dalles, OR 97058

The opportunity to participate in the training is being offered on a first-come-first serve basis. As a local service provider, you have been given the first opportunity to attend. If you are interested in attending the training, please contact Linda White at (541) 346-3889 or [lindaw@uoregon.edu](mailto:lindaw@uoregon.edu) and indicate which training date you would prefer to attend. Please reserve your place as soon as possible. Remaining spaces will be offered to local business owners on May 5th.

# Even if the worst happens -

## **Open for Business<sup>sm</sup> -**

A Disaster Planning Toolkit

for the Small Business Owner

### **Disaster Readiness Self-Assessment Questions**

1. Are you concerned that your normal business operations might be interrupted by a natural or human-caused disaster?
2. Have you determined what parts of your business need to be operational as soon as possible following a disaster, and planned how to resume those operations?
3. Do you and your employees have a disaster response plan in place to help assure your safety and to take care of yourselves until help can arrive?
4. Could you communicate with your employees if a disaster happened during work hours or after work hours?
5. Can your building withstand the impact of a natural disaster, and are your contents and inventory sufficiently protected so they will not be damaged?
6. Are your vital records protected from the harm that could be caused by a disaster?
7. Are you prepared to stay open for business if your suppliers cannot deliver, your markets are inaccessible, or basic needs (e.g. water, sewer, electricity, transportation) are unavailable?
8. Do you have plans to stay open for business, even if you cannot stay in or reach your place of business?
9. Have you worked with your community — public officials and other businesses — to promote disaster preparedness and plan for community recovery?

10. Have you consulted with an insurance professional to determine if your insurance coverage is adequate to help you get back in business following a disaster?

## **Plan now to stay...**

### **Open for**

### **Business<sup>sm</sup> Toolkit**

(includes CD-ROM)

### **Wildfires, floods, hurricanes/ high winds/tornadoes, earthquakes and freezing weather.**

Loss of power, waterline breaks, and computer crashes.

Disasters come in many sizes, but they can often mean big trouble for businesses, large and small. In fact, when disasters force businesses to shut down, 25% will never reopen.

But you can stay **Open for Business<sup>sm</sup>**, with advanced planning and the right tools.

That's why the Institute for Business & Home Safety (IBHS) created **Open for Business<sup>sm</sup>**, a

comprehensive disaster planning toolkit in booklet and CD-ROM formats. The easy-to-use guide

helps you reduce the potential for loss, should disaster strike, and reopen quickly should you be

forced to close. This creates savings for your business and also benefits your employees and customers who rely on it.

The kit includes valuable worksheets to help you develop a property protection and business

continuity plan, and gives you tips on disaster protection and recovery. This information can help you

identify the hazards your business faces, plan for and reduce the impact of disaster, keep your doors

open after a disaster hits, advise you on disaster supplies, and help make your business disaster resilient.

Single copies of the toolkit are available free! You can download **Open for Business<sup>sm</sup>** from

[www.ibhs.org](http://www.ibhs.org) , or you can email [info@ibhs.org](mailto:info@ibhs.org) or call 1-866-657-IBHS (4247) to request a single

copy without charge. Multiple copies can be ordered from the Public Entity Risk Institute,

[www.riskinstitute.org](http://www.riskinstitute.org).

[www.riskinstitute.org](http://www.riskinstitute.org)

The Institute for Business & Home Safety's mission is to reduce deaths, injuries, property damage, economic losses and human suffering caused by natural disasters.

**Taking the Lead in Property Loss Reduction** sm

**Pre-Disaster Mitigation Program  
Steering Committee  
Meeting Agenda  
Port of Morrow  
Sand Hollow Room  
July 11, 2006**

- |    |   |            |
|----|---|------------|
| 1. | Informal discussion                               | 8:30 a.m.  |
| 2. | Review of the Minutes of the June 6, 2006 meeting | 8:40 a.m.  |
| 3. | Re-cap of the last Steering Committee Meeting     | 8:45 a.m.  |
| 4. | The Plan: Section 1                               | 9:00 a.m.  |
| 5. | The Plan: Section 2                               | 9:30 a.m.  |
| 6. | BREAK   | 10:00 a.m. |
| 7. | The Plan: Section 3                               | 10:15 a.m. |
| 8. | Next Meeting Date and Place and Adjournment       | 11:30 a.m. |

Thanks for your time. It is appreciated.



MORROW COUNTY  
PRE-DISASTER MITIGATION PROGRAM  
STAKEHOLDER FORUM  
MAY 16, 2006 1:00 P.M.  
PORT OF MORROW CONFERENCE ROOM  
AGENDA

- I. Who is here to guide and assist us?
  - A. Carla McLane and Lori Timmons, Morrow County Planning Department
  - B. Bill Burns, DOGAMI
  
- II. Who all is here with me?
  
- III. Why are we all here? A quick explanation of the PDMP program and today's exercise.
  - A. Disaster Mitigation Act of 2000  
The Disaster Mitigation Act of 2000 (DMA 2000) provides an opportunity for states, tribes, and local governments to take a new and revitalized approach to mitigation planning. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by repealing the previous mitigation planning provisions (Section 409) and replacing them with a new set of requirements (Section 322). This new section emphasizes the need for State, Tribal, and local entities to closely coordinate mitigation planning and implementation efforts. It continues the requirement for a State mitigation plan as a condition of disaster assistance, adding incentives for increased coordination and integration of mitigation activities at the State level through the establishment of requirements for two different levels of State plans: "Standard" and "Enhanced." States that demonstrate an increased commitment to comprehensive mitigation planning and implementation through the development of an approved Enhanced State Plan can increase the amount of funding available through the Hazard Mitigation Grant Program(HMGP). Section 322 also established a new requirement for local mitigation plans and authorized up to 7% of HMGP funds available to a State to be used for development of State, Tribal, and local mitigation plans.
  
  - B. Partners for Disaster Resistance & Resilience:  
Oregon Showcase State - [www.OregonShowcase.org](http://www.OregonShowcase.org)
  
  - C. Plan Partners:  
Federal Emergency Management Agency; Oregon Emergency Management; Department of Geology and Mineral Industries; University of Oregon, Community Service Center, Oregon Natural Hazards Workgroup
  
  - D. Expected outcome of today's exercise:  
An explanation of and questions about the example map

Advise from the field - Bill Burns, DOGAMI

IV. Is there something else needed other than a Map?

A. Action Item Proposal Form

This form should include critical information on the rationale or fact base for the proposed action, ideas for implementation, coordinating and partner organizations, timeline, and plan goals addressed. This approach provides better documentation of the proposed action and keeps together all of the essential information needed to implement the action. This approach also promotes a more inclusive and dynamic approach and allows stakeholders to introduce action items both during and after the planning process by simply filling out the form and submitting it to the coordinating body for review and inclusion into the plan.

V. Time to get down to work.

Mapping Exercises and PDMP Themes:

- I. Human Populations
  - II. Economic Assets
  - III. Cultural and Historic Resources
  - IV. Infrastructure & Critical Facilities
  - V. Environmental Assets
- VI. How did today go? Did the County obtain what they needed?  
We need to identify in the final plan document what is important, why it is important and where it is located at. We also need to identify what is not working or may not work in the time of need. You have provided a lot of information today to answer those questions. But if we need more detail you will probably hear from us again.
- VII. Is it time to go yet?  
The room is reserved until 5:00 p.m., but Carla and Lori will do all they can to get us out of here before then. We know your time is valuable and want to use it to the best of our ability. Thanks much!!

# Household Natural Hazards Preparedness Survey

## Survey Report for:

(The Mid-Columbia Region)

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

## Prepared by:

**Oregon Natural Hazards  
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**August 2006**



# Special Thanks & Acknowledgements

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

Chris Fitzsimmons, Gilliam County

Ray Denny, Umatilla County

Carla McLane, Morrow County

Dennis Olson, Umatilla County

Michael Pasternak, Hood River and Wasco Counties

Shawn Payne, Sherman County

Marj Sharp, Wheeler County

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

# Appendix C: Household Risk Perception Survey

## Survey Purpose and Use

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

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

## Background

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

Citizen involvement is a key component in the natural hazard mitigation planning process. Citizens have the opportunity to voice their ideas, interests and concerns about the impact of natural disasters on their communities. To that end, the Disaster Mitigation Act of 2000<sup>1</sup>

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

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

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

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

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

## Methodology

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

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

**Table 1.1: County Mailing List Sources, 2006**

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

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

Source: Oregon Natural Hazards Workgroup

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

## Limitations

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

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

## Organization of Report

The survey results are organized into the following sections:

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

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

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



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

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

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

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

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

## Characteristics of Survey Respondents

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

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

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

**Table 2.1. Percent of Surveys Received Per County**

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

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

## Gender and Age

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

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

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

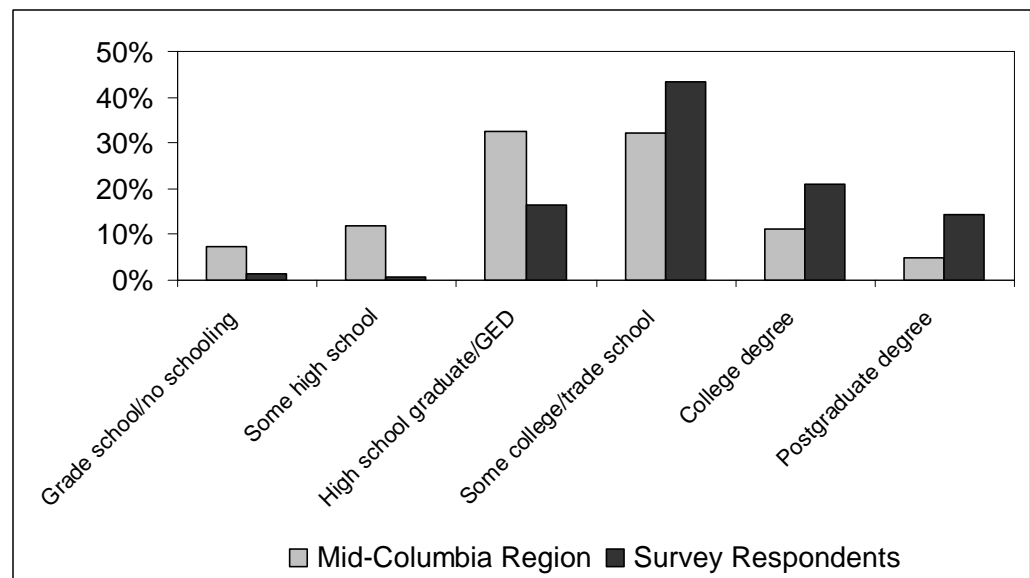
Source: U.S. Census Bureau: [www.census.gov](http://www.census.gov) (2000) and Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006).

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

## Level of Education

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

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

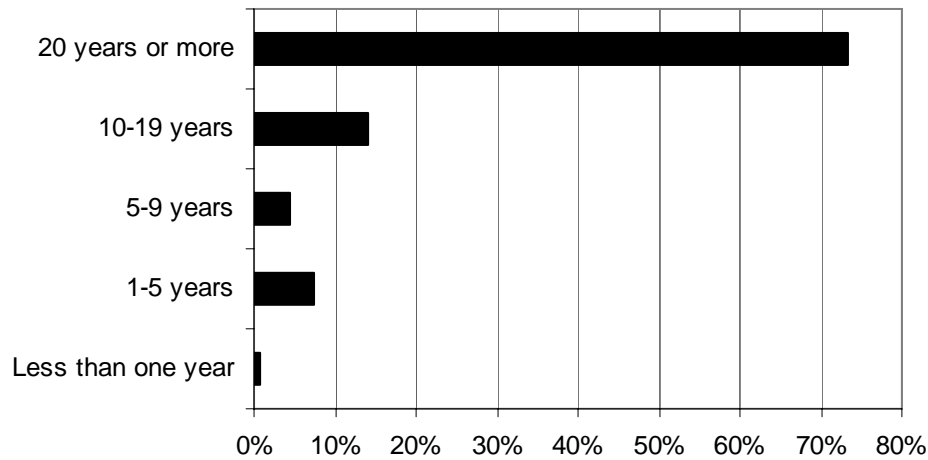


Source: U.S. Census Bureau: [www.census.gov](http://www.census.gov) (2000) and Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

## Oregon Residency

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

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



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

## Housing Characteristics

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

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

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

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

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

## Perception of Risk

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

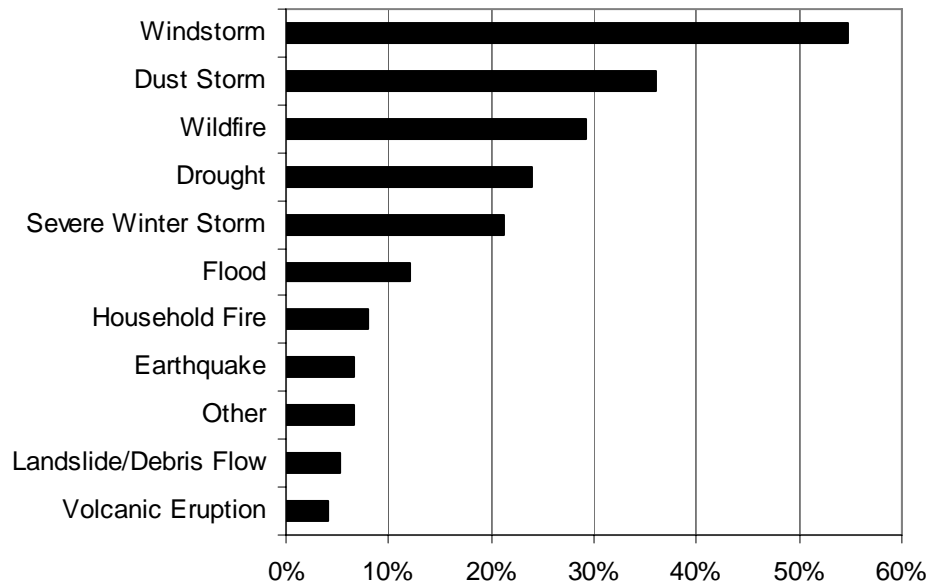
To understand the effectiveness of current outreach activities regarding home and family safety, the survey asked respondents about the types of information they receive on how to make their home and family safer. By identifying communication tools that have been effectively used in the past, local government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

## General Level of Concern

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

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

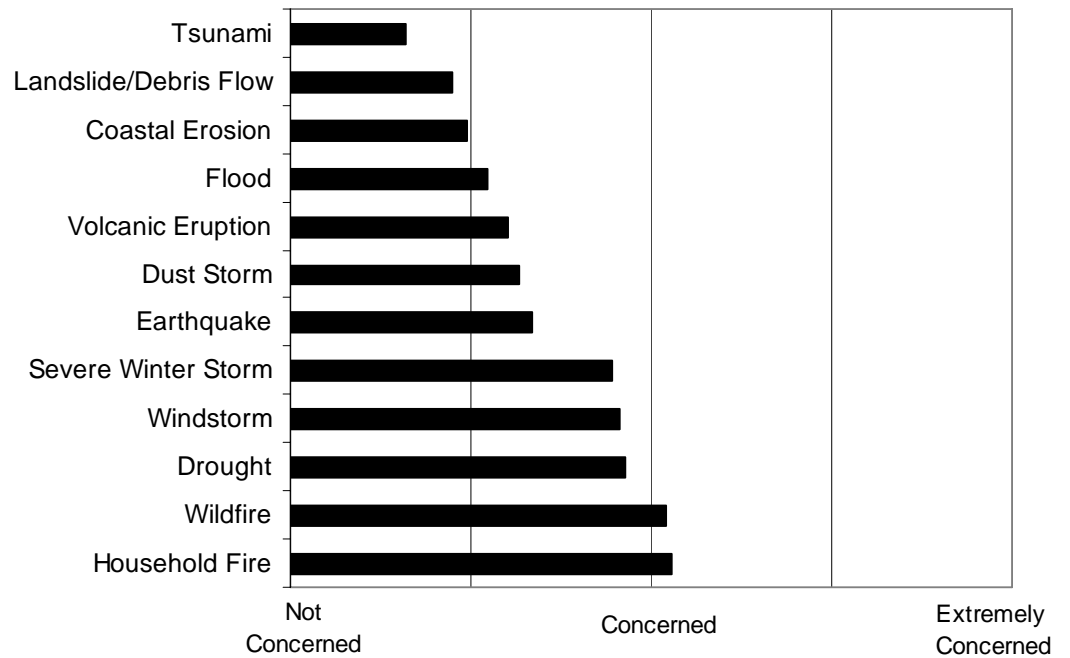
**Figure 3.1. Percent of Disasters Experienced by Survey Respondents Within the Past Five Years**



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

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

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



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

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

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

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

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

## Information Distribution

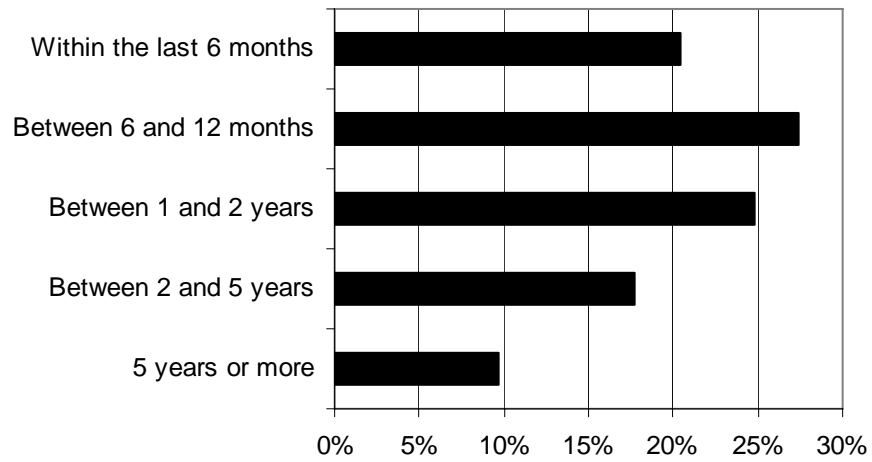
One of the objectives of the survey was to assess the amount and effectiveness of outreach activities focusing on natural hazards. The survey asked a series of questions on information and outreach.

### Recent information and sources

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



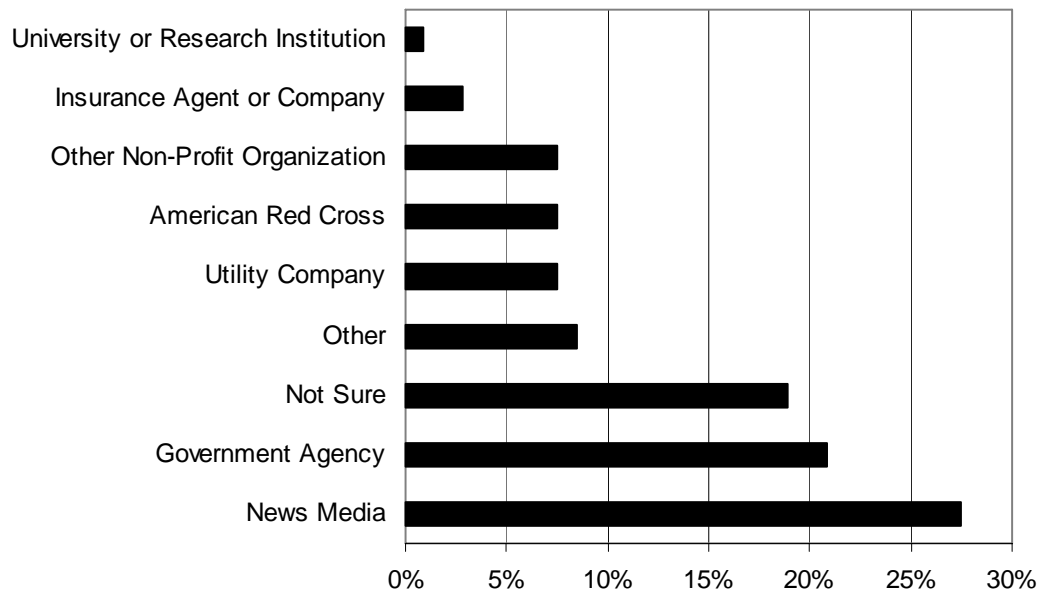
**Figure 3.3. Survey Respondents' History of Receiving Information on Family and Home Safety**



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

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

**Figure 3.4. Sources of Respondents' Most Recent Information**



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

### **Preferred Sources and Formats of Information**

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

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

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

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

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

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

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

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

## Level of Preparedness

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

### Types of Household Preparedness Activities

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

**Table 4.1. Survey Respondents’ Household Disaster Preparedness Activities**

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

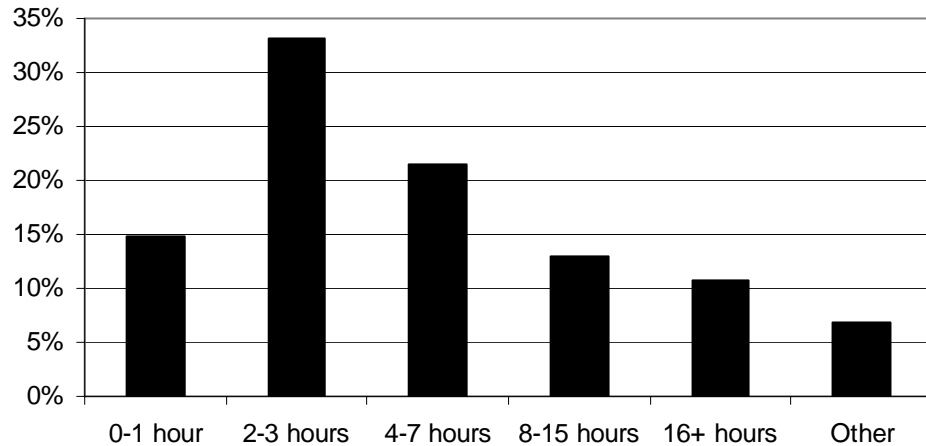
Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

### Willingness to Participate in Risk Reduction Activities

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

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

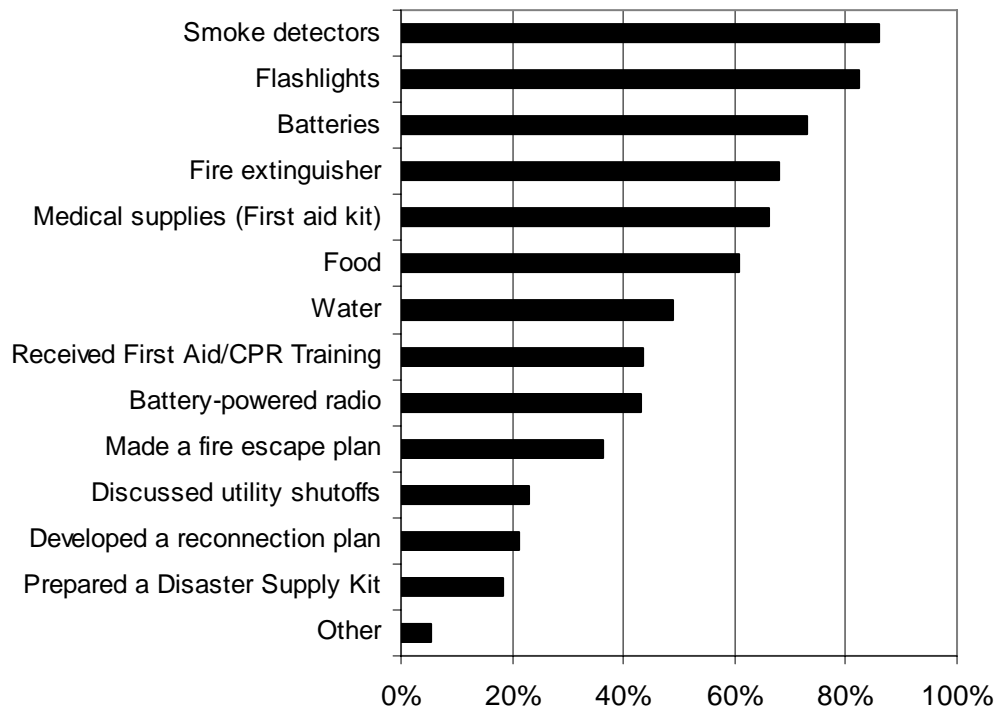
**Figure 4.1. Hours Per Year Survey Respondents Were Willing to Spend on Preparedness Activities**



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

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

**Figure 4.2. Preparedness Steps Taken by Survey Respondents**



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

### **Property and Financial Recovery**

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

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

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

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

# Natural Hazard Risk Reduction

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

## Home and Life Safety

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

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

**Table 5.1. Amount Survey Respondents Are Willing to Spend**

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

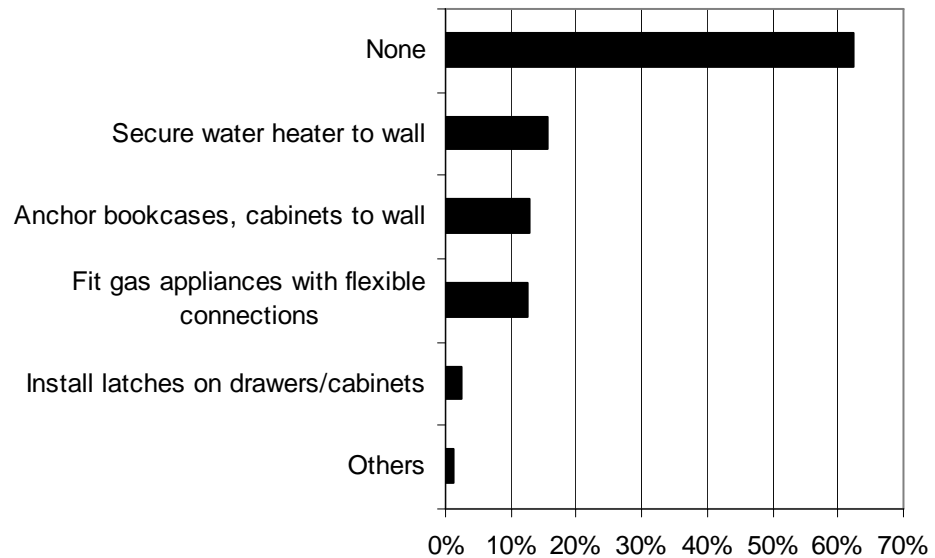
Source: Household Natural Hazards Preparedness Survey, Oregon Natural Hazards Workgroup, (June 2006)

## Nonstructural and Structural Home Modifications

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



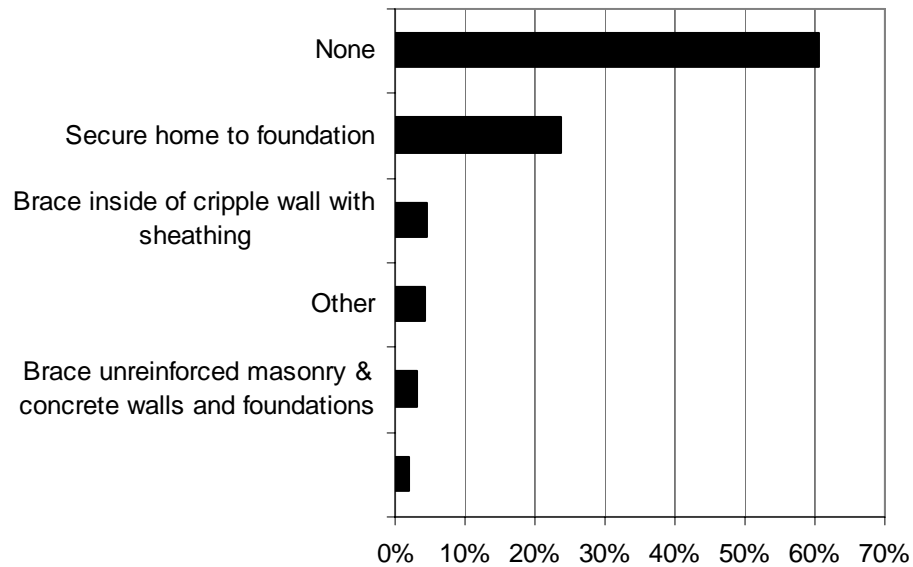
**Figure 5.1. Nonstructural Modifications Survey Respondents Have Made to Their Homes**



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

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

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



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

## Incentives

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

**Table 5.2. Survey Respondents' Preferred Incentives for Protecting Homes**

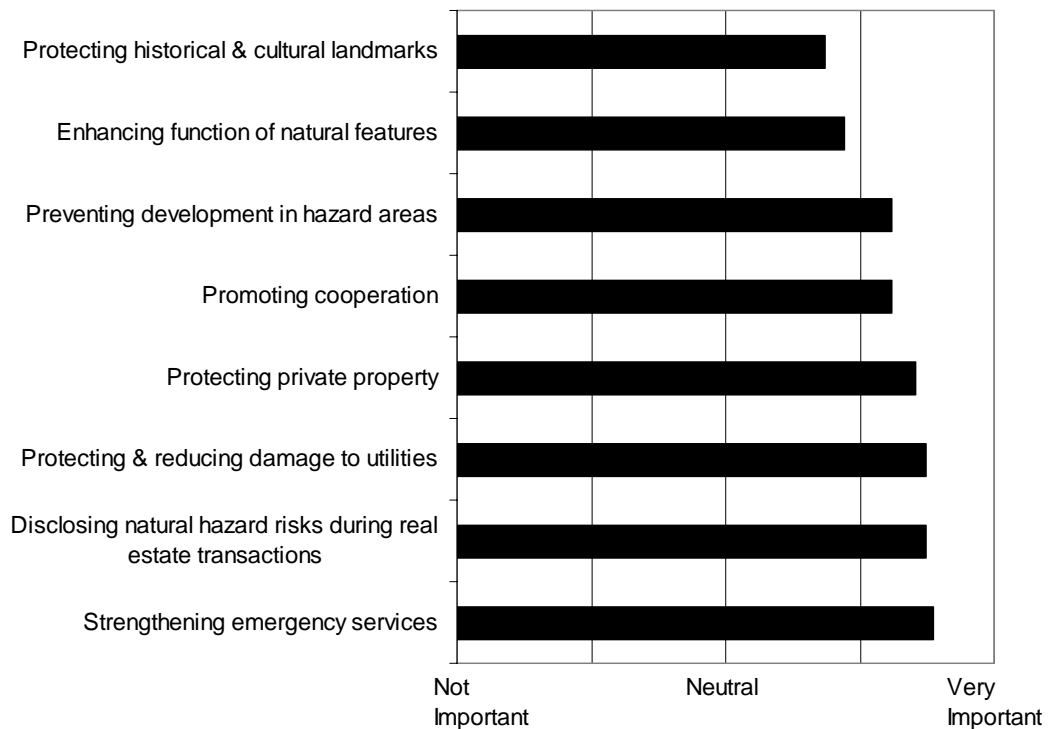
Incentive	Percent of Respondents
Tax break or incentive	67%
Insurance discount	59%
Low interest rate loan	25%
Mortgage discount	23%
None	17%
Lower new home construction costs	17%
Other	6%

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

# Community Natural Hazard Preparedness

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

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



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

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

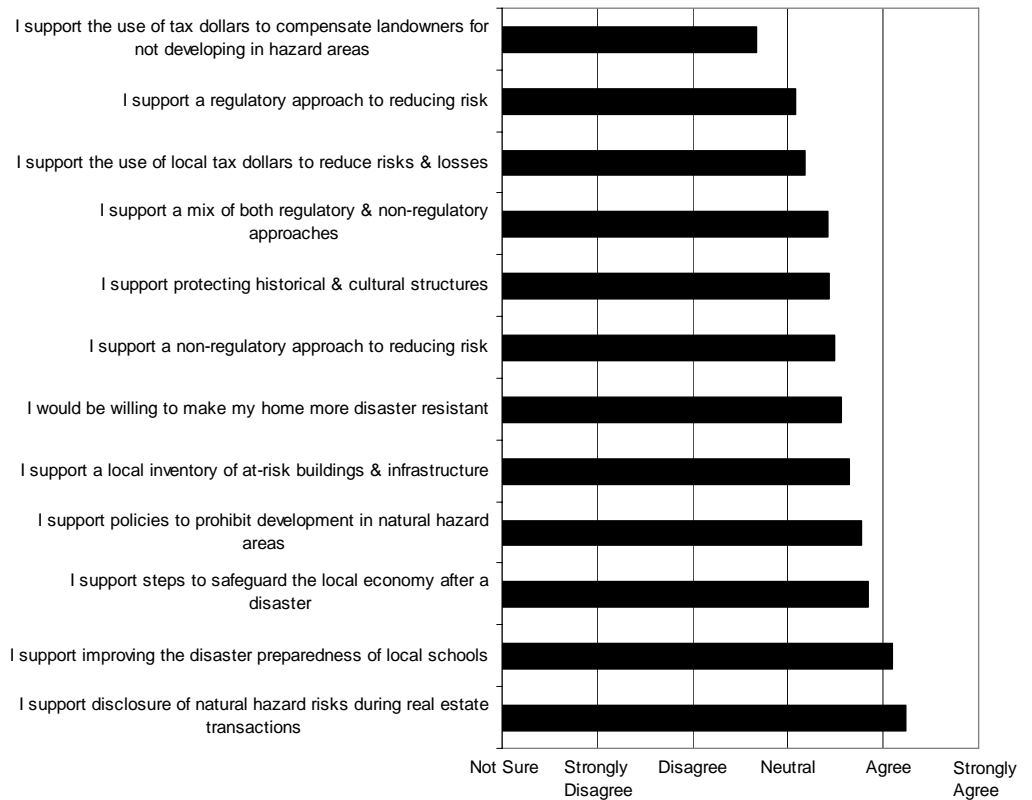
**Table 6.1. Survey Respondents' Goal Prioritization**

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

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

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

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



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

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

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

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

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

# Written Responses to Open-Ended Survey Questions

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

These are the “other” responses:

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

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

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

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

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

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

Some respondents also mentioned more informal sources of information:

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

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

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

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

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

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

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

Two federal sources were also mentioned:

- US Forest Service
- Army depot.

Two people listed church-related resources:

- Church officials
- [www.lds.org](http://www.lds.org) (Latter Day Saints).

Another two people mentioned alarm systems:

- Local alarm systems



- Radio alert system

Other responses included:

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

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

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

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

Other responses were:

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

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

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

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

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

Three people mentioned emergency plans:

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

The other responses were:

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

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

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

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

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

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

Three people had other comments:

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

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

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

- Not located on a fault

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

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

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

There were two other comments:

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

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

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

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

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

- Would need financial assist. To get protection.

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

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

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

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

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

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

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

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

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

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

Other reasons for not taking additional steps included:

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

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

- Rental deduction
- Local grant money specific to local needs (ie, high hazard area = high grant for modifications)
- To know more about efficiency for gas heater & gas hot H<sub>2</sub>O tank, to get credit for installation of more efficient furnace. Contractor did not know or advise us.

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

One person never thought about it before and said:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

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

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

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

There were also a few unclassifiable responses.

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

Finally, one respondent said:

- Everything is pretty well covered.

**Q21 Please indicate your level of education.**

Only one response was in the “other” category:

- Specialty training

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

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

Here are the responses:

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

**Q28 Do you rent/own a:**

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

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

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

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

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

- All of us living close to the Columbia River need to be educated on what to do and where to go – if The Dalles Dam or the John Day Dam were to rupture – if Mt. Hood were to rupture – or if an earthquake were to happen – we're not educated on what or where to go in our local areas.
- I feel that in our rural area we are not prepared for any kind of disaster. I really don't think that our leaders really know what they are going to do in actual case of a real disaster. We need more education on this. This does affect rich & poor. Thank you (comment also in govt.)

Several respondents discussed the importance of people taking **individual or personal responsibility** for their choices or actions. They stressed the importance of being responsible for themselves and their families rather than expecting an outside source to safeguard themselves and their possessions and provide compensation for destroyed property.

- Tax money should be used as little as possible. Individuals need to take more responsibility for safeguarding their own possessions. I would much rather pay for (or lose) for myself than to be forced to help pay for someone's loss if that person neglects to do what he can to protect his own things. Citizens must be willing to live with the consequences of his decision to build/live where a natural disaster may occur. Until or unless a person is forced to live in a dangerous area, it is that person's responsibility to safeguard his possessions. The government's responsibility is to inform the citizens of any dangers or considerations of living/building in a disaster zone. From there, it's the citizen's decision and risk.
- A lot of questions do not apply to us. As for insurance, we are insurance poor. Also, we live in a rural area. Nearest neighbor a mile away, so we have to take care of ourselves and glad of it.
- Because we live in the country, we probably feel that basically we are responsible for ourselves, except for fire, police, & ambulance, which our taxes and insurance help to pay for. Therefore, we feel that basically all people should be responsible for themselves. But, we realize that isn't reality, especially in towns, and that most services must be provided in order to people to survive. So, plan for the worst disaster and go from there. Good luck!
- 1) I feel very strongly that homes destroyed by floods in flood zones not be allowed to be reconstructed in the flood zones. Those who do shouldn't expect insurance companies to cover their homes, nor receive federal or

state aid to rebuild. 2) Each of us has to take personal responsibility in the location of our homes and our preparedness in meeting natural or other disasters and shouldn't expect governmental agencies to fully bear the burden of the costs to rebuild. 3) Volunteer fire departments in our area have been training for a variety of disasters, receiving funding through FEMA grants to do so. They should be commended for their efforts. (Hood River Area, WSFD.) (This comment is also located in the location of development section.)

- Early childhood education should stress the importance of individual responsibility for a safe environment. Nowhere except the U.S. can you cause a fire and not only not be shunned by society, but we will help you rebuild. Allowing building construction in flood, fire prone areas without adequate regard for bldg. techniques to reduce or eliminate major risk factors is ridiculous. This not only puts owners lives and property at risk but that of their neighbors and the emergency responders who are expected to protect us from ourselves.
- I believe timber land owners should be responsible for the fire threat on their property. They should have a fire prevention plan and clean up plan for their properties. Thinning, brush work, etc.

Two people thought changes to current **insurance** policies would be beneficial.

- Oregon's land use laws have addressed some of these problems which they have not done. They were hi-hacked by environmental extremists, & are no longer supported by the people of Oregon. I do not really trust the government to do the right thing. I would buy flood insurance if it was available from private companies. Actually, homeowners insurance should be expanded to cover all perils. (This comment is also located in the government section.)
- A lot of questions do not apply to us. As for insurance, we are insurance poor. Also, we live in a rural area. Nearest neighbor a mile away, so we have to take care of ourselves and glad of it.

Several respondents had comments about the **location of development** and related **planning and development codes**.

- 1) I feel very strongly that homes destroyed by floods in flood zones not be allowed to be reconstructed in the flood zones. Those who do shouldn't expect insurance companies to cover their homes, nor receive federal or state aid to rebuild. 2) Each of us has to take personal responsibility in the location of our homes and our preparedness in meeting natural or other disasters and shouldn't expect governmental agencies to fully bear the burden of the costs to rebuild. 3) Volunteer fire departments in our area have been training for a variety of disasters, receiving funding through FEMA grants to do so. They should be commended for their efforts. (Hood River Area, WSFD.) (This comment is also in the personal responsibility section.)
- Build where one wants does not mean we need to provide services or \$\$ when a disaster happens.

- Large expenditures for this sort of thing are unnecessary. 9-11 and Katrina have given much of our government agencies and education facilities a reason to spend money on things that may or not happen. All in the name of planning. (comment is also in funding section)
- Unfortunately, the scope of natural disasters is such that you can't depend on individual land owners to be able to do what needs to be done to be ready to be prepared. Building codes, zoning & properly educated planning staff at the local level need to set policies to support communities in this regard. Citizens should have cost-efficient resources available to them to deal with these issues as they can incorporate them into their lives (ie, a "lending library" of information, grants for funding improvements, staff to advise them, etc.). This is waving a "magic wand" but hey, you asked! :) (Also in
- We really need to enforce/create zoning and building codes that keep development out of natural resources; streams, river areas, & forest land. We should not authorize development in these areas. (also in location of dev section)

Concerns about **money** (how to spend it and who pays) are frequently contentious issues.

- Large expenditures for this sort of thing are unnecessary. 9-11 and Katrina have given much of our government agencies and education facilities a reason to spend money on things that may or not happen. All in the name of planning.
- I feel contingency funds should be set aside by the state for allocations to cities and counties in need of emergency services due to natural disasters. Fund could be used for prevention every so many years if natural disasters do not occur within that time period
- 1) Our home is located on 10 acres; 12 miles from fire dept (all uphill) – rural locations are subject to wildfire – our neighbor accidentally started a wildfire near our house. 2) Far too much effort and public money goes for flood protection of properties within the floodplains – perhaps we cannot protect every fool from their foolishness. 3) The Oregon State Police (Fire Marshall) spends much money gathering data about small amounts of propane, etc – the information IS NOT EVEN USED BY LOCAL FIRE DEPTS, too much paperwork.
- Tax money should be used as little as possible. Individuals need to take more responsibility for safeguarding their own possessions. I would much rather pay for (or lose) for myself than to be forced to help pay for someone's loss if that person neglects to do what he can to protect his own things. Citizens must be willing to live with the consequences of his decision to build/live where a natural disaster may occur. Until or unless a person is forced to live in a dangerous area, it is that person's responsibility to safeguard his possessions. The government's responsibility is to inform the citizens of any dangers or considerations of living/building in a disaster zone. From there, it's the citizen's decision and risk. (This comment is also in the individual responsibility section.)

Some respondents commented about the capability and role of **government** in natural hazard preparation and after natural disasters. The lack of **emergency services** was also mentioned.

- After New Orleans, I do not think government is capable of doing anything intelligent about natural disaster.
- I would hope government is more prepared to help our community better than they did down south – how sad it was to watch on the news.
- I feel that in our rural area we are not prepared for any kind of disaster. I really don't think that our leaders really know what they are going to do in actual case of a real disaster. We need more education on this. This does affect rich & poor. Thank you. (This comment also in the education section.)
- Gilliam County, Condon has 911, Sheriff Dept & no Red Cross. So the Sheriff Dept has it all. Red Cross will not come to Condon.
- 1) I feel very strongly that homes destroyed by floods in flood zones not be allowed to be reconstructed in the flood zones. Those who do shouldn't expect insurance companies to cover their homes, nor receive federal or state aid to rebuild. 2) Each of us has to take personal responsibility in the location of our homes and our preparedness in meeting natural or other disasters and shouldn't expect governmental agencies to fully bear the burden of the costs to rebuild. 3) Volunteer fire departments in our area have been training for a variety of disasters, receiving funding through FEMA grants to do so. They should be commended for their efforts. (Hood River Area, WSFD.) (This comment is also in the location of development section.)
- Oregon's land use laws have addressed some of these problems which they have not done. They were hi-jacked by environmental extremists, and are no longer supported by the people of Oregon. I do not really trust the government to do the right thing. I would buy flood insurance if it was available from private companies. Actually, homeowners insurance should be expanded to cover all perils. (This comment is also located in the insurance section.)

Another theme for some comments was **types of hazards** that should or should not be considered both in the Mid-Columbia region and Oregon.

- More relevant to this area of flat, irrigated former-desert are the risks of traffic accidents in dense fog or blowing dust.
- This whole county is dangerous because of Rimrock and deep canyons, and rough country. Population is very low here. Population is poor. Earthquakes would block all highways, dam the John Day River, and take out power. If terrorists bomb Hanford, traffic would be diverted through here and we don't have EMS/law enforcement to deal with it. The state would have to step up to the plate!
- It is difficult to imagine my level of "concern" when comparing life threatening events (e.g. volcanic eruption) with mere annoying problems (e.g. wind storm)( and economic disaster (drought). Also, my concerns are

more with events that have virtually no warning (tsunami) and those that have adequate warning (winter storm). The strategies to mitigate a bad outcome need to be different.

- Oregon is far too diverse a state to consider a “natural hazard” common to all parts of the state. Compare west of the Cascades to the high desert, or the Portland area with the rest of Oregon.

Several people offered **suggestions** about the types of preparation that should be made or considered.

- The best preparedness for our area where we have so much wind, windstorms, & hail storms, the Umatilla Army Depot (chemical depot) would be a storm cellar. I’ve lived in this area since 1940 & I’ve seen many kinds of storms, & wished I had a storm cellar.
- 1) To prevent wildfire spread, farmers who take CRP program should have fire buffer strip built into the CRP program – requiring the farmers to keep strips effective – we had the 60,000 acre fire a few years ago – we were lucky – buffer strips are the only way we will control this – too many farmers are not farming wheat anymore. 2) OLD cottonwoods fall into creek, plug channel & bridges – city of Pilot Rock needs to enforce floodway rules established by FEMA, and “oversee” a channel manage program – Pilot Rock has 4 bridges & foot bridges that can plug during floods – this can be done – everyone’s afraid of regulatory agencies giving out fines. To identify hazards is easy – no one wants to follow through.
- In some areas the flood plain designation appears to be given in a non-scientific manner. I have family in the Spokane County area – they have a 10 acre parcel which is surrounded by land that has been completely developed in the past 2 decades. They have been informed that their parcel is the “flood plain” and cannot be developed/a large percentage must be left undeveloped. Geologically the county does not seem to need any proof other than the necessity of no other undeveloped space left to absorb H<sub>2</sub>O. I agree that flood plains should not be developed, but there needs to be a more scientific & comprehensive plan. Land owners who have left space undeveloped should also then be reasonably reimbursed. It benefits us all to have some earth to re-absorb water, but a single land owner should not be financially punished.

Two respondents wrote to say **thank you**.

- It’s about time someone did this. Way to go! Keep up the great work! Sincerely, a thoughtfully concerned citizen, wife, and parent.
- Good luck on the survey

Finally, this last section contains **miscellaneous** comments.

- If I’d ever been in a disaster I’m sure some of my answers would be different. Was in storm in N.C., tho it was just heavy rains so went to movie at Base. It was cut short so went home & put rugs under the doors. Next AM all TV antennas were bent over & a new piece just completed a few months was lifted off the pilings & set down whole ¼ mile away. The fishing store & another building connected to pier were ok & they later

made them into rooms where we stayed for 2 nights for my husband's discharge papers & came then after 20 years in the Navy but last 5 yrs were spent at Marine bases since my husband was in Medical & Marines only have fighting men. 3 of my children attended U of O.

- 1) One question, why are you asking these questions? Do you know of a real disaster that's coming our way? I have heard before of the United States being split into 3 pieces from a severe earthquake. Most of California is man-made islands put together and the plates are very bad. Also New York & New Jersey are also in danger of shifting. Also along the Mississippi River. This is why I've been prepared for years. Not as much as I would like because of finances. Oregon will have its problems mostly with volcanoes & wildfires. Also coastal tsunamis.
- I know of a patented solution that, when sprayed on wood, will render it inflammable even when gasoline is applied and ignited. Why its sale and usage was somewhat squashed at the onset of its production is no mystery is it?
- The State of Oregon needs to protect the trees from being cut down, and not just timber forests either! Someone needs to stand up and protect the Columbia Gorge from a sewage dump. Has anyone taken into account the damage that will be done once the Warm Springs reservation builds their bloody casino? All the trash and pollution will destroy the salmon habitat for breeding grounds! We need to protect/save gas resources by raising the legal primary age limit to 18 years instead of 16 years. This would cut crime and teenage pregnancies!
- Please explain what the last question has to do with natural disaster.



# Appendix D

## Economic Analysis of Natural Hazard Mitigation Projects

This appendix was developed by the Community Service Center's Oregon Natural Hazards Workgroup at the University of Oregon. It has been reviewed and accepted by the Federal Emergency Management Agency as a means of documenting how the prioritization of actions shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

The appendix outlines three approaches for conducting economic analyses of natural hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies. Information in this section is derived in part from: The Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan*, (Oregon State Police – Office of Emergency Management, 2000), and Federal Emergency Management Agency Publication 331, *Report on Costs and Benefits of Natural Hazard Mitigation*. This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to provide the details of economic analysis methods that can be used to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

### Why Evaluate Mitigation Strategies?

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred. Evaluating possible natural hazard mitigation activities provides decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, police, utilities, and schools. Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce “ripple-effects” throughout the community, greatly increasing the disaster’s social and economic consequences.

While not easily accomplished, there is value, from a public policy perspective, in assessing the positive and negative impacts from mitigation

activities, and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

## **What are Some Economic Analysis Approaches for Evaluating Mitigation Strategies?**

The approaches used to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into three general categories: benefit/cost analysis, cost-effectiveness analysis and the STAPLE/E approach. The distinction between the 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, avoided future damages, and risk. In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented. A project must have a benefit/cost ratio greater than 1 (i.e., the net benefits will exceed the net costs) to be eligible for FEMA funding.

### **Cost-Effectiveness Analysis**

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

### **Investing in public sector mitigation activities**

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods to

evaluate the economic feasibility of public decisions which involve a diverse set of beneficiaries and non-market benefits.

### **Investing in private sector mitigation activities**

Private sector mitigation projects may occur on the basis of one of two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

1. Request cost sharing from public agencies;
2. Dispose of the building or land either by sale or demolition;
3. Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
4. Evaluate the most feasible alternatives and initiate the most cost effective hazard mitigation alternative.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchasers. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

### **STAPLE/E Approach**

Conducting detailed benefit/cost or cost-effectiveness analysis for every possible mitigation activity could be very time consuming and may not be practicable. There are some alternate approaches for conducting a quick evaluation of the proposed mitigation activities which could be used to identify those mitigation activities that merit more detailed assessment. One of these methods is the STAPLE/E Approach.

Using STAPLE/E criteria, mitigation activities can be evaluated quickly by steering committees in a systematic fashion. This set of criteria requires the committee to assess the mitigation activities based on the Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLE/E) constraints and opportunities of implementing the particular mitigation item in your community. The second chapter in FEMA's How-To Guide "Developing the Mitigation Plan – Identifying Mitigation Actions and Implementation Strategies" as well as the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process" outline some specific considerations in analyzing each aspect. The following are suggestions for how to examine each aspect of the STAPLE/E Approach from the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process".

**Social:** Community development staff, local non-profit organizations, or a local planning board can help answer these questions.

- Is the proposed action socially acceptable to the community?
- Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Will the action cause social disruption?

**Technical:** The city or county public works staff, and building department staff can help answer these questions.

- Will the proposed action work?
- Will it create more problems than it solves?
- Does it solve a problem or only a symptom?
- Is it the most useful action in light of other community goals?

**Administrative:** Elected officials or the city or county administrator, can help answer these questions.

- Can the community implement the action?
- Is there someone to coordinate and lead the effort?
- Is there sufficient funding, staff, and technical support available?
- Are there ongoing administrative requirements that need to be met?

**Political:** Consult the mayor, city council or county planning commission, city or county administrator, and local planning commissions to help answer these questions.

- Is the action politically acceptable?
- Is there public support both to implement and to maintain the project?

**Legal:** Include legal counsel, land use planners, risk managers, and city council or county planning commission members, among others, in this discussion.

- Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Are there legal side effects? Could the activity be construed as a taking?
- Is the proposed action allowed by the comprehensive plan, or must the comprehensive plan be amended to allow the proposed action?
- Will the community be liable for action or lack of action?
- Will the activity be challenged?

**Economic:** Community economic development staff, civil engineers, building department staff, and the assessor's office can help answer these questions.

- What are the costs and benefits of this action?
- Do the benefits exceed the costs?
- Are initial, maintenance, and administrative costs taken into account?
- Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private)?
- How will this action affect the fiscal capability of the community?
- What burden will this action place on the tax base or local economy?
- What are the budget and revenue effects of this activity?
- Does the action contribute to other community goals, such as capital improvements or economic development?
- What benefits will the action provide? (This can include dollar amount of damages prevented, number of homes protected, credit under the CRS, potential for funding under the HMGP or the FMA program, etc.)

**Environmental:** Watershed councils, environmental groups, land use planners and natural resource managers can help answer these questions.

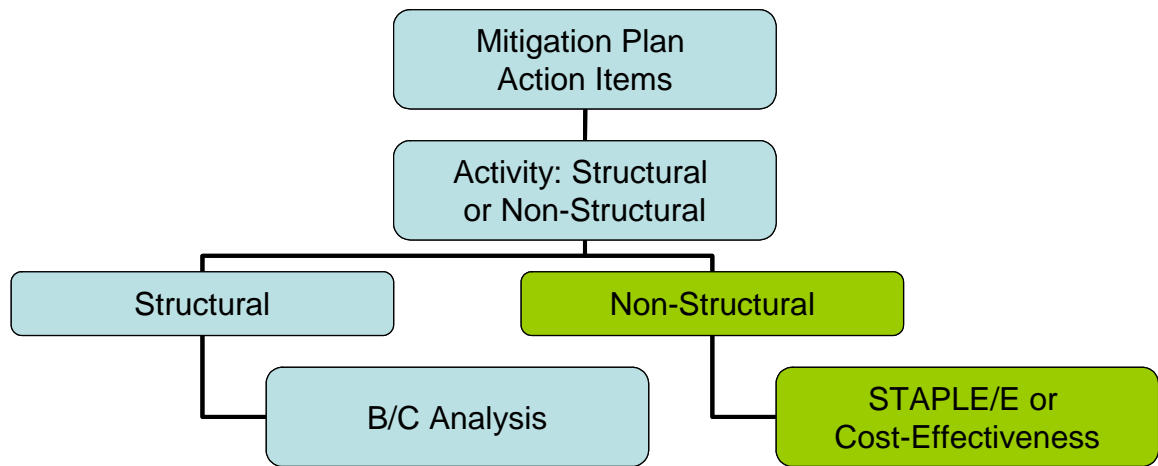
- How will the action impact the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

The STAPLE/E approach is helpful for doing a quick analysis of mitigation projects. Most projects that seek federal funding and others often require more detailed Benefit/Cost Analyses.

## **When to use the Various Approaches**

It is important to realize that various funding sources require different types of economic analyses. The following figure is to serve as a guideline for when to use the various approaches.

**Figure A.1: Economic Analysis Flowchart**



Source: Community Service Center's Oregon Natural Hazards Workgroup at the University of Oregon, 2005

## Implementing the Approaches

Benefit/cost analysis, cost-effectiveness analysis, and the STAPLE/E are important tools in evaluating whether or not to implement a mitigation activity. A framework for evaluating mitigation activities is outlined below. This framework should be used in further analyzing the feasibility of prioritized mitigation activities.

### 1. Identify the Activities

Activities for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation project can assist in minimizing risk to natural hazards, but do so at varying economic costs.

### 2. Calculate the Costs and Benefits

Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate activities. Potential economic criteria to evaluate alternatives include:

- **Determine the project cost.** This may include initial project development costs, and repair and operating costs of maintaining projects over time.
- **Estimate the benefits.** Projecting the benefits, or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the

risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings, bond and stock issues, and commercial loans.

- **Consider costs and benefits to society and the environment.** These are not easily measured, but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.
- **Determine the correct discount rate.** Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Including inflation should also be considered.

### 3. Analyze and Rank the Activities

Once costs and benefits have been quantified, economic analysis tools can rank the possible mitigation activities. Two methods for determining the best activities given varying costs and benefits include net present value and internal rate of return.

- **Net present value.** Net present value is the value of the expected future returns of an investment minus the value of expected future cost expressed in today's dollars. If the net present value is greater than the project costs, the project may be determined feasible for implementation. Selecting the discount rate, and identifying the present and future costs and benefits of the project calculates the net present value of projects.
- **Internal Rate of Return.** Using the *internal rate of return* method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project. Once the mitigation projects are ranked on the basis of economic criteria, decision-makers can consider other factors, such as risk, project effectiveness, and economic, environmental, and social returns in choosing the appropriate project for implementation.

## **Economic Returns of Natural Hazard Mitigation**

The estimation of economic returns, which accrue to building or land owners as a result of natural hazard mitigation, is difficult. Owners evaluating the economic feasibility of mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided
- Relocation and disruption expenses avoided
- Proprietor's income losses avoided

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period of time.

## **Additional Costs from Natural Hazards**

Property owners should also assess changes in a broader set of factors that can change as a result of a large natural disaster. These are usually termed "indirect" effects, but they can have a very direct effect on the economic value of the owner's building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices
- Availability of resource supplies
- Commodity and resource demand changes
- Building and land values
- Capital availability and interest rates
- Availability of labor
- Economic structure
- Infrastructure
- Regional exports and imports
- Local, state, and national regulations and policies



- Insurance availability and rates

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision makers should understand the total economic impacts of natural disasters in order to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

## **Additional Considerations**

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from natural hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects. Several resources and models are listed on the following page that can assist in conducting an economic analysis for natural hazard mitigation activities.

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. Many communities are looking towards developing multi-objective projects. With this in mind, opportunity rises to develop strategies that integrate natural hazard mitigation with projects related to watersheds, environmental planning, community economic development, and small business development, among others. Incorporating natural hazard mitigation with other community projects can increase the viability of project implementation.

## **Resources**

CUREe Kajima Project, *Methodologies For Evaluating The Socio-Economic Consequences Of Large Earthquakes*, Task 7.2 Economic Impact Analysis, Prepared by University of California, Berkeley Team, Robert A. Olson, VSP Associates, Team Leader; John M. Eiding, G&E Engineering Systems; Kenneth A. Goettel, Goettel and Associates Inc.; and Gerald L. Horner, Hazard Mitigation Economics Inc., 1997.

Federal Emergency Management Agency, *Benefit/Cost Analysis of Hazard Mitigation Projects*, Riverine Flood, Version 1.05, Hazard Mitigation Economics Inc., 1996.

Federal Emergency Management Agency *Report on Costs and Benefits of Natural Hazard Mitigation*. Publication 331, 1996.

Goettel & Horner Inc., *Earthquake Risk Analysis Volume III: The Economic Feasibility of Seismic Rehabilitation of Buildings in The City of Portland*, Submitted to the Bureau of Buildings, City of Portland, August 30, 1995.

Goettel & Horner Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects Volume V, Earthquakes*, Prepared for FEMA's Hazard Mitigation Branch, October 25, 1995.

Horner, Gerald, *Benefit/Cost Methodologies for Use in Evaluating the Cost Effectiveness of Proposed Hazard Mitigation Measures*, Robert Olson Associates, Prepared for Oregon State Police, Office of Emergency Management, July 1999.

Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan*, (Oregon State Police – Office of Emergency Management, 2000).

Risk Management Solutions, Inc., *Development of a Standardized Earthquake Loss Estimation Methodology*, National Institute of Building Sciences, Volume I and II, 1994.

VSP Associates, Inc., *A Benefit/Cost Model for the Seismic Rehabilitation of Buildings*, Volumes 1 & 2, Federal Emergency Management Agency, FEMA Publication Numbers 227 and 228, 1991.

VSP Associates, Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects: Section 404 Hazard Mitigation Program and Section 406 Public Assistance Program, Volume 3: Seismic Hazard Mitigation Projects*, 1993.

VSP Associates, Inc., *Seismic Rehabilitation of Federal Buildings: A Benefit/Cost Model*, Volume 1, Federal Emergency Management Agency, FEMA Publication Number 255, 1994.

# Appendix E

## Existing Plans, Policies, and Programs in Morrow County

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

### Existing Plans and Policies

The Disaster Mitigation Act of 2000 requires that communities identify a process where the requirements of the mitigation plan get incorporated into other planning mechanisms. The purpose of this appendix is to document those existing plans and policies in an effort to assist the community in identifying potential means to better integrate mitigation into the day-to-day decisions of local governments.

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances, and technical reports or studies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.<sup>1</sup>

The Natural Hazards Mitigation Plan includes a range of recommended action items that, when implemented, will reduce the county's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the county's existing plans and policies. Linking existing plans and policies to the Natural Hazards Mitigation Plan helps identify what resources already exist that can be used to implement the action items identified in the Plan.

Implementing the natural hazards mitigation plan's action items through existing plans and policies increases their likelihood of being supported and getting updated to remain current, and maximizes the county's resources.

Below is a table of the plans and policies that currently exist in Morrow County. For each plan or policy, the table provides information on its author, its purpose, and how it relates to natural hazard mitigation. The information provided in the table can also be used to complete action item worksheets by identifying rationale and potential ideas for implementation.

Morrow County  
Existing Plans, Policies Programs

Name	Date of Last Revision	Author/Owner	Description	Relation to Natural Hazard Mitigation
Morrow County Planning Zoning Ordinance	1-Nov-01	Morrow County Planning Department	This ordinance outlines how land within Morrow County is zoned and regulated promoting public health, safety, and welfare.	<ul style="list-style-type: none"> <li>• The county codes influences where and what type of development are allowable.</li> <li>• Development Ordinances can be used to keep development out of known hazard areas.</li> </ul>
Morrow County Planning Department Subdivision Ordinance	2001	Morrow County Planning Department	The subdivision ordinance outlines the standards of subdivision, partitioning, and other land developments.	<ul style="list-style-type: none"> <li>• Guides growth and development.</li> <li>• Can be linked to action items that shape growth and development so that they do not increase the county's risk to natural hazards.</li> <li>• Can be linked to action items that protect natural and historic areas and areas subject to natural hazards.</li> <li>• Can be linked to action items for how the County will implement Oregon Statewide Planning Goal 7 requirements.</li> </ul>
Columbia River Heritage Trail Concept Plan	2000	Morrow County Planning Department	The concept plan describes the Columbia River Heritage Trail.	<ul style="list-style-type: none"> <li>• The nexus between trails plans and natural hazard mitigation plans is that the trails plan can be used to acquire and preserve flood-prone open space. Those trails and their preservation of open space would permanently remove any development options from the flood-prone area.</li> </ul>

Morrow County  
Existing Plans, Policies Programs

Name	Date of Last Revision	Author/Owner	Description	Relation to Natural Hazard Mitigation
Regional Economic Profile	2002	Oregon Department of Employment	Economic Profile of Region 12 (Gilliam, Grant, Morrow, Umatilla, and Wheeler Counties)	<ul style="list-style-type: none"> <li>• The economic profile identifies projected population and economic growth, which in turn can help identify where people and the economy may be at risk to hazards.</li> <li>• The economic profile can be used as the rationale behind strategies or programs to protect local businesses from natural disasters.</li> </ul>
Morrow County Comprehensive Plan		Morrow County Planning Department	The plan guides land use and development with policies specific to Morrow County.	<ul style="list-style-type: none"> <li>• Guides land use within the county.</li> <li>• Goals of preserving resource and protecting life from hazards can be linked to action items that guide development to reduce the county's risk to natural hazards.</li> <li>• Can be linked to action items for how the County will implement Oregon Statewide Planning Goal 7 requirements.</li> </ul>
Morrow County Telecommunications Plan	Jan-01	Greater Eastern Oregon Development Corporation	The purpose of this plan is to summarize existing county telecommunications infrastructure and usage; to identify opportunities for improving telecommunications; and to recommend priorities for action in 2001 and forthcoming years.	In section "E" under government and emergency services, there is an action that talks about "unifying network infrastructure for County to eliminate redundant capacity, improve connectivity, and expand access to unused capacity" Restructuring the communication system may assist emergency services operators to better communicate with the public, and between departments
Morrow County Solid Waste Management Plan & Ordinance	Apr-06	Morrow County Planning Department	The plan regulates solid waste management outside of the cities with in the county.	Plan mentions how to go about dealing with and disposing of solid waste generated by disaster events

Morrow County  
Existing Plans, Policies Programs

Name	Date of Last Revision	Author/Owner	Description	Relation to Natural Hazard Mitigation
Morrow County Transportation Systems Plan	Jul-05	Morrow County Planning Department	The plan describes the Morrow County transportation facilities, goals and policies, conditions and inventory. The TSP also discusses the standards in Morrow County for roadways, accesses, and land use development.	<ul style="list-style-type: none"> <li>• Transportation systems assist in evacuation and response in the event of a natural hazard.</li> <li>• Can be linked to action items aimed at making the county's transit system more disaster resistant to reduce potential damage and risk.</li> </ul>

## Existing Social Service Providers

Social systems can be defined as community organizations and programs that provide social and community-based services, such as health care or housing assistance, to the public. In planning for natural hazard mitigation, it is important to know what social systems exist within the community because of their existing connections to the public. . Often times, actions identified by the plan involve communicating with the public, or specific subgroups within the population (e.g. elderly, children, low income). The County can use existing social systems as resources for implementing such communication related activities because these service providers already work directly with the public and have already established a trusted method for communicating with these subgroups. On a daily basis social service providers work and communicate directly with the public on a number of issues, one of which could be natural hazard preparedness and mitigation.

The following is a brief explanation of how the communication process works and how the community's existing social service providers could be used to provide natural hazard related messages to their clients.

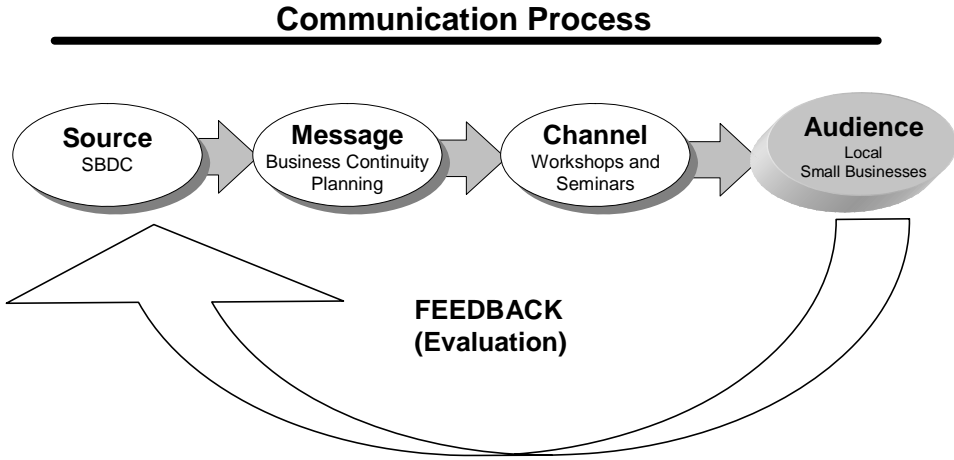
There are five essential elements for communicating effectively to a target audience:

- The **source** of the message must be credible,
- The **message** must be appropriately designed,
- The **channel** for communicating the message must be carefully selected,
- The **audience** must be clearly defined, and

The recommended action must be clearly stated and a **feedback** channel established for questions, comments and suggestions.

An example of an existing social system whose communication system can be linked to natural hazard mitigation is the Columbia Gorge Community College's Small Business Development Center (SBDC). The SBDC (the source) provides local businesses (the audience) with information on business contingency planning (the message) through workshops and seminars (the channel). To target small businesses, (insert name) County can provide the SBDC with information on developing business continuity plans and strategies for recovering from a natural hazard. When local small businesses attend the SBDC's workshops and seminars they can pick up this natural hazard mitigation information. This example communication process is graphically presented in *Figure E.2*:

**Figure E.2 Communication Process**



Source: Adapted from the U.S. Environmental Protection Agency Radon Division’s outreach program

The following table provides a list of existing social systems within Morrow County. The table provides information on each organization or program’s service area, types of services offered, populations served, and how the organization or program could be involved in natural hazard mitigation. The three involvement methods identified in the table are defined below:

- Education and outreach – organization could partner with the community to educate the public or provide outreach assistance on natural hazard preparedness and mitigation.
- Information dissemination – organization could partner with the community to provide hazard related information to target audiences.
- Plan/project implementation – organization may have plans and/or policies that may be used to implement mitigation activities or the organization could serve as the coordinating or partner organization to implement mitigation actions.

The information provided in the table can also be used to complete action item worksheets by identifying potential coordinating agencies and internal and external partners.

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<sup>1</sup> Burby, Raymond J., ed. 1998. *Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities.*



Morrow County  
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
<b>The Chemical Stockpile Reserve Emergency Preparedness Program</b> 4700 NW Pioneer Place Pendleton, Oregon, 97801 Tel: 877-367-2737 Fax: 541-966-3700 Website: <a href="http://www.csepp.net/">http://www.csepp.net/</a>	The emergency preparedness program is created to protect the lives of public from chemical warfare at US Army installations. The program is also the emergency management team for other hazards including: earthquakes, fires, floods, and severe winter weather.	Umatilla and Morrow Counties	✓	✓	✓	✓	✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>Arc of Umatilla County</b> 215 W. Orchard Ave, Hermiston, Oregon, 97838 Tel: 541-567-7615 Email: <a href="mailto:arcuma@eoni.com">arcuma@eoni.com</a>	Provide educational and recreational services to children and adults with developmental disabilities.	Umatilla and Morrow Counties		✓	✓			✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Boardman Chamber of Commerce</b> 206 N. Main Boardman, OR 97818 Tel: 541-481-3014 Website: <a href="http://www.visitboardman.com">www.visitboardman.com</a>	Provide economic development assistance to local businesses.	Morrow County	✓						<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>

Morrow County  
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
<b>CAP of East Central Oregon (CAPECO)</b> 721 SE 3rd St, Suite D Pendleton, Oregon, 97801 Tel: 541-276-1926 Fax: 541-276-7541 Website: www.capeco-works.org	A community organization that helps individuals, businesses, and communities in human and financial services. The organization focuses on: workforce development, senior services, housing projects, and emergency assistance.	Gilliam, Morrow, Umatilla and Wheeler Counties	✓		✓	✓	✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>Children's Trust Fund of Oregon</b> Family Talk Show / Umatilla County Commission 1410 SW Morrison Street, Portland, Oregon 97205 Tel: 503-222-7102 Fax: 503-222-6975 Website: http://www.ctfo.org/	The organization provides a radio program displaying a panel of expertise to give families of rural Eastern Oregon daily life tips. Their website provides useful tips and information for families.	Rural Eastern Oregon Counties	✓				✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Department of Human Services</b> Morrow/Wheeler County / Mental Health Program Tel: 541-481-2911	Provide self-sufficiency, medical, mental health, services and assistance for children, the elderly, and people with disabilities.	Morrow and Wheeler Counties		✓	✓	✓	✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>Domestic Violence Services</b> PO Box 173 Pendleton, Oregon 97801 Tel: 541-276-3322	Provides domestic violence services.	Umatilla and Morrow Counties		✓			✓		<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>

Morrow County  
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
<b>Eastern Oregon Support Services Brokerage</b> P.O Box 329 (1216 C Street) Hood River, OR 97031 Tel: 541-387-3600 Fax 541-387-2999 Website: <a href="http://www.eossb.org">www.eossb.org</a>	Provides support for individuals with disabilities.	Umatilla, Morrow, Wallowa, Malheur, Union, Baker, and Harney Grant Counties		✓	✓			✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Extension Service, OSU</b> Morrow County Office 54173 Highway 74 Heppner, OR 97836 Tel: 541-676-9642 Fax 541-387-2999 Website: <a href="http://www.extension.oregonstate.edu/morrow/">www.extension.oregonstate.edu/morrow/</a>	Provide economic development educational assistance to local agricultural businesses.	Morrow County	✓					✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Good Shepherd Community Health Foundation</b> 610 NW 11th Hermiston, OR 97838 Tel: 541-667-3413 <a href="http://www.gshealth.org/foundation.htm">http://www.gshealth.org/foundation.htm</a>	Enhances the quality of life and general health of residents	Umatilla and Morrow Counties		✓	✓	✓	✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>

Morrow County  
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
<b>Morrow County Grain Growers</b> P.O. Box 367 Lexington, OR 97839 Tel: 541-989-8221 FAX: 541-989-8229 Website: <a href="http://www.mcgg.net">http://www.mcgg.net</a>	Provide economic development assistance to local businesses.	Umatilla and Morrow Counties	✓						<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>Greater Eastern Oregon Development Corp</b> PO Box 1041 Pendleton, OR 97801 Tel: 541-276-6745 Website: <a href="http://www.geodc.org/">http://www.geodc.org/</a>	Provide economic development assistance to local businesses.	Gilliam, Grant, Morrow, Umatilla, Wheeler, Harney and Malheur Counties	✓						<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>Headstart of Umatilla-Morrow County</b> 330 NE 10th Street Irrigon, OR 97844 Tel: 541-922-5549 Website:	Provide educational services to children with economic hardships.	Morrow County		✓			✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Heppner Chamber of Commerce</b> PO Box 1232 Heppner, OR 97836 Tel: 541-676-5536 Website: <a href="http://www.heppnerchamber.com">www.heppnerchamber.com</a>	Provide economic development assistance to local businesses.	Morrow County	✓						<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>

Morrow County  
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
<b>Housing Authority of Umatilla</b> PO Box 107 Hermiston, Oregon, 97838 Tel: 541-567-3241 Fax: 541-567-3246 Email: ucha@uci.net	Provides equal opportunity housing for low-income families and individuals.	Umatilla, Morrow, Gilliam, and Wheeler Counties					✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>Ione School District</b> 445 Spring Street Ione, Oregon, 97843 Tel: 541422-7131 Email: bryn.browning@ione.k12.or.us	The school district is the organizational body for Ione for children K-12.	Morrow County		✓	✓		✓		<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>ICABO (Ione Community Agri-Business Organization)</b> Chair: Loyal Burns - 541-422-7512 or 541-422-7305 at home Vice: Betty Gray - 422-7335	A chamber of commerce type organization that assists agricultural businesses with their business needs	Ione	✓						<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>

Morrow County  
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
<b>Irrigon Chamber of Commerce</b> Laura Clark P.O. Box 678 Irrigon, OR 97844 541-564-0420 fax: 541-564-0396 Laura can also be reached at the Hermiston Plan Center at: plancenter@eoni.com	Provide economic development assistance to local businesses.	Irrigon	✓						<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Irrigon - Boardman Emergency Assistance Center</b> 290 Northeast Main Avenue Irrigon, Oregon, 97844 Tel: (541) 922-4563	Provides emergency assistance to the local population	Morrow County		✓	✓	✓	✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>Legal Aid Services of Oregon - Pendleton</b> PO Box 1327 Pendleton, Oregon, 97801 Tel: 541-276-6685 Fax: 541-276-4549	Provides legal information on domestic law, special education, housing, social security disability, and consumer issues and other topics.	Umatilla and Morrow Counties	✓		✓	✓	✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Morrow - Wheeler Behavior Health</b> PO Box 469 Heppner, OR, 97836 Tel: 541-676-9161 Fax: 541-5662	Provides mental health services and alcohol, drug and gambling addiction treatment services.	Umatilla and Morrow Counties				✓	✓		<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>

Morrow County  
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
<b>Morrow County Health Department</b> Po Box 799 Heppner, OR, 97836 Tel: 541-676-5421 Fax: 541-676-5652 Website: www.publichealth.morrowcounty.org	Provides health services.	Morrow County		✓	✓	✓	✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>Morrow County Health District</b> PO Box 9 Heppner, OR, 97836 Tel: 541-676-9133421 FAX: 541-676-2901 Website:	Provides health services.	Morrow County		✓	✓	✓	✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>Morrow County Juvenile Department</b> PO Box 791 Heppner, OR 97836 Tel: 541-676-5642 Fax: 541-676-5317	Provides public by holding youth offenders accountable; providing services for reformation and rehabilitation	Morrow County		✓					<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>

Morrow County  
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
<b>Morrow County School District</b> 270 W. Main, PO Box 368, Lexington, Oregon, 97839, Tel: 541-989-8202 Fax: 541-989-8470 Website: <a href="http://www.morrow.k12.or.us/">http://www.morrow.k12.or.us/</a>	The school district is the organizational body for nine schools in four communities for children K-12.	Morrow County		✓	✓			✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>Morrow Development Corporation</b> PO Box 200, Boardman, Oregon, 97818 Tel: 541-676-8719 Fax: 541-676-5989 Website: <a href="http://www.mdc.windwave.org">http://www.mdc.windwave.org</a>	Provide economic development assistance to local businesses.	Morrow County	✓						<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Oregon Outreach - Morrow 4H Friday School Program</b> Contact: Bill Broderick Email: <a href="mailto:bill.broderick@oregonstate.edu">bill.broderick@oregonstate.edu</a>	The organization provides supplemental learning service to children in schools. Hired instructors work with Umatilla county instructors to develop a leadership conference targeted to Hispanic children.	Morrow County		✓					<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>



Morrow County  
Social Service Providers

Name and Contact Information	Description	Service Area	Populations Served						Involvement with Natural Hazard Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
<b>Oregon's Office of Vocational Rehabilitation Services (OVR)</b> 1555 SW Southgate Place Pendleton, Oregon, 97801 Tel: 541-278-4161 Fax: 541-276-1942	Provides assistance to Oregonians with disabilities to achieve and maintain employment and independence. The office also works with other local organizations to help people with disabilities.	Umatilla and Morrow Counties			✓				<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Umatilla - Morrow Education Services District</b> 2001 SW Nye Pendleton, Oregon 97801 Tel: 541-276-6616 Website: www.umesd.k12.or.us	Provides various programs in relation to education for children from K to 12. The district also has programs for special needs students.	Umatilla and Morrow Counties		✓	✓		✓		<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> <li>• Plan/project implementation</li> </ul>
<b>Willow Creek Valley Economic Development Group</b> P.O. Box 14 Heppner, Oregon, 97836 Tel: 541-676-9228 Fax: 541-676-9211 website: wcvvedg@heppner.net	Provide economic development assistance to local businesses.	Morrow County	✓						<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>
<b>Women Infants Clinics</b> Umatilla / Morrow Head Start 110 NE 4th Street Hermiston, Oregon, 97838 Tel: 1-800-559-5878 Fax: 541-564-6879	The Women Infants Clinic is a supplemental nutrition program for women, infants, and children.	Umatilla and Morrow Counties		✓			✓	✓	<ul style="list-style-type: none"> <li>• Education and outreach</li> <li>• Information dissemination</li> </ul>

**Appendix F**  
**Mitigation Tools from the Oregon**  
**Technical Resource Guide**



### PLANNING FOR NATURAL HAZARDS:

#### *Appendix C: Tools*

July 2000



#### ***Oregon Department of Land Conservation & Development***

635 Capitol Street NE, Suite 150  
Salem, OR 97301  
503-373-0050



#### ***Community Planning Workshop***

Community Service Center  
1209 University of Oregon  
Eugene, OR 97403  
541-346-3889

#### **Special Acknowledgements to:**

This appendix of the Natural Hazards Technical Resource Guide utilizes information from a table included in Raymond Burby's book Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities. The table, entitled *A Qualitative Assessment of the Effectiveness of Land Use Management Tools for Hazard Mitigation* was developed by Robert Olshansky and Jack Kartez and based on a conference of the authors involved with Burby's text. This table has been supplemented with information from Tools and Techniques for Mitigating the Effects of Natural Hazards, a North Carolina Division of Emergency Management document.

## INTRODUCTION

This appendix describes various tools and techniques that can help communities reduce risk from natural hazards. A brief examination of the effectiveness and limitations for each tool is included.



<b>Land Use Management Tools</b>	<b>Description</b>	<b>Effectiveness</b>	<b>Limitations</b>
<b>Plans</b>			
<p>Comprehensive Land Use Plans adopted by all Oregon cities and counties and acknowledged by DLCDC.</p>	<p>In Oregon, local comprehensive plans comply with Statewide Planning Goals including Goal 7 – natural hazards.</p>	<p>Local governments are specifically required to address hazards in the context of community's overall land use plan.</p>	<p>Natural hazards element is only one piece of the comprehensive plan. Have historically been overshadowed by other issues (e.g., transportation and housing).</p>
<p>Hazard mitigation plans As of June 2000, approximately 30 Oregon communities have adopted hazard mitigation plans. Many of these are specific to flood hazards.</p>	<p>Specifies actions a community will take to reduce its hazard vulnerability. Assesses community's financial, legal and technical ability to mitigate hazards.</p>	<p>Allows for a substantial amount of decision-making to occur prior to a disaster event. Recommendations can be incorporated into a comprehensive plan and land use ordinances.</p>	<p>Limited funding for mitigation planning. Need to build local support for planning effort.</p>
<p>Public facility plans In Oregon, State-wide Planning Goal 11 requires communities to plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.</p>	<p>In Oregon, this refers to a plan for the sewer, water, and transportation facilities needed to serve a city with a population greater than 2,500. Less specific than a capital improvements program.</p>	<p>Can discourage or reduce the intensity of development in hazard areas. Local governments should consider natural hazards in public facilities planning although not specifically required by Goal 11.</p>	<p>Does not alter the basic spatial pattern of private development in hazard areas. Goal 11 does not specifically require consideration of natural hazards in public facilities planning.</p>

# Natural Hazard Technical Resource Guide

<i>Land Use Management Tools</i>	<i>Description</i>	<i>Effectiveness</i>	<i>Limitations</i>
<b>Building Standards</b>			
<p>Special building standards</p> <p>Oregon has a state building code administered by the state and local jurisdictions.</p>	<p>A set of regulations that govern the construction of buildings and other structures.</p> <p>Building codes may also apply to major repairs and renovations.</p>	<p>Elevating structures in floodplains to prevent building damages is widely used because of the National Flood Insurance Program. Landslide and wildfire standards can help reduce structure damage. Seismic codes can effectively save lives and reduce (but not prevent) chances of building collapse.</p>	<p>Applicable primarily to new development.</p>
<b>Development Regulations</b>			
<p>Zoning ordinances</p>	<p>The designation of allowable uses for a particular area.</p>	<p>Can limit exposure of new development in hazard areas and protect natural values and functions not yet degraded by development.</p>	<p>Cannot mitigate losses to existing development and infrastructure.</p> <p>Requires information identifying geographic extent of hazard.</p> <p>If a community's boundaries are all within high risk areas, zoning may be ineffective. (e.g., zoning may be ineffective for certain seismic hazards)</p>
<p>Overlay zones</p> <p>Many Oregon jurisdictions employ these for floods and steep slopes.</p>	<p>A special zone that is applied "over" or in addition to a base zone.</p> <p>Limit/apply additional regulation to underlying uses.</p>	<p>Allow communities to isolate and protect certain areas or to devise regulations that apply in specific situations.</p>	<p>Requires detailed information on the spatial extent and nature of the hazard to support effective regulation.</p>



<b>Land Use Management Tools</b>	<b>Description</b>	<b>Effectiveness</b>	<b>Limitations</b>
<b>Development Regulations continued</b>			
<p>Bonus and incentive zoning</p>	<p>The practice of allowing developers to exceed limitations imposed by current regulations, such as building height, floor area or density, in return for special concessions.</p> <p>An example could be a developer granting an open space easement in flood prone area in exchange for increased density outside the of hazard area.</p>	<p>Communities can offer bonuses, in the form of increased densities or floor space, to developers who avoid building in hazard-prone areas or who integrate mitigation into design.</p>	<p>Generally limited to metropolitan areas where land is scarcer and the market benefit to the developer is more tangible.</p> <p>May face legal challenges if there is not a clear connection between the concession and the government purpose.</p>
<p>Performance or impact zoning</p>	<p>Sets standards for the allowable effects or impacts of new development.</p>	<p>Allows local governments to set standards such as minimum protections for natural resources (e.g., wetlands protection, stormwater control and traffic access standards).</p>	<p>Performance standards may be difficult to write and administer. Requires time and expertise.</p>
<p>Planned Unit Developments (PUDs), average density, and cluster development</p>	<p>Regulation under which design is a matter of negotiation. The average density of the site remains at or near the allowable limit.</p>	<p>Allows flexible design of developments that are constructed as a unit. Can help shift density away from hazard prone areas.</p>	<p>PUDs must have areas of lower hazard risk available for development.</p>
<p>Subdivision ordinances</p>	<p>Local ordinances that regulate the conversion of undivided land into building lots for residential or other purposes.</p>	<p>The key tool in land use planning where damage can be reduced by design and density limitance. Moves structures, streets and utilities to safest area of site.</p>	<p>Subdivision regulation is not well tied to hazard mitigation objectives in many areas.</p>

# Natural Hazard Technical Resource Guide

<i>Land Use Management Tools</i>	<i>Description</i>	<i>Effectiveness</i>	<i>Limitations</i>
<b>Environmental Management</b>			
<p><b>Wetlands protection</b></p> <p>Wetlands provide habitat, water quality benefits and flood storage</p>	<p>Wetlands serve many environmental purposes in addition to flood mitigation. Other programs are in place to prohibit dredging and placement of fill in wetlands.</p>	<p>Prevents development in wetlands that protect areas for flood storage and preserve other environmental benefits. Wetlands regulations and funds to protect wetlands may also be used to support flood-plain management activities.</p>	<p>Evidence from the 1993 Midwest floods found that wetland restoration is effective for small and medium floods, but usefulness in mitigating floods diminished as the size of the flood increased.</p>
<p><b>Stormwater management</b></p> <p>New development generally results in an increase in impervious surface, impairing the ability of land to absorb water and increasing the volume of peak flow runoff.</p>	<p>Structural and non-structural measures to control run-off. Structural solutions include detention and retention ponds to store water, and filter strips. Non structural projects include maintaining existing stormwater systems and limiting impervious surfaces.</p>	<p>Measures reduce flooding, erosion and water quality problems. New permit requirements for smaller cities will encourage adoption of stormwater management tools.</p>	<p>Most effective for new development. Hard to retrofit existing stormwater systems to provide better water storage.</p>
<b>Public Facilities Policies</b>			
<p><b>Capital improvements program (CIP)</b></p> <p>Used in conjunction with other land use planning measures to ensure that development is not stimulated in hazard prone areas.</p>	<p>A multi-year plan describing how some or all of a community's capital improvements are to be developed. Contains detailed information on technical items (e.g., pipe capacity, for example) and information on projected costs and financing methods.</p>	<p>Can be useful in steering development away from hazard areas by limiting availability of necessary services. Can promote funding for services in lower hazard areas.</p>	<p>Many cities and counties do not have such programs.</p>





<b>Land Use Management Tools</b>	<b>Description</b>	<b>Effectiveness</b>	<b>Limitations</b>
<b>Land and Property Acquisition</b>			
Acquisition of land in high hazard areas.	Local jurisdiction acquires land for permanent open space or low-intensity use (e.g., recreation) in hazard prone areas.	Maintaining hazard areas as open space truly minimizes risks from hazards. Multiple objectives are possible (e.g., recreation, flood mitigation, alternative transportation corridors, and neighborhood redevelopment).	Acquisition is usually expensive.  Must coordinate acquisition with overall land use plan. The challenge is avoiding “checker-board” acquisition of property. Must target specific, high hazard areas.
Structural buy-outs	Obtain buildings damaged by natural hazards.	Can be a key component in the relocation of existing hazard area development to new site(s).	Effectiveness depends on what happens to acquired structures and subsequent rebuilding on- and off-site. Most effective if group of structures can be acquired in same area. Expensive, with very high demands for commitment and coordination.
Relocation of existing hazard area development to new site(s)	The removal and relocation of structures to areas with reduced hazard risk.	Removes risk to residents in the hazard area if limits are placed on the property thus precluding redevelopment.	Same limitations for structural buy-outs noted above. In addition, relocations require large investment in new site, with no assurances that former residents will move to relocated development. Timing is a problem because buyouts and relocation are not necessarily at the same time.
Acquisition of development rights or easements	Obtain a right to use property for a specific purpose.	Potentially very effective if funds are available and adequate authority (such as eminent domain) can be employed to target key sites. Property owner still allowed to use site for recreation, agriculture and other activities that minimize risk to people and structures.	Have not been frequently used for hazard mitigation in Oregon.

# Natural Hazard Technical Resource Guide

<i>Land Use Management Tools</i>	<i>Description</i>	<i>Effectiveness</i>	<i>Limitations</i>
<b>Land and Property Acquisition</b>			
Transfer of development rights (TDR) away from hazard areas to safer locations.	Development rights are separated from the land in an area where a community wishes to limit development. Development rights are then permitted to be sold for use in an area desirable for high-density development.	Potentially very effective if there are suitable receiving areas for transferred rights and the program is mandatory, not voluntary.	This is a complex tool for hazard mitigation aims alone.  Costs of developing and administering TDR or purchase of development rights programs are significant.
<b>Taxation and Fiscal Policies</b>			
Preferential (reduced) taxation	Taxation is linked with open space or reduced land use intensity of lands in hazard areas.	Important as a possible incentive for easements and other partial-fee transactions to limit development in hazard areas.	Has not been used for mitigation aims. Completely ineffective as a stand-alone tool. Requires state enabling legislation or extension of existing farmland and open-space laws for mitigation purposes.
Impact taxes or special assessments	Taxes or assessments to fund the added public costs of hazard area development.	Can shift costs of future public losses due to developing in hazardous locations back onto the developers and owners. Possible disincentive to vulnerable development.	Has not been used for mitigation, although many other public costs of development are now collected from new development.



<b>Land Use Management Tools</b>	<b>Description</b>	<b>Effectiveness</b>	<b>Limitations</b>
<b>Information Dissemination</b>			
Public information programs	Educational programs for increasing natural hazard mitigation.	Better-informed citizens and consumers can create a political constituency for hazard mitigation when they know about the location and magnitude of hazards.	Generally, programs have a mixed record in building local political commitment for hazard mitigation. Targeted programs providing specialized information have been more effective (e.g., DOGAMI landslide brochure).
Construction practice seminars or builder/developer mitigation	Educational programs aimed specifically at builders and developers.	Essential aspect of effective use of specialized codes and building standards. Can contribute to success of an overall multi-tool mitigation strategy.	It is a challenge to ensure that training is available for all local/state building code officials and that information provided is consistent.
Hazard disclosure	A requirement for disclosing hazard risk in real estate transactions.	Better-informed real estate purchasers should create pressure for limiting some of the worst cases of new development in known hazard locations.	Disclosure typically is perfunctory and is provided too late in the transaction to affect the purchase decision.

# Appendix G

## List of Acronyms

This appendix was developed by the Community Service Center's Oregon Natural Hazards Workgroup at the University of Oregon for use by Pre-Disaster Mitigation Communities.

### County and Regional

CPAWC	Cooperative Public Agencies of Washington County
CREW	Cascadia Region Earthquake Workgroup
CSEPP	Chemical Stockpile Emergency Preparedness Program
CWPP	Community Wildfire Protection Plan
PGE	Portland General Electric
PLP	Partners for Loss Prevention
NN	Northwest Natural
SWCD	Soil and Water Conservation District

### Oregon

AGC	Associated General Contractors
AOC	Association of Oregon Counties
BCD	Building Codes Division (Department of Consumer and Business Services)
BPA	Bonneville Power Administration
CPW	Community Planning Workshop (University of Oregon)
DAS	Department of Administrative Services
DCBS	Department of Consumer and Business Services
DEQ	Department of Environmental Quality
DHS	Department of Human Services
DLCD	Department of Land Conservation and Development
DOGAMI	Department of Geology and Mineral Industries
DSL	Division of State Lands
ESD	Education Service District
GIHMT	Governor's Interagency Hazard Mitigation Team
GNRO	Governor's Natural Resources Office (State of Oregon)
LCDC	Land Conservation and Development Commission (State of Oregon)
LOC	League of Oregon Cities
OCS	Oregon Climate Service
ODA	Oregon Department of Agriculture
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
OEM	Office of Emergency Management (Oregon State Police)
OEMA	Oregon Emergency Management Association

OERS Oregon Emergency Response System  
 OHIRA Oregon Hazard Identification and Risk Assessment  
 ONHW Oregon Natural Hazards Workshop (University of Oregon)  
 ORS Oregon Revised Statutes  
 ORVOAD Oregon Voluntary Organizations Active in Disaster  
 OSFM Office of State Fire Marshal (Oregon State Police)  
 OSP Oregon State Police  
 OSSPAC Oregon Seismic Safety Policy Advisory Commission  
 OSU Oregon State University  
 OUS Oregon University System  
 OWEB Oregon Watershed Enhancement Board  
 PSU Portland State University  
 PUC Public Utility Commission  
 WRD Water Resources Department

## **Federal**

AASHTO American Association of State Highway and Transportation Officials  
 AIA American Institute of Architects  
 APA American Planning Association  
 ARC American Red Cross  
 ASCE American Society of Civil Engineers  
 ATC Applied Technology Council  
 b/ca benefit/cost analysis  
 BFE Base Flood Elevation  
 BLM Bureau of Land Management  
 BSSC Building Seismic Safety Council  
 CDBG Community Development Block Grant  
 CFR Code of Federal Regulations  
 CRS Community Rating System  
 CVO Cascade Volcano Observatory (USGS)  
 CWPP Community Wildfire Protection Plan  
 DHS Department of Homeland Security  
 EDA Economic Development Administration  
 EPA Environmental Protection Agency  
 ER Emergency Relief  
 EWP Emergency Watershed Protection (NRCS Program)  
 FAA Federal Aviation Administration  
 FAS Federal Aid System  
 FEMA Federal Emergency Management Agency  
 FIRM Flood Insurance Rate Map  
 FMA Flood Mitigation Assistance (FEMA Program)  
 FTE Full Time Equivalent  
 GIS Geographic Information System  
 GNS Institute of Geological and Nuclear Sciences (International)  
 GSA General Services Administration

HAZUS	Hazards U.S.
HBA	Home Builders Association
HFRA	Healthy Forest Restoration Act
HMGP	Hazard Mitigation Grant Program
HMST	Hazard Mitigation Survey Team
HUD	Housing and Urban Development (United States, Department of)
IBHS	Institute for Business and Home Safety
ICC	Increased Cost of Compliance
IHMT	Interagency Hazard Mitigation Team
NCDC	National Climate Data Center
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NHMP	Natural Hazard Mitigation Plan (also known as "409 Plan")
NIBS	National Institute of Building Sciences
NIFC	National Interagency Fire Center
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
PDM	Pre-Disaster Mitigation Program
SBA	Small Business Administration
SEAO	Structural Engineers Association of Oregon
SHMO	State Hazard Mitigation Officer
TDR	Transfer of Development Rights
UGB	Urban Growth Boundary
URM	Unreinforced Masonry
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USFA	United States Fire Administration
USFS	United States Forest Service
USGS	United States Geological Survey
USGS-CVO	United States Geological Survey – Cascades Volcano Observatory
WSSPC	Western States Seismic Policy Council

**Appendix H**  
**Mid-Columbia Gorge Regional**  
**Profile and Hazard Assessment**

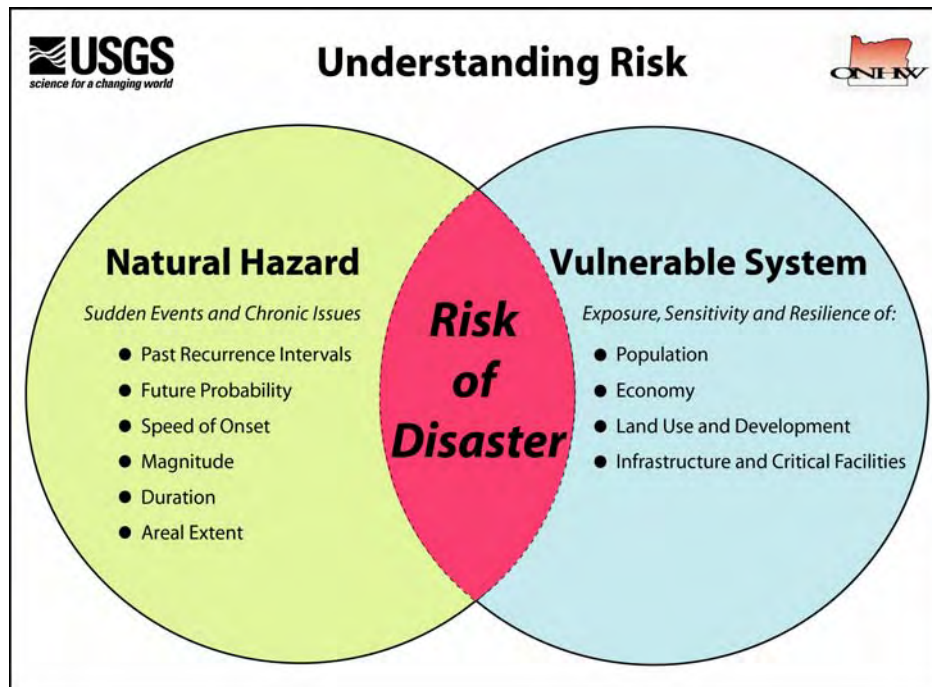
# Region 5: Mid-Columbia Natural Hazard Risk Profile

Hood River, Wasco, Sherman, Gilliam, Morrow, & Umatilla Counties

## Introduction and Purpose

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

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



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



Council (MMC) highlights that for every dollar spent on mitigation society can expect an average savings of \$4.00.<sup>2</sup>

## How to use this Report

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

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

## Regional Overview

The Mid-Columbia region (Region 5 as identified in the state's natural hazard mitigation plan) includes Hood River, Wasco, Sherman, Gilliam, Morrow, and Umatilla Counties. This region is at relatively high risk from wildfires, winter storms, and windstorms. It also faces moderate to high risk from drought and from flooding along tributaries of major rivers, though the major rivers of the Columbia, John Day, and Lower Deschutes are all fairly resistant to flooding because of dams. The Mid-Columbia region is also at risk from landslides in steep sloped areas, with Wasco and Hood River counties being particularly vulnerable. Other risks for the region, though with less frequent occurrence, are the effects of earthquakes and Mt. Hood volcanic eruptions.

## Organization of Report

This report includes three sections that present a comprehensive profile of the region and its sensitivity to natural hazards.

### Regional Maps

#### **Critical Infrastructure Map- Updated maps coming soon**

Using 2003 data from Oregon Department of Transportation, this map shows the approximate location of critical infrastructure, including

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<sup>\*</sup> FEMA Pre-Disaster Mitigation Grant PDM-C-PL-10-OR2005-003

schools, hospitals, bridges, dams, and power stations. Knowing the location of critical infrastructure is important when determining the sensitivities of the region.

### **County Hazard Risk Analysis Maps- Updated maps coming soon**

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

## **Regional Profile and Natural Hazard Sensitivity Analysis**

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

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

## **Regional Natural Hazard Risk Assessment**

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

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

## **Regional Profile and Sensitivity**

### **Section 1: Geography and Climate**

The six-county area of the Mid-Columbia region is approximately 10,302 square miles in area. The Mid-Columbia region trends east-west and is bordered by the Columbia River to the north, high desert to the south, the Blue Mountains to the east, and the Cascade Mountains to the west. The Cascades receive considerable rainfall annually from

storms and low-pressure systems coming in from the Pacific Ocean. Annual precipitation ranges from over 40 inches in western Hood River County to less than 10 inches in parts of Morrow and Umatilla Counties on the east side. The Cascades are volcanic in origin and are drained by hundreds of creeks, streams, rivers and lakes. Major rivers in the region include the Columbia, Deschutes, John Day, and Umatilla.<sup>3</sup>

## Section 2: Demographic profile

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

### Population and Demographics

In 2005, the estimated population of the Mid-Columbia region was 129,594, representing an increase of 2.8% since 2000. This growth pattern in the Mid-Columbia region is projected to continue at a moderate rate over the next 20 years, according to the Oregon Office of Economic Analysis. Table 1 displays the population change in each Mid-Columbia county, along with their respective average annual growth rates.

**Table 1. Population Growth, Mid Columbia Region, 2000-2005**

County	2000 Population	2005 Population	2000-2005		AAGR, 2000- 2005
			Population Change	% Change 2000-2005	
Gilliam	1,915	1,890	-25	-1.3%	-0.3%
Hood River	20,411	21,180	769	3.8%	0.8%
Morrow	10,995	11,945	950	8.6%	1.7%
Sherman	1,934	1,880	-54	-2.8%	-0.6%
Umatilla	70,548	72,395	1,847	2.6%	0.5%
Wasco	23,791	23,935	144	0.6%	0.1%
<b>Regional Total</b>	<b>129,594</b>	<b>133,225</b>	<b>3,631</b>	<b>2.8%</b>	<b>0.4%</b>

Source: Portland State University, Population Estimates, 2005.

The impact in terms of loss and the ability to recover vary among population groups following a disaster. Historically, 80% of the disaster burden falls on the public.<sup>4</sup> Of this number, a disproportionate burden is placed upon special needs groups, particularly minorities, and the poor. Minorities and the poor are more likely to be isolated in communities, are less likely to have the savings to rebuild after a disaster, and less likely to have access to transportation and medical care. Additionally, minorities and the poor are more likely to rent than

own homes, and in the event of a natural disaster, where homeowners would gain homeowner insurance, renters often do not have rental insurance. As of 2003, 12% of the region's population was living in poverty. (A large percentage of these people presumably fall into both categories.)

Median household income can be used to compare economic areas as a whole, but does not reflect how the income is divided among area residents. Table 2 displays the median household income for the Mid-Columbia region, which was \$37,355 in 2003. This is below the national average of \$43,318 and the state's average of \$42,593. The two percent median household income growth between 2000 and 2003 in the region is consistent with the two percent State and three percent National growth over the same time period.

**Table 2. Median Household Income, Mid Columbia Region, 2000 and 2003**

<b>County</b>	<b>2000</b>	<b>2003</b>	<b>% Change 2000-2003</b>
Gilliam	\$35,086	\$37,999	8%
Hood River	\$38,916	\$38,531	-1%
Morrow	\$38,331	\$40,435	5%
Sherman	\$35,022	\$36,272	4%
Umatilla	\$35,916	\$36,790	2%
Wasco	\$36,625	\$34,105	-7%
<b>Regional Average:</b>	<b>\$36,649</b>	<b>\$37,355</b>	<b>2%</b>

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

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

**Table 3. Poverty Rates, Mid Columbia Region, 2003**

County	Total Population in Poverty		Children Under 18 in Poverty	
	Number	%	Number	%
Gilliam	197	9%	65	12%
Hood River	2,471	13%	1,120	19%
Morrow	1,190	13%	623	20%
Sherman	252	13%	86	18%
Umatilla	9,210	14%	3,742	20%
Wasco	2,898	13%	1,100	21%
<b>Regional Average</b>		<b>12%</b>		<b>18%</b>

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

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

The age of the population is also an important consideration in hazard mitigation planning. In 2004, 28% of the regional population was under 14 or over 65 years of age.<sup>5</sup> Table 4 provides a breakdown of the percentages of youth and elderly in the Mid-Columbia region counties.

**Table 4. Mid Columbia Region Youth and Senior Populations, 2004**

County	0-14		65-74		75+	
	Number	%	Number	%	Number	%
Gilliam	312	16%	185	10%	198	10%
Hood River	4,695	22%	1,233	6%	1,380	7%
Morrow	2,890	24%	747	6%	537	4%
Sherman	313	17%	174	9%	209	11%
Umatilla	15,852	22%	4,472	6%	4,625	6%
Wasco	4,788	20%	1,911	8%	1,989	8%
<b>Regional Total and Average %:</b>	<b>28,850</b>	<b>20%</b>	<b>8,722</b>	<b>8%</b>	<b>8,938</b>	<b>8%</b>

Source: Portland State University Population Estimates, 2005

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

Young people also represent a vulnerable segment of the population. In Hood River, Morrow, Umatilla and Wasco counties, at least 20% of the

population is within the 0-14 year age range. Special considerations should be given to young populations and schools, where children spend much of their time, during the natural hazard mitigation process. Children are more vulnerable to heat and cold, have fewer transportation options, and require assistance to access medical facilities.

Special consideration should also be given to populations who do not speak English as their primary language. These populations can be harder to reach with preparedness and mitigation information materials. They are less likely to be prepared if special attention is not given to language and culturally appropriate outreach techniques. In the Mid-Columbia region, most citizens speak English as their primary language. However, in every county in Oregon, Spanish is the second most prominent language. As Table 5 shows, 8% of the total population in the Mid-Columbia region speaks English less than “very well”.

**Table 5. Population over Age 5 that Speaks English Less than “Very Well,” Mid Columbia Region, 2000 Region**

<b>County</b>	<b>%Population</b>
Gilliam	1%
Hood River	15%
Morrow	14%
Sherman	3%
Umatilla	8%
Wasco	5%
<b>Regional Average:</b>	<b>8%</b>

Source: US Census Bureau, 2000 Census, Summary File 3

## **Housing and Development**

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

The urban and rural growth pattern impacts how agencies prepare for emergencies as changes in development can increase risks associated with hazards. The Mid-Columbia region is growing more urban, with 5% population growth in incorporated areas between 2000 and 2005, versus a 4% population loss in unincorporated areas during the same

time period. Table 6 illustrates the trend in urban area population growth in the Mid-Columbia counties between 2000 and 2005.

**Table 6. Urban/Rural Populations, Mid Columbia Region, 2000-2005**

County	% Incorporated Population		% Change
	2000	2005	2000-2005
Gilliam	69%	72%	3%
Hood River	34%	36%	2%
Morrow	60%	59%	-1%
Sherman	59%	68%	9%
Umatilla	68%	72%	4%
Wasco	57%	59%	1%
<b>Regional Average:</b>	<b>58%</b>	<b>61%</b>	<b>3%</b>

Source: Portland State University Population Estimates, 2005

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

**Table 7. County Housing Profile, Mid-Columbia Region, 2000**

County	Single-Family	Multi-Family	Mobile Homes	Boat, RV, Van, etc.
Gilliam	76%	6%	17%	1%
Hood River	69%	17%	14%	0%
Morrow	51%	10%	36%	3%
Sherman	63%	4%	30%	2%
Umatilla	61%	19%	19%	1%
Wasco	63%	15%	21%	1%

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

Table 7 shows that the majority of the housing stock is in single-family homes and this trend is continuing with new construction. In 2002, an estimated 94% of new housing was single-family units<sup>6</sup>. This trend suggests that hazard mitigation efforts should provide outreach and information that specifically addresses preparedness in detached housing units.

In addition to location and type of housing, the year housing structures were built has implications for community vulnerability. The older a home is, the greater the risk of damage from natural disaster. This is because structures built after the late 1960s in the Northwest and California used earthquake resistant designs and construction techniques. In addition, FEMA began assisting communities with floodplain mapping during the 1970s, and communities developed ordinances that required homes in the floodplain to be elevated to one foot over Base Flood Elevation. Knowing the age of a structure is helpful in targeting outreach regarding retrofitting and insurance for owners of older structures. Table 8 illustrates the percentage of homes built per county during certain periods of time.

**Table 8. Housing, Year Built, Mid-Columbia Region**

County	1939 or earlier - 1959	1960-1979	1980-2000
Gilliam	61%	22%	17%
Hood River	40%	29%	31%
Morrow	25%	40%	35%
Sherman	52%	31%	17%
Umatilla	38%	38%	24%
Wasco	44%	31%	25%

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

### Section 3: Infrastructure Profile

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

#### Transportation

The Mid-Columbia region is an important freight corridor for the entire Pacific Northwest. The Columbia Gorge provides the only river-grade pass (i.e., the corridor does not include any major grades) through the Cascade Mountains from the Canadian border to California. The ability to pass through the Cascade Mountain Range on a relatively flat and straight surface is taken advantage of by many forms of transportation and shipping. There are three primary modes of transportation through the region: highways, railroad, and barges. There are also many small airports scattered throughout the region that are used primarily for passenger service.



## Roads and Bridges

There are two major highways that run through the Mid-Columbia region. I-84 is a major transportation corridor that connects Portland with eastern Oregon and beyond. I-84 is one of the few major east-west roads in Oregon, Washington, and Northern California that provides drivers with a river-grade crossing of the Cascades. U.S. 97 runs north-south through Sherman and Wasco Counties. U.S. 97 is the most important north-south transportation corridor east of the Cascades.<sup>7</sup>

Many commercial entities make use of the highways in the Mid-Columbia region. Trucks transported over 10 million tons of freight along I-84 in 2002 and the average daily truck volume was more than 3,000.<sup>8</sup> Trucks on the section of U.S. 97 between the I-84 junction and Shaniko in Wasco County transported between 4 and 9.99 million tons of freight in 2002. Truck volume averaged between 500 and 1,499 trucks per day.<sup>9</sup> U.S. 97 also serves as an important alternative route to I-5.

Highways are also heavily utilized by local traffic. Seventy six percent of workers in the Mid-Columbia commute by driving alone. According to Census 2000 data, the average commute for workers in the Mid-Columbia region is nineteen minutes each way. Additionally, in 2003, 39% of employees living in counties in the Mid-Columbia region worked outside of their home county.<sup>10</sup> A severe winter storm has the potential to disrupt the daily driving routine of thousands of people.

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

- Average daily traffic volume on I-84 recorded six miles west of The Dalles increased by about 14% between 1996 and 2005. Farther east on I-84, at about 4 miles west of Pendleton, the average daily traffic for the same time period increased by 24%. Judging from these trends, traffic levels will continue to increase.<sup>11</sup>
- Average daily traffic counts also increased by 9% between 1996 and 2005 on U.S. 97, one-half mile north of Moro in Sherman County.<sup>12</sup>

A large increase of automobiles can place stress on roads, bridges and infrastructure within the cities, and also in rural areas where there are fewer transit roads. Natural hazards can disrupt automobile traffic and shut down local transit systems across the area or region and make evacuations difficult. This is particularly important in this region, where hazardous materials are being transported along Interstate 84 and nearby railroad lines. An accident involving these hazardous materials could result in a dangerous situation.

The condition of bridges in the region is also a factor that affects risk from natural hazards. Most bridges are not seismically retrofitted, which is a particularly important issue for the Mid-Columbia region because of its risk from earthquakes. Incapacitated bridges can disrupt

traffic and exacerbate economic losses because of the inability of industries to transport services and products to clients. Table 9 shows the number of state, county, and city maintained bridges and culverts, and the number of historic covered bridges in the region. The bridges in the region are part of the state and interstate highway and maintained by the Oregon Department of Transportation.

**Table 9. Bridges and Culverts**

County	State Highway Bridges	State Highway Culverts	County Highway Bridges	County Highway Culverts	City/ Municipal Highway Bridges	City/ Municipal Highway Culverts	Historic Covered Bridges	2006 Total
Gilliam	16	35	17	0	0	0	0	68
Hood River	37	38	18	0	0	0	0	93
Morrow	25	35	43	1	10	1	0	115
Sherman	34	46	9	1	0	1	0	91
Umatilla	119	105	247	7	23	0	0	501
Wasco	58	46	88	24	5	0	0	221

Source: Oregon Department of Transportation, 2006.

### Railroads

Railroads are major providers of regional and national cargo and trade flows. Railroads that run through the Mid-Columbia region provide vital transportation links from the Pacific to the rest of the country. The Burlington Northern Santa Fe Railroad (BNSF) and the Union Pacific Railroad (UP) are the two major railroads in the region.

BNSF owns the tracks that run north-south along the Deschutes River which borders Sherman and Wasco Counties. The tracks run through Oregon to Southern California where the tracks turn east and continue to Texas.<sup>13</sup>

UP's tracks run east-west along the Columbia River. A major classification yard and a diesel locomotive maintenance shop are located in Hinkle near Hermiston in Umatilla County.<sup>14</sup>

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

Rails are sensitive to icing from the winter storms that are common in the Mid-Columbia region. For industries in the region that utilize rail

transport, these disruptions in service can result in economic losses. As mentioned above, the potential for rail accidents caused by natural hazards can also have serious implications for the local communities if hazardous materials are involved.

### **Barges**

Five of the six counties that make up the Mid-Columbia region border the Columbia River. The Columbia meets the Snake River in Kennewick, Washington. The two rivers are frequently combined into one transportation system and are referred to as the Columbia/Snake River System. The Columbia/Snake region consists of all of the Columbia River east of Portland and the Snake River. The Columbia/Snake region generated 1,100 jobs directly related to waterborne cargo activity in 2000 with another 1,500 jobs created indirectly. Waterborne cargo activities created \$39 million of direct payroll and \$80 million in income from direct, indirect, and induced effects.<sup>18</sup> In addition, products shipped from the region reach Pacific Rim countries one day faster than those shipped from California and 10 days faster than those shipped from the Gulf Coast.<sup>19</sup>

Wheat and barley are the primary products transported by barge in the Columbia/Snake River system. In 2000, 5.3 million tons of grain were shipped down the Columbia River.<sup>20</sup> Barges also transported 1.1 million tons of forest products, 1.8 million tons of liquids, and 1.1 million tons of crude materials and miscellaneous products in 2000.<sup>21</sup>

Barge transport is sensitive to disruption from natural hazards that affect all forms of ground transportation. Barges are dependent upon ground transportation for loading and unloading goods and continuing their transportation supply chain. Barge transportation is also vulnerable to large-scale natural disasters, such as volcanic eruptions, which would result in channel infill and sediment in the Columbia River.

### **Airports**

The Mid-Columbia region has ten small airports. The Eastern Oregon Regional Airport in Pendleton, Umatilla County is the only commercial airport in the region. Horizon Air provides passenger service and Horizon Air, Federal Express, and United Parcel Service use the airport to provide scheduled freight services.<sup>22</sup> The Eastern Oregon Regional Airport transported 200 tons of freight in and out of the airport in 2000. In comparison, the La Grande airport handled 100 tons, Eugene-Mahlon Sweet Field handled 2,000 tons and Portland International transported 165,000 tons of freight in 2000.<sup>23</sup>

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

## Critical Facilities

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

**Table 10. Mid Columbia Region Critical Facilities by county**

County	Hospitals		Police Station	Fire & Rescue Station	School Districts & Colleges
	# of Hospitals	# of Beds			
Gilliam	0	0	3	2	2 Districts
Hood River	1	25	2	6	1 District
Morrow	1	12	4	5	2 Districts
Sherman	0	0	1	5	1 District
Umatilla	3*	158*	11	16	10 Districts, 1 Community College
Wasco	1	49	2	8	3 Districts, 1 Community College

\*These totals include one psychiatric hospital with a 60-bed capacity.

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

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

## Power Generation and Transmission

The Mid-Columbia region is an important thoroughway for oil and gas pipelines and electricity transmission lines. In addition, the region is also a major producer of hydropower. The infrastructure associated with power generation and transmission plays a critical role in supporting the regional economy.

There are four major dams on the Columbia River in the Mid-Columbia region: the Bonneville, the McNary, The Dalles, and the John Day. The McNary has the lowest maximum generation capacity at 1,120 megawatts (mw). The John Day Dam has the highest maximum generation capacity at 2,480 mw. These dams are, by far, the largest hydropower producers in Oregon. The next largest hydropower producing dam in Oregon is the Brownlee Dam on the lower Snake River. Its maximum power generation is 585 mw.<sup>24</sup>

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

**Table 11. Mid-Columbia Region Power Plants and Dams by County**

County	Power Plants	Dams		
		Dams <sup>†</sup> (State)	Dams <sup>†</sup> (National)	Threat Potential
Gilliam	0	0	0	0 High Threat
Hood River	0	10	5	1 High Threat
Morrow	2 power plants, 1053 MW	8	13	2 High Threat
Sherman	0	11	6	1 High Threat
Umatilla	3 power plants, 1137 MW	21	14	3 High Threat
Wasco	0	29	19	6 High Threat

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

The electric, oil, and gas lines that run through the Mid-Columbia region are privately owned. A network of electricity transmission lines running through the Mid-Columbia region allows Oregon utility companies to exchange electricity with other states and Canada.<sup>25</sup> Most of the natural gas Oregon uses originates in Alberta, Canada. Two natural gas transmission pipelines run through the Mid-Columbia region. In addition, an oil pipeline runs through Umatilla County connecting Oregon with supplies of oil from the Rocky Mountain States and Canada.<sup>26</sup> These lines may be vulnerable to severe, but infrequent natural hazards, such as earthquakes.

<sup>†</sup> Note: The National Inventory of Dams includes all dams with either:

- a) a high or significant hazard rating
- b) a low hazard dam that exceeds 25 feet in height AND 15 acre-feet storage
- c) a low hazard dam that exceeds 6 feet in height AND 50 acre-feet storage

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

## **Section 4: Economic Profile**

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

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

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

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

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

### **Economic Overview**

The Mid-Columbia region enjoys many economic advantages due to its location. The region's proximity to the Portland area, the Southern Pacific, Union Pacific and Burlington Northern railroad lines that run across the western edge of the region, and I-84 provide good opportunities for the transportation of manufactured and agricultural goods. In addition, the region's close proximity to the Columbia River, the Cascade Mountains, and the high desert terrain provide year-round sporting and tourism activities. Furthermore, the area's prominence as a producer of hydroelectric power represents a significant asset in the form of cheap electricity.

According to the Oregon Employment Department, the Mid-Columbia region experienced economic problems due to the downturn in the lumber, wood products and aluminum industries during the 1990's. However, the region has been able to offset the loss of jobs in these industries by the addition of new manufacturing companies, especially food processing companies, in Hood River, Morrow, Umatilla, and Wasco counties. As of 2004, the region employed 73,600 people with a combined payroll of over one and a half billion dollars. Table 12 displays the payroll and employee figures per county.

**Table 12. Mid-Columbia Employment and Payroll by County, 2004**

<b>County</b>	<b># of Employees</b>	<b>Annual Payroll</b>
Gilliam	1,333	\$ 24,668,000
Hood River	14,380	\$ 277,702,000
Morrow	5,244	\$ 114,515,000
Sherman	1,209	\$ 19,413,000
Umatilla	39,166	\$ 922,272,000
Wasco	12,268	\$ 267,351,000
<b>Total</b>	<b>73,600</b>	<b>\$1,625,921,000</b>

Source: Bureau of Economic Analysis

In 2004, there were 3,465 businesses in the Mid-Columbia region. Of these, 90%, or 3,121, were small businesses with less than 20 employees.<sup>27</sup> The prevalence of small businesses in the Mid-Columbia region is an indication of sensitivity to natural hazards because small businesses are more susceptible to financial uncertainty.<sup>28</sup> When a business is financially unstable before a natural disaster occurs, financial losses (resulting from both damage caused and the recovery process) may have a bigger impact than they would for larger and more financially stable businesses.<sup>29</sup>

Although the Mid-Columbia region has a high percentage of small businesses, as a whole, the Mid-Columbia region has a more homogeneous economy than other Oregon regions. Many of the small businesses fall into the same categories of industry sectors. This low economic diversity means that certain industries are dominating the economic structure of the community, and are therefore extremely important to the Mid-Columbia region. Table 13 displays the diversity ranking for each county with 1 being the most diverse economic county in Oregon, 36 being the least diverse economic county in Oregon.

**Table 13. County Economic Diversity Ranking, 1999**

<b>County</b>	<b>Economic Diversity Index Ranking</b>
Gilliam	35
Hood River	24
Morrow	32
Sherman	36
Umatilla	12
Wasco	19

Source: Oregon Employment Department<sup>30</sup>

An economy that is heavily dependent upon a few key industries may have a more difficult time recovering after a natural disaster than one with a more diverse economic base. While a community with a diverse economic base may suffer from an industry sector being damaged

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

## **Key Industries**

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

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

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

## **High Revenue Sectors**

The Mid-Columbia region's top revenue generating industries are a mix of basic and non-basic sectors. In 2002, the three sectors in the Mid-Columbia region with the highest revenue were Retail Trade (39.2%), Wholesale Trade (21.1%), and Farm and Ranch (19.8%).<sup>31</sup>

Within the individual counties in the Mid-Columbia, however, the industries' relative contribution to revenue differs. For instance, in Gilliam, Morrow, and Sherman counties, the Farm and Ranch sector garners the highest amount of revenue. Table 14 shows the percent of total county revenue that is contributed by various sectors.



**Table 14. Percent of Revenue in Mid-Columbia Counties by Industry, 2002**

County	Industry									
	Retail Trade	Wholesale Trade	Accommodation and Food Services	Health Care/ Social Assistance	Professional, Scientific and Technology	Other (except Public Admin)	Real Estate and Rental and Leasing	Arts/ Entertainment	Administrative/ Waste Services	Farm and Ranch
Gilliam	29%	n/a	7%	n/a	n/a	n/a	n/a	n/a	n/a	63%
Hood River	39%	23%	7%	13%	4%	3%	2%	n/a	1%	10%
Morrow	10%	32%	3%	n/a	n/a	1%	1%	n/a	2%	52%
Sherman	39%	11%	6%	n/a	n/a	n/a	n/a	n/a	n/a	44%
Umatilla	46%	24%	10%	n/a	n/a	2%	1%	n/a	3%	15%
Wasco	45%	16%	6%	17%	2%	2%	1%	1%	1%	7%

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

The *retail trade sector* is primarily composed of small businesses (89%) that tend to be more sensitive to hazard induced costs due to prior financial instability. Retail trade is also largely dependent on wholesale trade and the transportation network for the delivery of goods for sale. Disruption of the transportation system could have severe consequences for retail businesses. Retail trade typically relies on local residents and tourists and their discretionary spending ability. Residents' discretionary spending diminishes after a natural disaster when they must pay to repair their homes and properties. In this situation, residents will likely concentrate their spending on essential items that would benefit some types of retail (e.g. grocery) but hurt others (e.g. gift shops). The potential income from tourists also diminishes after a natural disaster as people are deterred from visiting the impacted area. In summary, depending on the type and scale a disaster could affect specific segments of retail trade, or all segments.

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

The *farm and ranch sector* is inherently dependent on the weather and is susceptible to a variety of natural hazards that afflict the Mid-Columbia region, including flood, drought, and summer and winter storms. These natural hazards have the capacity to devastate seasonal

crops, representing a significant financial loss for the year. The western part of the region is known for its high quality fruit, including pears, apples, and cherries. The eastern part of the region is the state's principal wheat producing area.

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

### **Major employment sectors**

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

The three sectors in the Mid-Columbia region with the most employees in 2004 were Government (16.4%), Farm and Ranch (14.5%), and Retail Trade (11.3%).<sup>32§</sup>

Within the six Mid-Columbia counties, the percent of county employment by various sectors differs. For example, in Morrow County, manufacturing is the second largest employer, though across the region, manufacturing accounts for a smaller percent of total employment. Table 15 shows the distribution of each county's employees across the five largest regional employment sectors.

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

**Table 15. Percent of County Employment by the Five Largest Regional Employment Sectors, Mid-Columbia Region, 2004**

County	Industry						Accommodation and Food Services
	Government	Health Care and Social Services	Retail Trade	Farm	Manufacturing	Food Services	
Gilliam	16%	6%	7%	22%	1%	n/a	
Hood River	9%	12%	12%	11%	9%	9%	
Morrow	16%	2%	7%	19%	17%	3%	
Sherman	22%	n/a	12%	23%	n/a	n/a	
Umatilla	18%	9%	11%	7%	11%	6%	
Wasco	18%	14%	14%	7%	6%	8%	

Source: Bureau of Economic Analysis 2004

Sectors that are anticipated to be major employers in the future also warrant special attention in the hazard mitigation planning process.

Between 2005 and 2014, the largest job growth in the Mid-Columbia region is expected to occur in the Information, Local Government, and Educational and Health Services sectors.<sup>33</sup>

The *information sector*, as defined by the North American Industry Classification System, includes publishing industries, motion picture and sound recording industries, broadcasting industries, telecommunications industries, internet service providers, data processing industries, and information services industries. The information sector is sensitive to a loss of power from a disaster and to disruptions of physical transmission cables (phone lines, etc.). There may also be a disruption of employees' ability to work as a result of damages/problems at home.

If prepared and organized, however, this sector has the potential to have high resilience to many disasters due to its unique characteristics. First, as a basic sector, information businesses are frequently not dependant on the local community for revenue. Many of the targeted consumers of the products are located outside the region and their purchasing power would not be impacted by a localized natural disaster. Second, the sector is more insulated from disruptions to the transportation network than others because there is a potential for many of the employees to work from home and because some products are transmitted via internet.

The *health care and social assistance sector* ranges from physicians and chiropractors to family planning and kidney dialysis centers to emergency food and housing organizations and child day care services. This sector is growing in the Mid-Columbia, partly as a result of the large retirement age population.

The demand for health care and social assistance following a severe natural disaster may increase in the short term as extra health care and housing services may be necessary. Services that are privately subsidized and sensitive to interruptions of funding may suffer following a disaster. However, the long-term economic viability of this sector should not be adversely affected by a natural disaster. The facilities' ability to withstand the physical impacts of a disaster and the services' ability to cope with a potential influx of people requiring attention after a disaster may be concerns for this sector.

### **Common Business Types**

Identifying sectors that are represented by a large number of businesses can guide the development of targeted mitigation strategies for those sectors. Approximately 40% of all businesses in the Mid-Columbia region fall into three industry sectors-

18% (573) of all businesses are engaged in Retail Trade, 12% (373) of all businesses are engaged in Construction, and 11% (365) of all businesses are engaged in Health Care and Social Assistance.<sup>34</sup>

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

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

### **Regional Profile and Sensitivity Conclusion**

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



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<sup>2</sup> National Institute of Building Science’s Multihazard Mitigation Council. “Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities” 2005

<sup>3</sup> Loy, William G., ed. Atlas of Oregon. 2001. University of Oregon Press.

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

<sup>5</sup> Portland State University, Population Estimates, 2005

<sup>6</sup> US Census Bureau, County Building Permits, 2002

<sup>7</sup> Oregon Transportation Plan.  
<http://www.oregon.gov/ODOT/TD/TP/ortransplanupdate.shtml>.

<sup>8</sup> Oregon Transportation Plan.  
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<sup>9</sup> Oregon Transportation Plan.  
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<sup>10</sup> US Census Bureau LEDmap, 2003

<sup>11</sup> Oregon Department of Transportation website. “Permanent Automatic Traffic Recorder Stations.”  
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<sup>15</sup> Oregon Rail Plan: An Element of the Oregon Transportation Plan. 2001.  
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- <sup>18</sup> Ibid.
- <sup>19</sup> Ibid.
- <sup>20</sup> CEDER. 2005. *Columbia/Snake River System and Oregon Coastal Cargo Ports Marine Transportation System (MTS) Study*. <http://www.pnwa.net/ceder>.
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- <sup>22</sup> Oregon Department of Transportation Trip Check. <http://www.tripcheck.com/Pages/AirNorth.asp>; Pendleton Airport website. <http://www.pendleton.or.us/airport.htm>.
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- <sup>25</sup> Ibid.
- <sup>26</sup> Ibid.
- <sup>27</sup> US Census Bureau, Economic Census, 2002
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- <sup>30</sup> Oregon Employment Department, "Measuring Economic Development", 2001 <http://www.qualityinfo.org/olmisj/ArticleReader?itemid=0002037&print=1>
- <sup>31</sup> US Census Bureau Economic Census 2002, Oregon Agriculture Information Network, 2002.
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<sup>34</sup> U.S. Census Bureau. 2002 Economic Census. 2002.  
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