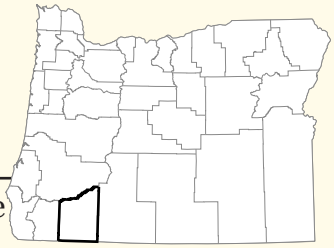
Jackson County

Multi-Jurisdictional Natural Hazards Mitigation Plan

Prepared for: Jackson County, Ashland, Eagle Point, Rogue River, Shady Cove



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Jackson County

Multi-jurisdictional Natural Hazards Mitigation Plan

Report for:

Jackson County

Ashland

Eagle Point

Rogue River

Shady Cove

Prepared by:

University of Oregon's Community Service Center:

Oregon Partnership for Disaster Resilience

1209 University of Oregon

Eugene, Oregon 97403-1209

October 2012

Special Thanks & Acknowledgements

Jackson County developed this Multi-jurisdictional Natural Hazards Mitigation Plan (NHMP) through a regional partnership funded by the Federal Emergency Management Agency's Pre-Disaster Mitigation Competitive Grant Program. FEMA awarded the Jackson County grant to support the update of the natural hazards mitigation plan. The county's planning process utilized a four-phased planning process, plan templates and plan development support provided by the Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Community Service Center. This project would not have been possible without technical and in-kind staff support provided by Jackson County and the cities of Ashland, Eagle Point, Rogue River and Shady Cove.

Partners include:

Jackson County
FEMA Region X
City of Ashland
City of Rogue River
City of Eagle Point
City of Shady Cove
Oregon Military Department – Office of Emergency Management
Community Service Center, Oregon Partnership for Disaster Resilience

Project Steering Committee:

Jackson County

Representatives from the following organizations served as steering committee members for the Jackson County natural hazards mitigation planning process.

Convener, Mike Curry	Jackson County Emergency Manager
Justin Bates	Medford Fire and Rescue
Neil Benson	Jackson County Integrated Fire Plan
Derek Bowker	Phoenix Police
Rod Countryman	Jackson County Sheriff's Office
Devin Hull	Jacksonville Fire Department
John Karns	Ashland Fire and Rescue
Mark Knox	Talent Planning
John Krawczyk	City of Rogue River
Mike Mattson	Jackson County Development Services
Ed Mayer	Shady Cove
Hector Meletich	Ashland Police
Mark Orndoff	Jackson County Health and Human Services
Tanya Phillips	Jackson County Health and Human Services
Mark Reagles	City of Rogue River
Jan Sanderson Taylor	United Way of Jackson County

Vern Thompson	Eagle Point Police Department
David Towe	Jacksonville Police
John Vial	Jackson County Parks
Jim Wolf	Jackson County Integrated Fire Plan
Ted Zuk	Jackson County Code Enforcement

City of Ashland

Convener, John Karns	Ashland Fire and Rescue
Juli DiChiro	Ashland School Superintendant
Terri Eubanks	Ashland CERT Coordinator
Mike Faught	Director Public Works
Dana Fortmiller	Ashland Chamber of Commerce
Michael Grubbs	Building Official
Terry Holderness	Ashland Police Department
Dave Kanner	Ashland City Administrator
Alice Miles	Ashland Community Hospital
Bill Molnar	Ashland Community Development Director
Paul Nichols	Oregon Shakespeare Festival
Scott Resch	Oregon Shakespeare Festival
Stephen Ross	Southern Oregon University
Sandra Slattery	Ashland Chamber of Commerce
Ali True	Ashland Firewise Communities Coordinator

City of Eagle Point

Convener, Vern Thompson	Eagle Point Police Department
Robert Miller	Eagle Point Public Works
Mike Upston	Eagle Point Planning

City of Rogue River

Convener, Mark Reagles	City Administrator
Lois DeBenedetti	Rogue River Planning
Dave Ehrhardt	Rogue River City Council
John Krawczyk	Rogue River Public Works

City of Shady Cove

Convener, Ed Mayer	Shady Cove Emergency Management
Danise Brakeman	Shady Cove City Administrator
Ron Holthusen	Shady Cove Mayor
Bob Miller	Jackson County Fire District #4

Project Managers:

Michael Howard, Program Specialist, Oregon Partnership for Disaster Resilience

Michael Curry, Jackson County Emergency Manager

Community Service Center Staff:

Josh Bruce, Interim Director, Oregon Partnership for Disaster Resilience

Julie Foster, Grants Administrator, Community Service Center

Linda White, Office Coordinator, Community Service Center

Geographic Information Systems (GIS) Maps:

The contributions from Jackson County Information Technology were essential in illustrating the extent and potential losses associated with the natural hazards affecting the community.

About the Community Service Center

The Community Service Center (CSC), a research center affiliated with the Department of Planning, Public Policy, and Management at the University of Oregon, is an interdisciplinary organization that assists Oregon communities by providing planning and technical assistance to help solve local issues and improve the quality of life for Oregon residents. The role of the CSC is to link the skills, expertise, and innovation of higher education with the transportation, economic development, and environmental needs of communities and regions in the State of Oregon, thereby providing service to Oregon and learning opportunities to the students involved.

About the Oregon Partnership for Disaster Resilience

The Oregon Partnership for Disaster Resilience (OPDR) is a coalition of public, private, and professional organizations working collectively toward the mission of creating a disaster-resilient and sustainable state. Developed and coordinated by the Community Service Center at the University of Oregon, the OPDR employs a service-learning model to increase community capacity and enhance disaster safety and resilience statewide.

Plan Template Disclaimer

This Natural Hazards Mitigation Plan is based in part on a plan template developed by the Oregon Partnership for Disaster Resilience. The template is structured to address the requirements contained in 44 CFR 201.6; where language is applicable to communities throughout Oregon, OPDR encourages the use of standardized language. As part of this regional planning initiative, OPDR provided copies of the plan templates to communities for use in developing or updating their natural hazards mitigation plans. OPDR hereby authorizes the use of all content and language provided to Jackson County in the plan template.

Jackson County
Natural Hazards Mitigation Plan

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

FEMA

February 4, 2013

Honorable Don Skundrick
Chair, Jackson County Commissioners
Jackson County Courthouse
10 South Oakdale, Room 214
Medford, Oregon 97501

Dear Chair Skundrick:

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has approved the ***Jackson County Hazard Mitigation Plan*** as a multi-jurisdictional local plan as outlined in 44 CFR Part 201. With approval of this plan, the following entities are now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through February 4, 2018:

Jackson County	**City of Ashland**	**City of Eagle Point**
City of Rogue River	**City of Shady Cove**	

The plan's approval provides the above jurisdictions eligibility to apply for hazard mitigation projects through your State. All requests for funding will be evaluated individually according to the specific eligibility and other requirements of the particular program under which the application is submitted. For example, a specific mitigation activity or project identified in the plan may not meet the eligibility requirements for FEMA funding, and even eligible mitigation activities are not automatically approved for FEMA funding under any of the aforementioned programs. Approved mitigation plans may be eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Additional information regarding the CRS can be found at www.fema.gov/business/nfip/crs.shtm or through your local floodplain manager.

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

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

Sincerely,

Mark Carey, Director
Mitigation Division

cc: Dennis Sigrist, Oregon Office of Emergency Management

BH:bb

BEFORE THE BOARD OF COUNTY COMMISSIONERS

STATE OF OREGON, COUNTY OF JACKSON

IN THE MATTER OF ADOPTING THE JACKSON COUNTY MULTI-JURISDICTIONAL NATURAL HAZARD MITIGATION PLAN)	ORDER NO. 4-13

WHEREAS, Jackson County's Natural Hazards Mitigation Plan was approved by the Federal Emergency Management Agency (FEMA) in 2006 and is updated every five years; and

WHEREAS, this plan revision is a Multi-Jurisdictional Natural Hazards Mitigation Plan; and

WHEREAS, the Oregon Office of Emergency Management and FEMA Region X officials have reviewed the Plan and pre-approved it (dated November 30, 2012), contingent upon this official adoption of the participating governments and entities, and

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

Now, therefore,

The Board of County Commissioners of Jackson County ORDERS:

Adoption of the Jackson County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan.

DATED this 16th day of January, 2013, at Medford, Oregon.

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JACKSON COUNTY BOARD OF COMMISSIONERS

Don Skundrick, Chair

John Rachor, Commissioner

Doug Breidenthal, Commissioner

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RESOLUTION NO. 2013- 02

A RESOLUTION ADOPTING THE CITY OF ASHLAND'S REPRESENTATION IN THE UPDATES TO THE JACKSON COUNTY MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN

RECITALS:

A. The City of Ashland recognizes the threat that natural hazards pose to people, property and infrastructure within our community;

B. Undertaking hazard mitigation actions will reduce the potential for harm to people, property and infrastructure from future hazard occurrences;

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

D. The City of Ashland has fully participated in the FEMA prescribed mitigation planning process to prepare the *Jackson County, Multi-Jurisdictional Natural Hazard Mitigation Plan*, which has established a comprehensive, coordinated planning process to eliminate or minimize these vulnerabilities;

E. The City of Ashland has identified natural hazard risks and prioritized a number of proposed actions and programs needed to mitigate the vulnerabilities of the City of Ashland to the impacts of future disasters within the *Jackson County, Multi-Jurisdictional Natural Hazard Mitigation Plan*;

F. These proposed projects and programs have been incorporated into the *Jackson County, Multi-Jurisdictional Natural Hazard Mitigation Plan* that has been prepared and promulgated for consideration and implementation by the cities of Jackson County; and

G. The Oregon Office of Emergency Management and Federal Emergency Management Agency, Region X officials have reviewed the *Jackson County, Multi-Jurisdictional Natural Hazard Mitigation* Plan and pre-approved it (dated, December 3, 2012) contingent upon this official adoption of the participating governments and entities.

THE CITY OF ASHLAND RESOLVES AS FOLLOWS:

SECTION 1. The City of Ashland adopts the *Jackson County Multi-Jurisdictional Natural Hazards Mitigation Plan* as an official plan.

SECTION 2. The City of Ashland shall submit this Adoption Resolution to the Oregon Office of Emergency Management and Federal Emergency Management Agency, Region X officials to enable final approval of the *Jackson County Multi-Jurisdictional Natural Hazards Mitigation Plan.*

This resolution was duly PASSED and ADOPTED this 15 day of January, 2013, and takes effect upon signing by the Mayor.

Barbara Christensen

Barbara Christensen, City Recorder

SIGNED and APPROVED this 16 day of January, 2013.

John Stromberg

John Stromberg, Mayor

Reviewed as to form:

David H. Lohman

David H. Lohman, City Attorney

RESOLUTION NO. 2013-02

A RESOLUTION ADOPTING THE CITY OF EAGLE POINT'S REPRESENTATION IN THE UPDATES TO THE JACKSON COUNTY MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN.

WHEREAS, the City of Eagle Point recognizes the threat that natural hazards pose to people, property and infrastructure within our community; and

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

WHEREAS, an adopted Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple Federal Emergency Management Agency (FEMA) pre- and post-disaster mitigation grant programs; and

WHEREAS, the City of Eagle Point has fully participated in the FEMA prescribed mitigation planning process to prepare the Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan, which has established a comprehensive, coordinated planning process to eliminate or minimize these vulnerabilities; and

WHEREAS, the City of Eagle Point has identified natural hazard risks and prioritized a number of proposed actions and programs needed to mitigate the vulnerabilities of the City of Eagle Point to the impacts of future disasters within the Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan; and

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

WHEREAS, the Oregon Office of Emergency Management and Federal Emergency Management Agency, Region X officials have reviewed the Jackson County Multi-Jurisdictional Natural Hazard Mitigation Plan and pre-approved it (dated, December 3, 2012) contingent upon this official adoption of the participating governments and entities.

Now, therefore,

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF EAGLE POINT, OREGON, THAT:

1. The City of Eagle Point adopts the Jackson County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan.

2. The City of Eagle Point will submit this Resolution to the Oregon Office of Emergency Management and Federal Emergency Management Agency, Region X officials to enable final approval of the Jackson County Multi-Jurisdictional Natural Hazards Mitigation Plan.

Passed in open session on the 22nd day of January, 2013.

Robert E. Russell, Mayor

ATTEST:

Cindy Hughes, City Recorder

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Council Bill
No. 12-2223

RESOLUTION NO. 12-1221-R

A RESOLUTION ADOPTING THE CITY OF ROGUE RIVER'S REPRESENTATION IN THE UPDATES TO THE JACKSON COUNTY MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN.

WHEREAS, the City of Rogue River recognizes the threat that natural hazards pose to people, property and infrastructure within our community; and,

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

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

WHEREAS, the City of Rogue River has fully participated in the FEMA prescribed mitigation planning process to prepare the Jackson County, Multi-Jurisdictional Natural Hazard Mitigation Plan, which has established a comprehensive, coordinated planning process to eliminate or minimize these vulnerabilities; and,

WHEREAS, the City of Rogue River has identified natural hazard risks and prioritized a number of proposed actions and programs needed to mitigate the vulnerabilities of the City of Rogue River to the impacts of future disasters within the Jackson County, Multi-Jurisdictional Natural Hazard Mitigation Plan; and,

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

WHEREAS, the Oregon Office of Emergency Management and Federal Emergency Management Agency, Region X officials have reviewed the Jackson County, Multi-Jurisdictional Natural Hazard Mitigation Plan and pre-approved it (dated, December 3, 2012) contingent upon this official adoption of the participating governments and entities;

NOW, THEREFORE, BE IT RESOLVED, that the City of Rogue River adopts the Jackson County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan; and,

BE IT FURTHER RESOLVED, that the City of Rogue River will submit this Adoption Resolution to the Oregon Office of Emergency Management and Federal Emergency Management Agency, Region X officials to enable final approval of the Jackson County Multi-Jurisdictional Natural Hazards Mitigation Plan.

RESOLUTION NO. 12-1221-R

The adoption of the above Resolution was moved by **Vail,** seconded by **England**, roll call being had thereon, resulted as follows:

VanArsdale; aye, England, aye; Vail; aye, Shamblin; aye, Schaeffer; aye.

Whereupon the Mayor Pro-tem declared the motion to be carried and the Resolution approved.

PASSED this **20th** day of **December 2012**, by the Common Council of the City of Rogue River, Oregon.

SIGNED this **21st** day **December 2012,** by the Mayor of the City of Rogue River, Oregon.

John Bond
Mayor

ATTEST:

Carol J. Weir
Deputy Recorder

City of Shady Cove

Resolution No. 13-01

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SHADY COVE, OREGON ADOPTING THE CITY OF SHADY COVE'S REPRESENTATION IN THE UPDATES TO THE JACKSON COUNTY MULTI-JURISDICTIONAL NATURAL HAZARDS MITIGATION PLAN.

Whereas, the City of Shady Cove recognizes the threat that natural hazards pose to people, property and infrastructure within our community; and

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

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

Whereas, the City of Shady Cove has fully participated in the FEMA prescribed mitigation planning process to prepare the *Jackson County, Multi-Jurisdictional Natural Hazard Mitigation Plan*, which has established a comprehensive, coordinated planning process to eliminate or minimize these vulnerabilities; and

Whereas, the City of Shady Cove has identified natural hazard risks and prioritized a number of proposed actions and programs needed to mitigate the vulnerabilities of the City of Shady Cove to the impacts of future disasters within the *Jackson County, Multi-Jurisdictional Natural Hazard Mitigation Plan*; and

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

Whereas, the Oregon Office of Emergency Management and Federal Emergency Management Agency, Region X officials have reviewed the *Jackson County, Multi-Jurisdictional Natural Hazard Mitigation Plan* and pre-approved it (dated, December 3, 2012) contingent upon this official adoption of the participating governments and entities;

Now, therefore, be it resolved, that the City of Shady Cove adopts *the Jackson County Multi-Jurisdictional Natural Hazards Mitigation Plan* as an official plan; and

Be it further resolved, that the City of Shady Cove will submit this Adoption Resolution to the Oregon Office of Emergency Management and Federal Emergency Management

Agency, Region X officials to enable final approval of the *Jackson County Multi-Jurisdictional Natural Hazards Mitigation Plan*.

Adopted by the City Council of the City of Shady Cove this 3rd day of January, 2013.

Approved:

Ron Holthusen
Mayor

Attest:

Aaron Prunty
Assistant to the City Administrator

Council Vote:

Mayor Holthusen	Y
Councilor Ulrich	Y
Councilor Hughes	Y
Councilor Hayes	Absent
Councilor Kyle	Y

Executive Summary

Jackson County developed this Multi-jurisdictional Natural Hazards Mitigation Plan (NHMP) in an effort to prepare for the long-term effects resulting from natural hazards. It is impossible to predict exactly when these hazards will occur, or the extent to which they will affect the community. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to create a resilient community that will benefit from long-term recovery planning efforts.

44 CFR 201.6 – The local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards. . . .

The Federal Emergency Management Agency (FEMA) defines mitigation as ". . . the effort to reduce loss of life and property by lessening the impact of disasters . . . through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk." Said another way, natural hazard mitigation is a method of permanently reducing or alleviating the losses of life, property, and injuries resulting from natural hazards through long and short-term strategies. Example strategies include policy changes, such as updated ordinances, projects, such as seismic retrofits to critical facilities; and education and outreach to targeted audiences, such as Spanish speaking residents or the elderly. Natural hazard mitigation is the responsibility of the "Whole Community" - individuals, private businesses and industries, state and local governments, and the federal government.

Why Develop this Mitigation Plan?

44 CFR 201.6(a)(1) – A local government must have a mitigation plan approved pursuant to this section in order to receive HMGP project grants . . .

In addition to establishing a comprehensive community-level mitigation strategy, the Disaster Mitigation Act of 2000 (DMA2K) and the regulations contained in 44 CFR 201 require that jurisdictions maintain an approved NHMP in order to receive federal funds for mitigation projects. Local and federal approval of this plan ensures that the county and listed cities will remain eligible for pre- and post-disaster mitigation project grants.

Who Participated in Developing the Plan?

The Jackson Multi-jurisdictional Natural Hazards Mitigation Plan (NHMP) is the result of a collaborative effort between the county, cities, special districts, citizens, public agencies, non-profit organizations, the private sector and regional organizations. A project steering

committee guided the plan development process. The project steering committee included representatives from the following organizations.

44 CFR 201.6(c)(1) – Documentation of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

- City of Ashland Fire and Rescue
- City of Eagle Point Police
- City of Jacksonville Police
- City of Jacksonville Fire Department
- City of Phoenix Police
- City of Rogue River Administration and Planning
- City of Shady Cove Administration and Emergency Management
- City of Talent
- Jackson County Code Enforcement
- Jackson County Integrated Fire Plan
- Jackson County Development Services
- Jackson County Emergency Management
- Jackson County Health and Human Services
- Jackson County Parks
- Jackson County Sherriff's Office
- United Way of Jackson County

The Jackson County Emergency Manager convened the planning process and will take the lead in implementing, maintaining and updating the plan. Jackson County is dedicated to directly involving the public in the continual reviewing and updating of the natural hazards mitigation plan. Although members of the steering committee represent the public to some extent, the public will also have the opportunity to continue to provide feedback about the Plan.

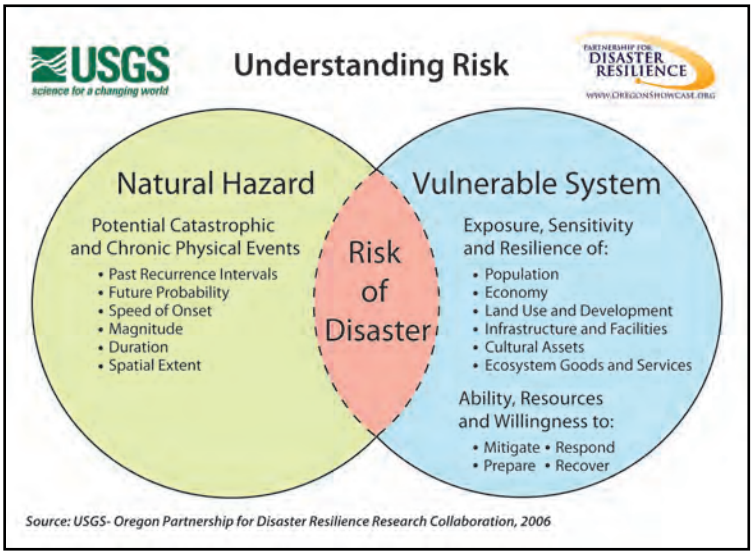
The county will ensure continued public involvement by posting the Jackson County Multi-jurisdictional Natural Hazard Mitigation Plan on the county's website. The plan will also be archived and posted on the University of Oregon Libraries' Scholar's Bank Digital Archive.

How Does this Mitigation Plan Reduce Risk?

44 CFR 201.6(c)(2) – A Risk Assessment that provides the factual basis for activities proposed in the strategy . . .

The natural hazards mitigation plan is intended to assist Jackson County reduce the risk from natural hazards by identifying resources, information, and strategies for risk reduction. It is also intended to guide and coordinate mitigation activities throughout the county. A risk assessment consists of three phases: hazard identification, vulnerability assessment, and risk analysis, as illustrated in the following graphic.

Figure i.1 Understanding Risk



Source: Oregon Partnership for Disaster Resilience.

By identifying and understanding the relationship between natural hazards, vulnerable systems, and existing capacity, Jackson County is better equipped to identify and implement actions aimed at reducing the overall risk to natural hazards.

What is the County's Overall Risk to Hazards?

Jackson County reviewed and updated their risk assessment to evaluate the probability of each hazard as well as the vulnerability of the community to that hazard. In addition, the cities of Ashland, Eagle Point, Rogue River and Shady Cove steering committees reviewed the recently updated Jackson County risk assessment to compare risk and vulnerability particular to their jurisdiction. Table i.1 below summarizes hazard vulnerability and probability as determined by the steering committee.

Table i.1: Risk Assessment Summary

Hazard	Probability	Vulnerability
Drought	Medium	Medium
Earthquake	Medium	High
Flood	High	Medium
Landslide	High	Low
Volcanic Eruption	Low	Low
Wildfire	High	Medium
Severe Winter Storm and Windstorm	High	High

Source: Jackson County NHMP Steering Committee. 2012.

What is the Plan's Mission?

The mission of the Jackson County Multi-jurisdictional Natural Hazards Mitigation Plan is to:

Reduce risk, prevent loss and protect life, property and the environment from natural hazard events through coordination and cooperation among public and private partners.

What are the Plan Goals?

44 CFR 201.6(c)(3)(i) – A description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

The plan goals describe the overall direction that the participating jurisdiction's agencies, organizations, and citizens can take toward mitigating risk from natural hazards (listed below in order of priority).

Goal 1: Emergency Services

Goal Statements: Minimize life safety issues by promoting, strengthening and coordinating emergency response plans.

Goal 2: Education and Outreach

Goal Statement: Further the public's awareness and understanding of natural hazards and potential risk, including economic vulnerability and mitigation efforts.

Goal 3: Prevention

Goal Statement: 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: Property Protection

Goal Statement: 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.

Goal 5: Partnership and Coordination

Goal Statements:

- 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; and
- Seek funding and resource partnerships for future mitigation efforts.

Goal 6: Natural Resource Protection

Goal Statement: Preserve and rehabilitate natural systems to serve natural hazard mitigation functions (i.e., floodplains, wetlands, watershed and urban interface areas).

Goal 7: Structural Projects

Goal Statement: When applicable, utilize structural mitigation activities to minimize risks associated with natural hazards.

How are the Action Items Organized?

44 CFR 201.6(c)(3)(ii) – A section that identifies and analyzes a comprehensive range of specific mitigation actions . . .

The action items are organized within an action matrix (full descriptions are provided in Appendix A, *Action Item Forms* and an abbreviated matrix list is located at the end of this section and within Section III), which lists all the multi-hazard and hazard-specific action items included in the mitigation plan. Data collection, research and the public participation process resulted in the development of the action items. The Action Item Matrix portrays the overall plan framework and identifies linkages between the plan goals, and actions. The matrix documents the title of each action along with, the coordinating organization, timeline, and the plan goals addressed. Action items particular to each of the participating cities are included at the end of the action item matrix.

How will the plan be implemented?

44 CFR 201.6(c)(3)(iii) – An action plan describing how the actions . . . will be prioritized, implemented and administered . . .

44 CFR 201.6(c)(4) – A plan maintenance process

The plan maintenance section of this plan details the formal process that will ensure that the Jackson County NHMP remains an active and relevant document. The plan will be implemented, maintained and updated by a designated convener. The Jackson County Emergency Manager is the designated convener and is responsible for overseeing the annual review and implementation processes. The plan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing a plan revision every five years. This section describes how the communities will integrate public participation throughout the plan maintenance process.

Plan Adoption

44 CFR 201.6(c)(5) – Documentation that the plan has been formally adopted by the governing body of the jurisdiction . . .

44 CFR 201.6(d) – Plan review [process]

Once the plan is locally reviewed and deemed complete the Plan Convener submits it to the State Hazard Mitigation Officer at Oregon Military Department – Office of Emergency Management (OEM). OEM reviews the plan and submits it 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 201.6. Once the plan is pre-approved by FEMA, the county and cities formally adopt the plan via resolution. The Jackson County NHMP convener will be responsible for ensuring local adoption of the Jackson County NHMP and providing the support necessary to

ensure plan implementation. Once the resolution is executed at the local level and documentation is provided to FEMA, the plan is formally acknowledged by FEMA and the county (and participating cities) will re-establish eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and the Flood Mitigation Assistance program funds.

The accomplishment of the Natural Hazards Mitigation Plan goals and actions depends upon regular Steering Committee participation and adequate support from city leadership. Thorough familiarity with this Plan will result in the efficient and effective implementation of appropriate mitigation activities and a reduction in the risk and the potential for loss from future natural hazard events.

Jackson County and the cities (Ashland, Eagle Point, Rogue River and Shady Cove) will review the plan annually in conjunction with the regular review of the County Emergency Operations Plan.

The steering committee met on three occasions December 9, 2011, April 25th and May 30th to review the plan update process. The City of Ashland met on three occasions May 29th, June 12th and June 25th. The City of Eagle Point steering committee met on two occasions May 29th and July 20th. The City of Rogue River steering committee met on one occasion, May 30th. The City of Shady Cove steering committee met on one occasion, May 29th.

The Jackson County Board of Commissioners adopted the plan on January 16, 2013.

The Ashland City Council adopted the plan on January 15, 2013.

The Eagle Point City Council adopted the plan on January 22, 2013.

The Rogue River City Council adopted the plan on December 20, 2012.

The Shady Cove City Council adopted the plan on January 3, 2013.

Table i.2: Jackson County Action Items

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Multi-Hazard #1	Sustain a public awareness campaign about natural hazards.	County Emergency Management, City Emergency Management Agencies	ARC, CERT, RVCOG, SOU, SOREDI, Emergency Response Agencies, Utilities and Telecommunications Companies, Media, FEMA, OEM, County Road, County Public Works	Ongoing		X	X	X	X		
Multi-Hazard #2	Sustain an education and outreach program for local jurisdictions and assist them in developing emergency operations, public information and hazard mitigation plans.	County Emergency Management	City Emergency Management Agencies, MCI Committee, ARC, Emergency Response Agencies, RVCOG, OEM, FEMA	Ongoing		X	X		X		
Multi-Hazard #3	Maintain a GIS inventory of all critical facilities, large employers/public assembly areas and lifelines, and use GIS to evaluate their vulnerability by comparing them with hazard-prone areas.	County GIS	County and City Emergency Management Agencies, County Roads, ODOT, City Public Works, Utility and Telecommunications Companies, Emergency Response Agencies, RVCOG, SOU, ODF, BLM, USFS	Ongoing	X	X	X				
Multi-Hazard #4	Promote natural hazards safety education.	County and City Emergency Management Agencies	School Districts, Facility Safety Personnel, CERT, Search and Rescue, Emergency Response Agencies, ARC, Association of Safety Enginners, REAL Coprs, Utility and Telecommunications Companies, Media, RVCOG, SOU, LEPC, OEM, FEMA	Ongoing		X			X		
Multi-Hazard #5	Establish partnerships to coordinate and collect geo-science and technical information for identifying potential areas of risk.	County GIS, RVCOG	County and City Emergency Management Agencies, SOU, ODF, BLM, USFS, USGS, DOGAMI, Emergency Response , Lomakatsi, The Nature Conservancy, Agencies, OEM, FEMA	Ongoing		X			X		
Multi-Hazard #6	Maintain a system to support populations with special needs (e.g., elderly and disabled persons) during a disaster.	County Emergency Management	RVCOG Senior and Disabled Services, City Emergency Management Agencies, County GIS, Rivernet and the COAD, ARC, Emergency Response Agencies	Ongoing	X	X			X		
Multi-Hazard #7	Explore funding sources and grant opportunities for community-wide natural hazard mitigation activities.	Mitigation Plan Steering Committee	County Administrative Office, SOREDI, OEM, FEMA, IISOI	Ongoing		X	X				
Multi-Hazard #8	Establish post-development inspection procedures for safety requirements (i.e. flood, earthquake, fire safety).	County Building	County Planning, FEMA	Long Term			X				
Multi-Hazard #9	Use hazard information as a basis for county ordinances and regulations that govern site-specific land use decisions	County Planning	County GIS, FEMA, DLCD	Long Term		X	X				
Multi-Hazard #10	Investigate the need for an emergency disaster fund.	County Emergency Management	SOREDI, RVCOG, City Councils, City Emergency Management Agencies	Long Term			X		X		
Multi-Hazard #11	Improve planning, notification and training for volunteers	County Emergency Management	Rivernet, COSAR, MRC, City Emergency Management Agencies, CERT, ARC, ARES, Search and Rescue, Ashland Fire Department	Ongoing	X	x			X		
Multi-Hazard #12	Promote hazard resistant utility and telecommunication construction and maintenance methods.	RVCOG	County and City Emergency Management Agencies, ARES	Long Term		X	X				

Source: Jackson County NHMP Steering Committee, updated 2012.

Table i.2: Jackson County Action Items (continued)

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Multi-Hazard #13	Develop a system for data collection for non-declared natural hazard events.	County and City Emergency Management Agencies	IISOI, County Building, County GIS, Farm Services, Insurance Companies	Long Term	X	X			X		
Multi-Hazard #14	Improve coordination and evaluate technical and engineering limitations for catastrophic event response, and develop a long-term recovery plan for Jackson County from the effects of catastrophic hazards.	County Emergency Management	SOU, USGS, DOGAMI, Klamath County Emergency Management, Regional Search and Rescue, Army National Guard, ARC, hospitals	Long Term	X				X		
Multi-Hazard #15	Promote the use of natural hazard loss estimation program (HAZUS) at the local level by providing for the training to use the computer model.	County GIS, DOGAMI	Utility and Telecommunications Companies, County and City Emergency Management, OEM, FEMA	Long Term		X	X		X		
Drought #1	Support Local Agencies Training on Water Conservation Measures and Drought Management Practices	Jackson Soil and Water Conservation District	County Agencies, Medford Water Commission, OSU Extension Service, Fruit Growers, Water Districts	Long Term		X			X	X	
Drought #2	Ensure Long-range Water Resources Development	Jackson County Watermaster	GIS, Public Works, BOC, SWCD	Long Term				X	X	X	
Earthquake #1	Promote building safety through nonstructural improvements.	County and City Emergency Management Agencies	County Building Officials, County Emergency Response Agencies, Builder's Association, IISOI, Red Cross, OSSPAC, OIT, DOGAMI	Ongoing		X	X	X			
Earthquake #2	Encourage purchase of earthquake hazard insurance	IISOI through local insurance companies	Mortgage Companies	Ongoing		X		X			
Earthquake #3	Maintain an inventory of all permitted dams in Jackson County	County and City Emergency Management Agencies, Water Master	Watershed Councils, USACE, BOR, WRD	Ongoing		X	X				X
Earthquake #4	Compile Relative Earthquake Hazard Maps for Jackson County	DOGAMI, County GIS	County Planning, County Emergency Management, USGS, BLM, SOU	Long Term		X	X		X		
Earthquake #5	Develop public/ private partnerships - with building contractors, architects, - to pursue retrofitting projects.	SOREDI	County Roads, Builder's Association, IISOI	Long Term		X			X		
Flood #1	Continue to coordinate with appropriate agencies, and maintain an inventory of all aggregate operations adjacent to or within the floodplain to ensure operations protect streams.	County Planning, County Engineering (Code Compliance)	County GIS, Watershed Councils, DOGAMI, DEQ, ODFW, USACE, DSL	Ongoing			X		X	X	
Flood #2	Maintain an inventory of all permitted dams in Jackson County	County and City Emergency Management Agencies, Water Master	Watershed Councils, USACE, BOR, WRD	Ongoing		X	X				X
Flood #3	Conduct workshops for target audiences on National Flood Insurance Programs, mitigation activities, and potential assistance from FEMA's Flood Mitigation Assistance and Hazard Mitigation Grant Programs.	County and City Planning, County and City Emergency Management Agencies	Watershed Councils, DLCD, OEM, FEMA	Ongoing		X	X	X	X		
Flood #4	Update the Flood Insurance Rate (FIRM) Maps for Jackson County as funding becomes available.	FEMA, DLCD	County Planning, City Planning, DOGAMI, County GIS	Ongoing			X	X	X		

Source: Jackson County NHMP Steering Committee, updated 2012.

Table i.2 Jackson County Action Items (continued)

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Flood #5	Encourage private property owners to restore natural systems within the floodplain, and to manage riparian areas and wetlands for flood abatement.	RVCOG, County Emergency Management	County Parks and Planning, FEMA, Watershed Councils, DLCD, Cities, USACE, DSL	Long Term				X		X	
Flood #6	Use federal grant funds to acquire or elevate individual properties adjacent to/ within 100-year floodplain as opportunities arise.	County Emergency Management	FEMA, County Planning, County Administrator's Office, OEM, DLCD, OECDD	Ongoing			X	X		X	
Flood #7	Continue to increase Jackson County's CRS (Community Rating System) rating over time through activities outlined by FEMA.	County and City Emergency Management Agencies, County and City Planning	Watershed Councils, OEM, DLCD, OECDD, USACE, FEMA,	Ongoing			X	X	X		
Flood #8	Preserve water quality by using storm water best management practices	County Roads, RVCOG, DEQ, County and City Planning	Watershed Councils, WRD, USACE, Irrigation Districts, State Parks, Rogue Valley Sewer Services	Ongoing						X	
Landslide #1	Compile Relative Landslide Risk maps for Jackson County.	DOGAMI, County GIS	County Planning, County Emergency Management, ODF, SOU	Ongoing		X	X		X		
Landslide #2	Increase public education related to landslide hazards by distributing landslide informational brochures.	County Emergency Management	County Planning, City Emergency Managers, DOGAMI, OEM, ODF, DLCD	Ongoing		X			X		
Landslide #3	Investigate the development and implementation of a county landslide ordinance.	County Planning	County Emergency Management, County GIS, DOGAMI, ODF, County Roads, DLCD	Long Term			X				
Volcanic Eruption #1	Increase awareness of volcanic eruption threats for county residents.	County and City Emergency Management Agencies, USGS-CVO	DOGAMI, SOU, National Park Service (Crater Lake)	Long Term		X			X		
Volcanic Eruption #2	Create and map hypothetical eruption scenarios to display potential eruption hazards.	SOU, USGS-CVO	County GIS, DOGAMI	Long Term		X					
Volcanic Eruption #3	Collaborate with county environmental health to provide immediate warning to communities about air quality hazards following volcanic eruptions.	County Environmental Health, DEQ	County and City Emergency Management Agencies, Media	Long Term	X				X		
Wildfire #1	Coordinate fire mitigation action items through the Jackson County Integrated Fire Plan	Jackson County Emergency Management	Fire and Rescue Districts (full list provided within JaCIFP), State Office of Emergency Management, Oregon Department of Forestry	Ongoing		X	X	X	X	X	
Severe Winter Storm/ Windstorm #1	Map areas where extreme weather, such as road icing or wind damage occurs.	County Roads	County Planning, NWS, ODOT, NOAA, County GIS	Short Term		X			X		
Severe Winter Storm/ Windstorm #2	Promote the benefits of tree-trimming and tree replacement programs and help to coordinate local efforts by public and private agencies.	County Roads, Vegetation Management	Utility and Telecommunications Companies, ODOT, City Public Works, USFS, BLM	Ongoing		X	X		X		

Source: Jackson County NHMP Steering Committee, updated 2012.

Table i.3 City of Ashland Action Items

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Multi-Hazard #1	Public Access to Emergency Preparedness Training and 72-hour kits	Ashland Fire and Rescue	American Red Cross, Local Retailers	Short Term		X	X				
Multi-Hazard #2	Building Inspector Certification Program	Ashland Community Development	Ashland Fire and Rescue	Short Term	X			X			
Multi-Hazard #3	CERT Training and Equipment	Ashland Fire and Rescue	City of Ashland, Chamber of Commerce, Ashland School District, Southern Oregon University	Ongoing	X	X					
Multi-Hazard #4	Mass Notification System Funding	Ashland Fire and Rescue	Jackson County Emergency Management	Ongoing	X						
Multi-Hazard #5	Community Education Plan	Ashland Fire and Rescue	City of Ashland, Ashland School District, Southern Oregon University, Chamber of Commerce, Oregon Shakespeare Festival, American Red Cross, Jackson County OEM	Long Term	X	X	X	X	X		
Multi-Hazard #6	Emergency Management Exercises	Ashland Fire and Rescue	City of Ashland, Chamber of Commerce, Ashland School District, Southern Oregon University, Ashland Community Hospital	Ongoing	X	X		X			
Multi-Hazard #7	Emergency Generators for City's Critical Infrastructure	Ashland Fire and Rescue	Ashland School District, Southern Oregon University	Long Term				X			X
Multi-Hazard #8	Emergency Provisions for Responders and Schools	Ashland Fire and Rescue	Ashland School District	Short Term	X				X		
Multi-Hazard #9	Evaluate Ashland's Land Use Policies in High Risk Areas	Ashland Community Development	Ashland Fire and Rescue	Long Term	X		X	X			
Multi-Hazard #10	Enhanced Audio Alert System for Southern Oregon University	Southern Oregon University	Jackson County Emergency Management	Short Term	X						
Drought #1	*No Action Item Developed*										
Earthquake #1	Emergency Operations Center Upgrades	Ashland Fire and Rescue	Ashland Police Department	Short Term	X			X	X		
Earthquake #2	Seismic Natural Gas shut-off Valves for the City's Critical Infrastructure	Ashland Fire and Rescue	AVISTA	Long Term	X		X	X			
Earthquake #3	Non-structural seismic upgrades for the City's Critical Infrastructure	Ashland Fire and Rescue	City of Ashland, Chamber of Commerce, Ashland School District, Southern Oregon University, Ashland Community Hospital, Oregon Shakespeare Festival	Long Term	X	X		X			
Earthquake #4	Seismic Retrofit for Critical Infrastructure	Ashland Fire and Rescue	City of Ashland, Chamber of Commerce, Ashland School District, Southern Oregon University, Oregon Shakespeare Festival	Long Term				X			X
Earthquake #5	Seismic Risk Assessment	Ashland Fire and Rescue	City of Ashland, Chamber of Commerce, Ashland School District, Southern Oregon University, Oregon Shakespeare Festival	Short Term			X	X			X
Flood #1	Flood Hazard Awareness Campaign	Ashland Fire & Rescue	Ashland Community Development, Jackson County Emergency Management	Short Term	X	X		X			
Landslide #1	Water Treatment Plant Relocation	Ashland Public Works	Ashland Community Development	Ongoing			X	X			X
Volcanic Eruption #1	No Action Item Developed										
Wildfire #1	Ashland Forest Resiliency Project	Ashland Fire and Rescue	The Nature Conservancy, USFS, Lomakatsi Restoration Project	Long Term	X		X	X		X	
Wildfire #2	Ashland Firewise Communities	Ashland Fire and Rescue	HOAs, Oregon Department of Forestry	Ongoing		X	X	X	X		
Severe Winter Storm/ Windstorm #1	*No Action Item Developed*										

Source: City of Ashland NHMP Steering Committee, 2012.

Table i.4 City of Eagle Point Action Items

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Multi-Hazard #1	Maintain public information programs to inform the public about the mitigation of all natural hazards	City Administrator	Public Works, Planning, JCFD#3, Jackson County DEM, Red Cross, Humane Society, Shelters, School District	Short Term	X	X	X	X	X		
Multi-Hazard #2	Integrate the goals and action items from the Natural Hazards Mitigation Plan into existing regulatory documents and programs where appropriate	Planning	Public Works, Building Codes Division	Short Term	X	X	X	X	X		
Drought #1	Develop a drought preparedness and response plan to include a city ordinance restricting water	Public Works	Planning, Administration, Legal Counsel, Water Districts, Irrigation and Watershed Councils, Medford Water Commission	Short Term	X	X	X	X	X		
Earthquake #1	Promote non-structural mitigation for buildings to prevent damage from earthquakes	City Administrator	Code Enforcement, Public Works, Planning, Building, Jackson County DEM	Short Term	X			X			
Earthquake #2	Promote earthquake insurance	City Administrator	City Hall, insurance companies, FEMA, mortgage companies	Short Term	X	X		X			
Earthquake #3	Promote and coordinate earthquake hazard risk mapping for Jackson County and cities	Planning	Public Works, Building, Administration, DOGAMI, Jackson County	Short Term	X	X		X	X		
Earthquake #4	Promote structural mitigation to prevent structural damage to city buildings in effort to provide business continuity	Building	Planning, Public Works, Administration, DOGAMI, Jackson County	Short Term	X		X	X			X
Flood #1	Inform the public about the National Flood Insurance Program and ensure compliance through enforcement of local floodplain management ordinances.	Planning	Public Works, Code Enforcement, Building, Jackson County; FEMA; NFIP; CRS/ISO; DLCD	Ongoing		X	X	X	X	X	
Flood #2	Continue to implement and enhance the public flood protection and education program.	Planning	Public Works, Code Enforcement, County GIS, Jackson County; FEMA; NFIP; CRS/ISO; DLCD	Ongoing	X	X	X	X	X	X	
Flood #3	Encourage participation in the NFIP's Community Rating System (CRS)	Planning	Public Works, Code Enforcement, County GIS, Jackson County; FEMA; NFIP; CRS/ISO; DLCD	Ongoing		X	X	X	X	X	
Flood #4	Promote and enhance the use of natural flood prone open space or wetlands as flood storage areas.	Planning	Public Works, Building, Code Enforcement, Jackson County, DEQ	Short Term		X	X	X	X	X	
Flood #5	Protect City facilities in flood prone areas.	Public Works	Planning, County GIS, Jackson County, DLCD	Short Term	X		X	X			X
Flood #6	Stormwater Management	Public Works	Planning, Jackson County; DEQ; Rogue Valley Sewer Services	Short Term		X	X	X		X	
Landslide #1	*No Action Item Developed*										
Volcanic Eruption #1	*No Action Item Developed*										

Source: City of Eagle Point NHMP Steering Committee, 2012.

Table i.4 City of Eagle Point Action Items (continued)

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Wildfire #1	Promote public awareness campaigns for individual property owners living in fire prone areas	Public Works	Planning, Administration, Code Enforcement, Police Department, Jackson County, JCFD#3, Office of State Fire Marshal	Short Term	X	X	X		X	X	
Wildfire #2	Partner with Jackson County on Implementation of Community Wildfire Protection Plan and outreach projects	Planning	Public Works, Administration, Jackson County, JCFD#3, Bureau of Land Management - Medford District, Oregon Department of Forestry, Office of State Fire Marshall	Short Term	X	X	X		X	X	
Wildfire #3	Reduce wildfire fuels/Investigate "Firewise Community" Program	Planning	Administration, Public Works, Jackson County, JCFD#3, Office of State Fire Marshall, Oregon Department of Forestry	Short Term	X	X	X		X	X	
Severe Winter Storm/ Windstorm #1	Encourage new developments with above ground utilities to underground utilities	Public Works	Planning, Utility companies, developers	Short Term	X		X	X	X		X
Severe Winter Storm/ Windstorm #2	Dangerous Tree Education and Outreach and Disaster Resilient Economy	Public Works	Planning, Utility companies, local Arborists, landscaping services and tree services	Short Term	X	X	X	X	X	X	
Severe Winter Storm/ Windstorm #3	Winter Storm Education and Outreach	Planning	Public Works, Utility companies, FEMA, Jackson County DEM	Short Term	X	X	X	X	X		

Source: City of Eagle Point NHMP Steering Committee, 2012.

Table i.5 City of Rogue River Action Items

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Multi-Hazard #1	Maintain public education programs to inform the public about methods of mitigating the impacts of natural hazards	City Administration	City Public Works, Rogue River Fire District, Jackson County Fire; Jackson County; Community Organizations	Ongoing	X	X	X	X	X		
Multi-Hazard #2	Integrate the goals and action items from the Natural Hazards Mitigation Plan into existing regulatory documents and programs, where appropriate.	City Planning	City Administration, City Public Works, Building Codes Division	Ongoing	X	X	X	X	X	X	
Drought #1	*No Action Item Developed*										
Earthquake #1	Promote non-structural mitigation to prevent damage from earthquake	Administration	City Public Works, City Building, Rogue River Fire District, Main Building	Ongoing	X	X	X	X			
Earthquake #2	Promte earthquake insurance	Administration	City Building, Rogue River Fire District, Insurance companies, FEMA, Mortgage companies	Short Term	X	X	X	X			
Earthquake #3	Promote and coordinate Earthquake Hazard Risk Map for Jackson County and cities	City Planning	City Administration, City Public Works, DOGAMI, Jackson County	Long Term	X		X	X	X		
Flood #1	Continue to implement and enhance the public folld protection and education program.	City Public Works	City GIS Coordinator, City Planning, Jackson County, FEMA, NFIP; CRS/ ISO	Ongoing	X	X	X	X	X	X	
Flood #2	Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.	City Planning	City Public Works, Jackson County, FEMA, NFIP; CRS/ ISO; DLCD	Ongoing	X	X	X	X	X	X	
Flood #3	Continue participation in the NFIP's Community Rating System (CRS)	City Planning	City, Public Works, Jackson County, FEMA, NFIP; CRS/ ISO; DLCD	Ongoing		X	X	X	X	X	
Flood #4	Promote and protect the use of naturally flood prone open space or wetlands as flood storage areas	City Public Works	City Planning, Jackson County, DEQ	Ongoing	X	X	X	X	X	X	
Flood #5	Stormwater management	City Public Works	City Planning, Jackson County; DEQ; Rogue Valley Sewer Services	Long Term		X	X	X		X	
Flood #6	Protect city facilities in flood prone areas	City Public Works	City Planning, City GIS, Jackson County, DLCD	Ongoing	X		X	X			X
Landslide #1	*No Action Item Developed*										
Volcanic Eruption #1	*No Action Item Developed*										
Wildfire #1	Promote public awareness campaigns for individual property owners living in fire prone areas.	City Administration	City Public Works, City Planning, Rogue River Police Department, Jackson County, Rogue River Fire Department	Short Term	X	X	X		X	X	
Wildfire #2	Partner with Jackson County on Implementation of Community Wildfire Protection Plan and outreach projects	City Planning	City Administration, City Public Works, ODF, Jackson County, Rogue River Fire District, Bureau of Land Management - Medford District, Oregon Department of Forestry, Office of State Fire Marshal	Short Term	X	X	X		X	X	
Wildfire #3	Reduce wildfire fuels / investigate "Firewise Community" program	City Planning	City Administration, City Public Works, Jackson County; Rogue River Fire District; Oregon Department of Forestry, Office of State Fire Marshal	Short Term	X	X	X		X	X	

Source: City of Rogue River NHMP Steering Committee, 2012.

Table i.5 City of Rogue River Action Items (continued)

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Severe Winter Storm/ Windstorm #1	Encourage new developments to include underground power lines.	City Public Works	City Planning, Utility Companies, Developers	Ongoing	X	X	X		X		X
Severe Winter Storm/ Windstorm #2	Education and outreach Disaster Resilient Economy	City Administration	City Planning, City Public Works, Utility companies, Churches, schools, Fire, American Red Cross, FEMA	Ongoing		X	X	X	X		

Source: City of Rogue River NHMP Steering Committee, 2012.

Table i.6 City of Shady Cove Action Items

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Multi-Hazard #1	*No Action Item Developed*										
Drought #1	*No Action Item Developed*										
Earthquake #1	*No Action Item Developed*										
Flood #1	Conduct workshops for target audiences on National Flood Insurance Programs, mitigation activities, and potential assistance from FEMAs Flood Mitigation Assistance and Hazard Mitigation Grant Programs.	Floodplain Management	City Planning, City Emergency Management, Upper Rogue Watershed Council , DLCD, OEM, FEMA	Short Term		X	X	X	X		
Flood #2	Encourage private property owners to restore natural systems within the floodplain, and to manage riparian areas and wetlands for flood abatement.	City Planning	Planning Commission, Floodplain Management, FEMA, County Emergency Management, Upper Rogue Watershed, DEQ, ODFW, DLCD, Rogue Valley Council of Governments (RVCOG), Rogue Fly Fishers, County Parks	Short Term				X		X	
Flood #3	Preserve water quality by using stormwater best management practices (BMP).	City Planning	City Planning, City Public Works, City Floodplain Management, Rogue Valley Sewer Services, Upper Rogue Watershed Council, Rogue Valley Council of Governments (RVCOG)	Long Term			X				
Flood #4	Continue compliance with the Natural Flood Insurance Program (NFIP).	City Floodplain Management	City Planning, FEMA, DLCD	Ongoing	X	X	X	X	X	X	
Landslide #1	*No Action Item Developed*										
Volcanic Eruption #1	*No Action Item Developed*										
Wildfire #1	Promote public awareness campaigns for individual property owners living in the Wildland / Urban Interface (WUI).	City Emergency Management	City Hazard Mitigation Committee, Fire Dist. #4, Firewise Project Coordinator, media, OEM, FEMA, DLCD, State Fire Marshal, ODF, BLM, U.S. Forest Service, insurance and real estate industries, Jackson County Sheriff Department.	Ongoing	X	X	X		X	X	
Wildfire #2	Reduce wildfire fuels / Promote and Enhance "Firewise Community" Program	City Emergency Management	City Hazard Mitigation Committee, Jackson County Fire Dist. #4, Firwise Project coordinator, State Fire Marshal, ODF, BLM, US Forest Service	Ongoing	X	X	X	X	X	X	
Wildfire #3	Distribute public outreach materials informing residents about wildfire hazards and mitigation actions they can take to protect their property.	City Emergency Management	City Hazard Mitigation Committee, Fire Dist. #4, Firewise, ODF, BLM, Forest Service	Short Term		X	X	X			
Severe Winter Storm/ Windstorm #1	Increase public awareness of windstorm mitigation activities.	City Emergency Management	City Public Works, Utilities, FEMA	Ongoing	X	X	X			X	
Severe Winter Storm/ Windstorm #2	Encourage critical facilities to secure emergency power.	City Emergency Management	City Hazard Mitigation Committee, Granting organizations, Upper Rogue Community Center	Ongoing					X		
Severe Winter Storm/ Windstorm #3	Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during severe weather events.	City Emergency Management	City Public Works, Utility providers, local Arborists and tree services,	Short Term	X	X	X		X	X	

Source: City of Shady Cove NHMP Steering Committee, 2012.

Section I: Introduction

This section provides a general introduction to natural hazard mitigation planning in Jackson County. In addition, Section I: Introduction addresses the planning process requirements contained in 44 CFR 201.6(b) thereby meeting the planning process documentation requirement contained in 44 CFR 201.6(c)(1). The section concludes with a general description of how the plan is organized.

What is Natural Hazard Mitigation?

The Federal Emergency Management Agency (FEMA) defines mitigation as ". . . the effort to reduce loss of life and property by lessening the impact of disasters . . . through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk." Said another way, natural hazard mitigation is a method of permanently reducing or alleviating the losses of life, property, and injuries resulting from natural hazards through long and short-term strategies. Example strategies include policy changes, such as updated ordinances, projects, such as seismic retrofits to critical facilities; and education and outreach to targeted audiences, such as Spanish speaking residents or the elderly. Natural hazard mitigation is the responsibility of the "Whole Community" - individuals, private businesses and industries, state and local governments, and the federal government.

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

Why Develop a Mitigation Plan?

Jackson County developed this Natural Hazards Mitigation Plan in an effort to reduce future loss of life and damage to property resulting from natural hazards. It is impossible to predict exactly when natural hazard events will occur, or the extent to which they will affect community assets. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize the losses that can result from natural hazards.

In addition to establishing a comprehensive community-level mitigation strategy, the Disaster Mitigation Act of 2000 (DMA2K) and the regulations contained in 44 CFR 201 require that jurisdictions maintain an approved NHMP in order to receive federal funds for mitigation projects. Local and federal approval of this plan ensures that the county and listed cities will remain eligible for pre- and post-disaster mitigation project grants.

What Federal Requirements Does This Plan Address?

DMA2K is the latest federal legislation addressing mitigation planning. It reinforces the importance of mitigation planning and emphasizes planning for natural hazards before they occur. As such, this Act established the Pre-Disaster Mitigation (PDM) grant program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP). Section 322 of the Act specifically addresses mitigation planning at the state and local levels. State and local jurisdictions 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.

Chapter 44 Code of Federal Regulations (CFR), section 201.6, also requires a local government to have an approved mitigation plan in order to receive HMGP project grants.[1] Pursuant of Chapter 44 CFR, the Natural Hazard Mitigation Plan planning processes shall include opportunity for the public to comment on the plan during review, and the updated NHMP shall include documentation of the public planning process used to develop the plan.[2] The NHMP update must also contain a risk assessment, mitigation strategy and a plan maintenance process that has been formally adopted by the governing body of the jurisdiction.[3] Lastly, the Natural Hazard Mitigation Plan must be submitted to Oregon Military Department – Office of Emergency Management for initial plan review, and then federal approval.[4]

What is the Policy Framework for Natural Hazards Planning 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 or away from hazard areas. Goal 7, along with other land use planning goals, has helped to reduce losses from natural hazards. Through risk identification and the recommendation of risk-reduction actions, this plan aligns with the goals of the jurisdiction's Comprehensive Plan, and helps each jurisdiction meet the requirements of statewide land use planning Goal 7.

The primary responsibility for the development and implementation of risk reduction strategies and policies lies with local jurisdictions. However, resources exist at the state and federal levels. Some of the key agencies in this area include Oregon Military Department –

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[1] Code of Federal Regulations. Chapter 44. Section 201.6, subsection (a). 2010
[2] ibid, subsection (b). 2010
[3] ibid, subsection (c). 2010
[4] ibid, subsection (d). 2010

Office of 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).

How was the Plan Developed?

The plan was developed by the Jackson County Natural Hazard Mitigation Plan steering committee and the steering committees for the cities of Ashland, Eagle Point, Rogue River and Shady Cove. The Jackson County steering committee formally convened on three occasions to discuss and revise the plan. Each of the participating city steering committees met once formally and informally on several other occasions. Steering committee members contributed data and maps and reviewed and updated the community profile, risk assessment, action items and implementation plan.

An open public involvement process is essential to the development of an effective plan. In order to develop a comprehensive approach to reducing the effects of natural disasters, the planning process shall include opportunity for the public, neighboring communities, local and regional agencies, as well as, private and non-profit entities to comment on the plan during review.[5] Jackson County submitted a press release in the Medford Tribune, and on the county's website, to encourage the public to offer feedback on the plan update. The cities of Ashland, Eagle Point, Rogue River and Shady Cove also submitted press releases and advertised the plan on their city websites.

How is the Plan Organized?

Each volume of the mitigation plan provides specific information and resources to assist readers in understanding the hazard-specific issues facing county and city residents, businesses, and the environment. Combined, the sections work in synergy to create a mitigation plan that furthers the community's mission to reduce or eliminate long-term risk to people and their property from hazards and their effects. This plan structure enables stakeholders to use the section(s) of interest to them.

Volume I: Multi-jurisdictional Natural Hazards Mitigation Plan

SECTION 1: INTRODUCTION

The Introduction briefly describes the countywide mitigation planning efforts and the methodology used to develop the plan.

SECTION 2: RISK ASSESSMENT

Section 2 provides the factual basis for the mitigation strategies contained in Section 3.

This section provides an overall description of Jackson County and the cities of Ashland, Eagle Point, Rogue River and Shady Cove. The section includes a brief community profile, discussion of the government structure, listing of existing plans, policies, and programs, listing of community organizations, summary of existing mitigation actions, and an overview of the hazards addressed in the plan. This section allows readers to gain an understanding of the county's and cities' sensitivities – those community assets and characteristics that may

[5] Code of Federal Regulations. Chapter 44. Section 201.6, subsection (b). 2010

be impacted by natural hazards, as well as the county's and cities' resilience – the ability to manage risk and adapt to hazard event impacts.

SECTION 3: MISSION, GOALS AND ACTION ITEMS

This section documents the plan vision, mission, goals, and actions and also describes the components that guide implementation of the identified mitigation strategies. Actions are based on community sensitivity and resilience factors and the hazard assessments in Section 2 and the Hazard Annexes.

SECTION 4: PLAN IMPLEMENTATION AND 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 five-year review meetings.

Volume II: Hazard Annexes

The hazard annexes describe the risk assessment process and summarize the best available local hazard data. A hazard summary is provided for each of the hazards addressed in the plan. The summary includes hazard history, location, extent, vulnerability, impacts, and probability.

The hazard specific annexes included with this plan are the following:

- Drought;
- Earthquake;
- Flood;
- Landslide;
- Severe Winter Storm and Windstorm;
- Volcanic Event; and
- Wildfire.

Volume III: Mitigation Resources

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

APPENDIX A: ACTION ITEM FORMS

This appendix contains the detailed action item forms for each of the mitigation strategies identified in this plan.

APPENDIX B: PLANNING AND PUBLIC PROCESS

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

APPENDIX C: 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. The Partnership for Disaster Resilience developed this appendix. It has been reviewed and accepted by the Federal Emergency Management Agency (FEMA) 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.

APPENDIX D: COMMUNITY PROFILE

The community profile describes the county and participating cities from a number of perspectives in order to help define and understand the regions sensitivity and resilience to natural hazards. The information in this section represents a snapshot in time of the current sensitivity and resilience factors in the region when the plan was updated. Sensitivity factors can be defined as those community assets and characteristics that may be impacted by natural hazards, (e.g., special populations, economic factors, and historic and cultural resources). Community resilience factors can be defined as the community's ability to manage risk and adapt to hazard event impacts (e.g., governmental structure, agency missions and directives, and plans, policies, and programs).

APPENDIX E: GRANT PROGRAMS AND RESOURCES

This appendix lists state and federal resources and programs by hazard.

APPENDIX F: BUSINESS PREPAREDNESS AND RECOVERY

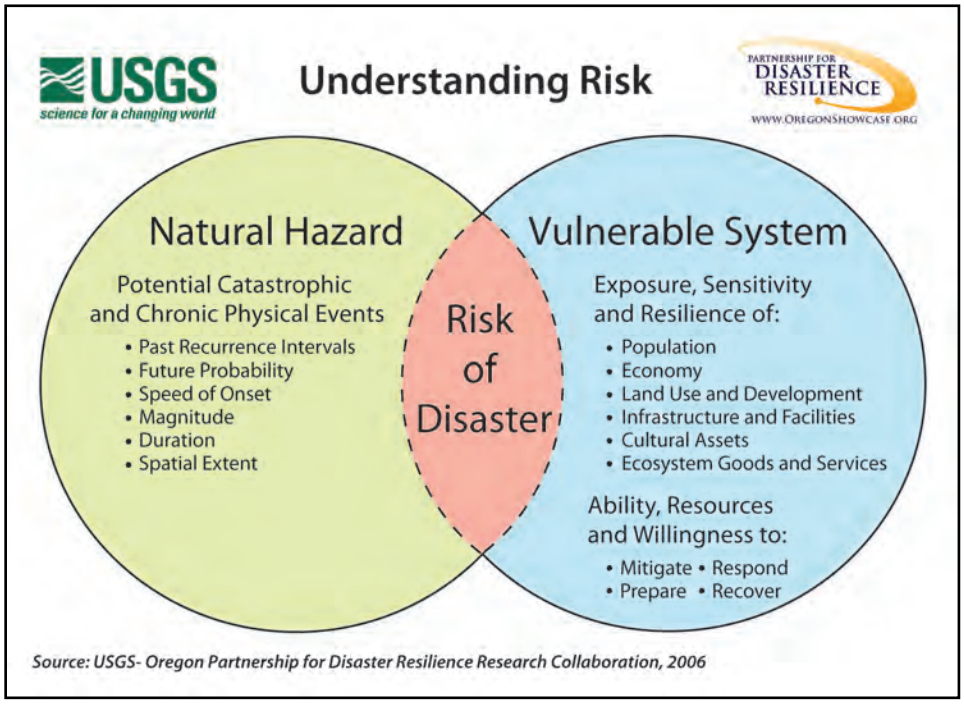
This appendix provides information on Jackson County business owners' perception of risk and level of preparedness for natural hazard events.

Section 2:
Risk Assessment

This section of the NHMP addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk begins with the identification of hazards that can impact the jurisdiction. Included in the hazard assessment is an evaluation of potential hazard impacts – type, location, extent, etc. The second step in the risk assessment process is the identification of important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources. The last step is to evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The information presented below, along with hazard specific information presented in the Hazard Annexes and community characteristics presented in the Community Profile Appendix, will be used as the local level rationale for the risk reduction actions identified in Section 3 – Mitigation Strategy. The risk assessment process is graphically depicted in Figure 2.1 below. Ultimately, the goal of hazard mitigation is to reduce the area where hazards and vulnerable systems overlap.

Figure 2.1 Understanding Risk

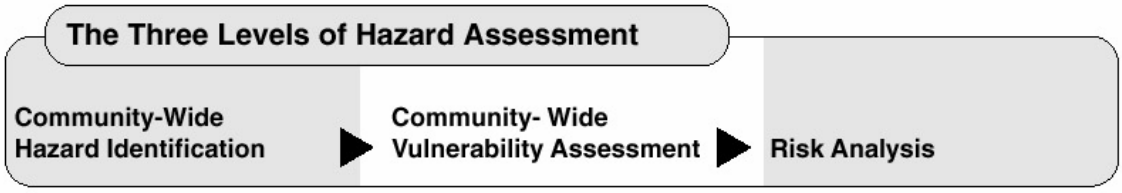


Source: Oregon Partnership for Disaster Resilience

What is a Risk Assessment?

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

Figure 2.2 Three Phases of a Risk Assessment



The first phase, hazard identification, involves the identification of the geographic extent of a hazard, its intensity, and its probability of occurrence. This level of assessment typically involves producing a map. The outputs from this phase can also be used for land use planning, management, and regulation; public awareness; defining areas for further study; and identifying properties or structures appropriate for acquisition or relocation.[1]

The second phase, vulnerability assessment, combines the information from the hazard identification with an inventory of the existing (or planned) property and population exposed to a hazard, and attempts to predict how different types of property and population groups will be affected by the hazard. This step can also assist in justifying

[1] Burby, R. 1998. Cooperating with Nature. Washington, DC: Joseph Henry Press, 126.

changes to building codes or development regulations, property acquisition programs, policies concerning critical and public facilities, taxation strategies for mitigating risk, and informational programs for members of the public who are at risk.[2]

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

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

Hazard Identification

Jackson County identifies seven natural hazards that could have an impact on the county. These hazards include drought, earthquake, flood, landslide, volcanic eruption, wildfire, severe winter storm and windstorm. For specific information pertaining to individual hazards, reference the Hazard Chapter Annexes (Volume II). Table 2.1 categorizes the hazards identified by Jackson County and compares it to the regional hazards identified in the State of Oregon Natural Hazard Mitigation Plan for Southwest Oregon (Region 4), which includes Jackson County. Notably, the county includes severe winter storm in a category along with windstorm while the state does not. Additionally, drought is a new hazard not identified in the previous Natural Hazard Mitigation Plan for Jackson County.

[2] Burby, R. 1998. Cooperating with Nature. Washington, DC: Joseph Henry Press, 133.

Table 2.1 Jackson County Hazard Identification

Jackson County*	State of Oregon NHMP Region 4 Southwest Oregon^
Drought	Drought
Earthquake	Seismic
Flood	Floods
Landslide	Landslides
Volcanic Eruption	Volcanic
Wildfire	Wildfires
Severe Winter Storm and Windstorm	Windstorms

Source: *Jackson County NHMP Steering Committee (2012)

^State of Oregon NHMP, Region 4: Southwest Oregon (2012)

Federal Disaster and Emergency Declarations

Looking at the past events that have occurred in the county can provide a general sense of the hazards that have caused significant damage in the county. Where trends emerge, disaster declarations can help inform hazard mitigation project priorities.

President Dwight D. Eisenhower approved the first federal disaster declaration in May 1953 following a tornado in Georgia. Since then, federally declared disasters have been approved within every state as a result of natural hazard related events. As of June 2012, FEMA has approved a total of 28 federal disaster declarations, two emergency declarations and 49 fire management assistance declarations in Oregon.[3] When governors ask for presidential declarations of major disaster or emergency, they stipulate which counties in their state they want included in the declaration. Table 2.2 summarizes the major disasters declared for Jackson County, since 1964. The table shows that all of the major disaster declarations for the county have been weather related.

An Emergency Declaration is more limited in scope and without the long-term federal recovery programs of a Major Disaster Declaration. Generally, federal assistance and funding are provided to meet a specific emergency need or to help prevent a major disaster from occurring. Table 2.2 also lists the only federal emergency declaration for the county (EM-3039). In April 1977, a drought was declared for much of Oregon including Jackson County.

[3] FEMA. Declared Disasters by Year or State. http://www.fema.gov/news/disaster_totals_annual.fema#markS. Accessed June 22, 2012

Table 2.2 FEMA Major Disaster and Emergency Declarations for Jackson County[4]

Declaration Number	Declaration Date	Incident(s) Period	Incident(s)	Individual Assistance	Public Assistance Categories
DR-1632	20-Mar-06	18-Dec-05 to 21-Jan-06	Severe storms, flooding, landslides, and mudslides	None	A, B, C, D, E, F, G
DR-1160	23-Jan-97	25-Dec-96 to 06-Jan-97	Severe winter storms/ flooding	Yes	A, B, C, D, E, F, G
DR-413	25-Jan-74	25-Jan-74 to 25-Jan-74	Severe storms, snowmelt, flooding	Yes	A, B, C, D, E, F, G
DR-184	24-Dec-64	24-Dec-64 to 24-Dec-64	Heavy rains and flooding	Yes	A, B, C, D, E, F, G
EM-3039	29-Apr-77	29-Apr-77 to 29-Apr-77	Drought	None	A, B

Source: FEMA, Oregon Disaster History. Major Disaster Declarations.

Drought

Characteristics

Droughts are not uncommon in Oregon, nor are they just an "east of the mountains" phenomenon. They occur in all parts of the state in both summer and winter months. Droughts appear to be recurring and they can have a profound effect on the economy, particularly the hydro-power and agricultural sectors. Although drought may not cause significant impacts to non-farming communities, the financial impact affects the economic stability of the county. The environmental consequences also are far-reaching. They include insect infestations in forests and the lack of water to support endangered fish species. In recent years, the state has addressed drought emergencies through the Oregon Drought Council. This interagency (state/federal) council meets to discuss forecasts and to advise the Governor as the need arises.

The Oregon State University Extension Service published a report in June 1979 following the 1977 drought. Highlights of the survey findings indicate that the 1977 drought affected 80% of ranches in eastern Oregon (including Jackson County), decreased forage, increased purchase of feed, reduced rate of gain of cattle, delayed breeding, herd health problems and increased water hauling and equipment investments[5].

Location/Extent

The extent of drought events depends upon the degree of moisture deficiency, and the duration and size of the affected area. Typically, droughts occur as regional events and often affect more than one city and county.

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[4] FEMA. Oregon Disaster History. Major Disaster Declarations

[5] Oregon State University Extension Services. "Effects of the 1977 Drought on Eastern Oregon Ranches." June 1979. http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/4743/SR%20no.%20555_ocr.pdf?sequence=1

Although Jackson County is spared from most droughts because of its location east of the ocean and west of the Cascades, it has been affected by droughts in the past. The region experiences dry conditions annually during the summer months from June to September.

Earthquake

Characteristics

Oregon and the Pacific Northwest in general are susceptible to earthquakes from three sources: 1) shallow crustal events within the North American Plate; 2) deep intra-plate events within the subducting Juan de Fuca Plate; and 3) the off-shore Cascadian Subduction Zone.[6]

Jackson County has experienced multiple earthquakes of an estimated magnitude of four and greater, with larger earthquakes in 1873 (magnitude 6.75), 1920 (magnitude 5.0, modified Mercalli intensity scale), and 1993 (two earthquakes magnitude 5.9 and 6.0)[7]. Primary earthquake hazards include ground shaking amplification, liquefaction, and earthquake-induced landslides.

Location/Extent

The areas most susceptible to ground amplification and liquefaction have young, soft alluvial sediments, found along river and stream channels. The extent of the damage to structures and injury and death to people will depend upon the type of earthquake, proximity to the epicenter and the magnitude and duration of the event. Buildings, dams, levees and lifelines including water, sewer, storm water and gas lines, transportation systems, and utility and communication networks are particularly at risk. Also, damage to roads, bridges and water systems will make it difficult to respond to post-earthquake fires.

Flood

Characteristics

The principal types of flood that occur in Jackson County include riverine, flash, shallow area and urban flood. Riverine flooding is the most common type of flooding, it typically occurs on larger rivers, such as the Rogue River, and usually results from large storms or prolonged wet periods. Portions of the Jackson County that are located along water bodies have the potential to experience riverine flooding after spring rains, heavy thunderstorms or rapid runoff from snow melt. Riverine floods can be slow or fast-rising, but usually develop over a period of days. The danger of riverine flooding occurs mainly during the winter months, with the onset of persistent, heavy rainfall, and during the spring, with melting of snow in the Coast and Cascade Range; such as the 1964 Christmas Day flood and the 1997 New Year's Day flood.

Flash floods are a major cause of weather-related deaths in the Unites States. Flash floods usually result from intense storms dropping large amounts of rain within a brief period. Flash floods are a major cause of weather-related deaths in the United States. Flash floods occur with little or no warning and rivers can rise in a manner of minutes. Flash floods are most common in arid and semi-arid areas where there is steep topography, little vegetation

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[6] *Planning for Natural Hazards: Oregon Technical Resource Guide,* Department of Land Conservation and Development, Community Planning Workshop, (July 2000). P. 8-8.
[7] Ibid.

and intense but short-duration rainfall. Jackson County, located in a semi-arid region, is prone to this type of flooding. Steep topography combined with clearing of vegetation for development and timber production causes rapid runoff of rainwater.

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

Urban flooding occurs where land has been converted from open space to areas consisting of homes, parking lots, and commercial, industrial and public buildings and structures. In such areas the previous ability of water to filter into the ground is often prevented by the extensive impervious surfaces associated with urban development. During periods of urban flooding streets can rapidly become swift moving rivers and basements and backyards can quickly fill with water. Storm drains and smaller creeks can back up due to yard waste and debris. Clogged storm drainage systems often lead to further localized flooding.

Location/Extent

The most significant of the FEMA-determined floodplains and floodways either surround the Rogue River, Bear Creek, Ashland Creek and Applegate River.[8] Properties in and near the floodplains in the cities of Rogue River and Shady Cove have are subject to frequent flooding events.

Landslide

Characteristics

In Oregon, a significant number of locations are at risk to dangerous landslides. While not all landslides result in private property damage, many landslides impact transportation corridors, fuel and energy conduits, and communication facilities. They can also pose a serious threat to human life.

All landslides can be classified into one of the following six types of movements: (1) slides, (2) flows, (3) spreads, (4) topples, (5) falls, or (6) complex[9]. In addition, landslides may be broken down into the following two categories: (1) rapidly moving; and (2) slow moving[10]. Rapidly moving landslides are typically “off-site” (debris flows and earth flows) and present the greatest risk to human life. Rapidly moving landslides have caused most of the recent landslide-related injuries and deaths in Oregon, including eight deaths in 1996 following La Niña storms[11]. Slow moving landslides tend to be “on-site” (slumps, earthflows, and block slides) and can cause significant property damage, but are less likely to result in serious human injuries[12].

Landslides vary greatly in the volumes of rock and soil involved, the length, width, and depth of the area affected, frequency of occurrence, and speed of movement. Some

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[8] Jackson County Flood Insurance Study FEMA, May 3, 2011.
[9] Interagency Hazard Mitigation Team. 2012. Oregon Natural Hazards Mitigation Plan. Salem, OR: Oregon Military Department – Office of Emergency Management
[10] DLCD, CPW, Planning for Natural Hazards: Oregon Technical Resource Guide, 1999
[11] Ibid
[12] Ibid.

characteristics that determine the type of landslide are slope of the hillside, moisture content, and the nature of the underlying materials.[13]

Location/Extent

In general, areas at risk to landslides have steep slopes (25 percent or greater,) or a history of nearby landslides. In otherwise gently sloped areas, landslides can occur along steep river and creek banks, and along ocean bluff faces. At natural slopes under 30 percent, most landslide hazards are related to excavation and drainage practices, or the reactivation of preexisting landslide hazards.[14] The severity or extent of landslides is typically a function of geology and the landslide triggering mechanism. Rainfall initiated landslides tend to be smaller, and earthquake induced landslides may be very large. Even small slides can cause property damage, result in injuries, or take lives.

Natural conditions and human activities can both play a role in causing landslides. The incidence of landslides and their impact on people and property can be accelerated by development.[15]

Volcanic Eruption

Characteristics

Jackson County and the Pacific Northwest lie within the "ring of fire", an area of very active volcanic activity surrounding the Pacific Basin. Volcanic eruptions occur regularly along the ring of fire, in part because of the movement of the Earth's tectonic plates. Volcanic eruptions have the potential to coincide with numerous other hazards including ash fall, earthquakes, lava flows, pyroclastic flows, lahars and debris flows, and landslides. Ash fall and earthquakes are the two associated hazards that have the potential to impact Jackson County directly.

Location/Extent

Active volcanoes that could impact Jackson County include composite volcanoes Crater Lake and Mount Shasta, and the broad field of shield volcanoes in the southern Cascades that includes Mount McLoughlin. If any of these volcanoes erupted, there would be a possibility of ash that could affect air quality and/or the water quality. The extent of damage from these hazards depends on the distance from the volcano, vent location, and type of hazardous events that occur during an eruption. The indirect effects of volcanoes within other counties must be considered as well.

Wildfire (Wildland-Urban Interface)

Characteristics

While more common to the arid areas of central and eastern Oregon, the potential for losses due to Wildland-Urban Interface (WUI) fires in the urbanized region should not be ignored. Fire is an essential part of Oregon's ecosystem, but it is also a serious threat to life and property. Wildfires that have the potential to affect Jackson County can be divided into four categories: interface, wildland, firestorms and prescribed burns. Ignition of a wildfire may occur naturally from lightning or from human causes such as debris burns, arson,

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[13] Ibid.
[14] Interagency Hazard Mitigation Team. 2012. Oregon Natural Hazards Mitigation Plan. Salem, OR: Oregon Military Department – Office of Emergency Management
[15] DLCD, CPW, Planning for Natural Hazards: Oregon Technical Resource Guide, 1999

careless smoking, and recreational activities or from an industrial accident. Once started, fuel, topography, weather and development conditions affect fire behavior.

Location/Extent

In Southern Oregon, large costly fires have become regular events, disrupted communities, cost millions of dollars in suppression and recovery costs, and increased the risk to private property owners. According to the Oregon Department of Forestry, "large fires that threaten dwellings are 48% more expensive to fight, and the likelihood of human-caused fires exponentially increases with the addition of each new home. Throughout Oregon's wildland-urban interfaces historically normal fires have become economically and socially unacceptable due to the scale of damage they cause.[16]

The extent of damage to Jackson County from WUI fires is dependent on a number of factors, including temperature, wind speed and direction, humidity, proximity to fuels, and steepness of slopes. WUI fires can be intensified by development patterns, vegetation and natural fuels, and can merge into unwieldy and unpredictable events.

Recent Fire/ WUI Events

Since 2000 there have been ten significant fires in Jackson County. Table 2.3 shows the most recent fires in the county, where available information has been included on the size of the conflagration event, the communities threatened and the mobilization cost.

Table 2.3 Significant Fires in Jackson County since 2000

Name	Date	FEMA	Acres	Communities Threatened	Conflagration Mobilization Cost	Federal Funding	Cause
North River Road	8/18/11	-	-	Rogue River	$80,951	$0	Undetermined
Oak Knoll	8/24/10	-	20	Ashland	-	-	Human - Arson
South County Complex	8/28/09	-	-	Ashland, Medford	$423,811	$312,666	Undetermined
Doubleday	2008	-	1,244	Butte Falls	-	-	Lightening
Wasson	2005	-	1,500	-	-	-	Traffic Accident
Cove Road	2003	FEMA-2496-FMAGP	700	-	-	-	Lightening
Timbered Rock	7/27/02	FEMA-2454-FMAGP	27,111	north Shady Cove	$237,457	$169,576	Lightening
Squire Peak/ Wall Creek/ Lost Creek	7/16/02	FEMA-2445-FMAGP	3,125	east of Ruch	$266,918	$191,787	Lightening
East Antelope	2002	-	1,947	-	-	-	Power Line
Quartz	2001	-	6,162	-	-	-	Lightening
Antioch	8/8/00	-	376	Antioch	$15,319	$0	Human - burning vehicle

Source: OPDR, "State of Oregon Natural Hazards Mitigation Plan: Fire Chapter", 2012.

Severe Winter Storm and Windstorm

Winter Storm Characteristics

Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms affecting Jackson County

[16] Oregon Department of Forestry, Oregon Forests Report, 2007-2009

typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from October through March.[17]

While snow is relatively rare in southern Oregon, but when a Pacific storm is associated with an air mass from the Gulf of Alaska, a major snowstorm may ensue. Jackson County often receives heavier snowfall than the rest of western Oregon under these conditions because of its lower temperatures and higher altitudes.[18] Crater Lake, at the county's northeast border, holds many state records for snowfall.

Like snow, ice storms are comprised of cold temperatures and moisture, but subtle changes can result in varying types of ice formation, including freezing rain, sleet, and hail. Freezing rain can be the most damaging of ice formations. While sleet and hail can create hazards for motorists when it accumulates, freezing rain can cause the most dangerous conditions within a community. Ice buildup can bring down trees, communication towers, and wires creating hazards for property owners, motorists, and pedestrians alike.

Winter Storm Location/Extent

All of Jackson County is vulnerable to winter storms and impacts typically extend region-wide. The magnitude or severity of severe winter storms is determined by a number of meteorological factors including the amount and extent of snow or ice, air temperature, wind speed, and event duration.

Windstorm Characteristics

Extreme winds occur throughout Oregon, and most communities have some level of vulnerability to windstorms. Windstorms can result in collapsed or damaged buildings, damaged or blocked roads and bridges, damaged traffic signals, streetlights, and parks, among other impacts. Roads blocked by fallen trees during a windstorm may have severe consequences to people who need access to emergency services. Emergency response operations can be complicated when roads are blocked or when power supplies are interrupted. Windstorms can cause flying debris which can also damage utility lines; overhead power lines can be damaged even in relatively minor windstorm events. Industry and commerce can suffer losses from interruptions in electric service and from extended road closures.

Although rare, tornados can and do occur in Oregon. Tornadoes are the most concentrated and violent storms produced by the earth's atmosphere. They are created by a vortex of rotating winds and strong vertical motion, which possess remarkable strength and cause widespread damage.

Windstorm Location/Extent

The damaging effects of windstorms may extend for distances of 100 to 300 miles from the center of storm activity. Windstorms in Jackson County usually occur from October to March, and their extent is determined by their track, intensity (the air pressure gradient they generate), and local terrain.

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[17] Interagency Hazard Mitigation Team. 2012. Oregon Natural Hazards Mitigation Plan. Salem, OR: Oregon Military Department – Office of Emergency Management

[18] Taylor, George H. & Chris Hannan, The Climate of Oregon, OSU Press, 1999.

Oregon and other western states experience tornadoes on occasion, many of which have produced significant damage and occasionally injury or death. Most of the tornadoes that develop in Oregon are caused by intense local thunderstorms. These storms also produce lightning, hail, and heavy rain, and are more common during the warm season from April to October.[19]

Hazard Probability

Probability is the likelihood of future occurrence within a specified period of time. Jackson County and the cities of Ashland, Eagle Point, Rogue River and Shady Cove evaluated the best available probability data to develop the probability scores presented below. For the purposes of this plan, the county and cities utilized the Oregon Military Department – Office of Emergency Management Hazard Analysis methodology probability definitions to determine hazard probability. The definitions are:

LOW = one incident likely within 75 to 100 years scores between 1 and 3 points

MEDIUM = one incident likely within 35 to 75 years scores between 4 and 7 points

HIGH = one incident likely within 10 to 35 years scores between 8 and 10 points

Table 2.4 presents the probability scores for each of the natural hazards present in Jackson County and for the cities of Ashland, Eagle Point, Rogue River and Shady Cove. As shown in the table, several hazards are rated with high probabilities within the county, including: flood, landslide, wildfire and severe winter storm and windstorm.

Table 2.4 Natural Hazard Probability Assessment Summary

Hazard	Jackson County	Ashland	Eagle Point	Rogue River	Shady Cove
Drought	Medium	Medium	Medium	Medium	High
Earthquake	Medium	Medium	Medium	Medium	Medium
Flood	High	High	High	High	High
Landslide	High	High	Medium	Low	Low
Severe Winter Storm and Windstorm	High	High	High	High	High
Volcanic Eruption	Low	Low	Low	Low	Low
Wildfire	High	High	Medium	High	High

Source: Jackson County, Ashland, Eagle Point, Rogue River and Shady Cove NHMP Steering Committees, 2012.

Community Vulnerability

Community vulnerabilities are an important supplement to the NHMP risk assessment. For more in-depth information regarding specific community vulnerabilities, reference Appendix D: Community Profile.

Populations

The socio-demographic qualities of the community population such as language, race and ethnicity, age, income, and educational attainment are significant factors that can influence the community's ability to cope, adapt to and recover from natural disasters. Historically, 80

[19] Taylor, George H., Holly Bohman, and Luke Foster. August 1996. A History of Tornadoes in Oregon. Oregon Climate Service. Corvallis, OR: Oregon State University. http://www.ocs.orst.edu/pub_ftp/reports/book/tornado.html

percent of the disaster burden falls on the public.[20] Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities, and low-income persons. Population vulnerabilities can be reduced or eliminated with proper outreach and community mitigation planning. For planning purposes, it is essential Jackson County and the cities of Ashland, Eagle Point, Rogue River and Shady Cove consider both immediate and long-term socio-demographic implications of hazard resilience.

Vulnerabilities

- As of 2010, 17.6% of the county population is over the age of 64, a number that is projected to rise to 23.5% by 2040. The county has a higher percent of its population over the age of 64 compared to Oregon as a whole which has currently 13.9% of it's population over the age of 64, with a projection of 20.2% by 2040. The Jackson County age dependency ratio is 55.1%, which is significantly higher than that of the State of Oregon (48.5%); the age dependency figures is expected to increase to 65.6% by the year 2040.
- Even though 97% of the entire county population is reported as proficient in English, almost half of the native Spanish speakers are not proficient in English. These populations would stand to benefit from mitigation outreach, with special attention to cultural, visual and technology sensitive materials.

Economy

Economic diversification, employment and industry are measures of economic capacity. However, economic resilience to natural disasters is far more complex than merely restoring employment or income in the local community. Building a resilient economy requires an understanding of how the component parts of employment sectors, workforce, resources and infrastructure are interconnected in the existing economic picture. The current and anticipated financial conditions of a community are strong determinants of community resilience, as a strong and diverse economic base increases the ability of individuals, families and the community to absorb disaster impacts for a quick recovery. It is imperative that Jackson County and the cities of Ashland, Eagle Point, Rogue River and Shady Cove recognize that economic diversification is a long-term issue; more immediate strategies to reduce vulnerability should focus on risk management for the dominant industries.[21]

Vulnerabilities

- According to the Oregon Employment Department, Jackson County unemployment has increased since 2007, to 11.5%. In the event of a large—scale disaster, unemployment has the potential to rise when businesses and companies are unable to overcome the ramifications of the hazard event.
- The largest sectors of employment in Jackson County are Trade, Transportation and Utilities (22.8%), Education and Health Services (17.1%), Government (15.1%) and Leisure and Hospitality (11.7%)[22]. Retail trade generated $3.42 billion in 2007, making it the largest earning sector in the region (manufacturing, generated nearly

[20] Hazards Workshop Session Summary #16, Disasters, Diversity, and Equity. (July 2000). University of Colorado, Boulder.
[21] Ibid.
[22] Oregon Employment Department, "2001 and 2011 Covered Employment and Wages Summary Reports". http://www.qualityinfo.org/olmisj/labforce. Accessed August 2012.

a quarter of the regions revenue at $2.04 billion)[23]. In the event of a natural disaster, the education and health services, manufacturing and government sectors may not be as vulnerable in the short term as other sectors; however, other large industries such as retail trade and leisure and hospitality may be significantly affected by a disaster as these basic industries tend to rely on a stable tourist base and local discretionary spending, both of which may decline following a disaster.

- It is imperative that Jackson County recognizes that economic diversification is a long-term issue; more immediate strategies to reduce vulnerability should focus on risk management for the dominant industries

Environment

The capacity of the natural environment is essential in sustaining all forms of life including human life, yet it often plays an underrepresented role in community resiliency to natural hazards. The natural environment includes land, air, water and other natural resources that support and provide space to live, work and recreate.[24] Natural capital such as wetlands and forested hill slopes play significant roles in protecting communities and the environment from weather-related hazards, such as flooding and landslides. When natural systems are impacted or depleted by human activities, those activities can adversely affect community resilience to natural hazard events.

Vulnerabilities

- The regions floodplains generally begin as narrow strip adjacent to the upper tributaries of Bear Creek and the Rogue River, and steadily increase in width at lower elevations. The widest floodplains are in the northern portion of the county near the confluence of Bear Creek and the Rogue River. These streams frequently flood, and while this can provide natural benefits, flooding can inflict personal injury and property damage. The communities of Ashland, Rogue River and Shady Cove are at particular risk due to history of flood loss and total property located within the flood hazard area.
- Jackson County and the cities of Ashland, Eagle Point, Rogue River and Shady Cove receive drinking water from wells, aquifers and river systems. It is imperative to consider the hazards that can affect water quality, including flooding, landslides and drought particular to each of these jurisdictions.
- The combination of a growing population and development intensification can lead to the increasing risk of hazards, threatening loss of life, property and long—term economic disruption if land management is inadequate; such as floodplain development that is common throughout parts of Jackson County.

Critical Facilities and Infrastructure

Critical facilities (i.e. police, fire, and government facilities), housing supply and physical infrastructure are critical during a disaster and are essential for proper functioning and response. The lack or poor condition of infrastructure can negatively affect a community's ability to cope, respond and recover from a natural disaster. Following a disaster,

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[23] U.S. Census Bureau, 2007 Economic Census, Table EC0700A1 "All sectors: Geographic Area Series: Economy-Wide Key Statistics: 2007", http://factfinder2.census.gov/, accessed August 2012.

[24] Mayunga, J. 2007. Understanding and Applying the Concept of Community Disaster Resilience: A capital-based approach. Summer Academy for Social Vulnerability and Resilience Building.

communities may experience isolation from surrounding cities and counties due to infrastructure failure. These conditions force communities to rely on local and immediately available resources.

Vulnerabilities

- Considering, Jackson County is the largest county in southern Oregon, it is critical to maintain the quality of built capacity (transportation networks, critical facilities, utility transmission, etc.) throughout the area, as it is likely that surrounding jurisdictions will seek assistance from, and through, Jackson County.
- Based on U.S. Census data, 61% of the residential housing throughout the county was built prior to current seismic building standards of 1990 and 50% were constructed prior to the local implementation of the flood elevation requirements of the 1970's (county FIRMs were not completed until 1980).[25] The cities of Ashland, Rogue River and Shady Cove have the greatest number of their housing units built prior to the flood mapping of the 1970s. And, the cities of Ashland and Rogue River have large portions of their housing stock built prior to the earthquake standards of the 1990s.
- The county has 37.4% of the housing units occupied by renters, versus 62.6% homeowners.[26] Studies have shown that renters are less likely than homeowners to prepare for hazardous events. Ashland, with a large student population, has a larger percent of its households renter occupied than the region as a whole.
- Some roads and bridges in the county are highly vulnerable to hazards specifically earthquakes. Because bridges vary in size, materials, siting, and design, any given hazard will affect them differently. The county should also pay considerable attention to roads and bridges that may become obstructed that serve as primary interstate travel routes, as this will likely have significant impacts on access in and out of the county and region.

National Flood Insurance Program (NFIP)

The Jackson County Flood Insurance Rate Maps are current as of May 3, 2011. Table 2.5 shows that as of August 20, 2012, Jackson County has 947 National Flood Insurance Program (NFIP) policies in force, 133 claims and three repetitive loss properties within the jurisdiction (there are a total of 2,114 policies in force within all jurisdictions in Jackson County). Jackson County has an "open" Community Assistance Visit (as of August 20, 2012); the county is a member of the Community Rating System (CRS) and has a Level 7 community rating, waiting for final verification of new status. The table shows that the cities of Eagle Point and Shady Cove have repetitive loss buildings and are also not currently participating in the CRS.

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[25] U.S. Census Bureau, 2006-2010 American Community Survey, Table B25044 "Year Structure Built", http://factfinder2.census.gov/, accessed August 2012.

[26] U.S. Census Bureau, Table DP-1 "Profile of General Population and Housing Characteristics: 2010", http://factfinder2.census.gov, accessed April 2012.

Table 2.5: Food Insurance Detail

Community	Policies	Insurance in Force	Total Paid Losses	Total Paid Amount	Repetitive Loss Buildings	Repetitive Loss Payment	CRS Class Rating	LAST CAV
Jackson County	2,114	$ 480,086,700	261	$ 2,245,689	7	$ 271,710	7	Open
Jackson County*	947	$ 208,304,900	133	$ 1,194,559	3	$ 218,963	7	Open
Ashland	117	$ 34,285,000	19	$ 363,549	0	$ -	7	12/11/01
Central Point	260	$ 60,462,700	27	$ 132,350	0	$ -	6	NA
Eagle Point	94	$ 20,922,900	32	$ 264,772	2	$ 9,068	NP	4/5/96
Medford	317	$ 78,566,000	24	$ 88,145	0	$ -	8	NA
Rogue River	75	$ 13,208,600	7	$ 103,243	0	$ -	7	Open
Shady Cove	117	$ 26,896,600	8	$ 41,848	1	$ 40,738	NP	Open

* Portion of entire county under Jackson County jurisdiction
NP = Not Participating
NA = Information Not Available

Source: Shirley, Chris. Oregon Floodplain Coordinator "Sent from Snipping Tool: Federal Emergency Management Agency, Disaster Report – Oregon, Flood Insurance - Detail." Message to Michael Howard. August 20, 2012. Email.

Vulnerability Summary

Vulnerability is a measure of the exposure of the built environment to hazards. The exposure of community assets to hazards is critical in the assessment of the degree of risk a community has to each hazard. Identifying the facilities and infrastructure at risk from various hazards can assist the county in prioritizing resources for mitigation, and can assist in directing damage assessment efforts after a hazard event has occurred. The exposure of county and city assets to each hazard and potential implications are explained in each hazard section.

Vulnerability includes the percentage of population and property likely to be affected under an "average" occurrence of the hazard. Jackson County and the cities of Ashland, Eagle Point, Rogue River and Shady Cove evaluated the best available vulnerability data to develop the vulnerability scores presented below. For the purposes of this plan, the county and cities utilized the Oregon Military Department – Office of Emergency Management Hazard Analysis methodology vulnerability definitions to determine hazard probability. The definitions are:

LOW = less than 1-percent affected scores between 1 and 3 points

MEDIUM = between 1 and 10-percent affected scores between 4 and 7 points

HIGH = more than 10-percent affected scores between 8 and 10 points

Table 2.6 presents the vulnerability scores for each of the natural hazards present in Jackson County and the cities of Ashland, Eagle Point, Rogue River and Shady Cove. As shown in the table, the county is highly vulnerable to the following hazards: earthquake and severe winter storm and windstorm.

Table 2.6 Community Vulnerability Assessment Summary

Hazard	Jackson County	Ashland	Eagle Point	Rogue River	Shady Cove
Drought	Medium	High	High	Medium	High
Earthquake	High	High	Medium	Medium	High
Flood	Medium	Medium	Medium	Medium	Medium
Landslide	Low	High	Low	Low	Medium
Severe Winter Storm and Windstorm	High	High	High	Medium	High
Volcanic Eruption	Low	Low	Low	Low	Low
Wildfire	Medium	High	Medium	Medium	High

Source: Jackson County, Ashland, Eagle Point, Rogue River and Shady Cove NHMP Steering Committees, 2012.

Risk Assessment

The Jackson County NHMP Steering Committee updated the county hazard analysis matrix at a steering committee meeting held on April 25, 2012. Table 2.7 presents the entire updated hazard analysis matrix for Jackson County. The hazards are listed in rank order from high to low. The table shows that hazard scores are influenced by each of the four categories combined. For local governments, conducting the hazard analysis is a useful step in planning for hazard mitigation, response, and recovery. The method provides the jurisdiction with sense of hazard priorities, but does not predict the occurrence of a particular hazard.

With considerations for past historical events, the probability or likelihood of a particular hazard event occurring, the vulnerability to the community, and the maximum threat or worst-case scenario, earthquake and severe winter storm and windstorm rank as the top hazard threats to the county. Flood, wildfire, and drought make-up the next three highest ranked hazards, while landslide and volcanic eruption make-up the lowest ranked hazards in the matrix.

One would think that hazards with a more prominent history and a higher likelihood of occurring in the future should be ranked high. However, if such hazards do not have a high threat or vulnerability, the ranking will not be as high. For example, the data indicates that landslides occur more frequently in the county and have a higher probability of occurring in the future compared to an earthquake hazard. However, since Jackson County is potentially more vulnerable to earthquake, especially in a worst-case scenario event, the overall threat score for earthquake is greater than that of landslide. The hazard ranks are influenced by all four categories combined.

Table 2.7 Hazard Analysis Matrix – Jackson County

	History			Probability			Vulnerability			Maximum Threat				
Hazard	Severity	Weight Factor	Subtotal	Severity	Weight Factor	Subtotal	Severity	Weight Factor	Subtotal	Severity	Weight Factor	Subtotal	Total Threat Score	**Hazard Rank**
Earthquake	4	2	8	6	7	42	10	5	50	10	10	100	200	# 1
Severe Winter Storm and Windstorm	10	2	20	10	7	70	10	5	50	6	10	60	200	# 1
Flood	10	2	20	10	7	70	4	5	20	5	10	50	160	# 3
Wildfire	10	2	20	10	7	70	4	5	20	5	10	50	160	# 3
Drought	5	2	10	5	7	35	7	5	35	5	10	50	130	# 5
Landslide	10	2	20	10	7	70	1	5	5	1	10	10	105	# 6
Volcanic Eruption	1	2	2	1	7	7	1	5	5	5	10	50	64	# 7

Source: Jackson County NHMP Steering Committee, Updated April 25, 2012.

The Jackson County NHMP Steering Committee also developed severity impact scores through a relative risk exercise at the steering committee meeting on April 25, 2012. The exercise takes into account the relative probability or likelihood of a particular hazard event occurring, the potential for injuries or death, the physical impact to facilities, as well as economic, ecologic, and social interruptions within the county. Table 2.8 presents the overall risk assessment for Jackson County including both the county's hazard analysis and relative risk. The hazards are listed in rank order from high to low. Taking into account relative probability and severity impact scores, wildfire and severe winter storm and windstorm rank as the top threats hazard to Jackson County. Flood, earthquake and landslide make-up the next three highest ranked hazards in the county, while drought and volcanic eruption make-up the lowest ranked hazards in terms of overall relative risk.

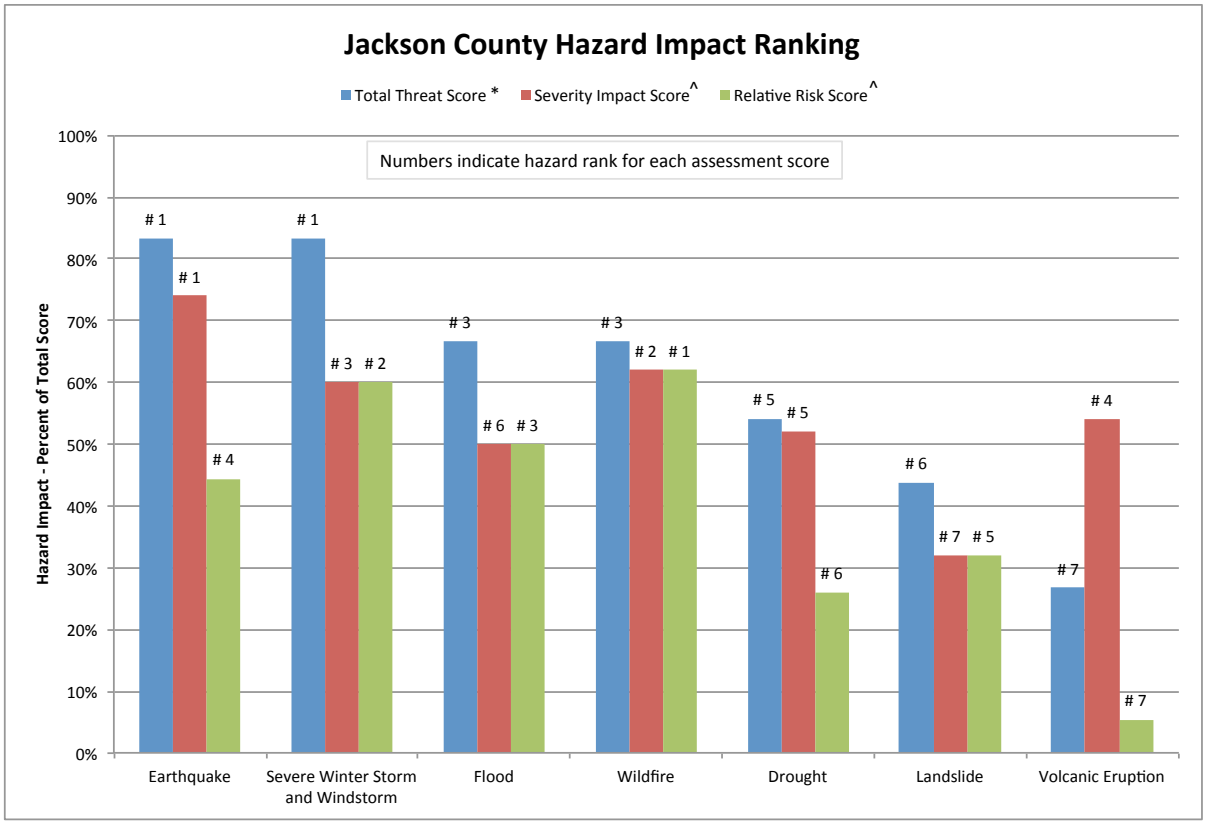
Table 2.8 Risk Assessment Summary – Jackson County

Hazard	**Probability Total**	**Vulnerability Total**	**Total Threat Score**	**Severity Impact Score**	**Relative Probability**	**Relative Risk**	**Hazard Rank**
Wildfire	70	20	160	3.1	5	15.5	# 1
Severe Winter Storm and Windstorm	70	50	200	3	5	15	# 2
Flood	70	20	160	2.5	5	12.5	# 3
Earthquake	42	50	200	3.7	3	11.1	# 4
Landslide	70	5	105	1.6	5	8	# 5
Drought	35	35	130	2.6	2.5	6.5	# 6
Volcanic Eruption	7	5	64	2.7	0.5	1.35	# 7

Source: Jackson County NHMP Steering Committee, Updated April 25, 2012.

Figure 2.3 presents the overall risk assessment for Jackson County including both the county's hazard analysis and relative risk. The hazards are listed in rank order from high to low total threat score. With considerations for past historical events, vulnerability to populations, the maximum threat, and the probability, or likelihood of a particular hazard event occurring; earthquake, severe winter storm and windstorm, flood and wildfire are the four hazards with the highest priority concerning total threat score. Earthquake, wildfire and severe winter storm and windstorm are designated with the highest severity impact scores. Wildfire, severe winter storm and windstorm and flood are designated with the highest relative risk scores.

Figure 2.3 Hazard Impact Ranking



Source: *Oregon Military Department – Office of Emergency Management Risk Assessment Methodology, 2012.

^ Jackson County NHMP Steering Committee,2012.

Multi-Jurisdictional Risk Assessment

Multi-jurisdictional Risk Assessment - §201.6(c) (2) (iii): For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

The four participating cities[27] in Jackson County; Ashland, Eagle Point, Rogue River and Shady Cove each held local steering committee meetings and completed a hazard analysis to compare to the assessment completed by the Jackson County NHMP Steering Committee. The following highlights the risk assessments completed by each city.

City of Ashland Risk Assessment

The City of Ashland completed a local hazard analysis on May 29th, 2012 to compare the city's risk for each identified hazard to that of Jackson County. The city addressed the seven hazards identified by the county: drought, earthquake, flood, landslide, severe winter storm and windstorm, volcanic event and wildfire. Scores were based off of past historical events,

[27] The cities of Central Point and Medford have stand-alone NHMPs and did not participate in this planning process. No other incorporated city within Jackson County participated in this process.

the probability or likelihood of a particular hazard event occurring, vulnerability to population, and the maximum threat or worst-case scenario.

Table 2.9 categorizes the probability and vulnerability scores from the hazard analysis for the city and compares the results to the assessment completed by the Jackson County NHMP Steering Committee (areas of differences are noted with **bold** text within the city ratings).

Table 2.9 Probability and Vulnerability Comparison – Ashland and Jackson County

	Ashland		Jackson County	
Hazard	Probability	Vulnerability	Probability	Vulnerability
Drought	Medium	**High**	Medium	Medium
Earthquake	Medium	High	Medium	High
Flood	High	Medium	High	Medium
Landslide	High	**High**	High	Low
Severe Winter Storm and Windstorm	High	High	High	High
Volcanic Eruption	Low	Low	Low	Low
Wildfire	High	**High**	High	Medium

Source: City of Ashland NHMP Steering Committee, May 29, 2012 and Jackson County NHMP Steering Committee, Updated April 25, 2012.

Hazard Probability

The City of Ashland and Jackson County share identical *probability* ratings for all seven identified hazards (drought, earthquake, flood, landslide, volcanic eruption, wildfire and severe winter storm and windstorm).

Based on historical events the city rated flood, landslide, wildfire and severe winter storm and windstorm with a high probability of occurring within a ten to thirty-five year period. These hazards have a history of occurring in the community at a similar frequency as they occur within the county.

The city has a high risk to flood and landslide since its central business district is located adjacent to Ashland Creek, which is a chief source of flood problems. Both the 1974 and 1997 flood events caused significant damage to the city.[28] During the flood events significant damage the city's water reservoir dam, which may also be impacted by landslide. Fire is also a concern in Ashland due to an increased amount of development along the Wildland Urban Interface and history of wildfire in the area.

Community Vulnerability

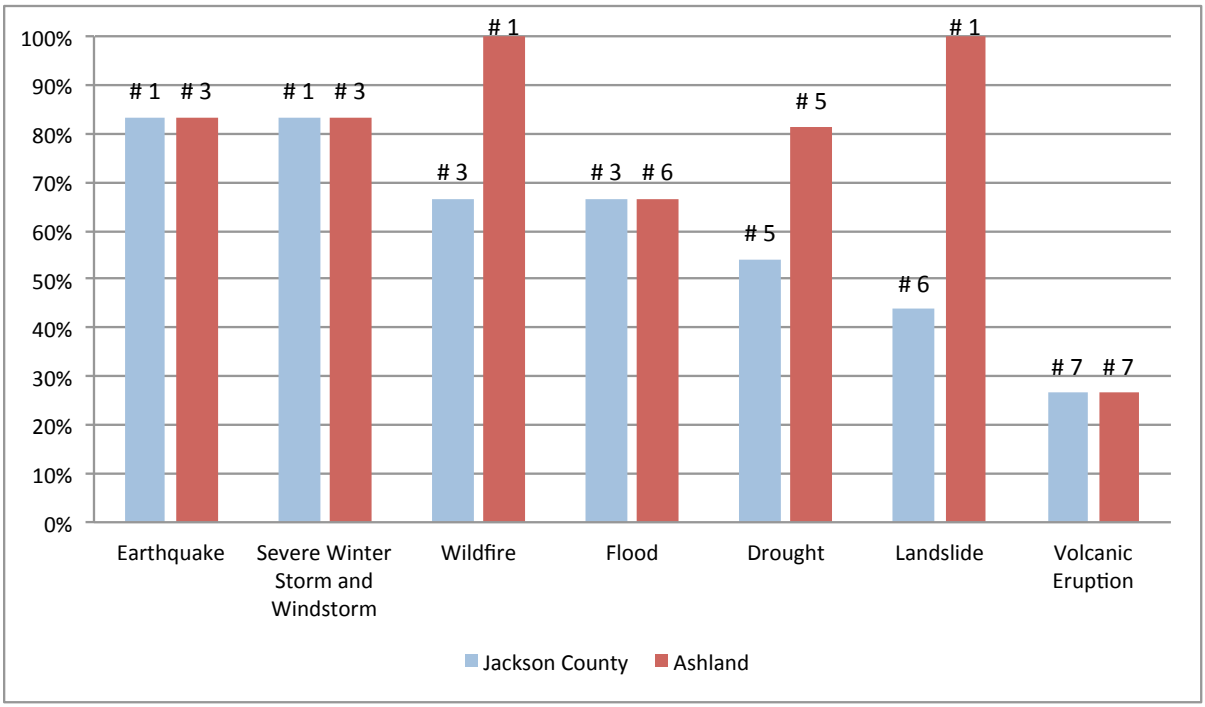
Compared to Jackson County, the hazard analysis for the City of Ashland identifies higher *vulnerability* to drought, landslide and wildfire.

The hazard analysis was similar to the county for the remaining four identified hazards (earthquake, flood, volcanic eruption and severe winter storm and windstorm).

[28] FEMA, Jackson County Flood Insurance Study, 2011

Figure 2.4 presents a summary of the hazard analysis for the City of Ashland and compares the results to the assessment completed by the Jackson County NHMP Steering Committee.

Figure 2.4 Overall Hazard Analysis Comparison – Ashland and Jackson County



Source: City of Ashland NHMP Steering Committee, May 29, 2012 and Jackson County NHMP Steering Committee, Updated April 25, 2012.

In terms of history, probability, vulnerability, and maximum threat, the hazard analysis for the city overall rated the drought, landslide and wildfire hazards higher than the county.

The city rated landslide and wildfire with the highest score possible (240 points). The county did not rate any hazard with the highest score possible; the city and the county ranked earthquake and severe winter storm and windstorm among the highest (200 points). Notably, the city also rated drought among the highest scores (195 points).

The city did not rate any hazards lower than the county.

City of Eagle Point Risk Assessment

The City of Eagle Point completed a local hazard analysis on May 29th, 2012 to compare the city's risk for each identified hazard to that of Jackson County. The city addressed the seven hazards identified by the county: drought, earthquake, flood, landslide, severe winter storm and windstorm, volcanic event and wildfire. Scores were based off of past historical events, the probability or likelihood of a particular hazard event occurring, vulnerability to population, and the maximum threat or worst-case scenario.

Table 2.10 categorizes the probability and vulnerability scores from the hazard analysis for the city and compares the results to the assessment completed by the Jackson County

NHMP Steering Committee (areas of differences are noted with **bold** text within the city ratings).

Table 2.10 Probability and Vulnerability Comparison – Eagle Point and Jackson County

	Eagle Point		Jackson County	
Hazard	Probability	Vulnerability	Probability	Vulnerability
Drought	Medium	**High**	Medium	Medium
Earthquake	Medium	**Medium**	Medium	High
Flood	High	Medium	High	Medium
Landslide	**Medium**	Low	High	Low
Severe Winter Storm and Windstorm	High	High	High	High
Volcanic Eruption	Low	Low	Low	Low
Wildfire	**Medium**	Medium	High	Medium

Source: City of Eagle Point NHMP Steering Committee, May 29, 2012 and Jackson County NHMP Steering Committee, Updated April 25, 2012.

Hazard Probability

The City of Eagle Point and Jackson County share identical *probability* ratings for five of the seven identified hazards (drought, earthquake, flood, volcanic eruption and severe winter storm and windstorm).

Based on historical events the city rates flood and severe winter storm and windstorm with a high probability of occurring within a ten to thirty-five year period. These hazards have a history of occurring in the community at a similar frequency as they occur within the county.

The city has a lower probability, *medium,* for the landslide and wildfire hazards because it does not have as much land with steep slopes and does not have as much history of wildfire as the county does as a whole.

Community Vulnerability

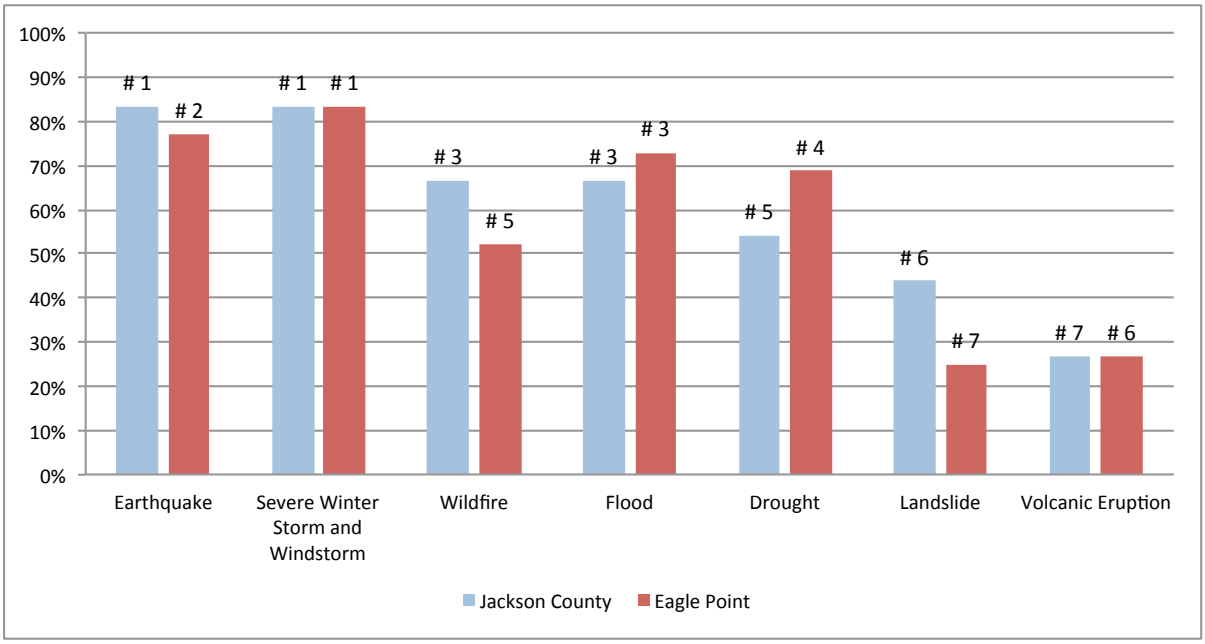
The City of Eagle Point and Jackson County share identical *vulnerability* ratings for five of the seven identified hazards (flood, landslide, volcanic eruption, wildfire and severe winter storm and windstorm).

Compared to Jackson County, the hazard analysis for the city identifies higher *vulnerability* to drought, primarily since it is allocated water from the Medford Water Commission and does not have its own reserves for time of drought.

Compared to Jackson County, the hazard analysis for the city identifies lower *vulnerability* to earthquakes, primarily because the city does not have as many tall buildings susceptible to earthquake and because there is less critical infrastructure at risk.

Figure 2.5 presents a summary of the hazard analysis for the city and compares the results to the assessment completed by the Jackson County NHMP Steering Committee.

Figure 2.5 Overall Hazard Analysis Comparison – Eagle Point and Jackson County



Source: City of Eagle Point NHMP Steering Committee, May 29, 2012 and Jackson County NHMP Steering Committee, Updated April 25, 2012.

In terms of history, probability, vulnerability, and maximum threat, the hazard analysis for the city overall rated the drought and flood hazards higher than the county.

Neither the city, nor the county rated any hazard with the highest score possible (240 points); the city and the county ranked earthquake and severe winter storm and windstorm among the highest. Notably, the city also rated drought and flood among the highest scores.

The city rated landslide and wildfire hazards below the county.

City of Rogue River Risk Assessment

The City of Rogue River completed a local hazard analysis on May 30th, 2012 to compare the city's risk for each identified hazard to that of Jackson County. The city addressed the seven hazards identified by the county: drought, earthquake, flood, landslide, severe winter storm and windstorm, volcanic event and wildfire. Scores were based off of past historical events, the probability or likelihood of a particular hazard event occurring, vulnerability to population, and the maximum threat or worst-case scenario.

Table 2.11 categorizes the probability and vulnerability scores from the hazard analysis for the city and compares the results to the assessment completed by the Jackson County NHMP Steering Committee (areas of differences are noted with **bold** text within the city ratings).

Table 2.11 Probability and Vulnerability Comparison – Rogue River and Jackson County

	Rogue River		Jackson County	
Hazard	Probability	Vulnerability	Probability	Vulnerability
Drought	Medium	Medium	Medium	Medium
Earthquake	Medium	**Medium**	Medium	High
Flood	High	Medium	High	Medium
Landslide	**Low**	Low	High	Low
Severe Winter Storm and Windstorm	High	**Medium**	High	High
Volcanic Eruption	Low	Low	Low	Low
Wildfire	High	Medium	High	Medium

Source: City of Rogue River NHMP Steering Committee, May 30, 2012 and Jackson County NHMP Steering Committee, Updated April 25, 2012.

Hazard Probability

The City of Rogue River and Jackson County share identical *probability* ratings for six of the seven identified hazards (drought, earthquake, flood, volcanic eruption, wildfire and severe winter storm and windstorm).

Based on historical events the city rates flood, wildfire and severe winter storm and windstorm with a high probability of occurring within a ten to thirty-five year period. These hazards have a history of occurring in the community at a similar frequency as they occur within the county.

The city has a lower probability, *low,* for the landslide hazard because it does not have as much land with steep slopes as the county does as a whole.

Community Vulnerability

The City of Rogue River and Jackson County share identical *vulnerability* ratings for five of the seven identified hazards (drought, flood, landslide, volcanic eruption and wildfire).

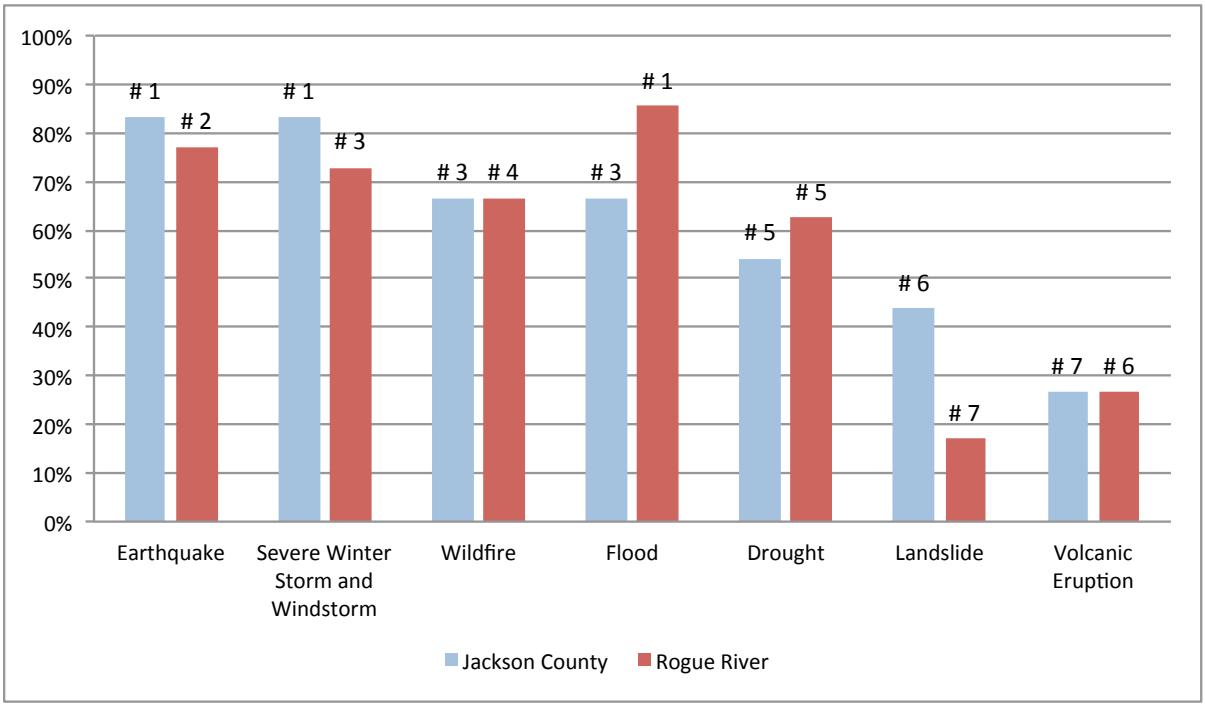
Compared to Jackson County, the hazard analysis for the city identifies lower *vulnerability* to earthquake, primarily since the community has fewer buildings and infrastructure at risk than the county as a whole. The city also is considered to be less vulnerable to severe winter storm and windstorm.

The identified community vulnerabilities include:

- High percentage of population greater than 64 (30%)
- Structures (fire, police, morrow heights assisted care facility)
- Wells/ pump station (vulnerable to flood/ earthquake/drought)
- Rogue River Fire District (3rd street – defensible, NW section of UGB – not in city)

Figure 2.6 presents a summary of the hazard analysis for the city and compares the results to the assessment completed by the Jackson County NHMP Steering Committee.

Figure 2.6 Overall Hazard Analysis Comparison – Rogue River and Jackson County



Source: City of Rogue River NHMP Steering Committee, May 30, 2012 and Jackson County NHMP Steering Committee, Updated April 25, 2012.

In terms of history, probability, vulnerability, and maximum threat, the hazard analysis for the city overall rated the drought and flood hazards higher than the county.

Neither the city, nor the county rated any hazard with the highest score possible (240 points); the city and the county ranked earthquake and severe winter storm and windstorm among the highest. Notably, the city rated flood highest.

The city rated landslide and severe winter storms and windstorm hazards below, but near, the county level. Most landslide hazards are outside of the city limits.

City of Shady Cove Risk Assessment

The City of Shady Cove completed a local hazard analysis on May 29th, 2012 to compare the city's risk for each identified hazard to that of Jackson County. The city addressed the seven hazards identified by the county: drought, earthquake, flood, landslide, severe winter storm and windstorm, volcanic event and wildfire. Scores were based off of past historical events, the probability or likelihood of a particular hazard event occurring, vulnerability to population, and the maximum threat or worst-case scenario.

Table 2.12 categorizes the probability and vulnerability scores from the hazard analysis for the city and compares the results to the assessment completed by the Jackson County NHMP Steering Committee (areas of differences are noted with **bold** text within the city ratings).

Table 2.12 Probability and Vulnerability Comparison – Shady Cove and Jackson County

	Shady Cove		Jackson County	
Hazard	Probability	Vulnerability	Probability	Vulnerability
Drought	**High**	**High**	Medium	Medium
Earthquake	Medium	High	Medium	High
Flood	High	Medium	High	Medium
Landslide	**Low**	**Medium**	High	Low
Severe Winter Storm and Windstorm	High	High	High	High
Volcanic Eruption	Low	Low	Low	Low
Wildfire	High	**High**	High	Medium

Source: City of Shady Cove NHMP Steering Committee, May 29, 2012 and Jackson County NHMP Steering Committee, Updated April 25, 2012.

Hazard Probability

The City of Shady Cove and Jackson County share identical *probability* ratings for five of the seven identified hazards (earthquake, flood, volcanic eruption, wildfire and severe winter storm and windstorm).

Based on historical events the city rates drought, flood, wildfire and severe winter storm and windstorm with a high probability of occurring within a ten to thirty-five year period. All but the drought hazard, which is rated more probable in the city, have a history of occurring in the community at a similar frequency as they occur within the county. Drought is considered more probable in the city since the community relies upon wells, which are more affected by periods of dry weather.

The city has a lower probability, *low,* for the landslide hazard because the community does not have a history of landslide.

Community Vulnerability

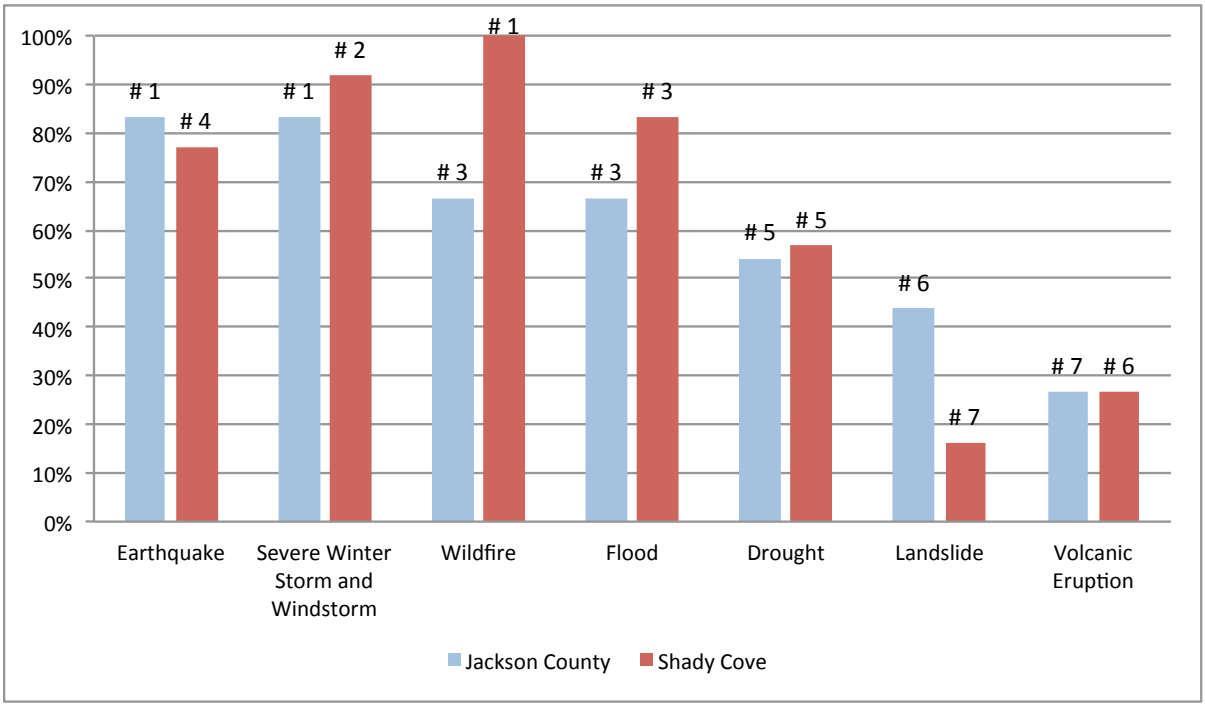
The City of Shady Cove and Jackson County share identical *vulnerability* ratings for four of the seven identified hazards (earthquake, flood, volcanic eruption and severe winter storm and windstorm).

Compared to Jackson County, the hazard analysis for the city identifies higher *vulnerability* to drought, primarily since it is reliant upon wells for drinking water and wildfire, which occur regularly and affect the local economy. The city also identifies a vulnerability rating of medium for landslide, since it is constrained by steep sloped geography that could affect the community if a landslide were to occur.

The city did not rate any hazards lower than the county.

Figure 2.7 presents a summary of the hazard analysis for the city and compares the results to the assessment completed by the Jackson County NHMP Steering Committee.

Figure 2.7 Overall Hazard Analysis Comparison – Shady Cove and Jackson County



Source: City of Shady Cove NHMP Steering Committee, May 29, 2012 and Jackson County NHMP Steering Committee, Updated April 25, 2012.

In terms of history, probability, vulnerability, and maximum threat, the hazard analysis for the city overall rated the drought, flood, severe winter storm and windstorm and wildfire hazards higher than the county.

The county did not rate any hazard with the highest score possible (240 points); however, the city rated wildfire with the highest score possible. In addition, the city ranked flood and severe winter storm and windstorm among the highest.

Section 3:
Mission, Goals and Action Items

Section III outlines Jackson County's strategy to reduce or avoid long-term vulnerabilities to the identified hazards. Specifically, this section presents a mission and specific goals and actions thereby addressing the mitigation strategy requirements contained in 44 CFR 201.6(c). The Natural Hazard Mitigation Plan steering committee reviewed and updated the mission, goals and action items documented in this plan. Additional planning process documentation is in Appendix B.

Mitigation Plan Mission

The plan mission states the purpose and defines the primary functions of Jackson County's Natural Hazard Mitigation Plan. It is intended to be adaptable to any future changes made to the plan and need not change unless the community's environment or priorities change.

Jackson County developed the following mission statement for the Natural hazards Mitigation Plan:

Protect life, property and the environment, reduce risk and prevent loss from natural hazard events through coordination and cooperation among public and private partners.

The 2012 plan update steering committee reviewed the 2006 plan and agreed that the above statement best describes the over purpose and intent of this plan; however, the opted to place primary importance on the protection of life, property and the environment, as such they moved that language to the front of the mission statement as shown above.

Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Jackson County citizens, and public and private partners can take while working to reduce the county's risk from natural hazards. These statements of direction form a bridge between the broad mission statement and particular action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

Public participation was a key aspect in developing the 2006 plan goals. Meetings with the project steering committee, stakeholder interviews and public workshops all served as methods to obtain input and priorities in developing goals for reducing risk and preventing loss for natural hazards in Jackson County.

In 2012, the Jackson County NHMP Steering Committee reviewed the community Goal Prioritization and opted to re-prioritize to reflect existing circumstances. Below is a list of the re-confirmed plan goals and goal statements, listed in order of community prioritization. All the plan goals are important. Establishing community priorities neither negates nor eliminates any goals, but it determines which action items to fund first, should funding become available. During the steering committee meetings for the participating cities (Ashland, Eagle Point, Rogue

River and Shady Cove) the Jackson County NHMP mission statement and goal statements were reviewed and agreed upon by each community.

Goal 1: Emergency Services

Goal Statement: Minimize life safety issues by promoting, strengthening and coordinating emergency response plans.

Goal 2: Education and Outreach

Goal Statement: Further the public's awareness and understanding of natural hazards and potential risk, including economic vulnerability and mitigation efforts.

Goal 3: Prevention

Goal Statement: 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: Property Protection

Goal Statement: 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.

Goal 5: Partnership and Coordination

Goal Statements:

- 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; and
- Seek funding and resource partnerships for future mitigation efforts.

Goal 6: Natural Resource Protection

Goal Statement: Preserve and rehabilitate natural systems to serve natural hazard mitigation functions (i.e., floodplains, wetlands, watershed and urban interface areas).

Goal 7: Structural Projects

Goal Statement: When applicable, utilize structural mitigation activities to minimize risks associated with natural hazards.

Existing Mitigation Activities

Existing mitigation activities include current mitigation programs and activities that are being implemented by the county in an effort to reduce the community's overall risk to natural hazards. Documenting these efforts can assist the jurisdiction to better understand risk and can assist in documenting successes. For a comprehensive list of existing mitigation activities for each specific hazard, reference Volume II: Hazard Annexes.

Government Structure

Beyond Emergency Management, most departments within the county and city governance structures have some degree of responsibility in building overall community resilience. Each plays a role in ensuring that jurisdiction functions and normal operations resume after an incident, and the needs of the population are met. For further explanation regarding how these departments influence hazard resilience, reference Appendix D: Community Profile.

Existing Plan & Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. 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. Plans and policies already in existence have support from local residents, businesses and policy makers.[1] A list documenting plans and policies already in place in the county and participating cities can be found in Appendix D: Community Profile.

Community Organizations and Programs

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. The county and cities can use existing social systems as resources for implementing such communication-related activities because these service providers already work directly with the public on a number of issues, one of which could be natural hazard preparedness and mitigation. Appendix D, Community Profile, provides a comprehensive list of community organizations and programs, and offers a more thorough explanation of how existing community organizations and programs can be utilized for hazard mitigation.

Current Mitigation Plan Action Items

Short- and long-term action items identified through the planning process are an important part of the mitigation plan. Action items are detailed recommendations for activities that local departments, citizens and others could engage in to reduce risk. They address both multi-hazard (MH) and hazard-specific issues. Action items can be developed through a number of sources. The figure below illustrates some of these sources. A description of how the plan's mitigation actions were developed is provided below.

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

Figure 3.1 Action Item Sources

Source: Partnership for Disaster Resilience, 2006

Each action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. The action item worksheets can assist the community in pre-packaging potential projects for grant funding. The worksheet components are described below. These action item worksheets are located in Appendix A.

Rationale or Key Issues Addressed

Action items should be fact-based and tied directly to issues or needs identified throughout the planning process. Action items can be developed at any time during the planning process and can come from a number of sources, including participants in the planning process, noted deficiencies in local capability, or issues identified through the risk assessment. The rationale for proposed action items is based on the information documented in Section 2 and the Hazard Annexes.

Ideas for Implementation:

The ideas for implementation offer a transition from theory to practice and serve as a starting point for this plan. This component of the action item is dynamic, since some ideas may prove to not be feasible, and new ideas may be added during the plan maintenance process. Ideas for implementation include such things as collaboration with relevant organizations, grant programs, tax incentives, human resources, education and outreach, research, and physical manipulation of buildings and infrastructure.

Implementation through Existing Programs

The Jackson County Natural Hazard Mitigation Plan includes a range of action items that, when implemented, will reduce loss from hazard events in the County. Within the plan, FEMA requires the identification of existing programs that might be used to implement these action items. Jackson County and the cities of Ashland, Eagle Point, Rogue River and Shady Cove currently address statewide planning goals and legislative requirements through their comprehensive land use plans, capital improvements plans, mandated standards and building codes. To the extent possible, the jurisdictions will work to incorporate the recommended mitigation action items into existing programs and procedures.

Many of the Jackson County Natural Hazard Mitigation Plan's recommendations are consistent with the goals and objectives of the existing plans and policies. Where possible, Jackson County and the participating cities will implement the multi-jurisdictional Natural Hazard Mitigation Plan's recommended actions through existing plans and policies. Plans and policies already in existence have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.[2] Implementing the Natural Hazard Mitigation Plan's action items through such plans and policies increases their likelihood of being supported and implemented.

Coordinating Organization:

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

Internal and External Partners:

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

Internal partner organizations are departments within the county or other participating jurisdiction 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.

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

Timeline:

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

Table 3.1 Jackson County Action Items

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Multi-Hazard #1	Sustain a public awareness campaign about natural hazards.	County Emergency Management, City Emergency Management Agencies	ARC, CERT, RVCOG, SOU, SOREDI, Emergency Response Agencies, Utilities and Telecommunications Companies, Media, FEMA, OEM, County Road, County Public Works	Ongoing		X	X	X	X		
Multi-Hazard #2	Sustain an education and outreach program for local jurisdictions and assist them in developing emergency operations, public information and hazard mitigation plans.	County Emergency Management	City Emergency Management Agencies, MCI Committee, ARC, Emergency Response Agencies, RVCOG, OEM, FEMA	Ongoing		X	X		X		
Multi-Hazard #3	Maintain a GIS inventory of all critical facilities, large employers/public assembly areas and lifelines, and use GIS to evaluate their vulnerability by comparing them with hazard-prone areas.	County GIS	County and City Emergency Management Agencies, County Roads, ODOT, City Public Works, Utility and Telecommunications Companies, Emergency Response Agencies, RVCOG, SOU, ODF, BLM, USFS	Ongoing	X	X	X				
Multi-Hazard #4	Promote natural hazards safety education.	County and City Emergency Management Agencies	School Districts, Facility Safety Personnel, CERT, Search and Rescue, Emergency Response Agencies, ARC, Association of Safety Enginners, REAL Coprs, Utility and Telecommunications Companies, Media, RVCOG, SOU, LEPC, OEM, FEMA	Ongoing		X			X		
Multi-Hazard #5	Establish partnerships to coordinate and collect geo-science and technical information for identifying potential areas of risk.	County GIS, RVCOG	County and City Emergency Management Agencies, SOU, ODF, BLM, USFS, USGS, DOGAMI, Emergency Response , Lomakatsi, The Nature Conservancy, Agencies, OEM, FEMA	Ongoing		X			X		
Multi-Hazard #6	Maintain a system to support populations with special needs (e.g., elderly and disabled persons) during a disaster.	County Emergency Management	RVCOG Senior and Disabled Services, City Emergency Management Agencies, County GIS, Rivernet and the COAD, ARC, Emergency Response Agencies	Ongoing	X	X			X		
Multi-Hazard #7	Explore funding sources and grant opportunities for community-wide natural hazard mitigation activities.	Mitigation Plan Steering Committee	County Administrative Office, SOREDI, OEM, FEMA, IISOI	Ongoing		X	X				
Multi-Hazard #8	Establish post-development inspection procedures for safety requirements (i.e. flood, earthquake, fire safety).	County Building	County Planning, FEMA	Long Term			X				
Multi-Hazard #9	Use hazard information as a basis for county ordinances and regulations that govern site-specific land use decisions	County Planning	County GIS, FEMA, DLCD	Long Term		X	X				
Multi-Hazard #10	Investigate the need for an emergency disaster fund.	County Emergency Management	SOREDI, RVCOG, City Councils, City Emergency Management Agencies	Long Term			X		X		
Multi-Hazard #11	Improve planning, notification and training for volunteers	County Emergency Management	Rivernet, COSAR, MRC, City Emergency Management Agencies, CERT, ARC, ARES, Search and Rescue, Ashland Fire Department	Ongoing	X	x			X		
Multi-Hazard #12	Promote hazard resistant utility and telecommunication construction and maintenance methods.	RVCOG	County and City Emergency Management Agencies, ARES	Long Term		X	X				

Source: Jackson County NHMP Steering Committee, updated 2012.

Table 3.1 Jackson County Action Items (continued)

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Multi-Hazard #13	Develop a system for data collection for non-declared natural hazard events.	County and City Emergency Management Agencies	IISOI, County Building, County GIS, Farm Services, Insurance Companies	Long Term	X	X			X		
Multi-Hazard #14	Improve coordination and evaluate technical and engineering limitations for catastrophic event response, and develop a long-term recovery plan for Jackson County from the effects of catastrophic hazards.	County Emergency Management	SOU, USGS, DOGAMI, Klamath County Emergency Management, Regional Search and Rescue, Army National Guard, ARC, hospitals	Long Term	X				X		
Multi-Hazard #15	Promote the use of natural hazard loss estimation program (HAZUS) at the local level by providing for the training to use the computer model.	County GIS, DOGAMI	Utility and Telecommunications Companies, County and City Emergency Management, OEM, FEMA	Long Term		X	X		X		
Drought #1	Support Local Agencies Training on Water Conservation Measures and Drought Management Practices	Jackson Soil and Water Conservation District	County Agencies, Medford Water Commission, OSU Extension Service, Fruit Growers, Water Districts	Long Term		X			X	X	
Drought #2	Ensure Long-range Water Resources Development	Jackson County Watermaster	GIS, Public Works, BOC, SWCD	Long Term				X	X	X	
Earthquake #1	Promote building safety through nonstructural improvements.	County and City Emergency Management Agencies	County Building Officials, County Emergency Response Agencies, Builder's Association, IISOI, Red Cross, OSSPAC, OIT, DOGAMI	Ongoing		X	X	X			
Earthquake #2	Encourage purchase of earthquake hazard insurance	IISOI through local insurance companies	Mortgage Companies	Ongoing		X		X			
Earthquake #3	Maintain an inventory of all permitted dams in Jackson County	County and City Emergency Management Agencies, Water Master	Watershed Councils, USACE, BOR, WRD	Ongoing		X	X				X
Earthquake #4	Compile Relative Earthquake Hazard Maps for Jackson County	DOGAMI, County GIS	County Planning, County Emergency Management, USGS, BLM, SOU	Long Term		X	X		X		
Earthquake #5	Develop public/ private partnerships - with building contractors, architects, - to pursue retrofitting projects.	SOREDI	County Roads, Builder's Association, IISOI	Long Term		X			X		
Flood #1	Continue to coordinate with appropriate agencies, and maintain an inventory of all aggregate operations adjacent to or within the floodplain to ensure operations protect streams.	County Planning, County Engineering (Code Compliance)	County GIS, Watershed Councils, DOGAMI, DEQ, ODFW, USACE, DSL	Ongoing			X		X	X	
Flood #2	Maintain an inventory of all permitted dams in Jackson County	County and City Emergency Management Agencies, Water Master	Watershed Councils, USACE, BOR, WRD	Ongoing		X	X				X
Flood #3	Conduct workshops for target audiences on National Flood Insurance Programs, mitigation activities, and potential assistance from FEMA's Flood Mitigation Assistance and Hazard Mitigation Grant Programs.	County and City Planning, County and City Emergency Management Agencies	Watershed Councils, DLCD, OEM, FEMA	Ongoing		X	X	X	X		
Flood #4	Update the Flood Insurance Rate (FIRM) Maps for Jackson County as funding becomes available.	FEMA, DLCD	County Planning, City Planning, DOGAMI, County GIS	Ongoing			X	X	X		

Source: Jackson County NHMP Steering Committee, updated 2012.

Table 3.1 Jackson County Action Items (continued)

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Flood #5	Encourage private property owners to restore natural systems within the floodplain, and to manage riparian areas and wetlands for flood abatement.	RVCOG, County Emergency Management	County Parks and Planning, FEMA, Watershed Councils, DLCD, Cities, USACE, DSL	Long Term				X		X	
Flood #6	Use federal grant funds to acquire or elevate individual properties adjacent to/ within 100-year floodplain as opportunities arise.	County Emergency Management	FEMA, County Planning, County Administrator's Office, OEM, DLCD, OECDD	Ongoing			X	X		X	
Flood #7	Continue to increase Jackson County's CRS (Community Rating System) rating over time through activities outlined by FEMA.	County and City Emergency Management Agencies, County and City Planning	Watershed Councils, OEM, DLCD, OECDD, USACE, FEMA,	Ongoing			X	X	X		
Flood #8	Preserve water quality by using storm water best management practices	County Roads, RVCOG, DEQ, County and City Planning	Watershed Councils, WRD, USACE, Irrigation Districts, State Parks, Rogue Valley Sewer Services	Ongoing						X	
Landslide #1	Compile Relative Landslide Risk maps for Jackson County.	DOGAMI, County GIS	County Planning, County Emergency Management, ODF, SOU	Ongoing		X	X		X		
Landslide #2	Increase public education related to landslide hazards by distributing landslide informational brochures.	County Emergency Management	County Planning, City Emergency Managers, DOGAMI, OEM, ODF, DLCD	Ongoing		X			X		
Landslide #3	Investigate the development and implementation of a county landslide ordinance.	County Planning	County Emergency Management, County GIS, DOGAMI, ODF, County Roads, DLCD	Long Term			X				
Volcanic Eruption #1	Increase awareness of volcanic eruption threats for county residents.	County and City Emergency Management Agencies, USGS-CVO	DOGAMI, SOU, National Park Service (Crater Lake)	Long Term		X			X		
Volcanic Eruption #2	Create and map hypothetical eruption scenarios to display potential eruption hazards.	SOU, USGS-CVO	County GIS, DOGAMI	Long Term		X					
Volcanic Eruption #3	Collaborate with county environmental health to provide immediate warning to communities about air quality hazards following volcanic eruptions.	County Environmental Health, DEQ	County and City Emergency Management Agencies, Media	Long Term	X				X		
Wildfire #1	Coordinate fire mitigation action items through the Jackson County Integrated Fire Plan	Jackson County Emergency Management	Fire and Rescue Districts (full list provided within JaCIFP), State Office of Emergency Management, Oregon Department of Forestry	Ongoing		X	X	X	X	X	
Severe Winter Storm/ Windstorm #1	Map areas where extreme weather, such as road icing or wind damage occurs.	County Roads	County Planning, NWS, ODOT, NOAA, County GIS	Short Term		X			X		
Severe Winter Storm/ Windstorm #2	Promote the benefits of tree-trimming and tree replacement programs and help to coordinate local efforts by public and private agencies.	County Roads, Vegetation Management	Utility and Telecommunications Companies, ODOT, City Public Works, USFS, BLM	Ongoing		X	X		X		

Source: Jackson County NHMP Steering Committee, updated 2012.

Table 3.2 City of Ashland Action Items

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Multi-Hazard #1	Public Access to Emergency Preparedness Training and 72-hour kits	Ashland Fire and Rescue	American Red Cross, Local Retailers	Short Term		X	X				
Multi-Hazard #2	Building Inspector Certification Program	Ashland Community Development	Ashland Fire and Rescue	Short Term	X			X			
Multi-Hazard #3	CERT Training and Equipment	Ashland Fire and Rescue	City of Ashland, Chamber of Commerce, Ashland School District, Southern Oregon University	Ongoing	X	X					
Multi-Hazard #4	Mass Notification System Funding	Ashland Fire and Rescue	Jackson County Emergency Management	Ongoing	X						
Multi-Hazard #5	Community Education Plan	Ashland Fire and Rescue	City of Ashland, Ashland School District, Southern Oregon University, Chamber of Commerce, Oregon Shakespeare Festival, American Red Cross, Jackson County OEM	Long Term	X	X	X	X	X		
Multi-Hazard #6	Emergency Management Exercises	Ashland Fire and Rescue	City of Ashland, Chamber of Commerce, Ashland School District, Southern Oregon University, Ashland Community Hospital	Ongoing	X	X		X			
Multi-Hazard #7	Emergency Generators for City's Critical Infrastructure	Ashland Fire and Rescue	Ashland School District, Southern Oregon University	Long Term				X			X
Multi-Hazard #8	Emergency Provisions for Responders and Schools	Ashland Fire and Rescue	Ashland School District	Short Term	X				X		
Multi-Hazard #9	Evaluate Ashland's Land Use Policies in High Risk Areas	Ashland Community Development	Ashland Fire and Rescue	Long Term	X		X	X			
Multi-Hazard #10	Enhanced Audio Alert System for Southern Oregon University	Southern Oregon University	Jackson County Emergency Management	Short Term	X						
Drought #1	*No Action Item Developed*										
Earthquake #1	Emergency Operations Center Upgrades	Ashland Fire and Rescue	Ashland Police Department	Short Term	X			X	X		
Earthquake #2	Seismic Natural Gas shut-off Valves for the City's Critical Infrastructure	Ashland Fire and Rescue	AVISTA	Long Term	X		X	X			
Earthquake #3	Non-structural seismic upgrades for the City's Critical Infrastructure	Ashland Fire and Rescue	City of Ashland, Chamber of Commerce, Ashland School District, Southern Oregon University, Ashland Community Hospital, Oregon Shakespeare Festival	Long Term	X	X		X			
Earthquake #4	Seismic Retrofit for Critical Infrastructure	Ashland Fire and Rescue	City of Ashland, Chamber of Commerce, Ashland School District, Southern Oregon University, Oregon Shakespeare Festival	Long Term				X			X
Earthquake #5	Seismic Risk Assessment	Ashland Fire and Rescue	City of Ashland, Chamber of Commerce, Ashland School District, Southern Oregon University, Oregon Shakespeare Festival	Short Term			X	X			X
Flood #1	Flood Hazard Awareness Campaign	Ashland Fire & Rescue	Ashland Community Development, Jackson County Emergency Management	Short Term	X	X		X			
Landslide #1	Water Treatment Plant Relocation	Ashland Public Works	Ashland Community Development	Ongoing			X	X			X
Volcanic Eruption #1	No Action Item Developed										
Wildfire #1	Ashland Forest Resiliency Project	Ashland Fire and Rescue	The Nature Conservancy, USFS, Lomakatsi Restoration Project	Long Term	X		X	X		X	
Wildfire #2	Ashland Firewise Communities	Ashland Fire and Rescue	HOAs, Oregon Department of Forestry	Ongoing		X	X	X	X		
Severe Winter Storm/ Windstorm #1	*No Action Item Developed*										

Source: City of Ashland NHMP Steering Committee, 2012.

Table 3.3 City of Eagle Point Action Items

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Multi-Hazard #1	Maintain public information programs to inform the public about the mitigation of all natural hazards	City Administrator	Public Works, Planning, JCFD#3, Jackson County DEM, Red Cross, Humane Society, Shelters, School District	Short Term	X	X	X	X	X		
Multi-Hazard #2	Integrate the goals and action items from the Natural Hazards Mitigation Plan into existing regulatory documents and programs where appropriate	Planning	Public Works, Building Codes Division	Short Term	X	X	X	X	X		
Drought #1	Develop a drought preparedness and response plan to include a city ordinance restricting water	Public Works	Planning, Administration, Legal Counsel, Water Districts, Irrigation and Watershed Councils, Medford Water Commission	Short Term	X	X	X	X	X		
Earthquake #1	Promote non-structural mitigation for buildings to prevent damage from earthquakes	City Administrator	Code Enforcement, Public Works, Planning, Building, Jackson County DEM	Short Term	X			X			
Earthquake #2	Promote earthquake insurance	City Administrator	City Hall, insurance companies, FEMA, mortgage companies	Short Term	X	X		X			
Earthquake #3	Promote and coordinate earthquake hazard risk mapping for Jackson County and cities	Planning	Public Works, Building, Administration, DOGAMI, Jackson County	Short Term	X	X		X	X		
Earthquake #4	Promote structural mitigation to prevent structural damage to city buildings in effort to provide business continuity	Building	Planning, Public Works, Administration, DOGAMI, Jackson County	Short Term	X		X	X			X
Flood #1	Inform the public about the National Flood Insurance Program and ensure compliance through enforcement of local floodplain management ordinances.	Planning	Public Works, Code Enforcement, Building, Jackson County; FEMA; NFIP; CRS/ISO; DLCD	Ongoing		X	X	X	X	X	
Flood #2	Continue to implement and enhance the public flood protection and education program.	Planning	Public Works, Code Enforcement, County GIS, Jackson County; FEMA; NFIP; CRS/ISO; DLCD	Ongoing	X	X	X	X	X	X	
Flood #3	Encourage participation in the NFIP's Community Rating System (CRS)	Planning	Public Works, Code Enforcement, County GIS, Jackson County; FEMA; NFIP; CRS/ISO; DLCD	Ongoing		X	X	X	X	X	
Flood #4	Promote and enhance the use of natural flood prone open space or wetlands as flood storage areas.	Planning	Public Works, Building, Code Enforcement, Jackson County, DEQ	Short Term		X	X	X	X	X	
Flood #5	Protect City facilities in flood prone areas.	Public Works	Planning, County GIS, Jackson County, DLCD	Short Term	X		X	X			X
Flood #6	Stormwater Management	Public Works	Planning, Jackson County; DEQ; Rogue Valley Sewer Services	Short Term		X	X	X		X	
Landslide #1	*No Action Item Developed*										
Volcanic Eruption #1	*No Action Item Developed*										

Source: City of Eagle Point NHMP Steering Committee, 2012.

Table 3.3 City of Eagle Point Action Items (continued)

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Wildfire #1	Promote public awareness campaigns for individual property owners living in fire prone areas	Public Works	Planning, Administration, Code Enforcement, Police Department, Jackson County, JCFD#3, Office of State Fire Marshal	Short Term	X	X	X		X	X	
Wildfire #2	Partner with Jackson County on Implementation of Community Wildfire Protection Plan and outreach projects	Planning	Public Works, Administration, Jackson County, JCFD#3, Bureau of Land Management - Medford District, Oregon Department of Forestry, Office of State Fire Marshall	Short Term	X	X	X		X	X	
Wildfire #3	Reduce wildfire fuels/Investigate "Firewise Community" Program	Planning	Administration, Public Works, Jackson County, JCFD#3, Office of State Fire Marshall, Oregon Department of Forestry	Short Term	X	X	X		X	X	
Severe Winter Storm/ Windstorm #1	Encourage new developments with above ground utilities to underground utilities	Public Works	Planning, Utility companies, developers	Short Term	X		X	X	X		X
Severe Winter Storm/ Windstorm #2	Dangerous Tree Education and Outreach and Disaster Resilient Economy	Public Works	Planning, Utility companies, local Arborists, landscaping services and tree services	Short Term	X	X	X	X	X	X	
Severe Winter Storm/ Windstorm #3	Winter Storm Education and Outreach	Planning	Public Works, Utility companies, FEMA, Jackson County DEM	Short Term	X	X	X	X	X		

Source: City of Eagle Point NHMP Steering Committee, 2012.

Table 3.4 City of Rogue River Action Items

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Multi-Hazard #1	Maintain public education programs to inform the public about methods of mitigating the impacts of natural hazards	City Administration	City Public Works, Rogue River Fire District, Jackson County Fire; Jackson County; Community Organizations	Ongoing	X	X	X	X	X		
Multi-Hazard #2	Integrate the goals and action items from the Natural Hazards Mitigation Plan into existing regulatory documents and programs, where appropriate.	City Planning	City Administration, City Public Works, Building Codes Division	Ongoing	X	X	X	X	X	X	
Drought #1	*No Action Item Developed*										
Earthquake #1	Promote non-structural mitigation to prevent damage from earthquake	Administration	City Public Works, City Building, Rogue River Fire District, Main Building	Ongoing	X	X	X	X			
Earthquake #2	Promte earthquake insurance	Administration	City Building, Rogue River Fire District, Insurance companies, FEMA, Mortgage companies	Short Term	X	X	X	X			
Earthquake #3	Promote and coordinate Earthquake Hazard Risk Map for Jackson County and cities	City Planning	City Administration, City Public Works, DOGAMI, Jackson County	Long Term	X		X	X	X		
Flood #1	Continue to implement and enhance the public folld protection and education program.	City Public Works	City GIS Coordinator, City Planning, Jackson County, FEMA, NFIP; CRS/ ISO	Ongoing	X	X	X	X	X	X	
Flood #2	Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.	City Planning	City Public Works, Jackson County, FEMA, NFIP; CRS/ ISO; DLCD	Ongoing	X	X	X	X	X	X	
Flood #3	Continue participation in the NFIP's Community Rating System (CRS)	City Planning	City, Public Works, Jackson County, FEMA, NFIP; CRS/ ISO; DLCD	Ongoing		X	X	X	X	X	
Flood #4	Promote and protect the use of naturally flood prone open space or wetlands as flood storage areas	City Public Works	City Planning, Jackson County, DEQ	Ongoing	X	X	X	X	X	X	
Flood #5	Stormwater management	City Public Works	City Planning, Jackson County; DEQ; Rogue Valley Sewer Services	Long Term		X	X	X		X	
Flood #6	Protect city facilities in flood prone areas	City Public Works	City Planning, City GIS, Jackson County, DLCD	Ongoing	X		X	X			X
Landslide #1	*No Action Item Developed*										
Volcanic Eruption #1	*No Action Item Developed*										
Wildfire #1	Promote public awareness campaigns for individual property owners living in fire prone areas.	City Administration	City Public Works, City Planning, Rogue River Police Department, Jackson County, Rogue River Fire Department	Short Term	X	X	X		X	X	
Wildfire #2	Partner with Jackson County on Implementation of Community Wildfire Protection Plan and outreach projects	City Planning	City Administration, City Public Works, ODF, Jackson County, Rogue River Fire District, Bureau of Land Management - Medford District, Oregon Department of Forestry, Office of State Fire Marshal	Short Term	X	X	X		X	X	
Wildfire #3	Reduce wildfire fuels / investigate "Firewise Community" program	City Planning	City Administration, City Public Works, Jackson County; Rogue River Fire District; Oregon Department of Forestry, Office of State Fire Marshal	Short Term	X	X	X		X	X	

Source: City of Rogue River NHMP Steering Committee, 2012.

Table 3.4 City of Rogue River Action Items (continued)

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Severe Winter Storm/ Windstorm #1	Encourage new developments to include underground power lines.	City Public Works	City Planning, Utility Companies, Developers	Ongoing	X	X	X		X		X
Severe Winter Storm/ Windstorm #2	Education and outreach Disaster Resilient Economy	City Administration	City Planning, City Public Works, Utility companies, Churches, schools, Fire, American Red Cross, FEMA	Ongoing		X	X	X	X		

Source: City of Rogue River NHMP Steering Committee, 2012.

Table 3.5 City of Shady Cove Action Items

Action Item	Proposed Action Title	Coordinating Organization(s)	Partner Organization(s)	Timeline	Plan Goals						
					Emergency Services	Education and Outreach	Prevention	Property Protection	Partnership and Coordination	Natural Resource Protection	Structural Projects
Multi-Hazard #1	*No Action Item Developed*										
Drought #1	*No Action Item Developed*										
Earthquake #1	*No Action Item Developed*										
Flood #1	Conduct workshops for target audiences on National Flood Insurance Programs, mitigation activities, and potential assistance from FEMAs Flood Mitigation Assistance and Hazard Mitigation Grant Programs.	Floodplain Management	City Planning, City Emergency Management, Upper Rogue Watershed Council , DLCD, OEM, FEMA	Short Term		X	X	X	X		
Flood #2	Encourage private property owners to restore natural systems within the floodplain, and to manage riparian areas and wetlands for flood abatement.	City Planning	Planning Commission, Floodplain Management, FEMA, County Emergency Management, Upper Rogue Watershed, DEQ, ODFW, DLCD, Rogue Valley Council of Governments (RVCOG), Rogue Fly Fishers, County Parks	Short Term				X		X	
Flood #3	Preserve water quality by using stormwater best management practices (BMP).	City Planning	City Planning, City Public Works, City Floodplain Management, Rogue Valley Sewer Services, Upper Rogue Watershed Council, Rogue Valley Council of Governments (RVCOG)	Long Term			X				
Flood #4	Continue compliance with the Natural Flood Insurance Program (NFIP).	City Floodplain Management	City Planning, FEMA, DLCD	Ongoing	X	X	X	X	X	X	
Landslide #1	*No Action Item Developed*										
Volcanic Eruption #1	*No Action Item Developed*										
Wildfire #1	Promote public awareness campaigns for individual property owners living in the Wildland / Urban Interface (WUI).	City Emergency Management	City Hazard Mitigation Committee, Fire Dist. #4, Firewise Project Coordinator, media, OEM, FEMA, DLCD, State Fire Marshal, ODF, BLM, U.S. Forest Service, insurance and real estate industries, Jackson County Sheriff Department.	Ongoing	X	X	X		X	X	
Wildfire #2	Reduce wildfire fuels / Promote and Enhance "Firewise Community" Program	City Emergency Management	City Hazard Mitigation Committee, Jackson County Fire Dist. #4, Firwise Project coordinator, State Fire Marshal, ODF, BLM, US Forest Service	Ongoing	X	X	X	X	X	X	
Wildfire #3	Distribute public outreach materials informing residents about wildfire hazards and mitigation actions they can take to protect their property.	City Emergency Management	City Hazard Mitigation Committee, Fire Dist. #4, Firewise, ODF, BLM, Forest Service	Short Term		X	X	X			
Severe Winter Storm/ Windstorm #1	Increase public awareness of windstorm mitigation activities.	City Emergency Management	City Public Works, Utilities, FEMA	Ongoing	X	X	X			X	
Severe Winter Storm/ Windstorm #2	Encourage critical facilities to secure emergency power.	City Emergency Management	City Hazard Mitigation Committee, Granting organizations, Upper Rogue Community Center	Ongoing					X		
Severe Winter Storm/ Windstorm #3	Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during severe weather events.	City Emergency Management	City Public Works, Utility providers, local Arborists and tree services,	Short Term	X	X	X		X	X	

Source: City of Shady Cove NHMP Steering Committee, 2012.

Section 4: Plan Implementation and Maintenance

The Plan Implementation and Maintenance section details the formal process that will ensure that the Jackson Natural Hazards Mitigation Plan remains an active and relevant document. The plan implementation and maintenance process includes a schedule for monitoring and evaluating the Plan annually, as well as producing an updated plan every five years. Finally, this section describes how the county will integrate public participation throughout the plan maintenance and implementation process.

Implementing the Plan

The success of the Jackson County Multijurisdictional Natural Hazard Mitigation Action Plan depends on how well the outlined action items are implemented. In an effort to ensure that the activities identified are implemented, the following steps will be taken. The plan will be formally adopted, a coordinating body will be assigned, a convener shall be designated, the identified activities will be prioritized and evaluated, and finally, the plan will be implemented through existing plans, programs, and policies.

Plan Adoption

The Jackson County Natural Hazard Mitigation Plan was developed and will be implemented through a collaborative process. After the Plan is locally reviewed and deemed complete, Jackson County Emergency Management submits it to the State Hazard Mitigation Officer at Oregon Military Department – Office of Emergency Management. OEM submits the plan to the Federal Emergency Management Agency (FEMA--Region X) for review. This review addresses the federal criteria outlined in the FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, the County will adopt the plan via resolution. At that point the County will gain eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and Flood Mitigation Assistance program funds. Following adoption by the county, the participating jurisdictions should convene local decision makers and adopt the Jackson County Multi-jurisdictional NHMP.

Convener

Although the County Administrator will provide ownership of the Jackson County Natural Hazard Mitigation Action Plan, the County's Emergency Manager will take responsibility for plan implementation. The Emergency Manager will facilitate the Hazard Mitigation Steering Committee meetings and will assign tasks such as updating and presenting the plan to the rest of the members of the committee. Plan implementation and evaluation will be a shared responsibility among all of the assigned Hazard Steering Committee Members. The convener's responsibilities include:

- Coordinate steering committee meeting dates, times, locations, agendas, and member notification;

- Documenting the discussions and outcomes of committee meetings;
- Serving as a communication conduit between the steering committee and the public/stakeholders;
- Identifying emergency management-related funding sources for natural hazard mitigation projects; and
- Utilizing the Risk Assessment as a tool for prioritizing proposed natural hazard risk reduction projects.

Coordinating Body

The Jackson County steering committee serves as the coordinating body for the mitigation plan. Coordinating body responsibilities include:

- Attending future plan maintenance and plan update meetings (or designating a representative to serve in your place);
- Serving as the local evaluation committee for funding programs such as the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and Flood Mitigation Assistance program funds;
- Prioritizing and recommending funding for natural hazard risk reduction projects;
- Evaluating and updating the Natural Hazards Mitigation Plan in accordance with the prescribed maintenance schedule;
- Developing and coordinating ad hoc and/or standing subcommittees as needed; and
- Coordinating public involvement activities.

Members

The following organizations were represented and served on the steering committee during the development of the Jackson County Natural Hazard Mitigation Plan:

- City of Ashland Fire and Rescue
- City of Eagle Point Police
- City of Jacksonville Police
- City of Phoenix Police
- City of Rogue River Administration and Planning
- City of Shady Cove Administration and Emergency Management
- City of Talent
- City of Salem Fire Department
- Jackson County Code Enforcement

- Jackson County Integrated Fire Plan
- Jackson County Development Services
- Jackson County Emergency Management
- Jackson County Health and Human Services
- Jackson County Parks
- Jackson County Sherriff's Office
- United Way of Jackson County

To make the coordination and review of the Jackson County Natural Hazard Mitigation Plan as broad and useful as possible, the coordinating body will engage additional stakeholders and other relevant hazard mitigation organizations and agencies to implement the identified action items. Specific organizations have been identified as either internal or external partners on the individual action item forms found in Appendix A.

Implementation through Existing Programs

The Natural Hazards 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. Jackson County, and the participating cities, currently addresses statewide planning goals and legislative requirements through their comprehensive land use plans, capital improvement plans, mandated standards and building codes. To the extent possible, Jackson County, and participating cities, 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 participating cities and county's existing plans and policies. Where possible, Jackson County, and participating cities, should implement the Natural Hazards Mitigation Plan's recommended actions through existing plans and policies. Plans and policies already in existence often 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. Implementing the Natural Hazards Mitigation Plan's action items through such plans and policies increases their likelihood of being supported and implemented.

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

- Community Wildfire Protection Plans
- City and County Budgets
- Economic Development Action Plans
- Comprehensive Land Use Plans

For additional examples of plans, programs or agencies that may be used to implement mitigation activities refer to list of plans in Appendix D.

Plan Maintenance

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

Meetings

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

- Review existing action items to determine appropriateness for funding;
- Educate and train new members on the plan and mitigation in general;
- Identify issues that may not have been identified when the plan was developed; and
- Prioritize potential mitigation projects using the methodology described below.
- Review existing and new risk assessment data;
- Discuss methods for continued public involvement; and
- Document successes and lessons learned during the year.

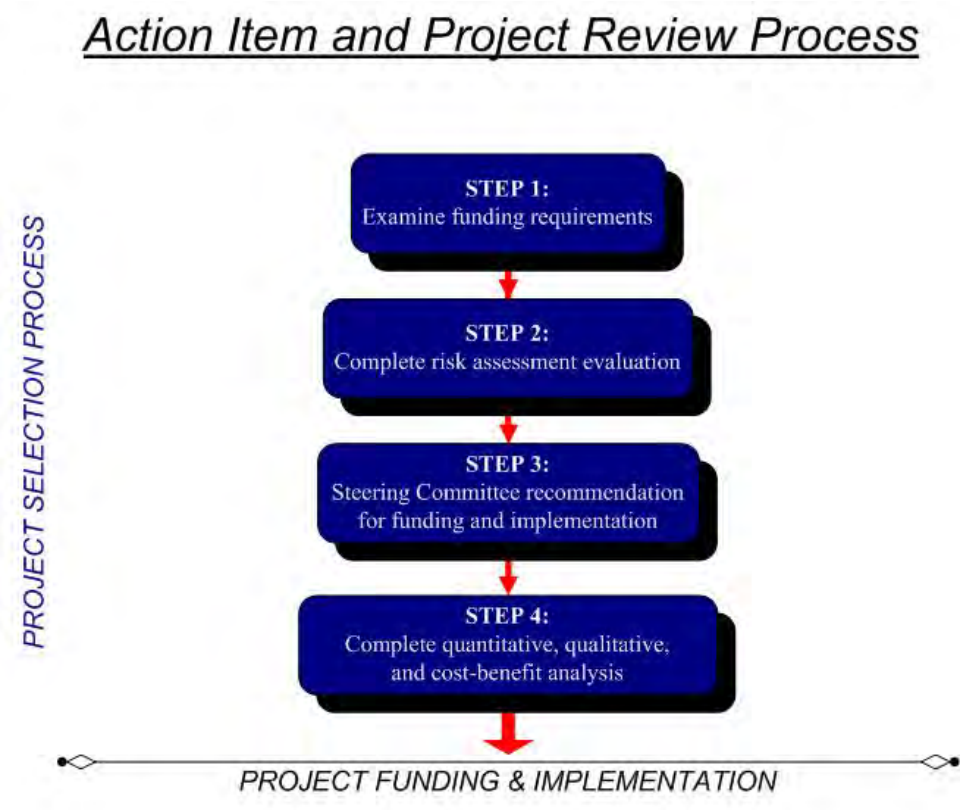
In addition, the convener will hold a concurrent meeting once a year with the city leads for participating jurisdictions. This meeting is an opportunity for the cities to report back to the county on progress that has been made towards their components of the Natural Hazard Mitigation Plan. This meeting will also serve as a means for the Hazard Mitigation Coordinator to provide information regarding potential funding sources for mitigation projects, as well as provide additional support for the cities steering committees.

The convener will be responsible for documenting the outcome of the annual meetings in Appendix B. The process the coordinating body will use to prioritize mitigation projects is detailed in the section below. The plan's format allows the county and participating jurisdictions 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 the participating jurisdictions.

Project Prioritization Process

The Disaster Mitigation Act of 2000 requires that jurisdictions identify a process for prioritizing potential actions. Potential mitigation activities 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. Figure 4.1 illustrates the project development and prioritization process.

Figure 4.1: Project Prioritization Process



Source: Community Service Center's Partnership for Disaster Resilience at the University of Oregon, 2008.

Step 1: Examine funding requirements

The first step in prioritizing the plan's action items is to determine which funding sources are open for application. Several funding sources may be appropriate for the county's proposed mitigation projects. 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, Hazard Mitigation Grant Program (HMGP), National Fire Plan (NFP), Community Development Block Grants (CDBG), local general funds, and private foundations, among others. Please see Appendix C Grant Programs for a more comprehensive list of potential grant programs.

Because grant programs open and close on differing schedules, the coordinating body will examine upcoming funding streams' requirements to determine which mitigation activities would be eligible. The coordinating body may consult with the funding entity, Oregon Military Department – Office of Emergency Management, or other appropriate state or regional organizations about project eligibility requirements. This examination of funding sources and requirements will happen during the coordinating body's semi-annual plan maintenance meetings.

Step 2: Complete risk assessment evaluation

The second step in prioritizing the plan's action items is to examine which hazards the selected actions are associated with and where these hazards rank in terms of community risk. The coordinating body will determine whether or not the plan's risk assessment supports the

implementation of eligible mitigation activities. This determination will be based on the location of the potential activities, their proximity to known hazard areas, and whether community assets are at risk. The coordinating body will additionally consider whether the selected actions mitigate hazards that are likely to occur in the future, or are likely to result in severe / catastrophic damages.

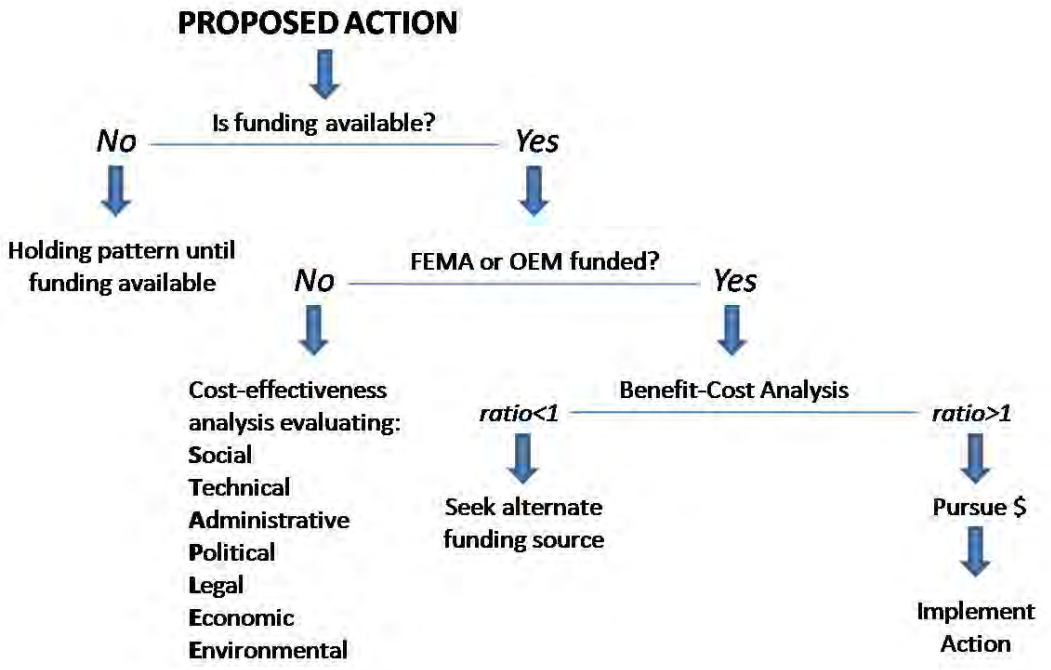
Step 3: Committee Recommendation

Based on the steps above, the coordinating body will recommend which mitigation activities should be moved forward. If the coordinating body decides to move forward with an action, the coordinating organization designated on the action item form will be responsible for taking further action and, if applicable, documenting success upon project completion. The coordinating body will convene a meeting to review the issues surrounding grant applications and to share knowledge and/or resources. This process will afford greater coordination and less competition for limited funds.

Step 4: Complete quantitative and qualitative assessment, and economic analysis

The fourth step is to identify the costs and benefits associated with the selected 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 assists 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 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. Figure 4.2 shows decision criteria for selecting the appropriate method of analysis.

Figure 4.2 Benefit Cost Decision Criteria



Source: Oregon Partnership for Disaster Resilience (2010).

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

For non-federally funded or nonstructural projects, a qualitative assessment will be completed to determine the project's cost effectiveness. The committee will use a multivariable assessment technique called STAPLE/E to prioritize these actions. STAPLE/E stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental. Assessing projects based upon these seven variables can help define a project's qualitative cost effectiveness. The STAPLE/E technique has been tailored for use in natural hazard action item prioritization by the Partnership for Disaster Resilience at the University of Oregon's Community Service Center.

Continued Public Involvement & Participation

The participating jurisdictions are dedicated to involving the public directly in the continual reshaping and updating of the Jackson County multi-jurisdictional Natural Hazard Mitigation Plan. Although members of the Steering Committee represent the public to some extent, the public will also have the opportunity to continue to provide feedback about the Plan.

To ensure that these opportunities will continue, the County and participating jurisdictions will:

- Post copies of their plans on corresponding websites;
- Place articles in the local newspaper directing the public where to view and provide feedback; and

- Use existing newsletters such as schools and utility bills to inform the public where to view and provide feedback; and

In addition to the involvement activities listed above, the county's multi-jurisdictional Natural Hazard Mitigation Plan has been archived and posted on the Partnership website via the University of Oregon Libraries' Scholar's Bank Digital Archive.

Five-Year Review of Plan

This plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. The Jackson County Natural Hazards Mitigation Plan is due to be updated in 2017. The convener will be responsible for organizing the coordinating body to address plan update needs. The coordinating body will be responsible for updating any deficiencies found in the plan, and for ultimately meeting the Disaster Mitigation Act of 2000's plan update requirements.

The following 'toolkit' can assist the convener in determining which plan update activities can be discussed during regularly-scheduled plan maintenance meetings, and which activities require additional meeting time and/or the formation of sub-committees.

Table 4.1: Natural Hazards Mitigation Plan Update Toolkit

Question	Yes	No	Plan Update Action
Is the planning process description still relevant?			Modify this section to include a description of the plan update process. Document how the planning team reviewed and analyzed each section of the plan, and whether each section was revised as part of the update process. (This toolkit will help you do that).
Do you have a public involvement strategy for the plan update process?			Decide how the public will be involved in the plan update process. Allow the public an opportunity to comment on the plan process and prior to plan approval.
Have public involvement activities taken place since the plan was adopted?			Document activities in the "planning process" section of the plan update
Are there new hazards that should be addressed?			Add new hazards to the risk assessment section
Have there been hazard events in the community since the plan was adopted?			Document hazard history in the risk assessment section
Have new studies or previous events identified changes in any hazard's location or extent?			Document changes in location and extent in the risk assessment section
Has vulnerability to any hazard changed?			Document changes in vulnerability in the risk assessment section
Have development patterns changed? Is there more development in hazard prone areas?			Document changes in vulnerability in the risk assessment section
Do future annexations include hazard prone areas?			Document changes in vulnerability in the risk assessment section
Are there new high risk populations?			Document changes in vulnerability in the risk assessment section
Are there completed mitigation actions that have decreased overall vulnerability?			Document changes in vulnerability in the risk assessment section
Did the plan document and/or address National Flood Insurance Program repetitive flood loss properties?			Document any changes to flood loss property status
Did the plan identify the number and type of existing and future buildings, infrastructure, and critical facilities in hazards areas?			1) Update existing data in risk assessment section, or 2) determine whether adequate data exists. If so, add information to plan. If not, describe why this could not be done at the time of the plan update
Did the plan identify data limitations?			If yes, the plan update must address them: either state how deficiencies were overcome or why they couldn't be addressed
Did the plan identify potential dollar losses for vulnerable structures?			1) Update existing data in risk assessment section, or 2) determine whether adequate data exists. If so, add information to plan. If not, describe why this could not be done at the time of the plan update
Are the plan goals still relevant?			Document any updates in the plan goal section
What is the status of each mitigation action?			Document whether each action is completed or pending. For those that remain pending explain why. For completed actions, provide a 'success' story.
Are there new actions that should be added?			Add new actions to the plan. Make sure that the mitigation plan includes actions that reduce the effects of hazards on both new and existing buildings.
Is there an action dealing with continued compliance with the National Flood Insurance Program?			If not, add this action to meet minimum NFIP planning requirements
Are changes to the action item prioritization, implementation, and/or administration processes needed?			Document these changes in the plan implementation and maintenance section
Do you need to make any changes to the plan maintenance schedule?			Document these changes in the plan implementation and maintenance section
Is mitigation being implemented through existing planning mechanisms (such as comprehensive plans, or capital improvement plans)?			If the community has not made progress on process of implementing mitigation into existing mechanisms, further refine the process and document in the plan.

Source: Oregon Partnership for Disaster Resilience (2010).

Drought Hazard Annex

Causes and Characteristics of Drought

A drought is a period of drier than normal conditions that results in water-related problems.[1] Drought occurs in virtually all climatic zones, but its characteristics vary significantly from one region to another.[2] Drought is a temporary condition; it differs from aridity, which is restricted to low rainfall regions and is a permanent feature of climate.[3]

The National Drought Mitigation Center and the National Center for Atmospheric Research define drought by categorizing it according the "type of drought." These types include the following:

Meteorological or Climatological Droughts

Meteorological droughts are defined in terms of the departure from a normal precipitation pattern and the duration of the event. These droughts are a slow-onset phenomenon that can take at least three months to develop and may last for several seasons or years.

Agricultural Droughts

Agricultural droughts link the various characteristics of meteorological drought to agricultural impacts. The focus is on precipitation shortages and soil-water deficits. Agricultural drought is largely the result of a deficit of soil moisture. A plant's demand for water is dependent on prevailing weather conditions, biological characteristics of the specific plant, its stage of growth, and the physical and biological properties of the soil.

Hydrological Droughts

Hydrological droughts refer to deficiencies in surface water and sub-surface water supplies. It is measured as stream flow, and as lake, reservoir, and ground water levels. Hydrological measurements are not the earliest indicators of drought. When precipitation is reduced or deficient over an extended period of time, the shortage will be reflected in declining surface and sub-surface water levels.

Socioeconomic Droughts

Socioeconomic droughts occur when physical water shortage begins to affect people, individually and collectively. Most socioeconomic definitions of drought associate it with supply, demand, and economic good. One could argue that a physical water shortage with no socio-economic impacts is a policy success.

Drought is typically measured in terms of water availability in a defined geographical area. It is common to express drought with a numerical index that ranks severity. The Oregon Drought Severity Index is the most commonly used drought measurement in the state

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1 Moreland, A. 1993. Open File Report 93-642. USGS.
2 National Drought Mitigation Center. 2007. What is Drought? http://www.drought.unl.edu/whatis/what.htm, accessed May 28, 2010.
3 National Drought Mitigation Center. 2006. What is Drought?: Understanding and Defining Drought. http://www.drought.unl.edu/whatis/concept.htm, accessed May 28, 2010.

because it incorporates both local conditions and mountain snow pack. The Oregon Drought Severity Index categorizes droughts as mild, moderate, severe, and extreme.[4]

History of Drought in Jackson County

Although Jackson County is spared from most droughts because of its location east of the ocean and west of the Cascades, it has been affected by droughts in the past. The region experiences dry conditions annually during the summer months from June to September. Periodically, this region experiences more significant drought conditions that affect the region or the state.

Between 1928 and 1941, there was a statewide drought. Low stream flows prevailed in western Oregon during the period from 1976-81, with 1976-77 being the driest year of the century. The 1985-94 drought was not as severe as the 1976-77 drought in any single year, but the cumulative effect of ten consecutive years with mostly dry conditions caused statewide problems. The peak year of the drought was 1992, when a drought emergency was declared for all of Oregon.[5] Dates for significant drought events that affected Jackson County are listed in Table DR-1. There have been no drought events since the 2006 Jackson County NHMP.

[4] OEM. Oregon Natural Hazard Mitigation Plan. 2012.
[5] Ibid.

Table DR-1: History of Droughts

Date	Location	Characteristics
1904-1905	Statewide	A state-wide drought period of about 18 months
1928-1941	Statewide	A significant drought affected all of Oregon from 1928 to 1941. The prolonged statewide drought created significant problems for the agricultural industry. The first of the three Tillamook Forest burns occurred during this drought in 1933.
1976-1981	Statewide	Low stream flows prevailed in Western Oregon during the period from 1976-81, but the worst year, by far, was 1976-77, the single driest year of the century.
1985-1997	Statewide	A dry period lasting from 1985 to 1994 caused significant problems statewide. The peak year was 1992, when the state declared a drought emergency. In the seven-year period from 1986-1992, Medford received only five years' worth of precipitation and other areas of southern Oregon were also significantly affected. Forests throughout Oregon suffered from a lack of moisture with fires common and insect pests flourishing.
2000-2001	Klamath/ Jackson	Klamath drought intensifies; low snowpack in mountains worsens conditions. Draw down at Detroit Lake, all but curtails lake recreation.
Feb. 2005	Statewide	February 2005 was the driest February on record since 1977, surpassing 2001's conditions. Above normal temperatures contributed to decreased water availability for the summer. Stream and river levels dropped significantly and watermasters regulated live flow use by irrigators. Drought conditions also led to the use of stored water, when it was available .

Source: Taylor, George H. and Chris Hannan. 1999. The Oregon Weather Book, A State of Extremes. Corvallis, OR: Oregon State University Press; OEM, Oregon Natural Hazards Mitigation Plan. 2012

Risk Assessment

How are Hazards Identified?

The extent of the drought depends upon the degree of moisture deficiency, and the duration and size of the affected area. Typically, droughts occur as regional events and often affect more than one city and county. In severe droughts, environmental and economic consequences can be significant.

Probability of Future Occurrence

Droughts are not uncommon in Oregon, nor are they just an “east of the mountains” phenomenon. They occur in all parts of the state, in both summer and winter. Oregon’s drought history reveals many short-term and a few long-term events.

Given the history of drought in Jackson County, and the region as a whole, the steering committee determined that there is a **medium** probability that the county will experience severe extended drought conditions, meaning that one drought event is likely to occur

within the next 35 to 75 years. This hazard was not rated in the 2006 Jackson County Hazard Analysis.

Vulnerability Assessment

The severity of a drought occurrence poses a risk for agricultural and timber losses, property damage, and disruption of water supplies and availability in urban and rural areas. Factors used to assess drought risk include agricultural practices, such as crop types and varieties grown, soil types, topography, and water storage capacity.

Due to the nature of droughts and their extensive effects, the Jackson County steering committee determined that the county has a **medium** vulnerability to drought, meaning up to 10% percent of the county's population or regional assets would be affected. This hazard was not rated in the 2006 Jackson County Hazard Analysis.

Risk Analysis

The Jackson County steering committee determined that the history of drought events is **medium**, with between two and three events occurring over the last 100 years. The maximum threat of a drought is also **medium**, considering the percentage of population and property that could be impacted under a worst—case scenario.[6]

Droughts in the past have caused no personal injury or death. The potential for future injuries or deaths is anticipated to remain similar to historic events. Jackson County estimates that less than 10% of the county's population could be physically displaced by a drought, and there would be little or no impact on community social networks.[7]

Facilities throughout the county anticipate little or no damage due to a drought, estimated at less than $1 million for hazard response, structural repairs and equipment replacement. In terms of commercial business, it is likely between 10% and 30% of businesses located in the county and surrounding area could experience commerce interruption for a period of days. The agricultural sector could suffer the greatest impact from a drought in comparison to other types of business. Lastly, drought would likely have extensive impacts on more than 75% of the City's ecological systems, including, clean water, wildlife habitat, and parks.[8]

The relative risk of a drought is estimated by considering the probability of a drought event and the severity of the outcome when a drought occurs. On a scale of 1 to 25, with 1 being the lowest and 25 being the highest relative risk, drought hazards in Jackson County are a score of 6.5.[9]

Community Hazard Issues

What is susceptible to damage during a hazard event?

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

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[6] Jackson County. NHMP Steering Committee. 2012.
[7] Ibid.
[8] Ibid.
[9] Oregon Military Department – Office of Emergency Management. Hazard Analysis Methodology, Relative Risk. 2009

Droughts are not just a summer-time phenomenon; winter droughts can have a profound impact on agriculture, particularly east of the Cascade Mountains. Also, below average snowfall in higher elevations has a far-reaching effect, especially in terms of hydro-electric power, irrigation, recreational opportunities and a variety of industrial uses. Jackson County has a large agricultural economy, which would suffer significantly during an extended drought.

Drought can affect all segments of a jurisdiction's population, particularly those employed in water-dependent activities (e.g., agriculture, hydroelectric generation, recreation, etc.). Also, domestic water-users may be subject to stringent conservation measures (e.g., rationing) and could be faced with significant increases in electricity rates.

There also are environmental consequences to drought. A prolonged drought in forests promotes an increase of insect pests, which in turn, damage trees already weakened by a lack of water. The incidence of forest and range fires increases substantially during extended droughts, which in turn places both human and wildlife populations at higher levels of risk. [10]

Some environmental effects of drought are short-term and conditions quickly return to normal following the end of the drought. Other environmental effects linger for some time or may even become permanent. Wildlife habitat, for example, may be degraded through the loss of wetlands, lakes, and vegetation. Many species, however, will eventually recover from this temporary aberration. Oregon has several fish species listed as threatened or endangered pursuant to the Endangered Species Act (ESA) of 1973. Some of these species have habitat requirements that often conflict with the needs or desires of the human environment. For example, in times of scarcity, the amount of water necessary to maintain certain fish species may conflict with the needs of the local agricultural community. The degradation of landscape quality, including increased soil erosion, may lead to a more permanent loss of biological productivity of the landscape. [11]

Existing Hazard Mitigation Activities

Water Management and Conservation Plan

The Medford Water Commission has a Water Management and Conservation Plan that addresses drought and sets forth a plan of action to reduce the negative impacts from a drought. The WMCP satisfies the requirement that each municipal water right permit extension holders submit a WMCP to gain access to additional quantities of water. As a holder of permits, this WMCP describes the affected jurisdictions' water uses, water needs, water conservation program, and plans for development of existing water rights to meet short- and long-term customer demands. In addition to meeting the rules' requirements, this WMCP demonstrates affected jurisdictions' stewardship of water resources.[12]

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[10] National Drought Mitigation Center. 2006. Understanding Your Risk and Impacts: Impacts of Drought. http://www.drought.unl.edu/risk/impacts.htm, accessed May 28, 2010.
[11] National Drought Mitigation Center. 2006. Understanding Your Risk and Impacts: Impacts of Drought. http://www.drought.unl.edu/risk/impacts.htm, accessed May 28, 2010.
[12] Medford Water Commission. Water Management and Conservation Plan. March 2009.

Water Conservation

In an effort to conserve water the Medford Water Commission, which serves the City of Eagle Point and the unincorporated community of White City, encourages residents to reduce water use in the summer, specifically by reducing water usage for lawns and through water-wise gardening.[13]

Outreach

The Medford Water Commission, which serves the City of Eagle Point and the unincorporated community of White City utilizes it's website to encourage water conservation. The website offers various strategies to reduce water usage in the home, i.e. H20 Home, water-wise gardening, water footprint calculator and descriptions of water-wise plants.[14]

Drought Mitigation Action Items

The following actions have been identified by the Jackson County, Ashland, Eagle Point, Rogue River and Shady Cove steering committees, and are recommended for mitigating the potential effects of drought in the various identified jurisdictions. Below you will find a brief description, title, of the action items, see full action item worksheets in Appendix A for a full description of the action items.

Jackson County

DH#1: Support Local Agencies Training on Water Conservation Measures and Drought Management Practices

DH#2: Ensure Long-range Water Resources Development

Ashland

No Action Items Developed.

Eagle Point

No Action Items Developed.

Rogue River

No Action Items Developed.

Shady Cove

No Action Items Developed.

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[13] Medford Water Commission. Conservation. Accessed August 17, 2012. http://www.medfordwater.org/SectionIndex.asp?SectionID=9

[14] Ibid

Jackson County

Drought Resource Directory

County Resources

Jackson County Emergency Management

Jackson County Emergency Management helps the community be better prepared for major emergencies and disasters. They work closely with cities, emergency responders, and volunteer agencies to find ways to reduce risks and minimize damages during hazard events. When a disaster occurs, they work with these partners in their Emergency Operations Center to coordinate resources and information. Once the event is over, they help bring assistance to those that have been harmed.

Contact: Jackson County Emergency Management Coordinator
Address: 10 South Oakdale, Medford, Oregon 97501
Phone: (541) 774-6821
Fax: (541) 774-6705
Website: http://www.co.jackson.or.us/sectionindex.asp?sectionid=28

Jackson Soil and Water Conservation District

The Jackson Soil and Water Conservation District is a leader in providing scientifically based technical assistance and financial resources in a manner that supports both rural and urban landowner abilities to implement best management practices, enhancing the natural environment while protecting Jackson County's cultural, social, and economic values. They also provide education and resources to both students and citizens in Jackson County, helping ensure conservation of our local resources.

Contact: Jackson Soil and Water Conservation District
Address: 573 Parsons Drive, Suite 102, Medford, Oregon 97501
Phone: (541) 776-4270 Ext. 3
Website: http://www.jswcd.org/Index.asp

Medford Water Commission

The Medford Water Commission operates and maintains the water system that delivers high-quality drinking water to around 131,000 Rogue Valley residents. The Commission is an autonomous agency of the City of Medford, Oregon, established through a change in the City's Charter on November 7, 1922.

The Commission directly serves customers in the City of Medford and the unincorporated community of White City. The cities of Central Point, Eagle Point, Jacksonville, Phoenix and Talent are served on a wholesale basis. Additionally, three domestic water districts purchase water from the Commission. All water services are metered with the exception of those used strictly for fire sprinkler service.

Contact: Medford Water Commission
Address: 200 S. Ivy Street, Rm. 177, Medford, Oregon 97501
Phone: (541) 774-2430
Email: wtrcom@ci.medford.or.us
Website: http://www.medfordwater.org

State Resources

Water Resources Department's (WRD) Drought Council and Water Availability Committee

The Drought Council is responsible for assessing the impact of drought conditions and making recommendations to the Governor's senior advisors. A subcommittee of technical people, the Water Availability Committee, monitor conditions throughout the state and report these conditions monthly to the Drought Council. In this manner the Drought Council keeps up-to-date on water conditions. Members combine this knowledge with information they bring from their organizations and differing geographic areas of the state in order to make recommendations for policy, response, and mitigation.

Contact: Water Resources Department
Address: 725 Summer Street NE, Suite A, Salem, OR 97301
Phone: (503) 986-0900
Email: webmaster@wrd.state.or.us
Website: http://www.oregon.gov/OWRD/Pages/WR/drought.aspx, or http://or.water.usgs.gov/

National Resources and Programs

United States Geological Survey's (USGS) WaterWatch

WaterWatch is a U.S. Geological Survey (USGS) World Wide Web site that displays maps, graphs, and tables describing real-time, recent, and past streamflow conditions for the United States. The real-time information generally is updated on an hourly basis. WaterWatch provides streamgage-based maps that show the location of more than 3,000 long-term (30 years or more) USGS streamgages; use colors to represent streamflow conditions compared to historical streamflow; feature a point-and-click interface allowing users to retrieve graphs of stream stage (water elevation) and flow; and highlight locations where extreme hydrologic events, such as floods and droughts, are occurring.

Website: http://waterwatch.usgs.gov/index.php?id=ww_drought

Earthquake Hazard Annex

Causes and Characteristics of Earthquake

Earthquakes occur in Oregon everyday; every few years an earthquake is large enough for people to feel; and every few decades there is an earthquake that causes damage. Each year, the Pacific Northwest Seismic Network locates more than 1000 earthquakes greater than magnitude 1.0 in Washington and Oregon. Of these, approximately two dozen are large enough to feel. These noticeable events offer a subtle reminder that the Pacific Northwest is an earthquake-prone region.

Seismic hazards pose a real and serious threat to many communities in Oregon, including Jackson County, requiring local governments, planners, and engineers to consider their community's safety. Currently, no reliable scientific means exists to predict earthquakes. Identifying seismic-prone locations, adopting strong policies and implementing measures, and using other mitigation techniques are essential to reducing risk from seismic hazards in Jackson County.[1]

Oregon and the Pacific Northwest in general are susceptible to earthquakes from three sources: 1) shallow crustal fault –slippage events within the North American Plate; 2) deep intra-plate events within the subducting Juan de Fuca Plate; and 3) the off-shore Cascadian Subduction Zone.[2]

Crustal Fault Earthquakes

These are the most common earthquakes and occur at relatively shallow depths of 6-12 miles below the surface.[3] When crustal faults slip, they can produce earthquakes of magnitudes up to 7.0. Although most crustal fault earthquakes are smaller than 4.0 and generally create little or no damage, some of them can cause extensive damage. Known active faults in the region include the Wallula, Hite, Mount Angel, and Lake of the Woods fault zones.[4] Of the three earthquake types, crustal earthquakes are the greatest threat to Jackson County.

Deep Intraplate Earthquakes

Occurring at depths from 18 to 60 miles below the earth's surface in the subducting oceanic crust, deep intraplate earthquakes can reach magnitude 7.5.[5] This type of earthquake is more common in the Puget Sound; in Oregon these earthquakes occur at lower rates and have none have occurred at a damaging magnitude.[6] The February 28, 2001 earthquake in

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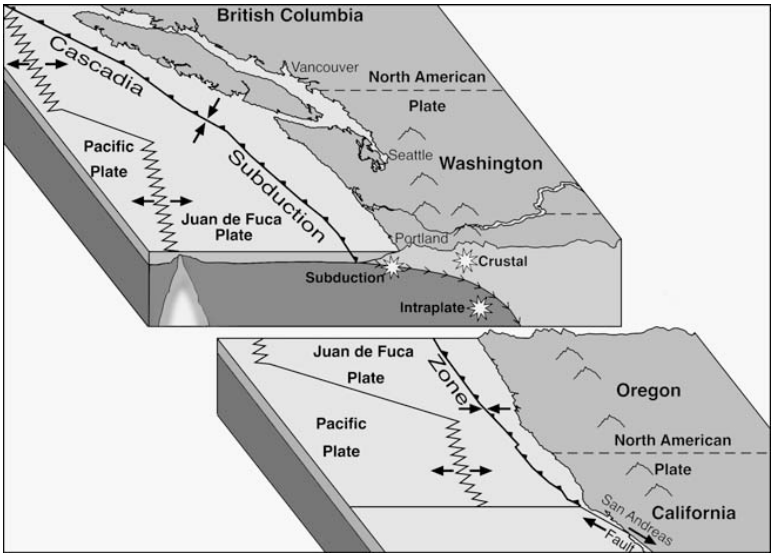
[1] Interagency Hazard Mitigation Team. 2012. Oregon Natural Hazards Mitigation Plan. Salem, OR: Oregon Military Department – Office of Emergency Management
[2] Planning for Natural Hazards: Oregon Technical Resource Guide, Community Planning Workshop, (July 2000), p. 8-8.
[3] Madin, Ian P. and Zhenming Wang, Relative Earthquake Hazard Maps Report, DOGAMI, 1999.
[4] Wong, Ivan G. and Jacqueline D.J. Bott, "A look back at Oregon's earthquake history, 1841-1994", Oregon Geology v57, no6, November 1995
[5] Planning for Natural Hazards: Oregon Technical Resource Guide, Community Planning Workshop, (July 2000), p. 8-8.
[6] Interagency Hazard Mitigation Team. 2012. Oregon Natural Hazards Mitigation Plan. Salem, OR: Oregon Military Department – Office of Emergency Management

Washington State was a deep intraplate earthquake. It produced a rolling motion that was felt from Vancouver, British Columbia to Coos Bay, Oregon and east to Salt Lake City, Utah.[7]

Subduction Zone Earthquakes

The Pacific Northwest is located at a convergent continental plate boundary, where the Juan de Fuca and North American tectonic plates meet. The two plates are converging at a rate of about 1.5 inches per year[8]. This boundary is called the Cascadia Subduction Zone (CSZ, see Figure 1.0). It extends from British Columbia to northern California. Earthquakes are caused by the abrupt release of this slowly accumulated stress.

Figure EQ.1. Cascadia Subduction Zone



Source: Shoreland Solutions. Chronic Coastal Natural Hazards Model Overlay Zone. Salem, OR: Oregon Department of Land Conservation and Development (1998) Technical Guide-3.

Although there have been no large recorded earthquakes along the offshore Cascadia Subduction Zone, similar subduction zones worldwide do produce "great" earthquakes with magnitudes of 8 or larger. They occur because the oceanic crust "sticks" as it is being pushed beneath the continent, rather than sliding smoothly. Over hundreds of years, large stresses build which are released suddenly in great earthquakes. Such earthquakes typically have a minute or more of strong ground shaking, and are quickly followed by numerous large aftershocks.

Subduction zones similar to the Cascadia Subduction Zone have produced earthquakes with magnitudes of 8.0 or larger. Historic subduction zone earthquakes include the 1960 Chile earthquake (magnitude 9.5), the 1964 southern Alaska (magnitude 9.2) earthquakes, the 2004 Indian Ocean earthquake (magnitude 9.0) and the 2011 Tohoku earthquake. Geologic

[7] Hill, Richard. "Geo Watch Warning Quake Shook Portland 40 Years Ago." The Oregonian. October 30, 2002.
[8] Interagency Hazard Mitigation Team. 2012. Oregon Natural Hazards Mitigation Plan. Salem, OR: Oregon Military Department – Office of Emergency Management

evidence shows that the Cascadia Subduction Zone has generated great earthquakes, most recently about 300 years ago.[9]

Geologic evidence shows that the Cascadia Subduction Zone has also generated great earthquakes, and that the most recent one was about 300 years ago. Large earthquakes also occur at the southern end of the Cascadia Subduction Zone (in northern California near the Oregon border) where it meets the San Andreas Fault system.

While all three types of earthquakes have the potential to cause major damage, subduction zone earthquakes pose the greatest danger. A major CSZ event could generate an earthquake with a magnitude of 9.0 or greater resulting in devastating damage and loss of life. Such earthquakes may cause great damage to the coastal area of Oregon as well as inland areas in western Oregon including Jackson County. It is estimated that shaking from a large subduction zone earthquake could last up to five minutes.[10] The specific hazards associated with an earthquake are explained below:

Ground Shaking

Ground shaking is the motion felt on the earth's surface caused by seismic waves generated by the earthquake. Ground shaking is the primary cause of earthquake damage. The strength of ground shaking depends on the magnitude of the earthquake, the type of fault that is slipping, and distance from the epicenter (where the earthquake originates). Buildings on poorly consolidated and thick soils will typically see more damage than buildings on consolidated soils and bedrock.

Ground Shaking Amplification

Ground shaking amplification refers to the soils and soft sedimentary rocks near the surface that can modify ground shaking from an earthquake. Such factors can increase or decrease the amplification (i.e., strength) as well as the frequency of the shaking. The thickness of the geologic materials and their physical properties determine how much amplification will occur. Ground motion amplification increases the risk for buildings and structures built on soft and unconsolidated soils.

> *"Due to the amount of faulting in the area, [the 1999 Klamath Falls earthquake] is just business as usual for such a geologically active region. Historic evidence, combined with geologic evidence for large numbers of earthquakes in the prehistoric past, suggest that one or more earthquakes capable of damage (magnitude 4 – 6) hit south-central Oregon every few decades, so it pays to be prepared."*
>
> James Roddey, DOGAMI

Surface Faulting

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

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[9] Interagency Hazard Mitigation Team. 2012. Oregon Natural Hazards Mitigation Plan. Salem, OR: Oregon Military Department – Office of Emergency Management

[10] Planning for Natural Hazards: Oregon Technical Resource Guide, Community Planning Workshop, (July 2000), p. 8-9.

Liquefaction and Subsidence

Liquefaction occurs when ground shaking causes wet, granular soils to change from a solid state into a liquid state. This results in the loss of soil strength and the soil's ability to support weight. When the ground can no longer support buildings and structures (subsidence), buildings and their occupants are at risk.

Earthquake-Induced Landslides and Rockfalls

Earthquake-induced landslides are secondary hazards that occur from ground shaking and can destroy roads, buildings, utilities and critical facilities necessary to recovery efforts after an earthquake. Some Jackson County communities are built in areas with steep slopes. These areas often have a higher risk of landslides and rockfalls triggered by earthquakes.

The severity of an earthquake is dependent upon a number of factors including: 1) the distance from the earthquake's source (or epicenter); 2) the ability of the soil and rock to conduct the earthquake's seismic energy; 3) the degree (i.e., angle) of slope materials; 4) the composition of slope materials; 5) the magnitude of the earthquake; and 6) the type of earthquake.

History of Earthquakes in Jackson County

All of Oregon west of the Cascades is at risk from the three earthquake types and associated hazards. The amount of earthquake damage at any place will depend on its distance from the epicenter, local soil conditions, and types of construction. Due to Oregon's relatively short written history and the infrequent occurrence of severe earthquakes, few Oregon earthquakes have been recorded in writing. Moreover, in the past century, there have been no reported damage or injuries in Jackson County due to earthquakes. However, several significant earthquake events have occurred in southwestern Oregon in the past 150 years. Details concerning these events are highlighted below.

Image of damage from the 2001 Nisqually earthquake near Seattle

November 23, 1873, Magnitude 6.75

The largest recorded earthquake in Oregon's history occurred near the California border at the coast. Property damage was reported in Crescent City, Port Orford, Grants Pass and Jacksonville and motion was felt in Portland and San Francisco. The earthquake is speculated to have originated from Cascadia Subduction Zone movement.

April 14, 1920

Three shocks were felt at Crater Lake. Despite an unrecorded magnitude or damage report, one of the earthquakes was rated "5" on the 1-10 Modified Mercalli intensity scale, indicating it was felt by nearly everyone; fragile objects and windows broke; plaster cracked; unstable objects overturned; disturbances to trees, poles, and other objects were noticeable.

September 20, 1993, Magnitude 5.9 and 6.0

Two earthquakes hit north-northwest of Klamath Falls, causing two fatalities and $7.5 million in damages in the nearby region, including extensive damage to the Klamath County Courthouse. Hundreds of small aftershocks were felt immediately afterwards and during the next three months, including a 5.1 quake on December 4, 1993.

Klamath Falls is located in the south-central part of Oregon, just north of the Oregon-California border. The city is situated in an earthquake- prone area between the High Cascades volcanic region and the Basin and Range system of faulting. Klamath Falls has experienced several minor earthquakes since the 1950's. The September 1993 earthquakes were felt over a 200-mile radius and caused extensive damage in Klamath Falls resulting in the deaths of two people.

Public facilities sustained damages of over $1.6 million, while 940 residences suffered at least minor damages involving cracked walls, broken windows, collapsed chimneys, and damaged plumbing. Businesses reported damages exceeding $2 million, while other non-residential structures estimated damages around $260,000. Two miles north of Klamath Falls, the Oregon Institute of Technology (OIT) experienced non-structural damage, including toppled bookcases and filing cabinets, and collapsed storage shelves. Most of the structural damage was limited to buildings with brick walls.[11]

November 28, 1999, Magnitude 3.4

This earthquake's epicenter was located 13.9 miles west-northwest of Klamath Falls, almost precisely where two quakes originated six years prior. Ground motion was felt in Medford, 45 miles away, and there were no reported injuries or damages.

Risk Assessment

How are Hazards Identified?

The Oregon Department of Geology and Mineral Industries (DOGAMI), in partnership with other state and federal agencies, has undertaken a rigorous program in Oregon to identify seismic hazards, including active fault identification, bedrock shaking, tsunami inundation zones, ground motion amplification, liquefaction, and earthquake induced landslides. DOGAMI has published a number of seismic hazard maps that are available for Oregon communities to use. Due to the large extent of associated hazards, earthquakes can affect all parts of the county to varying degrees.

In response to growing earthquake awareness statewide, the Oregon Building Codes Division (BCD) revised construction standards for new buildings to make them resistant to seismic events. Oregon State Building Codes reflect three seismic zones as depicted in Figure EQ.2. An increase in zone number reflects increased seismic activity. Zones are based on predicted ground motion and potential risk from large earthquakes within 50 years. New structures must be built to standards capable of resisting the forces caused by ground shaking applicable to the various seismic zones. For example, a structure in Zone 4 must be

[11] Planning for Natural Hazards: Oregon Technical Resource Guide, Community Planning Workshop, (July 2000).

33 percent stronger or more seismically resistant than a structure built in Zone 3.[12] Jackson County lies in Zone 3.

Figure EQ.2. Current Seismic Zones in Oregon

Source: Shoreland Solutions. Chronic Coastal Natural Hazards Model Overlay Zone. DLCD (1998).

Community Earthquake Issues

Earthquake damage occurs because humans have built structures that cannot withstand severe shaking. Buildings, airports, schools, and lifelines (highways, phone lines, gas, water, etc.) suffer damage in earthquakes and can ultimately result in death or injury to humans.

Death and Injury

Death and injury can occur both inside and outside of buildings due to falling equipment, furniture, debris, and structural materials. Likewise, downed power lines or broken water and gas lines endanger human life. Death and injury are highest in the afternoon when damage occurs to commercial and residential buildings and during the evening hours in residential settings.[13]

Building and Home Damage

Wood structures tend to withstand earthquakes better than structures made of brick or unreinforced masonry buildings.[14] Building construction and design play a vital role in the survival of a structure during earthquakes. Damage can be quite severe if structures are not designed with seismic reinforcements or if structures are located atop soils that liquefy or amplify shaking. Whole buildings can collapse or be displaced.

Bridge Damage

All bridges can sustain damage during earthquakes, leaving them unsafe for use. More rarely, some bridges have failed completely due to strong ground motion. Bridges are a vital transportation link – damage to them can make some areas inaccessible.

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[12] Oregon Building Codes Division
[13] Planning for Natural Hazards: Oregon Technical Resource Guide, Community Planning Workshop, (July 2000).
[14] Wolfe, Myer, et al. Land Use Planning for Earthquake Hazard Mitigation: A Handbook for Planners, Special Publication 14, Natural Hazards Research and Applications Information Center.

Because bridges vary in size, materials, siting, and design, earthquakes will affect each bridge differently. Bridges built before the mid 1970's often do not have proper seismic reinforcements. These bridges have a significantly higher risk of suffering structural damage during a moderate to large earthquake. Bridges built in the 1980's and after are more likely to have the structural components necessary to withstand a large earthquake.[15]

2001 Nisqually Earthquake

A 6.8 magnitude earthquake centered southwest of Seattle struck on February 28, 2001, followed by a mild aftershock the next morning, and caused more than $1 billion worth of damage. Despite this significant loss, the region escaped with relatively little damage for two reasons: the depth of the quake center and preparations by its residents. Washington initiated a retrofitting program in 1990 to strengthen bridges, while regional building codes mandated new structures withstand certain amounts of movement. Likewise, historic buildings have been voluntarily retrofitted with earthquake-protection reinforcements.

Source: "Luck and planning reduced Seattle quake damage", CNN Report, March 1, 2001

Damage to Lifelines

Lifelines are the connections between communities and critical services. They include water and gas lines, transportation systems, electricity, and communication networks. Ground shaking and amplification can cause pipes to break open, power lines to fall, roads and railways to crack or move, and radio or telephone communication to cease. Disruption to transportation makes it especially difficult to bring in supplies or services. All lifelines need to be usable after an earthquake to allow for rescue, recovery, and rebuilding efforts and to relay important information to the public.

Disruption of Critical Facilities

Critical facilities are police stations, fire stations, hospitals, and shelters. These are facilities that provide services to the community and need to be functional after an earthquake event. The earthquake effects outlined above can all cause emergency response to be disrupted after a significant event.[16]

Economic Loss: Equipment and Inventory Damage, Lost Income

Seismic activity can cause great loss to businesses, either a large-scale corporation or a small retail shop. Losses not only result in rebuilding cost, but fragile inventory and equipment can be destroyed. When a company is forced to stop production for just a day, business loss can be tremendous. Residents, businesses, and industry all suffer temporary loss of income when their source of finances are damaged or disrupted.

Fire

Downed power lines or broken gas mains can trigger fires. When fire stations suffer building or lifeline damage, quick response to quench fires is less likely.

Debris

After damage occurs to a variety of structures, much time is spent cleaning up brick, glass, wood, steel or concrete building elements, office and home contents, and other materials.

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[15] University of Washington website: www.geophys.washington.edu/SEIS/PNSN/INFO_GENERAL/faq.html#3.
[16] Earthquake Damage in Oregon: Preliminary Estimates of Future Earthquake Losses.

Probability of Future Occurrence

Scientists estimate the chance in the next 50 years of a large subduction zone earthquake is between 10 and 20 percent, assuming that the recurrence is on the order of 400 +/- 200 years.[17] Establishing a probability for crustal earthquakes is more difficult. There have been several earthquakes above magnitude 4.0 in the southwestern region of the state. Oregon's seismic record is short and the number of earthquakes above a magnitude 4 centered in the southwestern region is small. Therefore, any kind of prediction would be questionable. Earthquakes generated by volcanic activity in Oregon's Cascade Range are possible, but likewise unpredictable.

The Jackson County steering committee rated the probability of an earthquake occurring as **medium**, meaning that is it likely Jackson County will be affected by a damaging earthquake within a 35-75 year period. This rating is consistent with the 2006 Jackson County Hazard Analysis.

Vulnerability Assessment

The effects of earthquakes span a large area. The degree to which earthquakes are felt, however, and the damages associated with them may vary. At risk from earthquake damage are unreinforced masonry buildings, bridges built before earthquake standards were incorporated into building codes, many "high tech" and hazardous material facilities, extensive sewer, water, and natural gas pipelines, petroleum pipelines, and other critical facilities and private property located within the county. The areas that are particularly vulnerable to potential earthquakes in the county have been identified as those with soft, alluvial sediments and lands along stream channels, which appear in a significant portion of the Rogue Valley.

The Jackson County Steering Committee determined that the county's vulnerability to earthquakes is **high**, meaning that more than 10% of the population and the regional assets would be impacted by an earthquake. This rating is consistent with the 2006 Jackson County Hazard Analysis.

FEMA has developed a computer-based estimation methodology called HAZUS that uses mathematical formulas and information about building stock, local geology and the location and size of potential earthquakes, economic data, and other information to estimate losses from a potential earthquake. Earthquake loss estimates forecast damage, and human and economic impacts that may result from future earthquakes. They are not precise predictions, but rather estimates based on scientific and engineering knowledge.[18]

HAZUS is capable of using PC-based Geographic Information Systems (GIS) software to map and display ground shaking, the pattern of building damage, and demographic information about a community. Once the location and size of a hypothetical earthquake is identified, HAZUS estimates the violence of ground shaking, the number of casualties, damaged buildings, the amount of disruption to transportation systems, electrical and water utilities, population displaced from homes, and the estimated cost of repairing the projected damage. Earthquake damage for all 36 Oregon counties has been estimated recently using

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[17] Oregon Geology, Volume 64, No. 1, Spring 2002.
[18] National Institute of Building Sciences, HAZUS, www.nibs.org/hazus.htm.

FEMA's HAZUS program and is based on years of research into Oregon's geology.18 Since the HAZUS program was run statewide, estimates at the county level are less accurate. Therefore, DOGAMI cautions these figures and estimates should be used only for general planning purposes. Table EQ.1 below depicts predicted loss and damage for an 8.5 Cascadia zone event and 500-year model in Jackson County. Due to the county's relatively large economic base and potentially high economic loss in either event, Jackson County was included among nine counties at highest risk from earthquakes in Oregon.

Table EQ.1. Estimated Earthquake Damage Summary for Jackson County

Loss	8.5 Cascadia Subduction Zone Event	500-year Model
Injuries	428	930
Deaths	8	18
Displaced Households	650	1458
Short term shelter needs	489	1080
Economic losses for buildings	$538 million	$1.2 billion
Operational day after quake:	-	-
Fire stations	75%	NA
Police stations	62%	NA
Schools	70%	NA
Bridges	84%	NA
Communication	81%	NA
Economic losses to:	-	-
Highways	$10 million	$34 million
Airports	$2 million	$8 million
Communication	$2 million	$9 million
Debris generated (thousands of tons)	434	889

Source: Wang, Yumei and J.L. Clark, "Earthquake damage in Oregon: Preliminary estimates of future earthquake losses", Special Paper 29, DOGAMI, 1999.

Risk Analysis

The Jackson County steering committee determined that the history of earthquake events is **medium**, with two to three events occurring over the last 100 years. The maximum threat of an earthquake is **high**, considering the percentage of population and property that could be impacted under a worst—case scenario.

Earthquakes in the past caused no injuries regarding the health and safety of residents. However, the potential for injuries or deaths from past events or from similar events in other communities could escalate resulting in multiple deaths and major injuries. It is estimated that 25-50% of the county's population would be physically displaced by an

earthquake, accounting for the number of homes that would be damaged from seismic activity, and there would be extensive impact on community social networks.[19]

Most facilities throughout the county anticipate extensive damage due to an earthquake, estimated at more than $1 billion for hazard response, structural repairs and equipment replacement. In terms of commercial business, it is likely more than 75% of businesses located in the county would experience commerce interruption for a period of a year or longer. Earthquakes have the potential to inflict widespread damage to not only buildings but also the transportation network that may inhibit access to businesses. Lastly, earthquakes would likely have impacts on less than 10% of the county's ecological systems, including, clean water, wildlife habitat, and parks.[20]

The relative risk of an earthquake is estimated by considering the probability of an earthquake event and the severity of the outcome when an event occurs. On a scale of 1 to 25, with 1 being the lowest and 25 being the highest relative risk, earthquake hazards in Jackson County are a score of 11.10.[21]

Building Collapse Potential

Jackson County's human and physical assets are highly at risk from earthquake hazards in the next 35 years. The hazard profile above indicates several moderate earthquakes that have occurred within the southwest region.

In 2007, DOGAMI completed a rapid visual screening (RVS) of educational and emergency facilities in communities across Oregon, as directed by the Oregon Legislature in Senate Bill 2 (2005). RVS is a technique used by the Federal Emergency Management Agency (FEMA), known as FEMA 154, to identify, inventory, and rank buildings that are potentially vulnerable to seismic events. DOGAMI surveyed buildings in Jackson County and gave them a 'low,' 'moderate,' 'high,' or 'very high' potential of collapse in the event of an earthquake. It is important to note that these rankings represent a probability of collapse based on limited observed and analytical data and are therefore approximate rankings.[22] To fully assess a building's potential of collapse, a more detailed engineering study completed by a qualified professional is required, but the RVS study can help to prioritize which buildings to survey.

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[19] Oregon Military Department – Office of Emergency Management Risk Assessment Methodology. Jackson County NHMP Steering Committee, Updated April 25, 2012.
[20] Ibid.
[21] Interagency Hazard Mitigation Team. 2012. Oregon Natural Hazards Mitigation Plan. Salem, OR: Oregon Military Department – Office of Emergency Management
[22] State of Oregon Department of Geologic and Mineral Industries, Implementation of 2005 Senate Bill 2 Relating to Public Safety, Seismic Safety and Seismic Rehabilitation of Public Building, May 22, 2007, iv.

Table EQ-3 Jackson County Building Collapse Potential

Type of Facility	Low (<1%)	Moderate (>1%)	High (>10%)	Very High (100%)
K-12 Schools	103	12	71	17
Community Colleges	1	0	4	2
Rural Fire Districts	10	0	4	0
Sheriff Facilities	0	1	0	1
City Fire/ Police*	3	0	0	0
State Police	1	0	0	0
Hospitals (Acute Care)	10	0	0	0

* Ashland and Rogue River only

Source: DOGAMI 2007. Open File Report 07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment. http://www.oregongeology.org/sub/projects/rvs/OFR-O-07-02-SNAA-onscreen.pdf

Of the facilities evaluated by DOGAMI using RVS: eighty-eight K-12 school facilities, six community college facilities, four rural fire district facilities and one Jackson County Sheriff's building have a high, or very high, collapse potential as of 2007.

Community Hazard Issues

What is susceptible to damage during a hazard event?

The degree of damage and injury from earthquake hazards will depend upon the type of earthquake, proximity to the epicenter and the magnitude and duration of the event. The Jackson County steering committee identified relative risks associated with earthquake hazards; they estimate that there will be extensive social disruption of social networks, severe damage to multiple facilities, an extended interruption of commercial services and access, damage to ecological systems and widespread population displacement.

Existing Hazard Mitigation Activities

Mitigation through either regulatory or non-regulatory, voluntary strategies allow communities to gain cooperation, educate the public and provide solutions to ensure safety in the event of an earthquake.[23]

Individual Preparedness

At an individual level, preparedness for an earthquake is minimal as perception and awareness of earthquake hazards are low.[24] Strapping down heavy furniture, water heaters and expensive personal property as well as having earthquake insurance, is a step towards earthquake mitigation.

Earthquake Awareness Month

April is Earthquake Awareness Month. Oregon Military Department – Office of Emergency Management coordinates activities such as earthquake drills and encourages individuals to strap down computers, heavy furniture and bookshelves in homes and offices.

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[23] Planning for Natural Hazards: Oregon Technical Resource Guide, Community Planning Workshop, (July 2000), p. 8-20.
[24] Darienzo, Mark, Oregon Military Department – Office of Emergency Management, Personal Interview, (February 22, 2001).

School Education

Schools conduct earthquake drills regularly throughout Oregon and teach students how to respond when an earthquake event occurs.

Prioritization of Oregon Bridges for Seismic Retrofit

In January 1997, the Oregon Department of Transportation (ODOT), Oregon Local Agencies Seismic Committee, and CH2M HILL consultants completed a 4-year long study of seismic vulnerability for Oregon's bridge inventory. From this assessment, Jackson County was able to prioritize bridges for seismic retrofit within the county. Bridges that are considered structurally unsafe will be retrofitted or rebuilt to withstand high water flows, landslides and other natural hazards in addition to seismic events. ODOT can be contacted for more information on this bridge inventory.

Building Codes

Jackson County, and the participating cities, have adopted the International Building Code which includes regulations that address seismic hazards.

The Oregon State Building Codes Division adopts statewide standards for building construction that are administered by the state, cities and counties throughout Oregon. The codes apply to new construction and to the alteration of, or addition to, existing structures. Within these standards are six levels of design and engineering specifications that are applied to areas according to the expected degree of ground motion and site conditions that a given area could experience during an earthquake. The Structural Code requires a site-specific seismic hazard report for projects including critical facilities such as hospitals, fire and police stations, emergency response facilities, and special occupancy structures, such as large schools and prisons.[25]

The seismic hazard report required by the Structural Code for essential facilities and special occupancy structures considers factors such as the seismic zone, soil characteristics including amplification and liquefaction potential, any known faults, and potential landslides. The findings of the seismic hazard report must be considered in the design of the building. The Dwelling Code incorporates prescriptive requirements for foundation reinforcement and framing connections based on the applicable seismic zone for the area. The cost of these requirements is rarely more than a small percentage of the overall cost for a new building.

Requirements for existing buildings vary depending on the type and size of the alteration and whether there is a change in the use of the building that is considered more hazardous. Oregon State Building Codes recognize the difficulty of meeting new construction standards in existing buildings and allow some exception to the general seismic standards. Upgrading existing buildings to resist earthquake forces is more expensive than meeting code requirements for new construction. The state code only requires seismic upgrades when there is significant structural alteration to the building or where there is a change in use that puts building occupants and the community at greater risk.

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[25] Planning for Natural Hazards: Oregon Technical Resource Guide, Community Planning Workshop, (July 2000), p. 8-13.

Local building officials are responsible for enforcing these codes. Although there is no statewide building code for substandard structures, local communities have the option of adopting a local building code to mitigate hazards in existing buildings. Oregon Revised Statutes allow municipalities to create local programs to require seismic retrofitting of existing buildings within their communities. The building codes do not regulate public utilities or facilities constructed in public right-of-way, such as bridges.

Outreach

Jackson County provides information to the public about earthquake hazards and preparedness measures on the county website[26]. The region has several Community Emergency Response Teams (CERTs), including the Ashland CERT[27], the Central Point CERT[28], the Bear Creek CERT (covering Medford, Phoenix, Shady Cove, Talent and White City) and the Jacksonville CERT. Each of the CERTs provide opportunities for the community to learn the latest science and more about various hazards in their community.

Seismic Retrofit

Facilities within Jackson County have been awarded funds through the states Seismic Rehabilitation Grant Program (SRGP). During the first year of the program (2009-2010 cycle) the Medford School District was awarded grants for Washington Elementary School and Medford Opportunity High School. During the latest cycle, 2011-2012 Rogue River School District was awarded a grant for Rogue River Elementary School.

Earthquake Mitigation Action Items

The following actions have been identified by the Jackson County, Ashland, Eagle Point, Rogue River and Shady Cove steering committees, and are recommended for mitigating the potential effects of earthquakes in the various identified jurisdictions. Below you will find a brief description, title, of the action items, see full action item worksheets in Appendix A for a full description of the action items.

Jackson County

EQ#1: Promote building safety through nonstructural improvements.

EQ#2: Encourage purchase of earthquake hazard insurance.

EQ#3: Maintain an inventory of permitted dams in Jackson County.

EQ#4: Compile Relative Earthquake Hazard Maps for Jackson County.

EQ#5: Develop public / private partnerships – with building contractors, architects, - to pursue retrofitting projects.

Ashland

EQ#1: Emergency Operations Center Upgrades.

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[26] Jackson County Emergency Management, http://www.co.jackson.or.us/Page.asp?NavID=100
[27] Ashland CERT, http://www.ashland.or.us/Page.asp?NavID=541
[28] Central Point CERT, http://www.centralpointoregon.gov/

EQ#2: Seismic Natural Gas shut-off valves for the City's critical infrastructure.

EQ#3: Non-structural seismic upgrades for the City's critical infrastructure.

EQ#4: Seismic Retrofit for Critical Infrastructure.

EQ#5: Seismic Risk Assessment.

Eagle Point

EQ#1: Promote non-structural mitigation for buildings to prevent damage from earthquakes.

EQ#2: Promote earthquake insurance.

EQ#3: Promote and coordinate earthquake hazard risk mapping for Jackson County and cities.

EQ#4: Promote structural mitigation to prevent structural damage to city buildings in effort to provide business continuity.

Rogue River

EQ#1: Promote non-structural mitigation to prevent damage from earthquake.

EQ#2: Promote earthquake insurance.

EQ#3: Promote and coordinate Earthquake Hazard Risk Map for Jackson County and cities.

Shady Cove

No Action Items Developed.

Jackson County
Earthquake Resource Directory

County Resources

Jackson County Emergency Management

Jackson County Emergency Management helps the community be better prepared for major emergencies and disasters. They work closely with cities, emergency responders, and volunteer agencies to find ways to reduce risks and minimize damages during hazard events. When a disaster occurs, they work with these partners in their Emergency Operations Center to coordinate resources and information. Once the event is over, they help bring assistance to those that have been harmed.

Contact: Jackson County Emergency Management Coordinator
Address: 10 South Oakdale, Medford, Oregon 97501
Phone: (541) 774-6821
Fax: (541) 774-6705
Website: http://www.co.jackson.or.us/sectionindex.asp?sectionid=28

Regional Resources

Southern Oregon University

The Southern Oregon University Geology Department is working with the Oregon Department of Geology and Mineral Industries on an earthquake public awareness package for local schools. SOU has posted the preparedness plan, highlighting what to do before, during and after an earthquake.

Contact: Southern Oregon University Geology Department
Address: 1250 Siskiyou Blvd, Ashland, OR 97520
Phone: (541) 552-6479
Website: http://www.sou.edu/envirostudies/geology/index.html

Northwest GeoData Clearinghouse Department of Geology – Portland State University

Portland State University conducts geologic researches and prepares inventories and reports for communities throughout Oregon. The GeoData Clearinghouse provides geologic information on earthquakes in the Northwest. It is especially useful for finding earthquake related maps or links to geospatial mapping sites around the nation.

Contact: Department of Geology
Address: Portland State University P.O. Box 751
Portland OR 97207-0751
Phone: (503) 725-3022
Fax: (503) 725-3025
Websites: http://nwdata.geol.pdx.edu/
http://geology.pdx.edu/

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
Address: 635 Capitol Street NE, Suite 150, Salem, Oregon 97301
Phone: (503) 373-0050 ext. 250
Fax: (503) 378-5518
Website: http://www.oregon.gov/LCD/HAZ/Pages/index.aspx

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, tsunami, landslides, floods, and other geologic hazards. The Department has mapped earthquake hazards in most of western Oregon.

Contacts: Deputy State Geologist, Seismic Hazards Team Leader, Tsunami and Coastal Hazards Team Leader
Address: 800 NE Oregon St., Suite 965, Portland, Oregon 97232
Phone: (971) 673-1555
Website: http://www.oregongeology.org/sub/default.htm
Email: ian.madin@dogami.state.or.us

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 97309-0404
Phone: (503) 378-4133
Fax: (503) 378-2322
Website: http://www.cbs.state.or.us/bcd/

Oregon Military Department (OMD) - Office of Emergency Management (OEM)

In relation to Senate Bill 12 and rapidly moving landslide hazards, OEM coordinates state resources for rapid and effective response to landslide-related emergencies. The Oregon Emergency Response System (OERS) of OEM is a key player in the dissemination of debris flow advisories and warnings. OEM chairs a group that develops and measures landslide hazard mitigation strategies. OEM administers the FEMA Hazard Mitigation Grant Program, which provides a source of funding for implementing hazard mitigation projects. OEM also works with other state agencies to develop information for local governments and the public on landslide hazards.

Contact: Oregon Military Department – Office of Emergency Management
Address: 3225 State Street, Salem, Oregon 97301
Phone: (503) 378-2911
Fax: (503) 373-7833
Website: http://www.oregon.gov/OMD/OEM/Pages/index.aspx

The Nature of the Northwest Information Center

The Oregon Department of Geology and Mineral Industries and the USDA Forest Service operate the Nature of the Northwest Information Center jointly. 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: 800 NE Oregon Street, Suite 965 Portland, Oregon 97232
Phone: (971) 673-2331
Email: info@naturenw.org
Website: http://www.naturenw.org/geo-earthquakes.htm

National Resources and Programs

Federal Emergency Management Agency (FEMA)

FEMA is heavily involved with seismic risks in Oregon and has aided in several projects in Portland and Klamath Falls. The Federal Emergency Management Agency (FEMA) is a department within the Office of Homeland Security. FEMA's purpose 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 coordinates the federal response and provides disaster relief funds following a natural hazard event and works most closely with Oregon Military Department – Office of Emergency Management (OEM).

Contact: Public Affairs Officer
Address: Federal Regional Center, 130 228th Street, St., Bothell, WA 98021
Phone: (425) 487-4678
Website: http://www.fema.gov/earthquake

U.S. 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). Also see the USGS Earthquake Hazards Program-Pacific Northwest Regional Center website at: http://earthquake.usgs.gov/regional/pacnw/

Contact: USGS, National Earthquake Information Center
Address: 1711 Illinois Street, Golden, Colorado 80401
Phone: 303-273-8500
Fax: 303-273-8450
Website: http://earthquake.usgs.gov/regional/neic/
http://earthquake.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://bssc.nibs.org/

Additional Resources

Cascadia Region Earthquake Workgroup (CREW)

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

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

Contact: CREW, Executive Director
Address: 1330A S. 2nd Street, #105; Mount Vernon, WA 98273
Phone: (206) 965-0068
Website: http://www.crew.org

Western States Seismic Policy Council Earthquake Program Information Center (WSSPC)

WSSPC is a regional earthquake consortium funded mainly by the Federal Emergency Management Agency. Its website is a great earthquake resource, with information clearly categorized - from policy to engineering to education.

Website: http://www.wsspc.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 great educational resources and on-line publications for insurers, businesses and homeowners who are interested in taking the initiative to minimize future damages and losses.

Website: http://disastersafety.org/

Pacific Northwest Seismograph Network (PNSN) University of Washington Geophysics Program website

Information on Pacific Northwest earthquake activity and hazards from the Pacific Northwest Seismograph Network (PNSN), which operates seismograph stations and locates earthquakes in Washington. The PNSN is operated jointly by the University of Washington and several other northwest institutions, and is funded by the US Geological Survey (USGS), the Department of Energy, and the State of Washington.

Website: http://spike.geophys.washington.edu/SEIS/PNSN/

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

Produced by the Community and Planning Workshop for the Department of Land Conservation and Development (DLCD), 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, DLCD
Address: 635 Capitol Street NE, Suite 150, Salem, Oregon 97301
Phone: (503) 373-0050 ext. 250
Fax: (503) 378-5518
Email: christine.shirley@state.or.us
Website: http://www.oregon.gov/LCD/HAZ/pages/publications.aspx

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.

To obtain this document: Contact DOGAMI at (971) 673-1555 or the Nature of the Northwest Information Center at (971) 673-2331.

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.

To obtain this document: Contact the University of Colorado's Natural Hazards Research and Applications Information Center at (303) 492-6818.

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

These two publications are handy 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 for local government.

To obtain these documents: Contact DOGAMI at (971) 673-1555.

Flood Hazard Annex

Causes and Characteristics of Flood

Flooding results when rain and snowmelt creates water flow that exceed the carrying capacity of rivers, streams, channels, ditches, and other watercourses. In Oregon, flooding is most common from October through April when storms from the Pacific Ocean bring intense rainfall. Flooding can be aggravated when rain is accompanied by snowmelt and frozen ground. The frequency of flooding combined with concentrated development along rivers and streams caused millions of dollars in damage to Jackson County over the past several decades. The growing population and development activity in the floodplain can increase the risk of flood-related damages.

Anticipating and planning for flood events is an important activity for Jackson County. Federal programs provide insurance and funding to communities engaging in flood hazard mitigation. The Federal Emergency Management Agency (FEMA) manages the National Flood Insurance Program (NFIP) and the Hazard Mitigation Grant Program (HMGP). The NFIP provides flood insurance and pays claims to policyholders who have suffered losses from floods. The HMGP provides grants help mitigate flood hazards by elevating structures or relocating or removing them from flood hazard areas. These programs provide grant money to owners of properties who have suffered losses from floods, and in some cases, suffered losses from other natural hazard events.

The principal types of flood that occur in Jackson County include:

Riverine Floods

Riverine flooding typically occurs on larger rivers and streams when water levels overflow their banks, and this type of flooding usually results from large storms or prolonged wet periods. Portions of the county that are located along water bodies have the potential to experience riverine flooding after spring rains, heavy thunderstorms or rapid runoff from snow melt. Riverine floods can be slow or fast-rising, but usually develop over a period of days. The danger of riverine flooding occurs mainly during the winter months, with the onset of persistent, heavy rainfall, and during the spring, with melting of snow. Riverine flooding is the most common type of flooding in Jackson County. The Federal Emergency Management Agency (FEMA) has mapped the areas subject to riverine flooding for the National Flood Insurance Program (NFIP). [1] The most severe flooding conditions generally occur when direct rainfall is augmented by snowmelt, like the 1964 Christmas Day flood and the 1997 New Year's Day flood.

Flash Floods

Flash floods are a major cause of weather-related deaths in the United States. Flash floods usually result from intense storms dropping large amounts of rain within a brief period. Flash floods occur with little or no warning and rivers can rise in a manner of minutes. Flash floods are most common in arid and semi-arid areas where there is steep topography, little

[1] FEMA. Flood Insurance Study; Jackson County and Incorporated Areas, 2011.

vegetation and intense but short-duration rainfall. Jackson County, located in a semi-arid region, is prone to this type of flooding. Steep topography combined with clearing of vegetation for development and timber production causes rapid runoff of rainwater.

Flash floods occur in both urban and rural settings in Jackson County, principally along smaller rivers and drainage ways. Covering land within cities with non-permeable surfaces and the construction of storm water drainage systems compound the effects of flash flooding. Storm water systems are designed to move the rainwater quickly out of the city, and into the local drainage way. This additional rapid infusion of water can push rivers over their banks, and literally create a wall of water moving downstream. In flash flood situations, waters rise rapidly, move at high velocities, and often contain large amounts of debris. Occasionally, floating debris or ice can accumulate at a natural or man-made obstruction and restrict the flow of water. Water held back by ice jams or debris dams can cause flooding upstream. Subsequent flash flooding can occur downstream if the obstruction suddenly releases. Additionally, manmade structures like dams that retain water in reservoirs can fail and create flash floods downstream.

In 1918 Jackson County experienced a flash flood that was caused when the Fish Lake dam failed. The earthen dam was washed away by water flowing over the top. It took three hours and ten minutes for the wall of water and debris to reach the town of Medford. No human lives were lost in this flood, but the buildings and infrastructure of the town suffered significant damage. Dams, or impoundments, can mitigate the effects of some types of flood events by storing runoff from large storms and releasing it slowly. Conversely, dams can cause flooding as well, by failing and releasing a flash flood down the river channel.

Jackson County has a large number of impoundments and the Environmental Protection Agency notes that Jackson County has a high volume of impounded water.[2] There are over 75 dams in Jackson County, including twelve high hazard dams.[3]

Shallow Area Floods

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

Urban floods

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

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[2] Environmental Protection Agency website: http://www.epa.gov

[3] Oregon Water Resources Department website: http://apps.wrd.state.or.us/apps/misc/dam_inventory/default.aspx. Accessed August 17, 2012.

Factors that contribute to flooding in Jackson County

Precipitation

Heavy rainfall is the most common cause of flooding in Jackson County. The rainy season is from October through April, when Pacific storms from the ocean, 60 miles away, bring intense rainfall to the area. Jackson County receives approximately 20 inches of rain on average each year, however about 80% of the precipitation occurs during the seven wettest months of the year, October through April.[4] It is during this "wet season" that flooding is most likely to occur. Snowmelt can also cause flooding, particularly when combined with new rainfall. Rain falling on top of snow causes the snow to quickly melt and river levels to rise rapidly. The two most severe flood events in Jackson County were the result of rain falling on snow pack.

Geography/Geology

The eastern, western, and southern boundaries of Jackson County are mountainous, with a valley in the center of the county. These mountains collect rain and snowfall and deliver it into the Bear Creek and Rogue River valleys. Slopes of the surrounding mountains are relatively steep and have shallow, rocky soils. These types of soils have low absorption properties and quickly transport the rainwater to the river system.

Vegetation Cover

The type and relative amount of vegetation cover dramatically affect how quickly rainwater moves into waterways. Heavy vegetation cover slows the movement of rainwater into the river. When vegetation is removed or reduced, rainwater moves more rapidly into the river system, and contributes to higher water levels. Logging, clearing for development, and agricultural practices can all contribute to rapid water level fluctuations in Jackson County's rivers.

Location of Development

When development is located in the floodplain, it may cause floodwaters to rise higher than before the development was located in the hazard areas. This is particularly true if the development is located within the floodway. When structures or fill are placed in the floodplain, water is displaced. Development raises the base- flood elevation by forcing the river to compensate for the flow space obstructed by the inserted structures. Over time, when structures or materials are added to the floodplain and no fill is removed to compensate, serious problems can arise. The Jackson County Comprehensive Plan prohibits development in the floodway, but under certain circumstances may allow development in the floodplain.

Floodway development is currently regulated and Jackson County (and FEMA) require engineering ("no-rise") certification that the proposed developments will not cause the base flood (100-year flood) elevation to raise more than 1.0 feet.[5]

Displacement of a few inches of water can mean the difference between no structural damage occurring in a given flood event and the inundation of many homes, businesses, and other facilities. Careful attention must be paid to development that occurs within the

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4 Soil Survey of Jackson County Area, Oregon, p.3, (1993).
5 Section 60.3 (d) (3) of the National Flood Insurance Program Regulations.

floodplain and floodway of a river system to ensure that structures are prepared to withstand base flood events.

Surface Permeability

In urbanized areas, increased pavement leads to an increase in volume and velocity of runoff after a rainfall event, exacerbating potential flood hazards. Storm water systems collect and concentrate rainwater and then rapidly deliver it into the local waterway. Traditional storm water systems are a benefit to urban areas, by quickly removing captured rainwater. However, they can be detrimental to areas downstream because they cause increased stream flows due to the rapid influx of captured storm water into the waterway. It is very important to evaluate storm water systems in conjunction with development in the floodplain to prevent unnecessary flooding to downstream properties.

Terms Related To Flooding

Floodplain

A floodplain is land adjacent to a river, stream, lake, estuary or other water body that is subject to flooding. These areas, if left undisturbed, act to store excess floodwater. The floodplain is made up of two areas: the flood fringe and the floodway:

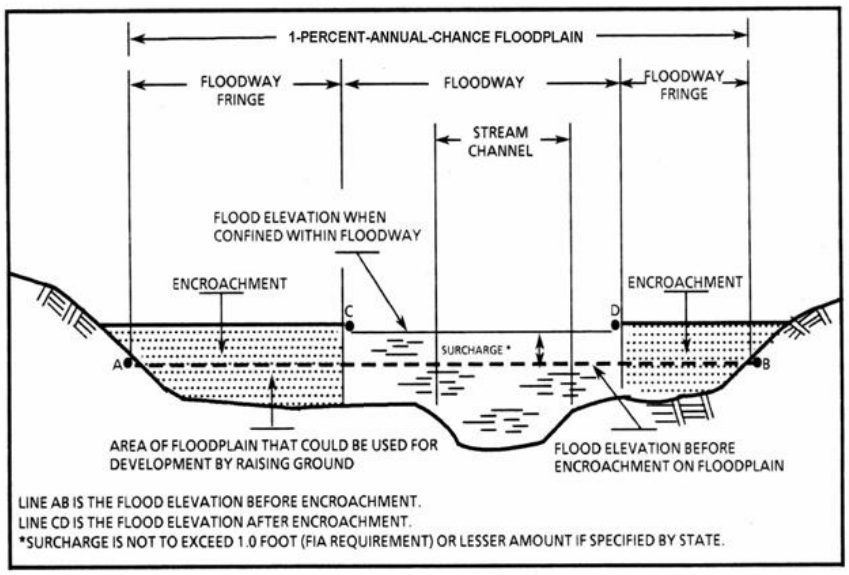
Floodway

The floodway is the portion of the floodplain that is closer to the river or stream. For National Flood Insurance Program (NFIP) and regulatory purposes, floodways are defined as the channel of a river or stream, and the over-bank areas adjacent to the channel. Unlike floodplains, floodways do not reflect a recognizable geologic feature. The floodway carries the bulk of the floodwater downstream and is usually the area where water velocities and forces are the greatest. NFIP regulations require that the floodway be kept open and free from development or other structures, so that flood flows are not obstructed or diverted onto other properties. The NFIP floodway definition is “the channel of a river or other watercourse and adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot (See Figure FL.1).” Floodways are not mapped for all rivers and streams but are typically mapped in developed areas.

The Flood Fringe

The flood fringe refers to the outer portions of the floodplain, beginning at the edge of the floodway and continuing outward. This is the area where development is most likely to occur, and where precautions to protect life and property need to be taken (See Figure FL.1).

Figure FL.1 Floodplain Schematic



Source: FEMA, Flood Insurance Study: Jackson County, Oregon and incorporated Areas, May 2011.

History of Floods in Jackson County

Flooding is a familiar occurrence in Jackson County and generally occurs when unusually warm weather mixed with heavy rain melts snow in the higher elevations and flood local streams. Over the past 100 years, the county has experienced major flood events on a regular basis. Table FL.1 lists some of the major flood events that have occurred in Jackson County and the Pacific Northwest.

The landmark flood event for Jackson County in the last century was the flood of 1964. This flood set most of the record high-water marks for the region. The trigger for this flood was warm rain on a substantial snow pack. The rain quickly melted the snow, and caused the rivers to overrun their banks. All subsequent floods have been compared to this event. The 1964 flood was characterized as a "100-year" flood event. A "100- year" flood has a 1% chance of occurring in any given year, or a 26% chance of occurring during the life of a 30-year home mortgage.[6]

Flooding in Ashland (Jan. 1997)
Source: Mail Tribune

In late December 1996 and early January 1997, Jackson County experienced another devastating flood event, known as the New Years' Day flood. In the weeks preceding the flood, the county received abundant rain and snowfall. A warm and heavily moisture-laden storm front, known as a "Pineapple Express," followed the abundant snowfall. The warm

[6] The 100-Year Flood Myth, FEMA, Region 10.

rain quickly melted the snow pack, and county streams and rivers rapidly filled their channels and exceeded their banks. Bear Creek's waters reached 17,600 cubic-feet-per-second. The mean daily flow for January 1st is 262 cubic-feet –per-second. This particular flood event caused over $12 million in damages to Jackson County homes, businesses and infrastructure. More than 1,500 people were evacuated and over 1,000 properties damaged.[7] In January 1997 President Clinton declared fourteen Oregon counties, including Jackson County, eligible for disaster assistance due to damages resulting from these severe winter storms (DR-1160).

Table FL.1 Significant Flood Events in Region 4 (including Jackson County)

Date	Location	Characteristics	Type of Flood
Mar. 1931	Western Oregon	Wet, mild weather, bridges and homes destroyed	Rain-on Snow (ROS)
Oct. 1950	Southwest Oregon	Severe flooding in Region 4. Six fatalities. Bridges and roads destroyed.	ROS
Jan. 1962	Western Oregon	Heavy rain (3"-4" in Rogue Valley); 84 people evacuated. Great loss of farmland	ROS
Dec. 1964	Entire State	Infamous '64 flood that has become an oregon benchmark. Record flows on Rogue and Umpua rivers.	ROS
Jan. 1974	Western Oregon	Series of storms with mild temperatures; large snowmelt with rapid runoff. Two fatalities.	ROS
Jan. 1986	Entire State	Significant flooding in western Oregon attributable to warrm, intense rain.	Snow melt (SM)
Jan. 1990	Western Oregon	Significant flooding in western Oregon	ROS
Feb. 1996	Entire State	Severe Storm, flooding. $280 Million in damage.	ROS
Nov. 1996	Entire State	Tropical air mass; intense rain; landslides; power outages. (FEMA-1149-DR-OR)	ROS
Dec. 1996/ Jan. 1997	Entire State	Mild weather conitnues. Severe flooding in Ashland. (FEMA-1160-DR-OR)	ROS
Dec. 2005	SW Region	$2.8 Million damage estimate (includes all of Region 4 and areas outside of region)	
Jun. 2006	Jackson	Heavy rain brought flash flooding to Jacksonville, but no reported damages.	Riverine
Aug. 2007	Jackson	Heavy rains caused flash flooding near Ashland, no major estimated damages.	Riverine
Aug. 2010	Jackson	Heavy rains in Central Point caused flooding	Riverine

Source: Taylor, George and Raymond Hatton, 1999, The Oregon Weather Book; Hazards & Vulnerability Research Institute (2007). The Spatial Hazard Events and Losses Database for the United States, Version 5.1 [Online Database]. Columbia, SC: University of South Carolina. Available from http://www.sheldus.org; National Climatic Data Center, Storm Events, available at http://www/ncdc.noaa.gov/stormevents; FEMA, Oregon Severe Storms/ Flooding, https://home.fema.gov/news/event.fema?id=672.

7 Jackson County Emergency Preparedness Plan for Families, p. 22, (1998).

Risk Assessment

How are Hazards Identified?

Hazard identification is the first phase of a hazard assessment, and is the process of estimating the geographic extent of the flood hazard, its intensity, and its probability of occurrence.[8] The flood hazard for Jackson County was identified by FEMA in their Flood Insurance Rate Maps of the county. These maps were first completed in September of 1980, and most recently updated in May 2011[9]. The maps outline the extent of the 100-year, or base, floodplain. This is an outline of where floodwaters would extend if there were such a flood. These maps are used by FEMA to identify properties that need to purchase flood insurance and, if developed, need to meet floodplain development regulations.

The regions floodplains generally begin as narrow strip adjacent to the upper tributaries of Bear Creek and the Rogue River, and steadily increase in width at lower elevations. The widest floodplains are in the northern portion of the county near the confluence of Bear Creek and the Rogue River.

Ashland

Ashland Creek is the chief source of flooding in Ashland. The creek, which has its origins in the Rogue River National Forest south of the city, is very steep and has a drainage area of approximately 27.5 square miles. The creek flows into Reeder Reservoir south of the city; from the reservoir the creek flows northward and empties into Bear Creek. Clay Creek rises in the hills to the southeast of Ashland, flows northward at the eastern edge of the city, and enters Bear Creek to the north.[10] Floods in the past, including the 1974 and 1997 floods on Ashland Creek, have caused failures with the Ashland water-supply system. Concern continues that future floods on Ashland Creek could affect the reservoir.[11]

Eagle Point

Little Butte Creek is the chief source of flooding in Eagle Point. Flooding in 1962 and 1964 was concentrated along Little Butte Creek and within west Eagle Point, due to inadequate drainage facilities and overflows from the irrigation canal. These issues were presumably fixed due to changes to the drainage structures in west Eagle Point and improved communications with the local irrigation district.[12]

Rogue River

The Rogue River, and its tributaries, Evans Creek and Ward Creek are the chief cause of flooding in Rogue River. The major flooding problems arise from backwater from the Rogue River, not from flooding along the creeks. Areas of special concern include the are just south of and west of the Depot Street bridge over the Rogue River, along the Rogue River, and the area just west of Evans Creek, near its mouth.[13]

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[8] Burby, R. (Ed.) Cooperating with Nature: Confronting Natural Hazards with Land Use Planning for Sustainable Communities. (1998) Washington D.C.: Joseph Henry Press

[9] FEMA, Flood Insurance Study: Jackson County, Oregon and incorporated Areas, May 2011.

[10] FEMA, Flood Insurance Study: Jackson County, Oregon and incorporated Areas, May 2011.

[11] DLCD, Oregon Risk MAP. http://www.oregonriskmap.com

[12] FEMA, Flood Insurance Study: Jackson County, Oregon and incorporated Areas, May 2011. And, DLCD, Oregon Risk MAP. http://www.oregonriskmap.com.

[13] Ibid.

Shady Cove.

The Rogue River and Indian Creek are the chief sources of flooding within Shady Cove; the Rogue River causes the majority of flooding problems. Highway 62 is a major transportation route that runs through the city; flooding in the past, the 1964 flood, have washed out bridges which affected the local economy. Much of the developable special flood hazard area has already been developed with mobile home sites on the east bank of the river, downstream from the Highway 62 bridge.[14]

Repetitive Flood Loss in Jackson County

Properties in and near the floodplains in Jackson County are subject to frequent flooding events. Since flooding is such a pervasive problem throughout the county, many residents have purchased flood insurance to help recover from losses incurred from flooding events. Flood insurance covers only the improved land, or the actual building structure. Repetitive loss structures are defined as a National Flood Insurance Program (NFIP)-insured structure that has had at least two paid flood losses of more than $1,000 each in any 10-year period since 1978[15]. Repetitive loss structures are troublesome because they continue to expose lives and valuable property to the flooding hazard. Local governments as well as federal agencies such as FEMA recognize this pitfall in floodplain insurance, and attempts to remove the risk from repetitive loss of properties through projects such as acquiring land and relocating homes, or by elevating structures. Continued repetitive loss claims from flood events lead to an increased amount of damage caused by floods, higher insurance rates, and contribute to the rising cost of taxpayer funded disaster relief for flood victims.[16]

The Jackson County Flood Insurance Rate Maps are current as of May 2011. As of June 30, 2012, Jackson County has 2,114 flood insurance policies, 261 claims and seven repetitive loss properties. For the land within the jurisdictional boundaries of Jackson County there are 947 flood insurance policies, 133 claims and three repetitive loss properties. The county has an open Community Assistance Visit and the county is a member of the Community Rating System (CRS) and has a level 7 community rating. The table shows that the cities of Eagle Point and Shady Cove have repetitive loss buildings and are also not currently participating in the CRS.

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[14] Ibid.

[15] Federal Emergency Management Agency. Definitions, available online at http://www.fema.gov/business/nfip/19def2.shtm#R

[16] National Flood Insurance Program. http://www.fema.gov/nfip.

Table FL.2 Flood Insurance Detail

Community	Policies	Insurance in Force	Total Paid Losses	Total Paid Amount	Repetitive Loss Buildings	Repetitive Loss Payment	CRS Class Rating	LAST CAV
Jackson County	2,114	$ 480,086,700	261	$ 2,245,689	7	$ 271,710	7	Open
Jackson County*	947	$ 208,304,900	133	$ 1,194,559	3	$ 218,963	7	Open
Ashland	117	$ 34,285,000	19	$ 363,549	0	$ -	7	12/11/01
Central Point	260	$ 60,462,700	27	$ 132,350	0	$ -	6	NA
Eagle Point	94	$ 20,922,900	32	$ 264,772	2	$ 9,068	NP	4/5/96
Medford	317	$ 78,566,000	24	$ 88,145	0	$ -	8	NA
Rogue River	75	$ 13,208,600	7	$ 103,243	0	$ -	7	Open
Shady Cove	117	$ 26,896,600	8	$ 41,848	1	$ 40,738	NP	Open

* Portion of entire county under Jackson County jurisdiction
NP = Not Participating
NA = Information Not Available

Source: Shirley, Chris. Oregon Floodplain Coordinator "Sent from Snipping Tool: Federal Emergency Management Agency, Disaster Report – Oregon, Flood Insurance - Detail." Message to Michael Howard. August 20, 2012. Email.

Probability of Future Occurrence

A hundred year flood has a 1% chance of occurring in any particular year, or a 26% chance of occurring during the life of a 30-year home mortgage. The flood of 1964 has been characterized as a 100-year flood in Jackson County. There were over $157 million of losses in the state. Some 600 persons in the Rogue Valley were evacuated.

A five hundred year flood has a .2% chance of occurring each year. In recorded Jackson County history, there is no evidence of a 500-year flood.

The historical incidence of flooding events resulting in substantial losses indicates significant flooding events likely within a 10-15 year range, well within the 35 year range used for high likelihood incidents. The Jackson County steering committee, therefore, determined that the probability of flooding is **high**, meaning that one event is likely in a 10-35 year period.[17] This rating is consistent with the 2006 Jackson County Hazard Analysis.

Vulnerability Assessment

Given the number of residents and facilities in or near the special flood hazard area, the Jackson County steering committee rated the county's vulnerability to flood as **medium**, meaning that between 1% and 10% of the county's population or assets would be impacted by a flood.[18] This rating is an increase from the 2006 Jackson County Hazard Analysis.

Information from the County Assessor's office, 2012, was combined with the FIRMs to estimate the improved property value that is at risk by a 100-year flood event. Only the

[17] Oregon Military Department – Office of Emergency Management. Hazard Analysis Methodology. 2009.
[18] Ibid.

improved value was catalogued. This is only the value of structures on those properties affected by the 100-year floodplain. Base property values were not considered.

As of 2012, there were 3,136 tax lots located within the 100-year flood plain of Jackson County, with an improved value of $466.7 million. Countywide (including incorporated communities) there were 5,431 tax lots located within the 100-year flood plain, with an improved value of $1.05 billion. Table FL.3 also shows the data for several cities within the county.

Table FL.3 Improved Value in the 100-year flood plain

Community	Taxlots	Improved Value	Average Improved Value
Jackson County	5,431	$ 1,052,360,250	$ 193,769
Jackson County*	3,136	$ 466,653,134	$ 148,805
Ashland	160	$ 46,332,080	$ 289,576
Central Point	518	$ 96,917,870	$ 187,100
Eagle Point	176	$ 17,355,900	$ 98,613
Medford	783	$ 283,633,776	$ 362,240
Rogue River	118	$ 17,493,990	$ 148,254
Shady Cove	239	$ 54,789,980	$ 229,247

* Portion of entire county under Jackson County

Source: CPW analysis of Jackson County Assessor Data.

Risk Analysis

The Jackson County steering committee determined that the history of flood events is **high**, with at least four events occurring over the last 100 years. The maximum threat of a flood is **medium**, considering the percentage of population and property that could be impacted under a worst—case scenario.[19]

Floods in the past have caused multiple major injuries or death. The potential for future injuries or deaths is anticipated to remain similar to historic events. It is estimated that 10-25% of the county's population would be physically displaced by a flood, accounting for the number of homes located in or near floodplains, and there would be little impact on community social networks.[20]

Multiple facilities throughout the county anticipate mild damage due to a flood, estimated between $10 million and $100 million for hazard response, structural repairs and equipment replacement. In terms of commercial business, it is likely that less than 10% of businesses located in the county and surrounding area would experience commerce interruption for a period of months. Floods have the potential to inflict widespread damage to not only buildings but also the transportation network that may inhibit access to businesses. Lastly,

[19] Jackson County. NHMP Steering Committee. 2012.
[20] Ibid.

floods would likely have moderate impacts on less than 10% of the county's ecological systems, including, clean water, wildlife habitat, and parks.[21]

Community Hazard Issues

What is susceptible to damage during a hazard event?

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

Community Flood Issues

Human Life

Protection of human life is of primary importance. This issue is tied to several other community issues. Keeping homes safe from floodwaters will also help protect human life.

Critical Facilities/Lifelines

Jackson County is divided by Bear Creek, and the two major regional hospitals are located on the east side of the creek. If Bear Creek floods and blocks access across the valley, people on the west side of the valley will be cut off from the primary medical facilities in the county.[22] Additionally, fire, Emergency Medical Services (EMS), and law enforcement response could be severely limited if roads and bridges were made impassable due to floodwaters.

Private Property

Homes

For further information on Critical Facilities/Lifelines, contact Jackson County Office of Emergency Management (See County Resources in the Resource Directory).

Private homes that are built in flood prone areas are of particular concern. In 1996, flood damage to private property totaled one-third of damages statewide.[23] Jackson County had insurance claims that totaled nearly $1.5 million for the 1997 flood event.[24]

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[21] Ibid.
[22] Jackson County Natural Hazards Public Workshop, (April 26, 2001).
[23] February 1996 Flooding and Landslides and Stream Erosion in the State of Oregon, The Interagency Hazards Mitigation Team (1996) Oregon Military Department – Office of Emergency Management.
[24] Dennis Sigrist, Oregon Military Department – Office of Emergency Management, Jackson County Cumulative NFIP Loss Data, (February 2001).

Manufactured Homes

Statewide, the 1996 floods destroyed 156 housing units. Of those units, sixty-one percent were mobile homes and trailers.[25] Numerous manufactured home parks are located along Bear Creek in Jackson County; especially of concern are homes within Shady Cove. Many older manufactured home parks are located in floodplain areas. Manufactured homes have a lower level of structural stability compared to traditional lumber-built homes. Manufactured homes in floodplain zones should be anchored to provide additional structural stability during flood events. However, because of confusion in the late 1980's resulting from multiple changes in NFIP regulations, there are areas of the county that did not consistently enforce anchoring requirements. Lack of consistent enforcement of manufactured home construction standards in floodplains can contribute to severe damages from flood events.[26]

All new manufactured homes in the County floodplain must be installed using methods and practices to minimize flood damage, as specified in the Jackson County Land Development Ordinance.

Businesses

The economic losses due to business closures often total more than the initial property losses that result from flood events. Business owners and their employees are significantly impacted by flood events. Direct damages from flooding are the most common impacts, but indirect damages, such as diminished clientele, can be just as debilitating to a business. Following the January 1997 flood, businesses in Ashland suffered direct damage from high water, and reduced water service resulting from damage to the public water system.

Public Infrastructure Flood Issues

Buildings and Roads

During the 1997 flood event, statewide, damages to public buildings represented 34% of total public losses.[27] Public buildings such as libraries, schools and government buildings are of concern to the county due to their potential utility in the event of a flood. These buildings can be used as temporary locations for medical and emergency housing services.

Road systems are important to the local economy, and during hazard events, resilient road connections are critical for providing essential and emergency services. Roads are maintained by multiple jurisdictions. Federal, state, county, and city governments all have a stake in protecting roads from flood damage. Road networks in Jackson County frequently cross floodplain and floodway areas.

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[25] The Interagency Hazards Mitigation Team February 1996 Flooding and Landslides and Stream Erosion in the State of Oregon, (1996).
[26] Ibid.
[27] Ibid.

Bridges

Bridges are key points of concern during flood events for two primary reasons:

1. Bridges are often important links in road networks, crossing watercourses or other significant natural features.

2. Bridges can be obstructions in the floodway, collecting debris and inhibiting the flow of water during flood events. This can cause water to back up and inundate areas upstream from the bridge that would not otherwise be affected. Also, this build-up of water can suddenly release, causing a flash flood of larger magnitude downstream.

Image of 1997 effort to remove trees from Ashland Creek
Source: Mail Tribune, (1997)

In Ashland, the bridge that crosses Ashland Creek in Lithia Park was at risk during the 1997 flood event. The bridge obstructed the flow of water and began collecting trees and other debris flowing down the stream. During the flood, a piece of heavy equipment was used to catch and remove trees as they floated downstream towards the bridge. After the flood event the bridge required significant repair work, and was upgraded.

Wastewater and Drinking Water Systems

Flood events significantly impact drinking water and waste water systems. When sewer systems are inundated with floodwaters, raw sewage can be flushed into the waterways, posing a significant health hazard. Additionally, drinking water supplies can be contaminated with flushed wastewater or high levels of solids (eroded soil for example), and made unsafe for consumption. Both water and sewage systems often require significant repair and maintenance work following a flood event.

Following the 1997 floods, the City of Ashland was without a functional drinking water system for several weeks while repair and sanitization work was performed. Businesses that depended on the Ashland water supply were unable to operate, and their employees were without work.

Storm Water

Storm water systems collect and concentrate rainwater and rapidly deliver it into the local waterway. This infusion of water causes increased flows downstream. During large rainstorms and flood events, these systems are pushed past their capacity and storm water begins flowing over-ground, causing other infrastructure damage. Traditional storm water systems are a benefit to urban areas by quickly removing captured rainwater, however, they can be detrimental to areas downstream.

Other problems often develop where open ditches enter culverts or go underground into storm water systems. An obstruction at these intersections causes overland water flow. The filling of ditches and swales near buildings can inhibit or prevent the flow of water can

compound these problems. Inadequate maintenance, especially following leaf accumulation in the fall, can also contribute to the flood hazard in urban areas.

Parks and Open Space

Public parks and publicly owned open space can provide a buffer between flood hazards and private property. Wetlands in public ownership can reduce flood impacts by absorbing floodwaters and buffering water level fluctuations.

Power Supply

Flooding also significantly impacts electrical supply systems. Floodwaters short-out electrical lines and cause transformers to fail. Additionally, debris transported by floodwaters can knock down power poles and put live, high-voltage lines in the water, posing a serious electrocution hazard to people.

Communications/Phone Lines

Telephone and cable lines are similarly susceptible to floodwaters and floating debris. Underground lines are more resistant to flood damage, but often are exposed and damaged by swift currents.

Existing Hazard Mitigation Activities

There are numerous programs currently under way in Jackson County designed to mitigate the affects of flooding. These programs range from federally funded national programs to individual projects by landowners. This section outlines the major mitigation activities underway in Jackson County.

Federal Programs

The National Flood Insurance Program (NFIP)

The NFIP is a federal program administered by the Federal Emergency Management Agency (FEMA). The function of the NFIP is to provide flood insurance to homes and businesses located in floodplains at a reasonable cost, and to encourage the location of new development away from the floodplain. The program maps flood risk areas, and requires local implementation to reduce the risk, primarily through restricting new development in floodplains. The maps are known as Flood Insurance Rate Maps (FIRM). Jackson County's FIRM was last updated in May 2011.[28] Jackson County is a participating community in the NFIP. The total claims from this program in Jackson County are shown in Table FL.2. It is important to note that property located outside the SFHA may still be subject to severe flooding. FEMA reports that 25% to 30% of all flood insurance claims are from owners of property located in low to moderate-risk areas located outside of the SFHA.

Community Rating System (CRS)

Another program under the NFIP is the Community Rating System (CRS). This voluntary program recognizes and rewards efforts that go beyond the minimum standards of the NFIP. This recognition is in the form of reduced flood insurance premiums for communities that adopt such standards. CRS encourages voluntary community activities that reduce flood losses, facilitate accurate insurance rating, and promote flood insurance awareness.

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[28] FEMA, Flood Insurance Study: Jackson County, Oregon and incorporated Areas, May 2011. And, DLCD, Oregon Risk MAP. http://www.oregonriskmap.com.

The Community Rating System places the county's flood outreach efforts and management practices at a Class 7 rating; ratings for the participating cities are shown in Table FL.2. The CRS rating for the county has improved from a Class 8, since the most recent NHMP Update. As a result of the county improving to a Class 7, flood insurance premium rates for Jackson County policy holders are discounted 15% to reflect the reduced flood risk resulting from the county's flood hazard mitigation actions.[29] For CRS participating communities, flood insurance premium rates are discounted in increments of 5%; i.e., a Class 1 community would receive a 45% premium discount, while a Class 9 community would receive a 5% discount.[30]

Table FL.4 below illustrates how the CRS point system is broken down. Jackson County enrolled in the CRS program in 1995 and has engaged in voluntary mitigation activities since then. The county is currently going through a Community Assistance Visit (CAV).[31] The CAV is performed by FEMA to assess how well the community is administering its local flood-plain ordinance.

Table FL.4 Summary of Points and Insurance Rate Discounts Under CRS

Credit Points	Class	Premium Reductions
0-499	10	0%
500-999	9	5%
1000-1499	8	10%
1500-1999	7	15%
2000-2499	6	20%
2500-2999	5	25%
3000-3499	4	30%
3500-3999	3	35%
4000-4599	2	40%
4500+	1	45%

Source: FEMA, National Flood Insurance Program, http://www.fema.gov/national-flood-insurance-program

Hazard Mitigation Grant Program (HMGP)

The HMGP is administered by the Federal Emergency Management Agency (FEMA) and provides grants to state and local governments to implement long- term hazard mitigation measures after a federal disaster declaration. It is important to stress that the HMGP is available only after the president has issued a federal disaster declaration.

Following the flood event of 1997, Jackson County received a presidential disaster declaration and applied to the HMGP program. The funding that Jackson County received was applied to a variety of projects throughout the county. An example of the types of projects already completed or underway are described below:

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[29] Federal Emergency Management Agency Community Status Report Book - Oregon: Communities Participating in the National Flood Program. 2010

[30] Ibid.

[31] Source: Shirley, Chris. Oregon Floodplain Coordinator "Sent from Snipping Tool: Federal Emergency Management Agency, Disaster Report – Oregon, Flood Insurance - Detail." Message to Michael Howard. August 20, 2012. Email.

- Jackson County – Developed a flood warning project for Bear Creek
- Rogue Valley Council of Governments – Developed education and training programs
- City of Talent – Acquired properties in the floodplain along Wagner Creek and developed a Storm Water Management and Flood Mitigation Action Plan
- City of Ashland – Upgraded the Windburn Way Bridge over Ashland Creek
- City of Eagle Point – Engaged in natural hazard mitigation planning, property acquisition, and home elevation

State Programs

State Land Use Planning Goals

There are 19 statewide planning goals that guide land use in the State of Oregon. One goal in particular focuses on land use planning and natural hazards:

Goal 7: Areas Subject to Natural Disasters and Hazards, requires local governments to identify hazards and adopt appropriate safeguards for land use and development.[32] This goal is currently under review. In the wake of 1996 flood events, the governor directed state agencies to mitigate natural hazards. The Community Service Center at the University of Oregon conducted a review of Goal 7 and identified gaps in information. New information on hazards needed to be incorporated into local policies and there was no consistent evaluation of risk to people and property being conducted in the state. The Goal 7 revision also updated the list of hazards and terminology. The DLCD conducted eleven workshops across the state to get comments on proposed changes. Revisions to Goal 7 were adopted September 28, 2001 (effective June 1, 2002). Goal 7 revisions advocate the continuous incorporation of hazard information in local land use plans and policies.

County Programs

Land Development Code - Floodplain Overlay

Community participation in the NFIP requires the adoption and enforcement of a local floodplain management ordinance that controls development in the floodplain. Jackson County and the cities of Ashland, Eagle Point, Rogue River and Shady Cove participate in the National Flood Insurance Program (NFIP). Communities participating in the NFIP may adopt regulations that are more stringent than those contained in 44 CFR 60.3, but not less stringent.[33]

This type of ordinance is currently in effect in Jackson County and each of the participating cities. The county Floodplain Overlay ordinance was first implemented on September 1, 1973, and was most recently amended in 2010.[34] In Jackson County all homes and other buildings legally constructed in the special flood hazard area must be mitigated to NFIP standards with the first floor being elevated at least one foot above base flood level, or in the case of non-residential buildings, flood proofed to at least one foot above the base flood level. The cities of Ashland, Eagle Point, Rogue River and Shady Cove also have floodplain ordinances.

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[32] Hazard Mitigation Workshop, Department of Geology and Mineral Industries, Salem, Oregon, (May 1, 2001).
[33] FEMA, Region 10. Floodplain Management: a Local Administrator's Guide to the National Flood Insurance Program.
[34] Ordinance 2010-2a, effective 6-26-11

Bear Creek Greenway Plan

This program strives to create an open-space/natural area along the Bear Creek drainage, in the heart of Jackson County. This open space assures that buildings are not located in the flood plain, and allows floodwaters to expand laterally without causing significant damage to homes and businesses. Jackson County has succeeded in establishing segments of the greenway along Bear Creek. Moreover, acquisition of additional land for the greenway is an ongoing activity.

Floodplain Development

To minimize damage to structures during flood events, the county requires all new construction in the floodplain to get a floodplain development permit. The permit requires development to be anchored against movement by floodwaters, resistant to flood forces, constructed with flood resistant materials, and flood-proofed or elevated so that the first floor of living space, as well as all mechanical and services, is at least one foot above the elevation of the 100-year flood. These standards apply to new structures and to substantial improvements of existing structures. Critical facilities are required to the extent possible outside of the special flood hazard area. Other types of development within the floodplain, such as, grading, cut and fill, installation of riprap, and other bank stabilization techniques also require a floodplain development permit.[35]

Elevation Certificate Maintenance

Elevation certificates are administered by Development Services and are required for buildings constructed in the floodplain in order to demonstrate that the building is elevated adequately to protect it from flooding.[36] The Elevation Certificate is an important administrative tool of the National Flood Insurance Program (NFIP). It is used to determine the proper flood insurance premium rate; it can be used to document elevation information necessary to ensure compliance with community floodplain management regulations; and it may be used to support a request for a Letter of Map Amendment (LOMA) or Letter of Map Revision based on fill (LOMR-F). Jackson County has Elevation Certificates on file for many of the properties that have developed.

FEMA Flood Map Modernization Program

Jackson County was selected to receive Digital Flood Insurance Rate Maps (DFIRMs) in addition to the traditional paper format. The countywide Digital Flood Insurance Rate Map (DFIRM) conversion for Jackson County consisted of three major efforts[37]:

1) New detailed studies of Daisy, Elk, Griffin, Horn, Jackson, and Mingus Creeks within the City of Central Point;

2) The digital conversion of effective floodplain mapping throughout the County. The digital conversion included the re-delineation of effective floodplain hazard areas using newly obtained topographic data within the Cities of Ashland, Central Point, Medford, Phoenix, Rogue River, and Shady Cove; and

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[35] Jackson County. Land Development Ordinance. Chapter 7.2. – Floodplain Overlay. http://www.co.jackson.or.us/Files/Chapter%207%20-%20LDO.pdf
[36] Ibid.
[37] DLCD, Oregon Risk MAP. http://www.oregonriskmap.com

3) The straight digital conversion, or capture, of flood hazards in areas without new topographic data. As part of the digitization process minor modifications were made to floodplain boundaries to improve mapping accuracy and alignment based on comparison to recent aerial photography.

Stormwater Management

Jackson County seeks to reduce the impacts of flooding through the implementation of the Stormwater Management Program (SWMP). The SWMP promotes environmental stewardship, preserves and enhances stream corridors, balances water quantity and quality and identifies community outreach strategies. The SWMP reduces flooding throughout the county and cities of Central Point, Phoenix and Talent by integrating flow control facilities into the drainage system network. These stormwater management practices influence stormwater infiltration and can delay peak stream flow. [38] The cities of Ashland, Eagle Point, Rogue River and Shady Cove have stormwater management plans that consider water quantity and flooding concerns.

Flood Mitigation Action Items

The following actions have been identified by the Jackson County, Ashland, Eagle Point, Rogue River and Shady Cove steering committees, and are recommended for mitigating the potential effects of flood in the various identified jurisdictions. Below you will find a brief description, title, of the action items, see full action item worksheets in Appendix A for a full description of the action items.

Jackson County

FL#1: Continue to coordinate with appropriate agencies, and maintain an inventory of all aggregate operations adjacent to or within the floodplain to ensure operations protect streams.

FL#2: Maintain an inventory of all permitted dams in Jackson County

FL#3: Conduct workshops for target audiences on National Flood Insurance Programs, mitigation activities, and potential assistance from FEMA's Flood Mitigation Assistance and Hazard Mitigation Grant Programs.

FL#4: Update the Flood Insurance Rate (FIRM) Maps for Jackson County as funding becomes available.

FL#5: Encourage private property owners to restore natural systems within the floodplain, and to manage riparian areas and wetlands for flood abatement.

FL#6: Use federal grant funds to acquire or elevate individual properties adjacent to/ within 100-year floodplain as opportunities arise.

FL#7: Continue to increase Jackson County's CRS (Community Rating System) rating over time through activities outlined by FEMA.

FL#8: Preserve water quality by using storm water best management practices.

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[38] Rogue Valley Sewer Services. Stormwater Management Program. 2012. http://www.rvss.us/DEQ_Reports.html

Ashland

FL#1: Flood Hazard Awareness Campaign.

Eagle Point

FL#1: Inform the public about the National Flood Insurance Program and ensure compliance through enforcement of local floodplain management ordinances.

FL#2: Continue to implement and enhance the public flood protection and education program.

FL#3: Encourage participation in the NFIP's Community Rating System (CRS).

FL#4: Promote and enhance the use of natural flood prone open space or wetlands as flood storage areas.

FL#5: Promote and enhance the use of natural flood prone open space or wetlands as flood storage areas.

FL#6: Stormwater Management

Rogue River

FL#1: Continue to implement and enhance the public folld protection and education program.

FL#2: Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.

FL#3: Continue participation in the NFIP's Community Rating System (CRS).

FL#4: Promote and protect the use of naturally flood prone open space or wetlands as flood storage areas.

FL#5: Stormwater management.

FL#6: Protect city facilities in flood prone areas.

Shady Cove

FL#1: Conduct workshops for target audiences on National Flood Insurance Programs, mitigation activities, and potential assistance from FEMAs Flood Mitigation Assistance and Hazard Mitigation Grant Programs.

FL#2: Encourage private property owners to restore natural systems within the floodplain, and to manage riparian areas and wetlands for flood abatement.

FL#3: Preserve water quality by using stormwater best management practices (BMP).

FL#4: Continue compliance with the Natural Flood Insurance Program (NFIP).

Jackson County
Flood Resource Directory

County Resources

Jackson County Emergency Management

Jackson County Emergency Management helps the community be better prepared for major emergencies and disasters. They work closely with cities, emergency responders, and volunteer agencies to find ways to reduce risks and minimize damages during hazard events. When a disaster occurs, they work with these partners in their Emergency Operations Center to coordinate resources and information. Once the event is over, they help bring assistance to those that have been harmed.

Contact: Jackson County Emergency Management Coordinator
Address: 10 South Oakdale, Medford, Oregon 97501
Phone: (541) 774-6821
Fax: (541) 774-6705
Website: http://www.co.jackson.or.us/sectionindex.asp?sectionid=28

Regional Resources

National Weather Service, Medford, Oregon

The National Weather Service Office in Medford provides weather warnings and forecasts for southern Oregon and northern California.

Contact: National Weather Service
Address: 4003 Cirrus Drive, Medford, OR 97504
Phone: (541) 773-1067
Website: http://www.wrh.noaa.gov/mfr/

American Red Cross, Rogue Valley Chapter

Services provided by the American Red Cross include emergency assistance, disaster relief, and health and safety courses.

Contact: Executive Director
Address: 60 Hawthorne Street, Medford, OR 97504
Phone: (541) 779-3773
Fax: (541) 772-7212
Email: info@soredcross.org
Websites:
http://www.soredcross.org/index.php?option=com_content&view=featured&Itemid=204

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. DLCD also serves as Oregon's federally designated agency to coordinate floodplain management in Oregon. DLCD maintains contact with flood prone communities throughout the state in order to help them meet the requirements of the NFIP and to ensure that they are prepared in case of flood. DLCD offers information on the NFIP, CRS and other FEMA-related programs. They also offer training courses on various flood mitigation programs.

Contact: 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/pages/index.aspx
Oregon Floodplain Coordinator: (503) 373-0050 ext. 250

State Division of Building Codes, Department of Consumer and Business Services

The Oregon Building Codes Division (BCD) adopts statewide standards for building construction that are administered by the state and local municipalities throughout Oregon. To find out more information about codes that affect development in floodplains contact BCD or your local building department.

Contact: Building Codes Division
Address: 1535 Edgewater Street NW, P.O. Box 14470, Salem, OR 97309-0404
Phone: (503) 378-4133
Fax: (503) 378-2322
Website: http://www.cbs.state.or.us/bcd/

Oregon Military Department (OMD) - Office of Emergency Management (OEM)

In relation to Senate Bill 12 and rapidly moving landslide hazards, OEM coordinates state resources for rapid and effective response to landslide-related emergencies. The Oregon Emergency Response System (OERS) of OEM is a key player in the dissemination of debris flow advisories and warnings. OEM chairs a group that develops and measures landslide hazard mitigation strategies. OEM administers the FEMA Hazard Mitigation Grant Program, which provides a source of funding for implementing hazard mitigation projects. OEM also works with other state agencies to develop information for local governments and the public on landslide hazards.

Contact: Oregon Military Department – Office of Emergency Management
Address: 3225 State Street, Salem, Oregon 97301
Phone: (503) 378-2911
Fax: (503) 373-7833
Website: http://www.oregon.gov/OMD/OEM/Pages/index.aspx

Oregon Department of Fish and Wildlife (ODFW)

ODFW can provide assistance to local governments in evaluating the effects of floodplain and floodway development on fish and wildlife species and habitat. In particular, your community should contact area Fish and Wildlife staff to help review floodway development permits. To obtain information on area office location, use the following contact information.

Address: 3406 Cherry Ave NE, Salem, Oregon 97303
Phone: (503) 947-6000
Website: http://www.dfw.state.or.us

State of Oregon Water Resources Department (WRD)

WRD manages the state's Dam Safety Program. Dam failures, though uncommon, can result in catastrophic flooding. WRD can provide technical assistance to local governments on issues of dam safety.

Address: 725 Summer St. NE, Salem, OR 97301
Phone: (503) 986-0900
Fax: (503) 986-0904
Website: http://www.wrd.state.or.us

Oregon Watershed Enhancement Board (OWEB)

OWEB is a potential funding source for communities wanting to do flood mitigation projects and other watershed activities/improvements. The mission of the Oregon Watershed Enhancement Board is to promote and implement programs to restore, maintain and enhance watersheds in the State of Oregon in order to protect the economic and social well being of the state and its citizens. Contact OWEB directly for more information on its grant programs.

Contact: Oregon Watershed Enhancement Board
Address: 775 Summer St. NE, Salem, Oregon 973101
Phone: (503) 986-0178
Fax: (503) 986-0199
Website: http://www.oweb.state.or.us/index.shtml

USGS Stream Flow Information for Oregon

This website created by the U.S. Geological Survey provides "real time streamflow" maps to track short term changes (over several hours) in rivers and streams. Additional information includes daily, 7-day average, and below normal stream flow. Links include the National Weather Service river conditions, Oregon water resources, and flood information. The Oregon USGS office is responsible for water- re-sources investigations for Oregon and part of southern Washington. Their office cooperates with more than forty local, state, and federal agencies in Oregon. Cooperative activities include water-resources data collection and interpretive water-avail-ability and water-quality studies.

Contact: U.S. Geological Survey, Oregon Water Science Center
Address: 2130 SW 5th Ave, Portland, Oregon 97201
Phone: (503) 251-3200
Fax: (503) 251-3470
Website: http://or.water.usgs.gov/

Division 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 allow 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 U.S. Army Corps of Engineers may issue these permits jointly. Contact the DSL with specific questions regarding this permit process.

Contact: Division of State Lands
Address: 775 Summer Street NE, Suite 100, Salem, OR 97301-1279
Phone: (503) 986-5200
Fax: (503) 378-4844
Website: http://www.oregon.gov/DSL/pages/index.aspx
Assistant Director: (503) 986-5279
Western Region Manager: (503) 986-5308

National Resources and Programs

Federal Emergency Management Agency (FEMA)

FEMA provides maps of flood hazard areas, various publications related to flood mitigation, funding for flood mitigation projects, technical assistance, and also operates the National Flood Insurance Program. FEMA's mission is "to reduce loss of life and property and protect our 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: 130-228th St. SW, Bothell, WA 98021-9796
Phone: (425) 487-4678
Website: http://www.fema.gov
To obtain FEMA publications, website: http://www.fema.gov/about-fema-library

Army Corps of Engineers

The Army Corps of Engineers administers a permit program to ensure that the nation's waters 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. For more specific information on this permitting program and how it affects your community contact the Portland district office.

Contact: U.S. Army Corps of Engineers, Floodplain Information Branch
Address: P.O. Box 2946/333 SW First Ave, Portland, OR 97208-2946
Phone: (503) 808-4874
Fax: (503) 808-4875
Website: http://www.nwp.usace.army.mil/

National Weather Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce - NOAA

The National Weather Service mission is to provide weather and flood watches and warnings, and public forecasts and advisories primarily for the protection of life and property. The Weather Service collects, interprets and disseminates up-to-date hydrologic data including information of the magnitude and frequency of past and expected water flows. The Weather Service website provides current forecasts and warnings as well as a link to the Emergency Managers Weather Information Network. Oregon has three weather service stations: Portland, Pendleton, and Medford. The Boise station serves southeastern Oregon.

Contact: National Weather Service – Portland
Address: 5241 NE 122nd Avenue, Portland, OR 97230
Phone: (503) 261-9246
Website: http://www.wrh.noaa.gov/pqr/

Natural Resource Conservation Service (NRCS)

NRCS operates many programs dealing with the protection of floodplain resources. The two most closely related to flooding are the Watershed Surveys and Planning Program and the Flood Risk Reduction Program, administered through the Farm Service Agency. NRCS also provides technical assistance to property owners, including methods to reduce stream bank erosion. NRCS is a federal agency whose mission is to "provide leadership in a partnership effort to help people conserve, improve, and sustain our natural resources and environment."

Contact: Natural Resource Conservation Service, Oregon State Branch
Address: 1201 NE Lloyd Blvd, Suite 900, Portland, OR 97204-3221
Phone: (503) 414-3200
Fax: (503) 414-3240
Website: http://www.or.nrcs.usda.gov/

Information for Coping With Floods - North Dakota State University

This site, maintained by the North Dakota extension service, provides a thorough list of what to do before and after a flood. Topics include sandbagging, repairing your home, insurance, financial assistance, and cleaning woodwork.

Contact: NDSU Extension Service
Address: Morrill Hall 315, Box 6050, Fargo, ND 58108-6050
Phone: (701) 231-8944
Website: http://www.ag.ndsu.nodak.edu/flood/flood.htm/

Surf Your EPA Watershed Site- Information on Watershed Scale:

According to the EPA's surf your watershed site Jackson County crosses 7 watersheds. This site provides information on watershed health and environmental indicators for each watershed. Residents can find which watershed provides their drinking water and examine the health of the watershed, including toxic releases, hazardous wastes and superfund sites.

Contact: Surf Your Watershed, United States Environmental Protection Agency
Address: Office of Water (4100T), 1200 Pennsylvania Ave NW, Washington, D.C. 20460
Website: http://cfpub.epa.gov/surf/state.cfm?statepostal=OR

FEMA's List of Flood Related Web Sites

This site contains a long list of flood related Internet sites from "American Heritage Rivers" to "The Weather Channel," and is a good starting point for flood information on the Internet.

Website: http://www.fema.gov/environmental-planning-and-historic-preservation-program/useful-environmental-links

The National Flood Insurance Program

The National Flood Insurance Program (NFIP) Web site 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 much 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.

Website: http://www.fema.gov/national-flood-insurance-program

Office of Hydrology, National Weather Service

The National Weather Service's Office of Hydrology (OH) 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, and an Automated Local Flood Warning Systems Handbook, Natural Disaster Survey Reports, and other scientific publications on hydrology and flooding.

Websites: http://www.nws.noaa.gov/oh/

The Floodplain Management Association

The Floodplain Management Web site 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 avail-able, an index of publications available free or at nominal cost, a list of associations, a list of firms and consultants in flood-plain 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 Web site, and, of course, a copious catalog of Web links.

Website: http://www.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.

Website: http://www.norfma.org/

HazLit Database (University of Colorado, Boulder)

The Natural Hazards Research and Applications Information Center at the University of Colorado, Boulder provides this library, which houses one of the most extensive collections of social science hazards literature in the world. This non- lending library is an important resource for practitioners who need information on different aspects of hazards and disasters. The collection includes approximately 22,000 catalogued items, including books, serials, reports, journal articles, videotapes, and compact discs. The database is comprehensive and is an excellent resource for communities looking for information on hazards.

Website: http://www.colorado.edu/hazards/library

Recommended Flood Publications

The following list groups publications into three categories: primary, secondary, and technical. Documents listed as primary are those that every community should have in its resource library. Secondary documents are those that provide useful information to communities, but that may not be as easy to access. Technical documents are those that focus on a specialized aspect of flood hazard mitigation, and may require interpretation by a scientist or engineer.

Primary Resources

These documents represent the principal resources communities can use to better plan for flood hazards. They are key tools for reducing the risks associated with flood prone areas.

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

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 do in order 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.

To obtain this resource: http://www.fema.gov, call 1-(800) 621-3362, or call the CRS office in Indianapolis at (317) 848-2898.

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

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

To obtain this resource: call FEMA at (800) 621-3362.

Flood Hazard Mitigation Planning: A Community Guide. Massachusetts Department of Environmental Management. (June 1997)

This informative guide offers a ten-step process for successful flood hazard mitigation. Steps include: map hazards, determine potential damage areas, take an inventory of facilities in the flood zone, determine what is or is not being done about flooding, identify gaps in protection, brainstorm alternatives and actions, determine feasible actions, coordinate with others who are doing this, prioritize actions, develop strategies for implementation, and adopt and monitor the plan.

To obtain this resource: You may download an electronic version at http://www.mass.gov/dcr/stewardship/mitigate/hazguide.pdf. For a hard copy of this guidebook contact the Massachusetts Flood Hazard Management Program (FHMP) at (617) 292-5673.

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

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 areas, ice jam flooding and mudslides.

To obtain this document: call FEMA at 1-800-621-3362.

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

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.

To obtain this resource: A copy of this ordinance is on the DLCD's website:
http://www.oregon.gov/lcd/pages/index.aspx
or contact the Oregon DLCD for more information, (503) 373-0050.

Secondary Resources

These documents provide additional information and tools for reducing the risks associated with flood prone areas.

Answers to Questions About Substantially Damaged Buildings. FEMA-213. (May 1991).

Answers to Questions About the National Flood Insurance Program. FIA-2. (March 1992).

Community Flood Mitigation Planning Guidebook. Wisconsin Department of Natural Resources. (Nov 1995).

Cities Under Water. Raymond J. Burby. (1988) University of Colorado Institute of Behavioral Science.

Floodplain Management in Northern Illinois. Illinois Department of Natural Resources. (December 1996).

Homeowners Guide to Retrofitting. FEMA-312. (1998).

How to Use a Flood Map to Protect Your Property. FEMA-258. (May 1995).

Manufactured Home Installation in Flood Hazard Areas. FEMA-85 (September 1985).

Technical Resources

The documents listed here focus on the technical aspects of flood hazard mitigation. They may require interpretation by a technical specialist.

Engineering Principles and Practices for Retrofitting Flood Prone Residential Buildings. (1995)

Managing Floodplain Development in Approximate Zone A Areas- A Guide for Obtaining and Developing Base (100-year) Flood Elevations. FEMA-265. (July 1995)

Hazard Annex Landslide

Causes and Characteristics of Landslides

Landslides are a geologic hazard in almost every state in America. Nationally, landslides cause 25 to 50 deaths each year.[1] In Oregon, economic losses due to landslides for a typical year are estimated to be over $10 million.[2] In years with heavy storms, such as in 1996, losses can be an order of magnitude higher and exceed $100 million.[3] In Oregon, a significant number of locations are at risk to dangerous landslides. While not all landslides result in private property damage, many landslides impact transportation corridors, fuel and energy conduits, and communication facilities.[4] They can also pose a serious threat to human life.

Landslides can be broken down into two categories: (1) rapidly moving; and (2) slow moving, in addition to "on-site" or "off-site" hazards. Rapidly moving landslides are typically "off-site" (debris flows and earth flows) and present the greatest risk to human life, and persons living in or traveling through areas prone to rapidly moving landslides are at increased risk of serious injury. Rapidly moving landslides have also caused most of the recent landslide-related injuries and deaths in Oregon. Slow moving landslides tend to be "on-site" (slumps, earthflows, and block slides) and can cause significant property damage, but are less likely to result in serious human injuries.

Types of Landslides

Landslides are downhill or lateral movements of rock, debris, or soil mass. The size of a landslide usually depends on the geology and the landslide triggering mechanism. Landslides initiated by rainfall tend to be smaller, while those initiated by earthquakes may be very large. Slides associated with volcanic eruptions can include as much as one cubic mile of material.

Landslides vary greatly in the volumes of rock and soil involved, the length, width, and depth of the area affected, frequency of occurrence, and speed of movement. Some characteristics that determine the type of landslide are slope of the hillside, moisture content, and the nature of the underlying materials. Landslides are given different names depending on the type of failure and their composition and characteristics. Types of landslides include slides, rock falls, and flows. Figure LS-1 depicts major landslide features and Figure LS-2 illustrates different types of landslides.

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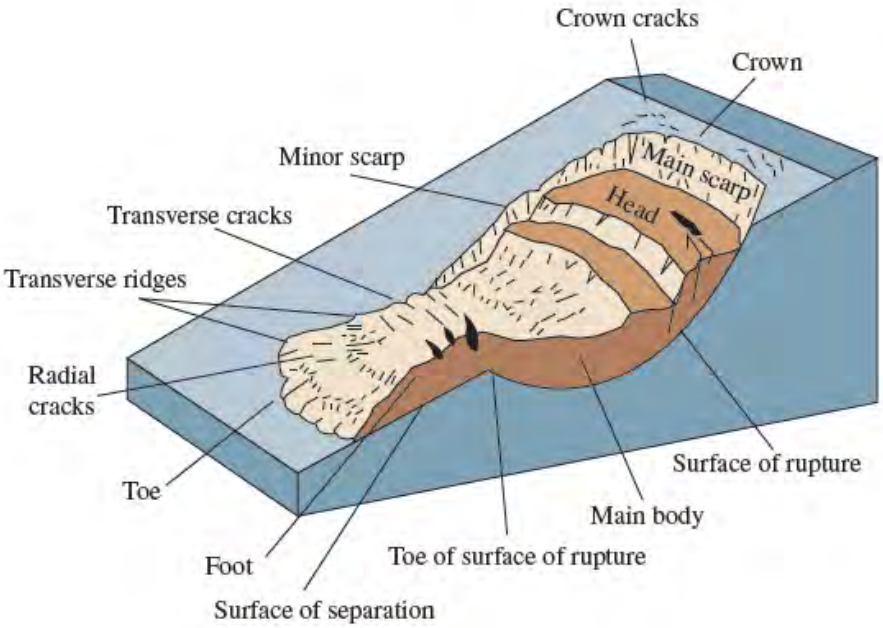
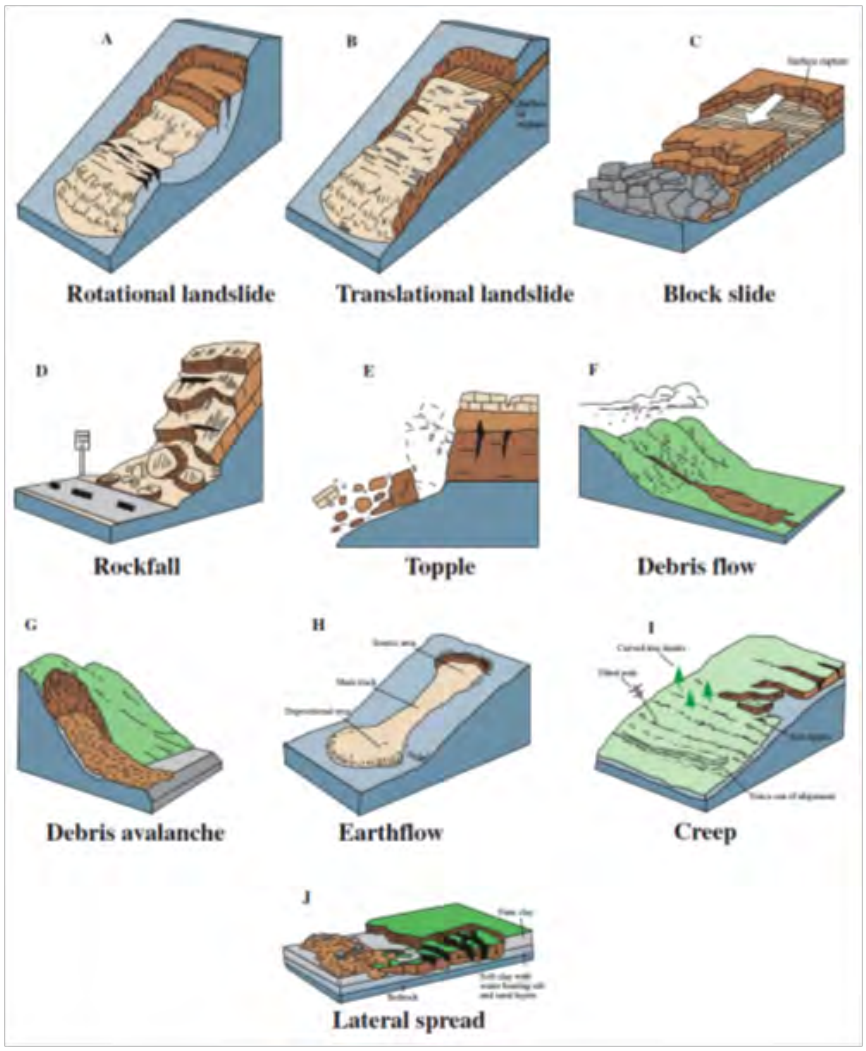
[1] Mileti, Dennis. 1999. Disasters by Design: A Reassessment of Natural Hazards in the United States. Washington D.C.: Joseph Henry Press.
[2] Wang, Yumei, Renee D. Summers, R. Jon Hofmeister, and Oregon Department of Geology and Mineral Industries. 2002. "Open-File Report O-02-05: Landslide Loss Estimation Pilot Project in Oregon." http://www.oregon.gov/LCD/docs/rulemaking/012308/item_1_Kehoe_att_b.pdf, accessed February 14, 2010
[3] Ibid.
[4] USGS Landslide Program Brochure, National Landslide Information Center, United States Geologic Survey.

Figure LS-1 Landslide Features



Source: USGS. Landslide Factsheet. http://pubs.usgs.gov/fs/2004/3072/. 2004

Figure LS-2 Landslide Types



Source: USGS. Landslide Factsheet. http://pubs.usgs.gov/fs/2004/3072/. 2004.

Slides

Slides move in contact with the underlying surface. These movements include rotational slides where sliding material moves along a curved surface and translational slides where movement occurs along a flat surface. These slides are generally slow moving and can be deep. Slow-moving landslides can occur on relatively gentle slopes and can cause significant property damage, but are far less likely to result in serious injuries than rapidly moving landslides.[5]

Erosion

Erosion occurs when ditches or culverts beneath hillside roads become blocked with debris. If the ditches are blocked, run-off from the slopes is inhibited during periods of

[5] Interagency Hazard Mitigation Team. 2012. Oregon Natural Hazards Mitigation Plan. Salem, OR: Oregon Military Department – Office of Emergency Management

precipitation. This causes the run-off water to collect in soil, and in some cases, cause a slide. Usually the slides are small (100 – 1,000 cubic yards), but they can be quite large.

Rock Falls

Rock falls occur when blocks of material come loose on steep slopes. Weathering, erosion, or excavations, such as those along highways, can cause falls where the road has been cut through bedrock. They are fast moving with the materials free falling or bouncing down the slope. In falls, material is detached from a steep slope or cliff. The volume of material involved is generally small, but large boulders or blocks of rock can cause significant damage. Rock falls have the potential to break off power poles located on hillsides.[6]

Flows

Plastic or liquid movements in which land mass (e.g. soil and rock) breaks up and flows during movement. Earthquakes often trigger flows.[7] Debris flows normally occur when a landslide moves downslope as a semi-fluid mass scouring, or partially scouring soils from the slope along its path. Flows are typically rapidly moving and also tend to increase in volume as they scour out the channel.[8] Flows often occur during heavy rainfall, can occur on gentle slopes, and can move rapidly for large distances.

Conditions Affecting Landslides

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

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

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

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[6] Eichorn, Ernie. Field Representative, Chemawa District, Bonneville Power Authority. Personal Interview. 10 November 2004.
[7] Robert Olson Associates. June 1999. Metro Regional Hazard Mitigation Policy and Planning Guide. Portland, OR: Metro.
[8] Ibid.

History of Landslides in Jackson County

Heavy and prolonged rains associated with major floods have been the most common factor triggering landslides in Jackson County. The 1997 New Year's Day flood resulted in over 200 landslides in the county. The 1955, 1964, and 1974 floods, caused primarily by rain over a heavy snowmelt, also triggered a significant number of landslides throughout the county. This discussion on past landslides in Jackson County focuses primarily on slides associated with the 1997 New Year's Day flood event.

The majority of landslides that occurred during the 1997 flood were fast moving debris flows located on steep, south facing slopes. The heavy rains associated with the flood increased the ground water levels. The soil in the area could not absorb the increases in water fast enough and this excess water eventually forced earth to move into a number of debris flows. There were also a significant number of slides, particularly slumps. Slumps require less saturation than debris flows and often result from roads that undercut steep slopes.

Landslides associated with the 1997 New Year's Day flood caused millions of dollars in damage to property and infrastructure. The Medford Mail Tribune reported a landslide in Ashland, which caused significant residential property damage.[9] Another landslide during the 1997 flood rendered the Talent Irrigation District unable to generate power for approximately six weeks.[10] Irrigation Districts often generate power in order to supplement their income and to keep water costs down. Finally, a landslide near the Butte Falls/Prospect area resulted in over one million dollars in damages while landslides along Dead Indian Memorial Road resulted in over $300,000 in damages.[11]

Table LS.1 shows the major slides that impacted Jackson County roads during the New Year's Flood of 1997, and the associated costs to repair those roads.[12]

Table LS.1. Major Landslide Damage – 1997 New Year's Day Flood Events

County Roads	Mile Point	Repair Cost
Butte Falls Prospect Road at Middle Fork	MP 19	$1,300,000
Butte Falls Road at Rocky Hill	MP 11	$70,000
Dead Indian Memorial Road	MP 6	$50,000
Dead Indian Memorial Road	MP 7	$320,000
Total	-	$1,740,000

Source: Jackson County Public Works 2001

[9] Dodge, Dani. "Developer wins uphill battle" Medford Mail Tribune July 1997.
[10] Fattig, Paul. "Irrigation District turns to power generation to cover costs." Medford Mail Tribune, December 20, 1997.
[11] Petrasek, Dale. Jackson County Engineer. Personal Interview. May 2001.
[12] Ibid.

Risk Assessment

How are Hazards Identified?

Geologic and geographic factors are important in identifying landslide-prone areas. Stream channels, for example, have major influences on landslides, due to undercutting of slopes by stream erosion and long-term hillside processes.

The Oregon Department of Forestry (ODF) Storm Impacts Study conducted after the 1996-97 landslide events found that the highest probability for the initiation of shallow, rapidly moving landslides was on slopes of 70 to 80 percent steepness. A moderate hazard of shallow rapid landslide initiation can exist on slopes between 50 and 70 percent.[13] DOGAMI recently conducted geologic mapping in the Bear Creek Valley included Ashland and Medford.[14] The map and database refine the understanding of the geologic conditions and will help with the assessment of regional seismic hazards and terrain susceptible to landslide[15]. Among the primary products are a geodatabase that contains detailed information on the geology of the region, a report, and a thematic geologic map.

In general, areas at risk to landslides have steep slopes (25 percent or greater,) or a history of nearby landslides. In otherwise gently sloped areas, landslides can occur along steep river and creek banks, and along ocean bluff faces. At natural slopes under 30 percent, most landslide hazards are related to excavation and drainage practices, or the reactivation of preexisting landslide hazards.

The severity or extent of landslides is typically a function of geology and the landslide triggering mechanism. Rainfall initiated landslides tend to be smaller, and earthquake induced landslides may be very large. Even small slides can cause property damage, result in injuries, or take lives.

Probability of Future Occurrence

The probability of rapidly moving landslide occurring depends on a number of factors, including 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 gauges and snow melt, and issues warnings as conditions warrant. Given the correlation between precipitation, snowmelt, 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.

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[13] Storm Impacts and Landslides of 1996 Final Report. (1999) Oregon Department of Forestry.

[14] Wiley, T.J., McClaughry, J.D., and D'Allura, J., 2011, Geologic database and generalized geologic map of Bear Creek Valley, Jackson County, Oregon: Oregon Department of Geology and Mineral Industries Open-File Report O-11-11, 75 p., scale 1:63,360.

[15] Ibid. http://www.oregongeology.org/pubs/ofr/p-O-11-11.htm

Geo-engineers with the Oregon Department of Forestry (ODF) estimate widespread landslides about every 20 years; landslides at a local level can be expected every two or three years.[16]

Based on the landslide history, the Jackson County steering committee determined that the probability of a landslide occurring is **high**, meaning that one event is likely in a 10-35 year period. This rating is consistent with the 2006 Jackson County Hazard Analysis.

Vulnerability Assessment

To a large degree, landslides are very difficult to predict. Vulnerability assessments assist in predicting how different types of property and population groups will be affected by a hazard.[17] The optimum method for doing this analysis at the city or county level is to use parcel-specific assessment data on land use and structures. [18] Data that includes specific landslide-prone and debris flow locations in the county can be used to assess the population and total value of property at risk from future landslide occurrences.

Landslides can impact major transportation arteries, blocking residents from essential services and businesses. Many aspects of the county are vulnerable to landslides. This includes land use and development patterns, the economy, population segments, ecosystem services, and cultural assets. The impacts to these community sectors are described in more detail in the hazard impacts section below.

The Jackson County steering committee determined that the county has a **low** vulnerability to landslides. A low rating means that less than 1% of the population, or regional assets, would be impacted by a landslide. This rating is consistent with the 2006 Jackson County Hazard Analysis.

Risk Analysis

The Jackson County steering committee determined that the history of landslide events is **high**, with at least four events occurring over the last 100 years. The maximum threat of landslides is **low**, considering the percentage of population and property that could be impacted under a worst—case scenario.[19]

Landslides in the past caused few minor injuries. However, the potential for injuries or deaths from past events or from similar events in other communities could escalate resulting in multiple minor injuries and a possible major injury. Jackson County estimates that less than 10% of the county's population could be physically displaced by a landslide, considering landslide events tend to have localized impacts; and there would be little to no impact on community social networks.[20]

Multiple facilities throughout the county anticipate mild damage due to a landslide, estimated at less than $1 million for hazard response, structural repairs and equipment replacement. In terms of commercial business, it is likely that less than 10% of businesses located in the county and surrounding area could experience commerce interruption for a

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[16] Mills, K. 2002. Oregon's Debris Flow Warning System. Cordilleran Section–98th Annual Meeting. Corvallis.
[17] Burby, R., ed. 1998. Cooperating with Nature. Washington D.C.: Joseph Henry Press.
[18] Burby, R., ed. 1998. Cooperating with Nature. Washington D.C.: Joseph Henry Press.
[19] Jackson County. NHMP Steering Committee. 2012.
[20] Ibid.

period of weeks. Landslide hazards have the potential to affect transportation and may inhibit access to businesses until roadways can be cleared. Lastly, landslides would likely have mild impacts on less than 10% of the county's ecological systems, including, clean water, wildlife habitat, and parks.[21]

The relative risk of a landslide is estimated by considering the probability of a landslide event and the severity of the outcome when an event occurs. On a scale of 1 to 25, with 1 being the lowest and 25 being the highest relative risk, landslide hazards in Jackson County are a score of 8.[22]

Community Hazard Issues

Community Landslide Issues

Acres of property may be damaged and buildings and homes destroyed by landslides. Landslides can cause associated dangers such as broken electrical, water, gas, and sewage lines, and disrupt roadways and railways. Finally, landslides can result in injury and loss of life.

Property Damage

Landslides can cause significant commercial and residential property damage. Landslides occur as "on-site" hazards and "off-site" hazards. On-site hazards occur on or near development areas. In general, slower moving landslides cause most of the property damage in urban areas. Off-site hazards typically begin on steep slopes at a distance from homes or developments, and are often rapidly moving. These rapidly moving landslides have caused most of the property damage in rural areas.[23] A severe landslide can result in financial ruin for affected property owners because landslide insurance (except for debris flow coverage) is unavailable.

Utility Infrastructure Damage

Damage to water, gas, electrical and sewer lines are another important problem resulting from landslides. These damages include not only the costs of replacing and repairing damaged facilities, but also the costs associated with the disruption of the utilities.

Roads and Railway Damage

Much of the economic loss caused by landslides is borne by federal, state and local agencies. Highway construction is an area where mitigation practices could have a dramatic effect on reducing the economic loss associated with landslides. Many of the practices of excavation and grading used in road construction contribute to slope instability.

The majority of slope failures (70%) that occurred in Jackson County during the 1997 flood events were adjacent to road cuts on steep slopes. More than 60 roads in Jackson County were noted as landslide blocked roads. Excavation practices were cited as the main cause for these particular slope failures. In addition, there was no attempt to re- vegetate the

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[21] Ibid.
[22] Oregon Military Department – Office of Emergency Management. Hazard Analysis Methodology, Relative Risk. 2009
[23] Interagency Hazard Mitigation Team. 2012. Oregon Natural Hazards Mitigation Plan. Salem, OR: Oregon Military Department – Office of Emergency Management

slopes after the road cuts were made. An important consideration, however, is that 77% of the slope failures caused by road cuts were located on south facing slopes where it is difficult for vegetation to grow and stabilize the soil.[24]

Death and Injury

Most of the death and injuries caused by landslides occur from rapidly moving landslides. Such landslides are impossible for people to outrun. The most common type of rapidly moving landslide is debris flow.[25]

Existing Hazard Mitigation Activities

The following activities are currently being carried out by local, regional, state, or national organizations.

Senate Bill 12

The 1997 Legislature passed Senate Bill 12 to address problems caused by landslides and debris flows. Provisions include:

1. Allowing the Oregon State Forester to prevent timber harvest or road construction in or below areas identified by the Department of Forestry as "high risk sites" and where homes or highways are in precarious locations.

2. Allowing road officials to close roads that pose a risk to human life because of landslides.

3. Requiring state agencies to develop, and local officials to distribute information about hazards of construction on sites that are vulnerable to landslides.

4. Establishing a 10-member Task Force on Landslide and Public Safety to assess the problem and develop a solution. It includes legislators and representatives from state natural resource agencies, boards of commission, local government, and the public.19

Debris Flow Mapping

Currently, two state agencies are involved in mapping debris flows: (1) the Oregon Department of Forestry and (2) the Department of Geology and Mineral Industries (DOGAMI). Senate Bill 12 requires that the Department of Geology and Mineral Industries, with cooperation from local governments and the Department of Forestry, identify and map landslide prone areas, or "further review areas." Senate Bill 12 defines a further review area as "an area of land in which further site specific review should occur before land management or building activities begin."[26] Mapping debris flow areas are especially relevant in Jackson County due to the area's topography (steep slopes) and the considerable number of debris flows that have occurred in the past.

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[24] Atkinson, Clinton. Landslide Mapping Results: Jackson County Oregon. (1998). Southern Oregon University.
[25] Interagency Hazard Mitigation Team. 2012. Oregon Natural Hazards Mitigation Plan. Salem, OR: Oregon Military Department – Office of Emergency Management
[26] Ibid.

Oregon Department of Forestry (ODF)

The Oregon Department of Forestry has provided a preliminary indication of debris flows (rapidly moving landslides) in Western Oregon. Their debris flow maps include locations subject to naturally occurring debris flows and include the initiation sites and locations along the paths of potential debris flows (confined stream channels and locations below steep slopes). These maps neither consider the effects of management-related slope alterations (drainage and excavation) that can increase the hazard, nor do they consider very large landslides that could possibly be triggered by volcanic or earthquake activity. Areas identified in these maps are not to be considered "further review areas" as defined by Senate Bill 12 (1999).[27] Information used to develop the ODF Debris Flow maps include:

- Digital elevation models at 30-meter resolution, based on U.S. Geological Survey data, were used to derive slope steepness and then to develop polygons for assigned hazards. Note that actual slopes are steeper than these digitally elevated models.
- Mapped locations of Tyee soil formation and similar sedimentary geologic units.
- Oregon Department of Forestry Storm Impacts and Landslides of 1996 study; debris flow initiation and path location data.
- Stream channel confinement near steep hill slopes based on U.S. Geological Survey Digital Raster Graphics.
- Historical information on debris flow occurrence in western Oregon (from Oregon Dept. of Forestry, U.S. Forest Service, DOGAMI, Bureau of Land Management, and the Oregon Department of Transportation).
- Fan-shaped land formations below long, steep slopes.
- Areas of highest intensity precipitation do not appear to be correlated with known areas of high and extreme debris flow hazard, so precipitation intensity was not used to develop risk (hazard) ratings.[28]

Oregon Department of Geology and Mineral Industries (DOGAMI)

The Oregon Department of Geology and Mineral Industries (DOGAMI) conducted field investigations and consolidated data on Oregon landslides associated with three flood events in 1996 and 1997. They collected evidence of over 9000 landslide and slope failure locations in the state. The generation of a statewide landslide inventory is intended to provide a means for developing and verifying hazard models as well as to facilitate various local efforts aimed at minimizing risk and damage in future storm events. The database includes a digital Geographic Information System file with landslide locations, a digital database with details on each landslide, and an accompanying report.[29]

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[27] Western Oregon Debris Flow Hazard Maps: Methodology and Guidance for Map Use. (1999).
[28] Ibid.
[29] Database of Slope Failures in Oregon for Three 1996/1997 Storm Events. Hofmeister, R.J. (2000). Oregon Department of Geology and Mineral Industries – Special Paper 34.

In addition to the slope failures report, DOGAMI is identifying and mapping further review areas. The further review areas identify where landslides have occurred and where landslides are likely to occur.[30]

Prohibition of Certain Forest Operations

As part of the requirements of Senate Bill 12, the Oregon Department of Forestry is currently administering the deferral of certain forest operations on landslide prone sites above homes and roads. The department's policy is that timber harvesting or road construction operations will be prohibited on land where landslides or debris flows pose a significant threat to human safety. Exceptions for salvage or other purposes are considered on an individual basis, but have been infrequent in keeping with the intent of preventing significant risks to human life.[31]

Debris Flow Warning System

The debris flow warning system was initiated in 1997 and involves collaboration between the Department of Forestry, DOGAMI, the Department of Transportation, local law enforcement, and National Oceanic and Atmospheric Administration (NOAA) Weather Radio and other media.

ODF meteorologists are responsible for forecasting storms that may trigger debris flows. Information is broadcast over NOAA Weather Radio, and on the Law Enforcement Data System. DOGAMI provides additional information on debris flows through the media. The Department of Transportation provides warning signs to motorists in landslide prone areas during high-risk periods.[32]

Landslide Brochure

The Department of Geology and Mineral Industries (DOGAMI) developed a landslide public outreach brochure in cooperation with several other state agencies. Forty thousand copies were printed in November 1997 and were distributed widely through building code officials, county planners, local emergency managers, natural resource agency field offices, banks, real estate companies, insurance companies, and other outlets. Landslide brochures are available from DOGAMI, the Office of Emergency Management (OEM), Oregon Department of Forestry (ODF), and the Department of Land Conservation and Development (DLCD).[33]

Oregon State Building Code Standards

The Oregon Building Codes Division adopts statewide standards for building construction that are administered by the state and local municipalities throughout Oregon. The One- and Two-Family Dwelling Code and the Structural Specialty Code contain provisions for lot grading and site preparation for the construction of building foundations.

Both codes contain requirements for cut, fill and sloping of the lot in relationship to the location of the foundation. There are also building setback requirements from the top and

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[30] Interagency Hazard Mitigation Team. 2012. Oregon Natural Hazards Mitigation Plan. Salem, OR: Oregon Military Department – Office of Emergency Management
[31] Ibid.
[32] Ibid.
[33] Ibid.

bottom of slopes. The codes specify foundation design requirements to accommodate the type of soils, the soil bearing pressure, and the compaction and lateral loads from soil and ground water on sloped lots. The building official has the authority to require a soils analysis for any project where it appears the site conditions do not meet the requirements of the code, or that special design considerations must be taken. ORS 455.447 and the Structural Code require a seismic site hazard report for projects that include essential facilities such as hospitals, fire and police stations and emergency response facilities, and special occupancy structures, such as large schools and prisons. This report includes consideration of any potentially unstable soils and landslides.[34]

Steep Slope Ordinances

The Cities of Ashland and Medford have both implemented steep slope ordinances to regulate development in hazard-prone areas. Senate Bill 12 also provides for a pilot program, under the guidance of the Department of Land Conservation and Development, to develop model ordinances, regulations and procedures for mitigation of hazards and for allowing the transfer of development rights.[35]

Jackson County Development Standards

Section 05.150 of the Jackson County Design, Development, and Access Standards states that the county may require consideration for road or building development by reasons of geological conditions, excessive surface erosion, expansive soils, steep slopes, unstable subsurface conditions, groundwater ponding and other dangerous conditions.

Section 05.160 states that grading and clearing for road and/or development purposes may be restricted or regulated if such grading can result in erosion or slide damage or other detrimental impacts.

Section 05.160 sets general criteria to minimize storm water runoff and land drainage problems.

Landslide Mitigation Action Items

The following actions have been identified by the Jackson County, Ashland, Eagle Point, Rogue River and Shady Cove steering committees, and are recommended for mitigating the potential effects of landslides in the various identified jurisdictions. Below you will find a brief description, title, of the action items, see full action item worksheets in Appendix A for a full description of the action items.

Jackson County

LS#1: Compile Relative Landslide Risk Maps for Jackson County.

LS#2: Increase public education related to landslide hazards by distributing landslide informational brochures.

LS#3: Investigate the development and implementation of a county landslide ordinance.

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[34] Planning for Natural Hazards: Oregon Technical Resource Guide. Community Planning Workshop. (July 2000). Chapter 5.
[35] Ibid.

Ashland

LS#1: Water Treatment Plant Relocation

Eagle Point

No Action Items Developed.

Rogue River

No Action Items Developed.

Shady Cove

No Action Items Developed.

Jackson County
Landslide Resource Directory

County Resources

Jackson County Emergency Management

Jackson County Emergency Management helps the community be better prepared for major emergencies and disasters. They work closely with cities, emergency responders, and volunteer agencies to find ways to reduce risks and minimize damages during hazard events. When a disaster occurs, they work with these partners in their Emergency Operations Center to coordinate resources and information. Once the event is over, they help bring assistance to those that have been harmed.

Contact: Jackson County Emergency Management Coordinator
Address: 10 South Oakdale, Medford, Oregon 97501
Phone: (541) 774-6821
Fax: (541) 774-6705
Website: http://www.co.jackson.or.us/sectionindex.asp?sectionid=28

Regional Resources

Department of Geology, Portland State University

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 includes 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, Portland, OR 97201
Phone: (503) 725-3022
Website: http://geology.pdx.edu

Southern Oregon University

The Geology and Environmental Studies programs at Southern Oregon University are involved in research related to the physical landscape in the region around Jackson County.

Contact: Southern Oregon University Geology Department
Address: 1250 Siskiyou Blvd, Ashland, OR 97520
Phone: (541) 552-6479
Website: http://www.sou.edu/envirostudies/geology/index.html

State Resources

Department of Land Conservation and Development (DLCD): Hazard Related Ordinances

The Department of Land Conservation and Development maintains a list of model hazard related ordinances. Landslide related ordinances are included for regions around the state including Deschutes County, Douglas County, Marion County and the City of Salem.

Website: http://www.oregon.gov/LCD/HAZ/pages/hazardrelatedordinances.aspx

Oregon Department of Forestry

In addition to its other functions, ODF regulates forest operations to reduce the risk of serious bodily injury or death from rapidly moving landslides directly 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, Medford Unit
Address: 5286 Table Rock Rd. Central Point, OR 97502
Phone: (541) 664-3328
Website: http://www.oregon.gov/odf/Pages/index.aspx

Oregon Department of Geology and Mineral Industries (DOGAMI) Statewide Landslide Information Database for Oregon (SLIDO-2)

DOGAMI is an important agency for landslide mitigation activities in Oregon. Some key functions of DOGAMI are development of geologic data for Oregon, 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 other private groups.

SLIDO release 2 is compilation of landslides in Oregon that have been identified on published maps. The database contains only landslides that have been located on these maps. Many landslides have not yet been located or are not on these maps and therefore are not in this database. This database does not contain information about relative hazards. The interactive map lets you view information on location, type, and other attributes related to identified landslides in Oregon.

Contact: DOGAMI
Address: 800 NE Oregon Street #28, Suite 965, Portland, Oregon 97232
Phone: (971) 673-1555
Website: http://www.oregongeology.org/sub/default.htm
Email: ian.madin@dogami.state.or.us

Nature of the Northwest, landslides

The Nature of the Northwest Information Center is operated jointly by Oregon Department of Geology and Mineral Industries and the USDA Forest Service. It 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, Suite 965, Portland, Oregon 97232
Phone: (971) 673-2331
Website: http://www.naturenw.org/geo-landslides.htm
Email: info@naturenw.org

Department of Land Conservation and Development (DLCD)

Oregon's Department of Land Conservation and Development administers a natural hazards program to assist local governments in meeting Statewide Planning Goal 7: Areas Subject to Natural Disasters and Hazards. Activities relating to landslide mitigation include:

- Distribution of model ordinances through which hazards can be mitigated. DLCD advises local governments on which ordinance best meets their needs;
- Reviewing local land use plan amendments for consistency with state landslide programs and regulations and providing direct technical assistance;
- Providing a liaison between pertinent local, state, and federal agencies. DLCD representatives serve on a variety of commissions and ad hoc committees which deal with natural hazards;
- Adopting and amending Statewide Planning Goals; and
- Administrative rules relating to natural hazards.

Contact: Natural Hazards Program Manager
Address: 635 Capitol Street NE, Suite 150, Salem, Oregon 97301
Phone: (503) 373-0050 ext 250
Fax: (503) 378-5518
Website: http://www.oregon.gov/LCD/HAZ/Pages/index.aspx

Oregon Military Department (OMD) - Office of Emergency Management (OEM)

In relation to Senate Bill 12 and rapidly moving landslide hazards, OEM coordinates state resources for rapid and effective response to landslide-related emergencies. The Oregon Emergency Response System (OERS) of OEM is a key player in the dissemination of debris flow advisories and warnings. OEM chairs a group that develops and measures landslide hazard mitigation strategies. OEM administers the FEMA Hazard Mitigation Grant Program, which provides a source of funding for implementing hazard mitigation projects. OEM also works with other state agencies to develop information for local governments and the public on landslide hazards.

Contact: Oregon Military Department – Office of Emergency Management
Address: 3225 State Street, Salem, Oregon 97301
Phone: (503) 378-2911
Fax: (503) 373-7833
Website: http://www.oregon.gov/OMD/OEM/Pages/index.aspx

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/bcd/

Oregon Department of Transportation (ODOT)

ODOT constructs and maintains road transportation networks across the state. For further information on state roads and landslides in Jackson County, contact the ODOT Region 3 office in Roseburg.

Contact: ODOT Main Office
Address: 355 Capitol St. NE Room 135, Salem OR 97301
Phone: (888) 275-6368
Fax: (503) 986-3432
Website: http://www.oregon.gov/ODOT/HWY/REGION3/Pages/index.aspx

National Resources and Programs

National Landslide Information Center; US Geological Survey

Their 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
Address: Mail Stop 966, Box 25046, Denver Federal Center, Denver, Colorado 80225
Phone: (800) 654-4966
Website: http://landslide.usgs.gov/nlic/

Federal Emergency Management Agency, Landslide and Debris Flow information.

Landslide and mudflows usually strike without warning. The force of rocks, soil, or other debris moving down a slope can devastate anything in its path. The websites focus on strategies to reduce risk and prevent loss from landslides and debris flows.

Website: http://www.ready.gov/landslides-debris-flow

American Planning Association, Landslide Hazards and Planning

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 early in the planning process so as to minimize exposure to landslide risks.

Website: http://www.planning.org/nationalcenters/hazards/
Report: Planning for Landslide Hazards and Planning (No. 533/534, September 2005)

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, Medford Branch
Address: 573 Parsons Dr, Suite 101, Medford, Oregon 97501
Phone: (541) 776-4270
Fax: (541) 776-4295
Website: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/home

Recommended Publications

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

Produced by the Community and Planning Workshop for the Department of Land Conservation and Development (DLCD), 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, DLCD
Address: 635 Capitol Street NE, Suite 150, Salem, Oregon 97301
Phone: (503) 373-0050 ext. 250
Fax: (503) 378-5518
Email: christine.shirley@state.or.us
Website: http://www.oregon.gov/LCD/HAZ/pages/publications.aspx

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

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, disasters, recovery, and mitigation; reveals how research findings have been translated into policies and programs; and advances a sustainable hazard mitigation research agenda. The book summarizes and sets the stage for other more detailed and topic specific volumes in the series.

URL Link: http://www.colorado.edu/hazards/publications/disastersbydesign.html

Bibliography:
http://www.colorado.edu/hazards/publications/bibliography_disastersbydesign.html

Planning for Hillside Development, Olshansky, Robert B. (1996) American Planning Association Planning Advisory Service Report #466

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

URL Link: http://www.planning.org/apastore/Search/Default.aspx?p=2392

Unstable Ground: Landslide Policy in the United States. Olshansky, Robert B. and Rogers, J. David. (1987) Ecology Law Quarterly page 939

This article is about the history and policy of landslide mitigation in the United States.

To obtain this resource: Contact your local library

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

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

Contact: USGS- MS 966, Box 25046, Federal Center, Denver, CO 80225
Phone: (800) 654-4966
Email: highland@usgs.gov
Website: http://landslides.usgs.gov/learning/ls101.php

Severe Winter Storm and Windstorm Hazard Annex

Jackson County is threatened by hazards generated from weather conditions almost every year. Storms bring heavy rains, strong winds, and occasionally ice and snow. Flooding and landslides can also accompany severe storms. Damaging storms are most common from October through April. Severe storms can create conditions that disrupt essential regional systems such as public utilities, telecommunications, and transportation routes. Wind, snow, and ice associated with winter storms can knock down or otherwise damage trees, power lines, and utility services. Freezing winter temperatures can damage agricultural crops and utilities. Lightning poses a risk to life and can result in property damage. Weather hazards cause damage to private property and public infrastructure, and occasionally cause injury or death.

Causes and Characteristics of Severe Winter Storm and Windstorm

Storms affect all parts of Jackson County. However, the varied elevations and topography of the County mean that the impact of a storm is variable depending on the location. The Cascade Mountains along the eastern border of the County, and the Siskiyou and Klamath Mountains to the south, regularly receive the highest amounts of rainfall and snowfall, and the strongest wind gusts in the County. The mountains to the south and west often bear the brunt of storms and provide some shelter to the lower, more populated valleys.

The most frequent weather related hazards in the Rogue Valley and other low-elevation areas of Jackson County are rain, wind, and freezing temperatures. Occasionally, freezing temperatures combine with moisture to produce snow and ice. Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms affecting Jackson County typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from October through March.[1]

Climate

The National Climatic Data Center has established climate zones in the United States for areas that have similar temperature and precipitation characteristics. Oregon's latitude, topography, and proximity to the Pacific Ocean give the state diversified climates. Jackson County is in Zone 3 as seen in Figure SW.1. The climate in Zone 3 generally consists of wet winters and dry summers.[2]

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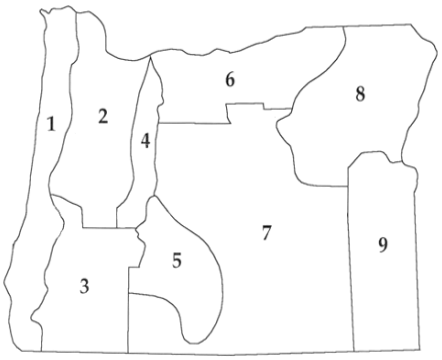
1 Interagency Hazard Mitigation Team. 2012. Oregon Natural Hazards Mitigation Plan. Salem, OR: Oregon Military Department – Office of Emergency Management

2 Taylor, George. The Climate of Oregon. Climate zone 3, Southwest Interior. 1993. http://hdl.handle.net/1957/5906

Figure SW.1. Oregon Climate Zones



Zone 1: Coastal Area
Zone 2: Willamette Valley
Zone 3: Southwestern Interior
Zone 4: Northern Cascades
Zone 5: High Plateau
Zone 6: North Central Area
Zone 7: South Central Area
Zone 8: Northeast Area
Zone 9: Southeast Area

Source: National Climatic Data Center

Jackson County's rugged topography and its distance from the Pacific Ocean are the principal factors influencing the nature of its weather.[3] Generally, the populated valleys of the County lie in the "rain shadow" of the Coast Range to the west. The Coast Range effectively separates the region from the most severe impacts of the storm systems moving east from the Pacific. While annual rainfall in the bottom of Bear Creek Valley averages less than twenty inches, Mt. Ashland receives more than fifty inches in an average year. Unofficial data from the Klamath Mountain regions along the southwestern edge of the county indicate highly localized averages in excess of 120 inches per year.[4]

Table SW.1. Average Precipitation (inches)

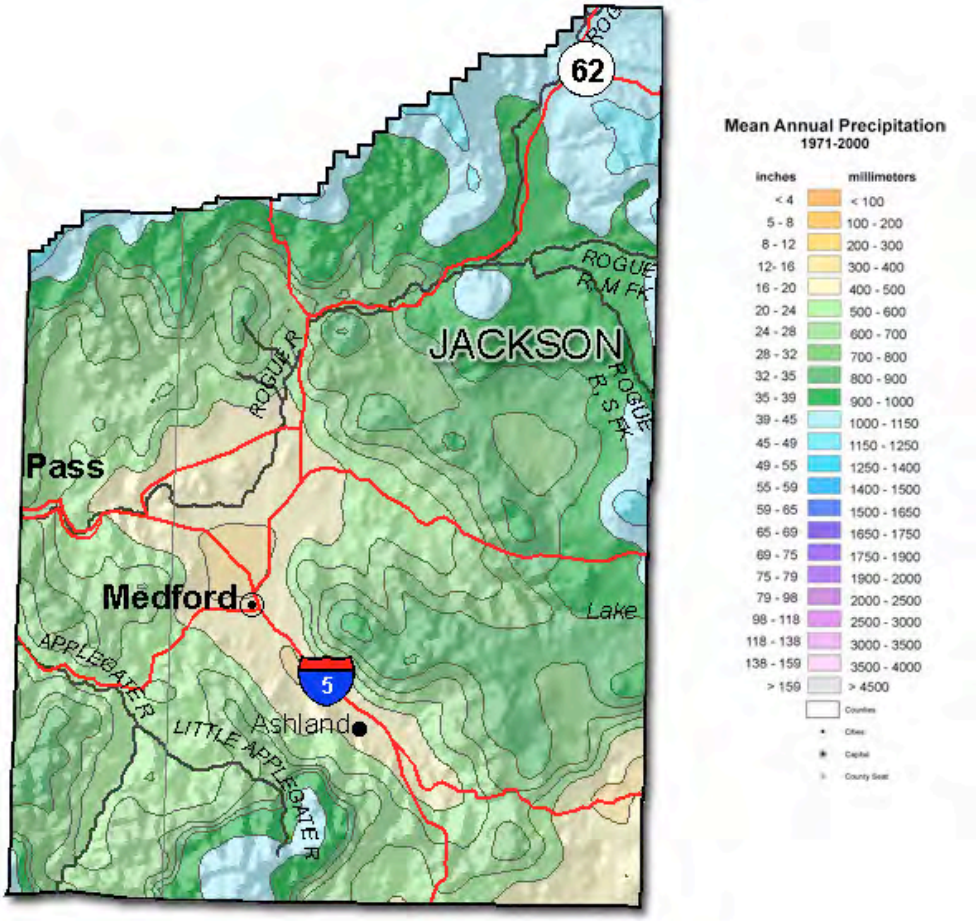
Month	Ashland	Howard Prairie Dam	Medford WSO AP	Prospect SW	Ruch
January	2.49	4.85	2.47	6.08	3.79
February	1.92	3.86	2.10	5.03	3.10
March	2.09	3.72	1.85	4.71	3.05
April	1.68	2.39	2.31	3.19	1.80
May	1.55	2.06	1.21	2.61	1.27
June	0.92	1.28	0.68	1.15	0.76
July	0.51	0.58	0.31	0.64	0.49
August	0.61	0.72	0.52	0.87	0.53
September	0.88	1.07	0.78	1.43	0.97
October	1.46	2.04	1.31	3.02	1.70
November	2.85	4.79	2.93	6.70	3.98
December	2.80	5.21	2.90	6.80	4.30
Annual	19.76	32.57	18.37	42.23	25.74

Source: The Oregon Climate Service, NOAA Climate Stations. "1971-2000 Climate of Jackson County". http://www.ocs.orst.edu/county_climate/Jackson_files/Jackson.html#table1.

[3] Taylor, George H. & Chris Hannan, The Climate of Oregon OSU Press, 1999. http://www.ocs.oregonstate.edu/county_climate/Jackson_files/Jackson.html
[4] Ibid.

Medford's average annual precipitation is 18.85 inches, with about three-quarters of that precipitation in the county falling between November and March. This pattern generally holds true, though in 1962, a massive rainstorm soaked the county for several days in October.[5] The following map shows the average annual precipitation in Jackson County and illustrates the influence that elevation has on precipitation levels.

Figure SW.2: Average Annual Precipitation Jackson County



Source: The Oregon Climate Service, Oregon State University

Despite lower rainfall amounts than in the Willamette Valley, snowfall averages in Jackson County's valleys are much greater. The county's drier climate and higher altitudes result in colder winter temperatures, and annual snowfall totals are typically between twenty and thirty inches, though snow does not usually last long in the valleys.[6]

[5] City of Medford weather data book, Table 19.
[6] Taylor, George H. & Chris Hannan, The Climate of Oregon OSU Press, 1999.

Mountain locations receive far more snow than the valleys. Valley locations average around three storms annually that yield at least an inch of snow, while mountain locations may average thirty such storms per year.[7]

Table SW.2. Average Monthly and Annual Snowfall (inches)

Month	Ashland	Howard Prairie Dam	Medford WSO AP	Prospect SW	Ruch
January	1.3	25.3	1.6	8.4	3.3
February	0.7	23.8	0.4	6.9	4.0
March	0.4	19.4	0.6	4.6	2.1
April	0.1	9.2	0.0	1.8	0.2
May	0.0	2.9	0.0	0.1	0.0
June	0.0	0.3	0.0	0.0	0.0
July	0.0	0.0	0.0	0.0	0.0
August	0.0	0.0	0.0	0.0	0.0
September	0.0	0.2	0.0	0.1	0.0
October	0.0	1.6	0.0	0.3	0.0
November	0.1	19.2	0.4	2.7	1.0
December	1.2	25.3	1.8	7.7	3.7
Annual	4.2	133.7	4.9	33.2	15.4

Source: The Oregon Climate Service, NOAA Climate Station: Medford WSO AP. "Climate of Jackson County". http://www.ocs.orst.edu/county_climate/Jackson_files/Jackson.html#table4.

Weather Patterns

Marine Air Masses

Most of western Oregon is dominated by moist marine air masses that move east up the coastal valleys. However, the coastal mountains protect Jackson County from all but the most powerful movements of marine air.

Subtropical Air Masses

Subtropical air masses from the far southwest regions of the Pacific are associated with the wettest storms and with relatively warm temperatures. Most of Jackson County's major flood events occur after these storms, especially if the rain melts snow from previous storms. The New Year's Day flood of 1997 and the Christmas flood of 1964 are examples of this phenomenon. The unusually high incidence of El Nino events during the 1980's and 1990's meant that subtropical air was a part of Pacific storms more often than in the past.

Gulf of Alaska Air Masses

When Pacific low-pressure systems form at high latitudes, they may bring air that is moist and cold enough to cause snowstorms. Medford's elevation of approximately 1,400 feet is particularly susceptible to snow generated by these air masses. These air masses can also be involved in certain kinds of fierce windstorms.

[7] Taylor, George H. The Oregon Weather Book. Corvallis, OR, OSU Press, 1999.

California Air Masses

South winds pass over California before coming into Oregon. These may arrive during the winter in advance of a storm system, when they bring warm, dry air from the Great Basin by way of California. During the summer, California air masses produce thunderstorms in the county when they bring moist Pacific air.[8]

Severe Winter Storms

Each year the State of Oregon receives many "mid-latitude synoptic- scale cyclones."[9] These systems approach from the Pacific, rotating counter-clockwise around a low-pressure zone. Oregon's big winter storms share the following characteristics:

- They move in a general west-to-east direction, with occasional detours to the north or south.
- They form over the north Pacific.
- They produce both wind and rain. Much of Jackson County's annual precipitation comes from these storms.
- They occur almost exclusively during the cool season, from October to March.
- They move fairly rapidly, affecting an area for a day or less.
- Pacific storm systems generate predictable wind patterns.

Winds generally originate from the south-southeast. As the leading edge of the storm passes over the county, wind direction changes to blow from the south-southwest. These are the destructive winds, which constitute the storm's main wind hazard. A cold front defines the trailing edge of the storm, and winds shift once again to bring cold air from the west-northwest. Cold winds arriving at the end of a Pacific storm can cause violent windstorms affecting small areas in mountain valleys along the west side of Jackson County.

Rain

In the Rogue and Bear Creek Valleys, rain is the most common form of precipitation associated with severe winter storms. Depending on the type of air mass and temperature, a winter storm can result in rain in the valleys and rain or snow in higher elevations. In 1964, the "Christmas" floods were the result of warm winter storms dropping rain in valleys and mountains. In 1997, warm rain in the mountains melted snow pack increasing the amount of water flowing in County creeks and rivers.

Snow

Freezing temperatures and sufficiently moist air are required to produce a snowstorm.[10] Between 1911 and 1996, Medford experienced a 24-hour snowfall total greater than five inches only fourteen times.[11] Western Oregon valleys are not often cold enough for snow, but when a Pacific storm is associated with an air mass from the Gulf of Alaska, a major snowstorm may ensue. Jackson County often receives heavier snowfall than the rest of western Oregon under these conditions because of its lower temperatures and higher

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[8] Taylor, George H. & Chris Hannan, The Climate of Oregon OSU Press, 1999.
[9] Taylor, George H. The Oregon Weather Book. Corvallis, OR, OSU Press, 1999.
[10] Ibid.
[11] City of Medford weather data book, Table 20.

altitudes.[12] Crater Lake, at the county's northeast border, holds many state records for snowfall.

Windstorms

A majority of the destructive surface winds in Oregon come out of the southwest. Under certain conditions, very strong east winds may occur, but these are usually limited to small areas in the vicinity of the mountain passes.

The more frequent and widespread strong winds from the southwest are associated with storms moving onto the coast from the Pacific Ocean. If the winds are from the west, they are often stronger on the coast than in the interior valleys due to the north-south orientation of the Coast Range and Cascades. The Coast Range shelters the populated valleys of Jackson County from the full force of Pacific windstorms.[13] In Medford the official record one-minute wind speed is only 55 mph, set on March 14, 1952, which is substantially below the hurricane-force threshold of 74 mph.[14] The most destructive winds are those which blow from the south, parallel to the major mountain ranges. The Columbus Day Storm of 1962 was a classic example of a south windstorm. The storm developed off the coast of California, moved to the northeast, and then turned north and paralleled the Oregon coast.

High winds are common in the mountains of both the Coast Range and the Cascade Range. Cold air from the northwest arriving behind Pacific storm fronts filters through mountain canyons into the basins and valleys of southwest Oregon. If the cold air is deep enough, it can spill over the mountain ridge. As the air funnels through canyons and over ridges, wind speeds may exceed 100 mph. Official wind observations in Oregon are all made at valley locations, but unofficial observations indicate that gusts over 100 mph occur several times a year across the higher ridges of Jackson County.[15] These very localized winds are unique to mountainous terrain. They are often intense, but of short duration and affect relatively small areas.[16] High wind events in mountainous regions are probably under-reported because of the lack of official weather stations there.[17]

Thunderstorms

County residents are familiar with the phenomenon of summer thunderstorms. Summer thunderstorms may cause very high winds in localized areas. They are complex, and may contain many weather elements. Wind almost always accompanies a thunderstorm, but lightning, hail and rain are also common elements.[18] While unusual relative to their occurrence in other parts of the country, thunderstorms occur most summers in Jackson County, with potentially serious consequences for the people, property and environment.

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[12] Taylor, George H. & Chris Hannan, The Climate of Oregon OSU Press, 1999.
[13] Ibid.
[14] City of Medford weather data book, Table 28.
[15] Oregon Climate Service website: http://www.ocs.orst.edu.
[16] Christopherson, Robert W. Elemental Geosystems: a Foundation in Physical Geography. Upper Saddle River, NJ: Prentice Hall, 1995. 164.
[17] Taylor, George H. The Oregon Weather Book. Corvallis, OR, OSU Press, 1999.
[18] Ibid.

History of Winter Storms in Jackson County

Jackson County's unique location adjacent to high coastal mountains generates severe weather significantly different from other places in western Oregon. For example, a Pacific storm in November of 1996 set 24-hour rainfall records from Portland to Roseburg,[19] but was only the third wettest storm in Medford at that point in time.[20] With few exceptions, Pacific storms must be powerful enough to affect most of the state to be considered major storms in Jackson County. A notable exception occurred on December 2, 1962, when a winter storm dropped a record 3.3 inches of rain in Medford and caused serious flooding there.[21] Yet this storm did not have serious impacts outside of southwestern Oregon.[22] More recently, the New Year's Day storm of 1997 caused major flooding in Jackson County, but was not a record- setting storm elsewhere in Oregon.

Rainstorms

Twice in its history Medford experienced 24-hour periods of rainfall amounts greater than three inches. On December 2 of 1962, Medford received 3.3 inches in 24-hours.[23] December 22 1964 brought 3.2 inches, and the resulting flood is known as the Christmas Flood of 1964.[24] Five other storms brought intense December rains, including two storms during the La Nina years of 1950 and 1955, each depositing two inches of rain in twenty-four hours.[25] Between October 28th and 29th of 1950, Medford received almost five inches of rain. October 1950 became the second wettest on record, with a total of 9.16 inches. The Columbus Day Storm of 1962 brought high winds throughout Oregon on October 12th. The days leading up to the windstorm, however, brought large amounts of rain.[26] Medford received an inch or more on the 8th and 9th of that month, with almost two inches on the 11th.[27]

Snowstorms

Snowstorms vary in character. Some are accompanied by strong winds, such as those of March 1988 and February 1989. Others are accompanied by freezing rain and ice, such as the storm of January 1980. A series of snowstorms occurred during the week of January 9th in 1950 that closed all highways west of the Cascades[28], while Medford accumulated more than 20 inches of snow in the month.[29]

The storm of November 1989 was unusual in that it did not result from a powerful Pacific storm, but was driven mainly by local climatic effects. Thus, Jackson County received heavy snow that did not occur in other areas in western Oregon. Major snowstorms have been less common in Jackson County during the 1990's, though significant amounts of snow fell

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[19] Ibid.
[20] City of Medford weather data book, Table 31.
[21] Ibid.
[22] Taylor, George H. The Oregon Weather Book. Corvallis, OR, OSU Press, 1999.
[23] City of Medford weather data book, Table 31.
[24] Taylor, George H. The Oregon Weather Book. Corvallis, OR, OSU Press, 1999.
[25] City of Medford weather data book, Table 31.
[26] Oregon Climate Service website: http://www.ocs.orst.edu.
[27] City of Medford weather data book, Table 31.
[28] Taylor, George H. The Oregon Weather Book. Corvallis, OR, OSU Press, 1999.
[29] Some of Area's Snowstorms." National Weather Service, Portland Office. http://www.wrh.noaa.gov/pqr/paststorms/snow.php

during the winter of 1998-99.[30] In December 1998, Medford received two inches of snow. The winter weather persisted throughout the month, culminating in a four-day period of sub-freezing temperatures just before Christmas. Snowfall in late December 2003 to early January 2004 caused significant infrastructure delays and impeded traffic on Interstate 5.

Snowstorm damage information is not systematically collected in Jackson County. The National Climatic Data Center (NCDC) maintains a database of past storm events throughout the country, organized by microclimate regions. A record is made of each storm reported to NCDC, including injury and property damage assessments. Unfortunately, winter storm damage assessments have not been reported for Oregon Climate Zone 3, and the list of winter storms for the region is far from complete. Table SW.3 shows a selection of the extreme weather events that have occurred in the county since 2006 as reported by the National Climatic Data Center. A few storms are highlighted below to provide additional detail to the range of type and scale of winter storms and windstorms that affect the county.

Windstorms

Damaging winds in Oregon are most often generated by Pacific windstorms. Records of major Pacific windstorms are documented by state agencies and weather stations throughout Oregon, including several official weather stations in Jackson County's lower valleys. However, because of the county's sheltered location, the most severe statewide windstorms only occasionally match up with local wind speed records. Jackson County experienced record-setting Pacific windstorms in January and February 1958. Wind speeds in November 1958 were not surpassed until 1981.[31] During this storm, every major highway in Oregon was at some point blocked by fallen trees.[32]

Oregon's second most powerful windstorm occurred in December of 1995.[33] This storm caused massive damage throughout the state. The 113 mph gusts measured in Portland illustrate the force of the 1995 storm.[34] However, in Medford the sustained one-minute wind speeds from this storm did not reach 44 mph, which was the local record for the month of December, set thirty years earlier in 1965.[35] The Columbus Day Storm of 1962 did register on Medford's official records, though winds reached only 40 mph.

Thunderstorms

The National Climatic Data Center (NCDC) database for Jackson County thunderstorms goes back to 1993, and lists numerous thunderstorms. Unfortunately, few of these listings include details, but 60-knot winds are recorded for three of the thunderstorms.

Lightning is almost always an element of summer thunderstorms in Jackson County, and is a direct hazard to human safety. The Oregon State Climatologist has recorded several tragic accounts of lightning strikes during thunderstorms in Ashland, Grants Pass, and Rogue River,

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[30] Ibid.
[31] City of Medford weather data book, Table 28.
[32] Taylor, George H. The Oregon Weather Book. Corvallis, OR, OSU Press, 1999.
[33] Oregon Climate Service website: http://www.ocs.orst.edu.
[34] Ibid.
[35] City of Medford weather data book, Table 28.

all of which resulted in injury or death.[36] More commonly, lightning damages property, primarily when it causes wildfires. Forested and grasslands are particularly vulnerable to thunderstorm lightning strikes during drought years.

Wind is a factor in most thunderstorms, and thunderstorm winds are sometimes very strong. During a thunderstorm in 1970, high winds caused extensive damage in the Medford area, notably to the Sheriff's radio communications system. A May 1987 storm caused 60 to 70-mph winds in Eagle Point, removing a number of roofs.

On July 8, 1995 a thunderstorm hit unincorporated Wimer, in northern Jackson County, and caused approximately $70,000 of wind damage. On July 29, 1996, a thunderstorm at the Medford airport was reported to have 60- knot winds. This storm reportedly caused $3.5 million in wind damage. On August 23, 1999 a thunderstorm in Central Point also reportedly achieved 60-knot winds.[37]

Winter Storm and Windstorm Events (2006-2012)

August 30, 2007

Numerous trees and limbs were reported down around the city, including one that was four feet in diameter that fell through a house. Two large trees in Garfield Park were also down. Power lines were downed and the water in Hamilton creek at the corner of East Main and Clay Creek was one foot from bankfull and rising rapidly.[38]

January 3 & 4, 2008

High winds knocked down many trees in the Jackson County forests and damaged many structures and vehicles. One death was recorded when a tree fell on a vehicle. While the highest recorded gust in the area was 52 mph, winds must have been much higher in the Butte Falls and Lake Creek areas. Around 50 trees were reported down around Butte Falls, where the elementary school, at least two houses, and at least one vehicle were heavily damaged. Many areas lost electricity and communications, and the power was not restored to some areas for several days.[39]

May 31, 2009

Minor to strong thunderstorms developed with frequent lightning strikes that caused structural damage and injuries when moving through urban areas. Localized urban flooding occurred in several locations (primarily in Medford and Central Point). Lightening strikes injured one person working at a fast food restaurant and partially burned a manufactured home. More than 14,000 customers lost power at some point during the storm. All but 891 of those customers had power restored within two hours.

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[36] Taylor, George H. The Oregon Weather Book. Corvallis, OR, OSU Press, 1999.
[37] NCDC web page for windstorms in Jackson County, OR. http:// www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms, April 2001.
[38] National Climatic Data Center. Storm Events Database. http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=41%2COREGON
[39] Ibid.

December 5 to 12, 2009

A frigid Arctic air mass moved into Oregon December 5th and remained over the area through December 12th, when it finally abated as a Pacific system approached the area. Temperatures during this period were in the teens, during the coldest nights temperatures dipped into the single digits. Cold-related damage was reported including broken pipes. During the evening of December 8 a homeless man died, apparently of exposure to the extreme cold weather.

March 13, 2011

High winds developed from a strong squall line that developed over the coastal waters and moved on shore (an unusual event for Oregon). The event brought severe winds and hail to the west side interior valleys uprooting and breaking trees. Several major roads (including Highway 62) were closed, 75,000 homes lost power and residential dwellings and buildings were destroyed in Rogue River and Jacksonville.

Table SW.4. History of Winter Storms and Windstorms (2006-2012)

Date	Type	Snow/ Rain Accumulation (inches)	Wind Speed (knots)	Deaths	Injuries
1/16/07	Heavy Snow	4.5	-	0	0
2/21/07	Heavy Snow	6.0-9.0	-	0	0
2/22/07	Heavy Snow	4.0-6.0	-	0	0
7/11/07	Thunderstorm Wind	-	52	0	0
8/30/07	Hail	3.0-4.0	52	0	0
8/30/07	High Wind	3.0-4.0	52	0	0
8/30/07	Flash Flood	3.0-4.0	52	0	0
10/26/07	High Wind	-	52	0	0
12/25-12/26/07	Heavy Snow	3.5	-	0	0
12/27/07	Heavy Snow	3.5	-	0	0
1/3-1/4/08	High Wind	-	70	1	0
1/6-1/8/08	Heavy Snow	6.0-8.0	-	0	0
1/27/08	Heavy Snow	4.0-10.0	-	0	0
2/2/08	Heavy Snow	4.5	-	0	0
6/28/08	Thunderstorm Hail/ Wind	0.9	-	0	0
8/17/08	Thunderstorm Hail	0.9	-	0	0
12/13/08	Heavy Snow	5.5	-	0	0
12/15/08	Heavy Snow	4.5	-	0	0
12/18-12/19/08	Heavy Snow	3.5-9.0	-	0	0
12/21/08	Heavy Snow	Up to 12.0	-	0	0
2/12-2/13/09	Heavy Snow	4.0-7.0	-	0	0
5/31/09	Thunderstorm/ Lightening	-	-	0	1
6/2/09	Hail	1.5-1.75	-	0	0
12/5-12/11/09	Extreme Cold/ Ice	-	-	1	0
7/27/10	Hail	1.0	-	0	0
8/17/10	Hail	0.75-1.5	-	0	0
11/22-11/23/10	Heavy Snow	5.0	-	0	0
12/29/10	Heavy Snow	4.0-8.5	-	0	0
2/23-2/25/11	Heavy Snow	4.0-12.0	-	0	0
3/13/11	Thunderstorm Wind	-	61	0	0
2/29/12	Heavy Snow	6.0-12.0	-	0	0
3/12-3/13/12	Heavy Snow	5.0-6.0	-	0	0
6/4/12	Hail	1.0 Hail	-	0	0

Source: National Climatic Data Center. Storm Events Database.
http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=41%2COREGON

Risk Assessment

How are Hazards Identified?

Hazard identification is the first phase of a hazard assessment, and is the process of estimating the geographic extent of the hazard, its intensity, and its probability of occurrence.[40]

Severe Winter Storm Identification

There is not currently a map of extreme weather occurrences in Jackson County. Though severe weather can be highly localized, the geographic extent of winter storm hazards includes all of Jackson County. The nature of the hazard varies by location, with snow and ice creating more hazards at higher elevations, localized flooding more hazardous on the valley floors, and flash floods on the steep valley slopes. Identifying severe winter storm hazards requires a historical review and mechanisms to systematically gather data on storm events. The nature of winter storm hazards is very dependent on land use. Changes in vegetation, soil grading, storm water systems, the amount of impermeable surface, etc. can impact the likelihood and degree of winter storm hazards.

Windstorm Identification

The geographic extent of windstorm hazards covers every area in the county where there are trees. The lower wind speeds typical in the lower valleys are still high enough to knock down trees, bring down power lines, and cause other property damage. Despite a lack of wind speed data for higher elevations, it is clear that the mountainous portions of the county experience much higher winds, under more varied conditions. Because of the local nature of wind hazards in the mountains, a fairly high resolution wind speed map (i.e. a G.I.S. overlay of wind speed data on a topographic map) would be required to accurately identify the degree of wind hazard throughout the county. Such a map could identify wind hazards other than tree-falls, such as winds sufficiently high to cause structural damage. Lacking such a map, a basic level of wind hazard can be assumed for every location in the county where trees can be found.

Probability of Future Occurrence

Jackson County experiences winter storms and windstorms on a regular basis, in the form of snow, ice, severe cold, wind and hail. The Jackson County steering committee determined that the county's probability of a severe winter storm or windstorm is **high**, meaning that the county will likely experience one winter storm or windstorm within a 10-35 year period. This high probability ranking is consistent with the 2006 Jackson County Hazard Analysis.

Vulnerability Assessment

Severe winter storms and windstorms can cause power outages and transportation and economic disruptions, and pose a high risk for injuries and loss of life. The events can also be typified by a need to shelter and care for adversely impacted individuals. Jackson County has suffered severe winter storms and windstorms in the past that brought economic hardship

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[40] Burby, R. (Ed.) Cooperating with Nature: Confronting Natural Hazards with Land Use Planning for Sustainable Communities. 1998, Washington D.C.: Joseph Henry Press.

and affected the life and safety of residents. Future severe winter storms and windstorms may cause similar impacts countywide.

The Jackson County steering committee determined that the county's vulnerability to a severe winter storm or windstorm is **high**, meaning more than 10% of the population or regional assets would be impacted by a severe winter storm or windstorm. This high rating is consistent with the 2006 Jackson County Hazard Analysis.

Risk Analysis

The Jackson County steering committee determined that the history of winter storm and windstorm events is **high**, with at least four events occurring over the last 100 years. The maximum threat of a winter storm is **moderate**, considering the percentage of population and property that could be impacted under a worst—case scenario.[41]

Winter storms and windstorms in the past caused multiple minor injuries or major injury (and some deaths). The potential for future injuries or deaths is anticipated to remain similar to historic events. Jackson County estimates that 10-25% of the County's population could be physically displaced by a winter storm or windstorm, accounting for families that may not have access to warm shelter; and there would be severe impact on community social networks due to poor driving conditions.[42]

Several facilities throughout the County anticipate mild damage due to winter storms and windstorms, estimated at between $1 million and $10 million for hazard response, structural repairs and equipment replacement. In terms of commercial business, it is likely that more than 75% of businesses located in the County and surrounding area could experience commerce interruption for a period of weeks until driving conditions improve and infrastructure damage is repaired. Winter storms and windstorms will likely have the greatest impacts on the transportation and utility systems, as snow, ice, heavy rains and wind can cause dangerous driving conditions and may damage utility infrastructure (pipes, utility lines). Lastly, winter storms and windstorms could likely have moderate impacts on between 10-25% of the County's ecological systems, including, clean water, wildlife habitat, and parks.[43]

The relative risk of a winter storm and windstorm event is estimated by considering the probability of a winter storm and windstorm and the severity of the outcome when an event occurs. On a scale of 1 to 25, with 1 being the lowest and 25 being the highest relative risk, winter storm and windstorm hazards in Jackson County are a score of 15.[44]

Community Hazard Issues

What is susceptible to damage during a hazard event?

Jackson County residents face a number of difficult issues when dealing with storms and their aftermath. Residents are primarily concerned with protecting life, property, infrastructure, utilities, and transportation systems from storm damages.

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[41] Jackson County. NHMP Steering Committee. 2012.
[42] Ibid.
[43] Ibid.
[44] Oregon Military Department – Office of Emergency Management. Hazard Analysis Methodology, Relative Risk. 2009

Property Protection

Severe Winter Storm Damages

Storm water drainage problems are one cause of property damage from severe winter storms. Insufficient or improperly maintained culverts or other elements of storm drainage systems cause localized flooding, and can lead to saturated soils and structural subsidence. Structural damage from subsidence can be very costly.

Property is also at risk due to flooding (see Flooding Annex) and landslides (see Landslide Annex) resulting from heavy rainfall and snow melt. Trees, power lines, telephone lines, and television and radio antennas can be impacted by ice, wind, snow, and falling trees and limbs. Soil that is saturated can cause trees to lose there ability to stand and can be uprooted falling on houses, cars, utilities and other property. Similarly, if streets are icy, it is difficult for emergency personnel to travel and may pose a secondary threat to life if police, fire, and medical personnel cannot respond to calls.[45]

Winter storms are deceptive killers. Many of the deaths that occur are indirectly related to the actual storm, including deaths resulting from traffic accidents on icy roads, heart attacks while shoveling snow, and hypothermia from prolonged exposure to the cold.

Windstorm Damages

Windstorms have the ability to cause damage over 100 miles from the center of storm activity. Isolated wind phenomena in the mountainous regions have more localized effects. Winds near the earth's surface and associated pressure effects on walls, doors, windows, and roofs, may cause structural components, the elements that provide the buildings structure, to fail. Wind pressure can create a direct and frontal assault on a structure, pushing walls, doors, and windows inward. Conversely, passing currents can create lift and suction forces that act to pull building components and surfaces outward. The effects of winds are magnified in the upper levels of multi-story structures. As positive and negative forces impact the buildings protective envelope (doors, windows, and walls), the result can be roof or building component failures and considerable structural damage.

Debris carried along by extreme winds can directly contribute to loss of life and indirectly to the failure of protective building envelope, siding or walls of the building. When severe windstorms strike a community, downed trees, power lines, and damaged property can be major hindrances to emergency response and disaster recovery. Effects of wind speed are shown in Table SW.4.

[45] Robert Olson Associates, Metro Regional Hazard Mitigation Policy and Planning Guide, Metro, (June 1999).

Table SW.4. The Effect of Wind Speed

Wind Speed (MPH)	Wind Effects
25-31	Large branches will be in motion.
32-38	Whole trees in motion; inconvenience felt walking against the wind.
39-54	Twigs and small branches may break off of trees; wind generally impedes progress when walking; high profile vehicles such as trucks and motor homes may be difficult to control.
55-74	Potential damage to TV antennas; may push over shallow rooted trees especially if the soil is saturated.
75-95	Potential for minimal structural damage, particularly to unanchored mobile homes; power lines, signs, and tree branches may be blown down.
96-110	Moderate structural damage to walls, roofs and windows; large signs and tree branches blown down; moving vehicles pushed off roads.
111-130	Extensive structural damage to walls, roofs, and windows; trees blown down; mobile homes may be destroyed.
131-155	Extreme damage to structures and roofs; trees uprooted or snapped
> 155	Catastrophic damage; structures destroyed.

Source: Washington County Office of Consolidated Emergency Management

Agricultural Damages

Strong winds can damage agricultural products. Following the Columbus Day Storm of 1962 pear producers in the Rogue and Bear Creek valleys reported severe crop damage. The strong winds knocked the some fruit from the trees and caused bruises and punctures to the remaining hanging fruit.[46] Severe storms in October will consistently threaten late season agricultural products.

Freezing temperatures can also have a severe impact on agricultural producers. In 2007, Jackson County produced approximately $79.1 million in agricultural products.[47] Jackson County ranks second in the state in the number of acres planted in pears and fourth in the state in the number of acres planted in wine grapes.[48] In December of 1998 low temperatures dropped below five degrees Fahrenheit on three successive nights. The low temperatures damaged several wine grape varieties. As a result, in the spring many vines failed to emerge at all from dormancy or just produced a few very small leaves and quit growing. Jackson County Extension Service estimated that 40% of newly planted grapevines were lost at a cost of $648,000.[49] Crop damage from hail or ice storms may be costly to individual growers and to the community as a whole, which could suffer from a loss of agricultural service jobs. Agricultural damages caused by weather events are extremely

[46] Wind, Rain Cause Severe Crop Damage Throughout the Valley," Medford Mail Tribune, October 13, 1962.
[47] 2007 Census of Agriculture County Profile, US Department of Agriculture. http://www.agcensus.usda.gov/Publications/2007/Online_Highlights/County_Profiles/Oregon/cp41029.pdf
[48] Ibid.
[49] Correspondence, Jackson County Farm Service Agency.

difficult to mitigate community wide. However, individual property owners may be able to protect themselves from losses by purchasing insurance.

Utilities

Severe Winter Storm

Soil saturation as a result of heavy rainfall can destabilize tree root systems. When heavy rainfall is accompanied by high winds, trees can be easily blown down, potentially causing damage to power lines and other utility infrastructure. Saturated soils are also much more subject to landslides, as evidenced by the high number of landslides that occurred in Jackson County during the 1997 New Year's Day storm.

Windstorm

High winds near ground level can be very destructive. Storm winds indirectly damage buildings, power lines, the environment, and infrastructure by falling trees and branches. Historically, falling trees have been the major cause of power outages. According to Pacific Power & Light (PP&L), even 20 mph winds create a risk of falling trees. While the PP&L's tree hazard mitigation program has been successful, it only addresses trees that potentially threaten PP&L power lines.[50] PP&L identified other areas besides power line easements that are at risk for tree-falls, including stands of trees left as visual screens adjacent to new timber cuts, and trees at the edges of new developments on the rural-urban fringe. Trees in these kinds of locations are much more vulnerable to strong winds than are trees in areas of contiguous forest. Harrington suggests that developers and foresters can coordinate their plans with utility companies and hazard planners to reduce risk from wind-induced tree-falls, and improve the effectiveness of tree hazard mitigation activities.

Utility repairs on Rogue River Highway, winter 2001.

Source: Medford Mail Tribune.

Transportation

Severe Winter Storm

Road closures from snow and ice can have severe consequences for commerce and public safety. Some roads in Jackson County are regularly closed due to snow and ice hazards. Commerce and industry are especially dependent on the Interstate Route 5 corridor, which may be subject to closure during storms. Many smaller roads are subject to flash flood damage at creek crossings, and to localized flooding from overwhelmed drainage systems.

Windstorm

Roads blocked by fallen trees during a windstorm isolate people by cutting them off from their homes, jobs and essential services. Blocked roads also disrupt business services by preventing the transportation of goods. Falling trees often bring electric power lines down to the pavement, creating the possibility of lethal electric shock. Utility lines brought down

[50] Harrington, Bill. Personal interview, April 2001.

by summer thunderstorms have also been known to cause wildfires, which can start in dry roadside vegetation.[51]

Economic Impacts

Closed transportation corridors impacts many Jackson County industries, which engage in product exports, services for tourists, and other transportation-dependent activities. Additionally, power outages can have significant indirect impacts on commerce and industry through business closures and lost work time.

Existing Hazard Mitigation Activities

The following activities are currently being carried out by local, regional, state, and national organizations.

Farm Service Agency crop insurance

The Non-insured Crop Disaster Assistance Program (NAP) insures crops when other crop insurance is not available. It provides assistance for farmers who grow such crops, limiting their losses from natural disaster and helping to manage their overall business risk. Eligible crops include agricultural commodities that are: grown for food, planted and grown for livestock consumption, (including but not limited to grain and seeded and native forage crops), crops grown for fiber, except for trees; and specialty crops, such as aquaculture, floriculture, ornamental nursery, Christmas trees, turf for sod, industrial crops, and seed crops used to produce crops that are eligible for NAP.[52]

Oregon Department of Transportation

The Oregon Department of Transportation (ODOT) has well-established programs to reduce the incidence of road closures from rain, snow, and ice, and windstorms. These include engineering standards for road construction as well as a tree removal program.

County and State Planning

Transformer substations are another aspect of public infrastructure subject to natural hazards. Jackson County requires that all proposed transmission lines over 115 Kilowatts undergo a site review process. The process may include an evaluation of the risks that natural hazards pose to new power infrastructure. Statewide building and codes are in place to reduce vulnerability to windstorm hazards. The State Building Code already requires that buildings in Jackson County be designed to resist wind speeds of 80 miles per hour. All utility facilities constructed on forestlands must submit to a conditional use process.

Pacific Power and Light tree mitigation

Pacific Power and Light (PP&L) spends $4 million per year in Jackson County on mitigating trees that are potentially hazardous to power lines during windstorms. The program involves pruning and tree removal, and the company has a fairly extensive outreach program. PP&L also operates a program through which the company subsidizes property owners to replace trees inappropriate for their location in or adjacent to utility easements.

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[51] Winfrey, Greg. Personal interview, April 2001.
[52] Disaster Assistance, Farm Service Agency Website: http://www.fsa.usda.gov/pas/disaster/nap.htm#top.

Power lines in high-wind zones are constructed according to different standards than areas with a lower wind hazard. These standards include stronger support wires, stronger connections, and different standards for poles and towers.

Outreach and Education

PP&L distributes numerous brochures from the International Society of Arboriculture on subjects such as Recognizing Tree Hazards, Avoiding Tree & Utility Conflicts, and many others on proper tree selection and care, especially in utility easements. PP&L's in-house forestry department has also put out their own publication on these subjects. PP&L distributes information from the U.S. Forest Service and the Washington State Department of Resources on landscaping for wildfire defense.

National Weather Service

The Portland Office of the National Weather Service issues severe winter storm watches and warnings when appropriate to alert government agencies and the public of possible or impending weather events. The watches and warnings are broadcast over NOAA weather radio and are forwarded to the local media for retransmission using the Emergency Alert System.

Severe Winter Storm and Windstorm Mitigation Action Items

The following actions have been identified by the Jackson County, Ashland, Eagle Point, Rogue River and Shady Cove steering committees, and are recommended for mitigating the potential effects of winter storms and windstorms in the various identified jurisdictions. Below you will find a brief description, title, of the action items, see full action item worksheets in Appendix A for a full description of the action items.

Jackson County

SW#1: Map areas where extreme weather, such as road icing or wind damage occurs.

SW#2: Promote the benefits of tree-trimming and tree replacement programs and help to coordinate local efforts by public and private agencies.

Ashland

No Action Items Developed.

Eagle Point

SW#1: Encourage new developments with above ground utilities to underground utilities

SW#2: Dangerous Tree Education and Outreach and Disaster Resilient Economy

SW#3: Winter Storm Education and Outreach

Rogue River

SW#1: Encourage new developments to include underground power lines.

SW#2: Education and outreach Disaster Resilient Economy

Shady Cove

SW#1: Increase public awareness of windstorm mitigation activities.

SW#2: Encourage critical facilities to secure emergency power.

SW#3: Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during severe weather events.

Jackson County
Winter Storm and Windstorm Resource Directory

County Resources

Jackson County Emergency Management

Jackson County Emergency Management helps the community be better prepared for major emergencies and disasters. They work closely with cities, emergency responders, and volunteer agencies to find ways to reduce risks and minimize damages during hazard events. When a disaster occurs, they work with these partners in their Emergency Operations Center to coordinate resources and information. Once the event is over, they help bring assistance to those that have been harmed.

Contact: Jackson County Emergency Management Coordinator
Address: 10 South Oakdale, Medford, Oregon 97501
Phone: (541) 774-6821
Fax: (541) 774-6705
Website: http://www.co.jackson.or.us/sectionindex.asp?sectionid=28

Regional Resources

National Weather Service, Medford, Oregon

The National Weather Service Office in Medford provides weather warnings and forecasts for southern Oregon and northern California.

Contact: National Weather Service
Address: 4003 Cirrus Drive, Medford, OR 97504
Phone: (541) 773-1067
Website: http://www.wrh.noaa.gov/mfr/

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. 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 ext 250
Fax: (503) 378-5518
Website: http://www.oregon.gov/LCD/HAZ/Pages/index.aspx

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 Agricultural Hall Room 326, Corvallis, OR 97331-2209
Phone: (541) 737-8927
Website: http://www.ocs.orst.edu/
Email: oregon@coas.oregonstate.edu

Oregon Military Department (OMD) - Office of Emergency Management (OEM)

In relation to Senate Bill 12 and rapidly moving landslide hazards, OEM coordinates state resources for rapid and effective response to landslide-related emergencies. The Oregon Emergency Response System (OERS) of OEM is a key player in the dissemination of debris flow advisories and warnings. OEM chairs a group that develops and measures landslide hazard mitigation strategies. OEM administers the FEMA Hazard Mitigation Grant Program, which provides a source of funding for implementing hazard mitigation projects. OEM also works with other state agencies to develop information for local governments and the public on landslide hazards.

Contact: Oregon Military Department – Office of Emergency Management
Address: 3225 State Street, Salem, Oregon 97301
Phone: (503) 378-2911
Fax: (503) 373-7833
Website: http://www.oregon.gov/OMD/OEM/Pages/index.aspx

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.

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/bcd/

National Resources and Programs

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: 1401 Constitution Ave., NW, Room 5128, Washington, DC 20230
Phone: (202) 482-6090
Fax: (202) 482-3154
Website: http://www.noaa.gov
Email: answers@noaa.gov

National Weather Service

The National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure, which can be used by other governmental agencies, the private sector, the public, and the global community.

Contact: National Weather Service
Address: 5241 NE 122nd Ave, Portland, Oregon 97230
Phone: (503) 261-9246
Website: http://www.wrh.noaa.gov/pqr/

Additional Resources

American Red Cross, Rogue Valley Chapter

Services provided by the American Red Cross include emergency assistance, disaster relief, and health and safety courses.

Contact: Executive Director
Address: 60 Hawthorne Street, Medford, OR 97504
Phone: (541) 779-3773
Fax: (541) 772-7212
Email: info@soredcross.org
Websites: http://www.soredcross.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:	1408 North Westshore Boulevard - Suite 208 - Tampa, FL 33607
Phone:	(813) 286-3400
E-mail:	info@ibhs.org
Website:	http://disastersafety.org/

Volcanic Eruption Hazard Annex

Volcanoes are present in Washington, Oregon, and California where volcanic activity is generated by continental plates moving against each other (Cascadia Subduction Zone movement). Because the population of the Pacific Northwest is rapidly expanding, volcanoes of the Cascades Range are now considered some of the most dangerous in the United States.[1]

Volcanoes, however, provide benefits to humans living on or near them. They produce fertile soil, and provide valuable minerals, geothermal resources, and scenic beauty. Volcanic products are used as building or road-building materials, as abrasive and cleaning agents, and as raw materials for many chemical and industrial uses. Volcanic ash makes soil rich in mineral nutrients thus encouraging human settlement.[2]

Causes and Characteristics of Volcanic Eruption

Jackson County, and the Pacific Northwest, lie within the "ring of fire," an area of very active volcanic activity surrounding the Pacific Basin. Volcanic eruptions occur regularly along the ring of fire, in part because of the movement of the Earth's tectonic plates. The Earth's outermost shell, the lithosphere, is broken into a series of slabs known as tectonic plates. These plates are rigid, but they float on a hotter, softer layer in the Earth's mantle. As the plates move about on the layer beneath them, they spread apart, collide, or slide past each other. Volcanoes occur most frequently at the boundaries of these plates and volcanic eruptions occur when the hotter, molten materials, or magma, rise to the surface.

The primary threat to lives and property from active volcanoes is from violent eruptions that unleash tremendous blast forces, generate mud and debris flows, and produce flying debris and ash clouds. The immediate danger area in a volcanic eruption generally lies within a 20-mile radius of the blast site. The following section outlines the specific hazards posed by volcanoes.

Volcanoes are commonly conical hills or mountains built around a vent that connect with reservoirs of molten rock below the surface of the earth.[3] Some younger volcanoes may connect directly with reservoirs of molten rock, while most volcanoes connect to empty chambers. Unlike most mountains, which are pushed up from below, volcanoes are built up by an accumulation of their own eruptive products: lava or ash flows and airborne ash and dust. When pressure from gases or molten rock becomes strong enough to cause an upsurge, eruptions occur. Gases and rocks are pushed through the opening and spill over, or fill the air with lava fragments. Figure VE.1 diagrams the basic features of a volcano.

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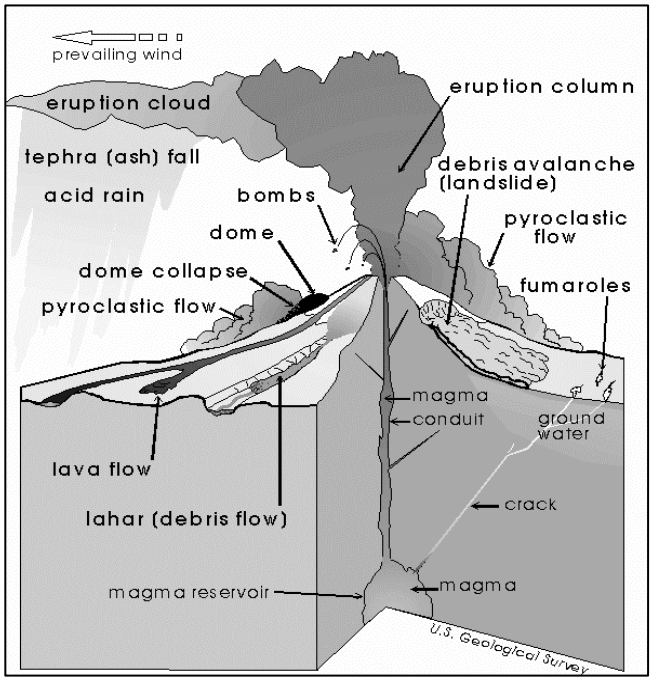
[1] Dzurisin, Dan, Peter H. Stauffer, and James W. Hendley II, Living With Volcanic Risk in the Cascades, USGS Fact Sheet 165-97, (2000).
[2] FEMA Library: Volcanoes at http://www.fema.gov/library/volcano.htm.
[3] Tilling, Robert I., Volcanoes, USGS General Interest Publication, (1985).

Figure VE.1. Volcano Characteristics



Source: Topinka, USGS/CVO, 1998, Modified from Myers and Brantley, 1995, USGS Open-File Report 95-231

There are four principal types of volcanoes: cinder cones, composite, shield, and lava domes. Of these types, shield and composite volcanoes pose a threat to Jackson County.

Shield Volcanoes[4]

Shield volcanoes are built almost entirely of lava flows. In the south Cascades, lava oozes out in all directions from a central summit vent, or group of vents, building a dome-shape cone. These cones are small when compared to shield volcanoes in other parts of the world; many south Cascades volcanoes are less than ten miles long as opposed to 40 to 50 miles long. Cascade shield volcanoes can remain active for a few months, years, or even centuries. Lava commonly erupts from vents along fractures that develop on the flanks of the cone. Shield volcanoes tend to erupt non-explosively and pour out large volumes of lava.

Nearby Shield Volcanoes

Several large basaltic shield volcanoes along the southern High Cascade Range have steep-sided summit cones, such as Mount Bailey, Mount Thielsen, and Mount McLoughlin. These peaks rival major composite cones in size but are unlike them in origin and structure. No evidence suggests that these shield volcanoes formed during highly explosive eruptions. Most lava flow and thick tephra-fall deposits are restricted within a few kilometers of vents, and pumice-like particles are typically not traceable farther than 20 kilometers from vents. Though ashfall probably did occur much farther away, no preserved ash can be traced.

[4] Ibid.

Composite Volcanoes[5]

Sometimes referred to as stratovolcanoes, most composite volcanoes have a crater at the summit that contains a central vent or a clustered group of vents. Lava either flows through breaks in the crater wall or from fissures on the flanks of the cone. Lava, solidified within the fissures, form dikes that greatly strengthen the cone.

The essential feature of a composite volcano is a conduit system through which magma from a reservoir deep in the Earth's crust rises to the surface. The volcano is built up by the accumulation of material erupted through the conduit and increases in size as lava, cinders, and ash, are added to its slopes. Composite volcanoes are long-lived and are recurrently active over hundreds of thousands of years. Composite volcanoes tend to erupt explosively and pose considerable danger to nearby life and property through their tendency to produce pyroclastic flows and lahars.

Nearby Composite Volcanoes[6]

Mount Shasta is a large composite volcano located about 40 miles from the Oregon-California border. Mount Shasta has been the most active volcano in California during the past 6,000 years, second in the entire Cascade Range to Mount St. Helens. During that time, Shasta has erupted on average every 200 to 300 years, producing many pyroclastic flows. It probably last erupted in 1786, when an eruption cloud was observed above the volcano from a ship passing by California's north coast.

Image of Mount Shasta
Source: USGS, photo by Lyn Topinka 1984

Nearby Crater Lake is a composite volcano whose top collapsed and formed a huge depression, or caldera, that lies in the remains of Mount Mazama after a series of tremendous explosions occurred approximately 7,600 years ago – the largest known eruption from a Cascades Range volcano. Although Mount Mazama has been quiet for a long time, it is considered active and slowly rebuilding magma from the last large eruption.[7] Mount Mazama's activity may be attributed to the nearby Basin and Range faulting that has been causing the more recent Klamath Falls earthquakes.[8]

Eruptions

Volcanic eruptions can be placed into two general categories: (1) those that are explosive, such as the 1980 eruption of Mount St. Helens, and (2) those that are effusive, such as the gentle lava flows, fountains, and spatter cones common in Hawai'i. Many eruptions are explosive in nature. They produce fragmented rocks from erupting lava and surrounding parent rock.

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[5] Ibid.
[6] USGS. Living With Volcanic Risk in the Cascades, http://pubs.usgs.gov/fs/1997/fs165-97/. 2008.
[7] Cashman, Kathy, Personal Interview, March 14, 2001.
[8] Ibid.

Some eruptions are highly explosive and produce fine volcanic ash that rises many kilometers into the atmosphere in enormous eruption columns. Explosive activity also causes related hazards such as widespread tephra fall, pyroclastic flows and surges, debris avalanches, landslides, lahars, earthquakes, and flash floods.[9]

Related Hazards

Ash / Tephra

Tephra consists of volcanic ash (sand-sized or finer particles of volcanic rock) and larger fragments. During explosive eruptions, tephra together with a mixture of hot volcanic gas are ejected rapidly into the air from volcanic vents. Larger fragments fall down near the volcanic vent while finer particles drift downwind as a large cloud. When ash particles fall to the ground, they can form a blanket-like deposit, with finer grains carried further away from the volcano. In general, the thickness of ash fall deposits decreases in the downwind direction. Tephra hazards include impact of falling fragments, suspension of abrasive fine particles in the air and water, and burial of structures, transportation routes and vegetation.

During an eruption that emits ash, the ash fall deposition is controlled by the prevailing wind direction. [10] The predominant wind pattern over the Cascades is from the west, and previous eruptions seen in the geologic record have resulted in most ash fall drifting to the east of the volcanoes. [11]

Earthquakes

Volcanic eruptions can be triggered by seismic activity or earthquakes can occur during or after a volcanic eruption. Earthquakes produced by stress changes are called volcano-tectonic earthquakes. These earthquakes, typically small to moderate in magnitude, occur as rock is moving to fill in spaces where magma is no longer present and can cause land to subside or produce large ground cracks.[12] In addition to being generated after an eruption and magma withdrawal, these earthquakes also occur as magma is intruding upward into a volcano, opening cracks and pressurizing systems.[13] Volcano-tectonic earthquakes do not indicate that the volcano will be erupting but can occur at anytime and cause damage to manmade structures or provoke landslides.

Lava flows

Lava flows are streams of molten rock that erupt relatively non-explosively from a volcano and move downslope, causing extensive damage or total destruction by burning, crushing, or burying everything in their paths. Secondary effects can include forest fires, flooding, and permanent reconfiguration of stream channels. [14]

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[9] Riley, Colleen M., A Basic Guide to Volcanic Hazards, Michigan Technological University: http://www.geo.mtu.edu/volcanoes/hazards/primer.
[10] Oregon State Natural Hazard Mitigation Plan. 2012." Volcanic Hazards Chapter," http://csc.uoregon.edu/opdr/sites/csc.uoregon.edu.opdr/files/docs/ORNHMP/OR-SNHMP_volcano_chapter.pdf
[11] Ibid.
[12] Riley, Colleen M., A Basic Guide to Volcanic Hazards, Michigan Technological University: http://www.geo.mtu.edu/volcanoes/hazards/primer.
[13] Scott, W. E., USGS Cascades Volcano Observatory, Personal Correspondence, (July 5, 2001).
[14] Oregon State Natural Hazard Mitigation Plan. 2012." Volcanic Hazards Chapter," http://csc.uoregon.edu/opdr/sites/csc.uoregon.edu.opdr/files/docs/ORNHMP/OR-SNHMP_volcano_chapter.pdf

Pyroclastic flows and surges

Pyroclastic flows are avalanches of rock and gas at temperatures of 600 to 1500 degrees Fahrenheit. They typically sweep down the flanks of volcanoes at speeds of up to 150 miles per hour. Pyroclastic surges are a more dilute mixture of gas and rock. They can move even more rapidly than a pyroclastic flow and are more mobile. Both generally follow valleys, but surges sometimes have enough momentum to overtop hills or ridges in their paths. Because of their high speed, pyroclastic flows and surges are difficult or impossible to escape. If, it is expected that they will occur, evacuation orders should be issued as soon as possible for the hazardous areas. Objects and structures in the path of a pyroclastic flow are generally destroyed or swept away by the impact of debris or by accompanying hurricane-force winds. Wood and other combustible materials are commonly burned. People and animals may also be burned or killed by inhaling hot ash and gases. The deposit that results from pyroclastic flows is a combination of rock bombs and ash and is termed *ignimbrite.* These deposits may accumulate to hundreds of feet thick and can harden to resistant rock. [15]

Lahars and debris flows

Lahar is an Indonesian term that describes a hot or cold mixture of water and rock fragments flowing down the slopes of a volcano or river valley.[16] Lahars typically begin when floods related to volcanism are produced by melting snow and ice during eruptions of ice-clad volcanoes like Mount Shasta, and by heavy rains that may accompany eruptions. Floods can also be generated by eruption-caused waves that could overtop dams or move down outlet streams from lakes. Given the number of dams and other water retention structures in Jackson County, a lahar event could be catastrophic to downstream development.[17]

Lahars react much like flash flood events in that a rapidly moving mass moves downstream, picking up more sediment and debris as it scours out a channel. This initial flow can also incorporate water from rivers, melting snow and ice. By eroding rock debris and incorporating additional water, lahars can easily grow to more than ten times their initial size. But as a lahar moves farther away from a volcano, it will eventually begin to lose its heavy load of sediment and decrease in size.[18]

Lahars often cause serious economic and environmental damage. The direct impact of a lahar's turbulent flow front or from the boulders and logs carried by the lahar can easily crush, abrade, or shear off at ground level just about anything in the path of a lahar. Even if not crushed or carried away by the force of a lahar, buildings and valuable land may become partially or completely buried by one or more cement-like layers of rock debris. By destroying bridges and key roads, lahars can also trap people in areas vulnerable to other hazardous volcanic activity, especially if the lahars leave deposits that are too deep, too soft, or too hot to cross.[19]

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[15] Ibid.
[16] USGS website: http://volcanoes.usgs.gov/Hazards/What/Lahars/lahars.html
[17] Miller, Potential Hazards from Future Volcanic Eruptions in California, USGS Bulletin 1847, (1989).
[18] Ibid.
[19] Ibid.

Volcanic Landslides (debris avalanches)[20]

Landslides – or debris avalanches – are a rapid downhill movement of rocky material, snow, and (or) ice. Volcanic landslides range in size from small movements of loose debris on the surface of a volcano to massive collapses of the entire summit or sides of a volcano. Steep volcanoes are susceptible to landslides because they are built up partly of layers of loose volcanic rock fragments. Landslides on volcano slopes are triggered not only by eruptions, but also by heavy rainfall or large earthquakes that can cause materials to break free and move downhill.

History of Volcanic Eruption in Jackson County

Although there have been no recent volcanic events in the Jackson County area, it is important to note the area is active and susceptible to eruptive events since the region is a part of the volcanic Cascades Range. Figure VE.1 displays volcanoes of the western United States.

Though not the same type of volcano as nearby Mount McLoughlin, the eruption of Mount St. Helens caused heavy damage and disruption to businesses and other essential services throughout Washington and much of Oregon. If Mount McLoughlin erupted, it would likely not be the same type of eruption as Mount St. Helens, though the impacts to people and property would be severe.

Cascadia: Living On Fire

A detailed report of the Pacific Northwest's catastrophic hazards and history written by Rick Gore appears in the May 1998 National Geographic, Vol. 193, No. 5. For more information or to request a back copy of this article, write to: National Geographic Society, P.O. Box 98199, Washington, D.C. 20090-8199 or visit www.nationalgeographic.com on the Internet.

[20] Wright and Pierson, Living With Volcanoes, USGS Volcano Hazards Program Circular 1973, (1992).

Figure VE-1 Potentially Active Volcanoes of the Western United States

Source: USGS. http://www.volcano.si.edu/reports/usgs/maps.cfm#usa

Mount St. Helen's Case Study

On May 18, 1980, following two months of earthquakes and minor eruptions and a century of dormancy, Mount St. Helens in Washington, exploded in one of the most devastating volcanic eruptions of the 20th century. Although less than 0.1 cubic mile of magma was erupted, 58 people died, and damage exceeded 1.2 billion dollars. Fortunately, most people in the area were able to evacuate safely before the eruption because the U.S. Geological Survey (USGS) and other scientists had alerted public officials to the danger. As early as 1975, USGS researchers had warned that Mount St. Helens might soon erupt. Coming more than 60 years after the last major eruption in the Cascades (Lassen Peak), the explosion of St. Helens was a spectacular reminder that the millions of residents of the Pacific Northwest share the region with live volcanoes.[21]

[21] Dzurisin, Dan, Peter H. Stauffer, and James W. Hendley II, Living With Volcanic Risk in the Cascades, USGS Fact Sheet 165-97, (2000).

Risk Assessment

How are Hazards Identified?

The nature of volcanic eruptions is such that the immediate danger area covers approximately a 20-mile radius from the eruptive origin, but danger can also extend 100 miles or more from a volcano.[22] Volcanoes within this proximal and distal range include composite volcanoes Crater Lake and Mount Shasta, and the broad field of shield volcanoes in the southern Cascades that includes Mount McLoughlin.

> "Shasta has been the most active volcano in the Cascades after St. Helens. A big eruption here could threaten I-5, the major transportation route on the West Coast, along with utility corridors."
>
> Bob Christiansen, USGS Volcanologist

The USGS has produced two hazard assessment reports for both Crater Lake and Mount Shasta, which include hazard maps. *Volcano and Earthquake Hazards in the Crater Lake Region, Oregon*[23] was completed in 1997 and *Potential Hazards from Future Eruptions in the Vicinity of Mount Shasta Volcano, Northern California*[24] was completed in 1980.

Image of Mount McLoughlin

Source: USGS, photo by C.D. Miller and Mullineaux

Probability of Future Occurrence

Mount Shasta, considered an active volcano, could threaten Jackson County with ash fallout if there were unusual southerly winds. On the basis of its past behavior, Mount Shasta is not likely to erupt large volumes of ash in the future. Areas subject to the greatest risk from air-fall tephra are located mainly east and within about 50 kilometers of the summit of the volcano. The degree of risk from air-fall tephra decreases progressively as the distance from the volcano increases.[25]

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[22] FEMA Library: Volcanoes at http://www.fema.gov/library/volcano.htm.
[23] Bacon, Charles R., et al, Volcano and Earthquake Hazards in the Crater Lake Region, Oregon, USGS Open-File Report 97-487, (1997).
[24] Miller, C. Dan, Potential Hazards from Future Eruptions in the Vicinity of Mount Shasta Volcano, Northern California, USGS Bulletin 1503, (1980).
[25] Ibid.

The most probable volcanic risks for Jackson County associated with Crater Lake are lahars or earthquakes. The Rogue River drains the west side of Crater Lake National Park. Activity around Crater Lake could impact areas in the lower Rogue River basin (Prospect, Shady Cove, Gold Hill, Rogue River). It is not likely that the walls holding Crater Lake would fail, though it is a possibility.[26] Although such an event is considered a low probability, a more likely scenario is for eruptions to expel water from the lake or melt winter snowpack, eroding large quantities of sediment and becoming a lahar, or debris flow.[27] Such a massive debris flow would travel swiftly down drainage areas, devastating downstream development. Such flows would likely only be a catastrophic problem in the upper parts of river valleys, flows move downstream. A local earthquake of sufficient magnitude to seriously damage structures and disrupt transportation systems in the Crater Lake area does not occur more than once every few thousand years.[28] Heavy damage occurred when a lahar rushed down the Toutle River in Washington following the Mount St. Helens eruption. In the early afternoon of May 18, 1980, mudflow and logs tore apart the Coal Banks bridge just outside of Toutle, Washington. The bridge has since been replaced.

A report developed by a Southern Oregon University geology student in 1996 revealed that Mount McLoughlin, located within Jackson County boundaries, is considered to be a minor threat and has not shown much activity since the early stages of its construction.[29]

Because geologic history is fragmentary for these volcanoes, the probability of future explosive eruptions is difficult to estimate. Given the low annual probability of a volcanic eruption, the Jackson County steering committee rated the probability of volcanic eruption as **low**, meaning that one incident is likely in a 75 to 100 year period. This rating is consistent with the 2006 Jackson County Hazard Analysis.

Vulnerability Assessment

While a quantitative vulnerability assessment (an assessment that describes number of lives or amount of property exposed to the hazard) has not yet been conducted for Jackson County volcanic eruption events, there are many qualitative factors (issues relating to what is in danger within a community) that point to potential vulnerability. However, the county's proximity to a number of Cascade Range volcanoes places the county at risk from ash fallout originating from such an event.

The Jackson County steering committee rated the county's vulnerability to volcanic eruption as **low**, meaning <1% of the population or regional assets would be affected by a volcano. This rating is consistent with the 2006 Jackson County Hazard Analysis. Vulnerabilities are described in detail in the following section community hazard issues.

Risk Analysis

The Jackson County steering committee determined that the history of volcanic events is **low**, with less than a couple events occurring over the last 100 years. The maximum threat

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[26] Bacon, Charles R., et al, Volcano and Earthquake Hazards in the Crater Lake Region, Oregon, USGS Open-File Report 97-487, page 16, (1997).
[27] Scott, W. E., USGS Cascades Volcano Observatory, Personal Correspondence, (July 5, 2001).
[28] Ibid.
[29] Mt. McLoughlin Volcanic Activity Disaster Management Proposal.

of a volcanic eruption is **moderate**, considering the percentage of population and property that could be impacted under a worst—case scenario.[30]

Volcanic eruptions in the past have not been recorded in recent times and have not caused injuries to the health and safety of residents. The potential for future injuries or deaths is anticipated to be relatively mild with expected minor injuries and perhaps a few major injuries expected. It is estimated that less than 10% of the county's population would be physically displaced by a volcanic eruption, considering the primary volcanic hazard that could impact the county is ash fallout, however there could be severe impact on community social networks.[31]

Several facilities throughout the county anticipate mild damage due to a volcanic eruption, estimated at less than $1 million for hazard response, structural repairs and equipment replacement. In terms of commercial business, it is likely that between 30% and 50% of businesses located in the county and surrounding area would experience commerce interruption for a period of months. Ash fall from volcanic eruptions has the potential to impact a wide region, inflicting damage to building circulation systems and road surface conditions. Lastly, volcanic eruptions would likely have extensive impacts on more than 75% of the county's ecological systems, including, clean water, wildlife habitat, and parks.[32]

Community Hazard Issues

What is susceptible to damage during a hazard event?

Volcanic eruptions can send ash airborne, spreading the ash for hundreds or even thousands of miles. An erupting volcano can also trigger flash floods, earthquakes, rockfalls, and mudflows. Volcanic ash can contaminate water supplies, cause electrical storms, and collapse roofs.[33] Residents living in the vicinity of Mount McLoughlin, Mount Shasta, and Crater Lake, should be aware of its potential hazards and be ready to evacuate if it becomes necessary.

Businesses and individuals can make plans to respond to volcano emergencies. Planning is prudent because once an emergency begins, public resources can often be overwhelmed, and citizens may need to provide for themselves and make informed decisions. Knowledge of volcano hazards can help citizens make a plan of action based on the relative safety of areas around home, school, and work.[34]

Building and Infrastructure Damage

Buildings and other property in the path of a flash flood, debris flow, or tephra fall can be damaged. Thick layers of ash can weaken roofs and cause collapse, especially if wet.[35] Clouds of ash often cause electrical storms that start fires or damp ash can short-circuit electrical systems and disrupt radio communication.

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[30] Jackson County. NHMP Steering Committee. 2012.
[31] Ibid.
[32] Ibid.
[33] Dzurisin, Dan, Peter H. Stauffer, and James W. Hendley II, Living With Volcanic Risk in the Cascades, USGS Fact Sheet 165-97, (2000).
[34] Scott, W.E. et al, Volcano Hazards in the Three Sisters Region, Oregon, USGS Open-File Report 99-437, (2001).
[35] Mt. McLoughlin Volcanic Activity Disaster Management Proposal.

Pollution and Visibility

Tephra fallout from an eruption column can blanket areas within a few miles of the vent with a thick layer of pumice. High-altitude winds may carry finer ash tens to hundreds of miles from the volcano, posing a hazard to flying aircraft, particularly those with jet engines.[36] In an extreme situation, the Medford-Jackson County Airport would need to close to prevent the detrimental effect of fine ash on jet engines and for pilots to avoid total impaired visibility.[37] Fine ash in water supplies will cause brief muddiness and chemical contamination.

Economic Impacts

Volcanic eruptions can disrupt the normal flow of commerce and daily human activity without causing severe physical harm or damage. Ash a few millimeters thick can halt traffic, possibly up to one week, and cause rapid wear of machinery, clog air filters, block drains and water intakes, and can kill or damage agriculture.[38]

Transportation of goods between Jackson County and nearby communities and trade centers could be deterred or halted. Subsequent airport closures can disrupt airline schedules for travelers. Fine ash can cause short circuits in electrical transformers, which in turn cause electrical blackouts. Volcanic activity can also force nearby recreation areas to close for safety precautions long before the activity ever culminates into an eruption.[39] The interconnectedness of the region's economy would be disturbed after a volcanic eruption due to the interference of tephra fallout with transportation facilities such as Interstate 5 and the railroad.

Death and Injury

Inhalation of volcanic ash can cause respiratory discomfort, damage or result in death for sensitive individuals miles away from the cone of a volcano. Likewise, emitted volcanic gases such as fluorine and sulfur dioxide can kill vegetation for livestock or cause a burning discomfort in the lungs.[40] Hazards to human life from debris flows are burial or impact by boulders and other debris.

Existing Hazard Mitigation Activities

Communities, businesses, and citizens can plan ahead to mitigate the effects of possible volcanic eruptions. Long-term mitigation includes using information about volcano hazards when making decisions about land use and siting of critical facilities. When volcanoes erupt or threaten to erupt, appropriate emergency response is needed. Such response will be most effective if citizens and public officials have an understanding of volcano hazards and have planned the actions needed to protect communities.

Monitoring Volcanic Activity

The U. S. Geological Survey's Cascades Volcano Observatory (CVO) in Vancouver, Washington, monitors and assesses hazards from the volcanoes of the Cascade Range in

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[36] Volcano Hazards of the Lassen Volcanic National Park Area, California.
[37] Mt. McLoughlin Volcanic Activity Disaster Management Proposal.
[38] Ibid.
[39] Cashman, Kathy, Volcanologist, Personal Interview, (March 14, 2001).
[40] Ibid.

Washington, Oregon, and California. Seismic monitoring is shared with the USGS center in Menlo Park, California, (for northern California) and the Pacific Northwest Seismograph Network at the University of Washington in Seattle (for Washington and Oregon).

Education and Outreach: USGS Volcano Hazards Program

The mission of the Volcano Hazards Program (VHP) is "to help mitigate the harmful effects of volcanic activity by assessing hazards at volcanoes and monitoring volcanic unrest, providing warning information on volcanic activity and rapidly responding to volcanic crises, conducting research to understand volcanic processes, and communicating scientific findings to authorities and the public in an effective and appropriate form."[41] In short, the VHP aims to prevent volcano hazards from becoming volcano disasters. The VHP communicates with public officials, educators, media, and the public using fact sheets, websites, videos, workshops, presentations, field trips, teacher's guides, exhibits, press releases, and cooperative outreach programs.

Volcano Videos

The International Association of Volcanology and Chemistry of the Earth's Interior has produced a video entitled: Reducing Volcanic Risk. This 24-minute educational program and its companion, Understanding Volcanic Hazards, are intended to help prevent future deaths from volcanic eruptions.

Reducing Volcanic Risk showcases how people can lower their risk from volcanic activity. Three steps can prevent volcanic eruptions from becoming volcanic disasters:

1. Identify Hazard Areas
2. Monitor Volcanoes
3. Develop an Emergency Plan

Understanding Volcanic Hazards features images of erupting volcanoes and graphically shows how volcanic activity can affect people, their property, and the land on which they live. The program focuses on seven types of volcanic hazards: ash falls, hot-ash flows (pyroclastic flows), lahars, landslides, tsunamis, lava flows, and volcanic gases.

Another video program*, Pilot & Airline Training Video,* educates pilots and airline dispatchers about how to avoid volcanic eruption clouds.[42]

Volcanic Eruption Mitigation Action Items

The following actions have been identified by the Jackson County, Ashland, Eagle Point, Rogue River and Shady Cove steering committees, and are recommended for mitigating the potential effects of volcanic eruption in the various identified jurisdictions. Below you will find a brief description, title, of the action items, see full action item worksheets in Appendix A for a full description of the action items.

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[41] US Geological Survey, Priorities of the Volcano Hazard Program 1999-2003, http://volcanoes.usgs.gov/Products/1999_5Year.html.
[42] USGS website: http://volcanoes.usgs.gov/Products/SProdsVideo.html#AtRisk.

Jackson County

VE#1: Increase awareness of volcanic eruption threats for county residents.

VE#2: Create and map hypothetical eruption scenarios to display potential eruption hazards.

VE#3: Collaborate with county environmental health to provide immediate warning to communities about air quality hazards following volcanic eruptions.

Ashland

No Action Items Developed.

Eagle Point

No Action Items Developed.

Rogue River

No Action Items Developed.

Shady Cove

No Action Items Developed.

Jackson County

Volcanic Eruption Resource Directory

County Resources

Jackson County Emergency Management

Jackson County Emergency Management helps the community be better prepared for major emergencies and disasters. They work closely with cities, emergency responders, and volunteer agencies to find ways to reduce risks and minimize damages during hazard events. When a disaster occurs, they work with these partners in their Emergency Operations Center to coordinate resources and information. Once the event is over, they help bring assistance to those that have been harmed.

Contact: Jackson County Emergency Management Coordinator
Address: 10 South Oakdale, Medford, Oregon 97501
Phone: (541) 774-6821
Fax: (541) 774-6705
Website: http://www.co.jackson.or.us/sectionindex.asp?sectionid=28

Regional Resources

American Red Cross, Rogue Valley Chapter

Services provided by the American Red Cross include emergency assistance, disaster relief, and health and safety courses.

Contact: Executive Director
Address: 60 Hawthorne Street, Medford, OR 97504
Phone: (541) 779-3773
Fax: (541) 772-7212
Email: info@soredcross.org
Websites: http://www.soredcross.org

Southern Oregon University

The Geology Department at Southern Oregon University researches the geological diversity of the southern Oregon region. Faculty and students study a variety of geological features, including volcanoes.

Contact: Southern Oregon University Geology Department
Address: 1250 Siskiyou Blvd, Ashland, OR 97520
Phone: (541) 552-6479
Website: http://www.sou.edu/envirostudies/geology/index.html

Northwest GeoData Clearinghouse, Department of Geology, Portland State University

Portland State University conducts geologic researches and prepares inventories and reports for communities throughout Oregon. The GeoData Clearinghouse provides geologic information on earthquakes in the Northwest. It is especially useful for finding earthquake related maps or links to geospatial mapping sites around the nation.

Contact: Department of Geology
Address: 17 Cramer Hall; 1721 SW Broadway, Portland, OR 97201
Phone: (503) 725-3022
Website: http://geology.pdx.edu

State Resources

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, tsunami, landslides, floods, and other geologic hazards. The Department has mapped earthquake hazards in most of western Oregon.

Contacts: Deputy State Geologist, Seismic Hazards Team Leader, Tsunami and Coastal Hazards Team Leader
Address: 800 NE Oregon Street #28, Suite 965, Portland, Oregon 97232
Phone: (971) 673-1555
Website: http://www.oregongeology.org/sub/default.htm

U.S. Geological Survey – David A. Johnston Cascades Volcano Observatory

The USGS Cascades Volcano Observatory strives to serve the national interest by helping people to live knowledgeably and safely with volcanoes and related natural hazards including earthquakes, landslides, and debris flows in the western United States and elsewhere in the world. CVO assesses hazards before they occur by identifying and studying past hazardous events. CVO provides warnings during volcanic crises by intensively monitoring restless volcanoes and interpreting results in the context of current hazards assessments. Furthermore, CVO investigates and reports on hazardous events after they occur to improve our assessment and prediction skills, and to help develop new concepts of how volcanoes work.

Contact: U.S. Geological Survey, Cascades Volcano Observatory
Address: 1300 SE Cardinal Court, Building 10, Suite 100 , Vancouver, WA 98683
Phone: (360) 993-8900
Fax: (360) 993-8980
Website: http://volcanoes.usgs.gov/observatories/cvo/

National Resources and Programs USGS Volcano Hazards Program

The U.S. Geological Survey has a website dedicated to worldwide volcanic hazards. This website includes general volcano information, updates on volcanic activity, risk reduction guides, links to other resources and observatories, and much more.

Contact: U.S. Department of the Interior, U.S. Geological Survey
Address: Menlo Park, California, USA
Website: http://volcanoes.usgs.gov/

Smithsonian Institution, Global Volcanism Program

The Global Volcanism Program (GVP) seeks better understanding of all volcanoes through documenting their eruptions--small as well as large-- during the past 10,000 years. According to the GVP, the range of volcanic behavior is great enough, and volcano lifetimes are long enough, that we must integrate observations of contemporary activity with historical and geological records of the recent past in order to prepare wisely for the future. GVP's focus is the rapid dissemination of on-going eruption reports from local observers through our monthly Bulletin of the Global Volcanism Network. GVP's effort to document Earth's volcanic eruptions of the last 10,000 years has led to development of comprehensive computer databases and an archive of relevant maps, photos, and documents.

Contact: Global Volcanism Program, National Museum of Natural History
Address: Room E-421, MRC 0119, PO Box 37012, Smithsonian Institution, Washington DC 20013
Website: http://www.volcano.si.edu/index.cfm

Wildfire (Wildland Urban Interface) Hazard Annex

Causes and Characteristics of Wildfire (Wildland Urban Interface; WUI) Fire

While more common to the arid areas of central and eastern Oregon, the potential for losses due to WUI fires in the urbanized region should not be ignored. Fire is an essential part of Oregon's ecosystem, but it is also a serious threat to life and property particularly in the state's growing rural communities. Wildfires are fires occurring in areas having large areas of flammable vegetation that require a suppression response. Areas of wildfire risk exist throughout the state with areas in central, southwest and northeast Oregon having the highest risk. The Oregon Department of Forestry has estimated that there are about 200,000 homes in areas of serious wildfire risk.

In the forested mountains of Jackson County, where the hills are timbered and can be steep, there is a high susceptibility to wildfires. In recent years, lower than normal levels of precipitation have contributed to the wildfire risk as vegetation dries out. Forested areas throughout Jackson County are becoming increasingly populated, and wildfires pose a risk to people and their property. Choices in landscaping, site location, and building materials can elevate the risk of fire.

Wildfires threaten valued forest and agricultural lands and individual home sites. State or federal firefighters provide the only formal wildfire suppression service in some areas, and they do not protect structures as a matter of policy. As a result, many rural dwellings have no form of fire protection. The potential for serious damage and loss of life from wildfire is second in magnitude only to flooding in the County. Once a fire has started, homes and development in wildland settings complicate firefighting activities and stretch available human and equipment resources. The loss of property and life, however, can be minimized through cooperation, preparedness, and mitigation activities.

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

Wildfire Characteristics

Several physical factors affect the amount of damage resulting from wildfires, and the ability of firefighters to suppress a fire. These include: topography, weather, fuel loading, vehicle access, fire breaks, proximity of water sources, distance from fire stations, and available firefighting personnel and equipment.[1] Areas where annual precipitation is less than 30

[1] Northwest Interagency Fire Prevention Group, Fire Safety Considerations for Developments in Forested Areas, (1978).

inches per year are extremely susceptible to fire. Jackson County's valley floors, with an annual precipitation of 18 to 20 inches, are especially susceptible to fires. Many rural residential areas lack large water storage or pumping facilities, and are long distances from fire stations.

In Jackson County, the long open valleys increase wind velocity. The wind can exacerbate a fire that is otherwise controllable. Wind and hilly terrain combine to form a dangerous natural wildfire accelerant. Wildfire can be divided into four categories: interface fires, wildland fires, firestorms, and prescribed fires.[2]

Interface Fires

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

- The classic wildland/urban interface exists where well-defined urban and suburban development presses up against open expanses of wildland areas.
- The mixed wildland/urban interface is more typical of the problems in areas of exurban or rural development: isolated homes, subdivisions, resorts and small communities situated in predominantly in wildland settings.
- The occluded wildland/urban interface where islands of wildland vegetation exist within a largely urbanized area.

Wildland Fires

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

Firestorms

Firestorms are events of such extreme intensity that effective suppression is virtually impossible. Firestorms often occur during dry, windy weather and generally burn until conditions change or the available fuel is consumed. The disastrous 1991 East Bay Fire in Oakland, California is an example of an interface fire that developed into a firestorm. In 1987, widespread dry lightning in late August ignited fires throughout northern California and southwest Oregon. Two of these were over 10,000 acres, and according to the Oregon Department of Forestry, this series of events fits the definition of a firestorm. Resources were brought in from other states and Canada to fight them.[3]

Prescribed Fires

Prescribed fires are intentionally set or are select natural fires that are allowed to burn for beneficial purposes. Before humans suppressed forest fires, small, low intensity fires cleaned the underbrush and fallen plant material from the forest floor while allowing the larger plants and trees to live through the blaze. These fires were only a few inches to two

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[2] Federal Emergency Management Agency, Multihazard, Identification and Risk Assessment Report,(1997), Washington, D.C.
[3] Jim Wolf, ODF, Personal Interview, (May 8, 2001).

feet tall and burned slowly. Forest managers now realize that a hundred years of prevention has contributed to the unnatural buildup of plant material that can flare up into tall, fast moving wildfires. These can be impossible to control and can leave a homeowner little time to react.

Conditions Contributing to Wildfires

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

Fuel

Fuel is the material that feeds a fire, and is a key factor in wildfire behavior. Fuel is classified by volume and type. Volume is described in terms of "fuel loading," the amount of available vegetative fuel. If fuel- loading doubles, the energy released can also be expected to double.[4] The type of fuel also influences wildfire. Jackson County is located far enough south in Oregon that even though it is west of the Cascades, it is dry enough to support the prevalent conifer, brush, and rangeland fuel types. Thus, Jackson County is subject to more frequent wildfires than other regions of western Oregon.[5] Another important element of fuel is its continuity. A house surrounded by brushy growth rather than cleared space allows for greater continuity of fuel and increases the fire's ability to spread.

Fire Magnitude

The magnitude of past fires within Jackson County is the result of two primary factors:

1. Severe drought, accompanied by dry- lightning storms, and

2. Long-term effects of almost a century of suppressing wildfires leading to buildup of brush and small diameter trees in forests and rangelands.

National Interagency Fire Center, National Register of Urban Wildland Interface.

Topography

Topography influences the movement of air, directing a fire's course. Slope is a key topographic feature in fire behavior. If the percentage of uphill slope doubles, the rate of spread in wildfire will likely double.[6] Gulches and canyons can funnel air and act as chimneys, which intensify fire behavior and cause the fire to spread faster. Similarly, saddle-shaped lands on ridge tops lower resistance to the passage of air and draw fires. Solar heating of drier, south-facing slopes produces upslope drafts that can complicate fire behavior.[7] Ironically, the most desirable residential areas are typically hillsides with hazardous topographic characteristics.

Weather

Weather is the most variable factor affecting wildfire behavior, with some geographic locations having a favorable overall climate for wildfire activity. High- risk areas in Oregon, including Jackson County, share a hot, dry season in late summer and early fall when high temperatures and low humidity favor fire activity. Predominant wind directions may guide a

[4] Federal Emergency Management Agency, Multihazard, Identification and Risk Assessment Report,(1997), Washington, D.C.
[5] Ibid.

fire's path, as demonstrated by New Mexico's wind driven Los Alamos fire in 2000.[8] It is often a change in the weather that marks the end of a wildfire's growth.[9]

Development

The amount of development in wildland/urban interface areas is increasing in Jackson County. Fire is a natural wildland element and can sweep through vegetation that is adjacent to homes in wildland areas made of combustible materials. Wildfires can rapidly grow to sizes that require formal fire services. New residents in remote locations are often surprised to find that in escaping urban areas, they left behind readily available fire services for structure protection.[10]

Development can influence the number of wildfire events and the behavior of fires. Owners often prefer homes that are private, have scenic views, are nestled in vegetation, and use natural materials (wood shake roofing, for example). More people living in forested settings make for more eyes watching for wildfire, but an increase in opportunities for fires to start may also arise.[11] A house far from public roads, or hidden behind a narrow, curving driveway, makes evacuation and firefighting difficult. Natural vegetation contributes to scenic beauty, but it may also provide a ready trail of fuel leading a fire directly to the combustible fuels of the home itself.[12] Conversely, a burning structure, such as a chimney, can introduce fire into wildlands.[13]

While reducing fuel loads in Jackson County communities may reduce wildfire risk, some risk is inherent to those living in wildfire-prone areas. Private landowners can help reduce this risk though the creation of defensible space around their homes and businesses and by using fire- resistant materials in building those structures.[14]

History of WUI Fire in Jackson County

Wildfires cause tremendous destruction in Oregon communities. The severe fire season of 1987 resulted in a record setting mobilization of resources in the state.[15] That year, tens of thousands of acres in Jackson County were blackened, and 218,000 acres burned throughout Oregon.[16] Often, accurate records of wildfire history do not exist. For instance, before the early 1960's, only those fires that were especially damaging were recorded.

In May of 1987 strong thunderstorms brought 60 to 70-mph winds to Jackson County, damaging buildings in Eagle Point and fanning multiple fires. In July of that same summer,

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[6] Ibid.
[7] Ibid.
[8] Ibid.
[9] Planning for Natural Hazards: Oregon Technical Resource Guide, Community Planning Workshop, (July 2000).
[10] National Wildland/Urban Interface Fire Protection Program, Wildfire Strikes Home (2nd Edition), (1991), Washington, D.C.
[11] Keith Woodley, Ashland Fire and Rescue, Personal Interview, (April 2001).
[12] National Wildland/Urban Interface Fire Protection Program, Wildfire Strikes Home (2nd Edition), (1991), Washington, D.C.
[13] Curran, C., Wildfire Hazard Management in the Urban/Wildland Interface in Southern Oregon, Ashland, OR: Southern Oregon State College, (1978).
[14] National Interagency Fire Center, National Register of Urban Wildland Interface Communities Within the Vicinity of Federal Lands that are at High Risk from Wildfire, http://www.nifc.gov/fireplan/fedreg.html, (Spring, 2001).
[15] Oregon Department of Forestry, Oregon Forestland-Urban Interface Fire Protection Act of 1997 "Senate Bill 360," Salem, OR, (1998).
[16] Planning for Natural Hazards: Oregon Technical Resource Guide, Community Planning Workshop, (July 2000), Page 7-3.

intense thunderstorms brought hail, lightning, and rain.[17] Lightning started numerous fires in the Umpqua and Rogue River National Forests. One fire lasted for five days. A third round of thunderstorms struck in late August of that summer. Over 900 fires were reported in the Siskiyou and Cascade Mountains, which destroyed more than 130,000 acres of forest and continued to burn well into September. This was Oregon's second worst fire in history, and the worst since the Tillamook Burn in the 1930's.[18] Each year, about 350 fires are sparked in Jackson and Josephine Counties alone. Table WF.1 shows the number of wildfires and costs from 1970 to 2000.

Table WF.1 Partial Summary, Jackson County Wildfire Damage 1970-2000

Time Period	Number of Fires	Acres Burned	Conflagration Mobilization Cost	Estimated Damage
1970-1979	14	8,079	924,698	910,506
1980-1989	19	31,530	9,431,263	5,887,958
1990-2000	16	2,404	22,232,504	212,500
Total	**49**	**63,650**	**32,588,465**	**7,010,964**

Source: Wolf, Jim. Oregon Department of Forestry, Jackson County Office.

The East Evans Creek (1992), Hull Mountain (1994) and Squires Peak fires are considered to be three of Oregon's most destructive Wildland/ Urban Interface fires; burning over 20,800 acres, costing $20.2 million and burning 54 structures.[19]

Table WF.2 shows the significant wildfires and cost that have occurred since 2000 in Jackson County.

Table WF.2 Significant Fires in Jackson County since 2000

Name	Date	FEMA	Acres	Communities Threatened	Conflagration Mobilization Cost	Federal Funding	Cause
North River Road	8/18/11	-	-	Rogue River	$80,951	$0	Undetermined
Oak Knoll	8/24/10	-	20	Ashland	-	-	Human - Arson
South County Complex	8/28/09	-	-	Ashland, Medford	$423,811	$312,666	Undetermined
Doubleday	2008	-	1,244	Butte Falls	-	-	Lightening
Wasson	2005	-	1,500	-	-	-	Traffic Accident
Cove Road	2003	FEMA-2496-FMAGP	700	-	-	-	Lightening
Timbered Rock	7/27/02	FEMA-2454-FMAGP	27,111	north Shady Cove	$237,457	$169,576	Lightening
Squire Peak/ Wall Creek/ Lost Creek	7/16/02	FEMA-2445-FMAGP	3,125	east of Ruch	$266,918	$191,787	Lightening
East Antelope	2002	-	1,947	-	-	-	Power Line
Quartz	2001	-	6,162	-	-	-	Lightening
Antioch	8/8/00	-	376	Antioch	$15,319	$0	Human - burning vehicle

Source: OPDR, "State of Oregon Natural Hazards Mitigation Plan: Fire Chapter", 2012.

[17] Taylor, George and Hatton, Raymond, The Oregon Weather Book: A State of Extremes, Corvallis, Oregon: Oregon State University Press, pp. 174, (1999).
[18] Ibid.
[19] Jackson County BOC, Jackson County Integrated Fire Plan (2006), http://www.co.jackson.or.us/Page.asp?NavID=3122

Risk Assessment

How are Hazards Identified?

The Jackson County Integrated Fire Plan (CWPP) identifies areas at risk based upon residential density and Fire District serviceability. The extent of damage to communities is dependent on a number of factors, including temperature, wind speed and direction, humidity, proximity to fuels, and steepness of slopes. Community Wildfire Protection Plans have also been created for Ashland[20], the Applegate Valley[21], Colestin Valley[22] and the Seven Basins[23] watersheds; these plans specifically identify wildfire hazards for their regions.

Hazard identification is the first phase of a hazard assessment, and is the process of estimating the geographic extent of the hazard, its intensity, and its probability of occurrence.[24] Not all high-risk areas are in the woods. Grasslands are susceptible to wildfires year-round. Any prolonged dry spell can increase the chances of range fires, and a house in the way of a grass fire will be difficult to defend.

Probability of Future Occurrence

The natural ignition of forest fires is largely a function of weather and fuel; human-caused fires add another dimension to the probability. Dry and diseased forests can be mapped accurately and some statement can be made about the probability of lightning strikes. Each forest is different and consequently has different probability and recurrence estimates. Wildfire always has been a part of these ecosystems and sometimes with devastating effects. The intensity and behavior of wildfire depends on a number of factors including fuel, topography, weather, and density of development. There are a number of often-discussed strategies to reduce the negative impacts of these phenomena. They include land-use regulations, management techniques, site standards, building codes, and a recently passed Oregon Forestland-Urban Interface Fire Protection Act (1997). All of these have a bearing on a community's ability to prevent, withstand, and recover from a wildfire event.

Based on the Jackson County's historical incidence of wildfire events, the Jackson County steering committee determined that the probability of wildfire is **high**, meaning one wildfire is likely to occur in a 10 to 35 year period. This rating is consistent with the 2006 Jackson County Hazard Analysis.

Vulnerability Assessment

Wildfires are 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.

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[20] Ashland Community Wildfire Protection Plan (2004), www.ashland.or.us/cwpp.
[21] Applegate Fire Plan (2001), http://www.grayback.com/applegate-valley/fireplan/
[22] Colestin Valley Community Wildfire Protection Plan (2005), http://www.crfd.org/community-fire-safety-plan.htm
[23] Seven Basins Community Wildfire Protection Plan (2005), http://extension.oregonstate.edu/sorec/wildfire
[24] Cooperating with Nature: Confronting Natural Hazards with Land Use Planning for Sustainable Communities. Burby, R.. (Ed.) (1998) Washington D.C.: Joseph Henry Press.

Each year a significant number of people build homes within or on the edge of the forest (urban/wildland interface), thereby increasing wildfire hazards. Many Oregon communities (incorporated and unincorporated) are within or abut areas subject to serious wildfire hazards, complicating firefighting efforts and significantly increasing the cost of fire suppression. Considering that there are areas within Jackson County that are considered at risk to wildfires, the Jackson County steering committee determined that the county has a **moderate** vulnerability to wildfire, meaning that between 1-10% of the community's population or assets would be impacted by a wildfire. This vulnerability rating represents an increased vulnerability and is not consistent with the 2006 Jackson County Hazard Analysis.

Risk Analysis

The JaCIFP Risk Assessment Committee approaches the yearly wildfire risk assessment with a comprehensive review of risk assessment methods and examples from communities throughout the United States. The committee also conducts an inventory of existing data for risk, hazard, values, structural vulnerability and protection capability. The JaCIFP risk assessment uses the state methodology created by the Oregon Department of Forestry (ODF) as a guide for the local assessment.[25]

The analysis takes into consideration a combination of factors that we define below:

- Ignition Risk: Potential and frequency for wildfire ignitions (based on past occurrences)
- Hazard: Conditions that may contribute to wildfire (vegetative fuels, crown fire potential, weather/ climate, topography, insect and disease)
- Values: People, property, 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.

In 2009, Jackson and Josephine counties collaborated on developing an updated wildfire risk assessment:

> **Two-County Risk Assessment**. In 2009, Jackson and Josephine County wildfire partners collaborated on an update of the joint risk assessment using the two-county fuel-mapping project data completed in 2008. With support from Jackson County GIS staff and Title III funds, updates of all the key data sets (ignition risk, hazard, protection capability, and values at risk) were completed for both Jackson and Josephine Counties. Both county risk/fuels committees reviewed the data and model parameters. The primary goals of the assessment update that were accomplished in 2009 included incorporation of the new calibrated LANDFIRE data and advanced fire modeling tools, and consistent use of the assessment methodology across the two-county area. The two counties also share a Mutual Aid Agreement for fire response.

The Integrated Fire plan is updated annually, and contains extensive analysis. Therefore, the current Jackson County Integrated Fire plan risk assessment is incorporated herein by reference. In accordance with CFR 401.6 and as part of the 2011/2012 NHMP update

[25] Jackson County Integrated Fire Plan, 2007.

process, the NHMP Steering Committee considered fire risk using the same evaluation method as other hazards included in the NHMP to allow for a comparative analysis of hazard risk.

The Jackson County steering committee determined that the history of wildfire is **high**, with four or more events occurring over the last 100 years. The maximum threat of wildfire is also **moderate**, considering the percentage of population and property that could be impacted under a worst—case scenario.[26]

Wildfires in the past have caused multiple major injuries or death. Based on history it is expected that future wildfire events may also cause multiple major injuries or death. Jackson County estimates that between 10-25% of the County's population could be physically displaced by a wildfire, considering the proximity of residential housing to WUI vulnerable areas; and there would be mild impact on community social networks.[27]

Multiple facilities throughout the County anticipate severe damage due to wildfires, estimated at between $10 and $100 million for hazard response, structural repairs and equipment replacement. In terms of commercial business, it is likely that less than 10% of businesses located in the County and surrounding area could experience commerce interruption for a period of months. The businesses most impacted are those in close proximity to WUI areas. Lastly, wildfires could likely have severe impacts on 25-50% of the County's ecological systems, including, clean water, wildlife habitat, and parks.[28]

The relative risk of a wildfire is estimated by considering the probability of a wildfire and the severity of the outcome when an event occurs. On a scale of 1 to 25, with 1 being the lowest and 25 being the highest relative risk, wildfire hazards in Jackson County are a score of 15.5.[29]

The National Wildland/Urban Fire Protection Program has developed a Wildland/Urban Fire Hazard Assessment Methodology tool for communities to assess their risk to wildfire. For more information on wildfire hazard assessment refer to www.Firewise.org.

Figure WF.1, below, shows the overall, compost risk score according to the Integrated Fire Plan. To access additional wildfire risk assessment maps and the current Integrated Fire Plan, visit: http://www.co.jackson.or.us/Page.asp?NavID=3122

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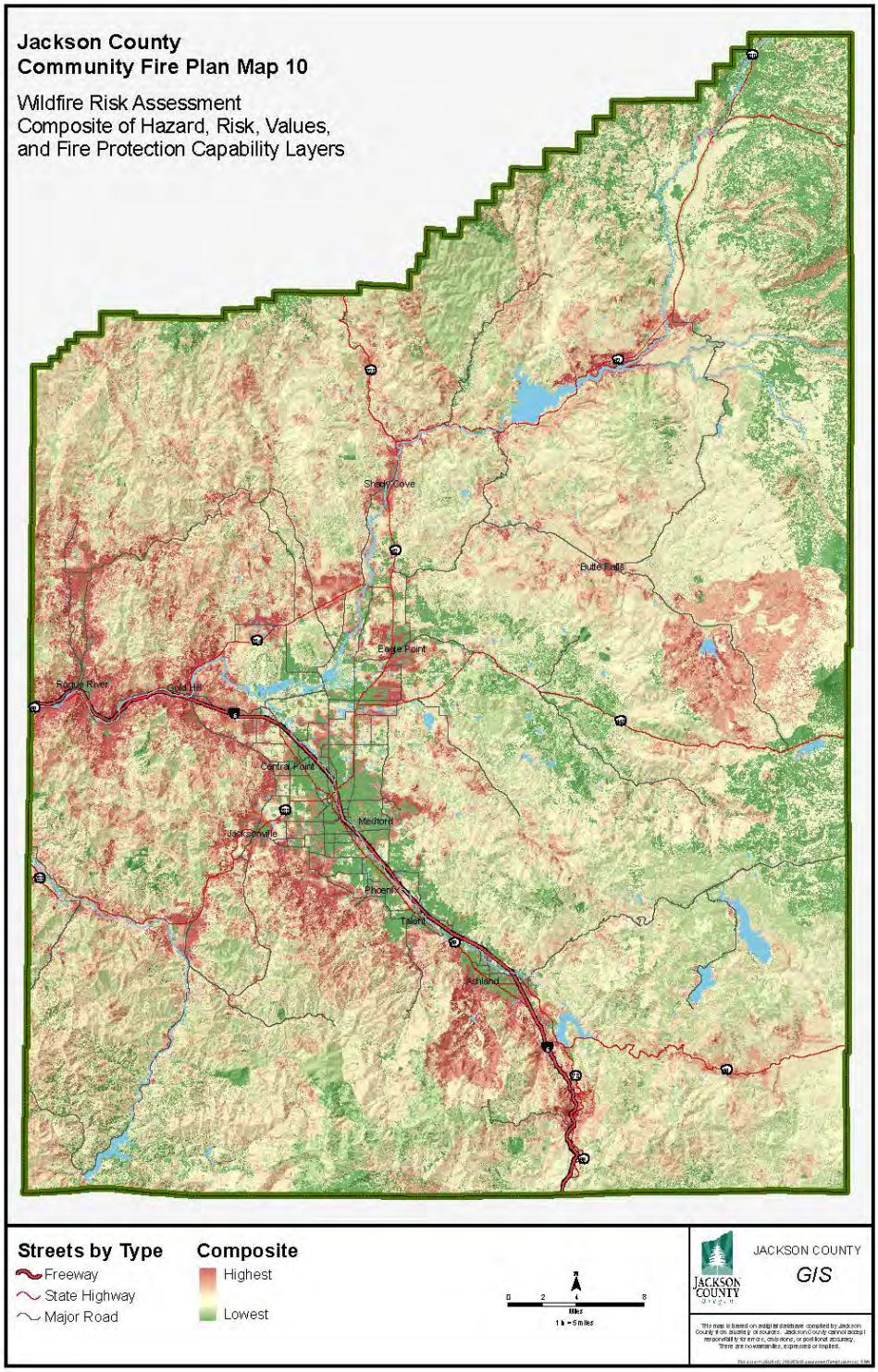
[26] Jackson County. NHMP Steering Committee. 2012.
[27] Ibid.
[28] Ibid.
[29] Oregon Military Department – Office of Emergency Management. Hazard Analysis Methodology, Relative Risk. 2009

Figure WF.1. Wildfire Risk Assessment - Composite View



Source: Jackson County Integrated Fire Protection Plan (2010)

Community Hazard Issues

What is susceptible to damage during a hazard event?

Threat to Life and Property

Since the 1970's, Jackson County's growing population expanded into traditional forest and range resource lands. The interface between urban and suburban areas and these resource lands are producing increased exposure to life and property from wildfire. In many cases, existing fire protection services cannot adequately protect new development.[30] Wildfires that also involve structures present complex and dangerous situations to firefighters. See map on the following page.

Personal Choices

Many interface areas, found at lower elevations and drier sites, are also desirable real estate. More people in Oregon are becoming vulnerable to wildfire by choosing to live in wildfire-prone areas.[31] Figure WF.2 illustrates the communities of highest risk in Oregon; the area surrounding Medford is an area of concern.

Community Firefighting

There is development in Jackson County located outside of rural fire districts where structural fire protection is not provided. In certain areas fire trucks cannot negotiate steep grades, poor road surfaces, narrow roads, flammable or inadequately designed bridges, or traffic attempting to evacuate the area. Development occurring in the small valleys and gulches extending up from the valley floors tend to have access via a single dead-end road. Little water during the fire season, and severe fuel loading problems add to the problem. In some areas, current protection resources are stretched thin, thus both property in the interface and traditionally protected property in the forests and cities are at greater risk from fire. Finally, many property owners in the interface are not aware of the problems and threats that they face, and owners in some areas have done little to manage or offset fire hazards or risks on their own property.

Communities at Risk

A community at risk is a geographic area within and surrounding permanent dwellings (at least one home per 40 acres) with basic infrastructure and services, under a common fire protection jurisdiction, government, or tribal trust or allotment, for which there is a significant threat due to wildfire.[32] A statewide *Communities at Risk* map was created in 2006 in order to identify and assess communities at risk of wildfire in the state of Oregon; the map is used to establish wildland urban interface (WUI) boundaries in the absence of a CWPP. Figure WF.2 is the 2006 *Communities at Risk* map.

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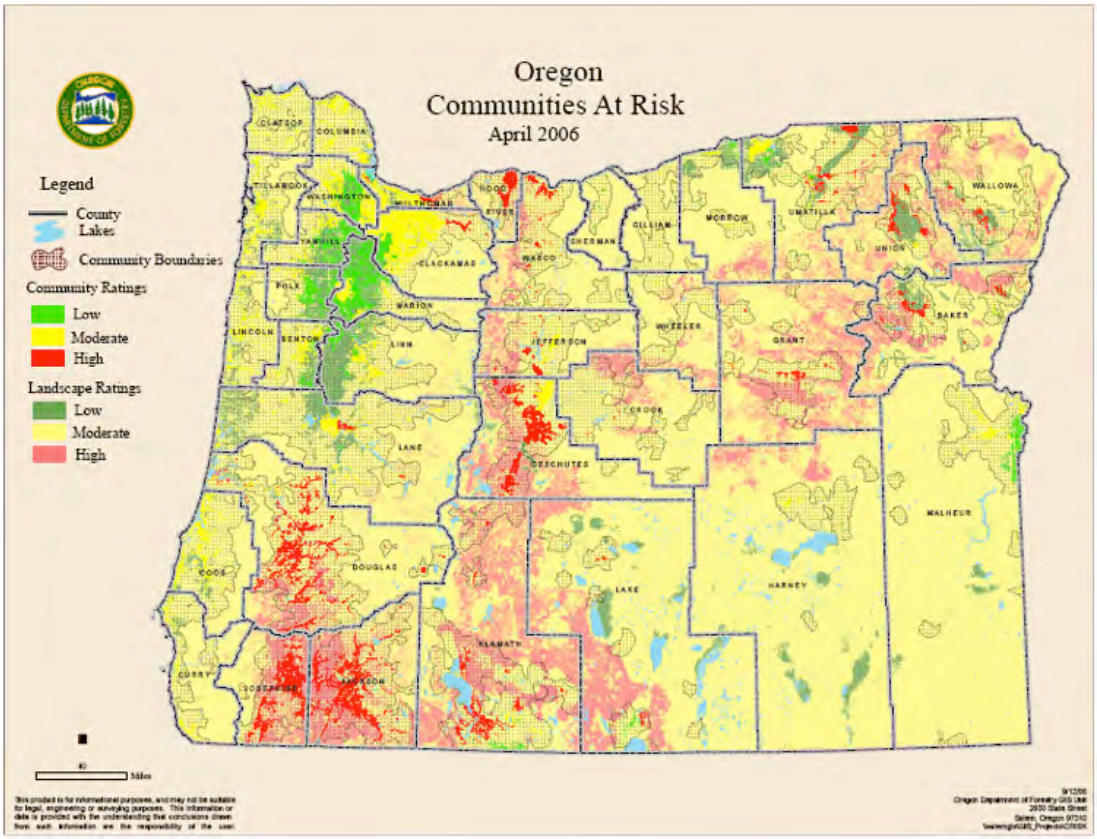
[30] Senate Bill 360, ODF website, http://www.odf.state.or.us/fireprot/sb360.html.
[31] National Wildland/Urban Interface Fire Protection, Fire protection in the Wildland/Urban Interface: Everyone's responsibility, Washington D.C., (1998).
[32] Jackson County Integrated Fire Plan (2007) and Healthy Forest Restoration Act, 2003.

Figure WF.2. Communities at Risk



Source: Oregon Department of Forestry

Drought

Recent concerns about the effects of climate change, particularly drought, are contributing to concerns about wildfire vulnerability. Unusually dry winters and hot summers increase the likelihood of a wildfire event, and place importance on mitigating the impacts of wildfire before an event takes place.

Existing Hazard Mitigation Activities

Some mitigation activities are, or will soon be, occurring in Jackson County, and in Oregon. Following is a list of many of these activities:

Jackson County Wildfire Ordinance

Chapter 8.7 of the Land Development Ordinance includes information on wildfire safety development regulations including the implementation of fuels reduction and the identification of areas subject to wildfire hazard as identified in the "Hazardous Wildfire Area Map".[33]

[33] Jackson County Lane Development Ordinance. Chapter 8.7. http://www.co.jackson.or.us/files/chapter_8_7.pdf

Jackson County Wildfire Outreach and Education

Jackson County maintains a webpage with information specific to wildfire hazard. Information on the website includes links to the Jackson County Integrated Fire Plan, fuels reduction and fire prevention websites, the Jackson County wildfire safety development regulations (land development code chapter 8.7), emergency vehicle access requirements and information on Jackson County fire safety information.[34]

Local Fire Crews

Fire crews can be called upon to meet with landowners at their house to provide recommendations to create a defensible space.[35]

County Fire Chief's Associations

Jackson and Josephine Counties have a strong fire chief's association. Mutual aid agreements and combined task forces are results of cooperation among different agencies that previously would not cross each other's jurisdictional lines.[36]

Local Fire Hazard Reduction Standards

Jackson County has worked with the local fire districts and other agencies to formulate fire hazard reduction standards. Standards now include requirements for road development, incline of driveways, width of roads, and building standards, as well as pumps and a water supply for houses outside the fire protection district.[37]

Local Working Committees

A working committee consisting of Rogue and Siskiyou National Forests, Bureau of Land Management (BLM), and Oregon Department of Forestry (ODF) meets monthly to focus on common fuel-related issues, suppression issues, and the combination and sharing of resources such as teams, flights, engines, dispatch capabilities, etc. [38]

Community Emergency Response Teams

The CERT, or Community Emergency Response Team, is a citizen- based program that teaches communities to be self-reliant for 72 hours without the assistance of local government.

In addition, a team of about 15 people in each neighborhood can provide a structural survey to the Emergency Operations Center after an event, will put out small fires, and will provide assistance to residents. It started just prior to Y-2K and is modeled after programs around the nation and in Medford, Portland, Ashland, and Klamath Falls.[39]

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[34] Jackson County Wildfire Information, http://www.co.jackson.or.us/page.asp?navid=1458
[35] Jim Wolf, ODF, Personal Interview, (February 28, 2001).
[36] Ibid.
[37] Randy Iverson, Jackson County Fire District #3, Personal Interview, (February 2001).
[38] M.J. Harvey, USFS, Personal Interview, (March 1, 2001).
[39] Keith Woodley, Ashland Fire and Rescue, Personal Interview, (April 2001).

Oregon Revised Statute, Chapter 478: Rural Fire Protection Districts

ORS 478 provides authority for a district, city, municipal corporation or other governmental agency, to contract with any person for the purpose of affording fire fighting, protection or prevention facilities. When a contract is entered into (pursuant to ORS 190.003 to 190.620) to provide fire protection service, the district, city, municipal corporation or governmental agency providing such service will have authority over open burning and the issuance of fire permits in the area served, and may make reasonable rules and regulations allowed in ORS 478.31.[40]

Senate Bill 360

ODF has been working on the implementation of Senate Bill 360. Passed in 1997, the primary purpose of the bill is to encourage landowners in the interface to reduce hazardous vegetative buildup around structures. It encourages government at various levels and the private sector to work together to accomplish mitigation tasks. Jackson and Deschutes Counties are the highest priorities and have already implemented the bill.[41]

Oregon Department of Forestry

ODF is involved with local fire chiefs and local fire departments to provide training. Local firefighters can get a range of experience from exposure to wildland firefighting. Local firefighters can also obtain their red card (wildland fire training documentation), and attend extensive workshops combining elements of structural and wildland firefighting, defending homes, and operations experience.[42] For years, ODF has worked with industrial partners (big timber companies) to share equipment in the case of extremely large fires.[43]

U.S. Forest Service

The U.S. Forest Service (USFS) is involved in a fuel-loading program implemented to assess fuels and reduce hazardous buildup on U.S. forestlands. The USFS is a cooperating agency and, while it has little to no jurisdiction in the lower valleys of Jackson County, it has an interest in preventing fires in the interface, as fires often burn up the hills and into the higher elevation U.S. forestlands.[44]

Federal Fire Grants

In 2001, the ODF received a $750,000 federal grant for cost share programs to help fund fuel reduction around individual homes.[45]

Firewise

Firewise, a national program is in the process of holding workshops with professionals throughout the region working in a wide array of fields dealing with land ownership and the effects of land use on wildfire cycles. By bringing people together and working through a

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[40] Oregon Revised Statutes (2011). http://www.leg.state.or.us/ors/478.html
[41] Ibid.
[42] Jim Wolf, ODF, Personal Interview, (February 28, 2001).
[43] Ibid.
[44] M.J. Harvey, USFS, Personal Interview, (March 1, 2001).
[45] Ibid.

series of exercises, solutions to urban/wildland interface fires are made. Soon, this program will be broken down into local workshops within Jackson County.[46]

Wildfire Mitigation Action Items

The following actions have been identified by the Jackson County, Ashland, Eagle Point, Rogue River and Shady Cove steering committees, and are recommended for mitigating the potential effects of wildfires (WUI) in the various identified jurisdictions. Below you will find a brief description, title, of the action items, see full action item worksheets in Appendix A for a full description of the action items.

Jackson County

WF#1: Coordinate fire mitigation action items through the Jackson County Integrated Fire Plan

Ashland

WF#1: Ashland Forest Resiliency Project.

WF#2: Ashland Firewise Communities.

Eagle Point

WF#1: Promote public awareness campaigns for individual property owners living in fire prone areas.

WF#2: Partner with Jackson County on Implementation of Community Wildfire Protection Plan and outreach projects.

WF#3: Reduce wildfire fuels/Investigate “Firewise Community” Program.

Rogue River

WF#1: Promote public awareness campaigns for individual property owners living in fire prone areas.

WF#2: Partner with Jackson County on Implementation of Community Wildfire Protection Plan and outreach projects.

WF#3: Reduce wildfire fuels / investigate "Firewise Community" program.

Shady Cove

WF#1: Promote public awareness campaigns for individual property owners living in the Wildland / Urban Interface (WUI).

WF#2: Reduce wildfire fuels / Promote and Enhance “Firewise Community” Program.

WF#3: Distribute public outreach materials informing residents about wildfire hazards and mitigation actions they can take to protect their property.

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[46] Ibid.

Jackson County

Wildfire/ Wildland Urban Interface Resource Directory

County Resources

Jackson County Emergency Management

Jackson County Emergency Management helps the community be better prepared for major emergencies and disasters. They work closely with cities, emergency responders, and volunteer agencies to find ways to reduce risks and minimize damages during hazard events. When a disaster occurs, they work with these partners in their Emergency Operations Center to coordinate resources and information. Once the event is over, they help bring assistance to those that have been harmed.

Contact: Jackson County Emergency Management Coordinator
Address: 10 South Oakdale, Medford, Oregon 97501
Phone: (541) 774-6821
Fax: (541) 774-6705
Website: http://www.co.jackson.or.us/sectionindex.asp?sectionid=28

Fire Protection Districts

Jackson County

Applegate Valley FD #9 (8500)

Address: 1095 Upper Applegate Road, Jacksonville, OR 97530
Phone: 541/899-1050 (D)
Fax: 899-9314
Website: http://applegatefd.com/

Ashland Fire and Rescue

Address: 455 Siskiyou Blvd., Ashland, OR 97520
Phone: 541/482-2770
Fax: 541/488-5318
Website: http://www.ashland.or.us/Page.asp?NavID=12812

Butte Falls Fire Department

Address: 431 Broad St, Butte Falls, OR 97522
Phone: 541/865-3262
Fax: 541/865-2795
Email: bf-fire@ccountry.net

Colestine Rural Fire District

Address: 1701 Colestine Road, Ashland, OR 97520
Phone: 541/488-1768
Fax: 541/552-9617
Website: http://www.crfd.org/bulletin.htm

Eagle Point Fire Department

Address: POB 779, Eagle Point, OR 97524
Phone: 541/826-4212
Fax: 541/826-6155

Evans Valley F.D. #6

Address: 8677 East Evans Rd., Rogue River, OR 97537
Phone: 541/582-0678
Fax: 541/582-0696
Website: http://www.evfire.org/

Jackson County Fire District #3

Address: 8333 Agate Road, White City, OR 97503
Phone: 541/826-7100
Fax: 541/826-4566
Website: http://www.jcfd3.com/

Jackson County Fire District #4

Address: 21200 Highway 62, Shady Cove. OR 97539
Phone: 541/878-2666
Fax: 541/878-3172

Jackson County Fire District #5

Address: 716 South Pacific Highway, Talent, OR 97540
Phone: 541/535-4222
Fax: 541/535-4226
Website: http://www.jcfd5.com

Jacksonville Fire Department

Address: 180 N Third St, POB 7, Jacksonville, OR 97530
Phone: 541/899-7246
Fax: 541/899-7882
Website: http://www.jacksonvilleor.us/?page_id=10

Lake Creek Rural

Address: 1584 S Fork Little Butte Creek Rd, Eagle Point, OR 97524
Phone: 541/826-2163
Fax: 541-826-2163

Medford City/Rural

Address: 200 South Ivy Street, Room 180, Medford, OR 97501
Phone: 541/774-2300
Fax: 541/774-2514
Website: http://www.ci.medford.or.us/SectionIndex.asp?SectionID=21

Phoenix Fire Department

Address: POB 666, Phoenix, OR 97535
Phone: 541/535-8400
Fax: 541/535-5769

Rogue River Rural

Address: POB 1170, Rogue River, OR 97537
Phone: 541/582-4411
Fax: 541/582-3456
Website: http://www.rogueriverfd.com/

RVI—Medford Airport Fire

Address: 3650 Biddle Road, Medford, OR 97504
Phone: 541/776-2830
Fax: 541/776-0964

Jackson County Roads and Parks Services

Address: 200 Antelope Road, White City, OR 97503
Phone: 541/774-8183/8184
Fax: 541/774-6971

Regional Fire Protection Districts

California Department of Forestry and Fire Protection

Contact: Northern Region Chief
Address: 1809 Fairlane Rd, Yreka, CA 96097
Phone: 530/842-3516
Fax: 530/842-7952
Website: http://www.fire.ca.gov/

Regional Resources

American Red Cross, Rogue Valley Chapter

Services provided by the American Red Cross include emergency assistance, disaster relief, and health and safety courses.

Contact: Executive Director
Address: 60 Hawthorne Street, Medford, OR 97504
Phone: (541) 779-3773
Fax: (541) 772-7212
Email: info@soredcross.org
Website: http://www.soredcross.org

State Resources

Oregon Department of Forestry (ODF)

ODF's fire prevention Unit is involved in interface wildfire mitigation, providing information about Oregon's Wildfire Hazard Zones. ODF has maps and information services relevant to wildfire hazard mitigation. The protection from Fire section of the ODF website includes Oregon specific fire protection resources, including wildfire condition reports. The GIS section of the site includes state maps of the following: slope, fire weather zones, precipitation, forest protection districts, potential natural vegetation, GAP vegetation, Northwest Oregon fire History, Southwest Oregon vegetation, lightning frequency, major watersheds, and general land ownership. ODF's Graphics Department can produce mapping at the local level, but data availability may limit the usefulness of this resource.

Contact: Fire Prevention Unit
Address: 2600 State Street, Salem, OR 97310
Phone: 503/945-7200
Fax: 503/945-7212
Website: http://www.oregon.gov/ODF/Pages/fire/fire.aspx

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 codes are 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: www.cbs.state.or.us/external/bcd

Office of the State Fire Marshal (OSFM)

The Prevention Unit of Oregon's Office of the State Fire Marshal includes 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.

Contact: Prevention Unit
Address: 4760 Portland Rd. NE, Salem, OR 97305-1760
Phone: 503/378-3473
Fax: 503/373-1825
Website: http://www.oregon.gov/OSP/SFM/Pages/index.aspx

National Resources

Federal Emergency Management Agency (FEMA)

FEMA Region 10 serves the northwestern states of Alaska, Idaho, Oregon, and Washington. The Federal Regional Center (FRC) for Region 10 is located in Bothell, Washington. FEMA is an agency of the federal government whose purpose is to reduce risks, strengthen support systems, and help people and their communities prepare for and cope with disasters regardless of cause. FEMA's mission is to "reduce loss of life and property and protect our nation's critical infrastructure from all types of hazards through a comprehensive, risk-based emergency management program of mitigation, preparedness, response, and recovery."

Contact: Federal Regional Center, Region 10
Address: 130-228th ST. SW, Bothell, WA 98021-9796
Phone: 425/487-4678
Website: www.fema.gov

National Fire Protection Association (NFPA)

NFPA 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 U.S. Department of Agriculture: Forest Service, the U.S. Department of the Interior: Bureau of Land Management, Bureau of Indian Affairs, Fish and Wildlife Service, and the National Park Service, and the United States Fire Administration.

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

Klamath National Forest

Contact: Forest Supervisor
Address: 1711 South Main Street, Yreka, CA 96097
Phone: 530/842-6131
Fax: 530/841-4571

Rogue River-Siskiyou National Forest

Contact: Fire Staff Officer
Address: 3040 Biddle Rd, Medford, OR 97504
Phone: 541/858-2200
Fax: 541/618-2400

Medford Fire Center

Contact: Asst. Fire Staff Officer
Address: 600 Nebula Way, Medford, OR 97504
Phone: 541/858-2343
Fax: 541/858-2346

Siskiyou Mountains Ranger District, Star Ranger Station

Contact: District Ranger
Address: 6941 Upper Applegate Road, Jacksonville, OR 97530
Phone: 541/899-3800
Fax: 541/899-3888

Siskiyou Mountains Ranger District, Ashland Ranger Station

Contact: District Ranger
Address: 645 Washington Street, Ashland, OR 97520
Phone: 541/552-2900
Fax: 541/552-2922

High Cascades Ranger District, Butte Falls Ranger Station

Contact: District Ranger
Address: POB 227, 730 Laurel St, Butte Falls, OR 97522
Phone: 541/865-2700
Fax: 541/865-2795

High Cascades Ranger District, Prospect Ranger Station

Contact: District Ranger
Address: 47201 Highway 62, Prospect, OR 97536
Phone: 541/560-3400,
Fax: 541/560-3444

Wild Rivers Ranger District, Grants Pass Ranger Station

Contact: Supervisor
Address: 2164 NE Spaulding Ave, Grants Pass, OR 97526
Phone: 541/471-6500
Fax: 541/471-6514

Tiller Ranger Station

Contact: District Ranger
Address: 27812 Tiller Trail Highway, Tiller, OR 97484
Phone: 541/825-3100

Crater Lake National Park

Contact: George Buckingham, Chief Ranger
Address: POB 7, Crater Lake National Park, OR 97604
Phone: 541/594-2211

Appendix A:
Action Item Forms

Jackson County Action Item
Multi-Hazard #1

Proposed Action Item:	Alignment with Plan Goals:
Sustain a public awareness campaign about natural hazards.	*Education and Outreach, Prevention, Property Protection, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Ideas for Implementation:

Inform and educate the public about potential natural hazards in Jackson County, personal preparedness, mitigation activities and opportunities, and options available when natural hazard events occur. The public awareness campaign may take many forms:

- Present hazard specific information at public workshops;
- Distribute preparedness and mitigation information at community fairs and events;
- Disseminate the Jackson County Emergency Preparedness Plan for
- Families to county residents;
- Maintain a natural hazard display at the Pacific Northwest Museum of
- Natural History;
- Use Public Service Announcements to educate people about emergency procedures;
- Survey the public to determine their level of preparedness and find out what deters them from taking preventative actions; and
- Develop a hazard information website that contains scientific facts about natural hazards, information on building codes, lists of companies that provide insurance for specific hazards, and educational information on damage prevention.

Coordinating Organization:	County Emergency Management, City Emergency Management Agencies

Internal Partners:	External Partners:
County Road, County Public Works	ARC, CERT, RVCOG, SOU, SOREDI, Emergency Response Agencies, Utilities and Telecommunications Companies, Media, FEMA, OEM, County Road, County Public Works

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred**

Jackson County Action Item
Multi-Hazard #2

Proposed Action Item:	Alignment with Plan Goals:
Sustain an education and outreach program for local jurisdictions and assist them in developing emergency operations, public information and hazard mitigation plans.	*Education and Outreach, Prevention, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Ideas for Implementation:

County Emergency Management is responsible for helping local jurisdictions develop plans that are compatible and well coordinated with other agency plans. In addition, County Emergency Management should:

- Train local jurisdictions on regional emergency management policies and procedures;
- Help coordinate countywide emergency management training and exercises;
- Help local jurisdictions develop resources and establish emergency facilities;
- Inform local jurisdictions about available resources, grant opportunities and other assistance;
- Disseminate information from Oregon Military Department – Office of Emergency Management and the
- Federal Emergency Management Agency.

Coordinating Organization:	County Emergency Management

Internal Partners:	External Partners:
	City Emergency Management Agencies, MCI Committee, ARC, Emergency Response Agencies, RVCOG, OEM, FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred**

Jackson County Action Item
Multi-Hazard #3

Proposed Action Item:	Alignment with Plan Goals:
Maintain a GIS inventory of all critical facilities, large employers/public assembly areas and lifelines, and use GIS to evaluate their vulnerability by comparing them with hazard-prone areas.	*Emergency Services, Education and Outreach, Prevention*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:
County GIS maintains databases containing information about natural hazards, land development, community infrastructure and demographics. These data sets may be used to create hazard maps, assess risk and develop plans.

Ideas for Implementation:

Coordinating Organization:	County GIS

Internal Partners:	External Partners:
County and City Emergency Management Agencies, County Roads, City Public Works	ODOT, Utility and Telecommunications Companies, Emergency Response Agencies, RVCOG, SOU, ODF, BLM, USFS

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred**

Jackson County Action Item
Multi-Hazard #4

Proposed Action Item:	Alignment with Plan Goals:
Promote natural hazards safety education.	*Education and Outreach, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Ideas for Implementation:
Natural hazards safety education includes earthquake duck-and-cover drills, facility lock-down drills, evacuation drills, fire safety training, hazardous materials training and Hug-A-Tree presentations. Natural hazards safety education may take place in schools, hospitals and businesses, as well as at preparedness fairs and community events.

Coordinating Organization:	County and City Emergency Management Agencies

Internal Partners:	External Partners:
	School Districts, Facility Safety Personnel, CERT, Search and Rescue, Emergency Response Agencies, ARC, Association of Safety Engineers, REAL Corps, Utility and Telecommunications Companies, Media, RVCOG, SOU, LEPC, OEM, FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Multi-Hazard #5

Proposed Action Item:	Alignment with Plan Goals:
Establish partnerships to coordinate and collect geo-science and technical information for identifying potential areas of risk.	*Education and Outreach, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Many public agencies in Jackson County collect geo-science and technical information for their internal needs. Often, these agencies contract with County GIS or RVCOG to work with their data and create specialized maps. With the agencies' permission, County GIS or RVCOG would use the data to develop hazard maps for County and City Emergency Management Agencies.

Ideas for Implementation:

One key outcome would be the coordination of disparate vegetation mapping. This would allow a wildland fire risk assessment to be done at a large scale, rather than on the individual parcel level.

Coordinating Organization:	County GIS, RVCOG

Internal Partners:	External Partners:
County and City Emergency Management Agencies	SOU, ODF, BLM, USFS, USGS, DOGAMI, Emergency Response, Lomakatsi, The Nature Conservancy, Agencies, OEM, FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Multi-Hazard #6

Proposed Action Item:	Alignment with Plan Goals:
Maintain a system to support populations with special needs (e.g., elderly and disabled persons) during a disaster.	*Emergency Services, Education and Outreach, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:
Jackson County Emergency Management worked with RVCOG Senior and Disabilities Services to develop a system to serve people who have physical and cognitive disabilities that impair their mobility, sight, or ability to independently respond to disasters. The system provides: • A database system available to 911 and Emergency Operations Centers that shows the location of senior and disabled persons

Ideas for Implementation:

Coordinating Organization:	County Emergency Management

Internal Partners:	External Partners:
County GIS	RVCOG Senior and Disabled Services, City Emergency Management Agencies, Rivernet and the COAD, ARC, Emergency Response Agencies

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred**

Jackson County Action Item
Multi-Hazard #7

Proposed Action Item:	Alignment with Plan Goals:
Explore funding sources and grant opportunities for community-wide natural hazard mitigation activities.	*Education and Outreach, Prevention*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Ideas for Implementation:
Identify grants and appropriate loans for people to take a proactive role in hazards mitigation. There are different types of mitigation grant programs, for example: federal fire money for wildfire hazard mitigation, Hazard Mitigation Grant Program for various types of hazard mitigation, and the Flood Mitigation Assistance Program.

Coordinating Organization:	Mitigation Plan Steering Committee

Internal Partners:	External Partners:
County Administrative Office	SOREDI, OEM, FEMA, IISOI

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Multi-Hazard #8

Proposed Action Item:	Alignment with Plan Goals:
Establish post-development inspection procedures for safety requirements (i.e. flood, earthquake, fire safety).	*Prevention*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:
A common concern heard in the stakeholder interviews was that the county does not conduct follow-up inspections to ensure that site plan requirements are being met. County policies and available resources only allow post-development inspections to occur after a complaint is received. This practice is currently being re-examined by the Director of County Roads, Parks and Planning.

Ideas for Implementation:

Coordinating Organization:	County Building

Internal Partners:	External Partners:
County Planning	FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
		Long Term

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Multi-Hazard #9

Proposed Action Item:	Alignment with Plan Goals:
Use hazard information as a basis for county ordinances and regulations that govern site-specific land use decisions	*Education and Outreach, Prevention*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Ideas for Implementation:
There is no funding for this particular activity at this time, however, during the next periodic review specific hazard information can be considered and incorporated into the County Comprehensive Plan.

Coordinating Organization:	County Planning

Internal Partners:	External Partners:
County GIS	FEMA, DLCD

Potential Funding Sources:	Estimated cost:	Timeline:
		Long Term

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Multi-Hazard #10

Proposed Action Item:	Alignment with Plan Goals:
Investigate the need for an emergency disaster fund.	*Prevention, Partnership and Communication*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:
A fund at the local level can be used to fund mitigation efforts or leverage state and federal assistance and grants.

Ideas for Implementation:

Coordinating Organization:	County Emergency Management

Internal Partners:	External Partners:
City Councils, City Emergency Management Agencies	SOREDI, RVCOG

Potential Funding Sources:	Estimated cost:	Timeline:
		Long Term

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred**

Jackson County Action Item
Multi-Hazard #11

Proposed Action Item:	Alignment with Plan Goals:
Improve planning, notification and training for volunteers.	*Emergency Services, Education and Outreach, Partnership and Communication*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Volunteers are a valuable resource during a disaster. Many volunteers are members of more than one organization. County Emergency Management needs to give volunteers a clear view of their roles during different types of disasters, and help them to prioritize their efforts.

Ideas for Implementation:

County Emergency Management should:

- Identify and prioritize how volunteers can assist during different types of disaster. Train volunteers about their roles and include them in community disaster exercises;
- Develop a notification process for volunteers that incorporates different thresholds of activation;
- Coordinate registration and training of emergent volunteers;
- Retain a professional coordinator for volunteer programs, activities, grant opportunities, etc.;
- Actively work to expand Community Emergency Response Teams (CERT) countywide and promote CERT to the business community.

Coordinating Organization:	County Emergency Management

Internal Partners:	External Partners:
City Emergency Management Agencies, Ashland Fire Department	Rivernet, COSAR, MRC, CERT, ARC, ARES, Search and Rescue

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Multi-Hazard #12

Proposed Action Item:	Alignment with Plan Goals:
Promote hazard resistant utility and telecommunication construction and maintenance methods.	*Education and Outreach, Prevention*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Ideas for Implementation:
Support/encourage utility and telecommunications companies to use construction and maintenance methods that reduce power outages from various natural hazards. Transmission lines can be underground trim lines vs. "T" poles. Maintenance plans that take age, construction and placement of poles into account may help alleviate risk of power outage during natural hazard events.

Coordinating Organization:	RVCOG

Internal Partners:	External Partners:
County and City Emergency Management Agencies	ARES

Potential Funding Sources:	Estimated cost:	Timeline:
		Long Term

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred**

Jackson County Action Item
Multi-Hazard #13

Proposed Action Item:	Alignment with Plan Goals:
Develop a system for data collection for non-declared natural hazard events.	*Emergency Services, Education and Outreach, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Ideas for Implementation:

Once a system for data collection is in place, the damage information should be collected and stored locally, as well as reported to the National Climate Data Center. This information can include countywide damage totals for each event, with the idea that over time this data will show the geographic patterns of occurrence and vulnerability.

Coordinating Organization:	County and City Emergency Management Agencies

Internal Partners:	External Partners:
County Building, County GIS	IISOI, Farm Services, Insurance Companies

Potential Funding Sources:	Estimated cost:	Timeline:
		Long Term

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred**

Jackson County Action Item
Multi-Hazard #14

Proposed Action Item:	Alignment with Plan Goals:
Improve coordination and evaluate technical and engineering limitations for catastrophic event response, and develop a long-term recovery plan for Jackson County from the effects of catastrophic hazards.	*Emergency Services, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Ideas for Implementation:

Where applicable, identify how Jackson County can coordinate with other entities after a seismic event, and identify what limitations exist that prevents coordinated event response. Where possible, develop mutual aid agreements for assistance after catastrophic natural hazard events.

A long-term recovery plan identifies how and where Jackson County communities will rebuild after a catastrophic event. A long-term plan identifies likely scenarios for rebuilding structures, transportation routes, and infrastructure conduits. These types of plans can be viewed as an opportunity to reconstruct the community in the wake of a large-scale natural disaster.

Coordinating Organization:	County Emergency Management

Internal Partners:	External Partners:
	SOU, USGS, DOGAMI, Klamath County Emergency Management, Regional Search and Rescue, Army National Guard, ARC, hospitals

Potential Funding Sources:	Estimated cost:	Timeline:
		Long Term

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred**

Jackson County Action Item
Multi-Hazard #15

Proposed Action Item:	Alignment with Plan Goals:
Promote the use of natural hazard loss estimation program (HAZUS) at the local level by providing for the training to use the computer model.	*Education and Outreach, Prevention, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:
HAZUS is a computer model that estimates direct losses (injury and death) and evaluates the indirect losses (economic impact and communications/transportation) associated with earthquakes. While the figures have some degree of uncertainty and should only be used for general planning purposes, HAZUS can help identify risk reduction strategies to minimize earthquake impacts on people, buildings and infrastructure.

Ideas for Implementation:

Coordinating Organization:	County GIS

Internal Partners:	External Partners:
County and City Emergency Management	DOGAMI, Utility and Telecommunications Companies, OEM, FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
		Long Term

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Drought #1

Proposed Action Item:	Alignment with Plan Goals:
Support Local Agencies Training on Water Conservation Measures and Drought Management Practices	*Education and Outreach, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- Agricultural economy- crops and livestock- susceptive to drought
  - Loss of income for farmers and ranchers during drought season
- Need for raised awareness of the impacts of drought
- Need for coordinated water conservation efforts
- Need for county-wide effort to reduce drought impact
- The impact that a natural hazard event has on one industry can reverberate throughout the regional economy. The effect is especially great when the businesses concerned belong to a basic sector industry. Basic sector industries are those that are dependent on sales outside of the local community; they bring money into a local community via employment. The farm industry is a basic industry. If agricultural production is hampered by a natural hazard event, the multiplier effect could harm the local community, in addition to meaning job losses in the agricultural industry. 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. Understanding and addressing the farming industry's sensitivity to drought is a strategic way to increase the resiliency of the entire regional economy

Ideas for Implementation:

In cooperation with OSU Extension Service and agricultural organizations prominent and respected within the farming and ranching community, build on existing outreach methods with the goal of providing water conservation/drought management training to farmers and ranchers

- Establish a public advisory committee
- Include public participation in drought planning
- Organize drought information meetings for the public and the media
- Implement water conservation awareness programs
- Publish and distribute pamphlets on water conservation techniques / drought management
- Organize workshops on special drought-related topics
- Prepare sample ordinances on water conservation
- Establish a drought information center
- Set up a demonstration of on-site treatment technology at visitor center
- Establish tuition assistance so farmers can enroll in farm management classes
- Develop training materials in several languages
- Provide education on different cultural perspectives of water resources
- Employ public participation and public information

Coordinating Organization:	Jackson Soil and Water Conservation District

Internal Partners:	External Partners:
County Agencies	Medford Water Commission, OSU Extension Service, Fruit Growers, Water Districts

Potential Funding Sources:	Estimated cost:	Timeline:
		Long Term

Form Submitted by:	2012 Jackson County Steering Committee
Action Item Status:	**NEW**

Jackson County Action Item
Drought #2

Proposed Action Item:	Alignment with Plan Goals:
Ensure Long-range Water Resources Development	*Property Protection, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- Potential and projected growth within the County could place serious burden on water supply for domestic and agricultural use
- Studying alternative sources may reveal under-utilized water resources and other information useful to water managers
- The impact that a natural hazard event has on one industry can reverberate throughout the regional economy. The effect is especially great when the businesses concerned belong to a basic sector industry. Basic sector industries are those that are dependent on sales outside of the local community; they bring money into a local community via employment. The farm industry is a basic industry. If agricultural production is hampered by a natural hazard event, the multiplier effect could harm the local community, in addition to meaning job losses in the agricultural industry. 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. Understanding and addressing the farming industry's sensitivity to drought is a strategic way to increase the resiliency of the entire regional economy

Ideas for Implementation:

- Assist in the determination of which alternative water sources in or near Jackson County would benefit by detailed studies and also assist in the determination of how these studies can be funded
- County Adoption of Stricter Water Conservation Policies
  - Establish stronger economic incentives for private investment in water conservation
  - Encourage voluntary water conservation
  - Improve water use and conveyance efficiencies
  - Implement water metering and leak detection programs
  - Imposing excess-use charges during times of water shortage
  - Imposing mandatory water-use restrictions during times of water shortage
  - Conduct water-conservation education of the public and of school children, including special emphasis during times of water shortage

Coordinating Organization:	Jackson County Watermaster

Internal Partners:	External Partners:
GIS, Public Works, BOC, SWCD	

Potential Funding Sources:	Estimated cost:	Timeline:
		Long Term

Form Submitted by:	2012 Jackson County Steering Committee
Action Item Status:	**NEW**

Jackson County Action Item
Earthquake #1

Proposed Action Item:	Alignment with Plan Goals:
Promote building safety through nonstructural improvements.	*Property Protection, Education and Outreach, Prevention*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:
Publicize information on securing bookcases, filing cabinets, light fixtures, and other items that can cause injuries and block exits. Work with local building supply outlets to feature checklists/retrofit kits for reducing nonstructural risk. Use the Home Show to promote nonstructural strategies and mitigation information.

Ideas for Implementation:

Coordinating Organization:	County and City Emergency Management Agencies

Internal Partners:	External Partners:
County Building Officials, County Emergency Response Agencies	Builder's Association, IISOI, Red Cross, OSSPAC, OIT, DOGAMI

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Earthquake #2

Proposed Action Item:	Alignment with Plan Goals:
Encourage purchase of earthquake hazard insurance.	*Property Protection, Education and Outreach*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:
Earthquake hazards are a major risk in Oregon. Many Oregonians, however, have not purchased earthquake insurance. There is a need to increase purchase of this insurance to alleviate financial loss from a seismic event.

Ideas for Implementation:

Coordinating Organization:	IISOI through local insurance companies

Internal Partners:	External Partners:
	Mortgage Companies

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Earthquake #3

Proposed Action Item:	Alignment with Plan Goals:
Maintain an inventory of all permitted dams in Jackson County	*Education and Outreach, Prevention*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Update appropriate seismic criteria and procedures for evaluating performance of existing dams (varies within each permitted dam Emergency Action Plan).

- Susceptibility to damage from flood events
- Amount of water impounded
- Type of construction
- Year completed
- Repair work performed

Ideas for Implementation:

Coordinating Organization:	County and City Emergency Management Agencies, Water Master

Internal Partners:	External Partners:
	Watershed Councils, USACE, BOR, WRD

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Earthquake #4

Proposed Action Item:	Alignment with Plan Goals:
Compile Relative Earthquake Hazard maps for Jackson County.	*Education and Outreach, Prevention, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:
Mapping earthquake hazards across the entire county will assist with mitigation activities and the provision of emergency services. The hazard map can be integrated with other GIS data to identify risk areas and assist in guiding land use away from hazardous areas.

Ideas for Implementation:

Coordinating Organization:	DOGAMI, County GIS

Internal Partners:	External Partners:
County Planning, County Emergency Management	USGS, BLM, SOU

Potential Funding Sources:	Estimated cost:	Timeline:
		Long Term

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred**

Jackson County Action Item
Earthquake #5

Proposed Action Item:	Alignment with Plan Goals:
Develop public/ private partnerships - with building contractors, architects, - to pursue retrofitting projects.	*Education and Outreach, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:
Encourage private contractors and architects to work on retrofitting buildings and infrastructure by recognizing their efforts through incentive programs. Incentive programs can assist in increasing the number of people and organizations aware of the importance of earthquake mitigation.

Ideas for Implementation:

Coordinating Organization:	SOREDI

Internal Partners:	External Partners:
County Roads	Builder's Association, IISOI

Potential Funding Sources:	Estimated cost:	Timeline:
		Long Term

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred**

Jackson County Action Item
Flood #1

Proposed Action Item:	Alignment with Plan Goals:
Continue to coordinate with appropriate agencies, and maintain an inventory of all aggregate operations adjacent to or within the floodplain to ensure operations protect streams.	*Prevention, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Ideas for Implementation:

Coordinating Organization:	County Planning, County Engineering (Code Compliance)

Internal Partners:	External Partners:
County GIS	DOGAMI, Watershed Councils, DEQ, ODFW, USACE, DSL

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred**

Jackson County Action Item
Flood #2

Proposed Action Item:	Alignment with Plan Goals:
Maintain an inventory of all permitted dams in Jackson County.	*Education and Outreach, Prevention, Structural Projects*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Update appropriate seismic criteria and procedures for evaluating performance of existing dams (varies within each permitted dam Emergency Action Plan).

- Susceptibility to damage from flood events
- Amount of water impounded
- Type of construction
- Year completed
- Repair work performed

Ideas for Implementation:

Coordinating Organization:	County and City Emergency Management Agencies, Water Master

Internal Partners:	External Partners:
	Watershed Councils, USACE, BOR, WRD

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	

Jackson County Action Item
Flood #3

Proposed Action Item:	Alignment with Plan Goals:
Conduct workshops for target audiences on National Flood Insurance Programs, mitigation activities, and potential assistance from FEMA's Flood Mitigation Assistance and Hazard Mitigation Grant Programs.	*Education and Outreach, Prevention, Property Protection, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Ideas for Implementation:
Include information about the financial aspects of building (and rebuilding) in the floodplain. Present information on how other communities have addressed building in the floodplain. Selected target audiences can include: realtors, lending institutions, surveyors, engineers, and government agencies.

Coordinating Organization:	County and City Planning, County and City Emergency Management Agencies

Internal Partners:	External Partners:
	Watershed Councils, DLCD, OEM, FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Flood #4

Proposed Action Item:	Alignment with Plan Goals:
Update the Flood Insurance Rate (FIRM) Maps for Jackson County as funding becomes available.	*Prevention, Property Protection, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Ideas for Implementation:
Work with FEMA on specific areas to update as funding becomes available.

Coordinating Organization:	FEMA, DLCD

Internal Partners:	External Partners:
County Planning, City Planning, County GIS	DOGAMI

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Flood #5

Proposed Action Item:	Alignment with Plan Goals:
Encourage private property owners to restore natural systems within the floodplain, and to manage riparian areas and wetlands for flood abatement.	*Property Protection, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Ideas for Implementation:
In addition to encouraging private property owners, managing publicly owned riparian and floodplain areas for conversion to open space/parkland/greenway is key to restoring natural floodwater absorption capacities (i.e. Bear Creek Greenway program).

Coordinating Organization:	RVCOG, County Emergency Management

Internal Partners:	External Partners:
County Parks and Planning	FEMA, Watershed Councils, DLCD,

Potential Funding Sources:	Estimated cost:	Timeline:
		Long Term

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Flood #6

Proposed Action Item:	Alignment with Plan Goals:
Use federal grant funds to acquire or elevate individual properties adjacent to/ within 100-year floodplain as opportunities arise.	*Prevention, Property Protection, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Ideas for Implementation:
Investigate Flood Mitigation Assistance or Hazard Mitigation Grant Program funds for potential elevation and acquisition projects. Maintain an inventory of properties that have experienced repetitive flood damage and assess each property for potential mitigation options.

Coordinating Organization:	County Emergency Management

Internal Partners:	External Partners:
County Planning, County Administrator's Office	FEMA, OEM,

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Flood #7

Proposed Action Item:	Alignment with Plan Goals:
Continue to increase Jackson County's CRS (Community Rating System) rating over time through activities outlined by FEMA.	*Prevention, Property Protection, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:
Communities engaging in these types of activities receive points according to a schedule developed for the CRS [i.e. strengthen building codes (and enforcement of); increase public education activities; dam safety programs; increased elevation standards for homes in the 100-year floodplain; community education programs, etc]. These activities reduce insurance premiums for property owners who have undertaken mitigation activities.

Ideas for Implementation:

Coordinating Organization:	County and City Emergency Management Agencies, County and City Planning

Internal Partners:	External Partners:
	Watershed Councils, OEM, DLCD, OECDD, USACE, FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Flood #8

Proposed Action Item:	Alignment with Plan Goals:
Preserve water quality by using storm water best management practices	*Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:
Model standards could be the National Pollution Discharge Elimination System (NPDES).

Ideas for Implementation:

Coordinating Organization:	County Roads, RVCOG, DEQ, County and City Planning

Internal Partners:	External Partners:
	Watershed Councils, WRD, USACE, Irrigation Districts, State Parks, Rogue Valley Sewer Services

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Landslide #1

Proposed Action Item:	Alignment with Plan Goals:
Compile Relative Landslide Risk maps for Jackson County.	*Education and Outreach, Prevention, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

DOGAMI has produced maps of potential debris flow areas in the county. However, field investigations must be undertaken to verify the actual flow hazard. The county may combine historic information on landslides in the county with the DOGAMI model data to inform planning and development processes.

Ideas for Implementation:

Coordinating Organization:	County GIS

Internal Partners:	External Partners:
County Planning, County Emergency Management	DOGAMI, ODF, SOU

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred**

Jackson County Action Item
Landslide #2

Proposed Action Item:	Alignment with Plan Goals:
Increase public education related to landslide hazards by distributing landslide informational brochures.	*Education and Outreach, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Ideas for Implementation:
Local governments in Jackson County can easily distribute brochures. Target departments include emergency management and land use planning.

Coordinating Organization:	County Emergency Management

Internal Partners:	External Partners:
County Planning, City Emergency Managers	DOGAMI, OEM, ODF, DLCD

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred**

Jackson County Action Item
Landslide #3

Proposed Action Item:	Alignment with Plan Goals:
Investigate the development and implementation of a county landslide ordinance.	*Prevention*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:
A Steep Slope and Rapidly Moving Landslide Ordinance is adopted in Jackson County to respond to the requirement of HB 3375 (2003). The purpose of the legislation and ordinance is to review development applications for properties within identified "further review areas" and excessive slope areas to assess the risk before allowing proposed land use activities. The ordinance can also use financial incentives or disincentives to promote development outside identified risk areas. The Salem Steep Slope / Landslide Ordinance can be an example of key components.

Ideas for Implementation:

Coordinating Organization:	County Planning

Internal Partners:	External Partners:
County Emergency Management, County GIS, County Roads	DOGAMI, ODF, DLCD

Potential Funding Sources:	Estimated cost:	Timeline:
		Long Term

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred**

Jackson County Action Item
Volcanic Eruption #1

Proposed Action Item:	Alignment with Plan Goals:
Increase awareness of volcanic eruption threats for county residents.	*Education and Outreach, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Ideas for Implementation:

Inform and educate the public about volcanic hazards in the Jackson County region. The public awareness campaign may take many forms:

- Feature an interview with a representative of the Cascade Volcano Observatory (USGS), talking about how they determine the likelihood of a volcanic eruption;
- Place an informational kiosk in view of Mt. McLoughlin describing the area geology and potential volcanic hazards in the region;
- Develop a volcanic hazards guidebook, including how to identify possible volcanic eruption warning signals, air and water quality issues, techniques to minimize ash entering one's home, and proper clean-up procedures.

Coordinating Organization:	County and City Emergency Management Agencies

Internal Partners:	External Partners:
	USGS-CVO, DOGAMI, SOU, National Park Service (Crater Lake)

Potential Funding Sources:	Estimated cost:	Timeline:
		Long Term

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Volcanic Eruption #2

Proposed Action Item:	Alignment with Plan Goals:
Create and map hypothetical eruption scenarios to display potential eruption hazards.	*Education and Outreach*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Hypothetical eruption scenarios for area volcanoes, showing the different possible eruption hazards can help the public understand the impacts of a volcanic eruption. Potential scenarios can show such occurrences as lava flows, tephra, ash plumes, lahars (debris flows), and possible geographic extent of impact. The scenarios can also cover likely grain size, thickness, physical properties, and hazards associated with ash fall. Pierce County, Washington uses hypothetical scenarios for Mount Rainier to show possible impacts. Cascades Volcano Observatory would partner with SOU geologists to create potential eruption scenarios.

Ideas for Implementation:

Coordinating Organization:	SOU

Internal Partners:	External Partners:
County GIS	USGS-CVO, DOGAMI

Potential Funding Sources:	Estimated cost:	Timeline:
		Long Term

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred**

Jackson County Action Item
Volcanic Eruption #3

Proposed Action Item:	Alignment with Plan Goals:
Collaborate with county environmental health to provide immediate warning to communities about air quality hazards following volcanic eruptions.	*Emergency Services, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:
Ash fall distribution is not predictable due to its dependence on wind speed and direction. Therefore, the Jackson County Environmental Health Office can alert communities when Mount Shasta or other volcanoes produce ash, and distribute information quickly about air quality and visibility, and whether it is safe for residents to go outdoors or travel.

Ideas for Implementation:

Coordinating Organization:	County Environmental Health, DEQ

Internal Partners:	External Partners:
County and City Emergency Management Agencies	Media

Potential Funding Sources:	Estimated cost:	Timeline:
		Long Term

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Wildfire (Wildland Urban Interface) #1

Proposed Action Item:	Alignment with Plan Goals:
Coordinate fire mitigation action items through the Jackson County Integrated Fire Plan	*Education and Outreach, Prevention, Property Protection, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:
Jackson County Integrated Fire Plan

Rationale for Proposed Action Item:
The Jackson County Integrated Fire Plan (JaCIFP) developed an extensive risk assessment and identified mitigation actions. The Plan undergoes annual review and update. The Integrated Fire Plan should be considered the Wildfire section of the NHMP as it contains more accurate and extensive information about the vulnerability, risk, and mitigation actions than this NHMP.

Ideas for Implementation:
Continue annual review and update of the JaCIFP.

Coordinating Organization:	County Emergency Management

Internal Partners:	External Partners:
	Fire and Rescue Districts (full list provided within JaCIFP), State Oregon Military Department – Office of Emergency Management, Oregon Department of Forestry

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2012 Jackson County Steering Committee
Action Item Status:	**NEW**

Jackson County Action Item
Severe Winter Storm and Windstorm #1

Proposed Action Item:	Alignment with Plan Goals:
Map areas where extreme weather, such as road icing or wind damage occurs.	*Education and Outreach, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:
Hazardous areas can be identified for the public so precautions can be taken at appropriate times. Extreme weather should be reported to the National Climatic Data Center. Information about county road icing or county road closures due to snow or other severe winter storm events may already exist within county offices but it can be mapped and disseminated countywide to make residents knowledgeable about severe winter and windstorm events.

Ideas for Implementation:

Coordinating Organization:	County Roads

Internal Partners:	External Partners:
County Planning, County GIS	NWS, ODOT, NOAA

Potential Funding Sources:	Estimated cost:	Timeline:
		Short Term

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

Jackson County Action Item
Severe Winter Storm and Windstorm #2

Proposed Action Item:	Alignment with Plan Goals:
Promote the benefits of tree-trimming and tree replacement programs and help to coordinate local efforts by public and private agencies.	*Education and Outreach, Prevention, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:
Pacific Power and Light's (PP&L) tree-trimming and tree replacement programs provide tree maintenance benefits to local communities. PP&L could benefit in turn from cooperation with Forest Service and BLM foresters in harvest plans that are adjacent to roads and/or power line easements.

Ideas for Implementation:

Coordinating Organization:	County Roads, Vegetation Management

Internal Partners:	External Partners:
City Public Works	Utility and Telecommunications Companies, ODOT, USFS, BLM

Potential Funding Sources:	Estimated cost:	Timeline:
		Ongoing

Form Submitted by:	2006 Jackson County Steering Committee
Action Item Status:	**Deferred/ Modified**

City of Ashland Action Item
Multi-Hazard #1

Proposed Action Item:	Alignment with Plan Goals:
Public Access to Emergency Preparedness Training and 72-hour kits	Education and Outreach Prevention

Alignment with Existing Plans/Policies:

Coordinates with current City of Ashland emergency preparedness training program.

Rationale for Proposed Action Item:

The City of Ashland is currently involved with implementing a program of emergency preparedness for the various elements of the community. Training and 72-hour kits were provided to all City employees and several business continuity training workshops were conducted in cooperation with the Chamber of Commerce. The City now wants to provide emergency preparedness workshops and access to 72-hour kits for its citizens.

Ideas for Implementation:

Provide workshops on several dates/times on emergency preparedness and Ashland's current natural hazards risk assessment. Also coordinate with local vendors to conduct a "build your own 72-hour kit" event in conjunction with the workshops. A fee will be charged for the 72-hour kits.

Coordinating Organization:	Ashland Fire & Rescue

Internal Partners:	External Partners:
	Red Cross Local Retailers

Potential Funding Sources:	Estimated cost:	Timeline:
City of Ashland HMPG funds Citizens of Ashland	$55,000	√ Short Term (0-2 years) € Long Term (2-4+ years) € Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

City of Ashland Action Item
Multi-Hazard #2

Proposed Action Item:	Alignment with Plan Goals:
Building Inspector Certification Program	Property Protection Emergency Services

Alignment with Existing Plans/Policies:
Coordinates with Ashland's EOC and EOP

Rationale for Proposed Action Item:
Currently the City of Ashland doesn't have any building inspectors certified to evaluate structures for post-disaster integrity and safety. Being able to conduct these inspections quickly and accurately is necessary for a community's quick recovery from a disaster.

Ideas for Implementation:
Send members of Community Development to training that will certify them in evaluating buildings for post-disaster safety. Certification is required for inspectors to conduct this service.

Coordinating Organization:	Ashland Community Development

Internal Partners:	External Partners:
Ashland Fire & Rescue	

Potential Funding Sources:	Estimated cost:	Timeline:
City of Ashland HMPG funds	$8,000	√ Short Term (0-2 years) € Long Term (2-4+ years) € Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

City of Ashland Action Item
Multi-Hazard #3

Proposed Action Item:	Alignment with Plan Goals:
CERT Training and Equipment	Education and Outreach Emergency Services

Alignment with Existing Plans/Policies:

Sustains and expands Ashland's existing CERT program that is sponsored by Ashland Fire & Rescue

Rationale for Proposed Action Item:

- Ashland's CERT program has trained over 500 local and area residents.
- Ashland's CERT program provides the training for other area CERT programs
- The City of Ashland has a strong commitment to the program
- CERT is integrated into the City's Emergency Operations Plan
- The program recently lost its AMERICORPS employee
- Title III funding is being reduced each budget

Ideas for Implementation:

- Continue with elements of the existing program while expanding the number of training opportunities
- Partner with the business community to conduct CERT training for the businesses in Ashland
- Deliver both public and private school-based CERT training
- Offer CERT training for Southern Oregon University staff including resident assistants

Coordinating Organization:	Ashland Fire & Rescue

Internal Partners:	External Partners:
City of Ashland	Chamber of Commerce, Ashland School District, Southern Oregon University

Potential Funding Sources:	Estimated cost:	Timeline:
HMGP Grant **Title III Funds**	$31,000	€ Short Term (0-2 years) € Long Term (2-4+ years) √ Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

City of Ashland Action Item
Multi-Hazard #4

Proposed Action Item:	Alignment with Plan Goals:
Mass Notification System Funding	Emergency Services

Alignment with Existing Plans/Policies:
Ashland current mass notification system "Citizen Alert"

Rationale for Proposed Action Item:
The City of Ashland is currently participating in a mass notification system with Jackson County and the City of Medford. Thus far the system has been funded through a grant acquired by Jackson County EM. Ashland will be responsible for subsequent funding of this system. Mass notification is a key component of Ashland emergency management program.

Ideas for Implementation:
Identify funding for the annual costs of the mass notification system.

Coordinating Organization:	Ashland Fire & Rescue

Internal Partners:	External Partners:
	Jackson County EM

Potential Funding Sources:	Estimated cost:	Timeline:
City of Ashland HMPG funds	$6,000 annually	€ Short Term (0-2 years) € Long Term (2-4+ years) √ Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

City of Ashland Action Item
Multi-Hazard #5

Proposed Action Item:	Alignment with Plan Goals:
Community Education Plan	Property Protection Education and Outreach Prevention Emergency Services Partnership and Coordination

Alignment with Existing Plans/Policies:

Coordinates with the City of Ashland's commitment to an increased level of emergency preparedness for its citizens.

Rationale for Proposed Action Item:

An informed, educated and prepared community is safer and has a better chance of surviving a natural disaster as well as recovering quicker than a community that is ill-prepared. By being informed and educated, the need for emergency services is lessened allowing response to critical needs situations

Ideas for Implementation:

Create a comprehensive, multi-tiered education program to target all elements of the community. All elements will receive a basic level of training/education with opportunities for higher level training/education if desired. Education will be delivered to the schools, university, businesses, service clubs, seniors, the homeless population, visitors, and residents.

Coordinating Organization:	Ashland Fire & Rescue

Internal Partners:	External Partners:
City of Ashland, Ashland School District, Southern Oregon University, Chamber of Commerce, Oregon Shakespeare Festival	American Red Cross Jackson County OEM

Potential Funding Sources:	Estimated cost:	Timeline:
HMGP Grant City of Ashland SOU ASD	TBD	€ Short Term (0-2 years) √ Long Term (2-4+ years) € Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

City of Ashland Action Item
Multi-Hazard #6

Proposed Action Item:	Alignment with Plan Goals:
Emergency Management Exercises	Education and Outreach Property Protection Emergency Services

Alignment with Existing Plans/Policies:

Will be conducted in accordance to the adopted Emergency Operations Plan of Ashland

Rationale for Proposed Action Item:

The City of Ashland operates under a comprehensive Emergency Operations Plan and utilizes an Emergency Operations Center during large scale emergencies or planned events. It is important to conduct periodic exercises to maintain functionality of the emergency management organization. By having a more efficient and effective emergency management organization the impact of a natural hazard can be minimized in terms of severity and scope.

Ideas for Implementation:

- Conduct one table-top exercise annually including area and regional first responders and stakeholders. This exercise will be facilitated and produce and after action report.
- Conduct one functional exercise with field activities annual including area and regional first responders and stakeholders. This exercise will be facilitated and produce and after action report.

Coordinating Organization:	Ashland Fire & Rescue

Internal Partners:	External Partners:
City of Ashland	Chamber of Commerce, Ashland School District, Southern Oregon University, Ashland Community Hospital

Potential Funding Sources:	Estimated cost:	Timeline:
HMGP Grant **City General Fund**	$5,500 annually	€ Short Term (0-2 years) € Long Term (2-4+ years) √ Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

City of Ashland Action Item
Multi-Hazard #7

Proposed Action Item:	Alignment with Plan Goals:
Emergency Generators for City's Critical Infrastructure	Structural projects Property protection

Alignment with Existing Plans/Policies:

Maintaining tenable critical infrastructure facilities is critical to implementing and sustaining the emergency management of the city as outlined in the Emergency Operations Plan that has been adopted.

Rationale for Proposed Action Item:

- The City is located in an area that experiences severe weather producing the potential for long term electrical power interruptions
- The City's critical infrastructure plays a major role in the City's emergency management including care and shelter

Ideas for Implementation:

- Inventory the City's critical infrastructure facilities and determine the viability of integrating emergency backup electrical power into the buildings' electrical systems
- Develop a priority list for facilities needing backup electrical power

Coordinating Organization:	Ashland Fire & Rescue

Internal Partners:	External Partners:
City of Ashland	Ashland School District, Southern Oregon University

Potential Funding Sources:	Estimated cost:	Timeline:
HMGP Grant	TBD	€ Short Term (0-2 years) √ Long Term (2-4+ years) € Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

City of Ashland Action Item
Multi-Hazard #8

Proposed Action Item:	Alignment with Plan Goals:
Emergency Provisions for Responders and Schools	Emergency Services Partnership and Coordination

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Acquire appropriate emergency supplies for the City's emergency responders and schools. This will allow for support of the responders helping with recovery from a disaster as well as the staff and students at the City's schools.

Ideas for Implementation:

Determine the necessary inventory of food, water, and other support supplies for the City's responders and school staff/students. Identify storage areas for the supplies. Acquire the supplies and develop a program for periodic replenishment.

Coordinating Organization:	Ashland Fire & Rescue

Internal Partners:	External Partners:
Other City Departments	Ashland School District

Potential Funding Sources:	Estimated cost:	Timeline:
City of Ashland Ashland School District HMPG funds	$ 48,000	√ Short Term (0-2 years) € Long Term (2-4+ years) € Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

City of Ashland Action Item
Multi-Hazard #9

Proposed Action Item:	Alignment with Plan Goals:
Evaluate Ashland's Land Use Policies in High Risk Areas	Property Protection Prevention Emergency Services

Alignment with Existing Plans/Policies:
Local land use policies

Rationale for Proposed Action Item:
Evaluate the City's land use provisions to better address the hazard mitigation for development in high risk areas.

Ideas for Implementation:
Identify a consultant to evaluate the City's land use policies and develop recommendations for land use provisions for future developments.

Coordinating Organization:	Ashland Community Development

Internal Partners:	External Partners:
Ashland Fire & Rescue	

Potential Funding Sources:	Estimated cost:	Timeline:
City of Ashland HMPG funds	$100,000	€ Short Term (0-2 years) √ Long Term (2-4+ years) € Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

City of Ashland Action Item
Multi-Hazard #10

Proposed Action Item:	Alignment with Plan Goals:
Enhanced Audio Alert System for Southern Oregon University	Emergency Services

Alignment with Existing Plans/Policies:
This project will enhance the current SOU notification system.

Rationale for Proposed Action Item:
Develop a system for enhanced local emergency notification for staff and students of Southern Oregon University. The current system isn't effective on much of the campus.

Ideas for Implementation:
Design and create a system that will give audio emergency notification on all areas of the SOU campus.

Coordinating Organization:	Southern Oregon University

Internal Partners:	External Partners:
	Jackson County EM

Potential Funding Sources:	Estimated cost:	Timeline:
SOU HMPG funds	$220,000	√ Short Term (0-2 years) € Long Term (2-4+ years) € Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

City of Ashland Action Item
Earthquake #1

Proposed Action Item:	Alignment with Plan Goals:
Emergency Operations Center Upgrades	Property Protection Partnership and Coordination Emergency Services

Alignment with Existing Plans/Policies:
The current EOP for Ashland

Rationale for Proposed Action Item:
The current Emergency Operations Center for Ashland is in a building that is not safe from a seismic standpoint and is inadequate in terms of size and capability. This project would allow for completion of "phase 2" of the Ashland Police Department's facility would has a new EOC facility in its design. Phase 1 of the project is currently under way.

Ideas for Implementation:
Proceed with phase 2 of the Ashland Police Department's facility project that will allow phase 2 to be implemented. This would relocate the City's EOC from its current located in the Council Chambers to the new, seismically safe, facility within the police department.

Coordinating Organization:	Ashland Fire & Rescue

Internal Partners:	External Partners:
Ashland Police Department	

Potential Funding Sources:	Estimated cost:	Timeline:
City of Ashland HMPG funds	$770,000	√ Short Term (0-2 years) € Long Term (2-4+ years) € Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

City of Ashland Action Item
Earthquake #2

Proposed Action Item:	Alignment with Plan Goals:
Seismic Natural Gas shut-off Valves for the City's Critical Infrastructure	Property Protection Prevention Emergency Services

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- Natural gas leaks after a seismic event increase the likelihood of fires and explosions

Ideas for Implementation:

- Inventory the City's critical infrastructure facilities
- Work with Avista to manage acquisition and installation of seismic gas valves.
- Identify incentives for installation from AVIST and insurance companies

Coordinating Organization:	Ashland Fire & Rescue

Internal Partners:	External Partners:
AVISTA HMPG funds	AVISTA

Potential Funding Sources:	Estimated cost:	Timeline:
HMGP Grant AVISTA	TBD	€ Short Term (0-2 years) √ Long Term (2-4+ years) € Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

City of Ashland Action Item
Earthquake #3

Proposed Action Item:	Alignment with Plan Goals:
Non-structural seismic upgrades for the City's Critical Infrastructure	Education and Outreach Property Protection Emergency Services

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

The number of personal injuries during a seismic event as well as a facility's ability to return to operation is greatly affected by non-structural precautions that have been implemented in a building. By employing these upgrades in the City's critical infrastructure, the City of Ashland will be better positioned to manage an emergency and better assist the citizens of Ashland in the community's recovery.

Ideas for Implementation:

- Inventory the City's critical infrastructure
- Identify cost-effective upgrades that can be implemented
- Prioritize the implementation of the upgrades

Coordinating Organization:	Ashland Fire & Rescue

Internal Partners:	External Partners:
City of Ashland	Chamber of Commerce, Ashland School District, Southern Oregon University, Ashland Community Hospital, Oregon Shakespeare Festival

Potential Funding Sources:	Estimated cost:	Timeline:
HMGP Grant	TBD	€ Short Term (0-2 years) √ Long Term (2-4+ years) € Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

City of Ashland Action Item
Earthquake #4

Proposed Action Item:	Alignment with Plan Goals:
Seismic Retrofit for Critical Infrastructure	Property Protection Structural Projects

Alignment with Existing Plans/Policies:
Coordinates with seismic risk assessment action plan

Rationale for Proposed Action Item:
Ashland's critical infrastructure, including the primary elements of its tourism industry, operates through system of older, non-reinforced structures. The structural compromise of any or all of these structures will negatively affect the ability of the City to respond to and recover from a natural disaster.

Ideas for Implementation:
Using the established inventory of critical infrastructures from the seismic risk assessment program, implement seismic retrofit recommendations with a predetermined priority list as funds become available.

Coordinating Organization:	Ashland Fire & Rescue

Internal Partners:	External Partners:
Ashland Community Development	SOU, ASD, OSF, Ashland Chamber of Commerce

Potential Funding Sources:	Estimated cost:	Timeline:
HMPG funds	TBD	€ Short Term (0-2 years) √ Long Term (2-4+ years) € Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

City of Ashland Action Item
Earthquake #5

Proposed Action Item:	Alignment with Plan Goals:
Seismic Risk Assessment	Property Protection Prevention Structural Projects

Alignment with Existing Plans/Policies:
Coordinates with City's existing plan for emergency preparedness

Rationale for Proposed Action Item:
Prior to implementation of structural upgrades the community needs to evaluate the risk assessment to its current critical infrastructure. Having a risk assessment will facilitate prioritizing future projects for structural upgrades.

Ideas for Implementation:
Inventory the City's critical infrastructure and contract with a consultant to develop a risk assessment and priority list.

Coordinating Organization:	Ashland Fire & Rescue

Internal Partners:	External Partners:
Ashland Community Development	SOU, ASD, OSF, Ashland Chamber of Commerce

Potential Funding Sources:	Estimated cost:	Timeline:
HMGP Grant City of Ashland Stakeholders in City's critical infrastructure	TBD	√ Short Term (0-2 years) € Long Term (2-4+ years) € Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

City of Ashland Action Item
Flood #1

Proposed Action Item:	Alignment with Plan Goals:
Flood Hazard Awareness Campaign	Property Protection Education and Outreach Emergency Services

Alignment with Existing Plans/Policies:

Hosler Dam Inundation Plan

Rationale for Proposed Action Item:

Create an awareness and education effort in Ashland of the flood prone areas with emphasis on planning and probability.

Ideas for Implementation:

Conduct an assessment in Ashland of flood prone areas. Deliver an education and awareness campaign to the community to allow for private preparation and mitigation efforts.

Coordinating Organization:	Ashland Fire & Rescue

Internal Partners:	External Partners:
Ashland Community Development	Jackson County Emergency Management

Potential Funding Sources:	Estimated cost:	Timeline:
City of Ashland HMPG	$25,000	√ Short Term (0-2 years) € Long Term (2-4+ years) € Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	NEW

City of Ashland Action Item
Landslide #1

Proposed Action Item:	Alignment with Plan Goals:
Water Treatment Plant Relocation	Property Protection Prevention Structural Projects

Alignment with Existing Plans/Policies:
Ashland Water Master Plan

Rationale for Proposed Action Item:
Previous landslides have placed the City's only water treatment plant out of service for several weeks. This eliminated domestic and firefighting water for that time. The plan for the City is to relocate the water treatment plant to an area less vulnerable to landslides.

Ideas for Implementation:
Construct and place into service a water treatment plant in a new location that is not prone to landslides. This will improve the City's water system's ability to survive significant landslides.

Coordinating Organization:	Ashland Public Works

Internal Partners:	External Partners:
Ashland Community Development	

Potential Funding Sources:	Estimated cost:	Timeline:
City of Ashland HMPG	$20,500,000	€ Short Term (0-2 years) √ Long Term (2-4+ years) €√ Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

City of Ashland Action Item
Wildfire (Wildland Urban Interface) #1

Proposed Action Item:	Alignment with Plan Goals:
Ashland Forest Resiliency Project	Property protection Prevention Natural Resource Protection Emergency Services

Alignment with Existing Plans/Policies:

The Ashland Forest Resiliency Project is currently being implemented.

Rationale for Proposed Action Item:

The Ashland Forest Resiliency Project is a stewardship project to manage the Ashland Creek Watershed, the water source for Ashland. The City of Ashland, The Nature Conservancy, the USFS, and the Lomakatsi Restoration Project have entered into a partnership for this project. The primary funding source for this 10 year project has been from ARRA funds. An additional $4 million is needed to complete the implementation of the project.

Ideas for Implementation:

Identify funding to complete the implementation of the current Ashland Forest Resiliency Stewardship Project. This project focuses on managing Ashland's watershed.

Coordinating Organization:	Ashland Fire & Rescue

Internal Partners:	External Partners:
	The Nature Conservancy USFS Lomakatsi Restoration Project

Potential Funding Sources:	Estimated cost:	Timeline:
USFS City of Ashland HMPG funds	$4 million	€ Short Term (0-2 years) √ Long Term (2-4+ years) € Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

City of Ashland Action Item
Wildfire (Wildland Urban Interface) #2

Proposed Action Item:	**Alignment with Plan Goals:**
Ashland Firewise Communities	Property Protection Education and Outreach Prevention Partnership and Coordination

Alignment with Existing Plans/Policies:

Ashland currently has a Firewise Communities program

Rationale for Proposed Action Item:

Ashland currently has a robust Firewise Communities program that is currently funded under Jackson County Title III funds. This funding source is being reduced each year and will likely be eliminated. The Firewise program is Ashland's primary tool for residential vegetation management and public education of fire resistant landscaping and construction.

Ideas for Implementation:

Continue the Firewise Communities Program to increase the City's involvement in a local solution for ensuring fire safe neighborhoods.

Coordinating Organization:	Ashland Fire & Rescue

Internal Partners:	**External Partners:**
HOAs	Oregon Department of Forestry

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
HMPG funds City of Ashland Jackson County Title III funds	$75,000 annually	€ Short Term (0-2 years) € Long Term (2-4+ years) √ Ongoing

Form Submitted by:	2012 Ashland NHMP Steering Committee
Action Item Status:	**NEW**

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City of Eagle Point Action Item
Multi-Hazard #1

Proposed Action Item:	**Alignment with Plan Goals:**
Maintain public information programs to inform the public about the mitigation of all natural hazards	*Emergency Services* *Education and Outreach, Prevention, Property Protection, Partnership and Coordination,*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- Conduct public outreach campaigns raises awareness about natural hazards and helps illustrate to residents and businesses that they can do to reduce the impact of a natural disaster to their properties, thereby significantly reducing the impact of natural hazards on the City of Eagle Point.
- Developing public education programs for hazard risk mitigation is one way to keep the public informed and involved in the city's action to mitigate hazards.

Ideas for Implementation:

- Maintain and improve natural hazard mitigation information on the city's website and available through newsletters and printed materials
- Create a partnership with Jackson County DEM in developing outreach programs on natural hazards
- Focus on public education for natural disasters as seasons approach
- Identify property and business owners in a disaster zone and disseminate awareness and prevention materials- place them in a pre-warning distribution list
- Place hazard information on the website to include links to Jackson Count y DEM
- Encourage home owners to implement mitigation strategies
- Include insurance information about coverage and purchasing for all natural hazards
- Educate the public about all hazards preparedness, resources and responses from local government
- Create a list of response volunteers and groups to include: faith –based organizations, civic, humanitarian, Humane Society, and business groups that will respond during a disaster

Coordinating Organization:	City Administrator

Internal Partners:	**External Partners:**
Public Works, Planning	JCFD#3, Jackson County DEM, Red Cross, Humane Society, Shelters, School District

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
TBD	Unknown	€ **Short Term (0-2 years)** € Ongoing

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Multi-Hazard #2

Proposed Action Item:	**Alignment with Plan Goals:**
Integrate the goals and action items from the Natural Hazards Mitigation Plan into existing regulatory documents and programs where appropriate	*Emergency Services, Education and Outreach, Prevention, Property Protection, Partnership and Coordination,*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- Incorporating natural hazard plans into comprehensive plans, local ordinances, and land-use regulations will ensure that the City of Eagle Point can implement the proper mitigation measures for our community.

Ideas for Implementation:

- Use the mitigation plan to help the City's Comprehensive Plan meet State Land Use Planning Goal 7, designed to protect life and property from natural disasters and hazards through planning strategies that restrict development in areas of known hazards;
- Use zoning codes to regulate development in hazard prone areas;
- Integrate the city's mitigation actions into the current emergency operations plan and capital improvement plans (where appropriate);
- Partner with other organizations and agencies with similar goals to promote building codes that are more disaster resistant at the state level;
- Use the natural hazard mitigation planning resources provided by the Oregon Partnership for Disaster Resilience to learn how to improve integration of existing documents and programs into the NHMP.

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
Public Works, Building	Building Codes Division

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
To be determined	Unknown	€ **Short Term (0-2 years)** € Ongoing

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Drought #1

Proposed Action Item:	Alignment with Plan Goals:
Develop a drought preparedness and response plan to include a city ordinance restricting water	*Emergency Services, Education and Outreach, Prevention, Property Protection, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- Outreach and education are the best sources to reach the public with ideas to maintain an adequate water supply
- Water resources are vital to public safety, economic development, agricultural stability, and sanitation

Ideas for Implementation:

- Public education of drought issues through website and printed informational materials
- Modify water system operations; reduction, restrictions, efficiencies
- Implement water saving strategies
- Irrigation restrictions and usage
- Discussion on the legality of water right issues during drought periods and consider an addendum to water rights

Coordinating Organization:	Public Works

Internal Partners:	External Partners:
Administration, Legal Counsel, Planning	Water Districts, Irrigation and Watershed Councils, Medford Water Commission

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	Unknown	€ **Short Term (0-2 years)** € Ongoing

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Earthquake #1

Proposed Action Item:	Alignment with Plan Goals:
Promote non-structural mitigation for buildings to prevent damage from earthquakes	*Emergency Services, Property Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- Outreach and education are the best sources to reach the public with ideas to prevent damage and injury from displaced items during an earthquake

Ideas for Implementation:

- Publicize information on securing bookcases, filing cabinets, light fixtures, and other items that can cause injuries and block exits;
- Work with local building supply outlets to feature checklists/retrofit kits etc., for reducing nonstructural risk;
- Provide mitigation information for nonstructural strategies to citizens through public forums

Coordinating Organization:	City Administrator

Internal Partners:	External Partners:
Public Works, Code Enforcement, Planning, Building	City Hall, Jackson County DEM

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	Unknown	€ **Short Term (0-2 years)** € Ongoing

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Earthquake #2

Proposed Action Item:	Alignment with Plan Goals:
Promote earthquake insurance	*Emergency Services, Education and Outreach, Property Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- Earthquake hazard is a major risk in Oregon, and many citizens have not purchased earthquake insurance to alleviate financial loss from a seismic event.

Ideas for Implementation:

- Partner with insurance companies and or Mortgage lenders to provide information regarding risk and insurance
- Provide information on the website, City Hall, Fire Department, and Jackson County Library

Coordinating Organization:	City Administrator

Internal Partners:	External Partners:
City Hall	insurance companies, FEMA, mortgage companies

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	Unknown	€ **Short Term (0-2 years)** € Ongoing

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Earthquake #3

Proposed Action Item:	**Alignment with Plan Goals:**
Promote and coordinate earthquake hazard risk mapping for Eagle Point and surrounding Cities	*Emergency Services, Education and Outreach, Property Protection, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- Mapping earthquake hazards will assist with mitigation activities and the provision of emergency services.

Ideas for Implementation:

- Partner with Jackson County and others to identify map risk areas;
- Identify risk areas will assist in guiding land use development away from hazardous areas

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
Public Works, Building, Administration,	DOGAMI, Jackson County

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
To be determined	Unknown	€ **Short Term (0-2 years)** € Ongoing

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Earthquake #4

Proposed Action Item:	**Alignment with Plan Goals:**
Promote structural mitigation to prevent structural damage to city buildings in effort to provide business continuity	*Emergency Services, Prevention, Property Protection, Structural Projects*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- City buildings lack the structural integrity to withstand seismic activity and have not been retrofitted for stability. In the event of a major earthquake, the city would be unable to operate within the building and continue government operation.

Ideas for Implementation:

- Develop a strategy to identify funding for structural improvements;
- Solicitation of qualified companies for estimation of costs associated with structural improvements

Coordinating Organization:	Building

Internal Partners:	**External Partners:**
Planning, Public Works, Administration,	DOGAMI, Jackson County

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
To be determined	Unknown	€ **Short Term (0-2 years)** € Ongoing

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Flood #1

Proposed Action Item:	Alignment with Plan Goals:
Inform the public about the National Flood Insurance Program and ensure compliance through enforcement of local floodplain management ordinances.	*Education and Outreach, Prevention, Property Protection, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

The National Flood Insurance Program (NFIP) provides communities with federally backed flood insurance to homeowners, renters, and business owners, provided that communities develop and enforce adequate floodplain management ordinances. The benefits of adopting NFIP standards for communities are a reduced level of flood damage in the community and stronger buildings that can withstand floods. According to the NFIP, buildings constructed in compliance with NFIP standards suffer approximately 80% less damage annually than those not built in compliance. The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii]. Continued participation in the NFIP will help reduce the level of flood damage to new and existing buildings communities while providing homeowners, renters and business owners additional flood insurance protection.

Ideas for Implementation:

- Community Assistance Visits (CAV) are scheduled visits to communities participating in the NFIP for the purpose of: 1) conducting a comprehensive assessment of the community's floodplain management program; 2) assisting the community and its staff in understanding the NFIP and its requirements; and 3) assisting the community in implementing effective flood loss reduction measures when program deficiencies or violations are discovered. Actively participate with DLCD and FEMA during Community Assistance Visits.
- Conduct with the county to ensure that floodplain ordinances and NFIP regulations are maintained and enforced
- Conduct an assessment of the floodplain ordinances to ensure they reflect current flood hazards and situations, and meet NFIP requirements
- Mitigate areas that are prone to flooding and/or have the potential to flood.

Coordinating Organization:	Planning

Internal Partners:	External Partners:
Public Works, Code Enforcement, Building	Jackson County; FEMA; NFIP; CRS/ISO; DLCD

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	Unknown	€ Ongoing

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Flood #2

Proposed Action Item:	Alignment with Plan Goals:
Continue to implement and enhance the public flood protection and education program.	*Emergency Services, Education and Outreach, Prevention, Property Protection, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- Conducting public outreach programs raises awareness about natural hazards and helps illustrate what residents and businesses can do to reduce the impact of a natural disaster on their properties, thereby significantly reducing the impacts of natural hazards on the City of Eagle Point.
- Develop public education programs for hazard risk mitigation keeps the public informed of, and involved in, the cities actions to mitigate hazards.

The flood protection and education program is designed to inform local residents about:

- The causes of local drainage problems, flooding and landslides;
- Why channels, ditches, and irrigations canals function and local drainage flooding
- What owners can do to protect their properties
- Health and safety issues resulting from flooding
- Butte Mill Creek and drainage ditch flooding differences
- Drainage ditch maintenance and prevention of flooding

Ideas for Implementation:

- Community-wide dissemination of information through newsletters and websites;
- Promote purchase of appropriate floodplain insurance coverage
- Use GIS database to identify property owners in flood prone areas; and develop database for pre-warning and informational updates
- Distribute flood preparedness information

Coordinating Organization:	Planning

Internal Partners:	External Partners:
Public Works, Code Enforcement, County GIS	Jackson County; FEMA; NFIP; CRS/ISO; DLCD

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	Unknown	€ **Ongoing**

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Flood #3

Proposed Action Item:	Alignment with Plan Goals:
Encourage participation in the NFIP's Community Rating System (CRS)	*Education and Outreach, Prevention, Property Protection, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- The Community Rating System (CRS) is operated under the National Flood Insurance Program (NFIP). The NFIP provides flood insurance to homes and businesses located in floodplains at a reasonable costs, and encourages the movement of development away from the floodplain. The program is based upon mapping areas of flood risk, and requiring local implementation to reduce that risk, primarily through restrictions on new development in the floodplains. CRS recognizes community efforts that go beyond the minimum standards of the NFIP. This recognition is in the form of reduced flood insurance premiums for communities that adopt such standards. CRS encourages community activities that reduce flood losses, facilitate accurate insurance rating, and promote flood insurance awareness. The city DOES not have a CRS rating.

Ideas for Implementation:

- Review eligibility requirements for participation in CRS
- Determine steps for participation
- Identify staff members to lead compliance and participation
- Obtain a CRS rating

Coordinating Organization:	Planning

Internal Partners:	External Partners:
Public Works, Code Enforcement, County GIS	Jackson County; FEMA; NFIP; CRS/ISO; DLCD

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	Unknown	€ Ongoing

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Flood #4

Proposed Action Item:	Alignment with Plan Goals:
Promote and enhance the use of natural flood prone open space or wetlands as flood storage areas.	*Education and Outreach, Prevention, Property Protection, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- One goal of the National Flood Insurance Program is the protection of the natural and beneficial functions of the floodplains. Natural and valuable floodplain functions include both the natural infiltration capacities of floodplains, as well as minimizing the pollutants that can enter waters from floodplains development activities. A number of options local governments can choose from are: 1) Prohibit all activities in the floodplain that may be hazardous to the public health or water quality; 2) Require new floodplain developments to avoid or minimize disruption to stream channels and stream banks; 3) Adopt regulations pursuant to a Habitat Conservation Plan approved by the US Fish and Wildlife Service or the National Marine Fisheries Service

Ideas for Implementation:

- Develop and implement flood protection alternatives for properties within and adjacent to the 100-year floodplain by taking into account city codes relating to the floodplain.
- Gain support for protecting naturally flood prone open space by educating the public of its importance

Coordinating Organization:	Planning

Internal Partners:	External Partners:
Public Works, Building, Code Enforcement,	Jackson County; DEQ

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	Unknown	€ **Short Term (0-2 years)**

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Flood #5

Proposed Action Item:	Alignment with Plan Goals:
Protect City facilities in flood prone areas.	*Emergency Services, Prevention, Property Protection, Structural Projects*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- The city has several facilities within the special flood hazard area including wells that are susceptible to flooding.

Ideas for Implementation:

- Map well sites and other flood prone City facilities on flood maps
- Identify at-risk facilities and establish flood elevations of critical facilities
- Protect critical facilities by flood-proofing where practical

Coordinating Organization:	Public Works

Internal Partners:	External Partners:
Planning, GIS	Jackson County; DLCD

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	Unknown	€ **Short Term (0-2 years)** € Ongoing

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Flood #6

Proposed Action Item:	Alignment with Plan Goals:
Stormwater Management	*Education and Outreach, Prevention, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- Eagle Point has adopted a comprehensive Stormwater Management Plan.
- Stormwater management is a key element in maintaining and enhancing a community's livability. There is a direct link between stormwater and a community's surface and ground waters. As a community develops, the impervious surfaces that are created increase the amount of runoff diring rainfall evens, disrupting the natural hydrologic cycle. Without control, these conditions erode stream channels and prevent groundwater recharge. Parking lots, roadways, and rooftops increase the pollution levels and temperature of stormwater runoff that is transported to streams, rivers, and groundwater resources. Protecting these waters is vital for a great number of uses, including fish and wildlife habitat, recreation, and drinking water.

Ideas for Implementation:

- Identify appropriate staff members to work on developing a Stormwater Design manual;
- Research existing Stormwater Design manuals in use in our region;
- Identify a manual or aspects of several manuals that best suit the City's needs; and
- Identify funding to create the manual and administer the program.

Coordinating Organization:	Public Works

Internal Partners:	External Partners:
Planning	Jackson County; DEQ; Rogue Valley Sewer Services

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	Unknown	€ **Short Term (0-2 years)** € Ongoing

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Wildfire (Wildland Urban Interface) #1

Proposed Action Item:	**Alignment with Plan Goals:**
Promote public awareness campaigns for individual property owners living in fire prone areas	*Emergency Services, Education and Outreach, Prevention, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

City Ordinance on Weed Abatement and Illegal Fireworks

Rationale for Proposed Action Item:

- Conducting public outreach programs about the hazards of wildfire will inform the public about the community's risk to wildfires and actions they can implement to reduce that risk;
- The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that reduce the impact of a natural hazard [201.6©(3)(ii)]. Conducting public outreach campaigns to inform residents about the risk that wildfire pose and mitigation actions they can implement will protect their property from future wildfire damage.

Ideas for Implementation:

- Continue to enforce the weed and tall grass abatement ordinance
- Public service announcements
- Voluntary site visits by fire crews to consult with landowners about specific ways to reduce risk to their property and to identify properties that would not be saved if a wildfire event occurred;
- Coordinate with Jackson County Fire District #3 for fire prevention programs

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
Planning, Administration, Code Enforcement, Police Department	Jackson County, JCFD#3, Office of State Fire Marshal

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
To be determined	Unknown	€ **Short Term (0-2 years)** € Ongoing

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Wildfire (Wildland Urban Interface) #2

Proposed Action Item:	**Alignment with Plan Goals:**
Partner with Jackson County on Implementation of Community Wildfire Protection Plan and outreach projects	*Emergency Services, Education and Outreach, Prevention, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- The public would benefit from partnering with Jackson County in a wildfire Protection Plan
- The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that reduce the impact of a natural hazard [201.6(C)(3)(ii)]. Conducting public outreach campaigns to inform residents about the risk that wildfire pose and mitigation actions they can implement will protect their property from future wildfire damage.

Ideas for Implementation:

- Begin a dialogue with the County
- Identify and coordinate the use of new or existing brochures as outreach materials
- Provide wildfire mitigation information at City Hall, Jackson County Library, through the city's website, and city newsletters

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
Public Works, Administration,	Jackson County, JCFD#3, Bureau of Land Management - Medford District, Oregon Department of Forestry, Office of State Fire Marshall

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
To be determined	Unknown	€ **Short Term (0-2 years)** € Ongoing

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Wildfire (Wildland Urban Interface) #3

Proposed Action Item:	**Alignment with Plan Goals:**
Reduce wildfire fuels/Investigate "Firewise Community" Program	*Emergency Services, Education and Outreach, Prevention, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- The public would benefit from a Firewise Community Program
- The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that reduce the impact of a natural hazard [201.6©(3)(ii)]. Conducting public outreach campaigns to inform residents about the risk that wildfire pose and mitigation actions they can implement will protect their property from future wildfire damage.

Ideas for Implementation:

- Identify methods of disposal or utilization of fire fuels removed from individual properties (i.e., prescribed fire application, fuel reduction through grass/timber/brush removal, small dioameter forest based products, chipping, etc.);
- Investigate requirements and benefits of promoting the "firewise Community" program;
- Seek funding and labor opportunities to staff fuel-reduction projects through wildfire hazard prone areas in the City o f Eagle Point;
- Work on Wildfire hazard mapping of Eagle Point and surrounding areas to identify areas and homes that would be most beneficial from fuel reduction projects;
- Promote opportunities for landowners to utilize fuel reduction projects;
- Investigate potential funding opportunities for individual mitigation projects.

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
Public Works, Building, Administration,	Jackson County, JCFD#3, Office of State Fire Marshall, Oregon Department of Forestry

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
To be determined	Unknown	€ **Short Term (0-2 years)** € Ongoing

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Severe Winter Storm and Windstorm #1

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage new developments with above ground utilities to underground utilities	*Emergency Services, Prevention, Property Protection, Partnership and Coordination, Structural Projects*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- Underground utilities will significantly reduce the impact of a natural disaster on life safety, citizen's properties, critical facilities, and emergency services thereby significantly reducing their impact of severe winter storms in the City of Eagle Point.

Ideas for Implementation:

- Review and update all ordinances for new commercial, industrial and sub-division development to include underground power transmission and service lines
- Partner with utility companies to encourage all utilities be placed underground

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
Planning,	Utility companies, developers

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
To be determined	Unknown	€ **Short Term (0-2 years)** € Ongoing

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Severe Winter Storm and Windstorm #2

Proposed Action Item:	**Alignment with Plan Goals:**
Dangerous Tree Education and Outreach and Disaster Resilient Economy	*Emergency Services, Education and Outreach, Prevention, Property Protection, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- Partner with responsible agencies and organizations to design and disseminate education information to property owners to reduce risk of tree failure to life, property, commerce and utility systems
- Identify and find solutions to potentially dangerous trees in urban areas, near utility corridors and near vital infrastructure; and
- Partner with responsible agencies and organizations to develop landscaping and tree programs that have less impact on above ground utility lines and roads.
- Develop partnerships between utility providers, and city to document known hazard areas and minimize risks;
- Coordinate with overhead utilities in developing GIS layers for power lines and at-risk trees
- Provide residents with a list of acceptable trees for under power lines; and
- Provide information about overhead utilities on 'Right tree-Right Place' program

Ideas for Implementation:

- Review and update all ordinances for new commercial, industrial and sub-division development to include underground power transmission and service lines
- Partner with utility companies to encourage all utilities be placed underground

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
Planning,	Utility companies, local Arborists, landscaping services and tree services

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
To be determined	Unknown	€ **Short Term (0-2 years)** € Ongoing

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

City of Eagle Point Action Item
Severe Winter Storm and Windstorm #3

Proposed Action Item:	**Alignment with Plan Goals:**
Winter Storm Education and Outreach	*Emergency Services, Education and Outreach, Prevention, Property Protection, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- Meeting the community's needs in preparation for power outages for families and organizations with respect to winter storms

Ideas for Implementation:

- Collect existing information on public education materials for protecting life, property, and the environment from windstorm events;
- Identify and collect additional information and programs as necessary; and
- Distribute educational materials to City residents and public and private sector organizations regarding preparedness for no-power situations and safe use of generators;
- Develop use of technology in distribution of educational materials

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
Public Works	Utility companies, FEMA, Jackson County DEM

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
To be determined	Unknown	€ **Short Term (0-2 years)** € Ongoing

Form Submitted by:	2012 Eagle Point NHMP Steering Committee
Action Item Status:	**NEW**

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City of Rogue River Action Item
Multi-Hazard #1

Proposed Action Item:	Alignment with Plan Goals:
Maintain public education programs to inform the public about methods of mitigating the impacts of natural hazards.	*Emergency Services, Education and Outreach, Prevention, Property Protection, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Conducting public outreach campaigns raises awareness about natural hazards and helps illustrate what residents and businesses can do to reduce the impact of a natural disaster on their properties, thereby significantly reducing the impact of natural hazards on the City of Rogue River.

Developing public education programs for hazard risk mitigation would be a way to keep the public informed of, and involved in, the cities actions to mitigate hazards.

Ideas for Implementation:

• Maintain hazard related information and public information materials and disseminate through existing resources such as the city website, city newsletter, brochures, and other mailings;
• Partner with Jackson County and other jurisdictions to develop education outreach for all hazards;
• Conduct public education as hazard seasons approach. Provide information for earthquake awareness in April, wildfire prevention in May, and flood and severe storm information in October;
• Include hazard information on the City of Rogue River and Rogue River Fire District websites;
• Identify property owners in flood, landslide, and wildfire hazard zones, and conduct a target mailing to disseminate information on all hazards;
• Prepare and distribute an informational brochure on unstable slopes, historical landslide areas and mitigation strategies.
• Encourage individual homeowners to implement mitigation practices;
• Include insurance information in public outreach and education materials;
• Promote purchase of appropriate insurance coverage;
• Educate the public about the resources available for hazard mitigation, response, and preparedness;
• Create a list of volunteers and organizations from faith based, civic, humanitarian, and business groups that can respond to needs requests during small events.

Coordinating Organization:	City Administration

Internal Partners:	External Partners:
City Public Works	Jackson County Fire; Jackson County and Community Organizations; Rogue River Fire District

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	Ongoing

Form Submitted by:	2012 Rogue River NHMP Steering Committee
Action Item Status:	**NEW**

City of Rogue River Action Item
Multi-Hazard #2

Proposed Action Item:	Alignment with Plan Goals:
Integrate the goals and action items from the Natural Hazards Mitigation Plan into existing regulatory documents and programs, where appropriate.	*Emergency Services, Education and Outreach, Prevention, Property Protection, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Incorporating natural hazard plans into comprehensive plans, local ordinances, and land-use regulations will ensure that the City of Rogue River can implement the proper mitigation measures for our community.

Ideas for Implementation:

• Use the mitigation plan to help the City's Comprehensive Land Use Plan meet State Land Use Planning Goal 7, designed to protect life and property from natural disasters and hazards through planning strategies that restrict development in areas of known hazards;
• Use zoning codes to regulate development in hazard-prone areas;
• Integrate the city's mitigation actions into the current emergency operations plan and capital improvement plans (where appropriate);
• Partner with other organizations and agencies with similar goals to promote building codes that are more disaster resistant at the state level;
• Use the natural hazard mitigation planning resources provided by the Oregon Partnership for Disaster Resilience to learn how to better integrate the NHMP into existing documents and programs.

Coordinating Organization:	City Planning

Internal Partners:	External Partners:
City Public Works; City Administration	Building Codes Division

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	Ongoing

Form Submitted by:	2012 Rogue River NHMP Steering Committee
Action Item Status:	**NEW**

City of Rogue River Action Item
Earthquake #1

Proposed Action Item:	Alignment with Plan Goals:
Promote non-structural mitigation to prevent damage from earthquake	*Emergency Services, Education and Outreach, Prevention, Property Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:
Outreach and education are the best avenue to reach the public with ideas to prevent damage and injury from displaced items in an earthquake.

Ideas for Implementation:
Publicize information on securing bookcases, filing cabinets, light fixtures, and other items that can cause injuries and block exits. • Work with local building supply outlets to feature checklists/retrofit kits etc. for reducing nonstructural risk; • Use the Rogue River Safety Fair to promote nonstructural strategies and provide mitigation information.

Coordinating Organization:	Administration

Internal Partners:	External Partners:
City Public Works; City Building	Rogue River Fire District; Main Building

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	Ongoing

Form Submitted by:	2012 Rogue River NHMP Steering Committee
Action Item Status:	**NEW**

City of Rogue River Action Item
Earthquake #2

Proposed Action Item:	Alignment with Plan Goals:
Promote earthquake insurance	*Emergency Services, Education and Outreach, Prevention, Property Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Earthquake hazard is a major risk in Oregon, but many citizens have not purchased earthquake insurance. The purchase of earthquake insurance will help to alleviate financial loss from a seismic event.

Ideas for Implementation:

- Partner with insurance companies and or mortgage lenders to provide information regarding risk and insurance.
- Provide information on the web site, City Hall, the Fire Department and the Rogue River Library.

Coordinating Organization:	Administration

Internal Partners:	External Partners:
City Building	Rogue River Fire District; Insurance companies; FEMA; Mortgage companies

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	Short Term

Form Submitted by:	2012 Rogue River NHMP Steering Committee
Action Item Status:	**NEW**

City of Rogue River Action Item
Earthquake #3

Proposed Action Item:	Alignment with Plan Goals:
Promote and coordinate Earthquake Hazard Risk Map for Jackson County and cities	*Emergency Services, Prevention, Property Protection, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:
• Mapping earthquake hazards will assist with mitigation activities and the provision of emergency services.

Ideas for Implementation:
• Partner with Jackson County and others to identify and map risk areas; • Identifying risk areas will assist in guiding land use (development) away from hazardous areas.

Coordinating Organization:	City Planning

Internal Partners:	External Partners:
Administration; Public Works	DOGAMI, Jackson County

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	Long Term

Form Submitted by:	2012 Rogue River NHMP Steering Committee
Action Item Status:	**NEW**

City of Rogue River Action Item
Flood #1

Proposed Action Item:	Alignment with Plan Goals:
Continue to implement and enhance the public flood protection and education program.	*Emergency Services, Education and Outreach, Prevention, Property Protection, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

- Conducting public outreach campaigns raises awareness about natural hazards and helps illustrate what residents and businesses can do to reduce the impact of a natural disaster on their properties, thereby significantly reducing the impact of natural hazards on the City of Rogue River.
- Developing public education programs for hazard risk mitigation would be a way to keep the public informed of, and involved in, the cities actions to mitigate hazards.

The flood protection and education program is designed to inform local residents about:

- The causes of local drainage problems, flooding and landslides;
- How channels, ditches, and irrigations canals function and dangers of local drainage flooding
- What owners can do to protect their properties
- Health and safety issues resulting from flooding
- Drainage ditch maintenance and prevention of flooding

Ideas for Implementation:

- Community-wide dissemination of information through newsletters and websites;
- Promote purchase of appropriate floodplain insurance coverage;
- Use GIS database to identify property owners in flood prone areas, and target these people for a group mailing; and
- Distribute flood preparedness information.

Coordinating Organization:	City Public Works

Internal Partners:	External Partners:
City GIS Coordinator; City Planning	Jackson County; FEMA; NFIP; CRS/ISO

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	Ongoing

Form Submitted by:	2012 Rogue River NHMP Steering Committee
Action Item Status:	**NEW**

City of Rogue River Action Item
Flood #2

Proposed Action Item:	Alignment with Plan Goals:
Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.	*Emergency Services, Education and Outreach, Prevention, Property Protection, Partnerships and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

The National Flood Insurance Program provides communities with federally backed flood insurance to homeowners, renters, and business owners, provided that communities develop and enforce adequate floodplain management ordinances. The benefits of adopting NFIP standards for communities are a reduced level of flood damage in the community and stronger buildings that can withstand floods. According to the NFIP, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance.

The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Continued participation in the NFIP will help reduce the level of flood damage to new and existing buildings in communities while providing homeowners, renters and business owners additional flood insurance protection.

Ideas for Implementation:

• Community Assistance Visits (CAV) are scheduled visits to communities participating in the NFIP for the purpose of: 1) conducting a comprehensive assessment of the community's floodplain management program; 2) assisting the community and its staff in understanding the NFIP and its requirements; and 3) assisting the community in implementing effective flood loss reduction measures when program deficiencies or violations are discovered. Actively participate with DLCD and FEMA during Community Assistance Visits.
• Conduct an assessment of the floodplain ordinances to ensure they reflect current flood hazards and situations, and meet NFIP requirements.
• Coordinate with the county to ensure that floodplain ordinances and NFIP regulations are maintained and enforced.
• Mitigate areas that are prone to flooding and/or have the potential to flood.

Coordinating Organization:	City Planning

Internal Partners:	External Partners:
City Public Works	Jackson County; FEMA; NFIP;CRS/ISO; DLCD

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	Ongoing

Form Submitted by:	2012 Rogue River NHMP Steering Committee
Action Item Status:	**NEW**

City of Rogue River Action Item
Flood #3

Proposed Action Item:	Alignment with Plan Goals:
Continue participation in the NFIP's Community Rating System (CRS).	*Education and Outreach, Prevention, Property Protection, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

The Community Rating System (CRS) is operated under the National Flood Insurance Program (NFIP). The NFIP provides flood insurance to homes and businesses located in floodplains at a reasonable cost, and encourages the movement of development away from the floodplain. The program is based upon mapping areas of flood risk, and requiring local implementation to reduce that risk, primarily through restrictions on new development in floodplains. CRS recognizes community efforts that go beyond the minimum standards of the NFIP. This recognition is in the form of reduced flood insurance premiums for communities that adopt such standards. CRS encourages community activities that reduce flood losses, facilitate accurate insurance rating, and promote flood insurance awareness. The city currently holds a CRS rating of 7.

Ideas for Implementation:

- Identify staff members to lead compliance efforts; and
- Review CRS participation requirements and take steps towards reaching a CRS rating of 6.

Coordinating Organization:	City Planning

Internal Partners:	External Partners:
City Public Works	Jackson County; FEMA; NFIP;CRS/ISO; DLCD

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	Ongoing

Form Submitted by:	2012 Rogue River NHMP Steering Committee
Action Item Status:	**NEW**

City of Rogue River Action Item
Flood #4

Proposed Action Item:	Alignment with Plan Goals:
Promote and protect the use of naturally flood prone open space or wetlands as flood storage areas.	*Emergency Services, Education and Outreach, Prevention, Property Protection, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

One of the goals of the National Flood Insurance Program is to protect the natural and beneficial functions of floodplains. Natural and beneficial floodplain functions include both the natural infiltration capacities of floodplains, as well as minimizing the pollutants that can enter waters from floodplain development activities. A number of options local governments can choose from are: 1) Prohibit all activities in the floodplain that may be hazardous to public health or water quality (e.g. septic systems, storage of hazardous materials) 2) Require new floodplain developments to avoid or minimize disruption to stream channels and stream banks 3) Adopt regulations pursuant to a Habitat Conservation Plan approved by the US Fish and Wildlife Service or the National Marine Fisheries Service.

Ideas for Implementation:

Develop and implement flood protection alternatives for properties within and adjacent to the 100-year floodplain by taking into account city codes related to the floodplain.

Gain support for protecting naturally flood prone open space by educating the public of its importance

Coordinating Organization:	City Public Works

Internal Partners:	External Partners:
City Planning	Jackson County; DEQ

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	Ongoing

Form Submitted by:	2012 Rogue River NHMP Steering Committee
Action Item Status:	**NEW**

City of Rogue River Action Item
Flood #5

Proposed Action Item:	Alignment with Plan Goals:
Stormwater management	*Education and Outreach, Prevention, Property Protection, Natural Resource Protection,*

Alignment with Existing Plans/Policies:

Rogue River Comprehensive Stormwater Management Plan

Rationale for Proposed Action Item:

Rogue River has adopted a comprehensive Stormwater Management Plan.

Stormwater management is a key element in maintaining and enhancing a community's livability. There is a direct link between stormwater and a community's surface and ground waters. As a community develops, the impervious surfaces that are created increase the amount of runoff during rainfall events, disrupting the natural hydrologic cycle. Without control, these conditions erode stream channels and prevent groundwater recharge. Parking lots, roadways, and rooftops increase the pollution levels and temperature of stormwater runoff that is transported to streams, rivers, and groundwater resources. Protecting these waters is vital for a great number of uses, including fish and wildlife habitat, recreation, and drinking water.

Ideas for Implementation:

- Identify appropriate staff members to work on developing a Stormwater Design Manual;
- Research existing Stormwater Design Manuals in use in our region;
- Identify a manual or aspects of several manuals that best suit the City's needs; and
- Identify funding to create the manual and administer the program.

Coordinating Organization:	City Public Works

Internal Partners:	External Partners:
City Planning	Jackson County; DEQ; Rogue Valley Sewer Services

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	Long Term

Form Submitted by:	2012 Rogue River NHMP Steering Committee
Action Item Status:	**NEW**

City of Rogue River Action Item
Flood #6

Proposed Action Item:	Alignment with Plan Goals:
Protect City facilities in flood prone areas.	*Emergency Services, Prevention, Property Protection, Structural Projects*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

The city has several facilities within the special flood hazard area including wells and sewage lift stations that are susceptible to flooding.

Ideas for Implementation:

- Map well sites, lift stations and other flood prone City facilities on flood maps.
- Identify at risk facilities and establish flood elevations of critical facilities.
- Protect critical facilities by flood proofing where practical.

Coordinating Organization:	City Public Works

Internal Partners:	External Partners:
City Planning; City GIS	Jackson County; DLCD

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	Ongoing

Form Submitted by:	2012 Rogue River NHMP Steering Committee
Action Item Status:	**NEW**

City of Rogue River Action Item
Wildfire (Wildland Urban Interface) #1

Proposed Action Item:	Alignment with Plan Goals:
Promote public awareness campaigns for individual property owners living in fire prone areas.	*Emergency Services; Education and Outreach; Prevention; Partnership and Coordination; Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

• Steering committee members at the Rogue River Risk Assessment meeting identified wildfire as a significant natural hazard. Conducting public awareness campaigns will inform residents about wildfire hazards and mitigation actions they can implement to reduce their vulnerability to wildfire.
• Conducting public outreach campaigns about the hazards that wildfires pose will inform the public about the community's risk to wildfires and actions they can implement to reduce that risk.
• The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Conducting public outreach campaigns to inform residents about the risks that wildfires pose and mitigation actions they can implement to protect their property from future wildfire damage.

Ideas for Implementation:

• Promote and encourage working demonstrations of risk reduction awareness measures (i.e., survivable space around structures; driveway, road and bridge specifications; and landscaping) at community events;
• Voluntary site visits by fire crews to consult with landowners about specific ways to reduce risk to their property and to identify properties that would not be saved if a wildfire event occurred;
• Mailings;
• Public service announcements in the media;
• Noxious weed abatement and enforcement of local weed ordinance.

Coordinating Organization:	City Administration

Internal Partners:	External Partners:
City Public Works; City Planning; Rogue River Police Department	OPDR, Jackson County; Rogue River Fire District

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	Short Term

Form Submitted by:	2012 Rogue River NHMP Steering Committee
Action Item Status:	**NEW**

City of Rogue River Action Item
Wildfire (Wildland Urban Interface) #2

Proposed Action Item:	Alignment with Plan Goals:
Partner with Jackson County on Implementation of Community Wildfire Protection Plan and outreach projects	*Emergency Services; Education and Outreach; Prevention; Partnership and Coordination; Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

• The City's working group identified that their risk to wildfire is great due to being surrounded by forestlands.
• Smaller cities in Jackson County would benefit from partnering with the County in a Wildfire Protection Plan.
• The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Conducting public outreach campaigns to inform residents about the risks that wildfires pose and mitigation actions they can implement will protect their property from future wildfire damage

Ideas for Implementation:

• Start a dialogue with the County
• Coordinate the use of new or existing brochures as outreach materials.
• Provide wildfire mitigation information at City Hall, the Rogue River Fire District office; the Rogue River Library, through newsletters and associated web sites.

Coordinating Organization:	City Planning

Internal Partners:	External Partners:
City Public Works; City Administration;	ODF; Jackson County; Rogue River Fire District; Bureau of Land Management - Medford District, Oregon Department of Forestry, Office of State Fire Marshall

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	Short Term

Form Submitted by:	2012 Rogue River NHMP Steering Committee
Action Item Status:	NEW

City of Rogue River Action Item
Wildfire (Wildland Urban Interface) #3

Proposed Action Item:	**Alignment with Plan Goals:**
Reduce wildfire fuels / Investigate "Firewise Community" Program	*Emergency Services; Education and Outreach; Prevention; Partnership and Coordination ; Natural Resource Protection*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

The City's working group identified that their risk to wildfire is great due to being surrounded by forestlands.
• The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Conducting public outreach campaigns to inform residents about the risks that wildfires pose and mitigation actions they can implement will protect their property from future wildfire damage

Ideas for Implementation:

• Identify methods of disposal or utilization of fire fuels removed from individual properties (i.e., prescribed fire application, fuel reduction through grass / timber / brush removal, small diameter forest product based industries, chipping, etc.);
• Investigate requirements and benefits of promoting the "Firewise Community" program;
• Seek funding and labor opportunities to staff fuel-reduction projects throughout wildfire hazard prone areas in the City of Rogue River;
• Work on Wildfire Hazard mapping of Rogue River and surrounding areas to identify areas and homes that would most benefit from fuel reduction projects;
• Promote opportunities for landowners to utilize fuel reduction projects; and
• Investigate potential funding opportunities for individual mitigation projects.

Coordinating Organization:	City Planning

Internal Partners:	**External Partners:**
City Public Works; City Administration;	Jackson County; Rogue River Fire District; Oregon Department of Forestry, Office of State Fire Marshal

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
	TBD	Short Term

Form Submitted by:	2012 Rogue River NHMP Steering Committee
Action Item Status:	**NEW**

City of Rogue River Action Item
Severe Winter Storm and Windstorm #1

Proposed Action Item:	Alignment with Plan Goals:
Encourage new developments to include underground power lines.	*Emergency Services, Education and Outreach, Prevention, Property Protection, Partnership and Coordination, Structural Projects*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

• Underground utilities will significantly reduce the impact of a natural disaster on life safety, citizen's properties, critical facilities, and emergency services thereby significantly reducing the impact of severe winter storms on the City of Rogue River.

Ideas for Implementation:

• Review ordinances for all new commercial, industrial and sub-division development to include underground power transmission and service lines.
• Partner with utility companies to encourage all utilities be placed underground.

Coordinating Organization:	City Public Works

Internal Partners:	External Partners:
City Planning	Utility companies, developers

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	Ongoing

Form Submitted by:	2012 Rogue River NHMP Steering Committee
Action Item Status:	**NEW**

City of Rogue River Action Item
Severe Winter Storm and Windstorm #2

Proposed Action Item:	Alignment with Plan Goals:
Education and Outreach Disaster Resilient Economy	*Education and Outreach, Prevention, Property Protection, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Education and awareness are often the most efficient and cost effective way to reduce a community's risk.
• Focusing on the benefits of mitigation activities through education aimed at households and businesses and targeting of special needs populations ensures community wide coverage.

Ideas for Implementation:

• Collect additional information and add to existing informational sources on public education materials for protecting life, property and the environment from storm events;
• Determine funding source(s) for conducting decided outreach methods.
• Distribute educational materials to city residents and public and private sector organizations regarding evacuation routes during road closures;
• Distribute audience-specific educational materials to schools, churches, and other public and private sector organizations;
• Develop methods of improving emergency warning system;
• Distribute educational materials to city residents and public and private sector organizations regarding preparedness for no power situations.
• Develop outreach materials to provide the public with tips n what to carry with them and in their cars during adverse weather, how to make emergency kits, etc.

Coordinating Organization:	City Administration

Internal Partners:	External Partners:
City Public Works; City Planning	Utility companies; Churches; schools; Fire, American Red Cross; FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	Ongoing

Form Submitted by:	2012 Rogue River NHMP Steering Committee
Action Item Status:	**NEW**

City of Shady Cove Action Item
Flood #1

Proposed Action Item:	Alignment with Plan Goals:
Conduct workshops for target audiences on National Flood Insurance Programs, mitigation activities, and potential assistance from FEMAs Flood Mitigation Assistance and Hazard Mitigation Grant Programs.	*Education and Outreach, Prevention, Property Protection, Partnership and Coordination*

Alignment with Existing Plans/Policies:

Continue the policy to work closely with FEMA's NFIP and the FEMA Compliance Plan for Shady Cove.

Rationale for Proposed Action Item:

The Shady Cove Natural Hazards Mitigation Committee recently conducted a risk assessment and identified floods as the third highest risk to the city.

Shady Cove is a situated along the Rogue River and has several tributaries within the city.

Ideas for Implementation:

Conduct community meetings; include information about the financial aspects of building (and rebuilding) in the floodplain. Present information on FEMA requirements, National Flood Insurance Program and the City Flood Plain Ordinance. Selected target audiences can include: community members, realtors, lending institutions, surveyors, engineers, and government agencies.

Coordinating Organization:	Floodplain Management

Internal Partners:	External Partners:
City Planning, City Emergency Management	Upper Rogue Watershed Council , DLCD, OEM, FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	€ Short Term (0-2 years)

Form Submitted by:	2012 Shady Cove NHMP Steering Committee
Action Item Status:	**NEW**

City of Shady Cove Action Item
Flood #2

Proposed Action Item:	Alignment with Plan Goals:
Encourage private property owners to restore natural systems within the floodplain, and to manage riparian areas and wetlands for flood abatement.	*Property Protection, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Shady Cove Planning Commission and Council is currently working on a Riparian Ordinance, this ordinance once complete will address this Action Step.

Rationale for Proposed Action Item:

Recently Shady Cove NHMP Committee conducted a risk assessment and identified flood as the third highest risk for the community.

Shady Cove is located along the Rogue River and has several tributaries within the city.

Most of the property along the banks of the river and streams is privately owned.

Ideas for Implementation:

Working with community members, continue efforts to draft a city riparian ordinance.

Provide public workshops to educate the public on the benefits of managing the riparian areas to enhance stream health and flood abatement.

Coordinating Organization:	Planning

Internal Partners:	External Partners:
Planning Commission, Floodplain Management	FEMA, County Emergency Management, Upper Rogue Watershed, DEQ, ODFW, DLCD, Rogue Valley Council of Governments (RVCOG), Rogue Fly Fishers, County Parks

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	€ Short Term (0-2 years)

Form Submitted by:	2012 Shady Cove NHMP Steering Committee
Action Item Status:	**NEW**

City of Shady Cove Action Item
Flood #3

Proposed Action Item:	Alignment with Plan Goals:
Preserve water quality by using stormwater best management practices (BMP).	*Prevention*

Alignment with Existing Plans/Policies:

Comply with the Shady Cove Floodplain Ordinance and policies of Rogue Valley Sewer Services.

Rationale for Proposed Action Item:

City of Shady Cove NHMP Committee recently conducted a risk assessment and determined Flood was the third highest risk to the city.

Shady Cove is located along the banks of the Rogue River and has several tributaries.

Most of the property along the stream banks is privately owned.

Ideas for Implementation:

- Support land design practices that improve upon existing infiltration systems and provide infiltration of water rather than creating stormwater runoff and increasing hydrologic impacts;
- Encourage practices that reduce sedimentation in drainage ways;
- Encourage the use of low-impact development standards on private property, including the use of pervious concrete;
- Continue maintenance on stormwater systems to increase capacity; and
- Consider stormwater detention/retention facilities where necessary

Coordinating Organization:	City Planning

Internal Partners:	External Partners:
City Planning, City Public Works, City Floodplain Management	Rogue Valley Sewer Services, Upper Rogue Watershed Council, Rogue Valley Council of Governments (RVCOG)

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	€ Long Term (2-4+ years)

Form Submitted by:	2012 Shady Cove NHMP Steering Committee
Action Item Status:	**NEW**

City of Shady Cove Action Item
Flood #4

Proposed Action Item:	Alignment with Plan Goals:
Continue compliance with the Natural Flood Insurance Program (NFIP).	*Emergency Services, Education and Outreach, Prevention, Property Protection, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

Continue work to comply with the FEMA Compliance Plan for Shady Cove. Comply with the Shady Cove Floodplain Ordinance.

Rationale for Proposed Action Item:

- The National Flood Insurance Program (NFIP) provides communities with federally backed flood insurance, providing that communities develop and enforce adequate floodplain management measures. According to the NFIP, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance.
- The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of a natural hazard on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Continued participation in the NFIP will diminish flood damage to new and existing buildings in communities while providing homeowners, renters, and business owners additional flood insurance protection.

Ideas for Implementation:

- Actively participate with DLCD and FEMA during Community Assistance Visits. The Community Assisted Visit (CAV) is a scheduled visit to a community participating in the NFIP for the purpose of: 1) conducting a comprehensive assessment of the community's floodplain management program; 2) assisting the community and its staff in understanding the NFIP and its requirements; 3) assisting the community in implementing effective flood loss reduction measures when program deficiencies or violations are discovered.
- Conduct an assessment of Shady Cove's floodplain ordinance to ensure it reflects current flood hazards.
- Continue active review of properties for compliance with Floodplain Ordinance

Coordinating Organization:	City Floodplain Management

Internal Partners:	External Partners:
City Planning	FEMA, DLCD

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	€ Ongoing

Form Submitted by:	2012 Shady Cove NHMP Steering Committee
Action Item Status:	**NEW**

City of Shady Cove Action Item
Wildfire (Wildland Urban Interface) #1

Proposed Action Item:	**Alignment with Plan Goals:**
Promote public awareness campaigns for individual property owners living in the Wildland / Urban Interface (WUI).	*Emergency Services; Education and Outreach; Prevention; Partnership and Coordination; Natural Resource Protection*

Alignment with Existing Plans/Policies:

City of Shady Cove EOP, Major Fire Incident Annex #3

Rationale for Proposed Action Item:

- Steering committee members at the Shady Cove Risk Assessment meeting identified wildfire as Shady Cove's most significant natural hazard. Conducting public awareness campaigns will inform residents about wildfire hazards and mitigation actions they can implement to reduce their vulnerability to wildfire.
- Recent wildfires have come close to Shady Cove. Conducting public outreach campaigns about the hazards that wildfires pose will inform the public about the community's risk to wildfires and actions they can implement to reduce that risk.
- The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Conducting public outreach campaigns to inform residents about the risks that wildfires pose and mitigation actions they can implement will protect their property from future wildfire damage.

Ideas for Implementation:

Focus on individual community outreach through:

- Firewise Program education;
- Working demonstrations of risk reduction awareness measures (i.e., survivable space around structures; driveway, road and bridge specifications; and landscaping) at community events;
- Voluntary site visits by fire crews to consult with landowners about specific ways to reduce risk to their property and to identify properties that would not be saved if a wildfire event occurred;
- Mailings;
- Public service announcements in the media;
- Noxious weed abatement and enforcement of local weed ordinance;
- Provide public education regarding potential fire hazard to ATV operators using areas in and near the city and strict enforcement of ATV off road and related statutes.

Coordinating Organization:	City Emergency Management

Internal Partners:	**External Partners:**
City Hazard Mitigation Committee	Fire Dist. #4, Firewise Project Coordinator, media, OEM, FEMA, DLCD, State Fire Marshal, ODF, BLM, U.S. Forest Service, insurance and real estate industries, Jackson County Sheriff Department.

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
To be determined	To be determined	€ € Ongoing

Form Submitted by:	2012 Shady Cove NHMP Steering Committee
Action Item Status:	**NEW**

City of Shady Cove Action Item
Wildfire (Wildland Urban Interface) #2

Proposed Action Item:	**Alignment with Plan Goals:**
Reduce wildfire fuels / Promote and Enhance "Firewise Community" Program	*Emergency Services, Education and Outreach, Prevention, Property Protection, Partnership and Coordination, Natural Resource Protection*

Alignment with Existing Plans/Policies:

• Shady Cove has been designated as a "Firewise Community." This action item will further that effort to get more neighborhoods in compliance and maintain those that have already been designated.

• City of Shady Cove EOP, Major Fire Incident Annex #3.

Rationale for Proposed Action Item:

• Steering committee members at the Shady Cove Risk Assessment meeting identified wildfire as Shady Cove's most significant natural hazard. Recently wildfires have come close to Shady Cove. Reducing wildfire fuels and promoting the Firewise Program will inform the public about the community's risk to wildfires and actions they can implement to reduce that risk.

• The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Conducting public outreach campaigns to inform residents about the risks that wildfires pose and mitigation actions they can implement will protect their property from future wildfire damage.

Ideas for Implementation:

• Identify methods of disposal or utilization of fire fuels removed from individual properties (i.e., prescribed fire application, fuel reduction through grass / timber / brush removal, small diameter forest product based industries, chipping, etc.);
• Promote and enhance existing "Firewise Community" program into additional Neighborhoods;
• Maintain existing Firewise neighborhoods to appropriate standards;
• Seek funding and labor opportunities to staff fuel-reduction projects throughout wildfire hazard prone areas in Shady Cove;
• Work on Wildfire Hazard mapping of Shady Cove and surrounding areas to identify areas and homes that would most benefit from fuel reduction projects;
• Promote opportunities for landowners to utilize fuel reduction projects; and
• Investigate potential funding opportunities for individual mitigation projects.

Coordinating Organization:	City Emergency Management

Internal Partners:	**External Partners:**
City Hazard Mitigation Committee	Jackson County Fire Dist. #4, Firwise Project coordinator, State Fire Marshal, ODF, BLM, US Forest Service

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
To be determined	To be determined	€ Ongoing

Form Submitted by:	2012 Shady Cove NHMP Steering Committee
Action Item Status:	**NEW**

City of Shady Cove Action Item
Wildfire (Wildland Urban Interface) #3

Proposed Action Item:	**Alignment with Plan Goals:**
Distribute public outreach materials informing residents about wildfire hazards and mitigation actions they can take to protect their property.	*Education and Outreach, Prevention, Property Protection*

Alignment with Existing Plans/Policies:

City of Shady Cove EOP, Major Fire Incident Annex #3.

Rationale for Proposed Action Item:

• Steering committee members at the Shady Cove Risk Assessment meeting identified wildfire as Shady Cove's most significant natural hazard. Conducting public outreach campaigns will inform residents about wildfire hazards and mitigation actions they can implement to reduce their vulnerability to wildfire.
• Recent wildfires have come close to Shady Cove. Conducting public outreach campaigns about the hazards that wildfires pose will inform the public about the community's risk to wildfires and actions they can implement to reduce that risk.
• The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Conducting public outreach campaigns to inform residents about the risks that wildfires pose and mitigation actions they can implement will protect their property from future wildfire damage.

Ideas for Implementation:

• Develop new or use existing brochures as outreach materials.
• Provide wildfire mitigation information at City Hall, Fire Dist. #4, Upper Rogue Community Center and Shady Cove Library. Place information on City and Fire Department web sites.
• Distribute outreach materials at community meetings such as Neighborhood Watch, Boosters, Chamber, Upper Rogue Watershed, PTO and mail materials in the Cities Community Newsletter.

Coordinating Organization:	City Emergency Management

Internal Partners:	**External Partners:**
City Hazard Mitigation Committee	Fire Dist. #4, Firewise, ODF, BLM, Forest Service

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
To be determined	To be determined	€ Short Term (0-2 years)

Form Submitted by:	2012 Shady Cove NHMP Steering Committee
Action Item Status:	**NEW**

City of Shady Cove Action Item
Severe Winter Storm and Windstorm #1

Proposed Action Item:	**Alignment with Plan Goals:**
Increase public awareness of windstorm mitigation activities.	*Emergency Services; Education and Outreach; Prevention; Natural Resource Protection*

Alignment with Existing Plans/Policies:

City of Shady Cove EOP, Severe Weather Incident Annex #5.

Rationale for Proposed Action Item:

The Shady Cove NHMP Committee recently conducted a risk assessment and Severe Weather (wind and snow storms) ranked second highest risk to the community.

Ideas for Implementation:

- Collect existing information on public education materials for protecting life, property, and the environment from windstorm events;
- Identify and collect additional information and programs as necessary; and
- Distribute educational materials to City residents and public and private sector organizations regarding preparedness for no-power situations and safe use of generators.

Coordinating Organization:	City Emergency Management

Internal Partners:	**External Partners:**
City Public Works	Utilities, FEMA

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
To be determined	To be determined	€ Ongoing

Form Submitted by:	2012 Shady Cove NHMP Steering Committee
Action Item Status:	**NEW**

City of Shady Cove Action Item
Severe Winter Storm and Windstorm #2

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage critical facilities to secure emergency power.	*Partnership and Coordination*

Alignment with Existing Plans/Policies:
City of Shady Cove EOP, Severe Weather, Incident Annex #5.

Rationale for Proposed Action Item:
Recently the Shady Cove NHMP Committee conducted a risk assessment and Severe Weather (Winter and windstorms) ranked second highest risk to the community.

Ideas for Implementation:
• Seek funding and capital improvements for emergency power availability for critical facilities including the Emergency Operations Center, Red Cross designated shelter; and • Identify critical facilities that need to secure emergency (back-up) power

Coordinating Organization:	City Emergency Management

Internal Partners:	**External Partners:**
City Hazard Mitigation Committee	Granting organizations, Upper Rogue Community Center

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
To be determined	To be determined	€ Ongoing

Form Submitted by:	2012 Shady Cove NHMP Steering Committee
Action Item Status:	**NEW**

City of Shady Cove Action Item
Severe Winter Storm and Windstorm #3

Proposed Action Item:	Alignment with Plan Goals:
Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during severe weather events.	*Emergency Services; Education and Outreach; Prevention; Partnership and Coordination; Natural Resource Protection*

Alignment with Existing Plans/Policies:

City of Shady Cove EOP, Severe Weather Incident Annex #5.

Rationale for Proposed Action Item:

Recently the Shady Cove NHMP Committee conducted a risk assessment and Severe Weather ranked second highest risk to the community.

Ideas for Implementation:

- Partner with responsible agencies and organizations to design and disseminate education information to property owners to reduce risk from tree failure to life, property, commerce and utility systems;
- Identify and find solutions to potentially hazardous trees in urban areas, near utility corridors, and near vital infrastructure; and
- Partner with responsible agencies and organizations to develop landscaping and tree programs that have less impact on above ground utility lines and roads.
- Develop partnerships between utility providers, and city to document known hazard areas and minimize risks;
- Coordinate with overhead utilities in developing GIS layers for power lines and at-risk trees;
- Provide residents with a list of acceptable trees for under power lines; and
- Provide information about overhead utilities' on "Right Tree – Right Place" Program

Coordinating Organization:	City Emergency Management

Internal Partners:	External Partners:
City Public Works	Utility providers, local Arborists and tree services,

Potential Funding Sources:	Estimated cost:	Timeline:
To be determined	To be determined	€ Short Term (0-2 years)

Form Submitted by:	2012 Shady Cove NHMP Steering Committee
Action Item Status:	**NEW**

Appendix B: Planning and Public Process

Memo

To: Federal Emergency Management Agency

From: **Oregon Partnership for Disaster Resilience**

Date: October 30, 2012

Re: **List of changes to the 2006 Jackson County NHMP for the 2012 Plan Update**

Purpose

This memo describes the changes made to the 2006 Jackson County Natural Hazards Mitigation Plan (NHMP) during the 2012 plan update process. Major changes are documented by plan section.

Project Background

Jackson County partnered with the Oregon Partnership for Disaster Resilience (OPDR) to update the 2006 Jackson County Natural Hazards Mitigation Plan (NHMP). The Disaster Mitigation Act of 2000 requires communities to update their mitigation plans every five years to remain eligible for Pre-Disaster Mitigation (PDM) program funding, Flood Mitigation Assistance (FMA) program funding, and Hazard Grant Mitigation Program (HMGP) funding. OPDR met with members of the Jackson County steering committee in December, April, and May of 2012 to update all content within the county's NHMP. During this update cycle the cities of Ashland, Eagle Point, Rogue River and Shady Cove opted to participate; as such the 2012 plan is multi-jurisdictional. Meetings with the steering committees for the four participating cities occurred during April, May and June 2012. OPDR and the committees made several changes to the 2006 NHMP. Major changes are documented and summarized in this memo.

2012 Plan Update Changes

The sections below only discuss *major* changes made to the 2006 Jackson County NHMP during the 2012 plan update process. Major changes include the addition of the four cities participating in the multi-jurisdictional NHMP, replacement or deletion of large portions of text, changes to the plan's organization, and new additions to the plan. If a section is not addressed in this memo, then it can be assumed that no significant changes occurred.

The plan's format and organization have been altered to fit within OPDR's plan templates. Table B1 below lists the 2006 plan section names and the corresponding 2012 section names, as updated.

This memo will use the 2012 plan update section names to reference any changes, additions, or deletions within the plan.

Table B.1 Changes to Plan Sections

2006 Jackson County NHMP	2012 Jackson County Multi-jurisdictional NHMP
Executive Summary: Five-Year Action Plan	Front Pages, Executive Summary
Section 1; Mitigation Plan Introduction	Front Pages, Executive Summary
Section 2: A Picture of Jackson County	Appendix D: Community Profile
Section 3: Multi-Hazard Plan Goals and Action Items	Section 3: Mission, Goals and Action Items
-	**NEW:** Hazard Annex: Drought
Section 4: Flood	Hazard Annex: Flood
Section 5: Landslide	Hazard Annex: Landslide
Section 6: Severe Winter Storm and Windstorm	Hazard Annex: Severe Winter Storm and Windstorm
Section 7: Wildfire	Hazard Annex: Wildfire
Section 8: Earthquake	Hazard Annex: Earthquake
Section 9: Volcanic Eruption	Hazard Annex: Volcanic Eruption
Section 10: Business Preparedness Assessment	Appendix F
Appendix A: Public Participation Process	Appendix B
Appendix B: Resource Directory	Appendix E
Appendix C: Business Recovery Questionnaire	Appendix F
Appendix D: GIS Metadata	Not included in 2012 update
Appendix E: Approaches for Economic Analysis	Appendix C
Appendix F: Plan Maintenance and Action Item Prioritizing Methodology	Section 3, Appendix A
Appendix G: Hazard Analysis Matrix	Executive Summary, Section 3
Appendix H: List of Acronyms	Not included in 2012 update

Several new sections were added and formatting was changed throughout the 2012 Jackson County Multi-jurisdictional NHMP. As well, the Jackson County steering committee added drought to the list of hazards that impact the county.

All of the appendices from the 2006 Plan were replaced and/or updated with new appendices for the 2012 update. Appendices A, B, and E were deleted and changed to the appendices listed in the table above. Appendix C was combined with Section 10 and included as Appendix F. Appendices D and H from the 2006 Plan were not included with the 2012 update. Parts of Appendix F were included within Section 3 and Appendix A in the 2012 update.

Front Pages

1. The plan's cover has been updated.
2. Acknowledgements have been updated to include the 2012 project partners and planning participants.

Volume I: Natural Hazard Mitigation Plan

Volume I provides the overall plan framework for the 2012 Multi-jurisdictional NHMP update. Volume I contains the following sections: an Executive Summary; Section 1: Introduction; Section 2: Risk Assessment; Section 3: Mission, Goals, and Action Items; and Section 4: Plan Implementation and Maintenance.

Executive Summary

The 2012 NHMP now includes an executive summary that provides information about the purpose of natural hazards mitigation planning and describes how the plan will be implemented.

Section 1: Introduction

Section 1 introduces the concept of natural hazards mitigation planning and answers the question, "Why develop a mitigation plan?" Additionally, Section 1 summarizes the 2012 plan update process, and provides an overview of how the plan is organized. Major changes to Section 1 include the following:

1. Most of Section 1 includes new information that replaces out of date text found in the 2006 NHMP. The new text describes the federal requirements that the plan addresses and gives examples of the policy framework for natural hazards planning in Oregon.
2. Section 1 of the 2012 update, outlines the entire layout of the plan update, which has been significantly altered since 2006.

Section 2: Risk Assessment

Section 2, Risk Assessment, consists of three phases: hazard identification, vulnerability assessment, and risk analysis. Hazard identification, involves the identification of hazard geographic extent, its intensity, and probability of occurrence. The second phase, attempts to predict how different types of property and population groups will be affected by the hazard. Lastly, the third phase, involves estimating the damage, injuries, and costs likely to be incurred in a geographic area over a period of time. Changes to Section 2 include:

1. Hazard identification, characteristics, history, probability, vulnerability, and hazard specific mitigation activities were updated.
2. NFIP information was updated.
3. The 2012 Jackson County Hazard Analysis does not organize hazard by chronic or catastrophic.
4. A multi-jurisdictional risk assessment is included to include assessments for the cities of Ashland, Eagle Point, Rogue River and Shady Cove.
5. Drought was identified as a new hazard for the 2012 Jackson County Hazard Analysis; probability (moderate) and vulnerability (moderate) ratings were identified.
6. The 2012 Jackson County Hazard Analysis probability of earthquake event was clarified to be medium while the vulnerability of earthquake remained high.
7. The 2012 Jackson County Hazard Analysis vulnerability of flood hazards was updated from low to moderate.
8. The 2012 Jackson County Hazard Analysis vulnerability of Wildfire hazards was updated from low to moderate.

Section 3: Mission, Goals, and Action Items

This section provides the basis and justification for the mission, goals, and mitigation actions identified in the NHMP. Major changes to Section 3 include the following:

1. The goals were re-prioritized into the following order:
    a. Emergency Services
    b. Education and Outreach
    c. Prevention

    d. Property Protection
    e. Partnership and Coordination
    f. Natural Resource Protection
    g. Structural Projects
2. The deletion of several action items.
3. The addition of new action items for hazards not accounted for in the 2006 NHMP, including drought.
4. The revision of existing actions, lead agency and partner designations.
5. The addition of actions for the cities of Ashland, Eagle Point, Rogue River and Shady Cove.

On May 30th, 2012, the Jackson County steering committee met to review the 2006 NHMP action items. The Jackson County steering committee reviewed and identified which of the 2006 NHMP's action items had been completed or not, or whether they should be deleted. Action items were deleted for a number of reasons, including not meeting basic action item criteria such as being measurable, assignable, or achievable.

After deciding which actions to delete, OPDR worked with the steering committee to formulate new action items for the 2012 Natural Hazard Mitigation Plan. These new action items are based upon continuous community needs, the identification of new hazards, deferred action items, and current needs based upon the community risk assessment. They are designed to be feasibly accomplished within the next five years, and can be found in Appendix A.

The action items from the 2006 NHMP and their status are discussed in table B.2 below. New action items for the cities of Ashland, Eagle Point, Rogue River and Shady Cove can be found in the Executive Summary, Section 3 and Appendix A.

Table B.2 Comparison of 2006 and 2012 Jackson County NHMP Action Items

2006 Action Item	Proposed Action Title	Status	2012 Action Item (Deferred Actions Only)	Explanation
Multi-Hazard Action Items				
ST #1	Sustain a public awareness campaign about natural hazards.	Deferred	MH #1	This is an ongoing action. Progress has been made over the last 5 years with new flood maps, wildland urban interface hazard maps, draft landslide hazard map at least one public meeting.
ST #2	Sustain an education and outreach program for local jurisdictions and assist them in developing emergency operations, public information and hazard mitigation plans.	Deferred	MH #2	This is an ongoing action. The county has a new Emergency Operations Plan (2011); the cities of Medford and Central Point have stand alone NHMPs; Ashland, Eagle Point, Rogue River and Shady Cove are participating in the county NHMP.
ST #3	Maintain a GIS inventory of all critical facilities, large employers/public assembly areas and lifelines, and use GIS to evaluate their vulnerability by comparing them with hazard-prone areas.	Deferred	MH #3	This is an ongoing action. Jackson County GIS maintains the data and uses it to inform risk and vulnerability analyses for the JaCIFP and other purposes.
ST #4	Promote natural hazards safety education.	Deferred	MH #4	This is an ongoing action.
ST #5	Establish partnerships to coordinate and collect geo-science and technical information for identifying potential areas of risk.	Deferred	MH #5	This is an ongoing action.
ST #6	Maintain a system to support populations with special needs (e.g., elderly and disabled persons) during a disaster.	Deferred	MH #6	This is an ongoing action. Among others, partnerships are ongoing with DOGAMI.
ST #7	Explore funding sources and grant opportunities for community-wide natural hazard mitigation activities.	Deferred	MH #7	This is an ongoing action. Following 2005 flood events HMGP funds were secured; at least one property was elevated and one property was acquired.
LT #1	Update the Jackson County Emergency Operations Plan and the FEMAapproved Natural Hazards Mitigation Action Plan on an annual basis. Conduct a complete review of the plans and have them officially promulgated by the approving authorities every five years.	Deleted	-	This action was determined to be addressed within the Jackson County NHMPs Section IV "Implementation and Matinenance" section.
LT #2	Make the Jackson County Emergency Operations Plan and the Natural Hazards Mitigation Action Plan available to the public by publishing the plans electronically.	Deleted	-	This action was determined to be addressed through standard procedures of public record.

Table B.2 Comparison of 2006 and 2012 Jackson County NHMP Action Items (continued)

2006 Action Item	Proposed Action Title	Status	2012 Action Item (Deferred Actions Only)	Explanation
LT #3	Establish post-development inspection procedures for safety requirements (i.e. flood, earthquake, fire safety).	Deferred	MH #8	Procedures exist for some post-development inspection needs.
LT #4	Use hazard information as a basis for county ordinances and regulations that govern site-specific land use decisions	Deferred	MH #9	County fire and flood ordinances were updated to reflect new information since the previous NHMP.
LT #5	Investigate the need for an emergency disaster fund.	Deferred	MH #10	Still under investigation.
LT #6	Improve planning, notification and training for volunteers	Deferred	MH #11	This is an ongoing action.Search and rescue trainings provided by CORSAR and MRC. Rivernet, Redcross also provide services.
LT #7	Promote hazard resistant utility and telecommunication construction and maintenance methods.	Deferred	MH #12	
LT #8	Develop a system for data collection for non-declared natural hazard events.	Deferred	MH #13	
LT #9	Improve coordination and evaluate technical and engineering limitations for catastrophic event response, and develop a long-term recovery plan for Jackson County from the effects of catastrophic hazards.	Deferred	MH #14	
EQ-LT #2	Promote the use of natural hazard loss estimation program (HAZUS) at the local level by providing for the training to use the computer model.	Deferred	MH #15	
Drought Action Items				
-	Support Local Agencies Training on Water Conservation Measures and Drought Management Practices	NEW	DR #1	
-	Ensure Long-range Water Resources Development.	NEW	DR #1	
Earthquake Action Items				
ST #1	Promote building safety through nonstructural improvements.	Deferred	EQ #1	This is an ongoing action. Some agencies currently pursuing action.
ST #2	Encourage purchase of earthquake hazard insurance	Deferred	EQ #2	This is an ongoing action.
ST #3	Maintain an inventory of all permitted dams in Jackson County	Deferred	EQ #3	This is an ongoing action. The state database is complete. Database maintenance is ongoing. Also FL #2.

Table B.2 Comparison of 2006 and 2012 Jackson County NHMP Action Items (continued)

2006 Action Item	Proposed Action Title	Status	2012 Action Item (Deferred Actions Only)	Explanation
LT #1	Compile Relative Earthquake Hazard Maps for Jackson County	Deferred	EQ #4	Elements of this action are complete (liquefaction maps, probability, fault maps).
LT #3	Develop public/ private partnerships - with building contractors, architects, - to pursue retrofitting projects.	Deferred	EQ #5	
Flood Action Items				
ST #1	Continue to coordinate with appropriate agencies, and maintain an inventory of all aggregate operations adjacent to or within the floodplain to ensure operations protect streams.	Deferred	FI #1	DOGAMI provides information on permits. Information is not available on which/ if any operations are located in flood plain.
ST #2	Coordinate river gauge information.	Deleted	-	No authority to coordinate locally.
ST #3	Maintain an inventory of all permitted dams in Jackson County	Deferred	FL #2	This is an ongoing action. The state database is complete. Database maintenance is ongoing. Also EQ #3.
ST #4	Conduct workshops for target audiences on National Flood Insurance Programs, mitigation activities, and potential assistance from FEMA's Flood Mitigation Assistance and Hazard Mitigation Grant Programs.	Deferred	FL #3	New DFIRMs included extensive public outreach. Elevation certificates acquired in certain areas (i.e., Central Point)
LT #1	Update the Flood Insurance Rate (FIRM) Maps for Jackson County as funding becomes available.	Deferred	FL #4	DFIRMS were created for much of the County in May 2011. Upper Rogue has new LiDAR and studies underway.
LT #2	Encourage private property owners to restore natural systems within the floodplain, and to manage riparian areas and wetlands for flood abatement.	Deferred	FL #5	County policy supports. Questions remain regarding how national policy changes affect this action item.
LT #3	Use federal grant funds to acquire or elevate individual properties adjacent to/ within 100-year floodplain as opportunities arise.	Deferred	FL #6	This action is ongoing. Since 2005 one property has been purchased and another raised.
LT #4	Continue to increase Jackson County's CRS (Community Rating System) rating over time through activities outlined by FEMA.	Deferred	FL #7	Jackson County has a level 7 CRS rating and has an open CAV.
LT #5	Preserve water quality by using storm water best management practices.	Deferred	FL #8	TMDLs for cities and counties are currently under review.
Landslide Action Items				
ST #1	Compile Relative Landslide Risk maps for Jackson County.	Deferred	LS #1	Maps exist for steep slopes, expansive soils as per 2004 ordinance. DOGAMI recently completed mapping via SLIDO-2.

Table B.2 Comparison of 2006 and 2012 Jackson County NHMP Action Items (continued)

2006 Action Item	Proposed Action Title	Status	2012 Action Item (Deferred Actions Only)	Explanation
ST #2	Increase public education related to landslide hazards by distributing landslide informational brochures.	Deferred	LS #2	
LT #1	Investigate the development and implementation of a county landslide ordinance.	Deferred	LS #3	A steep slopes ordinance was created in 2004; did not include landslides.
Severe Winter Storm and Windstorm Action Items				
ST #1	Map areas where extreme weather, such as road icing or wind damage occurs.	Deferred	WS #1	Information exists, not mapped.
LT #1	Promote the benefits of tree-trimming and tree replacement programs and help to coordinate local efforts by public and private agencies.	Deferred	WS #2	Some information currently exists; need to continue outreach to public.
Volcanic Eruption Action Items				
ST #1	Increase awareness of volcanic eruption threats for county residents.	Deferred	VE #1	
LT #1	Create and map hypothetical eruption scenarios to display potential eruption hazards.	Deferred	VE #2	Mt. Shasta and Mt. McLaughlin are the priority areas for mapping.
LT #2	Collaborate with county environmental health to provide immediate warning to communities about air quality hazards following volcanic eruptions.	Deferred	VE #3	
Wildfire (WUI) Action Items				
-	Coordinate fire mitigation action items through the Jackson County Integrated Fire Plan.	NEW	WF #1	The 2012 NHMP steering committee opted to coordinate fire mitigation actions through the JaCIFP since that plan receive annual review and has a robust risk assessment and developed resource allocation.
ST #1	Continue working with the Rogue Valley Fire Prevention Cooperative in the review of plans and inspection of structures for fire code compliance.	Deleted	-	Ibid.
ST #2	Advocate water storage facilities with fire-resistant electrical pump systems in development that is not connected to a community water/hydrant system.	Deleted	-	Ibid.
ST #3	Continue to promote public awareness campaigns for individual property owners living in interface areas.	Deleted	-	Ibid.
LT #1	Promote the expansion of rural fire districts.	Deleted	-	Ibid.
LT #2	Reduce wildfire fuels	Deleted	-	Ibid.

Meeting: Natural Hazards Mitigation Plan Update

Date: December 9, 2011

Time: 10:00 AM – 1:00 PM

Location: TBA

AGENDA

I. Introductions and Background (60 minutes)
Welcome & Introductions
Review of meeting goals and objectives
Process Overview
Why Are We Here?
Who is Involved?

II. Natural Hazards Mitigation Planning Overview (90 minutes)
What is Natural Hazards Mitigation Planning?
Grant Opportunities
Plan Update Process
New FEMA plan review guidance
Steering Committees
Public Involvement Strategies
Community Profile
Before Our Next Meeting…

Questions? (30 minutes)

Jackson County 2012 NHMP Update – Work Plan

Oregon Partnership for Disaster Resilience

Proposed Scope of Work for

Jackson County Natural Hazards Mitigation Plan Update and

Participating Jackson County Cities Addendum Creation

Purpose

In 2000, Congress passed the Disaster Mitigation Act (DMA2K) requiring communities to complete and regularly update natural hazard mitigation plans. In essence, a Natural Hazard Mitigation Plan (NHMP) forms the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. It creates a framework for risk-based decision making to reduce damages to lives, property, and the economy from future disasters. The DMA2K further allowed counties or other jurisdictions with FEMA approved NHMPs to receive funding prior to or after a Presidentially Disaster Declaration. These funds can then be used to mitigate the loss of life or property as a result of natural hazards.

This scope outlines the planning process and products necessary to update or develop natural hazard mitigation plans.

Background

The Jackson County NHMP was formally adopted on February 7th, 2006. To maintain its compliance with DMA2K, the plan will need to be reviewed, updated, re-approved by FEMA, and re-adopted not later than February 7th, 2011. At this time, there are no cities that have created addenda to the Jackson County NHMP. This scope of work provides, in detail, a description of how the Oregon Partnership for Disaster Resilience (OPDR) intends to facilitate the updating of the Jackson County NHMP, as well as creation and approval of addenda for any Jackson County cities that wish to participate.

OPDR will also be working concurrently with Southern Oregon University (SOU) to develop a NHMP specific to SOU. The work done by OPDR in updating the Jackson County NHMP will be used to inform the development of the SOU NHMP.

OPDR, a division of the University of Oregon's Community Service Center (CSC), works to comprehensively and cost-effectively enhance disaster safety and preparedness statewide. By fostering collaboration among private and public agencies, OPDR works with communities and organizations to identify issues, determine needs, and develop strategies for risk reduction. The CSC is an interdisciplinary service-learning organization at the University of Oregon that provides planning and technical assistance to Oregon communities. OPDR, through the CSC, is thus uniquely able to link the skills, expertise, and innovation of higher education with the hazard risk reduction needs of communities and regions in Oregon.

OPDR will be responsible for all activities described in this scope of work. The OPDR – CSC team will be comprised of André LeDuc, Executive Director; Krista Dillon, Associate Director; Josh Bruce, Projects Coordinator; Megan Findley, Pre-Disaster Mitigation Program Manager; Adam Crawford, Emergency Management Specialist for the Partnership; Gregoor Passchier, Planning Coordinator;

Julie Foster, CSC Grants Administrator; and Linda White, CSC Office Coordinator. OPDR's ability to carry out activities is enhanced by human and technical resources applied to OPDR from external partners. Chief among those partners is U.S. Geological Survey, Oregon Military Department – Office of Emergency Management, and the State Interagency Hazard Mitigation Team.

Natural Hazard Mitigation Planning

The following outlines the tasks that OPDR will implement to assist Jackson County in updating their natural hazard mitigation plan and any participating cities in developing addenda to that plan. All plans and addenda will have to go through the FEMA approval process. This project will kick off in summer 2010.

Planning Process

This portion of the scope of work identifies how OPDR will assist participating jurisdictions identify the what, who, how, and when of the proposed planning process.

Task 1: Identify Project Lead and Steering Committee Members

Jackson County will designate a project lead. OPDR will work with that project lead to identify potential steering committee members or work with existing disaster planning committees.

The steering committee will be responsible for overseeing the plan update process, providing information to update the plan, and providing feedback on plan drafts.

In addition, OPDR will work with the project lead to develop dates for mitigation meetings.

Product(s):	Project Lead and Steering Committee Members Identified
	Date of First Meeting Set
Timeline:	May 2010

Task 2: Distribute Planning Resources

Once the project leads and steering committees are set, OPDR will distribute planning resources. These will include OPDR's Pre-Disaster Mitigation Training Manual and the Pre-Disaster Mitigation Plan Update Manual. These documents walk a community through the process of creating or updating a NHMP to meet and in most cases, exceed the minimum FEMA planning requirements.

In addition to the plan update training manuals, OPDR will provide a planning initiative website for this project. The website will be part of the OPDR's website and will include all available electronic documents and resources presented at the work sessions. The website, in cooperation with the University of Oregon's Scholars' Bank, will also serve as the repository for final adopted plans, making them web accessible to the general public.

Product(s):	Plan Creation or Update Resources
	Project Website
Timeline:	June 2010-August 2010

Task 3: Develop or Update Community Profiles

OPDR will develop or update the community profile of Jackson County and make any necessary changes to relate information in the profile to natural hazards mitigation. OPDR will also create the

community profiles of any Jackson County city that wishes to create an addendum to the Jackson County NHMP. The profiles will include information about the area's geography and climate; population and demographics; employment and economics, housing, land use and development, transportation and commuting patterns, critical facilities and infrastructure, and historic and cultural resources. Additionally, the community profile will describe the government structure, existing plans and policies, and community organizations and programs. Existing plans and policies should highlight specific opportunities for the integration of mitigation goals and actions. Potential data sources for completing community profiles include: comprehensive plan, census, state natural hazard mitigation plan regional profiles, national register of historic places, and the Portland State University Population Research Center.

Product(s): Draft Community Profiles

Timeline: June 2010-August 2010

Task 4: Develop or Update Risk Assessments

The risk assessments for Jackson County and participating Jackson County cities should contain updated information for the following natural hazards: wildfire, earthquake, flood, landslides, severe winter storm, severe winter storms, and earthquake.

The following FEMA requirements must be reviewed and updated for each hazard: causes, characteristics, location, extent, previous occurrences, probability, vulnerability, and community-related impacts (or potential impacts). The causes, characteristics, location, extent, previous occurrences and probability can be reviewed and updated prior to the steering committee meeting by reviewing local, state, and federal studies or plans. Information on hazard history events, probability, and vulnerability will be compiled and discussed with the local steering committee at the first steering committee meeting (Task 6).

OPDR will rely on Jackson County and participating city staff to provide accurate information regarding the past hazard history for their jurisdictions.

Product(s): Draft Risk Assessments

Timeline: June 2010-August 2010

Task 5: Document Action Item Status

One important part of the plan update process is documenting which mitigation actions have been implemented and which are still pending. The updated plan's mitigation actions can consist of deferred actions from the previously approved plans, and new actions that address new vulnerabilities. OPDR will work with county staff to document the current status for actions from the 2006 plan.

Product(s): Documented Status of Action Items

Timeline: June 2010-August 2010

Task 6: Work Session #1: Getting Started

OPDR will hold the first meeting in Medford. Attendees will include the lead for Jackson County as well as the county's steering committee and representatives from any participating city. Topics to discuss at this meeting include:

- Overview of Natural Hazards Mitigation. Committee members will be refreshed on natural hazard mitigation, its purpose, and the benefits that a mitigation plan can provide a community.
- Plan update process and timeline. This meeting will discuss the planning process for updating or developing a NHMP, and a rough timeline for completion. OPDR will discuss firm meeting dates with the project lead at a later date.
- Discuss Draft Community Profiles. OPDR will send the jurisdictions their respective community profiles prior to this meeting. The jurisdictions will have a chance to review their draft community profiles and provide any further input.
- Discuss Risk Assessments: Risk assessment methodologies, common risk assessment barriers and ways to deal with them will be discussed. The jurisdictions will have a chance to review their risk assessments and provide any further input.

Product(s): Work Session #1: Getting Started

Timeline: September 2010

Task 7: Develop or Update Action Items

After the first work session and prior to the second, OPDR will draft potential actions for the county and participating cities. New actions should be based on vulnerabilities identified within the risk assessment. All vulnerabilities should have a corresponding action. It is not necessary that each hazard have an action, but if a hazard has a "high" probability of occurrence and a "high" vulnerability-then there must be a mitigation action for that hazard.

Each action will have a corresponding action item worksheet that lists the action's alignment with goals and existing plans and policies, rationale, ideas for implementation, coordinating organization, partner organization, and potential funding sources.

Product(s): Draft Action Items

Timeline: September 2010-October 2010

Task 8: Develop or Update Maintenance and Implementation Sections

The NHMPs for Jackson County and any participating Jackson County city need to contain a section detailing how the plan will be maintained an implemented. OPDR will be responsible for drafting a Maintenance and Implementation section of the plan to be reviewed prior to the second and final meeting.

Product(s): Draft Maintenance and Implementation Sections

Timeline: September 2010-October 2010

Task 9: Work Session #2: Goals, Actions Items, Maintenance and Implementation

The second work session will address the goals and actions within the individual mitigation plans. Included in this work session will be a discussion of the state NHMP goals as well as how to craft successful action items.

The second work session will also address how to craft maintenance and implementation strategies to ensure the plan will be implemented. The project lead and steering committee will learn about common pitfalls in both the implementation and maintenance of a natural hazard mitigation plan as well as how to get around them. OPDR will propose a meeting schedule and framework to ensure that the NHMP doesn't lapse and is updated in a timely manner. OPDR will also detail funding sources available for mitigation projects.

Product(s):	Hazard Mitigation Framework – Goals and Action Items
Timeline:	November 2010

Task 10: Final Edits and FEMA Approval Guidance

If necessary, OPDR is prepared to facilitate a third work session. This work session would address any unfinished items that would need to be dealt with prior to the plan's final submission to FEMA.

Based on comments from the steering committee and the final work session, OPDR will complete final edits to the Jackson County and participating city addenda and submit them to FEMA. When the plan has been sent to FEMA, OPDR will guide Jackson County through the FEMA approval process.

Also, a requirement for all updated NHMPs is to craft a memo detailing the changes made to the newly-submitted NHMP. OPDR will complete a changes memo describing major changes made to the Jackson County NHMP.

Product(s):	Memo Describing Changes to Jackson County NHMP
	Completed NHMPs
Timeline:	December 2010-January 2011

Meeting:	Natural Hazards Mitigation Plan Update – Risk Assessment
Date:	Wednesday, April 25th
Time:	9:00 – 11:00 a.m.
Location:	Jackson County Emergency Operations Center (400 Pech Road, Medford, OR)

Meeting Agenda

I. Welcome and Introductions (5 minutes)

II. Overview of Risk Assessment Process (10 minutes)

III. Review of Hazard Identification (15 minutes)

- Update Hazard Inventories
-

IV. Update Hazard Analysis Matrix (20 Minutes)

V. Relative Risk Overview (40 Minutes)

- Review of Relative Risk Questionnaire
- Outline potential severity/impact of identified hazards

VI. Review Existing Vulnerability Information (30 Minutes)

- Review of Asset Worksheet
- Update the list of Community Critical/Essential Facilities and Infrastructure

VII. Next Steps (10 Minutes)

- Identify date for the next meeting

To access OPDR information and resources visit: **http://csc.uoregon.edu/OPDR**

Meeting: Natural Hazards Mitigation Plan Update – Mitigation Strategy & Plan Implementation and Maintenance
Date: Wednesday, May 30th
Time: 9:00 – 12:00 p.m.
Location: Jackson County Emergency Operations Center (400 Pech Road, Medford, OR)

MEETING AGENDA

I.	**Welcome & Introductions**	**(5 minutes)**
II.	**Timeline & Process for Adoption of Updated Plan**	**(5 minutes)**
III.	**Overview of Mitigation Strategy Process**	**(30 minutes)**
IV.	**Reviewing Mission and Goals**	**(10 minutes)**
•	**Update mission statement and goals**	
V.	**Review and Update Current Mitigation Strategy**	**(45 minutes)**
•	**Review previously approved action items**	
VI.	**Action Item Development**	**(45 Minutes)**
•	**Review Risk Assessment vs. overall Relative Risk**	
•	**Develop new action items**	
VII.	**Implementation and Maintenance**	**(30 Minutes)**
VIII.	**Conclusion and Next Steps**	**(10 Minutes)**

To access information and resources on the Jackson County NHMP update process visit:
http://csc.uoregon.edu/OPDR/plans/Jackson

Meeting: Jackson County Natural Hazards Mitigation Plan Update – **City of Eagle Point Risk Assessment**
Date: Tuesday, May 29th
Time: 11:00 – 12:30 p.m.
Location: Eagle Point City Hall (17 Buchanan Avenue South, Eagle Point, OR 97524)

Meeting Agenda

I. **Welcome and Introductions** (5 minutes)

II. **Overview of Risk Assessment Process** (10 minutes)

- Review of Hazard Identification

III. **Review Existing Vulnerability Information** (30 Minutes)

- Update the list of Community Critical/Essential Facilities and Infrastructure

IV. **Update Hazard Analysis Matrix** (40 Minutes)

V. **Next Steps** (5 Minutes)

- Identify potential date(s) for the next meeting

To access information and resources on the Jackson County NHMP update process visit:
http://csc.uoregon.edu/OPDR/plans/Jackson

DATE: July 19, 2012

To	**Eagle Point Steering Committee**
From	**Michael Howard, Program Specialist**
SUBJECT	**CITY OF EAGLE POINT RISK ASSESSMENT SUMMARY AND ACTION ITEM PREPARATION**

This memo summarizes the Eagle Point Hazard Assessment that occurred on May 29th, 2012. A previous version of this material was provided on June 6th, 2012. This memo provides the previous information and adds additional content on the Mitigation Strategy/ Action Item process.

During our meeting on Friday July 20, 2012 I would like to answer any questions that may have developed from the Eagle Point Steering Committee regarding the nature of the hazard assessment and purpose of the mitigation strategy and action items.

Included with this memo is an Action Item Form that should be used when creating specific action items for the City of Eagle Point. I have also included some example action items that were created for other jurisdiction in Oregon.

The City of Eagle Point completed a local hazard analysis on May 29th, 2012 to compare the city's risk for each identified hazard to that of Jackson County. The city addressed the seven hazards identified by the county: drought, earthquake, flood, landslide, severe winter storm and windstorm, volcanic eruption and wildfire. Scores were based off of past historical events, the probability or likelihood of a particular hazard event occurring, vulnerability to population, and the maximum threat or worst-case scenario.

Table 1 presents the hazard analysis risk assessment for Eagle Point. The hazards are listed in rank order from high to low, taking consideration of past historical events, vulnerability to populations, the maximum threat, and the probability, or likelihood of a particular hazard event occurring. The data show that severe winter storm and windstorm is the highest ranked hazard in the city, followed closely by earthquake. The next highest ranked hazards are flood and drought. Wildfire, volcanic eruption and landslide are the lowest ranked hazards.

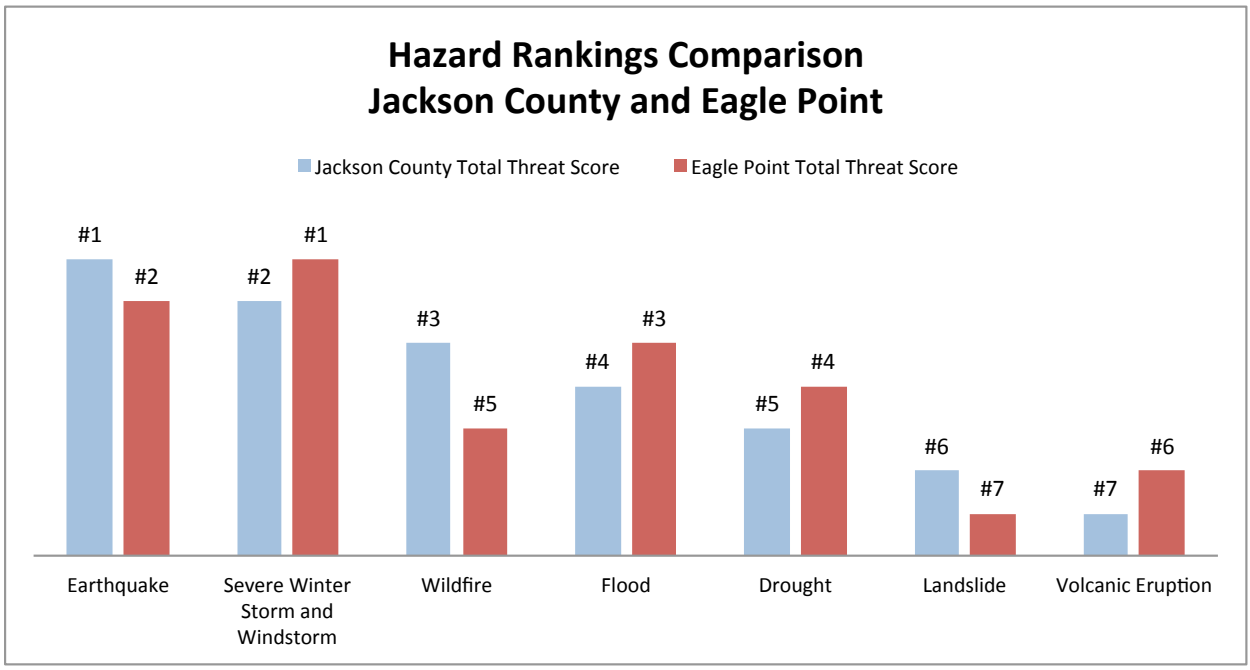
Table 1: Hazard Analysis Matrix

	History			Probability			Vulnerability			Maximum Threat				
Hazard	Severity	Weight Factor	**Subtotal**	Severity	Weight Factor	**Subtotal**	Severity	Weight Factor	**Subtotal**	Severity	Weight Factor	**Subtotal**	Total Threat Score	**Hazard Rank**
Severe Winter Storm and Windstorm	10	2	**20**	10	7	**70**	10	5	**50**	6	10	**60**	200	**1**
Earthquake	4	2	**8**	6	7	**42**	7	5	**35**	10	10	**100**	185	**2**
Flood	10	2	**20**	10	7	**70**	7	5	**35**	5	10	**50**	175	**3**
Drought	5	2	**10**	5	7	**35**	10	5	**50**	7	10	**70**	165	**4**
Wildfire	10	2	**20**	5	7	**35**	4	5	**20**	5	10	**50**	125	**5**
Volcanic Eruption	1	2	**2**	1	7	**7**	1	5	**5**	5	10	**50**	64	**6**
Landslide	5	2	**10**	5	7	**35**	1	5	**5**	1	10	**10**	60	**7**

Source: City of Eagle Point, Updated May 29, 2012

Figure 1 shows a comparison of the hazard ranks between Eagle Point and Jackson County. The information shows that there is a great degree of similarity in the ranking of hazards between the county as a whole and the city.

Figure 1: Hazard Rankings Comparison



Source: City of Eagle Point, Updated May 29, 2012

Table 2 provides a comparison between the Probability and Vulnerability rankings between Eagle Point and Jackson County (differences shown in **bold**). There is a great deal of similarity between the city and county scores with the greatest variability occurring due to decreased perceived probability to landslide and wildfire and perceived decrease in vulnerability ratings for earthquake. There is also a perceived increased vulnerability to the drought hazard.

Table 2: Probability and Vulnerability Comparison

	Eagle Point		Jackson County	
Hazard	Probability	Vulnerability	Probability	Vulnerability
Drought	Medium	**High**	Medium	Medium
Earthquake	Medium	**Medium**	Medium	High
Flood	High	Medium	High	Medium
Landslide	**Medium**	Low	High	Low
Volcanic Eruption	Low	Low	Low	Low
Wildfire	**Medium**	Medium	High	Medium
Severe Winter Storm and Windstorm	High	High	High	High

*Source: City of Eagle Point, May 29, 2012

^Source: Jackson County NHMP Steering Committee, Updated April 25, 2012

Mitigation Strategy/ Action Items

Title 44 of the Code of Federal Regulations, Part 201.6 presents the requirements for a Local Mitigation Plan. Section 201.6(c)(3) describes the necessary content of a local mitigation strategy and reads: [Below is presented the CFR language in *italics* with my commentary in normal text.]

(c) Plan Content. The plan shall include the following:

(3) A mitigation strategy that provides the jurisdictions blueprint for reducting the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools. This section shall include:

(i) A description of the mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

On May 30, 2012 the Jackson County NHMP Steering Committee reconfirmed the Plan Goals and prioritized them as follows:

1. Emergency Services
2. Education and Outreach
3. Prevention
4. Property Protection
5. Partnership and Coordination
6. Natural Resource Protection, and
7. Structure Projects

(ii) *A section that identifies and analysis a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure….*

On May 30, 2012 the Jackson County NHMP Steering Committee reviewed all existing action items and identified action items that were completed, deleted or deferred and identified new action items. This list of Action Items applies countywide and is not specific to the City of Eagle Point. Specific Action Items for the City of Eagle Point are required as per (c)(3)(iv) below.

(iii) *An action plan describing how the actions identified in paragraph (c)(3)(ii) [above] of this section will be prioritized, implemented, and administered by the local jurisdiction. Prioritization 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.*

On May 30, 2012 the Jackson County NHMP Steering Committee discussed action item prioritization.

(iv) *For multi-jurisdictional plans, there must be identifiable actions items specific to the jurisdiction requesting FEMA approval or credit of the plan.*

The City of Eagle Point Steering Committee must identify action items specific to the City in order to receive FEMA approval. The Action Items must comply with the standards of 33 CFR Part 201.6(c)(3) listed above. The actions should cover a comprehensive range (multiple number) of actions for each hazard. The top identified hazards for the City of Eagle Point are: Severe Winter Storm and Windstorm, Earthquake, Flood and Drought. The City may want to consider the creation of action items for the highest ranked hazards. In addition, the Goal prioritization of the County is listed above under (c)(3)(i), in reviewing potential Action Items the City may want to align action items with the prioritized County NHMP goals.

Actions should also address new and existing buildings and infrastructure and address continued compliance with the National Flood Insurance Program (for example the City may want to consider the creation of an action item promoting outreach to encourage the purchase of flood insurance for property owners within the special flood hazard area).

Meeting:	Jackson County Natural Hazards Mitigation Plan Update – **City of Shady Cove Risk Assessment**
Date:	Tuesday, May 29th
Time:	1:30 – 3:00 p.m.
Location:	Shady Cove City Hall (22451 Highway 62, Shady Cove, OR)

Meeting Agenda

VI. Welcome and Introductions (5 minutes)

VII. Overview of Risk Assessment Process (10 minutes)

- Review of Hazard Identification

VIII. Review Existing Vulnerability Information (30 Minutes)

- Update the list of Community Critical/Essential Facilities and Infrastructure

IX. Update Hazard Analysis Matrix (40 Minutes)

X. Next Steps (5 Minutes)

- Identify potential date(s) for the next meeting

To access information and resources on the Jackson County NHMP update process visit:
http://csc.uoregon.edu/OPDR/plans/Jackson

DATE: June 8, 2012

To	**Shady Cove Steering Committee**
From	**Michael Howard, Program Specialist**
SUBJECT	**CITY OF SHADY COVE RISK ASSESSMENT SUMMARY**

Table 1 presents the city's hazard analysis risk assessment for Shady Cove. The hazards are listed in rank order from high to low, taking consideration of past historical events, vulnerability to populations, the maximum threat, and the probability, or likelihood of a particular hazard event occurring. The data show that wildfire is the highest ranked hazards in the city, followed closely by severe winter storm and windstorm. The next highest ranked hazards are flood and earthquake. Drought, volcanic eruption and landslide are the lowest ranked hazards.

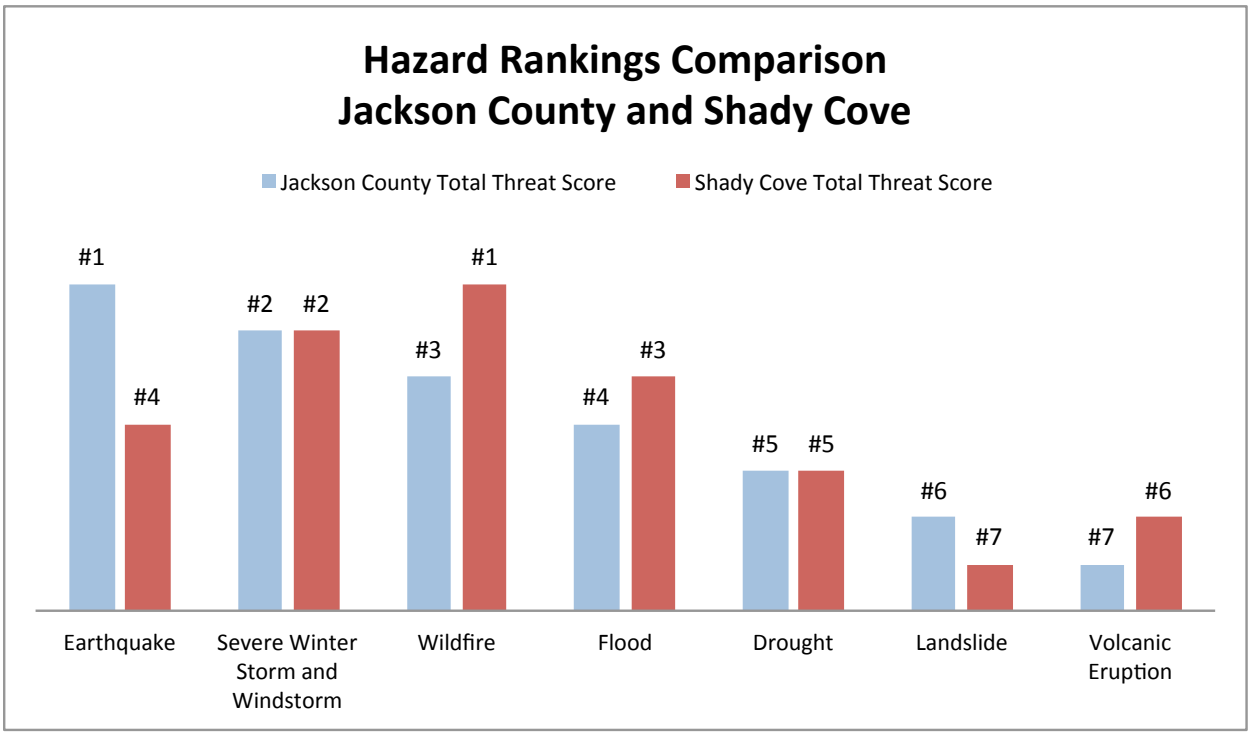
Table 1: Hazard Analysis Matrix

	History			Probability			Vulnerability			Maximum Threat				
Hazard	Severity	Weight Factor	**Subtotal**	Severity	Weight Factor	**Subtotal**	Severity	Weight Factor	**Subtotal**	Severity	Weight Factor	**Subtotal**	Total Threat Score	**Hazard Rank**
Wildfire	10	2	**20**	10	7	**70**	10	5	**50**	10	10	**100**	240	**1**
Severe Winter Storm and Windstorm	10	2	**20**	10	7	**70**	10	5	**50**	8	10	**80**	220	**2**
Flood	10	2	**20**	10	7	**70**	6	5	**30**	8	10	**80**	200	**3**
Earthquake	4	2	**8**	6	7	**42**	9	5	**45**	9	10	**90**	185	**4**
Drought	5	2	**10**	8	7	**56**	8	5	**40**	3	10	**30**	136	**5**
Volcanic Eruption	1	2	**2**	1	7	**7**	1	5	**5**	5	10	**50**	64	**6**
Landslide	1	2	**2**	1	7	**7**	4	5	**20**	1	10	**10**	39	**7**

Source: City of Shady Cove, Updated May 29, 2012

Figure 1 shows a comparison of the hazard ranks between Shady Cove and Jackson County. The information shows that the areas of greatest difference were in the earthquake and wildfire hazards. This is primarily due to heightened vulnerability related to the location of historical wildfires within the community and the perceived decreased threat with the earthquake hazard.

Figure 1: Hazard Rankings Comparison



Source: City of Shady Cove, Updated May 29, 2012

Table 2 provides a comparison between the Probability and Vulnerability rankings between Shady Cove and Jackson County (differences shown in **bold**). There is a great deal of similarity between the city and county scores with the greatest variability occurring due to increased probability and vulnerability ratings for the drought and landslide hazards and the increased vulnerability within the wildfire hazard.

Table 2: Probability and Vulnerability Comparison

	Shady Cove		Jackson County	
Hazard	Probability	Vulnerability	Probability	Vulnerability
Drought	**High**	**High**	Medium	Medium
Earthquake	Medium	High	Medium	High
Flood	High	Medium	High	Medium
Landslide	**Low**	**Medium**	High	Low
Volcanic Eruption	Low	Low	Low	Low
Wildfire	High	**High**	High	Medium
Severe Winter Storm and Windstorm	High	High	High	High

*Source: City of Shady Cove, May 29, 2012

^Source: Jackson County NHMP Steering Committee, Updated April 25, 2012

Meeting:	Jackson County Natural Hazards Mitigation Plan Update – **City of Ashland Risk Assessment**
Date:	Tuesday, May 29th
Time:	4:00 – 5:30 p.m.
Location:	Ashland Fire and Rescue (455 Siskiyou Boulevard, Ashland, OR 97520)

Meeting Agenda

XI. Welcome and Introductions (5 minutes)

XII. Overview of Risk Assessment Process (10 minutes)

- Review of Hazard Identification

XIII. Review Existing Vulnerability Information (30 Minutes)

- Update the list of Community Critical/Essential Facilities and Infrastructure

XIV. Update Hazard Analysis Matrix (40 Minutes)

XV. Next Steps (5 Minutes)

- Identify potential date(s) for the next meeting

To access information and resources on the Jackson County NHMP update process visit:
http://csc.uoregon.edu/OPDR/plans/Jackson

DATE: June 8, 2012

To	**Ashland Steering Committee**
From	**Michael Howard, Program Specialist**
SUBJECT	**CITY OF ASHLAND RISK ASSESSMENT SUMMARY**

Table 1 presents the city's hazard analysis risk assessment for Ashland. The hazards are listed in rank order from high to low, taking consideration of past historical events, vulnerability to populations, the maximum threat, and the probability, or likelihood of a particular hazard event occurring. The data show that landslide and wildfire are the highest ranked hazards in the city. The next highest ranked hazards are earthquake and severe winter storm and windstorm, followed closely by drought. Flood was the next highest ranked hazard. Lastly, volcanic eruption makes up the lowest ranked hazard.

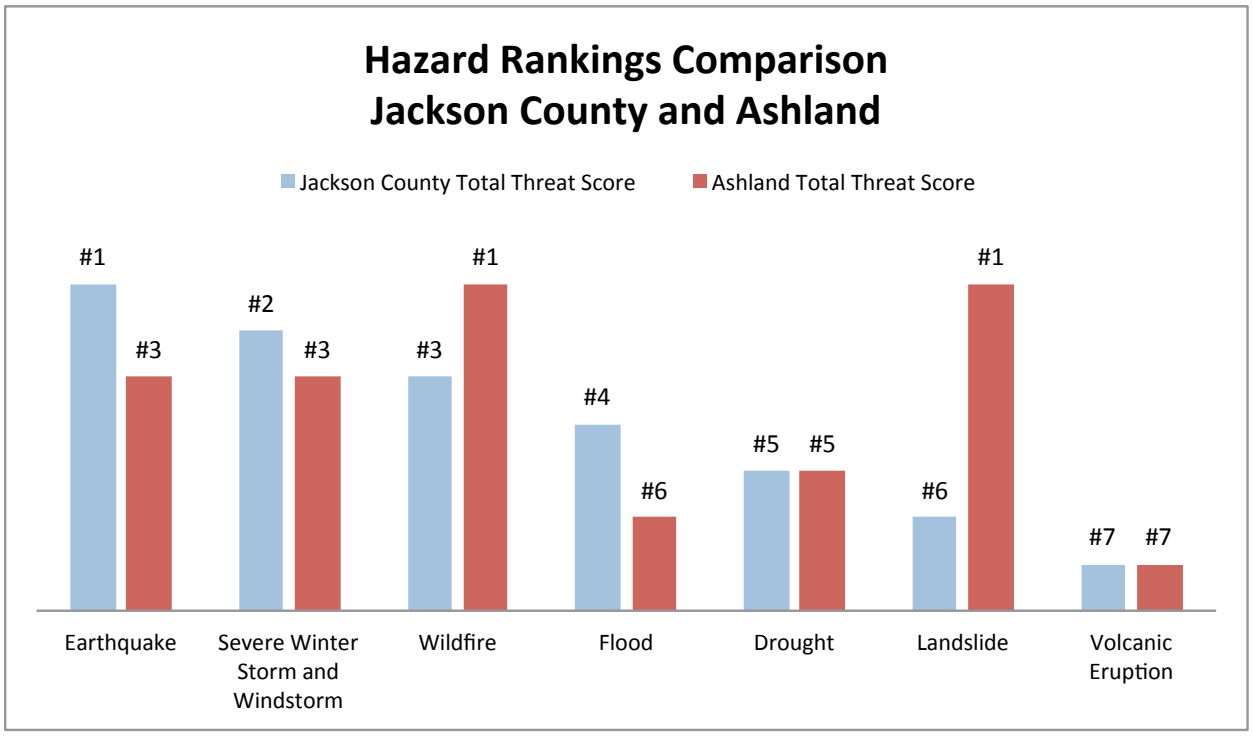
Table 1: Hazard Analysis Matrix

	History			Probability			Vulnerability			Maximum Threat				
Hazard	Severity	Weight Factor	**Subtotal**	Severity	Weight Factor	**Subtotal**	Severity	Weight Factor	**Subtotal**	Severity	Weight Factor	**Subtotal**	Total Threat Score	**Hazard Rank**
Landslide	10	2	**20**	10	7	**70**	10	5	**50**	10	10	**100**	240	**1**
Wildfire	10	2	**20**	10	7	**70**	10	5	**50**	10	10	**100**	240	**1**
Earthquake	4	2	**8**	6	7	**42**	10	5	**50**	10	10	**100**	200	**3**
Severe Winter Storm and Windstorm	10	2	**20**	10	7	**70**	10	5	**50**	6	10	**60**	200	**3**
Drought	5	2	**10**	5	7	**35**	10	5	**50**	10	10	**100**	195	**5**
Flood	10	2	**20**	10	7	**70**	4	5	**20**	5	10	**50**	160	**6**
Volcanic Eruption	1	2	**2**	1	7	**7**	1	5	**5**	5	10	**50**	64	**7**

Source: City of Ashland, Updated May 29, 2012

Figure 1 shows a comparison of the hazard ranks between Ashland and Jackson County. The information shows that the area of greatest difference was in the landslide. This is primarily due to heightened vulnerability related to the location of historical landslides within the community, including landslides near the drinking water source for the community.

Figure 1: Hazard Rankings Comparison



Source: City of Ashland, Updated May 29, 2012

Table 2 provides a comparison between the Probability and Vulnerability rankings between Ashland and Jackson County (differences shown in **bold**). There is a great deal of similarity between the city and county scores with the greatest variability occurring due to increased vulnerability ratings for the drought, landslide and wildfire hazards.

Table 2: Probability and Vulnerability Comparison

	Ashland		Jackson County	
Hazard	Probability	Vulnerability	Probability	Vulnerability
Drought	Medium	High	Medium	Medium
Earthquake	Medium	High	Medium	High
Flood	High	Medium	High	Medium
Landslide	High	High	High	Low
Volcanic Eruption	Low	Low	Low	Low
Wildfire	High	High	High	Medium
Severe Winter Storm and Windstorm	High	High	High	High

Source: City of Ashland, May 29, 2012

^Source: Jackson County NHMP Steering Committee, Updated April 25, 2012

Meeting:	Jackson County Natural Hazards Mitigation Plan Update – **City of Rogue River Risk Assessment**
Date:	Tuesday, May 30th
Time:	12:30 – 2:00 p.m.
Location:	Rogue River

Meeting Agenda

XVI.	**Welcome and Introductions**	(5 minutes)
XVII.	**Overview of Risk Assessment Process**	(10 minutes)

- Review of Hazard Identification

XVIII.	**Review Existing Vulnerability Information**	**(**30 Minutes)

- Update the list of Community Critical/Essential Facilities and Infrastructure

XIX.	**Update Hazard Analysis Matrix**	(40 Minutes)
XX.	**Next Steps**	(5 Minutes)

- Identify potential date(s) for the next meeting

To access information and resources on the Jackson County NHMP update process visit:
http://csc.uoregon.edu/OPDR/plans/Jackson

DATE: June 8, 2012

To	**Rogue River Steering Committee**
From	**Michael Howard, Program Specialist**
SUBJECT	**CITY OF ROGUE RIVER RISK ASSESSMENT SUMMARY**

Table 1 presents the city's hazard analysis risk assessment for Rogue River. The hazards are listed in rank order from high to low, taking consideration of past historical events, vulnerability to populations, the maximum threat, and the probability, or likelihood of a particular hazard event occurring. The data show that flood is the highest ranked hazard in the city, followed somewhat closely by earthquake and severe winter storm and windstorm. Wildfire and drought are the next two highest ranked hazards in the city. Volcanic activity and landslide make up the two lowest ranked hazards in the city.

Table 1: Hazard Analysis Matrix

	History			Probability			Vulnerability			Maximum Threat				
Hazard	Severity	Weight Factor	**Subtotal**	Severity	Weight Factor	**Subtotal**	Severity	Weight Factor	**Subtotal**	Severity	Weight Factor	**Subtotal**	Total Threat Score	**Hazard Rank**
Flood	10	2	**20**	10	7	**70**	7	5	**35**	8	10	**80**	205	**1**
Earthquake	4	2	**8**	6	7	**42**	7	5	**35**	10	10	**100**	185	**2**
Severe Winter Storm and Windstorm	10	2	**20**	10	7	**70**	5	5	**25**	6	10	**60**	175	**3**
Wildfire	10	2	**20**	10	7	**70**	4	5	**20**	5	10	**50**	160	**4**
Drought	5	2	**10**	5	7	**35**	7	5	**35**	7	10	**70**	150	**5**
Volcanic Eruption	1	2	**2**	1	7	**7**	1	5	**5**	5	10	**50**	64	**6**
Landslide	1	2	**2**	2	7	**14**	1	5	**5**	2	10	**20**	41	**7**

Source: City of Rogue River, Updated May 30, 2012

Figure 1 shows a comparison of the hazard ranks between Rogue River and Jackson County. The information shows that the area of greatest difference was in the flood hazard. Due to heightened local vulnerability concerns this hazard was ranked as the highest for Rogue River.

Figure 1: Hazard Rankings Comparison

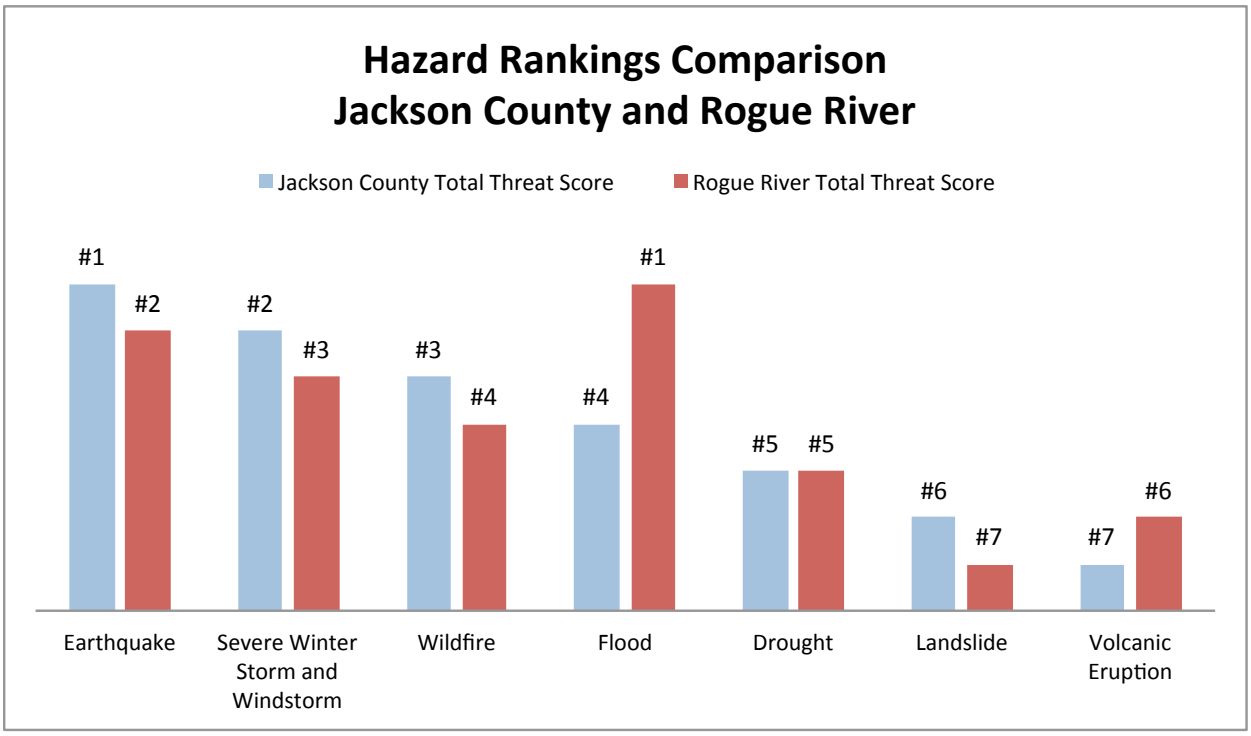


Table 2 provides a comparison between the Probability and Vulnerability rankings between Rogue River and Jackson County. There is a great deal of similarity between the city and county scores with the greatest variability occurring due to perceived decreased vulnerability to the earthquake and severe winter storm and windstorm hazards. Additionally, there is not a history, thus not high probability of landslide in Rogue River. As mentioned above, Flood is considered the #1 hazard (Total Threat Score) for Rogue River.

Table 2: Probability and Vulnerability Comparison

	Rogue River		Jackson County	
Hazard	Probability	Vulnerability	Probability	Vulnerability
Drought	Medium	Medium	Medium	Medium
Earthquake	Medium	**Medium**	Medium	High
Flood	High	Medium	High	Medium
Landslide	**Low**	Low	High	Low
Volcanic Eruption	Low	Low	Low	Low
Wildfire	High	Medium	High	Medium
Severe Winter Storm and Windstorm	High	**Medium**	High	High

*Source: City of Rogue River, May 30, 2012

^Source: Jackson County NHMP Steering Committee, Updated April 25, 2012

2012 NHMP
Public Participation Process

2012 NHMP Update

Jackson County is dedicated to directly involving the public in the review and update of the natural hazard mitigation plan. Although members of the steering committee represent the public to some extent, the residents of Jackson County, Ashland, Eagle Point, Rogue River and Shady Cove are also given the opportunity to provide feedback about the Plan. The Plan will undergo review on an annual basis.

Jackson County made the Plan available at http://www.co.jackson.or.us/Page.asp?NavID=3903 for public comment from October 5th – October 19th, 2012. The cities of Ashland, Eagle Point, Rogue River and Shady Cove also prepared a press release and included a link on their websites. In addition an article was provided in the Medford Mail Tribune on October 22, 2012 (see copy below).

Public Involvement Summary

During the public review period two comments were received as of October 23, 2012. The comments are listed below:

2012 NHMP Draft Comments

- *I just hope whoever writes these keeps writing more!*
- *Please do not omit planning for hardening key public facilities such as city halls, fire and ambulance stations, hospitals, police departments, water and electric and other utility facilities and government vehicle barns/garages to shield/protect transistors and computer chips in electronic devices from EMP (electromagnetic pulse) that can occur from Solar flares or upper atmosphere nuclear detonation.*

  The simplest, cheapest and probably only practical means to guard against this risk is by installing Faraday Cage wiring in or on these buildings so that all electronics inside them would be protected. Most people don't appreciate that all transistors and computer chips can be damaged or destroyed by a sufficiently strong EMP, and transistors and computer chips are in everything -- motor vehicle ignition systems, cell phones, laptops -- the list is nearly endless. At present, a sufficiently strong EMP would render virtually all utilities, communications and transportation useless.

  I will be happy to offer additional information on request.

Steering Committee

Steering committee members possessed familiarity with the Jackson County community and how it's affected by natural hazard events. The steering committee guided the update process through several steps including goal confirmation and prioritization, action item

review and development and information sharing to update the plan and to make the plan as comprehensive as possible. The steering committee met on the following dates:

- December 9, 2011
- April 25, 2012
- May 30, 2012

The steering committee formed under the guidance of Mike Curry, Jackson County Emergency Management Coordinator. The steering committee invested considerable time into the mitigation plan. Members of the steering committee include:

Jackson County

Representatives from the following organizations served as steering committee members for the Jackson County natural hazard mitigation planning process.

Convener, Mike Curry	Jackson County Emergency Manager
Justin Bates	Medford Fire and Rescue
Neil Benson	Jackson County Integrated Fire Plan
Derek Bowker	Phoenix Police
Rod Countryman	Jackson County Sheriff's Office
Devin Hull	Jacksonville Fire Department
John Karns	Ashland Fire and Rescue
Mark Knox	Talent Planning
John Krawczyk	City of Rogue River
Mike Mattson	Jackson County Development Services
Ed Mayer	Shady Cove
Hector Meletich	Ashland Police
Mark Orndoff	Jackson County Health and Human Services
Tanya Phillips	Jackson County Health and Human Services
Mark Reagles	City of Rogue River
Jan Sanderson Taylor	United Way of Jackson County
Vern Thompson	Eagle Point Police Department
David Towe	Jacksonville Police
John Vial	Jackson County Parks
Jim Wolf	Jackson County Integrated Fire Plan
Ted Zuk	Jackson County Code Enforcement

City of Ashland

Convener, John Karns	Ashland Fire and Rescue
Juli DiChiro	Ashland School Superintendant
Terri Eubanks	Ashland CERT Coordinator
Mike Faught	Director Public Works
Dana Fortmiller	Ashland Chamber of Commerce
Michael Grubbs	Building Official
Terry Holderness	Ashland Police Department
Dave Kanner	Ashland City Administrator
Alice Miles	Ashland Community Hospital
Bill Molnar	Ashland Community Development Director

Paul Nichols	Oregon Shakespeare Festival
Scott Resch	Oregon Shakespeare Festival
Stephen Ross	Southern Oregon University
Sandra Slattery	Ashland Chamber of Commerce
Ali True	Ashland Firewise Communities Coordinator

City of Eagle Point

Convener, Vern Thompson	Eagle Point Police Department
Robert Miller	Eagle Point Public Works
Mike Upston	Eagle Point Planning

City of Rogue River

Convener, Mark Reagles	City Administrator
Lois DeBenedetti	Rogue River Planning
Dave Ehrhardt	Rogue River City Council
John Krawczyk	Rogue River Public Works

City of Shady Cove

Convener, Ed Mayer	Shady Cove Emergency Management
Danise Brakeman	Shady Cove City Administrator
Ron Holthusen	Shady Cove Mayor
Bob Miller	Jackson County Fire District #4

Medford Mail Tribune Article

The following is the text from an article printed by the Mail Tribune on October 22, 2012.

Disaster-relief plans portend doom in valley: Because they account for contingencies, expert says

By John Darling for the Mail Tribune
October 22, 2012 2:00 AM

Four area towns — Ashland, Eagle Point, Rogue River and Shady Cove — have written disaster-relief plans, identifying their biggest hazards and what to do about lessening dangers before they happen.

The Natural Hazard Mitigation Plans make the cities eligible for grants from the Federal Emergency Management Agency, or FEMA, to lessen impacts of disasters — floods, landslides, wildfires, drought, windstorms, severe winter storms.

Most of the towns were placed at medium to high risk for fires, floods and storms, and have been shaping response plans for decades, with the caveat that volcanoes and earthquakes also can happen, said Ashland Fire Chief John Karns.

The study shows Ashland with a 90 percent risk of wildfire and landslides and 82 percent on drought, compared with much lower scores on these for the county as a whole. "Ashland has a greater exposure to wildfire and flood because it's next door to forest," said Karns. "And drought is a problem because we get all our water from Reeder Reservoir. An earthquake could also affect the dam and water supply.

"Earthquakes are equal opportunity offenders," said Karns. "They had one in Klamath Falls. The Cascadia Subduction Zone runs border-to-border and has a big fault slip every 341 years, on average. We haven't experienced one since the European influence here, and we're due for it. It could happen tomorrow. We don't know. It would be up to 9.0 on the Richter scale, and it would be 6.5 to 7 here. It absolutely will cause structural damage."

Protecting against quakes with seismic retrofitting is staggeringly expensive, but Karns said that as Ashland prioritizes its most vulnerable buildings, FEMA mitigation grants could help get the process rolling with affordable prices.

Whether human-caused or sparked by lightning, wildfires pose a big threat to Ashland because it has lots of new homes on steep, forested slopes. The watershed hasn't had a big fire since 1959, leading to growth of underbrush, which the town battles with its $4 million Ashland Forest Resiliency Project.

Jackson County adopted the NHMP in 2006 and requires member cities to file an addendum every five years, said Michael Howard, the grant liaison director with University of Oregon. Medford and Central Point have their own plans, not under the county.

Ashland's report, put together by the city and many community organizations, is primarily for outreach and community education and preparation, said Howard.

"It helps the community identify projects to work on to make it safer and more resilient," he said, "and gives the community a rationale about why to apply for FEMA grants, which they can apply for now, before the disaster."

In Rogue River, Public Works Director John Krawczyk wrote the response plan. "We identified flood and fire as the obvious hazards," he said. "I don't see very much we need to get grants for up front Most of our efforts are educational, like raising awareness about the floodplain."

John Darling is a freelance writer living in Ashland. Email him at jdarling@jeffnet.org.

2006 NHMP
Public Participation Process

2006 NHMP Update

This plan was developed through two distinct phases of public participation and involvement, the first from 2001 – 2003 and the second from 2004 – 2005. The first phase was dedicated to gathering input and ideas from various members of the public. This input was incorporated into the plan in a variety of ways, as described below. The second phase of public involvement was characterized by the refinement and elaboration of the plan and efforts to bring the final draft to the public for their review and additional input.

The first phase of public involvement was distinguished by the work of the Community Planning Workshop. To produce a plan that fit the needs of Jackson County agencies, businesses, and residents, Community Planning Workshop (CPW) engaged the public in three primary ways. A steering committee comprised of individuals representing different parts of the community guided the CPW team through the steps involved in producing the plan. CPW conducted stakeholder interviews to target the specialized knowledge of individuals working in the natural hazard field. Finally, CPW held two public workshops to inform the public about natural hazards that occur in Jackson County and to identify potential hazard mitigation strategies.

Steering Committee

Steering committee members possessed familiarity with the Jackson County community and how it's affected by natural hazard events. The steering committee guided the plan through several steps including goal formation, action item development, stakeholder identification, and information sharing to make the plan as comprehensive as possible. CPW met with the steering committee on the following dates:

- February 8, 2001
- April 4, 2001
- April 26, 2001
- May 30, 2001
- June 12, 2001

The steering committee formed under the guidance of Sandy Eccker, Jackson County Emergency Management Coordinator, in conjunction with inputs from CPW team manager, Dara Decker and Oregon Natural Hazards Workshop Director, Andre LeDuc. The steering committee invested considerable time into the mitigation plan. Members of the steering committee include:

- Erick Dittmer, Southern Oregon University
- Sandy Eccker, Jackson County Emergency Management
- Terry Haines, American Red Cross
- Mike Mathews, Applegate River Watershed Council
- Dale Petrasek, Jackson County Engineering
- Gordon Safely, Southern Oregon Regional Economic Development, Inc.
- Margaret Wilson, Jackson County Planning

Phase One: Stakeholder Interviews

The second avenue of public participation was a series of stakeholder interviews. The interviews offered alternative ways for Jackson County citizens to participate in the plan's development. Individuals who have a specialized knowledge of particular natural hazard issues in Jackson County were telephoned and interviewed by CPW. These individuals provided insight into the kinds of natural hazard events that occur in Jackson County, what factors make a given hazard particularly damaging, which mitigation activities are in place, which ones have worked in the past, and what future actions might work well to diminish the impacts of natural hazards.

Methodology

The stakeholder interviews were conducted from February through May 2001. CPW telephoned the stakeholders individually and asked a series of standard questions. The questions are as follows:

1. What is the history of natural hazard events in Jackson County (or in your community)?

2. What types of natural hazards currently affect Jackson County (or your community)?

3. How is growth and development in Jackson County (or in your community) attributing to natural hazard events?

4. Does your organization currently work in natural hazard mitigation?

5. If yes, how?

6. How can your organization contribute to regional coordination to reduce risk from natural hazards?

7. What activities will assist Jackson County in reducing risk and preventing loss from future natural hazard events? (If you had the money, how would you spend it?)

8. What are the ways you would like to see agencies, organizations or individuals in Jackson County participating and coordinating to reduce risk from natural hazards?

9. Can you think of other people or organizations we should contact? The information yielded from these interviews was compiled into various sections of the plan, particularly each of the hazard specific sections. Paper copies of the interview outcomes were compiled into a standard form and are available by contacting:

Jackson County Emergency Management Coordinator
10 South Oakdale, Room 214
Medford, OR 97501
PHONE: (541) 774-6821
FAX: (541) 774-6455

Note: The information recorded in the stakeholder interviews has been recorded and transcribed by Community Planning Workshop as accurately as possible. Community Planning Workshop makes no representations, express or implied, as to the accuracy of the information. This information is provided with the understanding that it is not guaranteed to be correct or complete and conclusions drawn from such information are the responsibility of the reader.

- Lu Anthony, Little Butte Watershed Council
- Paula Brown, Ashland Public Works
- Dick Converse, Rogue Valley Council of Governments
- Sandy Eccker, Jackson Co. Emergency Management Coordinator
- Tom Ferraro, Ferraro Geologic (consulting)
- Bill Harrington, Chief Forester, Pacific Power and Light
- MJ Harvie, United States Forest Service
- David Hussell, Eagle Point City Administrator
- Randy Iverson, Fire District #3
- Phil Kessler, Chief Administrator, Medford Fire Department
- Bill Ludwig, National Weather Service
- Betty McRoberts, Jackson County Housing Authority
- Ralph Nelson, Law Enforcement, Ret.
- Dale Petrasek, Jackson County Engineer
- Chris Reising, Medford Building Official
- Nancy Rose, USFS
- Gordon Safley, Southern Oregon Regional Economic Development Inc.
- Claudia Steinbroner, Pacific Power and Light
- John Viles, ODOT Region Manager
- Ron Wilson, White City Community Improvement Association
- Jim Wolfe, ODF District Office, Jackson County
- Keith Woodley, Chief, Ashland Fire and Rescue

Phase One: Public Workshops

The third method of public participation was a series of public workshops. The general public was invited to participate by addressing concerns relating to natural hazards, discussing ideas for mitigation strategies and establishing community priorities for plan goals. With involvement from the general public, the plan has greater community support and is best tailored to fit the needs of Jackson County residents.

Methodology

Two public workshops were held on the following dates:

- April 26, 2001
- June 12, 2001

The workshops were advertised through several means. Print ads were sent to local newspapers. Two local radio spots were aired on local stations. Flyers were posted in areas of town with heavy pedestrian traffic. Flyers were also sent to civic organizations, government agencies and other interested groups. Personal invitations were sent to stakeholders.

Workshop #1

The first workshop focused on common concerns relating to natural hazards, and on mitigation ideas and possible action items. Twelve participants attended. CPW facilitated a small group process during which the group voiced common mitigation concerns. Workshop outcomes are as follows:

Summary of Public Workshop Outcomes – April 26, 2001

Property Protection

1. Identify a method of disposal or utilization of fire fuels removed from individual properties.

Partnership and Coordination

1. Work proactively with county development services to make land use regulations stronger.
2. Work with the volunteer community to increase the volunteer pool and identify which volunteer groups will respond to certain hazard events:
    a. Identify scenarios of need so that volunteer groups can target their efforts (i.e. food storage/distribution, removing seniors from hazardous locations, immediate response)
    b. Identify different thresholds of activation so that volunteer efforts aren't duplicated
    c. Identify ways to utilize brand new volunteers during a hazard event
    d. Institutionalize volunteer coordination (i.e. a professional coordinator for volunteer programs, activities, grant opportunities, etc.)

Education and Outreach

1. Mandatory regulations aren't working. Increase education and focus volunteer efforts toward particular mitigation activities – Keep the message positive (i.e. You're the best organization for this job because…).
2. Make known countywide the grant opportunities available to non-profits, like watershed councils for instance.
3. Promote local community plans that balance ecological and human needs.
4. Promote public education about the financial aspects of building (and rebuilding) in floodplains, and present information on how other communities have addressed building in the floodplains.

5. Work with the Fire Districts to flag properties that could not be saved if a wildfire event occurred.
6. Promote the pathways of communication before, during and after a natural hazard event.
7. Promote the CERT program to the business community.
8. Gather information about lessons learned from other cities, counties and regions affected by natural hazard events.
9. Promote education programs in schools that focus on first aid and individual preparedness (partner with SOLV).
10. Promote the importance of being prepared for at least 72 hours on an individual level.
11. Develop a curriculum for elementary aged students (perhaps based off CIM/CAM) about natural hazards and mitigation planning (partner with SOU).

Preventative

1. Need for immediate mitigation remedies following an event, like planting vegetation right after a landslide.
2. Do the things we know we should do:
    a. Review building activity in flood-prone areas
    b. Review regulations and codes for effectiveness
    c. Provide economic incentives to engage individual property owners in mitigation activities
3. Work with the fire districts to strengthen regulations regarding fuel reduction around individual properties.

Natural Resource Protection

1. Coordinate with landowners on a watershed basis to assist with grant writing opportunities.
2. Invest in watershed councils.

Emergency Services

1. Develop a plan for large-scale power failure including response procedures and a communication plan.
2. Develop a plan for the phone system.
3. Identify alternative communication modes during natural hazard events (i.e. amateur radio).
4. Inventory emergency systems to determine how long they will last.
5. Critical medical facilities are on one side of the Rogue River while Medford lies on both sides. Concern is that the population could become cut off of medical services if a severe natural hazard event (like a flood or earthquake) struck.
6. Promote a clearinghouse of information for families after a natural disaster strikes.
7. Promote first aid training for businesses and other organizations.

Workshop #2

The second workshop focused on plan goals. Participants in the workshop went through a goal selection process to “prioritize” the goals, as recommended by FEMA. Three “dots”, sticky colored labels, were passed out to the participants. Each dot had a value, blue ones with a value of three, red ones with a value of two, and yellow ones with a value of one. The

dots were placed on a board with a list of the goals, organized under goal areas, to determine the public priorities. A discussion of the choices was held afterward. A summary of workshop outcomes follows:

Summary of Public Workshop Outcomes – June 12, 2001

What influenced your goal choices?

Property Protection

1. Spread property protection information via the neighborhood watch.

Education and Outreach

1. It is good to get information into the hands of the people.
2. Public education is important because government/volunteer organizations cannot protect the public as well as they can protect themselves.
3. It is important to provide public information about current mitigation efforts.
4. Looking for things that require ongoing maintenance provides the opportunity for the public to become knowledgeable about how hazards affect them.

Prevention

1. County and City planning departments have resources to apply to prevention activities.

Partnership and Coordination

1. From the planning perspective, only through partnership and coordination of public and private sector participation in mitigation activities will something workable result.
2. The more public and private coordination and partnership, the better off Jackson County will be.
3. Mitigation through the government has a hard time succeeding without partnerships.
4. Evaluate the coordination of paid and volunteer duties related to hazard events; coordination of volunteers is key.

Natural Resource Protection

1. Preserving and rehabilitating natural systems is undervalued in Jackson County and often neglected, but in the long term it helps mitigate hazard events the most.

Emergency Services

1. There MUST be emergency response plans.
2. Evaluating the performance of critical facilities during a natural hazard event should actually occur before or after natural hazard events.
3. The public often turns to volunteers during a hazard event for communications back- up and information transfer, which support the police and emergency services.
4. It is important to have “back-up” when communications/utilities go down.
5. Streamline communication given at critical facilities during emergency events.
6. Volunteer service is key during natural hazard events and more volunteers are needed. Professionals are most capable to handle intense/large-scale emergencies and volunteers can really support them.

7. The coordination of emergency volunteers and emergency response plans would be very helpful.

What are your ideas for outreach?

1. Provide information about flood hazards and mitigation opportunities to residents in the floodplain.
2. Have earthquake retrofit information, flood information, and information about communication breakdowns available at the planning office.
3. Create "how to" guides for people; send with other annual/semi-annual mailings (such as taxes or other regular mailings from the private sector) to save on costs.
4. Pool resources and coordinate efforts to send out more glossy publications like the Jackson County Preparedness Plan for Families.
5. Use emergency management/response groups to speak to other existing groups about natural hazard events.
6. Keep volunteer response teams "active" by conducting/ including them in drills.
7. In the coordination of volunteers, have them help get mitigation messages out.
8. Try to find what motivates people and use those motivations as a vehicle for outreach messages.
9. Use "personal" recommendations/messages – not only the government (neighbor to neighbor, which allows questions to be more freely asked).
10. Use existing networks, such as Boy/Girl Scouts, Neighborhood Watch, Rotary, etc.
11. Amateur Radio Field Day is a chance for the public to witness emergency communications. It is also an opportunity to hand out emergency preparedness/mitigation information and receives media coverage.
12. Promote "72-hour kits" during the holiday season.

Phase Two of the Public Involvement Process

Given the length of time which elapsed from the start of plan development in 2001 to the development of a final draft in 2005, it was necessary to undertake a second phase of public involvement. The purpose was to share the revised and refined draft and to ensure that the plan continued to meet local government expectations and needs, as well as those of local citizens.

Getting the final draft out to the general public was of prime importance. This goal was achieved by putting the plan on Jackson County's website and achieving immediate availability for thousands of people.

With the plan on the website, the Emergency Program Coordinator was able to attend a variety of regional community meetings, make a presentation on the plan and refer participants to the website. He did so, as detailed in Plan Section

1: Mitigation Plan Introduction. The Coordinator spoke about the plan at every significant regional professional meeting of emergency responders, including fire, police, medical and coordinating county departments.

While interest in and appreciation for the plan was often expressed and questions posed, the Emergency Program Coordinator did not receive input leading to any specific changes in

the document. In general, people were pleased that the plan had been developed and curious about the mitigation activities to be undertaken.

The discussion with the newly forming Community Organizations Active in a Disaster (COAD) was particularly useful for disseminating information to interested members of the public. Participants in this group have responded to disasters in the region and are working to develop a strong community response to disaster that complements government's response.

In October 2005, two Jackson County Commissioners and the Emergency Program Manager were guests on the local government television program "Jackson County Live". They spoke about disaster preparedness and the NHMP during the show, which had a live call-in feature. This particular program was rebroadcast more than 20 times on two local stations, providing broad public exposure to the plan.

In November 2005, the Emergency Program Manager was the featured speaker at a luncheon meeting of the League of Women Voters, where he discussed the NHMP.

Plan Implementation

The Jackson County Board of Commissioners adopted the 2006 plan on January 31, 2006. Following local adoption, FEMA Region Ten approved the plan on February 7, 2006. The 2006 plan expired on February 7, 2011.

Appendix C: Economic Analysis of Natural Hazard Mitigation Projects

This appendix was developed by the Oregon Partnership for Disaster Resilience at the University of Oregon's Community Service Center. 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 Military Department – Office of Emergency Management, 2000), and Federal Emergency Management Agency Publication 331, *Report on Costs and Benefits of Natural Hazard Mitigation*. This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

Why Evaluate Mitigation Strategies?

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred. Evaluating possible natural hazard mitigation activities provides decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, police, utilities, and schools. Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce "ripple-effects" throughout the community, greatly increasing the disaster's social and economic consequences.

While not easily accomplished, there is value, from a public policy perspective, in assessing the positive and negative impacts from mitigation activities, and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

What are some Economic Analysis Approaches for Evaluating Mitigation Strategies?

The approaches used to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into three general categories: benefit/cost analysis, cost-effectiveness analysis and the STAPLE/E approach. The distinction between the three methods is outlined below:

Benefit/Cost Analysis

Benefit/cost analysis is a key mechanism used by the state Oregon Military Department – Office of Emergency Management (OEM), the Federal Emergency Management Agency, and other state and federal agencies in evaluating hazard mitigation projects, and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

Benefit/cost analysis is used in natural hazards mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoiding future damages, and risk. In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented. A project must have a benefit/cost ratio greater than 1 (i.e., the net benefits will exceed the net costs) to be eligible for FEMA funding.

Cost-Effectiveness Analysis

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

Investing in Public Sector Mitigation Activities

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods to evaluate the economic feasibility of public decisions which involve a diverse set of beneficiaries and non-market benefits.

Investing in Private Sector Mitigation Activities

Private sector mitigation projects may occur on the basis of one or two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

1. Request cost sharing from public agencies;
2. Dispose of the building or land either by sale or demolition;

3. Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
4. Evaluate the most feasible alternatives and initiate the most cost effective hazard mitigation alternative.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchases. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

STAPLE/E Approach

Considering detailed benefit/cost or cost-effectiveness analysis for every possible mitigation activity could be very time consuming and may not be practical. There are some alternate approaches for conducting a quick evaluation of the proposed mitigation activities which could be used to identify those mitigation activities that merit more detailed assessment. One of those methods is the STAPLE/E approach.

Using STAPLE/E criteria, mitigation activities can be evaluated quickly by steering committees in a synthetic fashion. This set of criteria requires the committee to assess the mitigation activities based on the Social, Technical, Administrative, Political, Legal, Economic and Environmental (STAPLE/E) constraints and opportunities of implementing the particular mitigation item in your community. The second chapter in FEMA's How-To Guide "Developing the Mitigation Plan – Identifying Mitigation Actions and Implementation Strategies" as well as the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process" outline some specific considerations in analyzing each aspect. The following are suggestions for how to examine each aspect of the STAPLE/E approach from the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process."

Social: Community development staff, local non-profit organizations, or a local planning board can help answer these questions.

- Is the proposed action socially acceptable to the community?
- Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Will the action cause social disruption?

Technical: The city or county public works staff, and building department staff can help answer these questions.

- Will the proposed action work?
- Will it create more problems than it solves?
- Does it solve a problem or only a symptom?
- Is it the most useful action in light of other community goals?

Administrative: Elected officials or the city or county administrator, can help answer these questions.

- Can the community implement the action?
- Is there someone to coordinate and lead the effort?
- Is there sufficient funding, staff, and technical support available?
- Are there ongoing administrative requirements that need to be met?

Political: Consult the mayor, city council or city board of commissioners, 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?

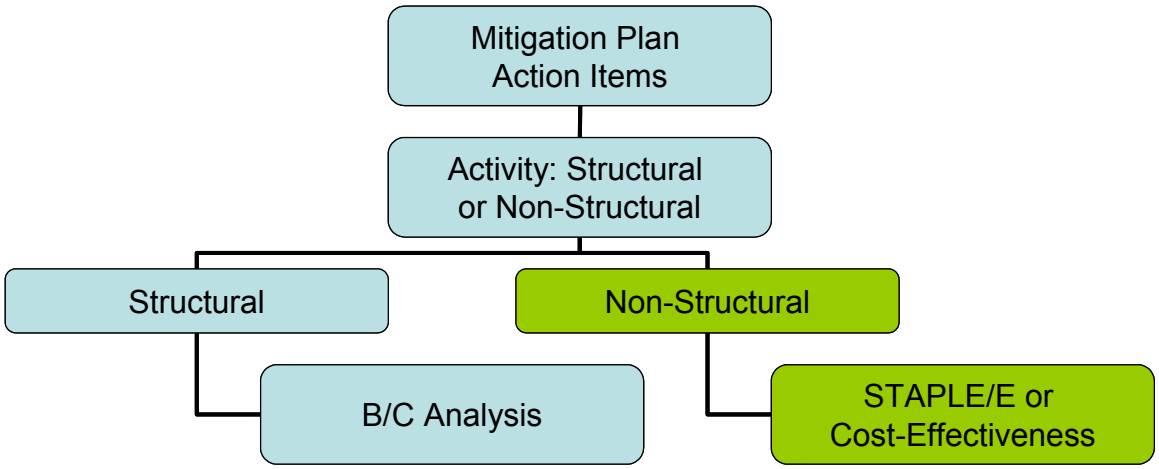
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

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 C.1: Economic Analysis Flowchart



Source: Oregon Partnership for Disaster Resilience. 2005.

Implementing the Approaches

Benefit/cost analysis, cost-effectiveness analysis, and the STAPLE/E are important tools in evaluating whether or not to implement a mitigation activity. A framework for evaluating mitigation activities is outlined below. This framework should be used in further analyzing the feasibility of prioritized mitigation activities.

1. Identify the Activities

Activities for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation projects can assist in minimizing risk to natural hazards, but do so at varying economic costs.

2. Calculate the Costs and Benefits

Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate activities. Potential economic criteria to evaluate alternatives include:

- ***Determine the project cost***. This may include initial project development costs, and repair and operating costs of maintaining projects over time.
- ***Estimate the benefits***. Projecting the benefits, or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings, bond and stock issues, and commercial loans.
- ***Consider costs and benefits to society and the environment***. These are not easily measured, but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.
- ***Determine the correct discount rate***. Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Including inflation should also be considered.

3. Analyze and Rank the Activities

Once costs and benefits have been quantified, economic analysis tools can rank the possible mitigation activities. Two methods for determining the best activities given varying costs and benefits include net present value and internal rate of return.

- ***Net present value***. Net present value is the value of the expected future returns of an investment minus the value of the expected future cost expressed in today's dollars. If the net present value is greater than the projected costs, the project may be determined feasible for implementation. Selecting the discount rate, and identifying the present and future costs and benefits of the project calculates the net present value of projects.
- ***Internal rate of return***. Using the internal rate of return method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project. Once the mitigation projects are ranked on the basis of economic criteria, decision-makers can consider other factors, such as risk, project effectiveness, and economic, environmental, and social returns in choosing the appropriate project for implementation.

Economic Returns of Natural Hazard Mitigation

The estimation of economic returns, which accrue to building or land owners as a result of natural hazard mitigation, is difficult. Owners evaluating the economic feasibility of

mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided
- Relocation and disruption expenses avoided
- Proprietor's income losses avoided

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period of time.

Additional Costs from Natural Hazards

Property owners should also assess changes in a broader set of factors that can change as a result of a large natural disaster. These are usually termed "indirect" effects, but they can have a very direct effect on the economic value of the owner's building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices
- Availability of resource supplies
- Commodity and resource demand changes
- Building and land values
- Capital availability and interest rates
- Availability of labor
- Economic structure
- Infrastructure
- Regional exports and imports
- Local, state, and national regulations and policies
- Insurance availability and rates

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision makers should understand the total economic impacts of natural disasters in order to calculate the benefits

of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

Additional Considerations

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from natural hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects. Several resources and models are listed on the following page that can assist in conducting an economic analysis for natural hazard mitigation activities.

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. With this in mind, opportunity rises to develop strategies that integrate natural hazard mitigation with projects related to watersheds, environmental planning, community economic development, and small business development, among others. Incorporating natural hazard mitigation with other community projects can increase the viability of project implementation.

Resources

CUREe Kajima Project, *Methodologies for Evaluating the Socio-Economic Consequences of Large Earthquakes*, Task 7.2 Economic Impact Analysis, Prepared by University of California, Berkeley Team, Robert A. Olson, VSP Associates, Team Leader; John M. Eidinger, G&E Engineering Systems; Kenneth A. Goettel, Goettel and Associates, Inc.; and Gerald L. Horner, Hazard Mitigation Economics Inc., 1997

Federal Emergency Management Agency, *Benefit/Cost Analysis of Hazard Mitigation* Projects, Riverine Flood, Version 1.05, Hazard Mitigation Economics, Inc., 1996

Federal Emergency Management Agency, *Report on the 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, Ocbober 25, 1995.

Horner, Gerald, *Benefit/Cost Methodologies for Use in Evaluating the Cost Effectiveness of Proposed Hazard Mitigation Measures*, Robert Olsen Associates, Prepared for Oregon Military Department – 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.

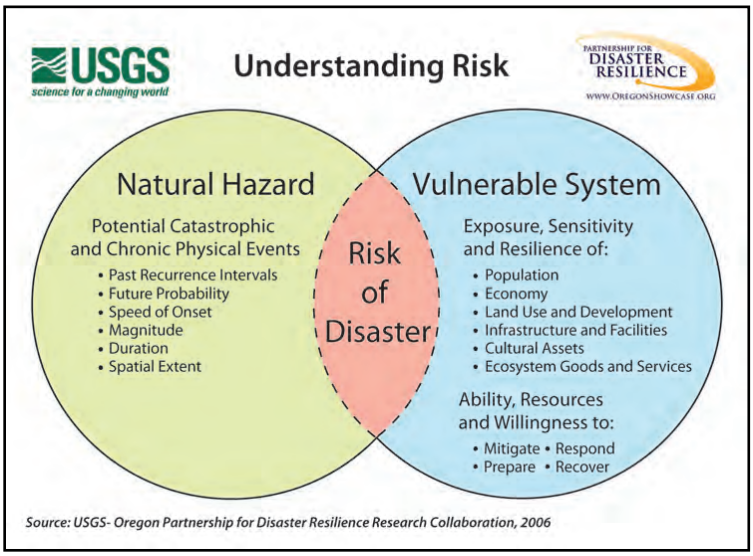
Appendix D:
Community Profile

The following section describes the County, and participating cities, from a number of perspectives in order to help define and understand the County's sensitivity and resilience to natural hazards. Sensitivity and resilience indicators are identified through the examination of community capitals (e.g., natural environment, socio-demographic capacity, regional economy, built infrastructure, community connectivity and political capital). These capitals organize a framework for which to understand the underpinnings of sensitivity and resilience.

Sensitivity factors can be defined as those community assets and characteristics that may be impacted by natural hazards, (e.g., special populations, economic factors, and historic and cultural resources). Community resilience factors can be defined as the community's ability to manage risk and adapt to hazard event impacts (e.g., governmental structure, agency missions and directives, and plans, policies, and programs).

The information in this section represents a snapshot in time of the current sensitivity and resilience factors in the county when the plan was developed. The information documented below, along with the hazard assessments located in the Hazard Annex, should be used as the local level rationale for the risk reduction actions identified in Section 3 – Mission, Goals, and Action Items. The identification of actions that reduce the county's sensitivity and increase its resiliency assist in reducing overall risk of disaster, the area of overlap in Figure 2.1 below.

Figure D-1 Understanding Risk



Source: Oregon Partnership for Disaster Resilience

Community Overview Summary

Jackson County and its residents have been subject to financial loss and property damage from flooding, landslides, wildfires, windstorms, and severe winter storms. Natural hazards will inevitably impact Jackson County in the future. These hazards can affect a wide geographic area and can severely impact the entire Southern Oregon region. Jackson County's growing population places increased demands on the county's infrastructure and undeveloped areas. The amount of rural residents in Jackson County highlights this interface between people, property, and the natural environment, and can ultimately place them at increased risk from natural hazards.[1]

This community overview summarizes high-level findings about the existing characteristics of community capitals present throughout the community. Attempts are made to relate these individual characteristics with a larger context of hazard resilience, as resilience recognizes the interconnectedness of the various natural, social and physical systems throughout a community. Specifically the community overview analyzes: Natural Environment Capacity, Socio Demographic Capacity, Regional Economic Capacity, Built Capacity, Community Connectivity Capacity, and Political Capacity.

Natural Environment Capacity

Natural environment capacity is recognized as the geography, climate and land cover of the area such as, urban, water and forested lands that maintain clean water, air and a stable climate.[2] Natural resources such as wetlands and forested hill slopes play significant roles in protecting communities and the environment from weather-related hazards, such as flooding and landslides. However, natural systems are often impacted or depleted by human activities adversely affecting community resilience.

The physical geography, weather, climate and land cover of an area represent various interrelated systems that affect overall risk and exposure to natural hazards. The projected climate change models representing Southern Oregon indicate the potential for increased effects of hazards due to the unique terrain and climate of the region. These factors combined with a growing population and development intensification can lead to increasing risk of hazards, threatening loss of life, property and long-term economic disruption if land management is inadequate.

Socio Demographic Capacity

Socio demographic capacity characterizes the community population in terms of language, race and ethnicity, age, income, educational attainment, and health. These attributes can significantly influence the community's ability to cope, adapt to and recover from natural disasters. Population vulnerabilities can be reduced or eliminated with proper outreach and community mitigation planning.

As of 2010, 17.6% of the county population is over the age of 64, a number that is projected to rise to 23.5% by 2040. The county has a higher percent of its population over the age of 64 compared to Oregon as a whole which has currently 13.9% of it's population over the age

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[1] Ibid.

[2] Mayunga, J. 2007. Understanding and Applying the Concept of Community Disaster Resilience: A capital-based approach. Summer Academy for Social Vulnerability and Resilience Building.

of 64, with a projection of 20.2% by 2040. The Jackson County age dependency ratio[3] is 55.1%, which is significantly higher than that of the State of Oregon (48.5%); the age dependency figures are expected to increase to 65.6% and 61.0% respectively by the year 2040.[4]

Even though 97% of the entire county population is reported as proficient in English, almost half of the native Spanish speakers are not proficient in English.[5] These populations would stand to benefit from mitigation outreach, with special attention to cultural, visual and technology sensitive materials.

The current status of other socio-demographic capacity indicators in Jackson County such as low graduation rate, quality of schools, median household income can have long term impacts on the economy and stability of the community ultimately affecting future resilience.

Regional Economic Capacity

Regional economic capacity refers to the financial resources present in the community. Income equality, housing affordability, economic diversification, employment and industry are measures of economic capacity. However, economic resilience to natural disasters is far more complex than merely restoring employment or income in the local community. Building a resilient economy requires an understanding of how the component parts of employment sectors, workforce, resources and infrastructure are interconnected in the existing economic picture.

Considering the high regional unemployment, high housing cost burden, and an economy heavily dependent on a single or few key industries, Jackson County may experience a more difficult time in recovering after a disaster than one with a more diverse economic base.[6] To the benefit of Jackson County, The Health Care and Social Assistance sector is heavily dependent on local residents and not external markets. It is imperative that Jackson County recognizes that economic diversification is a long-term issue; more immediate strategies to reduce vulnerability should focus on risk management for the dominant industries.[7]

Built Capacity

Built capacity refers to the built environment and infrastructure that supports the community. The various forms, quantity, and quality of built capital contribute significantly to community resilience. Physical infrastructures, including utility and transportation lifelines, are critical during a disaster and are essential for proper functioning and response. The lack or poor condition of infrastructure can negatively affect a community's ability to cope, respond and recover from a natural disaster.

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[3] Dividing the combined "under 15" and "65-and-over" populations by the "15-to-64" population and multiplying by 100 derive the dependency ratio.

[4] Source: U.S. Census Bureau, Table QT-P1 "Age Groups and Sex: 2010", http://factfinder2.census.gov, accessed April 2012; Office of Economic Analysis, Department of Administrative Services. Long Term County Forecast. State and County Population Forecasts by Age and Sex, 2000-2040, accessed April 2012.

[5] U.S. Bureau, 2005-2009 American Community Survey. B16001 Languages Spoken at Home.

[6] State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.

[7] Ibid.

Given the unique dependent nature of Jackson County it is that much more critical to maintain the quality of built capacity throughout the area. The planning considerations seemingly most significant for the county are contingency planning for medical resources and lifeline systems due to the imminent need for these resources. Hospitals should consider medical surge planning and develop memorandums with surrounding counties for medical transport and treatment. Additional memorandums to consider pertain to utility and transportation lifelines such as, airports, railways, roads and bridges with surrounding counties to acquire utility service and infrastructure repair.

Community Connectivity Capacity

Community connectivity capacity places strong emphasis on social structure, trust, norms, and cultural resources within a community. In terms of community resilience, these emerging elements of social and cultural capital will be drawn upon to stabilize the recovery of the community. Social and cultural capital is present in all communities; however, it may be dramatically different from one town to the next as these capitals reflect the specific needs and composition of the community residents.

Sustaining social and cultural resources such as, social services and cultural events, may be essential to preserving community cohesion and a sense of place. The presence of larger communities including Medford and Ashland makes available many resources and services for the public. However, it is important to consider that these amenities may not be equally distributed to the rural portions of the county and may produce implications for recovery in the event of a disaster.

In the long-term, it may of specific interest to the county to evaluate community stability. A community experiencing instability and low homeownership may hinder the effectiveness of social and cultural resources, distressing community coping and response mechanisms.

Political Capacity

Political capacity is recognized as the government and planning structures established within the community. In terms of hazard resilience, it is essential for political capital to encompass diverse government and non-government entities in collaboration; as disaster losses stem from a predictable result of interactions between the physical environment, social and demographic characteristics and the built environment.[8] Resilient political capital seeks to involve various stakeholders in hazard planning and works towards integrating the Natural Hazard Mitigation Plan with other community plans, so that all planning approaches are consistent.

Many governmental entities in Jackson County are responsible for work relevant to hazards planning; however, from an external perspective it is challenging to decipher whether these structures work collaboratively in practice towards improving hazard mitigation. On a similar note, in short of reviewing all relevant policy documents in the county, it is questionable whether existing plans effectively integrate hazard initiatives into implementation policy.

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[8] Mileti, D. 1999. Disaster by Design: a Reassessment of Natural Hazards in the United States. Washington D.C.: Joseph Henry Press.

Natural Environment Capacity

The capacity of the natural environment is composed of elements known as natural capital. Natural capital is essential in sustaining all forms of life including human life, yet it often plays an underrepresented role in community resiliency to natural hazards. Natural capital is the geography, climate and land cover of the area such as, urban, water and forested lands that provide space to live, work and recreate; and ecosystems that maintain clean water, air and a stable climate.[9] Natural capitals such as wetlands and forested hill slopes play significant roles in protecting communities and the environment from weather-related hazards, such as flooding and landslides. However, natural systems are often impacted or depleted by human activities adversely affecting community resilience.

Geography

Jackson County occupies the upper Rogue River Valley in southwestern Oregon, covering 2,182 square miles. The area is rich in natural resources: forests, mountains, rivers and lakes dominate the landscape. Three major mountain ranges characterize Jackson County boundaries: the Klamath Mountains to the west and south, Western Cascades in the north and the High Cascades to the east with the Bear Creek Valley within the central lowlands. The Rogue River and its tributaries cut through each of these regions on its journey towards the Pacific Ocean. This river corridor through the mountains provides an avenue for westerly winds and Pacific Storms to travel into Jackson County with relative ease.

Slopes are generally steep and topsoil, unique to the Northwest in structure and chemistry, is susceptible to landslides, torrential flooding, and sheet erosion. Those mountains subjected to extensive weathering, large-scale faulting, or consisting of softer parent rock have gentler slopes, in which earthflow (debris flow) and slump (creep) are common natural hazards.[10]

Klamath Mountains

The Klamath Mountains encompass approximately 12,000 square miles, and consist of several north-south-trending belts of rock that formed in an ocean setting (terrain) and subsequently collided with the North American crustal plate about 150 million years ago. The area is rugged with narrow canyons. Mt. Ashland, at 7,530 feet, is the highest peak in the Oregon Klamaths.

[9] Mayunga, J. 2007. Understanding and Applying the Concept of Community Disaster Resilience: A capital-based approach. Summer Academy for Social Vulnerability and Resilience Building.

[10] Beaulieu, John D. and Paul W. Hughes, Land Use Geology of Central Jackson County, Department of Geology and Mineral Industries, Oregon, (1977).

Cascade Mountains

The geologic story of the Cascades begins around 40 million years ago when the Pacific [Juan de Fuca] plate began moving beneath the North American crustal plate. Convergence of these crustal plates has slowed considerably, from an estimated 3 inches per year 35 million years ago to only ½ inch at present; less subduction means less volcanic activity.

The tallest point in Jackson County, Mt. McLoughlin, a young and dormant volcano, rises to 9,760 feet. It lies just within the county's eastern boundary in the High Cascades and although it is the tallest volcanic peak between Crater Lake and Mt. Shasta, it is dwarfed by their bulk. The entire northwest slope of the mountain is the catchment area for Big Butte Springs. These large-volume springs gush from the end of the lava flows and are the domestic water source for Medford and other towns in the Bear Creek Valley.[11]

Nearby volcanic neighbors include Mt. Bailey, Mt. Thielsen, and the remnants of Mt. Mazama (Crater Lake) to the north. While dramatic eruptions have been absent during the last century, continued subduction and presence of numerous faults indicate that a significant seismic or volcanic event could occur at any time. Seismic activity can also trigger landslides and cause flashflood events due to breached dams, jeopardizing the safety of downstream communities.

Bear Creek Valley

This broad valley separates the older Klamath Mountains from the Cascade Range. Bear Creek, along with the Rogue River and other river valleys in the county, contain soft sediments over bedrock. Hazards include ponding, high ground water, flooding, and stream bank erosion.[12] Much of the development in Jackson County has occurred in the Bear Creek Valley and the I-5 corridor, which includes the cities of Ashland, Central Point, Medford, Phoenix and Talent.

Current and Projected Climate

Late October marks the beginning of the rainy season in Jackson County. Surrounding mountain ranges help moderate the area's annual rainfall, which averages 18 inches in the Medford area.[13] This is in sharp contrast to the 37 to 50 inches normally seen in other parts of the Pacific Northwest. In most winters, there are one or two severe windstorms and in some years, accompanying heavy rains cause serious flooding. Summer precipitation is very low, increasing the risk of wildfire and requiring irrigation for crops.

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[11] United States Geological Survey, Cascades Volcano Observatory, http://vulcan.wr.usgs.gov/home.html.
[12] Ibid.
[13] The Oregon Climate Service, George Taylor, State Climatologist "1971-2000 Climate of Jackson County." http://www.ocs.orst.edu/county_climate/Jackson_files/Jackson.html#table1

Table D-1: Average Precipitation (inches)

Month	Ashland	Howard Prairie Dam	Medford WSO AP	Prospect SW	Ruch
January	2.49	4.85	2.47	6.08	3.79
February	1.92	3.86	2.10	5.03	3.10
March	2.09	3.72	1.85	4.71	3.05
April	1.68	2.39	2.31	3.19	1.80
May	1.55	2.06	1.21	2.61	1.27
June	0.92	1.28	0.68	1.15	0.76
July	0.51	0.58	0.31	0.64	0.49
August	0.61	0.72	0.52	0.87	0.53
September	0.88	1.07	0.78	1.43	0.97
October	1.46	2.04	1.31	3.02	1.70
November	2.85	4.79	2.93	6.70	3.98
December	2.80	5.21	2.90	6.80	4.30
Annual	19.76	32.57	18.37	42.23	25.74

Source: The Oregon Climate Service, NOAA Climate Stations. "1971-2000 Climate of Jackson County". http://www.ocs.orst.edu/county_climate/Jackson_files/Jackson.html#table1. Accessed October 11, 2011.

Table D-2: Average Temperature (deg F) Medford WSO AP

Month	Mean Maximum	Mean Minimum	Mean Temperature	Extreme Maximum	Extreme Minimum
January	47.3	30.9	39.1	71	10
February	53.8	33.1	43.5	79	9
March	58.3	35.9	47.1	83	22
April	64.3	39.0	51.6	93	24
May	72.2	44.0	58.1	103	28
June	81.2	50.1	65.6	111	33
July	90.2	55.2	72.7	110	38
August	90.1	54.9	72.5	114	41
September	83.5	48.3	65.9	110	32
October	70.0	40.2	55.1	99	18
November	52.8	35.0	43.9	77	10
December	45.2	31.0	38.1	69	-6
Annual	67.4	41.5	54.5	114	-6

Source: The Oregon Climate Service, NOAA Climate Station: Medford WSO AP. “Climate of Jackson County”. http://www.ocs.orst.edu/county_climate/Jackson_files/Jackson.html#table3. Accessed October 11, 2011.

Temperature

Climate models project that the annual average temperatures in Jackson County and the Rogue River Basin are likely to increase by 1 to 3°F by around 2040, and 4 to 8° F by around

2080. Summer temperatures may increase dramatically reaching 7 to 15° above baseline temperatures by 2080, while winter temperatures may increase 3 to 8°F.[14]

Precipitation and Snowpack

Total precipitation may remain similar to historic levels but it is increasingly likely to fall in the mid-winter months rather than in the spring, summer and fall. Rising temperatures will cause snow to turn to rain in lower elevations and decrease average January snowpack significantly; this corresponds with a decline in runoff and stream flows. Worst-case scenario as projected by climate models, is a reduction of snowpack by 75% by 2040.[15]

Hazard Severity

The dynamic geography, climate and land cover across Jackson County are significant indicators of hazard vulnerability when combined with projected climate change and severe weather related events. The Rogue River Basin is likely to experience more severe storm events, variable weather, higher and flashier winter and spring runoff events, and increased flooding. Both wet and dry cycles are likely to last longer and be more extreme, leading to periods of deeper drought and more extensive flooding. The reduced snowpack and subsequently lower soil moisture with hotter temperatures will likely increase the amount of vegetation consumed by wildfire.[16]

Land Cover

Due to the topography and climate described above, land is used most intensively by people in the Bear Creek, middle Rogue and to a lesser extent, the Applegate Valleys. Development has followed the land use patterns of the early settlers; farmers located on the rich valley floors, and miners and woodsmen claimed the foothill areas.[17] Agriculture, rural, suburban, urban, industrial, and rural service center land uses are concentrated in these fertile valleys, whereas forest and open space and pockets of agriculture occur in surrounding mountainous regions of the county. Consequently, intense valley development is subject to increased risk from associated flood hazards. Forested mountains and steep slopes surrounding these valleys pose a significant risk to the entire region from wildfire and landslide events.

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[14] Doppelt, B., R. Hamilton, C. Deacon Williams & M. Koopman. 2008. Preparing for Climate Change in the Rogue River Basin of Southwest Oregon. In Stressors, Risks, and Recommendations for Increasing Resilience and Resistance in Human, Built, Economic and Natural Systems. Climate Leadership Initiative Institute for a Sustainable Environment, National Center for Conservation Science and Policy, MAPSS Team at the U.S. Forest Service: Pacific Northwest Research Station.
[15] Ibid.
[16] Ibid.
[17] Jackson County Comprehensive Plan. 1989. Section 5-1.

Synthesis

The physical geography, weather, climate and land cover of an area represent various interrelated systems that affect overall risk and exposure to natural hazards. The projected climate change models representing Southern Oregon indicate the potential for increased effects of hazards due to the unique terrain and climate of the region. These factors combined with a growing population and development intensification can lead to increasing risk of hazards, threatening loss of life, property and long-term economic disruption if land management is inadequate.

Socio Demographic Capacity

Socio demographic capacity is a significant indicator of community hazard resilience. The characteristics and qualities of the community population such as language, race and ethnicity, age, income, educational attainment, and health are significant factors that can influence the community's ability to cope, adapt to and recover from natural disasters. Population vulnerabilities can be reduced or eliminated with proper outreach and community mitigation planning.

Population

The majority of people across Jackson County reside in Medford and Ashland, with smaller population segments scattered throughout surrounding rural communities.[18] Between 2000 and 2010, Jackson County experienced a population percent change of approximately 12%, this is significantly greater than population growth experienced by the surrounding counties; however, this level is consistent with statewide growth over the same time period. Most of the population growth between 2000 and 2010 occurred in Medford (18.6%), Central Point (37.4%), Eagle Point (76.5%) and White City (45.9%).[19] The Office of Economic Analysis projects by 2040 that Jackson County's population will increase by over 94,000 people, a 46.4% change. The projected population growth remains consistent with State projections.[20]

Table D-3: Population Growth 2000-2010 – Jackson County and Surrounding Counties

Jurisdiction	2000 Population	2010 Population	2000-2010 Population Change	Percent Change	Average Annual Growth Rate
Jackson	181,269	203,206	21,937	12.1%	1.1%
Douglas	100,399	107,667	7,268	7.2%	0.7%
Josephine	75,726	82,713	6,987	9.2%	0.9%
Klamath	63,775	66,380	2,605	4.1%	0.4%
Oregon	3,421,399	3,831,074	409,675	12.0%	1.1%

Source: Portland State University, Population Research Center. Intercensal Population Estimates. http://www.pdx.edu/prc/.

[18] US Census Bureau, 2010 Census. P1 2010 Total Population Summary File 1.

[19] US Census Bureau, 2000 and 2010 Census. P1 Total Population Summary File 1.

[20] Office of Economic Analysis, Department of Administrative Services. Long Term County Forecast. State and County Population Forecasts by Age and Sex, 2000-2040. April 2004. (and) U.S. Census Bureau, 2010 Census. P1 2010 Total Population Summary File 1

Table D-4: Population Growth 2000-2010 – Jackson County Communities

	2000	2010		Population Change 2000-2010		
Jurisdiction	**Population***	**Population^**	**Percent of Jackson County Population**	**Population Change**	**Percent Change**	**Average Annual Growth Rate**
Ashland	19,522	20,078	9.9%	556	2.8%	0.3%
Butte Falls	439	423	0.2%	-16	-3.6%	-0.4%
Central Point	12,493	17,169	8.4%	4,676	37.4%	3.7%
Eagle Point	4,797	8,469	4.2%	3,672	76.5%	7.7%
Gold Hill	1,073	1,220	0.6%	147	13.7%	1.4%
Jacksonville	2,235	2,785	1.4%	550	24.6%	2.5%
Medford	63,154	74,907	36.9%	11,753	18.6%	1.9%
Phoenix	4,060	4,538	2.2%	478	11.8%	1.2%
Rogue River	1,847	2,131	1.0%	284	15.4%	1.5%
Shady Cove	2,307	2,904	1.4%	597	25.9%	2.6%
Talent	5,589	6,066	3.0%	477	8.5%	0.9%
Sub-Total	*117,516*	*140,690*	69.2%	23,174	19.7%	2.0%
Not Incorporated	63,753	62,516	30.8%	-1,237	-1.9%	-0.2%
Total	**181,269**	**203,206**	**100%**	**21,937**	**12.1%**	**1.2%**

Source: *U.S. Census Bureau, Table DP-1 "Profile of General Demographic Characteristics: 2000"; ^ U.S. Census Bureau, Table DP-1 "Profile of General Population and Housing Characteristics: 2010", http://factfinder2.census.gov, accessed June 2012.

Urban and rural growth patterns can impact how agencies, cities and counties prepare for emergencies, because changes in development can increase risk associated with hazards. As indicated by Table D-5, Jackson County and surrounding Southern Counties are growing more urban. The trend towards a more urbanized population corresponds with the decrease in unincorporated population over the ten-year period.

Table D-5: Urban and Rural Populations 2000-2010

	Percent Incorporated		
Jurisdiction	**2000**	**2010**	**Percent Change**
Jackson	65.1%	70.2%	5.1%
Douglas	45.4%	48.5%	3.1%
Josephine	32.3%	41.8%	9.6%
Klamath	34.7%	36.7%	2.0%
Oregon	66.6%	69.8%	3.2%

Source: Portland State University, Population Research Center. Population Estimates for Oregon an Its Counties and Incorporated Cities: April 1, 2000 to July 1, 2010. http://www.pdx.edu/prc/.

*Population Estimates of Oregon by Area Type and Specific Metropolitan Areas: 2010.

Population size itself is not an indicator of vulnerability. More important is the location, composition, and capacity of the population within the community. Research by social scientists demonstrates that human capital indices such as language, race, age, income, education and health can affect the integrity of a community. Therefore, these human capitals can impact community resilience to natural hazards. As an example, Jackson County's trend towards urbanization suggests that the population may be becoming less self-reliant and more reliant on external goods and services.

Language

Special consideration should be given to populations who do not speak English as their primary language. Language barriers can be a challenge when disseminating hazard planning and mitigation resources to the general public, and it is less likely they will be prepared if special attention is not given to language and culturally appropriate outreach techniques.[21]

There are various languages spoken across Jackson County; the three primary languages are English, Spanish and German. Overall, 3% of the total population in Jackson County are not proficient in English and speak another primary language at home.[22] Table D-6 breaks down the percentage of people not proficient in English by primary language.

Table D-6: Jackson County Language Barriers

Language	Total Number of Speakers	Number of People not Proficient in English	Percent of People not Proficient in English by Language
English	171,269	0	0.0%
Spanish	11,443	4,670	40.8%
German	852	81	9.5%
Other	3,054	783	25.6%
Total	186,618	5,534	3.0%

Source: U.S. Census Bureau, 2005-2009 American Community Survey. B16001 Languages Spoken at Home.

Race

The impact in terms of loss and the ability to recover may also vary among minority population groups following a disaster. Studies have shown that racial and ethnic minorities can be more vulnerable to natural disaster events. This is not reflective of individual characteristics; instead, historic patterns of inequality along racial or ethnic divides have often resulted in minority communities that are more likely to have inferior building stock, degraded infrastructure, or less access to public services. Table D-7 describes Jackson County's population by race and ethnicity.

[21] State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.
[22] U.S. Census Bureau, 2005-2009 American Community Survey. B16001 Languages Spoken at Home

Table D-7: Jackson County Race and Hispanic or Latino Origin

Race	Jackson County	Ashland	Central Point	Eagle Point	Medford	Rogue River	Shady Cove
Total Population	203,206	20,078	17,169	8,469	74,907	2,131	2,904
One Race	96.5%	96.0%	96.8%	96.4%	96.1%	97.8%	97.3%
White	88.7%	90.3%	90.8%	92.1%	86.0%	93.3%	95.5%
Black or African American	0.7%	1.1%	0.4%	0.2%	0.9%	0.8%	0.3%
American Indian and Alaska Native	1.2%	0.9%	1.0%	1.3%	1.2%	0.9%	0.7%
Asian	1.2%	2.1%	1.0%	1.0%	1.5%	0.4%	0.3%
Native Hawaiian and Other Pacific Islander	0.3%	0.3%	0.4%	0.1%	0.5%	0.0%	0.0%
Some Other Race	4.5%	1.4%	3.1%	1.7%	6.0%	2.1%	0.6%
Two or More Races	3.5%	4.0%	3.2%	3.6%	3.9%	2.2%	2.7%
Hispanic or Latino (of any race)	10.7%	5.1%	9.0%	6.8%	13.8%	5.3%	4.7%
Not Hispanic or Latino	89.3%	94.9%	91.0%	93.2%	86.2%	94.7%	95.3%

Source: U.S. Census Bureau, Table QT-P3 "Race and Hispanic or Latino Origin: 2010", http://factfinder2.census.gov, accessed June 2012.

While the minority population in Jackson County is not large, with 88.7% of residents indicating themselves as white, it will be important for the County to identify specific ways to support all portions of the community through hazard preparedness and response. Culturally appropriate, and effective, outreach can include both methods and messaging targeted to this diverse audience. For example, connecting to historically disenfranchised populations through already trusted sources or providing preparedness handouts and presentations in the languages spoken by the population will go a long way to increasing overall community resilience.

The cities within Jackson County roughly parallel the counties demographics with regard to race and Hispanic origin. Notably, the cities of Central Point and Medford have higher percentages of population that are Hispanic than the other cities in the table. The communities of Ashland, Eagle Point, Rogue River and Shady Cove have less residents of Hispanic origin than the county does as a whole.

Age

Of the factors influencing socio demographic capacity, the most significant indicator in Jackson County may be age of the population. As depicted in Table D-8 as of 2010, 17.6% of the county population is over the age of 64, a number that is projected to rise to 23.5% by 2040. The county has a higher percent of its population over the age of 64 compared to Oregon as a whole which has currently 13.9% of it's population over the age of 64, with a projection of 20.2% by 2040. The Jackson County dependency ratio[23] is 55.1%, which is significantly higher than that of the State of Oregon (48.5%). The dependency ratio indicates a higher percentage of dependent aged people to that of working age; this trend is projected to continue with rates in 2040 of 65.6% and 61.0% respectively.

[23] The dependency ratio is derived by dividing the combined under 15 and 65-and-over populations by the 15-to-64 population and multiplying by 100.

Table D-8: Population by Age Groups and Age Dependency Ratio (2010 and 2040)

2010		< 15 Years		> 64 Years			
Jurisdiction	**Total**	**Number**	**Percent**	**Number**	**Percent**	**15 to 64**	**Age Dependency Ratio**
Oregon	3,831,074	717,323	18.7%	533,533	13.9%	2,580,218	48.5%
Jackson County	203,206	36,329	17.9%	35,834	17.6%	131,043	55.1%
Ashland	20,078	2,519	12.5%	3,532	17.6%	14,027	43.1%
Central Point	17,169	3,757	21.9%	2,546	14.8%	10,866	58.0%
Eagle Point	8,469	1,930	22.8%	1,201	14.2%	5,338	58.7%
Medford	74,907	15,111	20.2%	12,109	16.2%	47,687	57.1%
Rogue River	2,131	334	15.7%	631	29.6%	1,166	82.8%
Shady Cove	2,904	389	13.4%	774	26.7%	1,741	66.8%
2040							
Oregon	5425408	958,949	17.7%	1,097,519	20.2%	3,368,940	61.0%
Jackson County	297,496	48,124	16.2%	69,775	23.5%	179,598	65.6%

Source: U.S. Census Bureau, Table QT-P1 "Age Groups and Sex: 2010", http://factfinder2.census.gov, accessed April 2012; Office of Economic Analysis, Department of Administrative Services, Long Term County Forecast, "State and County Population Forecasts by Age and Sex, 2000-2040", accessed April 2012.

The age profile of an area has a direct impact both on what actions are prioritized for mitigation and how response to hazard incidents is carried out. School age children rarely make decisions about emergency management. Therefore, a larger youth population in an area will increase the importance of outreach to schools and parents on effective ways to teach children about fire safety, earthquake response, and evacuation plans. Furthermore, children are more vulnerable to the heat and cold, have few transportation options and require assistance to access medical facilities.[24] Older populations may also have special needs prior to, during and after a natural disaster. Older populations may require assistance in evacuation due to limited mobility or health issues. Additionally, older populations may require special medical equipment or medications, and can lack the social and economic resources needed for post-disaster recovery.[25]

Other important considerations for high-risk populations are the number of people over the age of 64 living alone and single parent households with children under 18. There are more than 10,000 households over 64 years of age living alone in Jackson County (approximately twelve percent of all households) and approximately 8,000 single parent households (approximately nine percent of all households), these populations will likely require additional support during a disaster and will inflict strain on the system if improperly managed. Rogue River and Shady Cove have the largest percent of households over 64 years of age living alone at 27.3% and 20.8% respectively. While Central Point, Eagle Point and Medford have the largest percent of single parent households.

[24] State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.

[25] Wood, Nathan. Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon. U.S. Geological Survey, Reston, VA, 2007.

Table D-9: High Risk Householders

Jurisdiction	Households	> 64 Living Alone	Single Male with Children < 18	Single Female with Children < 18
Oregon	1,518,938	9.7%	2.5%	6.1%
Jackson County	83,706	11.9%	2.8%	6.5%
Ashland	9,409	13.5%	2.2%	6.9%
Central Point	6,542	11.3%	2.6%	8.8%
Eagle Point	3,231	9.7%	3.7%	7.6%
Medford	30,079	12.4%	3.2%	8.2%
Rogue River	1,054	27.3%	2.5%	5.2%
Shady Cove	1,291	20.8%	2.3%	3.6%

Source: U.S. Census Bureau, Table DP-1 "Profile of General Population and Housing Characteristics: 2010", http://factfinder2.census.gov, accessed April 2012.

Income

Household income and poverty status are indicators of socio demographic capacity and the stability of the local economy. Household income can be used to compare economic areas as a whole, but does not reflect how the income is divided among the area residents.[26] The median household income across Jackson County is approximately $44,000; this is slightly lower than the State of Oregon median income of $49,000. The data reveals that Jackson County had a 22.4% growth in income between 2000 and 2010; this is greater than the state's growth (19.8%) in income over the same period of time. The cities of Central Point and Eagle Point have the highest median income in 2010 at around %50,000, while the cities of Eagle Point and Rogue River had the greatest percent change from 2000 to 2010 at 34.6% and 62.2% respectively. Shady Cove increased its median income by only 2.1% in that period.

Table D-10: Median Household Income

Jurisdiction	2000	2010	Percent Change
Oregon	$40,916	$49,260	20.4%
Jackson County	$36,461	$44,142	21.1%
Ashland	$32,670	$40,140	22.9%
Central Point	$40,622	$50,631	24.6%
Eagle Point	$37,557	$50,568	34.6%
Medford	$36,481	$42,745	17.2%
Rogue River	$23,419	$37,978	62.2%
Shady Cove	$33,429	$34,125	2.1%

Source: U.S. Census Bureau, 2006-2010 American Community Survey, Table DP03 "Selected Economic Characteristics"; U.S. Census Bureau, Table DP3 "Profile of Selected Economic Characteristics: 2000", http://factfinder2.census.gov, accessed April 2012.

[26] State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.

Table D-11 identifies the percentage of individuals and families and children under 18 that are below the poverty level in 2010. It is estimated that ten-percent of families and sixteen-percent of families with children live below the poverty level across the county. Ashland, Medford and Rogue River have rates that are slightly higher than the county rates for the same two categories. Interestingly, Shady Cove has a higher rate of families with children under 18 that are below the poverty level, yet has a lower rate of families overall that are below the poverty level than the county as a whole. These poverty estimates remain relatively consistent with statistics from the State and Nation.

Table D-11: Individuals and Families Below Poverty Level

Jurisdiction	All People	People < 18	Families	Families with Children < 18
Oregon	14.0%	18.3%	9.6%	15.5%
Jackson County	14.0%	19.0%	9.9%	16.2%
Ashland	18.8%	27.6%	11.5%	20.9%
Central Point	9.2%	13.3%	8.1%	12.4%
Eagle Point	12.3%	21.8%	10.1%	15.2%
Medford	15.7%	22.9%	12.1%	19.4%
Rogue River	12.7%	23.4%	12.2%	21.1%
Shady Cove	16.6%	23.8%	8.5%	20.6%

Source: U.S. Census Bureau, 2006-2010 American Community Survey, Table DP03 "Selected Economic Characteristics", http://factfinder2.census.gov, accessed April 2012.

Income is a resiliency indicator, as higher incomes are often associated with increased self-reliance, and ability to prepare oneself if an emergency does occur. The higher the poverty rate, the increased assistance the community will likely need in the event of a disaster, in the form of sheltering, medical assistance and transportation. Notably, higher income populations often have less mobility following significant hazard events because their assets may be rooted in the local community. Conversely, lower income members of the population may find it easier to relocate.

Education

Educational attainment of community residents is also identified as an influencing factor in socio demographic capacity. Educational attainment often reflects higher income and therefore higher self-reliance. Widespread educational attainment is also beneficial for the regional economy and employment sectors as there are potential employees for professional, service and manual labor workforces. An oversaturation of either highly educated residents or low educational attainment can have negative effects on the resiliency of the community.

Table D-12: Educational Attainment

Jurisdiction	Oregon	Jackson County	Ashland	Central Point	Eagle Point	Medford	Rogue River	Shady Cove
Total Population > 18 Years	2,898,286	155,866	16,135	11,954	5,729	56,014	1,654	2,408
Less than 9th Grade	4.0%	3.0%	0.4%	3.6%	0.4%	3.4%	3.9%	3.0%
9th -12th Grade, No Diploma	8.1%	9.2%	3.5%	9.6%	8.7%	9.7%	18.8%	12.9%
High School Graduate, GED, or Equivalent	26.4%	29.3%	12.6%	32.5%	36.6%	29.2%	34.0%	35.7%
Some College, No Degree	27.8%	29.4%	31.1%	28.7%	30.5%	30.4%	26.6%	25.4%
Associate's Degree	7.6%	6.9%	5.7%	8.5%	8.3%	6.7%	8.2%	7.9%
Bachelor's Degree	17.0%	14.3%	25.3%	11.1%	11.6%	13.9%	5.0%	9.1%
Graduate or Professional Degree	9.2%	8.0%	21.5%	6.0%	4.0%	6.7%	3.6%	6.1%
Sub-Total (No Highschool Degree)	*12.1%*	*12.2%*	*3.9%*	*13.2%*	*9.1%*	*13.1%*	*22.7%*	*15.9%*
Sub-Total (High School Graduate and beyond)	*87.9%*	*87.8%*	*96.1%*	*86.8%*	*90.9%*	*86.9%*	*77.3%*	*84.1%*
Sub-Total (College Graduate and beyond)	*33.7%*	*29.2%*	*52.4%*	*25.6%*	*23.9%*	*27.3%*	*16.7%*	*23.0%*

Source: U.S. Census Bureau, 2006-2010 American Community Survey, Table B15001 "Sex by Age by Educational Attainment for the population 18 years and over", http://factfinder2.census.gov, accessed April 2012.

According to the U.S. Census, 87.8% of the Jackson County population over 18 years of age has graduated from high school or received a high school equivalency, with approximately 29.2% receiving a college degree. Ashland and Eagle Point have the highest rates of high school graduates, while Rogue River and Shady Cove have the highest rates of population without a high school degree, GED, or equivalent. The 2011 high-school graduation rate of 67% is of concern; however, Jackson County's rate is slightly higher than the State's graduation rate of 66%.[27]

In relation to the high school graduation rate it is important to note the progress ratings of the county school districts. The Oregon Department of Education Federal Adequate Yearly Progress Report (2010-2011) indicates that eight out of nine school districts in the County are not meeting national standards.[28] The quality of education received at K-12 area schools likely influences the level of higher education achieved. These circumstances can have long-term impacts on future regional employment, income and ultimately community stability and resilience.

Health

Individual and community health play an integral role in community resiliency, as indicators such as health insurance, people with disabilities, dependencies, homelessness and crime rate paint an overall picture of a community's well being. These factors translate to a community's ability to prepare, respond and cope with the impacts of a disaster.

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[27] County Health Rankings. Jackson County. 2012. www.countyhealthrankings.org. Note: High school graduation is reported as the percent of a county's ninth-grade cohort in public schools that graduates from high school in four years. Starting in 2012 the cohort graduation rates are collected from state Department of Education websites. The school years for data used for this sampling were 2008 to 2009.

[28] Oregon Department of Education. Adequate Yearly Progress (AYP) Reports and Report Card Download. http://www.ode.state.or.us/data/reportcard/reports.aspx. Jackson County school districts include: Ashland 5 (1 of 3 schools do not meet one or more standards), Butte Falls 91 (2 of 2 schools do not meet one or more standard), Central Point 6 (4 of 11 schools do not meet one or more standard), Eagle Point 9 (8 of 11 schools do not meet one or more standard), Medford 549C (13 of 20 schools do not meet one or more standard), Phoenix-Talent 4 (6 of 6 schools do not meet one or more standard), Pinehurst 94 (1 of 1 schools meet all standard), Prospect 59 (1 of 1 schools do not meet one or more standard) and Rogue River 35 (1 of 4 schools do not meet one or more standard).

The Resilience Capacity Index recognizes those who lack health insurance or are impaired with sensory, mental or physical disabilities, have higher vulnerability to hazards and will likely require additional community support and resources. The following two figures identify health insurance coverage and disability status across Jackson County. It is important to note in Table D-13, that the percentage of population in Jackson County without health insurance (20.3%, 40,926 people) is higher than that of the State and Nation and the neighboring counties. For planning purposes, this should be taken into consideration with the high dependency ratio across the county (Table D-8), and the lower median income (Table D-10. The county may be obligated to provide services to the dependent aged population if their families do not have insurance, or cannot afford to care for them following a natural disaster.

Table D-13: Health Insurance Coverage

Jurisdiction	Population	With Health Insurance	Without Health Insurance	Population without Health Insurance
United States	304,287,836	84.5%	15.5%	47,208,222
Oregon	3,799,107	82.9%	17.1%	651,504
Jackson County	201,487	79.7%	20.3%	40,926
Douglas County	106,473	83.1%	16.9%	17,956
Josephine County	82,212	83.0%	17.0%	14,015
Klamath County	64,483	80.0%	20.0%	12,916

Source: U.S. Census Bureau, 2010 American Community Survey, 1-Year Estimates, Table DP03 "Select Economic Characteristics", http://factfinder2.census.gov, accessed April 2012.

Table D-14 describes disability status of the population. As of 2010, over 15% of the county population (34,545 people) identifies with one or more disabilities; this rate is above the State and National rates, but less than two of the surrounding counties.

Table D-14 Jackson County Disability Status

Jurisdiction	Population	With a Disability	Percent
United States	304,287,836	36,354,712	11.9%
Oregon	3,799,107	525,066	13.8%
Jackson County	201,487	34,545	15.7%
Douglas County	106,473	23,035	21.6%
Josephine County	82,212	11,785	14.3%
Klamath County	64,483	11,532	17.9%

Source: U.S. Census Bureau, 2010 American Community Survey, 1-Year Estimates, Table DP02 "Selected Social Characteristics in the United States", http://factfinder2.census.gov, accessed April 2012.

On a similar note, a community with high percentages of drug dependency and violent crimes may experience increased issues with the disruption of normal social systems. It is likely that the continuity of addiction and mental health services will be interrupted by a disaster and in combination with a high stress environment, an increase in crime incidents may result. Table D-15 and Table D-16 illustrate drug dependencies and crime rate in Jackson County.

Table D-15: Estimated Substance Abuse and Dependencies

Dependence	Population	Percent
Alcohol Dependence	12,849	7.6%
Drug Dependence	5,035	3.0%

Source: Oregon Health Authority, Addictions Services "Oregon's Epidemiological Data on Alcohol, Drug, mental Health and Gambling 2000 to 2010". Data represents figures from 2006-2008. http://cms.oregon.gov/dhs/addiction/pages/ad/main.aspx.

Table D-16 describes the crime rate status of the county. As of 2008, the county has a lower violent crime rate than the state, but higher than two of the surrounding counties.

Table D-16: Crime Rate

Jurisdiction	Violent Crimes (2006-2008)	Violent Crime Rate
National Benchmark	NA	100
Oregon	NA	275
Jackson County	1,491	250
Douglas County	377	121
Josephine County	245	101
Klamath County	541	272

Source: County Health Rankings and Roadmaps, "Violent Crime Rates". Data represents figures from 2006-2008. http://www.countyhealthrankings.org/app/oregon/2011/measures/factors/43/data. Accessed October 2011.

In 2011, Oregon Housing and Community Services (OHCS) conducted a homeless count to identify the number of homeless, their age and their family type. The OHCS study found that over 1,000 individuals in Jackson County identify as homeless. The primary age groups of those identified are children age 0-5 years, and adults 24-44 and 45-54 years.29 The homeless have little resources to rely on, especially during an emergency. It will likely be the responsibility of the county and local non-profit entities to provide services such as shelter, food and medical assistance. Therefore, it is critical to foster collaborative relationships with agencies that will provide additional relief such as the American Red Cross and homeless shelters. As well, it will be important to identify how to communicate with these populations, since traditional means of communication may not be appropriate or available.

Synthesis

For planning purposes, it is essential Jackson County consider both immediate and long-term socio-demographic implications of hazard resilience. Immediate concerns regard the large presence of an elderly population and language barriers associated with a culturally diverse community. Even though the vast majority of the population is reported as proficient in English, almost half of the native Spanish speakers are not proficient in English. These populations would serve to benefit from mitigation outreach, with special attention to cultural, visual and technology sensitive materials. The current status of other socio-demographic capacity indicators such as low graduation rate, quality of schools, median

[29] Oregon Housing and Community Services, "2011 Point in Time Homeless Count". http://www.ohcs.oregon.gov/OHCS/RA_2011_Point_In_Time_Homeless_Counts.shtml

household income can have long term impacts on the economy and stability of the community ultimately affecting future resilience.

Regional Economic Capacity

Regional economic capacity refers to the financial resources present and revenue generated in the community to achieve a higher quality of life. Income equality, housing affordability, economic diversification, employment and industry are measures of economic capacity. However, economic resilience to natural disasters is far more complex than merely restoring employment or income in the local community. Building a resilient economy requires an understanding of how the component parts of employment sectors, workforce, resources and infrastructure are interconnected in the existing economic picture. Once any inherent strengths or systematic vulnerabilities become apparent, both the public and private sectors can take action to increase the resilience of the local economy.

Regional Affordability

The evaluation of regional affordability supplements the identification of socio-demographic capacity indicators, i.e. median income, and is a critical analysis tool to understanding the economic status of a community. This information can capture the likelihood of individuals' ability to prepare for hazards, through retrofitting homes or purchasing insurance. If the community reflects high income inequality or housing cost burden, the potential for home owners and renters to implement mitigation can be drastically reduced. Therefore, regional affordability is a mechanism for generalizing the abilities of community residents to get back on their feet without Federal, State or local assistance.

Income Equality

Income equality is a measure of the distribution of economic resources, as measured by income, across a population. It is a statistic defining the degree to which all persons have a similar income. Table D-17 illustrates the county and cities level of income inequality. The Gini index is a measure of income inequality. The index varies from zero to one. A value of one indicates perfect inequality (only one household has any income). A value of zero indicates perfect equality (all households have the same income).[30] Jackson County's income distribution is reflective of the State as a whole. The cities within the county vary slightly with greater income equality within the cities of Central Point, Eagle Point, Rogue River and Shady Cove and less income equality within Ashland and Medford. Based on social science research the regions cohesive response to a hazard event may be affected by the distribution of wealth in communities that have less income equality (Ashland and Medford)[31].

[30] University of California Berkeley. Building Resilient Regions, Resilience Capacity Index. http://brr.berkeley.edu/rci/.

[31] Susan Cutter, Christopher G. Burton, and Christopher T. Emrich. 2010. "Disaster Resilience Indicators for Benchmarking Baseline Conditions," Journal of Homeland Security and Emergency Management 7, no.1: 1-22

Table D-17: Regional Income Equality

Jurisdiction	Income Inequality Coefficient
Oregon	0.446
Jackson County	0.442
Ashland	0.498
Central Point	0.378
Eagle Point	0.372
Medford	0.448
Rogue River	0.391
Shady Cove	0.394

Source: U.S. Census Bureau, 2006-2010 American Community Survey, Table B19083 "Gini Index of Income Inequality", http://factfinder2.census.gov, accessed August 2012.

Housing Affordability

Housing affordability is a measure of economic security gauged by the percentage of a metropolitan area's households paying less than 35% of their income on housing.[32] Households spending more than 35% are considered housing cost burdened. Table D-18 displays the percentage of homeowners and renters reflecting housing cost burden across the region. In comparison to the State, Jackson County has higher percentages of homeowners and renters paying more than 35% of their income on housing. Among homeowners, Ashland, Rogue River and Shady Cove have the greatest rates of households with housing cost burdens. Among renters, Ashland, Medford and Shady Cove residents have the greatest rates of households with housing cost burdens. In general, the population that spends more of their income on housing has proportionally fewer resources and less flexibility for alternative investments in times of crisis.[33]

This disparity imposes challenges for a community recovering from a disaster as housing costs may exceed the ability of local residents to repair or move to a new location. These populations may live paycheck to paycheck and are extremely dependent on their employer, in the event their employer is also impacted it will further the detriment experienced by these individuals and families.

[32] University of California Berkeley. Building Resilient Regions, Resilience Capacity Index. http://brr.berkeley.edu/rci/.
[33] Ibid.

Table D-18: Households Spending > 35% of Income on Housing*

	Owners		
Jurisdiction	**With Mortgage**	**Without Mortgage**	**Renters**
Oregon	30.7%	11.3%	39.8%
Jackson County	36.6%	14.0%	42.5%
Ashland	43.2%	12.9%	52.2%
Central Point	31.6%	13.2%	36.5%
Eagle Point	36.9%	14.1%	36.1%
Medford	35.1%	14.9%	43.4%
Rogue River	45.0%	21.3%	37.0%
Shady Cove	50.2%	14.1%	44.6%

Source: U.S. Census Bureau, 2006-2010 American Community Survey, Table B25070 "Gross Rent as a Percentage of Household Income in the Past 12 Months" and Table B25091 "Mortgage Status by Selected Monthly Owner Costs as a Percentage of Household Income in the Past 12 Months", accessed August 2012.

Economic Diversity

Economic diversity is a general indicator of an area's fitness for weathering difficult financial times. Business activity in the Southwest Oregon region is fairly diverse. Jackson County and other surrounding counties all rank in the top third of state ranked economic diversity with Jackson County ranking seventh out of the 36 counties in the state.[34] Economic diversity is not a guarantor of economic resilience. As of July 2012, the Oregon Economic and Community Development Department identified Jackson County, which has a July 2012 unemployment rate of 10.7%, as "economically distressed".[35] The economic distress measure is based on indicators of decreasing new jobs, average wages and income and is associated with an increase of unemployment.

Employment and Wages

According to the Oregon Employment Department, unemployment has reduced since 2010. However, the Southern Oregon region including Jackson County remains higher than the State unemployment rate.

Table 18: Regional Unemployment

	Unemployment Rate		
Jurisdiction	**2011**	**2007**	**Percent Change**
Oregon	9.5%	5.2%	4.3%
Jackson County	11.5%	5.7%	5.8%
Douglas	13.1%	7.7%	5.4%
Josephine	12.6%	7.1%	5.5%
Klamath	12.2%	6.9%	5.3%

Source: Oregon Employment Department, "Local Area Employment Statistics". http://www.qualityinfo.org/olmisj/labforce. Accessed August 2012. Note: The Medford MSA includes data for all of Jackson County.

[34] Beleiciks, Nick. Oregon Employment Department. "Hachman Diversity Index 2009, 2006, 2003, 2001, 1999".
[35] Business Oregon. "Distressed Areas in Oregon", http://www.oregon4biz.com/Publications/Oregon-Economic-Data/Distressed-Areas-in-Oregon/, accessed August 30, 2012.

Table D-20 displays the payroll and employee figures for Jackson County. As of 2011, the County employed 74,872 individuals, with an average wage of $35,152. The State and Jackson County, and the other counties in the region, have lost employment since the last update of this plan; however average pay has increased slightly for that same period.

Table D-20: Jackson County Employment and Average Pay

	Employment		Average Pay	
Jurisdiction	**2011**	**2007**	**2011**	**2007**
Oregon	1,616,583	1,728,351	$43,092	$39,564
Jackson County	74,872	84,411	$35,152	$32,867
Douglas	34,188	38,870	$34,049	$32,259
Josephine	22,571	25,112	$31,219	$29,452
Klamath	21,478	23,916	$33,417	$31,949

Source: Oregon Employment Department, "2011 Covered Employment and Wages Summary Report". http://www.qualityinfo.org/olmisj/labforce. Accessed August 2012.

In 2010, there were 5,786 employment establishments of which 89% had fewer than 20 employees.[36] The prevalence of small businesses in Jackson County is an indication of sensitivity to natural hazards because small businesses are more susceptible to financial uncertainty. If 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.[37]

Industry

Major Regional Industry

Key industries are those that represent major employers and are significant revenue generators. 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.[38]

This is of specific concern when the businesses belong to the basic sector industry. Basic sector industries are those that are dependent on sales outside of the local community; they bring money into a local community via employment. The farm and ranch, information, and wholesale trade industries are all examples of basic industries. Non-basic sector industries are those that are dependent on local sales for their business, such as retail trade, construction, and health services.[39]

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[36] U.S. Census Bureau, 2010 County Business Patterns (NAICS). http://censtats.census.gov/cgi-bin/cbpnaic/cbpsect.pl, accessed August 2012.
[37] State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.
[38] Ibid.
[39] Ibid.

Employment by Industry

Economic resilience to natural disasters is particularly important for the major employment industries in the region. If these industries are negatively impacted by a natural hazard, such that employment is affected, the impact will be felt throughout the regional economy.[40] Thus, understanding and addressing the sensitivities of these industries is a strategic way to increase the resiliency of the entire regional economy.[41]

Table D-21 identifies employment by industry. The four industry sectors in Jackson County with the most employees, as of 2011, are Trade, Transportation and Utilities (17,042), Education and Health Services (12,799), Government (11,285) and Leisure and Hospitality (8,790). While Jackson County has some basic industries, such as Manufacturing and Information; their four largest employers are of the non-basic nature and thus they rely on local sales and services. Trending towards basic industries can lead to higher community resilience. As Table D-21 shows growth over the last ten years has been minimal (1%). The sectors of growth within Jackson County are the non-basic industries of Education and Health Services (26.1%), Finance Activities (8.7%), Government (10.8%) and Leisure and Hospitality (3.3%). The industries that suffered the greatest losses are Construction (-22.8%) and Manufacturing (-19.6%).

[40] Ibid.
[41] Ibid.

Table D-21: 2011 Total Employment by Industry

Jurisdiction	2011 Firms	2011 Employees	2011 Percent Workforce	2011 Average Pay	Percent Change in Employment 2001-2011
Total	*6,469*	*74,872*	*100%*	*$35,152*	**1.0%**
Total Private	6,255	63,588	84.9%	$33,760	-0.5%
Natural Resources and Mining	161	2,122	2.8%	$24,927	-10.7%
Construction	638	2,809	3.8%	$39,100	-22.8%
Manufacturing	312	6,191	8.3%	$40,836	-19.6%
Trade, Transportation & Utilities	1,274	17,042	22.8%	$31,370	-3.6%
Wholesale	*316*	*2,118*	*2.8%*	*$45,333*	*-0.6%*
Retail	*774*	*12,274*	*16.4%*	*$26,645*	*-7.3%*
Information	125	1,703	2.3%	$43,042	-6.2%
Finance Activities	614	3,159	4.2%	$40,667	**8.7%**
Professional & Business Services	878	6,214	8.3%	$37,736	-2.1%
Education & Health Services	739	12,799	17.1%	$42,919	**26.1%**
Leisure & Hospitality	687	8,790	11.7%	$16,636	**3.3%**
Other Services	804	2,740	3.7%	$23,353	-1.1%
Private Non-Classified	24	19	0.0%	$40,357	-24.0%
Government	214	11,285	15.1%	$42,996	**10.8%**

Source: Oregon Employment Department, "2001 and 2011 Covered Employment and Wages Summary Reports". http://www.qualityinfo.org/olmisj/labforce. Accessed August 2012.

High Revenue Sectors

In 2007, the four sectors with the highest revenue were Retail Trade, Manufacturing, Health Care and Social Assistance and Wholesale Trade. Table D-22 shows the revenue generated by each economic sector. All of the sectors combined generated almost $9 billion in revenue for the County. Because Jackson County relies on both basic and non-basic sector industries it is important to consider the effects each may have on the economy following a disaster. Basic sector businesses have a multiplier effect on a local economy that can spur the creation of new jobs, some of which may be non-basic. The presence of basic sector jobs can help speed the local recovery; however, if basic sector 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 potential job losses for the non-basic businesses that are dependent on them.[42]

[42] State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.

Table D-22: Revenue of Top Sectors in Jackson County

Sector Meaning (NAICS code)	Revenue ($1,000)	Percent of Total Revenue
Retail Trade	$3,422,363	38.2%
Manufacturing	$2,037,469	22.8%
Health Care & Social Assistance	$1,173,866	13.1%
Wholesale Trade	$1,047,067	11.7%
Accomodation & Food Services	$372,936	4.2%
Professional, Scientific & Technical Services	$224,012	2.5%
Real Estate & Rental & Leasing	$205,392	2.3%
Administrative & Support & Waste Management & Remediation Services	$186,985	2.1%
Other Services (except Public Administration)	$181,962	2.0%
Arts, Entertainment & Recreation	$83,059	0.9%
Educational Services	$14,663	0.2%
Information	na	-
Total	$8,949,774	

Source: U.S. Census Bureau, 2007 Economic Census, Table EC0700A1 "All sectors: Geographic Area Series: Economy-Wide Key Statistics: 2007", http://factfinder2.census.gov/, accessed August 2012.

Retail Trade and *Manufacturing* were by far the largest revenue generators in 2007, generating over $5.4 billion that year. The *Retail Trade* sector ($3.4 billion in revenue) 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. Retail trade is also largely dependent on wholesale trade and the transportation network for the delivery of good for sale. Disruption of the transportation system could have severe consequences for retail businesses. In summary, depending on the type and scale a disaster could affect specific segments of retail trade, or all segments.

Manufacturing generated nearly 23% of the revenue in Jackson County. It is highly dependent upon the transportation network in order to access supplies and send finished products to outside markets. As a base industry, manufacturers are not dependent on local markets for sales, which contribute to the economic resilience of this sector.

In 2007, the *Health Care and Social Assistance* sector generated $1.2 billion, making it among the largest earning sectors in Jackson County.[43] Health Care and Social Assistance is a relatively stable revenue sector. It largely relies on the local presence of older residents and elderly facilities. It is likely the populations that require such services on a daily basis will continue requiring assistance, such as those living in residential care facilities. With Jackson County's elderly population expected to increase, growth in this sector will likely continue. However, in the event of a disaster medical needs may increase due to physical or stress

[43] U.S. Census Bureau, 2007 Economic Census. Table 1 Selected Statistics by Economic Sector.

induced injuries and trauma. The physical infrastructure of this sector will be essential in maintaining the capacity of service that they currently exhibit.

Wholesale Trade generated nearly 12% of the county revenue in 2007. *Wholesale Trade* is closely linked with retail trade but it has a broader client base, 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 the local wholesalers due to transportation disruptions from a natural disaster.

Accommodation and Food Services generated over $370 million in revenue. Portions of this sector are more stable than others. The stable portion of this sector is likely dependent upon health care and residential facilities in the county; as these populations will continue to require these services. However, part of this revenue is generated through leisure and hospitality. This portion of the sector could be adversely affected by a disaster as it primarily serves regional residents with disposable income and tourists. The behavior of both demographics would be disrupted as tourists deter from visiting the impacted area, or local residents may concentrate spending on essential items rather than luxury expenditures (e.g. dinning out).

Both accommodation and food services are highly dependent upon the transportation network in order to receive shipped goods (e.g. food supplies and products) and be accessible by traveling motorists. Disruption of the transportation system could have severe consequences for this sector. Depending on the type and scale of the disaster, it could affect specific segments of accommodation and food services.

In the event that any of these primary sectors are impacted by a disaster, Jackson County may experience a significant disruption of economic productivity.

Future Employment in Industry

Sectors that are anticipated to be major employers in the future also warrant special attention in the hazard mitigation planning process. Between 2010 and 2020, the largest employment growth is anticipated within the Educational and Health Services (25%, primarily within health care), Professional and Business Services (18%), Construction (18%) and Manufacturing (15%).[44] Considering these projected industries are among the highest revenue generating, and/ or paying, industries in Jackson County (Tables D-20 and D-21), all of the above mentioned issues should be incorporated into future hazard mitigation planning.

Synthesis

The current and anticipated financial conditions of a community are strong determinants of community resilience, as a strong and diverse economic base increases the ability of

[44] Oregon Employment Department, "Employment Projections by Industry and Occupations: 2010-2020 Oregon and Regional Summary", http://qualityinfo.org/pubs/projections/projections.pdf, accessed August 2012.

individuals, families and the community to absorb disaster impacts for a quick recovery. Considering the high regional unemployment, high housing cost burden, and an economy heavily dependent on a single or few key industries, Jackson County may experience a more difficult time in recovering after a disaster than one with a more diverse economic base.[45] It is important to consider what might happen to the County economy if the largest revenue generators and employers are impacted by a disaster. It is imperative that Jackson County recognizes that economic diversification is a long-term issue; more immediate strategies to reduce vulnerability should focus on risk management for the dominant industries.[46]

Built Capacity

Built capacity refers to the built environment and infrastructure that supports the community. The various forms, quantity, and quality of built capital mentioned above contribute significantly to community resilience. Physical infrastructures, including utility and transportation lifelines, are critical during a disaster and are essential for proper functioning and response. The lack or poor condition of infrastructure can negatively affect a community's ability to cope, respond and recover from a natural disaster. Following a disaster, communities may experience isolation from surrounding cities and counties due to infrastructure failure. These conditions force communities to rely on local and immediately available resources.

Housing Building Stock

In addition to location, the characteristics of the housing stock affect the level of risk posed by natural hazards. Table D-23 identifies the types of housing most common throughout the county. Of particular interest are mobile homes and other non-permanent housing structures, which account for 13.0% of the housing in Jackson County. Mobile structures are particularly vulnerable to certain natural hazards, such as windstorms, and special attention should be given to securing the structures, because they are more prone to wind damage than wood-frame construction.[47] Shady Cove (≈35%), Rogue River (≈15%) and Eagle Point (≈11%) have more mobile structures than other parts of the county.

Table D-23: County Housing Profile

Jurisdiction	Total Housing Units	Single-Family	Multiple-Family	Mobile Homes	Van, RV, Boat, Etc.
Jackson County	89,717	69.7%	17.3%	12.7%	0.3%
Ashland	10,230	71.9%	26.6%	1.5%	0.0%
Central Point	6,625	80.8%	12.9%	6.3%	0.0%
Eagle Point	3,251	78.2%	10.6%	11.1%	0.0%
Medford	32,874	67.8%	28.5%	3.7%	0.0%
Rogue River	1,030	56.2%	28.7%	15.0%	0.0%
Shady Cove	1,383	58.6%	6.4%	33.2%	1.9%

Source: U.S. Census Bureau, 2006-2010 American Community Survey, Table B25024 "Units in Structure", http://factfinder2.census.gov/, accessed August 2012.

[45] State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.
[46] Ibid.
[47] Ibid.

As the previous table indicates, the majority of the housing stock is single-family homes, a trend that is continuing with new construction. Table D-24 below shows that approximately 96% of residential permits issued between 2000 and 2011 were for single-family units. This suggests that hazard mitigation and outreach should specifically address preparedness for detached housing structures.

Since 2008, residential construction activity has decreased significantly; a trend that is visible in the table, which shows that between 2006 and 2008 the issuance residential building permits declined by 53% and decreased another 65% between 2009 and 2011. Residential construction activity is a key indicator of community stability, and can demonstrate positive community growth. However, in recent years with the downfall of the residential market this is less of an accurate indicator as activity all across the nation was impacted.

Table D-24: Annual Privately-Owner Residential Building Permits

	2000-2002		2003-2005		2006-2008		2009-2011		Total (2000-2011)	
Jurisdiction	**Buildings**	**Units**	**Buildings**	**Units**	**Buildings**	**Units**	**Buildings**	**Units**	**Buildings**	**Units**
Single Family	3,697	3,697	4,949	4,949	2,310	2,310	837	837	96.4%	84.6%
Two Family	36	72	76	152	54	108	3	6	1.4%	2.4%
Three and Four Family	50	188	97	373	25	95	6	24	1.5%	4.9%
Five or More Family	26	306	31	428	32	229	10	162	0.8%	8.1%
Total	3,809	4,263	5,153	5,902	2,421	2,742	856	1,029	100%	100%
Percent Change From the Previous Period	na	na	35.3%	38.4%	-53.0%	-53.5%	-64.6%	-62.5%	na	na

Source: U.S. Census Bureau, "Annual New Privately-Owned Residential Building Permits", http://censtats.census.gov/cgi-bin/bldgprmt/bldgsel.pl, accessed August 2012.

Age of housing is another characteristic that influences a structure's vulnerability to hazards. Generally, the older the home is, the greater the risk of damage. Structures built after the late 1960's in the Northwest utilized earthquake resistant designs and construction. Communities began implementing flood elevation ordinances in the 1970's, with the first FEMA flood insurance study completing in June 1978,[48] and in 1990 Oregon again upgraded seismic standards to include earthquake loading in the building design.[49]

Table D-25: Housing Year Built

Jurisdiction	Jackson County	Ashland	Central Point	Eagle Point	Medford	Rogue River	Shady Cove
Total Housing Units	89,717	10,230	6,625	3,251	32,874	1,030	1,383
Pre 1980	49.3%	59.6%	35.0%	24.0%	49.7%	48.2%	31.2%
1980 to 1989	11.6%	9.4%	5.8%	3.9%	12.6%	22.0%	20.8%
1990 and Later	39.0%	31.0%	59.2%	72.1%	37.7%	29.8%	47.9%

Source: U.S. Census Bureau, 2006-2010 American Community Survey, Table B25034 "Year Structure Built", http://factfinder2.census.gov/, accessed August 2012.

Knowing the age of the structure is helpful in targeting outreach regarding retrofitting and insurance for owners of older structures.[50] Based on U.S. Census data, 49.8% of Jackson

[48] FEMA, Flood Insurance Study: Jackson County, Oregon and incorporated Areas, May 2011.
[49] Wang Yumei and Bill Burns. "Case History on the Oregon GO Bond Task Force: Promoting Earthquake Safety in Public Schools and Emergency Facilities." National Earthquake Conference. January 2006.
[50] State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.

County housing was built prior to 1980 and the implementation of flood elevation requirements. There is a need to identify if these homes are located in a floodplain, and target outreach to the property owners to encourage appropriate flood mitigation. Roughly 39.0% of the housing units in the County were built after 1990 when more stringent building codes were put in place; the remaining 71.0% of housing stock may have questionable seismic stability. Ashland has the greatest percent of housing built prior to 1980 at 59.6% of its housing stock; additionally, Ashland and Rogue River have approximately 70% of their building stock built prior to 1990. The cities of Central Point, Eagle Point and Shady Cove have the largest percentage of their housing built after 1990, and therefore, may be the most resilient in the county. In addition to single-family households, it is also important to consider the structural integrity of multi-unit residences, as these structures will have an amplified impact on the population.

Commercial Building Stock

Critical Facilities

Critical facilities are those facilities that are essential to government response and recovery activities (e.g., hospitals, police, fire and rescue stations, school districts and higher education institutions). The interruption or destruction of any of these facilities would have a debilitating effect on incident management.

Critical facilities in Jackson County are identified in Table D-26. While lifelines and other physical infrastructure, such as transmission lines, power generation facilities, levees and dams are also critical, they have been documented elsewhere for the purposes of this profile. This information provides the basis for informed decisions about the infrastructure and facilities already in place that can be used to reduce the vulnerability of Jackson County to natural hazards.

Table D-26: Jackson County Critical Facilities

Hospitals				
# Hospitals	# Beds	Law Enforcement	Fire and Rescue Stations	School Districts and Colleges
3	594	1 Sheriff, 10 City Police Departments	19	9 School Districts, 3 Higher Education Institutions

Source: Oregon Department of Human Services, "Oregon Hospitals: 2008-09-20", https://data.oregon.gov/dataset/Oregon-Hospitals-2008-09-20/s2vy-pvyp, and USA Cops: The Nations Law Enforcement Site, http://www.usacops.com/or/jackson.html, and Oregon State Police Oregon Office of State Fire Marshal, "Fire Department List" http://www.oregon.gov/OSP/SFM/Fire_Department_List.shtml, and Oregon Department of Education, "Education Institutions", http://www.osba.org/Links/LeftNav/Education%20Institutions.aspx, accessed August 2012.

Dependent Facilities

In addition to the critical facilities mentioned above in Table D-26, there are other facilities that are vital to the continued delivery of health services and may significantly impact the public's ability to recover from emergencies. Assisted living centers, nursing homes, residential mental health facilities, and psychiatric hospitals are important to identify within the community because of the dependent nature of the residents; and also these facilities can serve as secondary medical facilities as they are equipped with nurses, medical supplies and beds.

Jackson County has 28 assisted living centers, five registered nursing homes, and seven residential mental health facilities.[51] There are no reported psychiatric hospitals in the Jackson, or surrounding, counties. Of all of the dependent facilities identified in the county, 16 (57%) assisted living centers, four (80%) nursing homes and six (86%) residential mental health facilities are located in Medford, in summary, there are 26 of 40 (65%) dependent care facilities located in one city across the county.

Correctional Facilities

Correctional facilities are incorporated into physical infrastructure as they play an important role in everyday society by maintaining a safe separation from the public. There are three correctional facilities located in Jackson County. The Oregon Youth Authority (average daily population 33, 2010-11) and the Jackson County Jail (230 beds, 2009) are both located in Medford; and the Jackson County Community Justice Transition Center in Talent (169 beds, average daily population 126.35, 2010-11)[52]. While correctional facilities are built to code to resist structural failure and institutions will have back up power to sustain regulation of inmates following the immediate event of an emergency, logistical planning becomes more of a challenge when the impacts of the event continue over a long duration.

Physical Infrastructure

Physical infrastructure such as dams, levees, roads, bridges, railways and airports support Jackson County communities and economies. Due to the fundamental role that physical infrastructure plays both in pre and post-disaster, they deserve special attention in the context of creating resilient communities.

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[51] Online Google Based Query, October 2011.

[52] Jackson County Sheriff and Jackson County Community Justice, http://www.co.jackson.or.us/SectionIndex.asp?SectionID=9, accessed August 2012.

Dams

Dam failures can occur rapidly and with little warning.[53] Fortunately most failures result in minor damage and pose little or no risk to life safety.[54] However, the potential for severe damage still exists. The Oregon Water and Resources Department has inventoried all dams located in Oregon and Jackson County. Of the high hazard dams, of special concern for Jackson County are Lost Creek Reservoir (last inspected in 2001), Howard Prairie (last inspected in 2006) and Fish Lake (last inspected in 2005); these are of specific interest because their last inspections took place over 6 years ago.

Table D-27: Jackson County Dam Inventory

Number of Dams	Threat Potential
12	High
23	Significant
41	Low

Source: Oregon water Resources Department, "Dam Inventory Query", http://apps.wrd.state.or.us/apps/misc/dam_inventory/, accessed April 2012.

Rail Ways

Railroads are major providers of regional and national cargo trade flows. The Central Oregon and Pacific and the White City Terminal Railroad run through Jackson County.[55] The Central Oregon & Pacific Line follows I-5 through the Jackson County, it then runs west through Lane County and loops back into Douglas County through Reedsport. The White City Terminal Railroad is a short spur off the Central Oregon & Pacific Line in Jackson County.

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

Airports

Jackson County has one commercial service airport, three other public airports and 17 private airports.[56] The Rogue Valley International Airport in Medford is the only commercial service airport in surrounding Douglas, Josephine and Klamath Counties. Access to these airports face the potential for closure from a number of natural hazards, including wind and winter storms common to the region. Another important consideration in identifying area air resources is the type and condition of runway surfaces at these various facilities, as they will impact the ability to utilize the airport. Common runway surface types in Jackson County are turf, dirt, asphalt, concrete, and gravel.

Power Plants

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[53] Federal Emergency Management Agency. Dam Failure. www.fema.gov/hazard/damfailure/index.shtm. Accessed November 18, 2011.
[54] Ibid.
[55] Oregon Department of Transportation, State of Oregon, Oregon Railways. http://www.oregon.gov/ODOT/TD/TDATA/gis/docs/statemaps/railroads.pdf?ga=t
[56] FAA Airport Master Record. 2011. http://www.faa.gov/airports/airport_safety/airportdata_5010/menu/index.cfm.

The majority of electrical power in the region is generated through hydropower primarily from dams situated on the Rogue River. There are four power plants located in Jackson County including one located in White City, which uses biomass as its energy source.[57]

Roads and Bridges

The region's major expressway is Interstate 5. It runs north/south through Jackson County and is the main passage for automobiles and trucks traveling along the West Coast. Other major highways that service this region include:

- US Highway 66 connects the Ashland Municipal Airport with Ashland and Klamath Falls.
- US Highway 62 connects Medford to Central Oregon
- Highway 227 joins Highway 62 near Shady Cove, and eventually merges with I-5 north near Roseburg.
- US Highway 199 intersects with I-5 in Grants Pass, just outside of Jackson County, and runs south to the North Coast of California.

Daily, transportation infrastructure capacity in the Southwest Oregon region is stressed by maintenance, congestion, and oversized loads. Natural hazards can further disrupt automobile traffic and create gridlock this is of specific concern in periods of evacuation.[58]

The existing condition of bridges in the region is also a factor that affects risk from natural hazards. Bridge failure can have immediate and long-term implications in the response and recovery of a community. Incapacitated bridges can disrupt traffic and exacerbate economic losses due to the inability to transport products and services in and out of the area.[59] Table D-28 represents the condition of the State National Bridge inventory (NBI), and highlights the number of distressed bridges in the region. The region encompasses all of Jackson and Josephine Counties, eastern Douglas County and a part of Klamath County as illustrated on Figure D-2.

The NBI identifies 45 distressed bridges, 23.5% of all the State bridges in the region exhibit some form of structural or other deficiency. The classification of a distressed bridge does not imply the bridge is unsafe; however in the event of seismic activity these bridges are of higher vulnerability to failure.

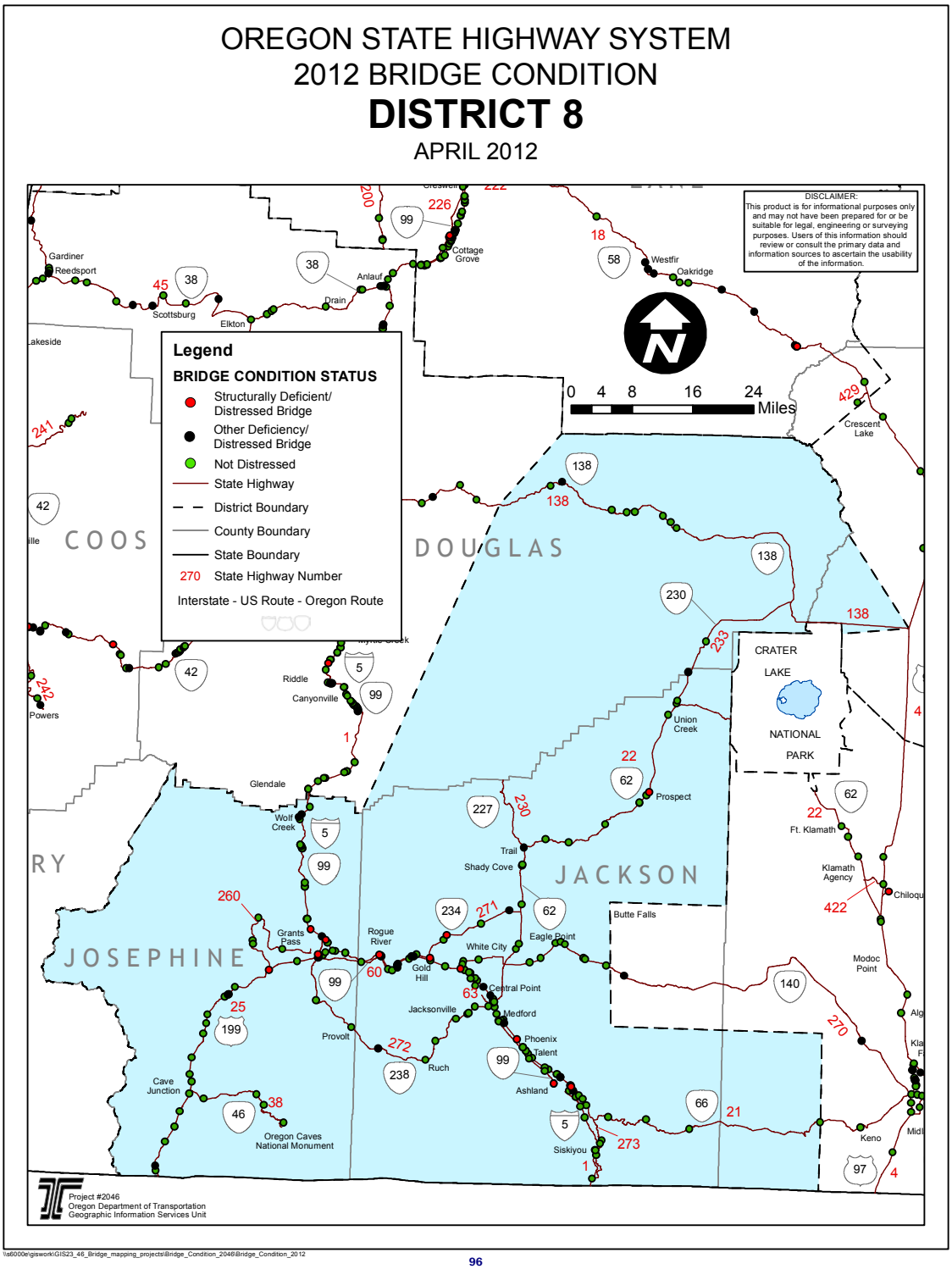
Table D-28: State Bridge Condition – Region 3, District 8

	Structurally Deficient / Distressed Bridges	Other Deficiency / Distressed Bridges	Not Distressed
Number	12	24	163
Percent	6.0%	12.1%	81.9%

Source: Oregon Department of Transportation, "2012 Bridge Condition Report", http://cms.oregon.gov/odot/hwy/bridge/pages/index.aspx, accessed August 2012.

[57] Loy, W. G., ed. 2001. Atlas of Oregon, 2nd Edition. Eugene, OR: University of Oregon Press
[58] State of Oregon Natural Hazards Mitigation Plan, Region 4 Southwest Oregon Regional Profile.
[59] Ibid.

Figure D-2 2012 Bridge Condition: Region 3, District 8



\\s6000e\gisworkGIS23_46_Bridge_mapping_projects\Bridge_Condition_2046\Bridge_Condition_2012

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Source: Oregon Department of Transportation, "2012 Bridge Condition Report", http://cms.oregon.gov/odot/hwy/bridge/pages/index.aspx, accessed August 2012.

Utility Lifelines

Utility lifelines are the resources that the public relies on daily, (i.e., electricity, fuel and communication lines). If these lines fail or are disrupted, the essential functions of the community can become severely impaired. Utility lifelines are closely related to physical infrastructure, (i.e., dams and power plants) as they transmit the power generated from these facilities.

Jackson County and the surrounding counties primarily receive oil and gas from Alaska by way of the Puget Sound through pipelines and tankers. Jackson County is at the southern end of this pipeline network; oil and gas are supplied by Northern California from a separate network. The electric, oil, and gas lifelines that run through the County are both municipally and privately owned.[60]

The network of electricity transmission lines running through the Southwest Oregon region is operated by Pacific Power and Light and primarily facilitates local energy production and distribution.[61] Most of the natural gas Oregon uses originates in Alberta, Canada. Avista Utilities owns the main natural gas transmission pipeline.[62] These lines may be vulnerable to severe, but infrequent natural hazards, such as earthquakes.

Synthesis

Given the unique dependent nature of Jackson County it is that much more critical to maintain the quality of built capacity throughout the area. The planning considerations seemingly most significant for the county are contingency planning for medical resources and lifeline systems due to the imminent need for these resources. As mentioned above, functionality of hospitals and dependent care facilities are a significant priority in providing for Jackson County residents. One factor that is critical to consider in planning is the availability of medical beds in local hospitals and dependent care facilities. In the event of a disaster, medical beds may be at a premium providing not just for the significant elderly population but the entire county. Some of these facilities may run at almost full capacity on a daily basis, hospitals should consider medical surge planning and develop memorandums with surrounding counties for medical transport and treatment. Additional memorandums to consider pertain to utility lifelines and transportation lifelines such as, airports, railways, roads and bridges with surrounding counties to acquire utility service and infrastructure repair.

While these elements are traditionally recognized as part of response and recovery from a natural disaster, it is essential to start building relationships and establishing contractual agreements with entities that may be critical in supporting community resilience.

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[60] Loy, W. G., ed. 2001. Atlas of Oregon, 2nd Edition. Eugene, OR: University of Oregon Press.
[61] Ibid.
[62] Ibid.

Community Connectivity Capacity

Community connectivity capacity places strong emphasis on social structure, trust, norms, and cultural resources within a community. In terms of community resilience, these emerging elements of social and cultural capital will be drawn upon to stabilize the recovery of the community. Social and cultural capitals are present in all communities; however, it may be dramatically different from one city to the next as these capitals reflect the specific needs and composition of the community residents.

Social Systems

Social systems include community organizations and programs that provide social and community-based services, such as employment, health, senior and disabled services, professional associations and veterans' affairs for the public. In planning for natural hazard mitigation, it is important to know what social systems exist within the community because of their existing connections to the public. Often, actions identified by the plan involve communicating with the public or specific subgroups within the population (e.g. elderly, children, low income, etc.). The County can use existing social systems as resources for implementing such communication-related activities because these service providers already work directly with the public on a number of issues, one of which could be natural hazard preparedness and mitigation. The presence of these services are more predominantly located in urbanized areas of the County, this is synonymous with the general urbanizing trend of local residents.

The social organizations identified in Jackson County can be involved in hazard mitigation; a few methods are defined below.

- Education and outreach – organization could partner with the community to educate the public or provide outreach assistance on natural hazard preparedness and mitigation.
- Information dissemination – organization could partner with the community to provide hazard-related information to target audiences.
- Plan/project implementation – organization may have plans and/or policies that may be used to implement mitigation activities or the organization could serve as the coordinating or partner organization to implement mitigation actions.

Civic Engagement

Civic engagement and involvement in local, state and national politics are important indicators of community connectivity. Those who are more invested in their community may have a higher tendency to vote in political elections. The 2008 Presidential General Election resulted in 85.2% voter turnout in the County. The 2010 State Representative General Election resulted in a voter participation rate of just 68.1%. [63] These results are relatively equal to voter participation reported across the State.[64] Other indicators such as volunteerism, participation in formal community networks and community charitable

[63] Jackson County, Election Information. http://www.co.jackson.or.us/Page.asp?NavID=2696
[64] Oregon Blue Book, Voter Participation. http://bluebook.state.or.us/state/elections/elections04.htm

contributions are examples of other civic engagement that may increase community connectivity.

Cultural Resources

Historic Places

Historic and cultural resources such as historic structures and landmarks can help to define a community and may also be sources for tourism revenue. Because of their role in defining and supporting the community, protecting these resources from the impact of disasters is important. Table D-29 identifies the type of historic features present in Jackson County. Overall there are a total of 149 historically registered places.

Table D-29: Jackson County Historic Places

Type	Number
Houses, Hotels, Resorts and Cabins	80
Districts	11
Municipal Buildings, Libraries and Schools	9
Cemetaries	4
Parks, Campgrounds, Ranches and Openspace	6
Military Posts, Ranger Stations and Guard Lookouts	11
Bridges	2
Churces	2
Misc. Buildings	24
Total	149

Source: National Register of Historic Places, Internet Query, http://nrhp.focus.nps.gov/natreghome.do?searchtype=natreghome, accessed April 2012.

Libraries and Museums

Libraries and museums develop cultural capacity and community connectivity as they are places of knowledge and recognition, they are common spaces for the community to gather, and can serve critical functions in maintaining the sense of community during a disaster. They are recognized as safe places and reflect normalcy in times of distress. There are currently six libraries in Jackson County located in Ashland, Gold Hill, Medford, Phoenix and White City.[65] The museums across Jackson County cater to varying audiences; they range from historical, science, art and biology museums.

[65] Oregon State Library, Library Directory. http://libdir.osl.state.or.us/

Cultural Events

Other such institutions that can strengthen community connectivity are the presence of festivals and organizations that engage diverse cultural interests. Jackson County is particularly recognized for the Oregon Shakespeare Festival in Ashland. Examples of other events and institutions include the Britt Festival in Jacksonville, the County Fair in Central Point and the Southern Oregon Historical Society in Medford. Not only do these events bring revenue into the community, they can improve cultural competence and enhance the sense of place. Cultural connectivity is important to community resilience, as people may be more inclined to remain in the community because they feel part of the community and culture.

Community Stability

Residential Geographic Stability

Community stability is a measure of rootedness in place. It is hypothesized that resilience to a disaster stems in part from familiarity with place, not only for navigating the community during a crisis, but also accessing services and other supports for economic or social challenges.[66] Table D-30 estimates residential stability across the region. It is calculated by the number of people who have lived in the same house and those who have moved within the same county a year ago, compared to the percentage of people who have migrated into the region. Jackson County overall has geographic stability rating of 93.5% (i.e., 93.5% of the population lived in the same house or moved within the county). The figures of community stability are relatively consistent across the region; Ashland shows the least geographically stable population (89.2%) while Central Point (94.3%) and Medford (94.3%) have the most geographically stable populations. Central Point, Medford, Rogue River and Shady Cove have the greatest percent of their populations that lived in the same house one year ago; while Ashland and Eagle Point have less population that was in the same house one year ago.

Table D-30: Regional Residential Stability

Jurisdiction	Population	Geographic Stability	Same House	Same County
Jackson County	198,316	93.5%	79.6%	13.9%
Ashland	19,924	89.2%	71.6%	17.7%
Central Point	16,206	94.3%	79.1%	15.1%
Eagle Point	7,692	91.2%	73.4%	17.8%
Medford	72,910	94.3%	78.6%	15.7%
Rogue River	2,003	92.9%	79.5%	13.4%
Shady Cove	5,946	90.7%	81.6%	9.1%

[66] Cutter, Susan, Christopher Burton, Christopher Emrich. "Disaster Resilience Indicators for Benchmarking Baseline Conditions". Journal of Homeland Security and Emergency Management.

Source: U.S. Census Bureau, 2006-2010 American Community Survey, Table B07003 "Geographical Mobility in the Past Year 5-Year Estimate", http://factfinder2.census.gov/, accessed August 2012.

Homeownership

Often homeownership is associated with greater resilience as it is a measure of place attachment and commitment. Homeownership is an indicator that residents will return to a community post-disaster, as these people are economically and socially invested in the community. Similar to communities with higher median household income, homeownership can reflect an increased resource capacity to prepare, respond and cope with a crisis situation. Table D-31 identifies housing tenure across the county. The table shows the home-ownership rate is lowest in Ashland, Medford and Rogue River. The higher percentage of renters in Ashland is likely attributed to the student population at Southern Oregon University, in Ashland. There are approximately, 75,000 renters within Jackson County; renters are less likely to return after a disaster, since they are less economically invested in the community.

Table D-31: Homeownership

Jurisdiction	Occupied Households	Owner Occupied	Percent Owner Occupied	Renter Occupied	Percent Renter Occupied	Population Renter Occupied
Jackson County	83,076	52,045	62.6%	31,031	37.4%	74,614
Ashland	9,409	4,856	51.6%	4,553	48.4%	8,907
Central Point	6,542	4,165	63.7%	2,377	36.3%	6,377
Eagle Point	3,231	2,246	69.5%	985	30.5%	2,717
Medford	30,079	15,606	51.9%	14,473	48.1%	35,301
Rogue River	1,054	519	49.2%	535	50.8%	1,077
Shady Cove	1,291	915	70.9%	376	29.1%	895

Source: U.S. Census Bureau, Table DP-1 "Profile of General Population and Housing Characteristics: 2010", http://factfinder2.census.gov, accessed April 2012.

Synthesis

Jackson County comprises various social and cultural resources that work in favor to increase community connectivity and resilience. Sustaining social and cultural resources such as, social services and cultural events, may be essential to preserving community cohesion and a sense of place. The presence of larger communities including Medford and Ashland makes available many resources and services for the public. However, it is important to consider that these amenities may not be equally distributed to the rural portions of the county and may produce implications for recovery in the event of a disaster.

In the long-term, it may be of specific interest to the county to evaluate community stability. A community experiencing instability and low homeownership may hinder the effectiveness of social and cultural resources, distressing community coping and response mechanisms.

Political Capacity

Political capacity is recognized as the government and planning structures established within the community. In terms of hazard resilience, it is essential for political capital to encompass diverse government and non-government entities in collaboration; as disaster losses stem from a predictable result of interactions between the physical environment, social and demographic characteristics and the built environment.[67] Resilient political capital seeks to involve various stakeholders in hazard planning and works towards integrating the Natural Hazard Mitigation Plan with other community plans, so that all planning approaches are consistent.

Government Structure

A three member Board of Commissioners governs Jackson County. The Commissioners serve as the Executive Branch and perform legislative and quasi-judicial functions of the County. Commissioners are responsible for the planning, formation and implementation of the annual budget. In addition, Commissioners serve on other federal, state and local mandated governmental panels, boards and commissions with fiscal duties and authority over public monies.[68]

[67] Mileti, D. 1999. Disaster by Design: a Reassessment of Natural Hazards in the United States. Washington D.C.: Joseph Henry Press.
[68] Jackson County. http://www.co.jackson.or.us/Departments.asp.

Beyond Emergency Management, all the departments within the county governance structure have some degree of responsibility in building overall community resilience. Each plays a role in ensuring that county functions and normal operations resume after an incident, and the needs of the population are met.

Some divisions and departments of Jackson County government that have a role in hazard mitigation are:[69]

- **Development Services**: Development Services manages the development, utilization, and preservation of Jackson County's natural resources in order to promote and protect the health, safety, and well-being of all citizens.
    - **Planning**: conducts both short and long-range plans that determine much of the built, physical community. Through the County Comprehensive Plan and subsequent policies, this department guides decisions about growth, development, and conservation of natural resources. The Planning Department can be partners in mitigation by developing, implementing, and monitoring policies that incorporate hazard mitigation principles such as ensuring homes, businesses, and other buildings are built to current seismic code and out of the flood zones.
    - **Building**: Administers structural, mechanical, plumbing, electrical and manufactured dwelling specialty codes. Building plays an active role in developing specialty codes that make building more structurally sound against hazards, i.e., flooding and earthquakes. This department could collaborate to do outreach with owners of structures that were not built up to modern, resilient code. Professionals from this department could even be called on to help survey buildings after an incident.
- **Watermaster**: The Watermaster works in conjunction with the Oregon Water Resources Department and is responsible for water supply management in the middle to upper Rogue Basin. The Watermaster functions as a local contact for landowners, elected officials and watershed councils, as well as other government agencies at the local, state, and federal level. The Watermaster performs routine dam safety inspections and regulates water usage during time of shortage. Considering the Watermaster is the community water liaison, they can collaborate to do public outreach about increased risk of wildfire due to limited water availability.
- **Health and Human Services**: The mission of Jackson County Health and Human Services is to plan, coordinate and provide public services that protect and promote the health and well being of county residents.
    - **Commission on Children and Families:** Plans, advocates, and engages the community around issues on behalf of families and children, often thought of as vulnerable populations due to increased sensitivity to the impacts of hazard incidents. Because this department is in frequent contact with a

[69] Ibid.

vulnerable population, it would be a natural partner in mitigation actions for outreach efforts and to build the County's awareness of the needs of children and families.

  - **Mental Health Services:** Provides a range of community-based mental health services to the citizens of Jackson County. Jackson County Mental Health (JCMH) provides information, referral and screening for all mental health concerns. JCMH provides immediate crisis assessment and intervention for mental health crises in the community. This department is composed of mental health subject matter experts that should be referenced in creating mitigation and response plans.

  - **Public Health:** Provides a wide range of services including prevention of disease, health education and promotion to assure the physical and mental well-being of County residents. As an inherently mitigation focused department, Public Health can be an ally in preparing the community for natural hazards. Public Health likely has a distribution network established for information and supplies and these connection to the community will be to encourage personal preparedness and also during incident response.

- **Information Technology**: focuses on providing the various other County departments with the information systems and telecommunications technology to conduct daily business. Without this critical component, the County could not effectively serve the residents. Mitigation efforts from this department would not likely involve citizens at all, but would go a long way to ensuring uninterrupted services during hazard incidents.

  - **Geographic Information Systems**: Develops and maintains a Geographic Information System (GIS) for Jackson County. The GIS is composed of computer maps and associated databases. Examples of the maps include soils, flood hazard areas, and streams. In all phases of the disaster cycle, information is key. Building robust data that catalogues not only the County's risk and vulnerability, but also resources and response capability can ensure that efficient and effective mitigation activities.

- **Public Works**: The Public Works Department assures the roads, bridges, traffic signs, and rights-of-way are designed, built, and maintained to provide users with the best-possible, safest transportation system. The Public Works department will have important information about the resilience of the physical aspects of the community. This department can help to prioritize projects for mitigation and will be a key partner in implementation as well.

- **Sheriff's Office**: The mission of the Jackson County Sheriff's Office is to provide quality public safety services, in a professional, ethical and fiscally responsible manner. Life safety is the first goal of mitigation and response. Public Safety interacts with the vulnerable aspects of the community on a day-to-day basis and can help identify areas for focused mitigation.

The communities of Ashland, Eagle Point, Rogue River and Shady Cove have the following government structures as illustrated in Table D-32.

Table D-32: Participating City Government Structure

	Ashland	Eagle Point	Rogue River	Shady Cove
Government Form	Mayor/ Council	Council/ Administrator	Council/ Mayor	Council/ Manager
City Manager/ Administrator	Yes	Yes	Yes	Yes
Mayor	Yes	Yes	Yes	Yes
City Council	6-Person	6-Person	6-Person	4-Person
Building	Yes	Yes	Yes	Yes
Conservation	Yes	No	No	No
Parks/ Recreation	Yes	Yes	No	No
Planning	Yes	Yes	Yes	Yes
Public Works	Yes	Yes	Yes	Yes
Police	Yes	Yes	Yes	Yes*
Fire	Yes	Yes**	No	No
Information Technology	Yes	No	No	Yes***

* Jackson County Sheriff's Office provides service for Shady Cove.
** Provided by Jackson County Fire District
*** Provided by Rogue Valley Council of Governments

Source: Oregon Partnership for Disaster Resilience

Existing Plan & Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances, and technical reports or studies. Plans and policies already in existence have support from local residents, businesses and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.[70]

The Jackson County Natural Hazards Mitigation Plan includes a range of recommended action items that, when implemented, will reduce the county's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the county's existing plans and policies. Linking existing plans and policies to the Natural Hazards Mitigation Plan helps identify what resources already exist that can be used to implement the action items identified in the Plan. Implementing the natural hazards mitigation plan's action items through existing plans and policies increases their likelihood of being supported and getting updated, and maximizes the county's resources.

The following are a list of plans and policies already in place in Jackson County:[71]

- Jackson County Floodplain Ordinance
- Jackson County Comprehensive Plan
- Jackson County Emergency Operations Plan
- Jackson County Integrated Fire Plan
- Jackson County Land Development Ordinance
    - Chapter 8.7: Wildfire Safety
- Jackson County Transportation System Plan

[70] Burby, Raymond J., ed. 1998. Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities.
[71] Jackson County. http://www.co.jackson.or.us/page.asp?navid=2611.

- Urban Growth Boundary Management Agreements/ Urbanization Policies
- White City Transportation System Plan
- White City Urban Unincorporated Community Plan

Ashland

- Floodplain Ordinance
- Emergency Operations Plan
- Hosler Dam Inundation Plan
- Water Master Plan
- Transportation System Plan
- Comprehensive Plan
- Community Wildfire Protection Plan

Eagle Point

- Flood Zone Ordinance
- Comprehensive Plan
- Transportation Plan
- Storm Drain Management Plan (Draft)
- Buchanan Ditch Storm Discharge Capacity Analysis
- Emergency Management Plan

Rogue River

- Floodplain Ordinance
- Comprehensive Plan
- Transportation System Plan
- Emergency Operations Plan
- Stormwater Management Plan

Shady Cove

- Floodplain Ordinance
- City of Shady Cove Comprehensive Plan
- Local Street Network Plan
- Emergency Operations Plan
- Storm Water Management Plan
- FEMA Compliance Plan

Synthesis

As addressed above, many governmental entities are responsible for work relevant to hazards planning; however, from this perspective it is challenging to decipher whether these structures work collaboratively in practice towards improving hazard mitigation. On a similar note, in short of reviewing each of the relevant policy documents it is questionable whether the documents effectively integrate hazard initiatives into implementation policy. Further analysis is needed to evaluate the effectiveness of political capital in terms of community resilience.

Appendix E:
Grant Programs and Resources

Post-Disaster Federal Programs

Hazard Mitigation Grant Program

- The Hazard Mitigation Grant Program (HMGP) provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act.
  http://www.fema.gov/hazard-mitigation-grant-program

Physical Disaster Loan Program

- When physical disaster loans are made to homeowners and businesses following disaster declarations by the U.S. Small Business Administration (SBA), up to 20% of the loan amount can go towards specific measures taken to protect against recurring damage in similar future disasters.
  http://www.sba.gov/category/navigation-structure/loans-grants/small-business-loans/disaster-loans

Pre-Disaster Federal Programs

Pre-Disaster Mitigation Grant Program

- The Pre-Disaster Mitigation (PDM) program provides funds to states, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are to be awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds.
  http://www.fema.gov/pre-disaster-mitigation-grant-program

Flood Mitigation Assistance Program

- The overall goal of the Flood Mitigation Assistance (FMA) Program is to fund cost-effective measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other National Flood Insurance Program (NFIP) insurable structures. This specifically includes:
  - Reducing the number of repetitively or substantially damaged structures and the associated flood insurance claims;
  - Encouraging long-term, comprehensive hazard mitigation planning;

- Responding to the needs of communities participating in the NFIP to expand their mitigation activities beyond floodplain development activities; and
- Complementing other federal and state mitigation programs with similar, long-term mitigation goals.
  http://www.fema.gov/flood-mitigation-assistance-program

Detailed program and application information for federal post-disaster and pre-disaster programs can be found in the f, available at :
https://www.fema.gov/library/viewRecord.do?id=4225

For Oregon Military Department – Office of Emergency Management grant guidance on Federal Hazard Mitigation Assistance, visit:
http://www.oregon.gov/OMD/OEM/pages/all_grants.aspx - Hazard_Mitigation_Grants

OEM contact: Dennis Sigrist, dsigrist@oem.state.or.us

State Programs

Community Development Block Grant Program

- Promotes viable communities by providing: 1) decent housing; 2) quality living environments; and 3) economic opportunities, especially for low and moderate income persons. Eligible Activities Most Relevant to Hazard Mitigation include: acquisition of property for public purposes; construction/reconstruction of public infrastructure; community planning activities. Under special circumstances, CDBG funds also can be used to meet urgent community development needs arising in the last 18 months which pose immediate threats to health and welfare.
  http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs

Oregon Watershed Enhancement Board

- While OWEB's primary responsibilities are implementing projects addressing coastal salmon restoration and improving water quality statewide, these projects can sometimes also benefit efforts to reduce flood and landslide hazards. In addition, OWEB conducts watershed workshops for landowners, watershed councils, educators, and others, and conducts a biennial conference highlighting watershed efforts statewide. Funding for OWEB programs comes from the general fund, state lottery, timber tax revenues, license plate revenues, angling license fees, and other sources. OWEB awards approximately $20 million in funding annually.
  http://www.oregon.gov/OWEB/Pages/index.aspx

Federal Mitigation Programs, Activities & Initiatives

Basic & Applied Research/Development

- National Earthquake Hazard Reduction Program (NEHRP), National Science Foundation. Through broad based participation, the NEHRP attempts to mitigate the effects of earthquakes. Member agencies in NEHRP are the US Geological Survey (USGS), the National Science Foundation (NSF), the Federal Emergency Management Agency (FEMA), and the National Institute for Standards and Technology (NIST). The agencies focus on research and development in areas such as the science of earthquakes, earthquake performance of

buildings and other structures, societal impacts, and emergency response and recovery. http://www.nehrp.gov/

- Decision, Risk, and Management Science Program, National Science Foundation. Supports scientific research directed at increasing the understanding and effectiveness of decision making by individuals, groups, organizations, and society. Disciplinary and interdisciplinary research, doctoral dissertation research, and workshops are funded in the areas of judgment and decision making; decision analysis and decision aids; risk analysis, perception, and communication; societal and public policy decision making; management science and organizational design. The program also supports small grants for exploratory research of a time-critical or high-risk, potentially transformative nature. http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5423

Hazard ID and Mapping

- National Flood Insurance Program: Flood Mapping; FEMA. Flood insurance rate maps and flood plain management maps for all NFIP communities. http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping
- National Digital Orthophoto Program, DOI – USGS. Develops topographic quadrangles for use in mapping of flood and other hazards. http://www.ndop.gov/
- Mapping Standards Support, DOI-USGS. Expertise in mapping and digital data standards to support the National Flood Insurance Program. http://ncgmp.usgs.gov/standards.html
- Soil Survey, USDA-NRCS. Maintains soil surveys of counties or other areas to assist with farming, conservation, mitigation or related purposes. http://soils.usda.gov/survey/printed_surveys/

Project Support

- Coastal Zone Management Program, NOAA. Provides grants for planning and implementation of non-structural coastal flood and hurricane hazard mitigation projects and coastal wetlands restoration. http://coastalmanagement.noaa.gov/
- Community Development Block Grant Entitlement Communities Program, HUD. Provides grants to entitled cities and urban counties to develop viable communities (e.g., decent housing, a suitable living environment, expanded economic opportunities), principally for low- and moderate- in come persons. http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/entitlement
- National Fire Plan (DOI – USDA) Provides technical, financial, and resource guidance and support for wildland fire management across the United States. Addresses five key points: firefighting, rehabilitation, hazardous fuels reduction, community assistance, and accountability. http://www.forestsandrangelands.gov/
- Assistance to Firefighters Grant Program, FEMA. Grants are awarded to fire departments to enhance their ability to protect the public and fire service personnel from fire and related hazards. Three types of grants are available: Assistance to Firefighters Grant (AFG), Fire Prevention and Safety (FP&S), and Staffing for Adequate Fire and Emergency Response (SAFER). http://www.fema.gov/welcome-assistance-firefighters-grant-program

- Emergency Watershed Protection Program, USDA-NRCS. Provides technical and financial assistance for relief from imminent hazards in small watersheds, and to reduce vulnerability of life and property in small watershed areas damaged by severe natural hazard events. http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp
- Rural Development Assistance – Utilities, USDA. Direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs. http://www.rurdev.usda.gov/Utilities_Programs_Grants.html
- Rural Development Assistance – Housing, USDA. Grants, loans, and technical assistance in addressing rehabilitation, health and safety needs in primarily low-income rural areas. Declaration of major disaster necessary.

  http://www.rurdev.usda.gov/HAD-HCFPGrants.html
- Public Assistance Grant Program, FEMA. The objective of the Federal Emergency Management Agency's (FEMA) Public Assistance (PA) Grant Program is to provide assistance to State, Tribal and local governments, and certain types of Private Nonprofit organizations so that communities can quickly respond to and recover from major disasters or emergencies declared by the President. http://www.fema.gov/public-assistance-local-state-tribal-and-non-profit
- National Flood Insurance Program, FEMA. Makes available flood insurance to residents of communities that adopt and enforce minimum floodplain management requirements. http://www.fema.gov/national-flood-insurance-program
- HOME Investments Partnerships Program, HUD. Grants to states, local government and consortia for permanent and transitional housing (including support for property acquisition and rehabilitation) for low-income persons. http://www.hud.gov/offices/cpd/affordablehousing/programs/home/
- Disaster Recovery Initiative, HUD. Grants to fund gaps in available recovery assistance after disasters (including mitigation). http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/dri
- Emergency Management Performance Grants, FEMA. Helps state and local governments to sustain and enhance their all-hazards emergency management programs. http://www.fema.gov/fy-2012-emergency-management-performance-grants-program
- Partners for Fish and Wildlife, DOI – FWS. Financial and technical assistance to private landowners interested in pursuing restoration projects affecting wetlands and riparian habitats. http://www.fws.gov/partners/
- North American Wetland Conservation Fund, DOI-FWS. Cost-share grants to stimulate public/private partnerships for the protection, restoration, and management of wetland habitats. http://www.fws.gov/birdhabitat/Grants/index.shtm
- Federal Land Transfer / Federal Land to Parks Program, DOI-NPS. Identifies, assesses, and transfers available Federal real property for acquisition for State and local parks and recreation, such as open space. http://www.nps.gov/ncrc/programs/flp/index.htm

- Wetlands Reserve program, USDA-NCRS. Financial and technical assistance to protect and restore wetlands through easements and restoration agreements. http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/wetlands
- Secure Rural Schools and Community Self-Determination Act of 2000, US Forest Service. Reauthorized for FY2012, it was originally enacted in 2000 to provide five years of transitional assistance to rural counties affected by the decline in revenue from timber harvests on federal lands. Funds have been used for improvements to public schools, roads, and stewardship projects. Money is also available for maintaining infrastructure, improving the health of watersheds and ecosystems, protecting communities, and strengthening local economies. http://www.fs.usda.gov/pts/

Appendix F:
Business Preparedness and Recovery

Introduction

Note: This section presents and assessment of business preparedness and a related questionnaire that was developed and implemented in 2001 during the creation of the Jackson County NHMP.

Jackson County businesses are vulnerable to an array of hazards, both natural and technological, which can affect business operations and the regional economy. The focus of Jackson County Business Preparedness Assessment is on the perception of risk of Jackson County's business owners and the current level of preparedness for natural hazard events.

In a post-disaster environment, economic recovery is a key goal for any community. However, community-wide recovery efforts often only address elements such rebuilding roads, public facilities, and other critical community infrastructure; rarely do communities address the topic of individual business continuity. Research, including reports from the Federal Emergency Management Agency (FEMA), has concluded it is not enough to look only at the internal business operations and needs. There is a codependent relationship between business and the community within it operates.

> *"Even if the facility survives a natural disaster with little or no damages, the business cannot operate if the transportation or utility systems it relies upon are damaged, if employees can't get to work and customers can't buy products or services. A business is dependent on its employees' and the community's resilience to natural disasters."*[1]
>
> *James L. Witt, (Former) Director of the Federal Emergency Management Agency*

According to U.S. Department of Labor Statistics, over 40% of all companies that experience a disaster never reopen and over 25% of the remaining companies close within two years.[2] Natural hazard events weaken the core of any community's economy. These issues underscore a strong need for coordinated efforts aimed at risk reduction in Jackson County and its business communities. Mitigation is one way to reduce the economic and structural impacts of natural hazards on Jackson County businesses.

What is business preparedness?

Business Preparedness (also known as contingency planning) is focused on putting practices, or contingencies, into place before an emergency event occurs so that (1) the business can adequately respond when the hazard event happens, and (2) continue to operate given the new circumstances. Preparedness planning or pre-emergency planning is considered any

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1 Protecting Business Operations: Second report on costs and benefits of natural hazard mitigation, FEMA REPORT 331, Federal Emergency Management Agency, Mitigation Directorate, Washington, DC August 1998,
2 Tampa Bay Regional Planning Council, "Your Business Disaster Continuity Planning Guide", Small Business Disaster Survival Kit CD-ROM.

type of planning that can increase the individual, organizational, and community control over the subsequent disaster response.[3]

What is known about business preparedness?

Until recently, little empirical research was conducted on how business and industry withstands and recovers from natural hazard events, and more specifically, why some businesses survive while others fail.

The most conclusive research to date was conducted by the University of Delaware's Disaster Research Center (DRC). Since 1993, the DRC has conducted five systematic, large-scale mail surveys to gauge the level of hazard awareness, preparedness, disaster impacts and short and long term recovery across 5,000 private sector firms throughout the United States.[4] The five communities included Memphis/Shelby County Tennessee; Des Moines, Iowa, impacted by the 1993 Midwest Floods; Los Angeles, California, impacted by the 1994 Northridge Earthquake; Santa Cruz, California impacted by the 1989 Loma Prieta Earthquake; and South Dade County Florida, impacted by Hurricane Andrew (1992). This research illustrates characteristics that contribute to business resilience, and empirical data that suggests that basic assumptions may not hold up in relation to business recovery prospects. Some key points include:

- A low percentage of business owner/operators actually engage in mitigation and preparedness activities;
- The greatest trend in mitigation and preparedness planning is focusing activities on immediate life safety in the aftermath of a natural hazard event;
- The most devastating impact of natural hazards is not the event itself but the business interruption caused by utility and telecommunication disruption;
- Preparedness and post-disaster financial aid bear no relation to recovery rates; and
- The most successful preparedness and mitigation activities are the most far-reaching in scope: onsite is good but community- wide is better.

Their research also concluded that basic determinants of disaster preparedness were a series of characteristics that included the size and type of the business; whether the business was independently owned or part of a franchise; the age of the business, and whether business property was owned or leased.[5] Common sense suggests that the larger the business, the more resources at its disposal for emergency planning.

Findings from the University of Delaware's Disaster Research Center pointed to the correlation between the size of a firm and its level of preparedness. Overall, the size of a business appears to be the most important factor influencing the propensity of businesses to prepare. In every community DRC studied, larger organizations have done more to

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[3] James M. Dahlhamer and Melvin J. D'Souza, University of Delaware Disaster Research Center. "Determinants of Business Preparedness," International Journal of Mass Emergencies and Disaster 15 (1997) 267.

[4] Gary R. Webb, Kathleen J. Tierney, and James M. Dahlhamer, University of Delaware Disaster Research Center. "Businesses and Disasters: Empirical Patterns and Unanswered Questions," Natural Hazards Review 1 (2000) 83.

[5] James M. Dahlhamer and Melvin J. D'Souza, University of Delaware Disaster Research Center. "Determinants of Business Preparedness," International Journal of Mass Emergencies and Disaster 15 (1997) 267.

prepare than their smaller counterparts."[6] Larger firms had more financial and labor resources to organize and plan for emergency events, and the more employees working at the firm, the more likely there were evacuation plans and other preparedness measures in place. The age of the business is also a measurable determinant of business preparedness.

The older a business becomes, the more likely it is to have amassed resources and institutional knowledge for mitigation and preparedness activities. Business locations owned rather than leased are also more likely to invest additional money for mitigation or preparedness activities.[7]

The national research led to specific recommendations regarding business mitigation for natural hazard events. According to Businesses and Disasters: Empirical Patterns and Unanswered Questions published in the Natural Hazards Review in May of 2000 communities should:[8]

- Focus on smaller businesses and less-prepared sectors;
- Find out more about what kinds of approaches work best to get business to take action; and
- Address the crucial linkage between community and business.

The Jackson County Business Recovery Questionnaire was developed to assess the situation and determining future steps to assist the County's business community reduce risk from natural hazards.

Jackson County Business Recovery Questionnaire

Purpose

Jackson County included a Business Recovery Questionnaire as part of the development of the Jackson County Natural Hazards Mitigation Action Plan. The questionnaire surveyed local businesses, regardless of business size or type, to collect information regarding business disaster preparedness. Specifically, the questionnaire was designed to:

1. Gauge the extent of business preparedness for natural hazard events;
2. Evaluate what business have already done to be prepared for natural hazard events;
3. Document concerns local business owners/operators have related to natural hazards;
4. Identify the format in which owner/operators prefer to receive information; and
5. Increase the level of local business preparedness.

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[6] Gary R. Webb, Kathleen J. Tierney, and James M. Dahlhamer, University of Delaware Disaster Research Center. "Businesses and Disasters: Empirical Patterns and Unanswered Questions," Natural Hazards Review 1 (2000) 85.
[7] James M. Dahlhamer and Melvin J. D'Souza, University of Delaware Disaster Research Center. "Determinants of Business Preparedness," International Journal of Mass Emergencies and Disaster 15 (1997) 267.
[8] Ibid.

The questionnaire establishes a baseline of information about services that are critical to local business and evaluates the business community's understanding of mitigation activities that assist in reducing their risk to natural hazards. Survey results provide the basis for recommendations that the County can use to minimize natural hazard impacts on the local business and the economy.

Methodology

The questionnaire was adapted from a disaster resilience survey developed by Stephen B. Baruch & Associates of Los Altos, California. Representatives from Oregon Natural Hazards Workgroup, Institute for Business & Home Safety, Jackson County, and Southern Oregon Economic Development, Inc (SOREDI) reviewed and refined the questionnaire content before distribution. The survey was then field tested on 11 businesses representing a diverse range of industry sectors, number of employees, and geographic location in Jackson County. Input from the field test refined the survey further before its countywide distribution.

A postcard was mailed to announce the survey and describe what would be asked and how the information would be used. The survey followed, along with a business reply postcard indicating whether survey respondents wanted to receive the survey results and/or whether they wanted to participate in a workshop designed to provide information and resources to those who want to improve their business preparedness. Another survey mailing followed to remind people to fill out and return surveys.

CPW distributed questionnaires to 989 employers within Jackson County using an Oregon Employment Department database. The sample included both private and public employers. CPW received 228 valid responses, which is a 23% response rate.

Findings

The questionnaire contained 13 questions. Following are survey results and highlights of the key findings. The questionnaire summary is comprised of three core elements:

1. General information and background,
2. Susceptibility to natural hazards events, and
3. Preparedness and mitigation activities

To review a full copy of the survey and results refer to the last section of this appendix.

General information and background

In 1999, Jackson County had about 5,269 employers representing about 71,600 jobs.[9] This survey represents 228 of those employers and 22,894 current jobs.[10] The first five questions of the survey requested general business information: years of operation, type of business, ownership status, and employees – how many and average commute time to work.

Key findings from the Jackson County respondents related to business age, business type, and ownership include:

- 18% of business owners have been in operation for 1 to 10 years; 42% of business owners have been in operation for 11 to 25 years; and 2% of business owners have been in operation for over 100 years.
- 67% owned/operated individual firms
- 23% owned/operated a chain of businesses
- 51% own the building their business occupies
- 42% lease the business location

Key findings from the Jackson County respondents related to business size and distance from business location and employees:

- 54% of respondents had 25 employees or less; 12% of respondents had between 100 and 499 employees; and 3% or respondents had over 500 employees.
- 66% report that employee commutes typically last between 15 to 29 minutes
- 27.7% of businesses that report commutes lasting between 5 to 14 minutes

Susceptibility to natural hazards events

This section of the survey addressed business vulnerability to different natural hazards and the need for various services and infrastructure.

The survey asked respondents to list the severity of impact that the listed hazard could have on their business, using a five-point scale.

[9] Oregon Employment Department, 1999 Covered Employment and Payroll. http://www.olmis.org.
[10] Community Planning Workshop/Oregon Natural Hazards Workgroup, 2001 Jackson County Business Preparedness Survey.

Of the twelve hazards listed in Table F.1, flooding, earthquake, electricity and water supply loss appear to be critical business impacts. Wind damage, winter storm/snow/ice, windstorm and hazardous materials accidents were rated as important business impacts.

Volcanic eruption was the only hazard event that survey respondents felt no need to address at this time. "Other" captured 36% of survey responses in the "no need to address now" category, but individual responses were not separated.

Table F.1. How severe are natural hazard impacts on your business?

Hazard Event	Critical	Very Important	Important	Not Very Important	No Need to Address Now
Wind damage	9.7%	14.7%	**35.0%**	34.1%	6.5%
Flooding	**24.3%**	19.8%	20.3%	**24.3%**	11.3%
Landslide / Debris Flow	12.4%	9.2%	15.6%	**34.9%**	28.0%
Winter storm / snow & ice	16.9%	23.7%	**34.2%**	21.5%	3.7%
Windstorm	12.1%	17.7%	**35.3%**	29.3%	5.6%
Earthquake	**35.7%**	20.4%	18.6%	17.2%	8.1%
Volcanic eruption	23.9%	10.4%	12.2%	23.0%	**30.6%**
Electricity loss	**63.4%**	21.9%	7.6%	5.8%	1.3%
Hazardous materials accident	17.8%	18.3%	**27.9%**	26.0%	10.0%
Air / train accidents	6.9%	11.9%	16.1%	**39.4%**	25.7%
Water supply loss	**41.4%**	18.5%	25.2%	11.7%	3.2%
Wildfire	19.0%	16.3%	22.6%	**26.2%**	15.8%
Other	31.8%	13.6%	4.5%	13.6%	**36.4%**

Source: Community Planning Workshop 2001

Table F.1 shows that flooding is a critical impact for 24% of survey respondents and it also shows that 24% of survey respondents don't consider flooding to be very important in terms of potential impact. These seemingly opposite outcomes result directly from business location. If a business were located near a floodplain then it could be a critical impact, while if a business is not near a floodplain then flooding would not be a worry.

The survey asked respondents to rate the importance of infrastructure and services on business operations. Table F.2 shows how the majority of respondents rated each type of infrastructure and service.

Table F.2. How important are services to your business operations?

Service Type	Critical	Very Important	Important	Not Very Important	No Need to Address Now
Electricity	**78.1%**	15.4%	3.9%	1.8%	0.9%
Water	**46.9%**	23.5%	16.8%	11.1%	1.8%
Natural gas	**31.0%**	19.0%	18.1%	16.8%	15.0%
Phone/ Internet	**55.9%**	23.3%	17.6%	3.1%	0.0%
Postal/ package services	19.7%	27.8%	**34.5%**	12.6%	5.4%
Sewer/ wastewater services	**32.0%**	24.9%	27.6%	11.6%	4.0%
Transportation, e.g. roads, rail	**35.7%**	29.1%	26.4%	6.6%	2.2%

Source: Community Planning Workshop 2001

With the exception of postal/package services, all services and infrastructure were rated as a critical need for business operations. Survey respondents rated electricity as the most critical business need, followed by phone/Internet services and water. National findings also reveal that electricity is the most critical service to business operations, the absence of which is economically devastating.[11]

The survey asked how long businesses could afford to be shut down or inoperable during a natural hazard event before suffering major financial loss. The first part of the question asked whether businesses would suffer financial loss immediately, within hours, or within days.

- 39% of respondents would suffer immediate financial impacts,
- 7% of businesses feeling financial impacts in a matter of hours, and
- 54% of respondents would suffer major financial loss in a matter of days.

The second part of the question tried to quantify the number of hours or days it would take for a business to suffer financially. Results yielded:

- 76% of survey respondents indicated that their business would suffer financial loss within 12 hours,
- 18% of respondents thought their business would suffer financial loss between 13 and 24 hours, and
- 6% of survey respondents felt their business would suffer financial loss between 37 and 48 hours.

When asked how many days it would take before businesses suffer financial loss, he results yielded:

- 82% would suffer major financial loss within 10 days,
- 13% would suffer within 11 to 20 days, and
- 4% would suffer financial loss within a one-month period.

The survey asked respondents to identify all the transportation systems upon which the business depends. Below is a breakdown of the most utilized transportation systems.

- 90% of respondents primarily relied on city roads,
- 85% of respondents using state highways,
- 83% using interstate highways, and

[11] Kathleen J. Tierney and Joanne M. Nigg. University of Delaware Disaster Research Center. Business Vulnerability to Disaster-Related Lifeline Disruption. From the Proceedings of the Fourth U.S. Conference on Lifeline Earthquake Engineering. New York: Technical Council on Lifeline Earthquake Engineering, American Society of Civil Engineering. (1995) 72-79.

- 75% of businesses using county roads.

Though important to the businesses that use them, air and rail made up a small overall percentage. The "other" category made up four of survey responses and included such specific transportation modes as elevators and mass transit.

The survey specifically addressed lifeline services for business operations. Respondents were asked to rate the level of importance of each critical service for business operations. Five types of service were covered including: electrical power, telecommunications, water, sewage disposal, and natural gas. For each service category, an "other" category was provided to capture answers that were not listed in the questionnaire.

Electrical power

CPW asked responders how important electrical service is for four basic business operations: computers/cash registers; machinery; lights/office and heating/ventilation/air conditioning.

- 50% survey respondents consider electricity critical to power computers and cash registers, and
- 47% think electricity is critical for machinery, lighting and office uses.

Approximately 88% of respondents stated that electrical power was important to critical in need for their business, specifically in using electricity for heating/ventilation/air conditioning (HVAC). Refrigeration and security make up the lion's share, at 22% each.

Telecommunications

Telecommunication in the form of telephones, fax machines, computer modems, and credit card machines are important to many businesses.

- 52% of survey respondents consider regular phone use a critical need for business operations.
- 44% consider computer modems as critical.
- 29% consider fax machines as critical to business operations.
- 18% of respondents consider credit card machines critical. At the opposite end of the spectrum, though, almost 40% of surveyed businesses do not use credit card machines in their daily operations.

Water

Water for drinking, cooking, bathroom and sanitary use, industrial use, and HVAC systems, is considered a critical service for many survey respondents.

- 42% of respondents consider the "other" category as the most critical need for water for their business.
- 37% consider water as critical for bathroom use.
- 33% consider water as critical for drinking and cooking use.

- Of the 13% of survey respondents who considered water critical to their HVAC systems, 28% at least considered it important and anther 27% didn't use water for that purpose.

Sewage disposal

Sewage disposal is used for bathroom/sanitary and industrial use.

- Over 39% consider bathroom use and sanitary sewers as critical to business operations.
- 12% consider industrial wastewater disposal as critical.
- Almost 47% of surveyed businesses do not use water for industrial processes.
- What is difficult to decipher is that 77% of "other" is noted as not being used, but it is not evident what water is not being used for.

Natural gas

Natural gas is used in industrial processes and HVAC systems for many businesses. Key respondent findings include:

- Of those surveyed, 15% consider natural gas critical for industrial processes.
- 22% who consider natural gas critical for HVAC systems.
- 22% consider natural gas to be critical for other service categories.
- Approximately 50% use natural gas for kitchen use.

Mitigation activities and business preparedness

CPW asked survey respondents to identify how important various mitigation activities would be to their business and to gauge their level of preparedness.

Survey respondents evaluated the potential importance of specific mitigation activities for their business by rating the activities as very useful, somewhat useful, not useful or already addressed. Five categories of mitigation activities were listed in the questionnaire including: facility and road access; utilities; businesses helping businesses; training and public outreach; and mitigation incentives.

Facility and road access

Table F.3 indicates how respondents rated potential activities, and also shows whether a particular mitigation activity is not considered useful or has already been addressed. All five activities were considered very useful by between 41% and 53% of survey respondents though much smaller percentages, ranging from 4% to 6% had actually implemented such activities.

Table F.3. How important would facility and road access mitigation activities be to your business?

Facility & Road Access	Very Useful	Somewhat Useful	Not Useful	Already Addressed
Road access issues & debris removal	**52.9%**	37.6%	5.9%	3.6%
Alternate route availability	**48.9%**	38.0%	9.5%	3.6%
Data & equipment protection	**52.7%**	32.3%	8.6%	6.4%
Retrieval of critical data from storage	**41.0%**	36.9%	16.7%	5.4%
Allocation of emergency response efforts	30.5%	**54.9%**	9.9%	4.7%

Source: Community Planning Workshop 2001

Utilities

Table F.4 shows which utility-related mitigation activities survey respondents considered to be very useful and somewhat useful. Back-up power sources were considered the most potentially useful activity at 71%, followed by forming single points of contact to report utility failure (60%) and forming single points of contact for businesses regarding business preparedness activities (57%). Relatively small percentages had already addressed these types of mitigation activities.

Table F.4. How important would utility mitigation activities be to your business?

Utilities	Very Useful	Somewhat Useful	Not Useful	Already Addressed
Make information "one phone call away" for businesses	**56.9%**	37.3%	3.6%	2.2%
Back-up power sources	**71.0%**	21.4%	3.1%	4.5%
Single point of contact for reporting utility failure	**60.4%**	32.4%	4.9%	2.2%
Alternate communications	**50.7%**	39.5%	6.7%	3.1%
Alternate shipping/ transportation	25.7%	**44.5%**	27.5%	2.3%
Sewage plan protection	31.2%	**46.0%**	20.0%	2.8%
Central input progress reports	18.9%	**47.6%**	29.1%	4.4%

Source: Community Planning Workshop 2001

Businesses helping businesses

Businesses helping businesses refers to reaching out and forming partnerships before a disaster strikes and mutually increasing business resilience after a disaster. Table F.5 shows that almost 45% of respondents consider sharing resources in an emergency as potentially beneficial. About 25% of respondents concluded that mentoring programs would not be useful. Again, very small percentages, ranging between 0.5% and 2.3%, had already addressed such measures.

Table F.5 How important would "businesses helping businesses" be for your business?

Businesses Helping Businesses	Very Useful	Somewhat Useful	Not Useful	Already Addressed
Resource sharing in an emergency situation	**44.6%**	41.4%	11.7%	2.3%
Work with "like" businesses on mitigation projects	35.7%	**40.7%**	21.7%	1.8%
Mentoring program between more & less prepared businesses	20.5%	**52.5%**	25.1%	1.8%
Mutual aid networks for emergency shelter & food	36.7%	**45.0%**	17.9%	0.5%
Large scale food vendors/ facilities that could cooperate with smaller, related businesses	28.8%	**40.5%**	30.2%	0.5%

Source: Community Planning Workshop 2001

Training and public outreach

Table F.6 indicates that a central point of contact for information dissemination was considered to be the most useful activity, at 53%. Alternate school and daycare sites, information from work about personal preparedness and an informational website were considered somewhat useful to survey respondents. A negligible percentage reported having conducted these mitigation activities. Communication with the Jackson County Emergency Management Office, however, rated the most commonly completed activity.

Table F.6. How important would training & public outreach mitigation activities be for your business?

Training and Public Outreach	Very Useful	Somewhat Useful	Not Useful	Already Addressed
Develop a direct notification plan for vulnerable businesses	**44.2%**	42.9%	12.5%	0.4%
Develop a central contact office to quickly disseminate information	**52.7%**	36.6%	9.8%	0.9%
Communicate with Jackson County Emergency Management Office	41.8%	**45.8%**	9.8%	2.7%
Plan & publicize alternate commute routes	**44.8%**	43.9%	10.8%	0.4%
Alternate school / day care sites so employees can leave home for work	29.3%	**50.5%**	20.3%	0.0%
Help employees make plans to protect themselves & their home	37.8%	**51.4%**	10.8%	0.0%
Develop a website for business & community to report damages and recovery after a disaster	30.0%	**50.5%**	19.5%	0.0%

Source: Community Planning Workshop 2001

Mitigation incentives

Just over half the survey respondents, at 51%, would consider expediting the permit process to facilitate mitigation projects. Financial aid for structural retrofits (46%) and asset management as a part of disaster preparedness and recovery (54%) were considered somewhat useful, as shown in Table F.7. These percentages actually translate into about 100 people willing to participate in some mitigation incentive program to promote disaster mitigation and preparedness.

Table F.7. How important would mitigation incentives be for your business?

Mitigation Incentives	Very Useful	Somewhat Useful	Not Useful	Already Addressed
Loans & grants for structural retrofits & other disaster preparedness measures	40.1%	**46.1%**	13.4%	0.5%
Expedite permit process for mitigation projects	**51.4%**	38.0%	10.2%	0.5%
Information that emphasizes asset management as part of disaster preparedness & recovery	28.4%	**53.5%**	16.7%	1.4%

Source: Community Planning Workshop 2001

The survey also asked respondents to indicate their preferred format for receiving information about mitigation and preparedness activities. About 59% of respondents favored a fact sheet/brochure that could be distributed to interested business owners. A self-paced handbook came in at a close second at 54%, followed by the Internet at 36%, newspapers at (27%) and TV/radio at 20%.

CPW asked respondents to identify which preparedness activities are addressed by the business. Additionally, respondents identified activities that the business had already done, planned to do, or was unable to do. If the activity was not applicable, respondents were given the opportunity to say so.

Table F.8 lists types of preparedness activities and the percentage of survey respondents who have engaged in such activities at their business. The bold and italicized percentages indicate the majority of responses for a given activity. Only the purchase of business interruption insurance was identified as having been done for the most survey respondents.

The majority of survey respondents indicated that the remaining ten disaster preparedness activities had not been done for their business. Since respondents were given the option to express whether they planned to conduct the activity, were unable to engage in the activity, or that the activity was not applicable to their business, then the conclusion is that survey respondents simply have not taken action in regard to specific business preparedness activities.

Table F.8. Have you engaged in natural disaster preparedness activities at your business?

Preparedness Activities	Have Done	Plan to Do	Not Done	Unable to Do	Not Applicable
Attended meetings / received written information on preparedness	35.1%	6.7%	**52.4%**	0.0%	5.8%
Talked with employees about what to do in an emergency	43.8%	7.5%	**44.7%**	0.0%	4.0%
Developed an employee plan about disaster procedures	35.0%	14.8%	**47.5%**	0.0%	2.7%
Purchased flood insurance	17.1%	3.3%	**46.4%**	3.8%	29.4%
Purchased business interruption insurance	**39.1%**	2.9%	38.2%	1.9%	17.9%
Stored extra fuel / batteries & other emergency supplies	31.8%	7.3%	**51.4%**	2.3%	7.3%
Developed a business emergency response plan	36.0%	12.2%	**49.1%**	0.5%	2.3%
Developed a business emergency recovery plan	17.1%	13.5%	**63.5%**	0.5%	5.4%
Conducted employee disaster drills / exercises	30.0%	11.2%	**56.1%**	0.4%	2.2%
Made arrangements for alternate business sites in an natural disaster	9.5%	4.1%	**57.2%**	15.3%	14.0%
Obtained an emergency back-up generator for power	28.8%	6.3%	**55.4%**	4.5%	5.0%

Source: Community Planning Workshop 2001

Survey and Research Conclusions

The Jackson County Business Recovery Questionnaire yielded several interesting findings. A low overall percentage of surveyed businesses are actually engaged in mitigation and preparedness activities, though all the potential mitigation activities were rated as useful to very useful. Almost 30% of respondents had purchased flood insurance, followed by approximately 18% who had purchased business interruption insurance, and 14% of respondents who had secured alternate business sites.

Central points of contact for reporting problems and receiving information were listed as the most useful type of future mitigation activities. There also exists a need for increasing the public education and outreach related to hazard mitigation tools and techniques and response procedures for disaster events.

Preservation of community infrastructure and services is necessary for overall economic recovery. Mitigation and preparedness techniques should be a dual effort between the individual business owner for on- site needs and the community for off-site needs.

National research results spell out that there are some general determinants of post disaster recovery include: the size of the business, whether the firm is an individual firm or

part of a chain, age of the business and whether the business location is owned or leased. Additionally, individual economic trends figure more prominently than the disaster itself. In other words, if the business was not doing well for whatever reason before the disaster, then chances are it will not survive the disaster event.[12] However, this does not suggest a 'do nothing approach.' It supports working towards an understanding of the risks that communities and business face, and determining appropriate means to reduce the risk of natural hazards.

Recommendations

Overall, both nationally and in Jackson County, research to date suggests that businesses are not adequately prepared for disaster events.[13] Businesses rely on government and private sector services such as utilities, telecommunication, and infrastructure. Public/private sector partnerships are therefore essential in achieving business preparedness and implementing mitigation activities. This assessment lists several conclusions resulting from the Jackson County Business Recovery Questionnaire and from national research.

Questionnaire findings yield potential activities for reducing businesses' risk from natural hazards. These recommended activities can be undertaken on a personal level or community level. Businesses can choose to participate and decide how the activities will be accomplished. Community level activities are broader in scope and affect larger areas than individual business sites, and require greater cooperation than individual activities and projects.

Recommendation #1:

Conduct a business preparedness focus group/workshop within the County

It was evident in the survey that people wanted more information on natural hazards mitigation and business preparedness. How information is disseminated within a community, however, can impact the number of people who actually receive and understand the information. When respondents were asked how they would like to receive information about natural hazard mitigation, the indicated preferences for the following:

- 59% fact sheet or brochure
- 54% a handbook
- 36% Internet
- 27% newspaper
- 20% radio or TV

[12] Daniel J. Alesch, James N. Holly, Elliott Mittler and Robert Nagy. When Small Businesses and Not-For-Profit Organizations Collide with Natural Disasters. Preliminary Research in cooperation with the Public Entity Risk Institute, Fairfax, Virginia. (2000).
[13] Gary R. Webb, Kathleen J. Tierney, and James M. Dahlhamer, University of Delaware Disaster Research Center. "Businesses and Disasters: Empirical Patterns and Unanswered Questions," Natural Hazards Review 1 (2000) 85.

- 19% workshops
- % Chamber of Commerce

This recommendation is focused on ensuring that when business preparedness information is developed for Jackson County businesses, it is designed and disseminated in way that is useful and reaches a large percentage of Jackson County businesses.

Conducting a focus group with a cross-section of business representatives from Jackson County will provide an opportunity to gather information on the type of information needed, and how best to spread that information out to the community. Forty-nine of the survey respondents returned postcards indicating that they would be interested in participating in a workshop aimed at increasing Jackson County business resilience. These respondents could be targeted for the initial focus group/workshop that will lead to a more widespread outreach campaign.

Once outreach programs are developed, the County can present resources on basic mitigation and preparedness planning that deal with immediate life safety issues in the disaster's aftermath and contingencies that will help secure economic recovery. Disaster plans can take many forms and focus on many things, (i.e. evacuation, response, recovery). A *Capital District Business Review* article emphasizes the four C's: Circumvention (avoid it entirely); Continuity (What are you going to do to keep essential processes running?); Crisis management (As well as the business, what are you doing to respond to the crisis itself?); and Contingency planning (develop enough contingencies to minimize overall impact to the business).[14]

Two examples of self-paced publications and programs that are helpful include:

Open for Business: A Disaster Planning Toolkit for the Small Business Owner, compiled by the Institute for Business and Home Safety in partnership with the Small Business Administration. The booklet is designed to help the business owner identify and plan for potential hazards, continue operating after the disaster and give basic advise on equipment and supplies.

Obtain a copy of this resource: http://www.crew.org/products-programs/open-business-disaster-planning-toolkit-small-business-owner

Emergency Management Guide for Business and Industry: A Step-by-step Approach to Emergency Planning, Response and Recovery for Companies of All Sizes, compiled by the Federal Emergency Management Agency, Publication #141 (1993) identifies steps business owners can engage in to increase business resilience.

Obtain a copy of this resource: http://www.fema.gov/library/viewRecord.do?id=1689

[14] Dan Napolitano and Richard Pearl. Having Business Impact Plan can aid in Disaster Recovery. Capital District Business Review. (1999). http://albany.bcentral.com/albany/stories/1999/05/24/focus5.html.

Recommendation #2:

Send survey results to interested parties to stimulate thought and dialogue about emergency preparedness.

Use the database that resulted from the returned postcards to create a mailing list to mail out survey results. This list contains about 80 people. From this group, leaders may emerge who are committed to building a more disaster resilient economy.

Develop strategies to engage agencies, businesses, and community-based organizations in this dialogue include fostering partnerships and developing outreach programs to assist businesses engage in mitigation and preparedness activities. The initial list of survey respondents interested in receiving more information on business preparedness is just a start to the stakeholders who can engage in this process. Chamber of Commerce's, Small Business Development Center's, Economic Alliances, Business Associations, and other state, county, and community agencies and organizations should be included in future discussions on business preparedness.

The Jackson County Business Preparedness Survey provides information on both the severity of impact that natural hazards have on county businesses, as well as programs and informational needs desired by county business owners. This information can be used to design, implement, and target various business groups for technical assistance and education and outreach related to business preparedness.

Business Recovery Questionnaire

Note: This is the 2001 business recovery questionnaire.

This questionnaire is comprised of three elements: (1) assessing disaster preparedness of Jackson County businesses and (2) understanding business community needs in reducing risk and loss from natural hazards and (3) gauging business owner knowledge of mitigation tools and techniques. This information is intended to help improve public/private coordination of mitigation, preparedness, response and recovery following a natural hazard event by obtaining more accurate information on your recovery needs. We ask that you please take a few minutes to answer this questionnaire.

GENERAL INFORMATION

1. How many years has this business been in operation?

18%	1 to 10 years
42%	11 to 25 years
28%	26 to 50 yea
10%	51 to 99 years
2%	100+ years

Mean # of years of operation: 22 years
Median # of years of operation: 27 years

2. Is your business:

67%	An individual firm with no other units	2%	Public organization
5%	A franchise	1%	Non-Profit organization
23%	Part of a chain of businesses	1%	Other

3. Does your company own or lease the building in which the business is located?

51%	Own	2%	Own and lease
42%	Lease	2%	Other
3%	Rent		

4a. How many employees work with/for you?

54%	1 to 25 employees
21%	26 to 50 employees
10%	51 to 99 employees
12%	100 to 499 employees
3%	500 + employees

Mean # of employees: 101 employees
Median # of employees: 25 employees

4b. Please convert the above number into full-time equivalency (1.0 FTE equals 40 hrs/wk).

61% 1 to 25 FTE
14% 26 to 50 FTE
9% 51 to 99 FTE
11% 100 to 499 FTE
5% 500 + FTE

Mean # of FTE: 112 employees
Median # of FTE: 20 employees

5. On average, how long (in minutes) does it take your employees to arrive at work?

28% 5-14
66% 15-29
6% 30-44
0% 45-59
0% 60 or more

6. Jackson County is vulnerable to several types of natural hazards. Please rate these hazard events in terms of possible impact on your business. [Circle the corresponding number for each hazard]

1. Critical
2. Very Important
3. Important
4. Not Very Important
5. No need to address now

Hazard Event	Critical	Very Important	Important	Not Very Important	No Need to Address Now
Wind damage	9.7%	14.7%	**35.0%**	34.1%	6.5%
Flooding	**24.3%**	19.8%	20.3%	**24.3%**	11.3%
Landslide / Debris Flow	12.4%	9.2%	15.6%	**34.9%**	28.0%
Winter storm / snow & ice	16.9%	23.7%	**34.2%**	21.5%	3.7%
Windstorm	12.1%	17.7%	**35.3%**	29.3%	5.6%
Earthquake	**35.7%**	20.4%	18.6%	17.2%	8.1%
Volcanic eruption	23.9%	10.4%	12.2%	23.0%	**30.6%**
Electricity loss	**63.4%**	21.9%	7.6%	5.8%	1.3%
Hazardous materials accident	17.8%	18.3%	**27.9%**	26.0%	10.0%
Air / train accidents	6.9%	11.9%	16.1%	**39.4%**	25.7%
Water supply loss	**41.4%**	18.5%	25.2%	11.7%	3.2%
Wildfire	19.0%	16.3%	22.6%	**26.2%**	15.8%
Other	31.8%	13.6%	4.5%	13.6%	**36.4%**

7. Please rate the services listed below in terms of their importance for your business operations. [Circle the corresponding number for each service]

1. Critical
2. Very Important
3. Important
4. Not Very Important
5. Not Important At All

Service Type	Critical	Very Important	Important	Not Very Important	No Need to Address Now
Electricity	**78.1%**	15.4%	3.9%	1.8%	0.9%
Water	**46.9%**	23.5%	16.8%	11.1%	1.8%
Natural gas	**31.0%**	19.0%	18.1%	16.8%	15.0%
Phone/ Internet	**55.9%**	23.3%	17.6%	3.1%	0.0%
Postal/ package services	19.7%	27.8%	**34.5%**	12.6%	5.4%
Sewer/ wastewater services	**32.0%**	24.9%	27.6%	11.6%	4.0%
Transportation, e.g. roads, rail	**35.7%**	29.1%	26.4%	6.6%	2.2%

8. If your business was forced to shut down during a natural hazard event such as a flood or winter storm for instance, how long could you afford to be closed without suffering major financial loss? [Please check only one box]

39% Would immediately suffer major losses

7% Hours	*How many?*	65% 1 to 10 hours,	29% 11 to 25 hours, 6% 25+ hours
54% Days	*How many?*	82% 1 to 10 days,	13.5% 11 to 25 days, 4.5% 25+ days

9. Upon which of the following transportation systems does your business depend?

[Please check all that apply]

49%	Private roads	28%	Air
91%	City streets	8%	Rail
75%	County roads	2%	Other
85%	State highways	1%	Elevator
83%	Interstate highways	1%	Bus or Taxi

PREPAREDNESS ACTIVITIES AT YOUR BUSINESS

10. There are many things that businesses can do to prepare for a natural disaster such as a flood or wildfire, for example. In the following list, please check all those things that you have already done at your business, plan to do in the near future, or are unable to do. [Please check one answer for each action].

Preparedness Activities	Have Done	Plan to Do	Not Done	Unable to Do	Not Applicable
Attended meetings / received written information on preparedness	35.1%	6.7%	**52.4%**	0.0%	5.8%
Talked with employees about what to do in an emergency	43.8%	7.5%	**44.7%**	0.0%	4.0%
Developed an employee plan about disaster procedures	35.0%	14.8%	**47.5%**	0.0%	2.7%
Purchased flood insurance	17.1%	3.3%	**46.4%**	3.8%	29.4%
Purchased business interruption insurance	**39.1%**	2.9%	38.2%	1.9%	17.9%
Stored extra fuel / batteries & other emergency supplies	31.8%	7.3%	**51.4%**	2.3%	7.3%
Developed a business emergency response plan	36.0%	12.2%	**49.1%**	0.5%	2.3%
Developed a business emergency recovery plan	17.1%	13.5%	**63.5%**	0.5%	5.4%
Conducted employee disaster drills / exercises	30.0%	11.2%	**56.1%**	0.4%	2.2%
Made arrangements for alternate business sites in an natural disaster	9.5%	4.1%	**57.2%**	15.3%	14.0%
Obtained an emergency back-up generator for power	28.8%	6.3%	**55.4%**	4.5%	5.0%

11. How important is each of the following types of service in conducting your business? [Please circle the corresponding number for each service]

1. Critical - Business would have to close without it.
2. Very Important - Loss would cause major disruption.
3. Important - Loss would cause some disruption
4. Not Very Important - Loss would cause minor inconvenience.
5. Not Used - Business doesn't use this service.

NOTE - Write in Option for "Other": This table includes the options written for "other" categories, and the number of times that they were listed as Critical, Very Important, Important, etc. Some respondents wrote in an answer, but did not evaluate its importance. These responses are marked "no value assigned."

Electrical power for:	Critical	Very Important	Important	Not Very Important	Not Used
A. Computers/ Cash registers	**50%**	27%	16%	4%	3%
B. Heavy machinery	**47%**	18%	11%	15%	10%
C. Lights/ Office	**47%**	34%	16%	3%	0%
D. Heating, ventilation, AC	28%	29%	**34%**	8%	2%
E. Other:	**77%**	0%	0%	0%	24%
	Refrigeration (2)				
	Security (2)				
	Video Equipment (1)				
	Phones (1)				
	Sewer (1)				
	Fuel (1)				
	Compressor (1)				

Telecommunications for:	Critical	Very Important	Important	Not Very Important	Not Used
F. Regular phone calls	**52%**	31%	14%	4%	0%
G. Fax machines	**29%**	26%	25%	16%	4%
H. Computers - modems	**44%**	29%	15%	9%	4%
I. Credit card machines	18%	14%	17%	13%	**38%**
J. Other:	29%	24%	0%	6%	**41%**
	Security (1)				
	ATM (1)				

Water used for:	Critical	Very Important	Important	Not Very Important	Not Used
K. Drinking - cooking	**33%**	23%	18%	23%	3%
L. Bathrooms - sanitary	**37%**	32%	23%	7%	1%
M. Industrial use	17%	13%	14%	18%	**39%**
N. Heating, ventilation, AC	13%	17%	**28%**	15%	27%
O. Other:	42%	12%	0%	12%	**35%**
	Refrigeration (1)				
	White Water (1)				
	Dental Equipment (1)				
	Onwell (1) - *No Value Assigned*				

Sewage disposal:	Critical	Very Important	Important	Not Very Important	Not Used
P. Bathrooms - sanitary	**40%**	32%	19%	7%	2%
Q. Industrial wastewater	15%	12%	12%	14%	**47%**
R. Other:	9%	0%	5%	9%	**77%**
	Back-up (1) - *No Value Assigned*				
	Ice Machine (1) - *No Value Assigned*				
	Septic systems (1) - *No Value Assigned*				

Natural gas used for:	Critical	Very Important	Important	Not Very Important	Not Used
S. Industrial processes	15%	9%	7%	9%	**60%**
T. Heating, ventilation, AC	22%	20%	20%	8%	**30%**
U. Other:	29%	7%	7%	3%	**55%**
			Propane (1)	Propane (1)	
	Kitchen (5)	Kitchen (1)			
	Fuel (1)				
	Boilers (1)				
	ATM (1)				
			Water (1)		

12. Below is a list of potential mitigation activities in which businesses can engage. Rate the importance of each measure to your business and employees using the following scale:

1. Very Useful
2. Somewhat Useful
3. Not Useful
4. Already Addressed

Facility and road access	Very Useful	Somewhat Useful	Not Useful	Already Addressed
A. Road access issues and debris removal	**53%**	38%	6%	4%
B. Alternate route availability	**49%**	38%	10%	4%
C. Data and equipment protection	**53%**	32%	9%	6%
D. Retrieval of critical data from storage	**41%**	37%	17%	5%
E. Allocation of emergency response efforts	31%	**55%**	10%	5%
Utilities	**Very Useful**	**Somewhat Useful**	**Not Useful**	**Already Addressed**
F. Making information "one phone call away" for businesses	**57%**	37%	4%	2%
G. Back-up sources of power	**71%**	21%	3%	5%
H. Single point of contact for reporting any utility failures	**60%**	32%	5%	2%
I. Alternate communications	**51%**	40%	7%	3%
J. Alternate shipping/ transportation	26%	**45%**	28%	2%
K. Sewageplant protection	31%	**46%**	20%	3%
L. Central input progress reports	19%	**48%**	29%	4%
Businesses helping businesses	**Very Useful**	**Somewhat Useful**	**Not Useful**	**Already Addressed**
M. Share resources among businesses in an emergency situation	**45%**	41%	12%	2%
N. Work with "like" businesses on mitigation projects	36%	**41%**	22%	2%
O. Mentoring program between more and less prepared businesses	21%	**53%**	25%	2%
P. Mutual aid networks for emergency shelter and food	37%	**45%**	18%	1%
Q. Food vendors able to supply large facilities, which could in turn host smaller businesses	29%	**41%**	30%	1%
R. Developing a plan for direct notification of vulnerable businesses	**44%**	43%	13%	0%
S. Developing a central contact office to quickly disseminate information	**53%**	37%	10%	1%
Training and public outreach	**Very Useful**	**Somewhat Useful**	**Not Useful**	**Already Addressed**
T. Need for communication with Jackson County Emergency Management Office	42%	46%	10%	3%
U. Planning and publicizing alternate commute routes	45%	44%	11%	0%
V. Alternate schools/ day care sites so employees can leave home for work	29%	51%	20%	0%
W. Help employees make plans to protect themselves and their home	38%	51%	11%	0%
X. Develop a website for business & community to report damages and recovery after a disaster	30%	51%	20%	0%

Mitigation incentives	Very Useful	Somewhat Useful	Not Useful	Already Addressed
Y. Loands and grants for structural retrofits and other disaster preparedness measures	40%	46%	13%	1%
Z. Expedite permit process for mitigation projects	51%	38%	10%	1%
AA. Information that emphasizes asset management as part of disaster preparedness and recovery	28%	54%	17%	1%

13.How would you like to receive information about the mitigation activities listed above? [Please check all that apply]

54% Handbook
59% Fact sheet / brochure
27% Newspaper
20% Radio / TV
36% Internet
14% Chamber of Commerce
19% Workshop
7% Administrative meetings, i.e. monthly, quarterly
0% Other

THANK YOU VERY MUCH FOR PROVIDING THIS INFORMATION

Survey prepared by Community Planning Workshop in partnership with the Community Service Center's Oregon Natural Hazard Workshop at the University of Oregon, Institute for Business & Home Safety, and the Oregon Showcase State for Natural Disaster Resistance and Resilience Initiative. Elements of the Business Recovery Questionnaire courtesy of: Stephen B. Baruch & Associates, 1752 Selig Lane, Los Altos, California 94024, USA