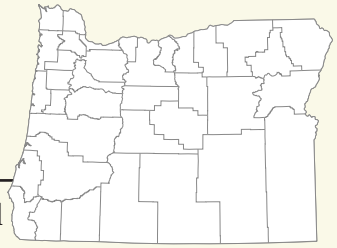
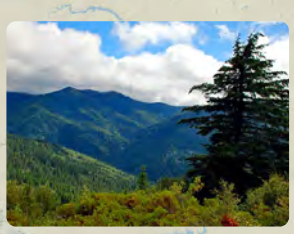
Curry County

Multi-Jurisdictional Natural Hazards Mitigation Plan



Report for: Curry County and the cities of Brookings, Gold Beach, and Port Orford



Photos: Gary Halvorson, Oregon State Archives

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

FEMA

September 10, 2010

Bill Waddle, Chair
Curry County Board of Commissioners
Post Office Box 746
Gold Beach, Oregon 97444

Dear Chairman Waddle:

On September 1, 2010, The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) approved the ***Curry County Multi-Hazard Mitigation Plan*** as a multi-jurisdictional local plan as outlined in 44 CFR Part 201. The initial approval letter referenced an incorrect expiration date. As such, 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 September 1, 2015:

Curry County

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

Over the next five years, we encourage your communities to follow the plan's schedule for 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 Emergency Management Division, which coordinates and administers these efforts for local entities.

Sincerely,

John Graves for
Mark Carey, Director
Mitigation Division

Enclosure

cc: Dennis Sigrist, Oregon Emergency Management

BH:bb

IN THE BOARD OF COUNTY COMMISSIONERS

IN AND FOR THE COUNTY OF CURRY, OREGON

In the Matter of a Resolution Establishing the Curry County Multi-Jurisdictional Natural Hazards Mitigation Plan	))))	RESOLUTION

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

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

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

WHEREAS, Curry County fully participated in the FEMA-prescribed mitigation planning process to prepare this five-year update to the Curry County Multi-jurisdictional Natural Hazards Mitigation Plan; and

WHEREAS, the Oregon Office of Emergency Management and Federal Emergency Management Agency, Region X officials have reviewed the Curry County Multi-Jurisdictional Natural Hazards Mitigation Plan dated August 8, 2005, updated August 16, 2010, and pre-approved by FEMA on July 26, 2010, contingent upon this official adoption of the participating governments and entities;

NOW, THEREFORE, THE BOARD OF CURRY COUNTY COMMISSIONERS HEREBY RESOLVES AS FOLLOWS:

1) **Curry County adopts the Curry County Multi-Jurisdictional Natural Hazards Mitigation Plan dated July 18, 2005 and updated August 16, 2010; and**

FILED IN CURRY COUNTY
Renee' Kolen, County Clerk
Commissioners' Journal
CJ: 2010-367
08/17/2010 03:46 PM

2) Curry County will submit this Adoption Resolution to the Oregon Office of Emergency Management and Federal Emergency Management Agency, Region X officials to enable the Plan's final approval.

DATED this 16th day of August, 2010.

BOARD OF CURRY COUNTY COMMISSIONERS

Bill Waddle

Bill Waddle, Chair

Georgia Yee Nowl

Georgia Yee Nowlin, Vice Chair

— ABSENT —

George Rhodes, Commissioner

Approved as to Form:

M. Gerard Herbage

M. Gerard Herbage
Curry County Legal Counsel

Curry County

Multi-Jurisdictional
Natural Hazards Mitigation Plan

Plan for:

Curry County

Brookings

Gold Beach

Port Orford

Prepared by:

The Oregon Partnership for Disaster Resilience
1209 University of Oregon
Eugene, OR 97403

August 2010

Special Thanks & Acknowledgements

This Natural Hazard Mitigation Plan was developed through a regional partnership funded by the Federal Emergency Management Agency's Pre-Disaster Mitigation Competitive Grant Program. The Oregon Coast Region grant was awarded to update the natural hazard mitigation plans for the region. This regional effort used a plan update process, plan templates and plan development support provided by the Oregon Partnership for Disaster Resilience at the University of Oregon.

Regional partners include:

- Oregon Partnership for Disaster Resilience at the University of Oregon's Community Service Center
- Oregon Emergency Management
- Federal Emergency Management Agency Region X
- Curry County

Project Steering Committee:

- Coos Forest Protective Association
- Bureau of Land Management
- City of Gold Beach
- United State Forest Service
- Lower Rogue Watershed Council
- City of Port Orford
- City of Brookings
- Curry County Sheriff
- Curry County School District
- Oregon Department of Transportation
- Curry County GIS
- Curry County Road Department

Project Managers:

- Albert Harrell, Curry County Emergency Services Department Coordinator
- Gregoor Passchier, Planning Coordinator, Oregon Partnership for Disaster Resilience
- Josh Bruce, Projects Director, Oregon Partnership for Disaster Resilience

Community Service Center Staff:

Andre LeDuc, Executive Director, Oregon Partnership for Disaster Resilience

Josh Bruce, Assistant Director, Oregon Partnership for Disaster Resilience

Megan Findley, Program Manager, Oregon Partnership for Disaster Resilience

Adam Crawford, Emergency Management Specialist, Oregon Partnership for Disaster Resilience

Gregoor Passchier, Planning Coordinator, Oregon Partnership for Disaster Resilience

Geographic Information Systems (GIS) Maps:

Curry County Enterprise GIS developed the maps for this plan. The contributions from this department were essential in illustrating the extent and potential losses associated with the natural hazards affecting the community

Table of Contents

Executive Summary

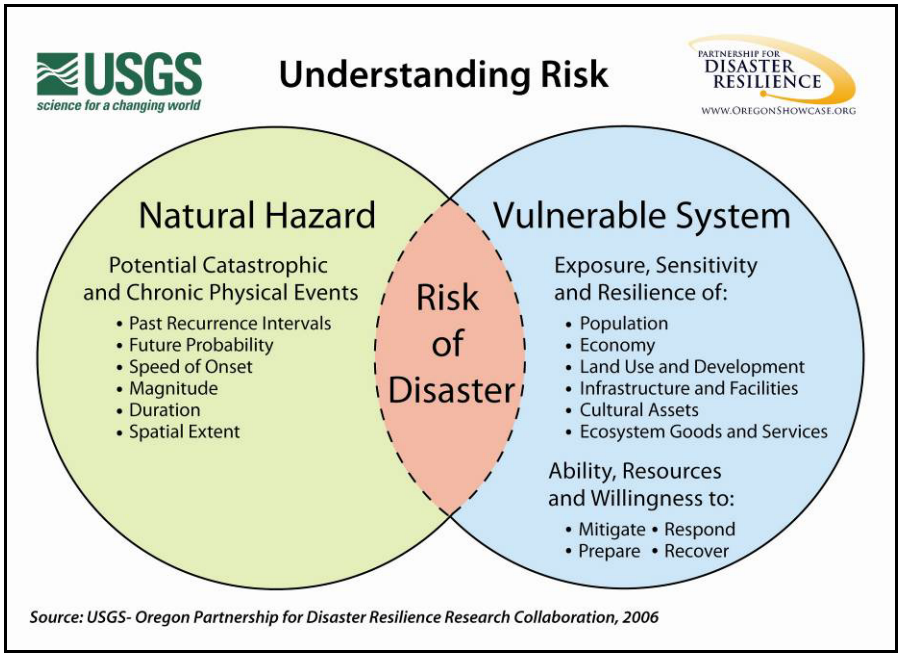
Curry County developed this multi-jurisdictional Natural Hazard Mitigation Plan in an effort to reduce future loss of life and damage to property resulting from natural hazards. This plan was developed with and for the following jurisdictions: Curry County and the cities of Brookings, Gold Beach, and Port Orford. These are the same jurisdictions that were represented in the 2005 Curry County Natural Hazards Mitigation Plan. It is impossible to predict exactly when natural 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 minimize the losses that can result from natural hazards.

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

Why Develop this Mitigation Plan?

This natural hazard mitigation plan is intended to assist Curry County and the cities of Brookings, Gold Beach, and Port Orford in reducing the risk from natural hazards by identifying resources, information, and strategies for risk reduction. It will also help guide and coordinate mitigation activities throughout the county. The figure below is utilized throughout the plan to illustrate the concept of risk reduction.

Figure i.1 Understanding Risk



A natural hazards mitigation plan can assist jurisdictions in understanding what puts the community at risk. By identifying and understanding the relationship between natural hazards, vulnerable systems, and existing capacity, communities in Curry County become better equipped to identify and implement actions aimed at reducing the overall risk to natural hazards.

Who Participated in Developing the Plan?

The 2010 update of the Curry County Natural Hazards Mitigation Plan was funded by a grant extension of a 2006 Pre-Disaster Mitigation (PDM) planning grant. The PDM planning grant was developed in partnership with the Oregon Partnership for Disaster Resilience (OPDR) and Oregon Emergency Management to create or update mitigation plans for the Oregon Coast and Northeast Oregon. In 2009, OPDR received a grant extension to update the Coos and Curry County mitigation plans. Plan update efforts began in the fall of 2009.

The 2010 Curry County Natural Hazards Mitigation Plan 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. The Curry County Emergency Services Coordinator served as the convener for Curry County's Natural Hazards Mitigation Plan update process. The Emergency Services Coordinator developed a new plan steering committee to review and update the mitigation plan and to oversee the planning process. New committee members were needed because the 2005 committee's composition had changed. The steering committee consisted of representatives from the following organizations:

- Coos Forest Protective Association
- Bureau of Land Management
- City of Gold Beach
- United State Forest Service
- Lower Rogue Watershed Council
- City of Port Orford
- City of Brookings
- Curry County Sheriff
- Curry County School District
- Oregon Department of Transportation
- Curry County GIS
- Curry County Road Department
- Curry County Emergency Services

The Curry County Emergency Services Coordinator was designated as the plan's convener and will take the lead in implementing, maintaining and updating the plan. Public participation played a key role in the development of goals and action items. Public involvement in the planning process was achieved by including members from different organizations to provide representation in the steering committee meetings and engaging the public in a final plan review.

In 2008, OPDR distributed a region-wide household preparedness survey. The survey gauged household knowledge of mitigation tools and techniques and assessed household disaster preparedness. The survey results improve public/private coordination of mitigation and preparedness for natural hazards by obtaining more accurate information on household understanding and needs. Results of the survey are documented in an independent report in Appendix D.

What is the Plan's Mission?

The mission of the Curry County Natural Hazards Mitigation Plan is intended to be adaptable to any future changes made to the plan. The mission of the Curry County Natural Hazards Mitigation Plan is to:

Create a disaster resilient Curry County.

What are the Plan Goals?

The plan goals describe the overall direction that Curry County's agencies, organizations, and citizens can take toward mitigating risk from natural hazards. The goals for the Curry County Natural Hazards Mitigation Plan are to:

- Save lives and reduce injuries.

- Minimize and prevent damage to public and private buildings and infrastructure.
- Reduce economic losses.
- Increase cooperation and coordination among private entities, local agencies, state agencies, and federal agencies.
- Increase education, outreach, and awareness.
- Protect natural and cultural resources.

How are the Action Items Organized?

The action items are organized within an action matrix (located at the end of this summary), which lists all the multi-hazard and hazard-specific action items included in the mitigation plan. The action items were developed through collecting local hazard data and the public participation process. 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.

How will the Plan be Implemented?

Section 4 of this plan details the formal process that will ensure that the Curry County Natural Hazards Mitigation Plan remains an active and relevant document. The plan will be implemented, maintained and updated by the Curry County Emergency Management Services Coordinator who is the plan's designated convener. The convener is responsible for overseeing annual review processes. Cities and special districts developing addenda to the county plan will also designate a convener and will work closely with the county convener to keep the plans coordinated. The plan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing a revised plan every five years. Finally, the plan maintenance section describes how the communities will integrate public participation throughout the plan maintenance process.

Plan Adoption

After the plan is locally reviewed and deemed complete the Curry County Emergency Management Services Coordinator will be responsible for submitting it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management will then submit the plan to the Federal Emergency Management Agency (FEMA – Region X) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA the county will adopt the plan via resolution. The individual jurisdiction's conveners will be responsible for ensuring local adoption of the Curry County multi-jurisdictional Natural Hazards Mitigation Plan and providing the support necessary to ensure plan implementation. At that point the county will

gain eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program, and the Flood Mitigation Assistance Program.

The success of a multi-jurisdictional natural hazard mitigation plan's goals and actions depends upon the maintenance of a competent steering committee. Furthermore, the incorporation of mitigation actions into existing plans and policies can strengthen and support the plan. It is hereby directed that the responsible persons and organizations will implement and maintain the concepts in this plan. Thorough understanding and consistent use of this plan will result in the implementation of appropriate mitigation activities and the reduction of risk from future natural hazard events.

Curry County NHMP Action Item Matrix

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals					
					Save Lives and Reduce Injuries	Minimize and Prevent Damage	Reduce Economic Losses	Increase Cooperation and Coordination	Increase Education and Outreach	Protect Natural and Cultural Resources
Coastal Erosion # 1	Continue to monitor the progression of coastal erosion in conjunction with sea level rise.	State Parks-ODOT	Planning Division, Coast Watch, County Road Department, County Commission, ODOT, OSU, DLCD	LT		X			X	X
Drought # 1	Continue to enforce existing water requirement codes for rural residents.	Curry County Planning Division	Curry County Cities, Coos Forest Protective Association, State of Oregon Water Resources Department, Community Wildfire Protection Team	Ongoing		X			X	
Earthquake # 1	Conduct regular earthquake safety drills.	Curry County Emergency Management	Cities, schools, businesses, hospitals, American Red Cross, FEMA, OEM	Ongoing	X			X	X	
Earthquake # 2	Conduct non-structural seismic retrofit workshops with government agencies, businesses, and residents to prevent damage from earthquakes.	Curry County Emergency Services Department	Curry County Departments, local businesses, hospitals, chamber of commerce, community groups	ST	X	X			X	

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals					
					Save Lives and Reduce Injuries	Minimize and Prevent Damage	Reduce Economic Losses	Increase Cooperation and Coordination	Increase Education and Outreach	Protect Natural and Cultural Resources
Flood # 1	Continue to review and assess the county's floodplain ordinance to determine whether it meets current NFIP requirements.	Curry County Planning Division	County Commission, Planning Commission, FEMA, DOGAMI, DLCD	LT	X	X	X	X		
Flood # 2	Take steps to qualify for participation in the National Flood Insurance Program's (NFIP) Community Rating System.	Curry County Planning Division	Curry County Emergency Services, Curry County Road Department, FEMA, OEM, CRS Program, Property owners impacted	LT	X	X	X			
Flood # 3	Maintain the county's Flood Insurance Rate Maps (FIRM) when new data becomes available.	Curry County Planning Division	County Commission, Planning Commission, FEMA, DOGAMI, DLCD	LT	X	X	X	X		
Flood # 4	Research flood prone areas and develop appropriate mitigation action items.	Curry County Road Department	Curry County Planning Division, Emergency Services, FEMA, OEM	LT		X	X			
Landslide # 1	Assess LIDAR maps to evaluate development in hazardous areas.	Curry County Planning Division	Curry County Emergency Services, FEMA, DOGAMI, DLCD	LT	X	X				

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals					
					Save Lives and Reduce Injuries	Minimize and Prevent Damage	Reduce Economic Losses	Increase Cooperation and Coordination	Increase Education and Outreach	Protect Natural and Cultural Resources
Landslide # 2	Continue to track landslide events along major roadways and develop appropriate mitigation measures.	Curry County Road Department	Curry County Planning Division, Emergency Services, ODOT, FEMA, DOGAMI	ST	X	X	X			
Tsunami # 1	Conduct regular earthquake/tsunami evacuation drills.	Curry County Emergency Services	Curry County Planning, Curry County Sheriff, Fire Departments, Oregon State Parks, DOGAMI, FEMA, DLCD	ST	X			X	X	
Tsunami # 2	Seek funding to relocate critical services outside of the tsunami inundation zone.	Curry County Commission	Curry County Road Department, FEMA, OEM	LT	X	X				
Wildfire # 1	Implement actions in the Curry County Community Wildfire Protection Plan.	Community Wildfire Protection Team (CWPT)	Curry County Emergency Services, BLM, Oregon Department of Forestry, US Forest Service, cities, property owners	LT	X	X	X	X		X
Wildfire # 2	Encourage new development to incorporate wildfire mitigation measures and ensure adequate emergency access.	Curry County Planning Division	Curry County Emergency Services, Oregon Department of Forestry, FEMA	Ongoing	X	X				X

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals					
					Save Lives and Reduce Injuries	Minimize and Prevent Damage	Reduce Economic Losses	Increase Cooperation and Coordination	Increase Education and Outreach	Protect Natural and Cultural Resources
Wind Storm # 1	Educate the public about the role of proper tree pruning and care in preventing damage during windstorms.	Curry County Emergency Services	Curry County Planning Division, Coos-Curry Electric Cooperative	Ongoing		X			X	
Wind Storm # 2	Encourage utilities to use underground construction methods where possible to reduce loss of service from windstorms.	Coos-Curry Electric Cooperative	Curry County Emergency Services, Curry County Road Department, Other public utilities	LT		X	X			
Multi-Hazard # 1	Ensure that all critical facilities have backup power and/or emergency operations plans in place to deal with power outages.	Curry County Emergency Services	All Curry County Departments, FEMA, OEM	LT	X	X				
Multi-Hazard # 2	Develop a voluntary registry of vulnerable populations that may need assistance in an emergency situation.	Curry County Emergency Services	Curry County Public Health, Special needs populations, health care providers.	ST	X					
Multi-Hazard # 3	Identify and disseminate information regarding alternate transportation routes.	Curry County Road Department	Curry County Emergency Services, Forest Service, ODOT, DOGAMI, Curry County Aviation	ST	X				X	
Multi-Hazard # 4	Further develop risk assessment maps to show areas at risk for all hazards.	Curry County Commission	Curry County Road Department, Curry Emergency Services, DOGAMI, FEMA, OEM	ST	X	X				

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals					
					Save Lives and Reduce Injuries	Minimize and Prevent Damage	Reduce Economic Losses	Increase Cooperation and Coordination	Increase Education and Outreach	Protect Natural and Cultural Resources
Multi-Hazard # 5	Establish mutual aid agreements between government agencies and commercial businesses in the event of an emergency (e.g. fuel, heavy equipment, food, etc.).	Curry County Emergency Services	Curry County Road Department, Curry County Sheriff, Board of Commissioners, local businesses, FEMA, OEM	LT	X		X	X		
Multi-Hazard # 6	Encourage citizens to prepare and maintain provisions for one week without services.	Curry County Emergency Services	CERT, Sheriff, Board of Commissioners, DOGAMI, FEMA, OEM, hospitals	LT	X				X	
Multi-Hazard # 7	Support efforts to create a post-disaster redevelopment plan for Curry County.	Curry County Board of Commissioners	All county departments, Fire Department, Sheriff, cities, OPDR	ST	X		X	X		
Multi-Hazard # 8	Continue the development of Citizens Corps Programs to ease the load on emergency services following a disaster.	Curry County Emergency Services	Curry County Police Departments, Fire Departments, local residents, Curry County Citizens for Emergency Preparedness, Cities	ST				X	X	
Multi-Hazard # 9	Educate and encourage businesses, schools, and governmental organizations to develop continuity of operations plans.	Curry County Emergency Management	All county departments, FEMA, OEM, cities, chamber of commerce, OPDR	ST		X	X		X	

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals					
					Save Lives and Reduce Injuries	Minimize and Prevent Damage	Reduce Economic Losses	Increase Cooperation and Coordination	Increase Education and Outreach	Protect Natural and Cultural Resources
Multi-Hazard # 10	Develop backup systems for county records.	Curry County Board of Commissioners	GIS, Pulic Services, Curry County Emergency Services, cities, OEM	LT		X				
Multi-Hazard # 11	Incorporate the natural hazards mitigation plan into the Curry County Comprehensive Plan.	Curry County Planning Division	County Commission, Planning Commission, DLCD, FEMA	Ongoing	X	X		X	X	
Multi-Hazard # 12	Encourage special districts (including ports) to develop addenda to the Curry County Natural Hazards Mitigation Plan.	Curry County Commission	Curry County Emergency Services, Special Districts	LT		X		X		
Multi-Hazard # 13	Identify Red Cross shelters that are seismically sound, and retrofit existing shelters.	Red Cross	Curry County Emergency Services, Police, Fire, Schools, OEM, FEMA	LT	X	X				
Multi-Hazard # 14	Explore developing a redundant utility system to supply Curry County with continuous service.	Curry County Commission	Curry County Economic Development, Curry County Emergency Services, Coos-Curry Electric, other utility providers	LT		X		X		

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals					
					Save Lives and Reduce Injuries	Minimize and Prevent Damage	Reduce Economic Losses	Increase Cooperation and Coordination	Increase Education and Outreach	Protect Natural and Cultural Resources
Multi-Hazard # 15	Develop a multi-hazard public education campaign targeted to residents and tourists about the natural hazards Curry County is vulnerable to and mitigation measures they can implement.	Curry County Emergency Services	Planning Division, Police, Fire, Coos Forest Protective Association, Community Wildfire Protection Team, DOGAMI, FEMA, OEM	Ongoing	X	X		X	X	
Multi-Hazard # 16	Complete a risk analysis for the hazards addressed in this plan, when information is available, to estimate potential loss of life and damage to property.	Curry County GIS	Emergency Services, Planning Division, Road Department, DOGAMI, OEM, FEMA	LT		X	X			
Plan Implementation # 1	Consider adopting the South Coast Emergency Management Advisory Committee as the coordinating body for the Curry County Natural Hazards Mitigation Plan.	Mitigation Plan Coordinating Body	Curry County Emergency Services, Coos County, SCEMAC members	ST				X		

Section1: Introduction

What is Natural Hazard Mitigation?

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

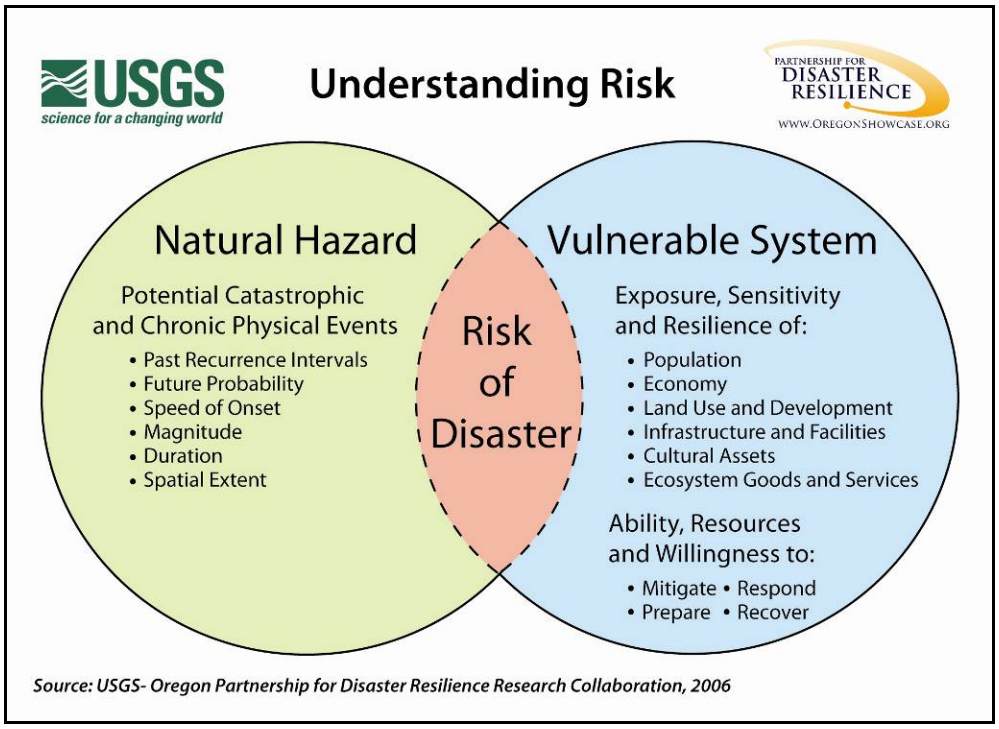
Engaging in mitigation activities provides jurisdictions with a number of benefits, including reduced loss of life, property, essential services, critical facilities and economic hardship; reduced short-term and long-term recovery and reconstruction costs; increased cooperation and communication within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

Why Develop a Mitigation Plan?

Curry County developed this multi-jurisdictional Natural Hazards Mitigation Plan in an effort to reduce future loss of life and damage to property resulting from natural hazards. This plan was developed with and for the following jurisdictions: Curry County and the cities of Port Orford, Gold Beach, and Brookings. These are the same jurisdictions that were represented in the 2005 Curry County Natural Hazards Mitigation Plan. It is impossible to predict exactly when these disasters will occur, or the extent to which they will affect the county. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize the losses that can result from natural hazards.

The figure below is utilized throughout the plan to illustrate the concepts of risk reduction.

Figure 1.1 Understanding Risk



A natural hazard mitigation plan can assist Curry County in understanding what puts the county at risk. By identifying and understanding the relationship between natural hazards, vulnerable systems, and existing capabilities, communities in Curry County can become better equipped to identify and implement actions that reduce overall risk to natural hazards.

This plan focuses on the primary natural hazards that could affect Curry County, Oregon, which include coastal erosion, drought, earthquake, flood, landslide, tsunami, and wind storms. The dramatic increase in the costs associated with natural disasters over the past decades has fostered interest in identifying and implementing effective means of reducing vulnerability. A report submitted to Congress by the National Institute of Building Science's Multi-hazard Mitigation Council (MMC) highlights that for every dollar spent on mitigation, society can expect an average savings of $4.[1] This multi-jurisdictional natural hazards mitigation plan is intended to assist all participating jurisdictions in reducing risk from natural hazards by identifying resources, information, and strategies for risk reduction.

The plan is strategic and non-regulatory in nature, meaning that it does not necessarily set forth any new policy. It does, however, provide: (1) a

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

foundation for coordination and collaboration among agencies and the public in the county; (2) identification and prioritization of future mitigation activities; and (3) aid in meeting federal planning requirements and qualifying for assistance programs. The mitigation plan works in conjunction with other county and city plans and programs including the Curry County Comprehensive Plan, Curry County Emergency Response and Recovery Plans, Curry County Zoning Ordinance, Curry County Transportation Systems Plan, Curry County Community Wildfire Protection Plan, and the State of Oregon Natural Hazards Mitigation Plan.

The plan provides a set of actions that reduce Curry County's vulnerabilities to natural hazards. Proposed actions include preventative activities, property protection strategies, public education and awareness activities, natural resource protection projects, and structural projects. Where possible, actions identified in this plan are intended to be implemented through existing county plans, policies, or programs.

Policy Framework for Natural Hazards in Oregon

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

Statewide land use planning Goal 7: Areas Subject to Natural Hazards calls for local plans to include inventories, policies and ordinances to guide development in 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 Emergency Management (OEM), Oregon Building Codes Division (BCD), Oregon Department of Forestry (ODF), Oregon Department of Geology and Mineral Industries (DOGAMI), and the Department of Land Conservation and Development (DLCD).

The Disaster Mitigation Act of 2000 (DMA 2000) is the latest federal legislation addressing mitigation planning. It reinforces the importance of mitigation planning and emphasizes planning for 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.

How was the Plan Developed?

2005 Plan Development Process

In 2003, Curry County hired the President of Diversified Safety Management to develop the Curry County Natural Hazards Mitigation Plan. Diversified Safety Management served as the project lead, facilitating local steering committee meetings and public workshops and writing the mitigation plan. Mike Murphy, Curry County Emergency Services Coordinator, assisted Diversified Safety Management by identifying local steering committee members and coordinating committee meetings and workshops. Diversified Safety Management developed the mitigation plan with assistance from the Oregon Natural Hazards Workgroup, who provided a series of plan development trainings between September 2003 and January 2004. Diversified Safety Management used information from these trainings to structure the plan development process, which covered the following topics:

1. Organizing the community;
2. Identifying natural hazards, local vulnerabilities and goals and action items;
3. Finalizing the mitigation plan; and
4. Public involvement.

Curry County received formal approval for its Natural Hazards Mitigation Plan on August 8, 2005.

Details for each step of the 2005 plan development and public involvement process can be found in the Plan Update Changes Memo in Appendix B Planning and Public Process.

Plan Implementation and Maintenance

Between 2005 and 2010, Curry County held three meetings to implement the natural hazards mitigation plan. The Community Wildfire Protection Team has been actively involved in completing wildfire mitigation actions, and is the body responsible for implementing the Curry County Community Wildfire Protection Plan (2008). Over the past five years, Curry County Emergency Services has engaged the public about natural hazards through earthquake safety drills conducted at local schools, and training events through the Citizens Emergency Response Team (CERT).

2010 Plan Update Process

The 2010 update of the Curry County Natural Hazards Mitigation Plan was funded by a 2006 Pre-Disaster Mitigation (PDM) Planning Grant. The PDM planning grant was developed in partnership with the Oregon Partnership for Disaster Resilience (OPDR) and Oregon Emergency Management to create or update mitigation plans for Lincoln and Clatsop counties and the cities therein. In 2009, OPDR received a grant extension to update the Coos and Curry County mitigation plans. Plan update efforts began in the fall of 2009.

The Curry County Emergency Services Coordinator served as the convener for Curry County's Natural Hazards Mitigation Plan update process. The Emergency Services Coordinator developed a new plan steering committee to review and update the mitigation plan and to oversee the planning process. New committee members were needed because the 2005 committee's composition had changed. The plan steering committee consisted of representatives from the following organizations:

- Coos Forest Protective Association
- Bureau of Land Management
- City of Gold Beach
- United States Forest Service
- Lower Rogue Watershed Council
- City of Port Orford
- City of Brookings
- Curry County Sheriff
- Curry County School District
- Oregon Department of Transportation
- Curry County GIS
- Curry County Road Department

The planning process and associated resources used to update Curry County's multi-jurisdictional Natural Hazards Mitigation Plan were developed by OPDR. The planning process was designed to: (1) result in a plan that is DMA 2000 compliant; (2) coordinate with the state's plan and activities of OPDR; and (3) build a network of jurisdictions and organizations that can play an active role in plan implementation. The following is a summary of major activities included in the plan update process.

Plan Update Work Sessions

Curry County Plan Update Introductory Meeting (November 2009)

On November 17, 2009, OPDR met with the Curry County Emergency Services Coordinator and representatives from the Curry County

Community Wildfire Protection Team to provide an overview of the plan update process. The purpose of the meeting was to (1) provide an overview of natural hazards mitigation, (2) discuss the process to update the mitigation plan, (3) set dates for future community meetings, (4) identify members for the plan update steering committee, (5) discuss the addition of the drought and coastal erosion hazard to the mitigation plan, and (6) identify community stakeholders to be interviewed during the plan update process. Meeting materials and sign-in sheets can be found in Appendix B Public Process.

Plan Update Kickoff and Vulnerability Assessment Meeting (February 2010)

On February 16, 2010, OPDR held a plan update kickoff meeting with the county's steering committee. The purpose of the meeting was to (1) give an overview of the plan update process, (2) identify strategies for community involvement during the update process, (3) identify community vulnerabilities for each hazard addressed in the plan, and (4) gather hazard history and probability and vulnerability estimates for the coastal erosion hazard and drought hazard. Using the information gathered from this meeting, OPDR updated the hazard chapters of the Curry County Natural Hazards Mitigation Plan, developed new hazard chapters for drought and coastal erosion, and identified new action items based on the identified vulnerabilities. Meeting materials and sign-in sheets from the February 16 meeting can be found in Appendix B Public Process.

Goals, Action Items, and Plan Implementation and Maintenance Meeting (March 2010)

On March 16, 2010, OPDR held a goals, action items, and plan implementation and maintenance work session with Curry County's steering committee. The purpose of the meeting was to (1) review and update the mitigation plan's mission and goal statements, (2) determine the status of the 2005 mitigation plan's action items, (3) discuss new action items for the 2010 plan update, (4) identify a convener and coordinating body for continued plan implementation, (5) review and update the plan's method and schedule for monitoring, evaluating, and updating the plan within a five-year cycle, and (6) discuss the process for prioritizing mitigation action items.

Meeting materials and sign-in sheets for the March 16 work session can be found in Appendix B Public Process.

Public Involvement

Plan Review

The Curry County steering committee served as the primary plan reviewers. Upon completion of a final draft, Curry County posted a copy on its county website, submitted a press release that described the plan update process, and requested feedback on plan content. A notice was posted on the Curry County website and in the *Curry Coastal Pilot*

newspaper on May 29, 2010 regarding the comment period on the draft natural hazards mitigation plan. The public notice read as follows:

(Gold Beach, OR) – Curry County is currently in the process of updating the existing multi-jurisdictional Natural Hazards Mitigation Plan. This work is being performed in cooperation with the Oregon Partnership for Disaster Resilience and Oregon Emergency Management utilizing funds obtained from the Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation Grant Program. With re-adoption of the plan, Curry County will maintain its eligibility to apply for federal funding towards natural hazard mitigation projects. This local planning process includes a wide range of representatives from county and city governments, state agencies, and federal agencies.

A natural hazards mitigation plan provides communities with a set of goals, action items, and resources designed to reduce risk from future natural disaster events. 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. A draft version of the updated Curry County Natural Hazards Mitigation Plan will be available for public comment until June 5. Copies of the plan will be available on the Curry County website at http://www.co.curry.or.us/Emergency%20Services/emergency_Services.htm and at http://opdr.uoregon.edu.

If you have any questions regarding the Curry County Natural Hazards Mitigation Plan or the update process, please call Gregoor Passchier, Planning Coordinator for the Oregon Partnership for Disaster Resilience at (541) 346-7350 or e-mail adriaanp@uoregon.edu.

ODPR's website (http://opdr.uoregon.edu) served as an additional outreach tool to communities. The webpage was used to provide the public with local contact information and updates on the planning process. The final adopted and approved plan is posted on the University of Oregon Libraries' Scholar's Bank Digital Archive.

Household Preparedness Survey

In 2008, OPDR distributed a region-wide household preparedness survey. The survey gauged household knowledge of mitigation tools and techniques and assessed household disaster preparedness. The survey results can be used to improve public/private coordination of mitigation and preparedness for natural hazards by obtaining more accurate information on household understanding of natural hazards. Results of the survey are documented in an independent report in Appendix D.

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 citizens, businesses, and the environment. Combined, the sections work in synergy to create a mitigation plan that furthers the community's mission to create a disaster resilient Curry County. This plan structure enables stakeholders to use the section(s) of interest to them.

Volume I: Multi-jurisdictional Natural Hazard Mitigation Plan

Section 1: Introduction

The Introduction briefly describes the countywide mitigation planning efforts and the methodology used to develop the plan. City specific planning efforts are documented in Volume III: City/Special District Addendums.

Section 2: Community Overview

This section provides an overall description of Curry County, and includes a community profile and a description of the county's government structure. Additionally, the community overview identifies existing county plans, policies, and programs, and active community organizations. This section allows readers to gain an understanding of the county's assets and characteristics that may be impacted by natural hazards. Likewise, the community overview provides a description of the county's ability to manage risk and adapt to hazard event impacts. Community overviews for each participating city and special district are located in Volume III: City/Special District Addenda.

Section 3: Mission, Goals and Action Items

This section documents the plan's mission, goals, and actions. Actions address community vulnerabilities that are identified within Volume II: Hazard Specific Annexes. Actions that are specific to cities, and/or special districts are located in Volume III: City/Special District Addenda.

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 semi-annual plan maintenance and 5-year plan update processes.

Volume II: Hazard-Specific 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, probability, vulnerability, and impacts.

The following hazards are addressed within the plan's hazard specific annexes:

- Coastal Erosion
- Drought
- Earthquake
- Flood
- Landslide/Debris Flow
- Tsunami
- Wildfire
- Wind Storm

Volume III: City/Special District Addenda

Volume III of the plan is reserved for any city or special district addenda developed through this multi-jurisdictional planning process.

Volume IV: Resource Appendices

The resource appendices are designed to provide the users of Curry County's Natural Hazards Mitigation Plan with additional information. Appendices supplement information provided in the natural hazards mitigation plan, and include resources that assist with plan implementation.

Appendix A: 2010 Plan Update Action Item Forms

This appendix contains the detailed mitigation strategies for the 2010 mitigation plan update. It is a compilation of actions continued from the 2005 version of this plan and new action items developed during the 2010 update process. For reference, the mitigation actions from the 2005 plan are listed in the Plan Update Changes Memo in Appendix B.

Appendix B: Planning and Public Process

This appendix includes documentation of all the countywide public processes used to implement and update the plan. It includes the Plan Update Changes Memo, 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 Hazards 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.

Appendix D: Regional Household Preparedness Survey

This appendix includes the survey instrument and results from the regional household preparedness survey implemented by OPDR. The

survey aims to gauge household knowledge of mitigation tools and techniques to assist in reducing the risk and loss from natural hazards, as well as assessing household disaster preparedness.

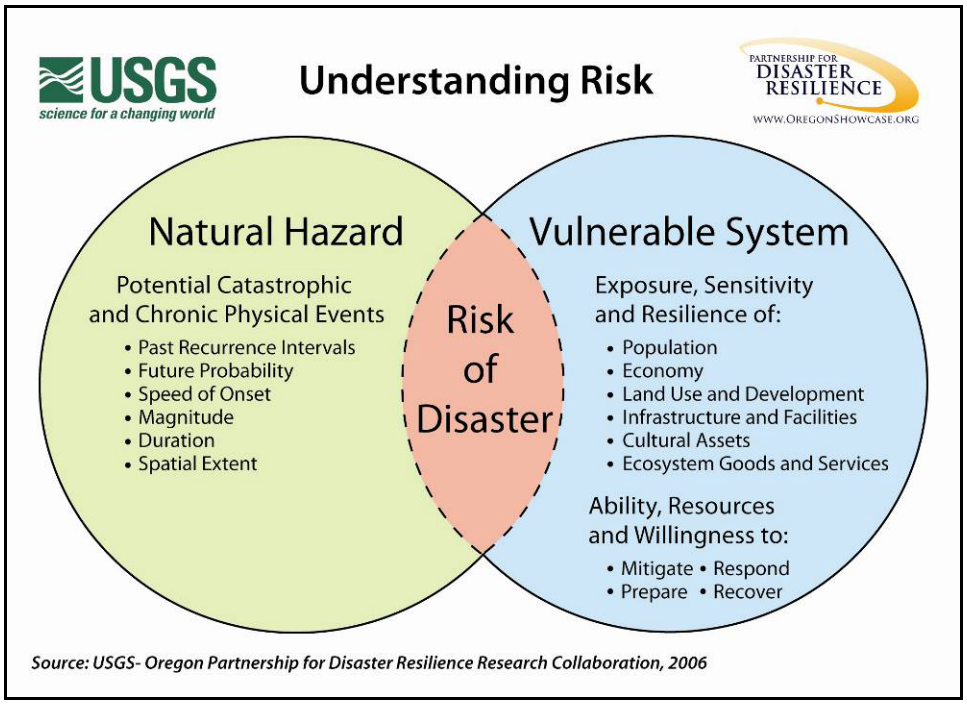
Appendix E: Grant Programs

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

Section 2:
Community Overview

The community overview section describes Curry County from a number of perspectives to help define and understand the county's sensitivity to natural hazards. 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 of Curry County's current sensitivity and resilience factors at the time this plan was developed. The information documented below, along with the hazard assessments located in the Hazard Annexes, was 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 resilience assist in reducing overall risk, or the area of overlap in Figure 2.1 below.

Figure 2.1 Understanding Risk



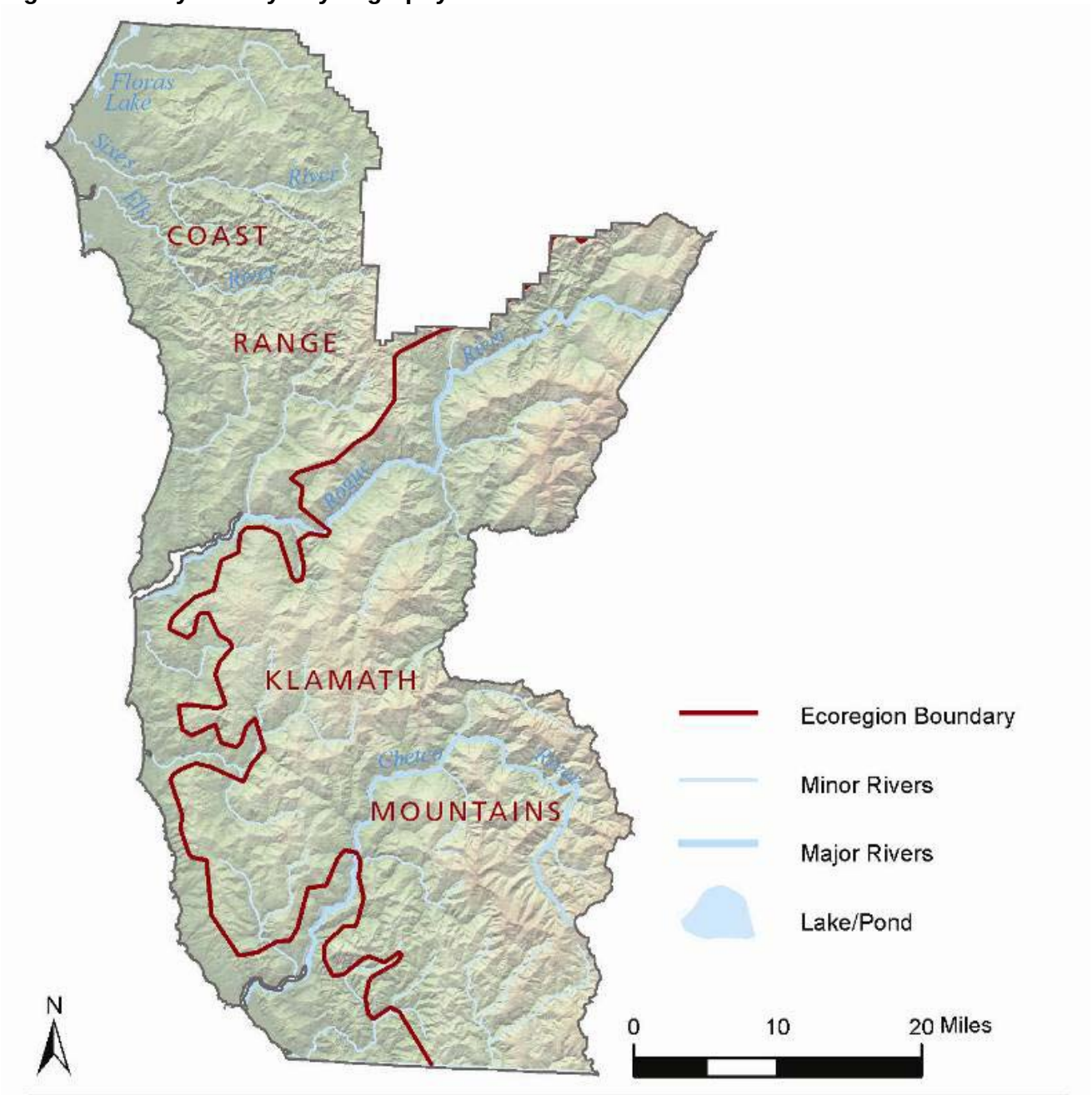
Source: USGS- Oregon Partnership for Disaster Resilience Research Collaboration, 2006

Geography & Climate

Curry County is located in southwest coastal Oregon and encompasses 1,627 square miles. It is bounded to the north by Coos County, to the northeast by Douglas County, to the east by Josephine County, and to the south by California. Lands within Curry County are administered by US Forest Service, the Bureau of Land Management, Oregon Parks and Recreation Department and the Department of State Lands. Much of the county's 80 miles of undeveloped coastline are dedicated as state parks, and all of the offshore islands are in the Oregon Islands National Wildlife Refuge.

Curry County has a diverse geography. The terrain along the northwest coast is relatively flat. However, farther inland to the east and south, the Coast Range and the Klamath Mountains run through the majority of the county, giving the inland areas a mountainous topography. Elevations within the county range from sea level to over 5,000 feet, with Mount Brandy as the county's highest elevation at 5,298 feet. Major rivers in Curry County include the Rogue and Chetco and their tributaries. Minor rivers include Floras Creek, Elk River, and Sixes River. Minor rivers include Bush Creek, Euchre Creek, Turtle Creek, Hunter Creek, Pistol River, and Winchuck River. Figure 2.2 shows the general physiography of Curry County.

Figure 2.2 Curry County Physiography



Curry County has a mild and humid marine climate which results from the moderating influences of the Pacific Ocean and from rainfall induced by the coast mountain range. Average January temperatures are 45 degrees, and average July temperatures are 65 degrees.[2]

Average annual rainfall in Curry County is 82.7 inches.[3] Rainfall amounts also vary depending on the location. Along the lower coastal elevations, rainfall averages between 65 to 90 inches per year, while areas on the higher west slopes of the coast mountain range may get up to 200 inches.[4] Figure 2.3 shows the average annual precipitation in Curry County.

Although Curry County's climate is generally considered temperate, there are exceptions. In most winters, one or two storms bring strong and sometimes damaging winds to the coastal areas, and in some years the accompanying heavy rains cause serious flooding. Storms coming in from the coast can be slowed or stopped against the coast range peaks and drop considerable amounts of precipitation in short periods of time.[5]

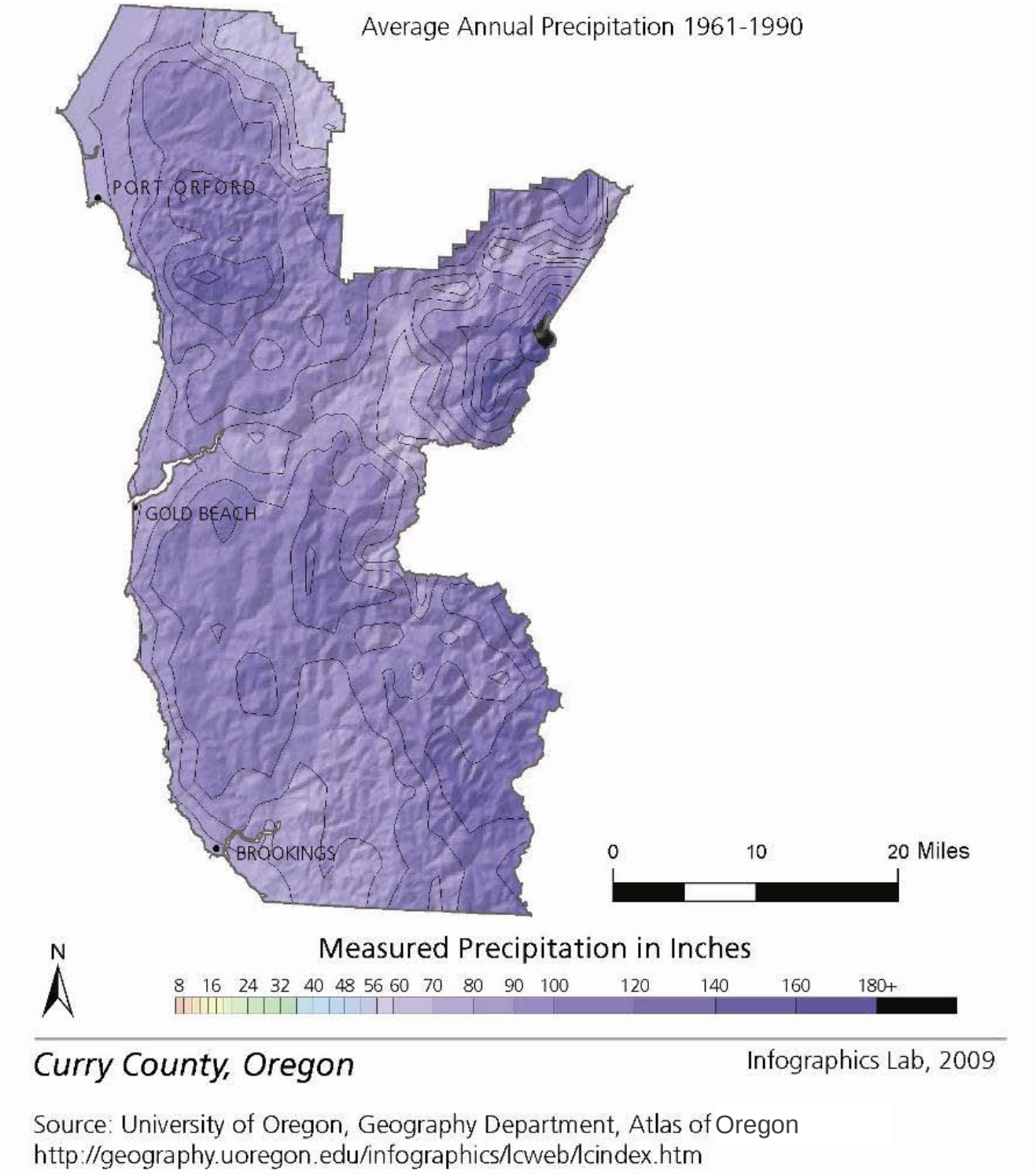
[2] Oregon Bluebook, Curry County, http://bluebook.state.or.us/local/counties/counties08.htm, accessed May 6, 2010.

[3] Ibid.

[4] Climate Service, "Climate of Curry County," http://www.ocs.orst.edu/, accessed February 5, 2010.

[5] Oregon Climate Service, "Climate of Curry County," http://www.ocs.orst.edu/, accessed February 5, 2010.

Figure 2.3 Curry County Average Annual Precipitation



Population & Demographics

Curry County has seen little change in its population size over the past decade. In 2009 the county's population was 21,340, an increase of only 1% from the 2000 population estimate of 21,137.[6] However, the county has experienced significant demographic changes. Between 2000 and 2008, the 20–24 age group increased by 42.3%, the 55 to 59 and 60 to 64 age group both increased by about 20%, and the 85 and over age range increased by 59.9%. Conversely, population groups of 35-44 years old and under 14 years old experienced population declines. Table 2.1 below shows Curry County's population by age.

Table 2.1 Curry County Population by Age, 2000-2008

Age Range	2000*	2008**	%Change
Under 5	867	827	-4.6%
5 to 9	1,078	871	-19.2%
10 to 14	1,329	1,085	-18.4%
15 to 19	1,144	1,188	3.9%
20 to 24	656	933	42.3%
25 to 34	1,537	1,630	6.0%
35 to 44	2,685	1,931	-28.1%
45 to 54	3,207	3,236	0.9%
55 to 59	1,508	1,806	19.8%
60 to 64	1,498	1,791	19.5%
65 to 74	3,005	3,199	6.5%
75 to 84	2,067	2,125	2.8%
85 and over	556	889	59.9%
Total	**21,137**	**21,510**	**1.8%**

Source: *US Census 2000 "Profile of General Demographic Characteristics"; **PSU Population Research Center "Population by Age and Sex for Oregon and its Counties" 2002, 2008 Population Estimates

Disaster impacts (in terms of loss and the ability to recover) vary among population groups following a disaster. According to the Federal Emergency Management Agency 80% of the disaster burden falls on the public.[7] Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities, and low income persons. As shown in Table 2.2, 13% of Curry County's 2008 population is between the ages of 0 and 14 and approximately 29% are considered elderly (over 65 years of age). In general, children are more vulnerable to heat and cold, have fewer transportation options, and require assistance to access medical facilities. Elderly individuals may require special consideration due to sensitivities to heat and cold, reliance upon

[6] Population Research Center, *2009 Certified Population Estimates; 2002 Oregon Population Report*, "Annual Population Report," http://www.pdx.edu/prc/annual-oregon-population-report.

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

transportation for medications, and comparative difficulty in making home modifications that reduce risk to hazards. Addressing the needs of vulnerable groups through natural hazards mitigation is important to improve the community's overall resilience to natural hazards.

Table 2.2 Curry County Youth and Senior Populations, 2008

Age Range	Number	%
0-14	2,783	13%
65-74	3,199	15%
75+	3,014	14%

Source: PSU Population Research Center "Population by Age and Sex for Oregon and its Counties" 2008 Population Estimates

Housing

Housing type and age are important factors in mitigation planning. Certain housing types tend to be less disaster resistant and warrant special attention. Mobile homes, for example, are generally more prone to wind and water damage than standard wood frame construction. Homes built before 1993 may also be more vulnerable to earthquakes because they were built prior to the incorporation of earthquake standards in Oregon's building codes. Structures built in Oregon after 1993 use earthquake resistant designs and construction techniques. Additionally, in the 1970s, the Federal Emergency Management Agency (FEMA) began assisting communities with floodplain mapping and communities passed floodplain ordinances. These measures made homes built after the 1970s less vulnerable to floods.

Curry County has a variety of housing types. In 2008, 60% of Curry County's homes were single-family residences; 25% were mobile homes; 12% were multi-family homes, and 3% were boats/RV's, vans, etc.[8] Curry County's mobile homes are particularly vulnerable to natural hazards such as floods and windstorms because they are not secured by a foundation. Given the high number of mobile homes, outreach efforts should be targeted to these groups.

Curry County also has a large number of older housing structures that may be vulnerable to earthquakes. Approximately 67% of the housing units were built before 1993 when more stringent seismic codes were put into place (see Table 2.3 below).

[8] US Census, "Curry County Selected Housing Characteristics," 2006-2008 American Community Survey 3-Year Estimates, www.census.gov.

Table 2.3 Curry County Housing Age

Year Built	Number of Structures	% of Structures
2005 or later	313	2.6%
2000 to 2004	1,459	11.9%
1990 to 1999	2,248	18.4%
1980 to 1989	1,836	15.0%
1970 to 1979	2,440	19.9%
1960 to 1969	1,387	11.3%
1950 to 1959	1,507	12.3%
1940 to 1949	712	5.8%
1939 or earlier	334	2.7%
Total	**12,236**	**100%**

Source: US Census, "Curry County Selected Housing Characteristics," 2006-2008 American Community Survey 3-Year Estimates, www.census.gov.

In 2008, Curry County had 12,236 housing units. Of those 85.5% were occupied (10,461) and 14.5% were vacant (1,775).[9] Of the occupied housing units, 65.6% (6,867) were owner occupied, and 34.4% (3,594) were renter occupied.[10] Studies have shown that renters are less likely than homeowners to prepare for catastrophic events.[11] Renters tend to have higher turnover rates that may limit their exposure to hazard information. Likewise, preparedness campaigns tend to pay less attention to renters. Renters typically have lower incomes and fewer resources to prepare for natural disasters, and renters may lack the motivation to invest in mitigation measures for rented property.[12]

Employment & Economics

Curry County has a moderately diverse economy compared to other counties in Oregon. According to the Oregon Employment Department, Curry County's 2006 economic diversity rating was 16 (with 1 being the most diverse, and 36 being the least).[13] An economy that is less diverse, i.e. heavily dependent upon a few key industries, may have a more difficult time recovering after a natural disaster than one with a more diverse economic base.

[9] US Census Bureau, "Profile of Selected Housing Characteristics: 2006-2008," American Community Survey, www.census.gov.

[10] Ibid.

[11] Morrow, 1999; Burby and others, 2003.

[12] Burby and others, 2003.

[13] Oregon Employment Department, *Hachman Diversity Index By County, 2006,* data file, available upon request.

Economic resilience to natural disasters is particularly important for the major employment sectors in the region. If these sectors are negatively impacted by a natural hazard, such that employment is affected, the impact will be felt throughout the regional economy.

As shown in Table 2.4 below, the trade, transportation, and utilities sector is the largest industry sector in the county, providing 18.3% of all the county's jobs. This sector is vulnerable to natural disaster events if buildings are damaged, supply chains are severed, or if stores are inaccessible. As a result, many small businesses may struggle to remain open following a major event.

The leisure and hospitality sector, the county's second largest industry sector, provides 16.1% of the county's employment, and is also vulnerable to natural hazard events. The leisure and hospitality sector includes accommodation facilities for visitors (e.g. hotels, motels, boarding houses) and food services, which include places that prepare food and/or drink for immediate consumption. The sector is predominantly dependent on people who come to the area as tourists, on business, or simply passing through. The industry relies on an open transportation network both for customers and for supplies and is particularly sensitive to road closures (e.g., from wildfires, wind storms, or landslides). The businesses that primarily cater to tourists and recreationalists are also dependent on an unimpaired physical environment. Restaurants and other food providers that rely on local customers may also suffer the same fate as other non-essential retail services; after a disaster, the local population may lack the funds to spend it on "luxury" services such as eating at restaurants. These businesses are highly vulnerable to natural disaster events.

Table 2.4 Curry County Employment by Major Industry, 2009

Industry	Total Persons Employed	% of Workforce
Trade, Transportation & Utilities	**1,147**	**18.3%**
Wholesale	41	
Retail	942	
Transportation, Warehousing & Utilities	165	
Leisure & Hospitality	**1,007**	**16.1%**
Arts, Entertainment & Recreation	48	
Accommodations & Food Services	959	
Accommodation	318	
Food services and drinking places	641	
Education & Health Services	**596**	**9.5%**
Manufacturing	**564**	**9.0%**
Professional & Business Services	**418**	**6.7%**
Construction	**396**	**6.3%**
Financial Activities	**285**	**4.5%**
Natural Resources & Mining	**249**	**4.0%**
Crop production	112	
Forestry and logging	58	
Fishing, hunting and trapping	39	
Other Services	**213**	**3.4%**
Repair and maintenance	64	
Personal and laundry services	23	
Membership associations and organization	89	
Private households	38	
Information	**83**	**1.3%**
Total Local Government	**989**	**15.8%**
Total State Government	**216**	**3.4%**
Total Federal Government	**101**	**1.6%**
Total Employment	**6,264**	

Source: Oregon Employment Department, "Curry County Covered Employment and Wages, 2009," www.qualityinfo.org, accessed June 8, 2010.

Median income can be used as an indicator of the strength of the region's economic stability. In 2008, the median household income in Curry County was $33,722.[14] This is $18,453 below the 2008 national median household income of $52,175 and roughly $16,141, below the median income for Oregon.[15] Between 2000 and 2008, the county's median

[14] US Census, 2006-2008 American Community Survey 3-Year Estimates, "Selected Economic Characteristics," www.census.gov.

[15] US Census, 2006-2008 American Community Survey 3-Year Estimates, "Selected Economic Characteristics, US, Oregon," www.census.gov.

household income changed at a lower rate than the nation's 24% increase (see Table 2.5 below). Although median household income can be used to compare areas as a whole, this number does not reflect how income is divided among area residents.

Table 2.5 Curry County Median Household Income 2000 to 2008

Area	2000	2008	% Change
United States	$41,994	$52,175	24%
Oregon	$40,916	$49,863	22%
Curry County	$30,117	$33,722	12%

Source: US Census 2000, 2006-2008 American Community Survey 3-Year Estimates "Selected Economic Characteristics," www.census.gov.

Curry County's poverty rate is also growing among all ages, as shown in Table 2.6 below. Low income populations may require additional assistance following a disaster because they may not have the savings to withstand economic setbacks, and if work is interrupted, housing, food, and necessities become a greater burden. Additionally, low-income households are more reliant upon public transportation, public food assistance, public housing, and other public programs, all of which can be impacted in the event of a natural disaster.

Table 2.6 Curry County Poverty 2000 and 2008

	2000		2008	
Ages	Total Persons	% of Population	Total Persons	% of Population
All Ages in Poverty	2,554	12.2%	*	15.3%
Under 18 in Poverty	2,011	11.8%	*	19.6%

Source: US Census 2000, 2006-2008 American Community Survey 3-Year Estimates "Selected Economic Characteristics," www.census.gov.

Historic and Cultural Resources

Historic and cultural resources can help define a community's identity and may also be a source of tourism dollars. Because of their role in defining and supporting the community, protecting these resources from the impacts of disasters is important. Curry County has 45 historic sites listed on the National Register of Historic Places.[16] Those with available site location information are listed in Table 2.7 below. Since the locations of archaeological sites are confidential, they are not included in the list below.

[16] State of Oregon, *Oregon National Register List*, October 19, 2009, http://www.oregon.gov/OPRD/HCD/NATREG/docs/oregon_nr_list.pdf.

Table 2.7 Curry County Buildings and Sites Listed on the National Register of Historic Places

Site Name	Location	Year Built
Rogue River Ranch	Agness vicinity	1880
Central Building	Brookings	1915
Wheeler Ridge Japanese Bombing Site	Brookings	1942
Gold Beach Ranger Station	Gold Beach	1936
Mary D Hume Whaling Ship (sunk)	Gold Beach	1880
Paterson Bridge	Gold Beach	1931
Port Orford Coast Guard Station	Port Orford	1934
Sixes Hotel	Sixes	1895
Cape Blanco Lighthouse	Sixes vicinity	1870
Patrick Hughes House	Sixes vicinity	1898

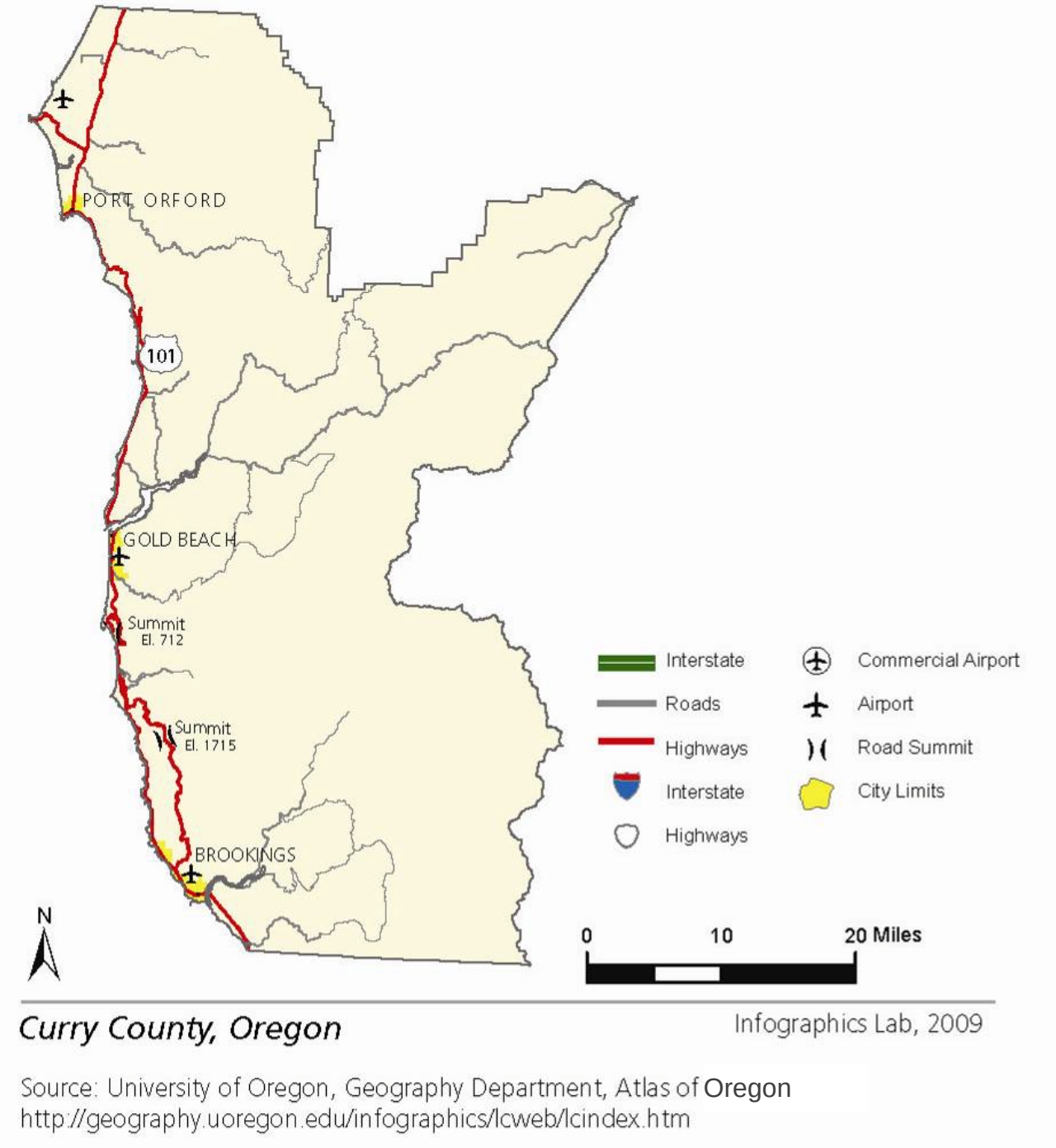
A complete list that includes archaeological sites can be found on the state of Oregon's State Historic Preservation Office website.

Infrastructure & Critical Facilities

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

There are three primary modes of transportation in Curry County: roads, air, and marine. Four State Highways –US Highway 101, Cape Blanco Highway (Hwy 250), Carpenterville Highway (Hwy 255), and Port Orford Highway (Hwy 251)—are located in Curry County. Highways 250 and 251 are relatively minor highways that do not serve a large population area. Highway 101 runs north-south along the Pacific Coast, providing the only major highway connection between Curry County and the other surrounding counties. Figure 2.4 shows the major transportation routes in Curry County.

Figure 2.4 Transportation Routes in Curry County



Highway 101 carries relatively high traffic volumes for the county. In Brookings, the 2008 volume was 17,800 average daily traffic (ADT); in Gold Beach the highest ATD was 9,300; and in Port Orford, the highest ADT was 4,900.[17] Catastrophic disasters can disrupt major roadways, disrupting automobile traffic and commercial activity, and making any response or recovery effort difficult. Curry County is especially vulnerable to traffic disruption because Highway 101 is the only major highway connecting the county and the communities of Port Orford, Gold Beach, and Brookings with the rest of the state. Focusing mitigation efforts on vulnerable portions of highway 101 will make Curry County more resilient from natural disasters.

The condition of bridges in Curry County is also a factor that affects risk from natural hazards. Most bridges are not seismically retrofitted, which is important because of the county's earthquake risk. Damaged bridges can disrupt traffic and exacerbate economic losses because of the inability of industries to transport services and products to clients. There are 160 bridges and culverts in Curry County, of which 60 bridges are in use by state highways and 30 are in use by county highways.[18]

Curry County's marine facilities consist of three ports: the Port of Brookings, which is located on the east bank of the Chetco River, south of Highway 101; the Port of Gold Beach, which is located at the mouth of the Rouge River; and the Port of Port Orford. There are also three small airports that serve Curry County: Curry Coast Airpark (Brookings), Gold Beach Airport, and Cape Blanco State Airport.

Critical facilities are those facilities that are essential to government response and recovery activities (e.g., police and fire stations, public hospitals, public schools). Curry County has one hospital, Curry County General Hospital, located in Gold Beach. Two small medical centers are located in Brookings and Port Orford.[19] A new medical facility is being built in Brookings, and a 24 hour emergency room is planned for that facility. The county has four police stations and 11 fire & rescue stations.[20] The county also has three school districts centered in each of the three cities. The Coos Curry Electric Cooperative provides power to local critical facilities as well as businesses and residential customers in Coos, Curry, Douglas and Josephine counties. Figure 2.5 maps critical facilities in Curry County.

---

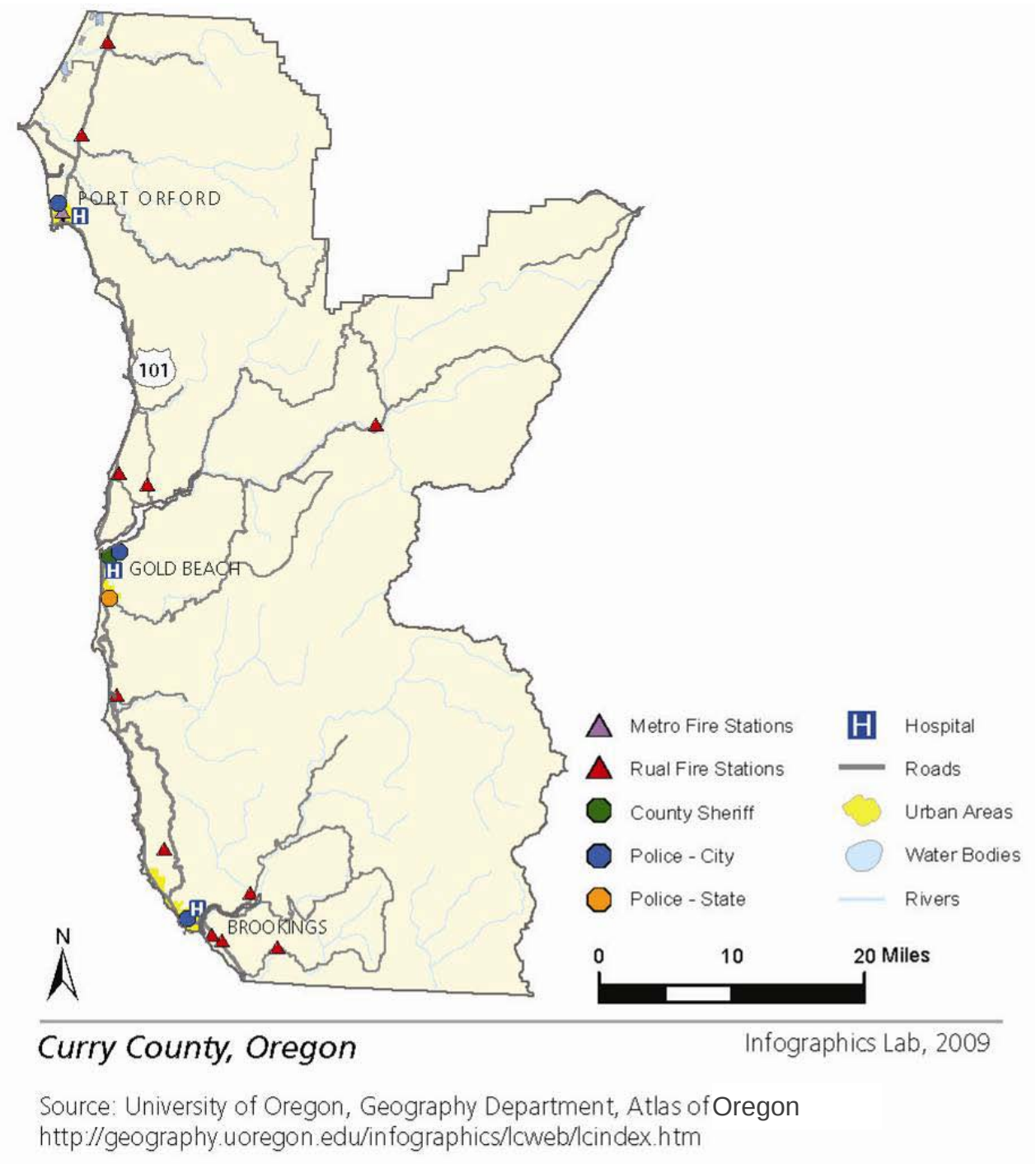
[17] Oregon Department of Transportation, "Traffic Volumes on State Highways," http://www.oregon.gov/ODOT/TD/TDATA/tsm/docs/2008_TVT.pdf, accessed January 29, 2010.

[18] Oregon Department of Transportation, information available upon request.

[19] Curry County General Hospital, "Curry County Health Network," http://www.curryhealthnetwork.com/, accessed February 8, 2010.

[20] State Fire Marshall, *Oregon Fire Department List,* http://www.oregon.gov/OSP/SFM/docs/Data_Services/Fire_Department_List_County.pdf, accessed February 8, 2010.

Figure 2.5 Curry County Critical Response Facilities.



Dam failures can occur at any time and nationally are quite common. Fortunately, most failures result in minor damage and pose little or no risk to life safety. Curry County has nine dams.[21] Dams are ranked with hazard ratings of low, significant, or high, which defines the downstream consequences of a sudden dam failure.[22] There are no dams within Curry County that have a high hazard rating, so a dam failure will likely have no human casualties and little property damage. However, Port Orford has a dam located on the North Fork of Hubbard Creek that is used for the city's water needs. Failure of the dam will lead to the loss of water for the city.

Land Use & Development

Like many western Oregon counties, the majority of lands in Curry County are managed by public agencies. The county encompasses approximately 1,042,281 acres of which, 66% are managed by public agencies. Land ownership is divided among the U.S. Forest Service, private property owners, the Bureau of Land Management, State of Oregon, and local government as shown in Table 2.8 below. A map showing land ownership in the county is shown in Figure 2.6.

Table 2.8 Curry County Publicly Owned Lands

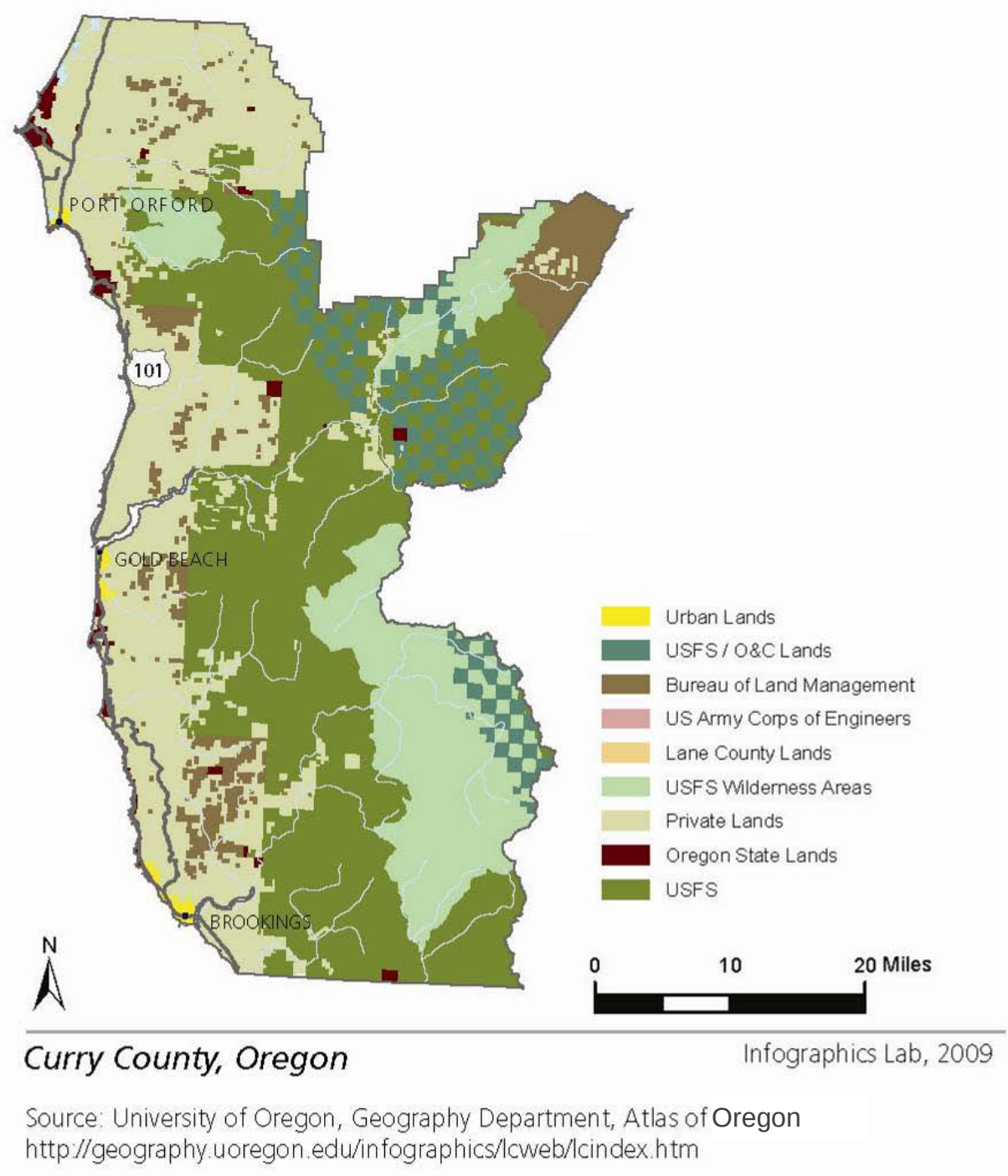
Landowner Entity	Acres
USDA Forest Service	614,243
Privately owned land	350,546
Bureau of Land Management	67,463
Oregon Parks and Recreation Dept.	7,475
Oregon Department of State Lands	2,389
Local Government	165
Total County Acreage	**1,042,281**

Source: Curry County Community Wildfire Protection Plan

[21] Water Resources Department "Dam Inventory Query, 2007" http://apps2.wrd.state.or.us/apps/misc/dam_inventory/Default.aspx.

[22] Ibid

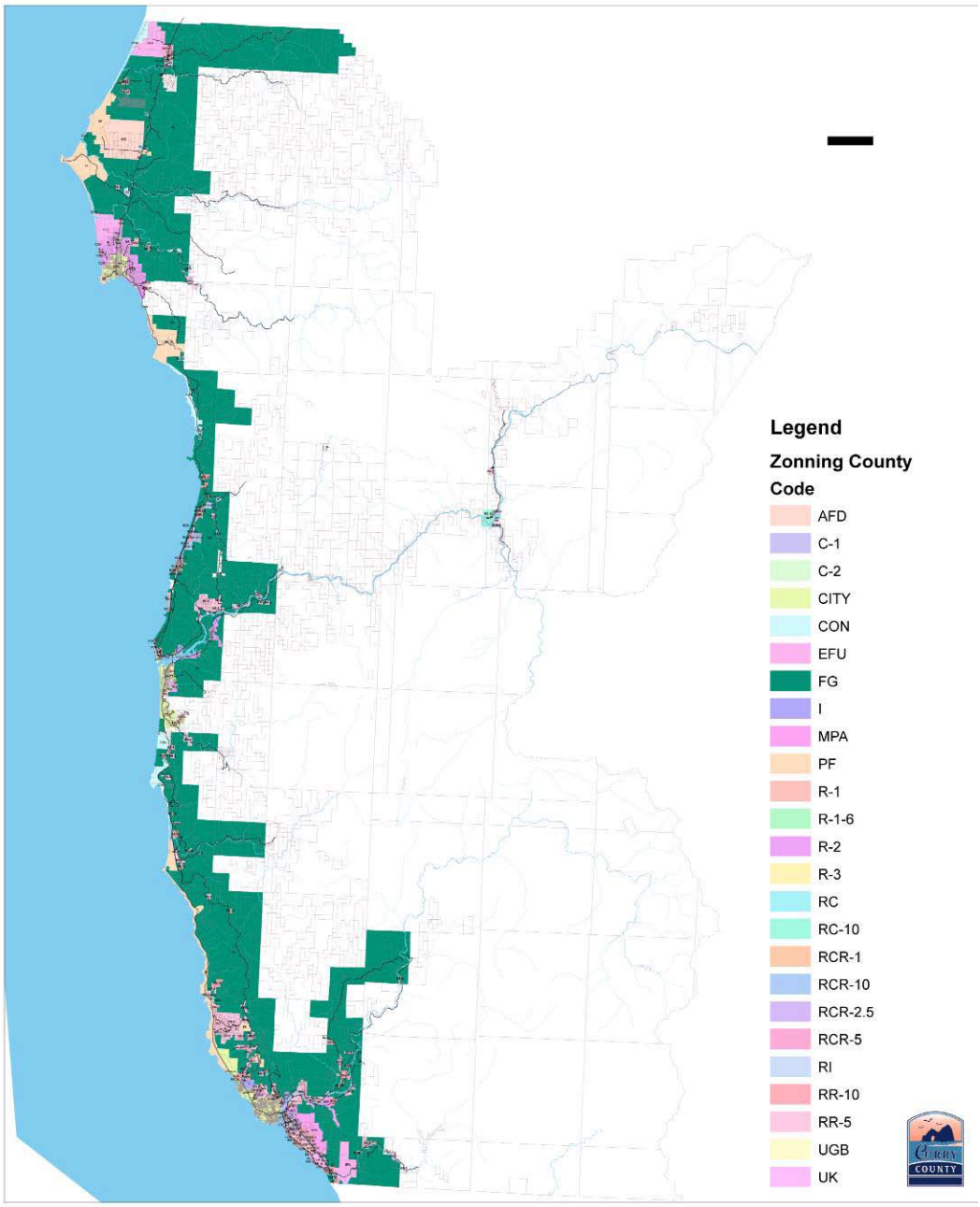
Figure 2.6 Curry County Land Ownership



Curry County has a number of zoning designations that guide development and economic activities in Curry County. General zoning designations include: timber, forest-grazing, agricultural, exclusive farm use, residential, commercial, industrial, marine, beach and dune conservation areas, estuary resource zone, scenic waterway areas, shoreland overlay, natural hazards overlay, archaeological and historic

sites, and riparian corridor buffer overlay. A general land use map of Curry County is shown in Figure 2.7 below.

Figure 2.7 Curry County Land Use



Source: Curry County Comprehensive Plan

In addition to the three incorporated communities of Brookings, Gold Beach and Port Orford, Curry County also has a large unincorporated population. Unincorporated communities are settlements located outside urban growth boundaries that are primarily residential, but can have other commercial, industrial or public land uses. Curry County's unincorporated communities include the following: Agness, Harbor, Langlois, Nesika Beach, Ophir, Pistol River, Sixes, and Wedderburn. Table

2.9 below depicts the percentage of Curry County's population living within incorporated areas in 2000 and 2008.

Table 2.9 Curry County Urban/Rural Populations

Incorporated Population		% Change
2000	2008	2000-2008
40.2%	46.0%	5.8%

Source: Portland State University Population Estimates, 2000, 2008.

Government Structure

Local governments can encourage natural hazard mitigation by integrating mitigation strategies into existing plans, policies, and programs. If mitigation strategies are successfully integrated, mitigation becomes part of a government's daily activities. This section describes Curry County's government departments that can play a role in hazards mitigation.

Curry County's government has jurisdiction over all privately owned land outside of incorporated communities and land not owned by Native American tribes. The county government consists of three commissioners, tax assessor, clerk, surveyor, and treasurer, and contains the following departments:

Public Services: administers local and state regulations regarding land-use, environmental sanitation, and building construction. Consists of three divisions, listed below:

Planning Division: responsible for comprehensive land-use planning through the continuing development of the Curry County Comprehensive Plan. The Planning Division also provides staff assistance to the Curry County Planning Commission. The division can incorporate mitigation measures into the Comprehensive Plan or the Curry County Zoning Ordinance.

Environmental Services Division: evaluates land, issues permits, and inspects construction within the county for on-site sewage disposal systems. The Environmental Services Division inspects septic pumping equipment used by private contractors for removal and disposal of septic tank contents within the county. The division also investigates complaints and provides enforcement of the applicable Oregon Administrative Rules (OAR's).

Buildings and Plumbing Division: issues building permits and inspects new construction of one and two family dwellings and certain commercial and industrial structures as per the Uniform Building Code. The Division issues permits and provide inspections for set-up of manufactured homes in the county through the Oregon Manufactured Dwellings Code. In addition, the Division issues permits and provides inspections for construction of plumbing and mechanical installations under the Uniform Plumbing and Mechanical Codes. The

division can assist in implementing mitigation actions that improve a building's structural components.

Emergency Services: responsible for managing the Emergency Operations Center and coordinating response, preparedness, mitigation, and recovery efforts in the county. Emergency Services can assist in coordinating mitigation activities and identify plans and policies where mitigation actions can be incorporated.

Law Enforcement: The Curry County Sheriff's office provides non-discriminatory, effective and efficient law enforcement services. The Sheriff's office protects the life and property of Curry County citizens, and ensures that the constitutional rights of all persons are protected. Law enforcement can potentially help disseminate information about natural hazards mitigation.

Roads: The Road Department provides safe, efficient and economical road transportation services in the county. The department can implement mitigation activities that reduce the impacts of natural hazards on new and existing infrastructure.

Public Health: Public Health promotes and protects the health of the public through the control of communicable diseases, the collection of vital statistics, programs which identify and mitigate risks to health, the promotion of maternal and child health, and education and referral services. Public Health can help disseminate information about natural hazards in the community.

Personnel: The Personnel Department advertises job openings in the different departments within Curry County, distributes applications to the appropriate department, and conducts orientation and in-processing for individuals who have been selected to fill positions. All personnel records are maintained in the Human Resources Office and are updated as necessary. Personnel could disseminate outreach information about natural hazards mitigation to government employees.

Information Technology: Information technology provides support to all county departments and agencies for all computer systems and related equipment, including the county's internal phone systems. The department is responsible for all technical support, systems administration and security monitoring. The information technology department could implement mitigation actions that protect critical county equipment from natural hazard events such as earthquakes.

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.[23]

The Curry 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 is a list of active plans and policies which are relevant to natural hazards mitigation planning in Curry County.

Name: Curry County Comprehensive Plan
Date of Last Revision: December 2008
Author / Owner: Curry County Public Services Department
Description: The Comprehensive Plan presents the official goals and policies concerning land use in Curry County. It addresses all phases of land use and resource utilization, and addresses all applicable Oregon Planning Goals adopted by the Land Conservation and Development Commission.
Relation to Natural Hazards Mitigation: Guides growth and development; can be linked to action items that shape growth and development so that they do not increase the county's risk to natural hazards; can be linked to action items that protect natural and historic areas and areas subject to natural hazards; can be linked to action items for how the county will implement Oregon's Statewide Planning Goal 7 requirements. With regards to Goal 7, the Comprehensive Plan contains goals and policies in Chapter 7 that are designed to "protect life and property from natural disaster and hazards identified as potentially occurring in Curry County."

Name: Curry County Community Wildfire Protection Plan
Date of Last Revision: February 2008
Author / Owner: Institute for a Sustainable Environment: Resource Innovations/Curry County
Description: Sets forth action plan for addressing prioritized fuel reduction, treatment of structural ignitability, and increased collaboration to reduce the impact of wildland urban interface fires.
Relation to Natural Hazards Mitigation: A CWPP identifies strategies and priorities for the protection of life, property, and infrastructure in the

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

wildland-urban interface. The Curry County CWPP works to reduce the impacts of a wildfire on the community and information is incorporated into the Curry County Natural Hazards Mitigation Plan.

Name: Curry County Zoning Ordinance
Date of Last Revision: 2006
Author / Owner: Curry County Public Services Department
Description: Guides growth and development by establishing the county's authority to govern land use zoning and by providing conditions for sustainable land use practices.
Relation to Natural Hazards Mitigation: The Curry County Zoning Ordinance guides growth and development in the county and can prevent development in hazardous areas of the county. The ordinance helps protect natural and historic areas and areas subject to catastrophic disasters. The ordinance can also be used to implement long-term mitigation strategies.

Name: Curry County Transportation Systems Plan
Date of Last Revision: May 2005
Author / Owner: David Evans and Associates, Inc./Curry County
Description: Makes transportation system and service recommendations for the county and is designed to be responsive to changes in ridership demand and population growth.
Relation to Natural Hazards Mitigation: Transportation systems assist in evacuation and response in the event of a catastrophic disaster. Mitigation actions relating to reducing the impact of natural hazards can be incorporated into the transportation systems plan.

Name: Curry County Flood Damage Prevention Ordinance
Date of Last Revision: September 2009
Author / Owner: Curry County Public Services Department
Description: Local floodplain ordinance that promotes the public health, safety and general welfare by minimizing public and private losses due to flood conditions in specific areas.
Relation to Natural Hazards Mitigation: The Flood Damage Prevention Ordinance is focused on reducing the impact of floods on Curry County. The Curry County Natural hazards Mitigation Plan's flood mitigation actions could be incorporated into the ordinance.

Community Organizations and Programs

Social systems can be defined as community organizations and programs that provide social and community-based services, such as health care or housing assistance, to the public. In implementing mitigation, it is important to know what social systems exist within the community because of their existing connections to the public. Often, actions identified by the plan involve communicating with the public or specific subgroups within the population (e.g. elderly, children, low income). The county can use existing social systems as resources for implementing such communication-related activities because these service providers already

work directly with the public on a number of issues, one of which could be natural hazard preparedness and mitigation.

The following table lists organizations that are active within the community and may be potential partners for implementing long-term recovery or mitigation actions. The table includes information on each organization or program's service area, types of services offered, populations served, and how the organization or program could be involved in natural hazard mitigation. The three involvement methods 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.

Name and Contact Information	Description	Service Area	Populations Served						Involvement with Natural Hazards Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
US Department of Agriculture Farm Service Agency 376 N Central Blvd. Coquille, OR 97423-1244 (541) 396-4323	Administer a variety of commodity, loan, conservation, and emergency disaster assistance programs to small farms. Maintains an "emergency plan" for continuity of operations and assistance to producers.	Coos and Curry Counties	✓						• Education and outreach • Information dissemination • Participate in mitigation efforts
Coos Forest Protective Association (CFPA) CFPA Headquarters 63612 Fifth Road Coos Bay, Oregon 97420 (541) 267-3161	Private, nonprofit corporation that provides protection from fires on 1.5 million acres of private, county, state and Bureau of Land Management timber and grazing lands in Coos, Curry and western Douglas counties	Coos and Curry Counties	✓	✓	✓	✓	✓	✓	• Participate in mitigation efforts
Oregon Coast Community Action 2110 Newmark Ave Coos Bay, Oregon 97420 (541) 888-1574	Nonprofit network of programs that feed, house, warm and educate people.	Coos, Curry and Western Douglas Counties		✓	✓	✓	✓	✓	• Education and outreach • Information dissemination • Participate in mitigation efforts

Name and Contact Information	Description	Service Area	Populations Served						Involvement with Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
Southwestern Oregon Community College, Curry County Campuses*	Provide high quality learning opportunities for individuals in Curry County	Curry County	✓		✓	✓	✓	✓	• Education and outreach • Information dissemination • Participate in mitigation efforts
Curry County Economic and Community Development 94235 Moore Street PO Box 746 Gold Beach, OR 97444 (541) 247-4466	Offers many services and resources to assist new business, existing business and the residents of Curry County.	Curry County	✓	✓	✓	✓	✓	✓	• Education and outreach • Information dissemination • Participate in mitigation efforts
Curry County Health Foundation P.O. Box 1274, Gold Beach, OR 97444 (541) 247-3189	Supports Curry General Hospital and the delivery of health care services throughout Curry County	Curry County		✓	✓	✓	✓	✓	• Education and outreach • Information dissemination • Participate in mitigation efforts
OSU Extension Service Curry County 29390 Ellensburg (Hwy 101) Gold Beach, Or 97444 541-247-6672	Offers a wealth of non-formal educational programs and information services	Curry County	✓	✓	✓	✓	✓	✓	• Education and outreach • Information dissemination
Brookings Habitat for Humanity Curry County HFH PO Box 1212 Brookings, OR 97415 (541) 412-7166	Works in partnership with people in need to build safe, decent housing	Curry County		✓	✓	✓	✓	✓	• Education and outreach • Information dissemination • Participate in mitigation efforts

* There are three Southwestern Oregon Community College facilities in Curry County. There locations can be found at: http://www.socc.edu/curry/co/about/locations/index.shtml

Hazard Overview

The following is a brief overview of the hazards that can impact Curry County. Each of the hazards is described in more detail in Volume II: Hazard Annexes.

Coastal Erosion: Coastal erosion occurs throughout the year in Curry County, but is accelerated during the winter months when storms increase the rate of erosion. Coastal erosion is gradually eroding the Nesika Beach area, north of Gold Beach, threatening beachfront homes. Harris State Park experiences coastal erosion on a regular basis, and in 2004, erosion destroyed a hiking trail in Otter Point State Park. In the Dawson Tract Subdivision north of Brookings, a home had to be torn down due to coastal erosion. Finally, in February 1998, heavy surf damaged Port Orford's sewage treatment plant, causing approximately $300,000 in damage and eroding the dune that separates the ocean from Garrison Lake, which is one of Port Orford's sources of water. The dune breach has since been repaired and is monitored regularly.

Drought: Drought conditions are not uncommon in Curry County. The environmental and economic consequences can be significant, especially for Curry County's agricultural sector. Drought also increases the probability of wildfires in Curry County.

Earthquake: Curry County has not experienced any major earthquake events in recent history. Seismic events do, however, pose a threat. In particular, a Cascadia Subduction Zone (CSZ) event could produce devastating damage and loss of life in Curry County. The geographical position of Curry County makes it also susceptible to deep intraplate events within the subducting Juan de Fuca Plate, and shallow crustal events within the North American Plate.

Flooding: Floods frequently occur in Curry County during periods of heavy rainfall. Riverine flooding, in particular, is the leading cause of flood events. Major sources of riverine flooding include Chetco River, Elk River, Pistol River, Rogue River, Sixes River, Winchuck River, and Hunter Creek.

Landslide: Curry County is subject to landslide events. 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.[24]

Tsunami: Tsunamis can result from either local earthquake events (Cascadia Subduction earthquake) or distant earthquake events sometimes thousands of miles away. People on open beaches, at low-lying areas of the beach, by bay mouths or bay tidal flats, in low parts of coastal towns and cities, and near mouths of rivers draining into the ocean are in greatest danger from tsunamis. The Geological Society of America has reported evidence of eleven large tsunami-producing earthquakes in the past 5,500 years, in the Sixes River estuary near Cape Blanco, about 20 miles south of

[24] State of Oregon Natural Hazard Mitigation Plan. Part 3: Hazard Chapters. "Landslides – Debris Flows," p. LS-2. March, 2006.

Bandon. On April 1, 1946, a tsunami resulted in a three-meter run-up at Coos Bay and Bandon. On March 27, 1964, a tsunami struck the Oregon coastline, killing four people and causing nearly one million dollars in damage (in 1964 dollars).

Wildfire: 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. The Curry County Community Wildfire Protection Plan identified sixteen communities "at risk" to the effects of wildfire.

Windstorm: Many buildings, utilities, and transportation systems in the county are vulnerable to wind damage. This is especially true in open areas, such as natural grasslands or farmlands, and it is also true in forested areas along tree-lined roads where electrical transmission lines are frequently damaged.

Section 3: Mission, Goals, and Action Items

The information provided in Section 2 and the Hazard Annexes provide the basis and justification for the mitigation actions identified in this plan. This section describes: (1) the components that guide implementation of the identified mitigation strategies; (2) information on the process used to develop Curry County's mission, goals, and action items; and (3) explains how Curry County intends to incorporate the mitigation strategies outlined in the plan into existing planning mechanisms and programs such as the county's comprehensive land use planning process, capital improvement planning process, and building codes enforcement and implementation. City or special district specific documentation of how actions will be implemented through existing plans and policies is located in Volume III: City/Special District Addendums.

- Mission— The mission statement is a philosophical or value statement that answers the question "Why develop a plan?" In short, the mission states the purpose and defines the primary function of Curry County's multi-jurisdictional Natural Hazards Mitigation Plan. The mission is an action-oriented statement of the plan's reason to exist. It is broad enough that it need not change unless the community environment changes.

- Goals— Goals are the guiding principles for the mitigation plan's action items. They identify how Curry County intends to work toward mitigating risk from natural hazards.

- Action Items— The action items are detailed recommendations for activities that local departments, citizens, and others could engage in to reduce risk.

Mitigation Plan Mission

The mission of the Curry County Natural Hazards Mitigation Plan is intended to be adaptable to any future changes made to the plan. The Oregon Partnership for Disaster Resilience (OPDR), together with the Curry County Plan Update Steering Committee, developed the following mission statement for the Curry County Natural Hazards Mitigation Plan:

Create a disaster resilient Curry County.

This mission statement replaces the mission statement found in the 2005 Curry County Natural Hazards Mitigation Plan (see the "Plan Update Changes Memo" in Appendix B for the old mission statement). Steering

committee members at the March 16, 2010 Steering Committee Meeting reviewed the 2005 plan's mission statement and agreed that the above mission statement better defines why Curry County has developed their mitigation plan.

Mitigation Plan Goals

The plan goals help guide the direction of future activities aimed at reducing risk and preventing loss from natural hazards. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items. The goals for the Curry County Natural Hazards Mitigation Plan are to:

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

These goals replace the goals found in the 2005 Curry County Natural Hazards Mitigation Plan (see the "Plan Update Changes Memo" in Appendix B for the 2005 plan goals). Steering committee members at the March 16, 2010 steering committee meeting evaluated the previous mitigation plan goals and adopted the goals listed above because they more adequately describe what Curry County wants to achieve, and because they align with the State of Oregon's current mitigation planning goals.

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, as shown in Figure 3.1 below, and can include steering committee work sessions, stakeholder interviews, local records, plans, policies, and reports, and regional risk assessments found in the State of Oregon Natural Hazards Mitigation Plan.

Figure 3.1 Action Item Sources

Source: Oregon Partnership for Disaster Resilience, 2006

The Curry County steering committee, together with OPDR, developed the action items presented in this plan. The actions were developed based upon local vulnerability information gathered during the February 17 steering committee meeting, from the 2005 Curry County Natural Hazards Mitigation Plan, the results of stakeholder interviews, and an analysis of local plans and reports. The action items also include deferred actions from the 2005 mitigation plan. During the update process, the Curry County Steering Committee identified which actions from the 2005 plan had been completed or not completed, and whether or not actions should continue to be listed in the plan. The 2005 plan's actions and their status are listed in the Plan Update Changes Memo in Appendix B Public Process.

Each action item in this plan 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 Curry County multi-jurisdictional 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. Where relevant, each action items lists existing plans and programs that might be used to implement the action. Curry County currently addresses statewide planning goals and legislative requirements through its comprehensive land use plan, capital improvements plan, mandated standards and building codes. To the extent possible, Curry County will work to incorporate the recommended mitigation action items into existing programs and procedures.

Many of the Curry County multi-jurisdictional Natural Hazards Mitigation Plan's recommendations are consistent with the goals and objectives of the county's existing plans and policies. Where possible, Curry County 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.[25] Implementing the natural hazard mitigation plan's action items through such plans and policies increases their likelihood of being supported and implemented.

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

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.

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.

Status

As action items are implemented or new ones are created during the plan maintenance process, it is important to indicate the status of the action item—whether it is new, ongoing, or complete. Documenting the status of the action will make reviewing and updating mitigation plan easier during the plan's five-year update, and can be used as a benchmark for progress.

Section 4: Plan Implementation and Maintenance

The Plan Implementation and Maintenance section details the formal process that will ensure that the Curry County multi-jurisdictional 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.

In addition, this section describes how Curry County and participating jurisdictions will integrate public participation throughout the plan maintenance and implementation process.

Implementing the Plan

After the plan is locally reviewed and deemed complete, Curry County submits it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management 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 county adoption, the participating jurisdictions should adopt their addendums.

Convener

The Curry County Emergency Services Coordinator will be the convener for the Curry County Natural Hazards Mitigation Plan. The convener's responsibilities include:

- Coordinating committee meeting dates, times, locations, agendas, member notification, and public 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;
- Coordinating plan update processes;

- Submitting future plan updates to Oregon Emergency Management for review; and
- Coordinating local adoption processes.

Coordinating Body

The Curry County Mitigation Steering Committee serves as the coordinating body for the mitigation plan. The coordinating body is appointed by the Curry County Board of Commissioners. Roles and responsibilities of the coordinating body include:

- Attending future plan maintenance and plan update meetings;
- Serving as the local evaluation committee for funding programs such as the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program, and the Flood Mitigation Assistance Program;
- Prioritizing and recommending funding for natural hazard risk reduction projects;
- Updating the natural hazards mitigation plan within a five-year plan update schedule;
- Developing and coordinating ad hoc and/or standing subcommittees as needed; and
- Coordinating public involvement activities.

Members of the Curry County coordinating body include:

- Curry County Emergency Services Coordinator (convener)
- Curry County Road Master
- Curry County GIS Coordinator
- Curry County Sheriff
- City representatives
    - Brookings Building Official
    - Gold Beach Emergency Management Director
    - Port Orford City Manager
- Coos Forest Protective Association Unit Forester
- Oregon Department of Transportation South Coast Maintenance Office Coordinator
- Curry County Soil and Water Conservation District Lower Rogue Watershed Coordinator
- Bureau of Land Management Assistant Fire Management Officer

- US Forest Service, Rogue River/Siskiyou National Forest Ranger District
- Curry County School District Representative

To make the coordination and review of the Curry County multi-jurisdictional 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.

In 2004, Coos and Curry Counties developed the South Coast Emergency Management Advisory Council (SCEMAC) which advises Coos and Curry County and city governments about their emergency management programs. To avoid duplicating activities between the mitigation plan's coordinating body and SCEMAC, the coordinating body may choose to adopt SCEMAC as the coordinating body for the mitigation plan in the future. Adoption of SCEMAC as the coordinating body for the mitigation plan is listed as Plan Implementation Action # 1.

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's and city/special district's efforts to reduce the risks posed by natural hazards. This section was developed by the Oregon Partnership for Disaster Resilience at the University of Oregon and includes a process to ensure that a regular review and update of the plan occurs. The coordinating body 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.

Semi-Annual Meetings

The committee will meet on a semi-annual basis, in the spring and fall, and others can be organized as needed. Tasks to be completed at each meeting include:

- Discuss available (or soon to be available) funding streams, and which mitigation actions should be implemented within the coming year. All departments and/or organizations that are responsible for mitigation actions should be invited to attend (in addition to the regular coordinating body.
- Determine whether there are components of the plan's Risk Assessment that can be updated. For example, discuss any natural disasters (or significant hazard events) that have occurred in the previous years. Record this information, and add it to the natural hazards mitigation plan. Or, further refine the risk assessment (i.e.,

conduct further studies, and acquire data and/or information that could produce better maps).

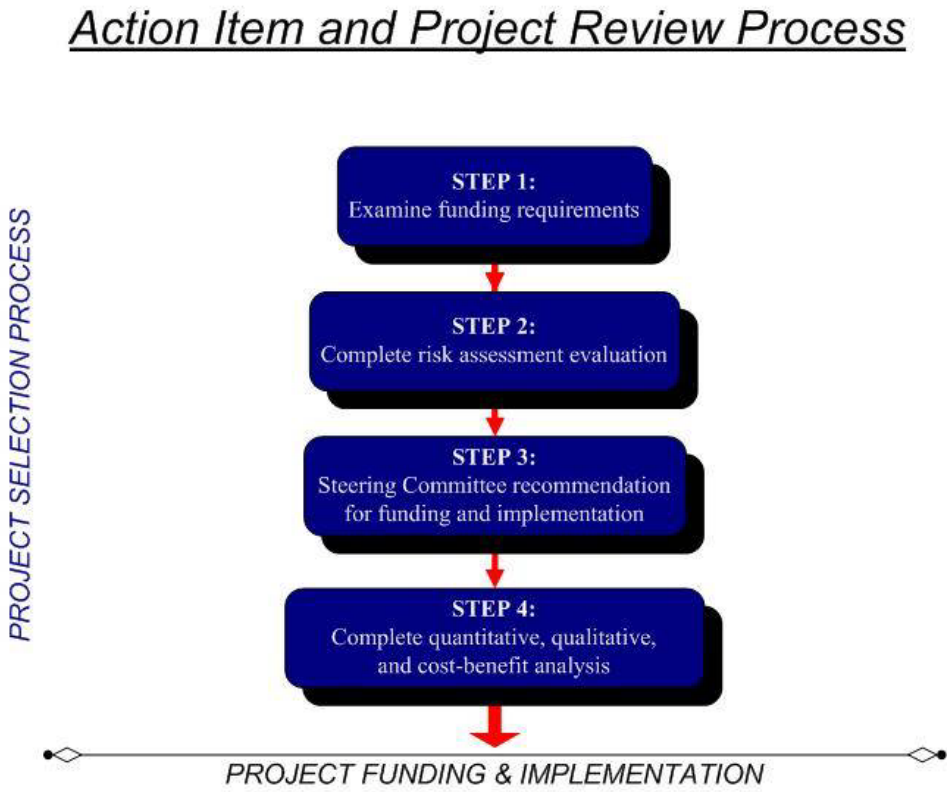
- Discuss potential community outreach activities.
- In 2014, complete a full update of the county's natural hazards mitigation plan. Two or more meetings may be needed to complete this task. In addition, the convener may need to assign plan-update tasks to the committee as needed.

The convener will be responsible for documenting the outcome of the semi-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 (via the Pre-Disaster Mitigation Program) 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 E 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 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.

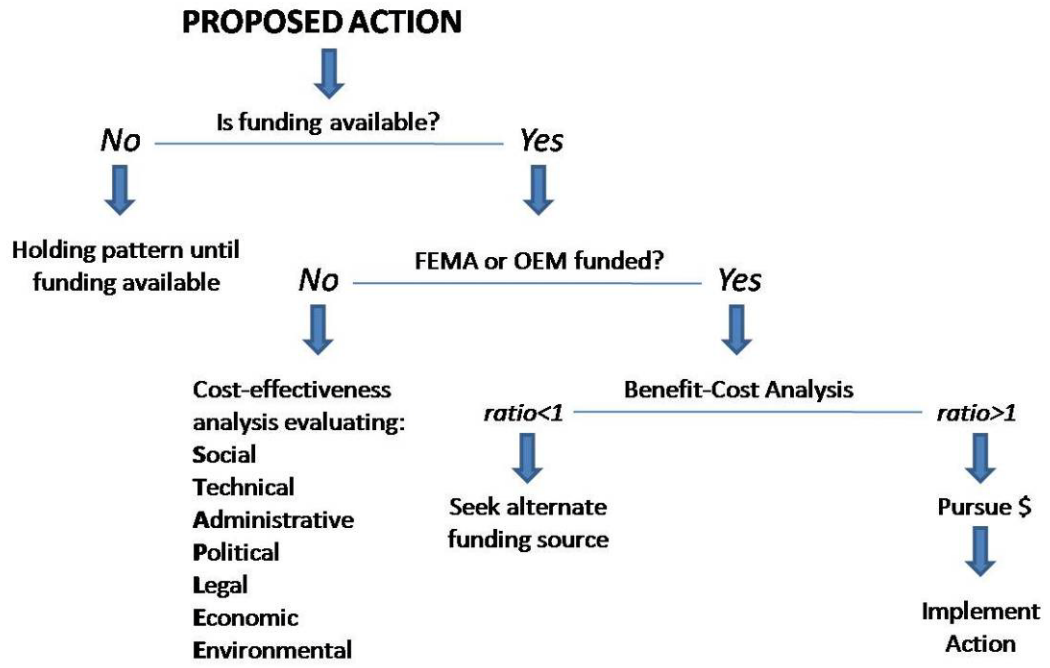
Step 3: Coordinating body recommendation

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 at the University of Oregon's Community Service Center, 2010.

If the activity requires federal funding for a structural project, the coordinating body 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 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 Oregon Partnership for Disaster Resilience at the University of Oregon's Community Service Center. See Appendix C for a description of the STAPLE/E evaluation methodology.

Continued Public Involvement & Participation

The participating jurisdictions are dedicated to involving the public directly in the continual reshaping and updating of the Curry County multi-jurisdictional Natural Hazard Mitigation Plan. Although members of the coordinating body represent the public to some extent, the public

will also have the opportunity to continue to provide feedback about the plan.

To ensure that the public remains involved throughout the plan implementation and maintenance process, Curry County and participating jurisdictions will:

- Publicly announce coordinating body meetings;
- Post a copy of the plan on the Curry County website;
- Regularly conduct stakeholder interviews;
- Distribute the mitigation plan to all county departments, schools, hospitals, special districts, and libraries using the existing distribution list for the Emergency Operations Plan;
- Use existing brochures to summarize mitigation efforts (existing examples could include electric bill newsletters and the monthly Rural Lite magazine); and
- Make a copy of the plan available at a booth during the Curry County Home Show and Curry County Fair.

In addition to the involvement activities listed above, Curry County's multi-jurisdictional Natural Hazard Mitigation Plan has been archived and posted on the Oregon Partnership for Disaster Resilience's (OPDR) 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 Curry County Natural Hazards Mitigation Plan is due to be updated by August 16, 2015. 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-schedule plan maintenance meetings, and which activities require additional meeting time and/or the formation of sub-committees.

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?			
Do future annexations include hazard prone areas?			
Are there new high risk populations?			
Are there completed mitigation actions that have decreased overall vulnerability?			

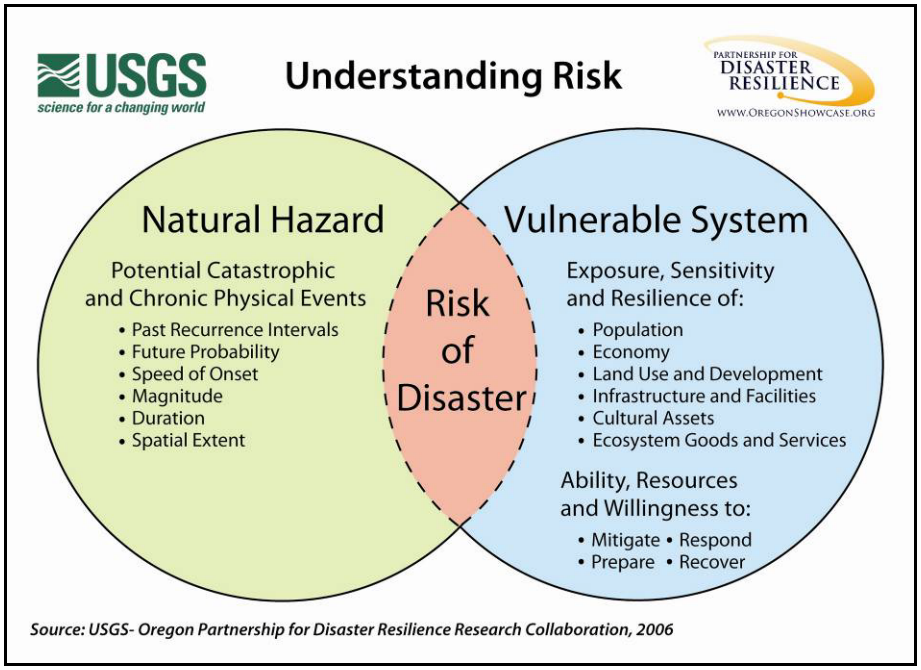
Mitigation Plan Update Toolkit			
Question	*Yes*	*No*	*Plan Update Action*
Did the plan document and/or address National Flood Insurance Program repetitive flood loss properties?			Document any changes to flood loss property status
Did the plan identify the number and type of existing and future buildings, 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.

Volume II: Hazard Annex Introduction

The foundation of the Curry County multi-jurisdictional Natural Hazards Mitigation Plan is the risk assessment. Risk assessments provide information about the areas where the hazards may occur, the value of existing land and property in those areas, and an analysis of the potential risk to life, property, and the environment that may result from natural hazard events.

This section identifies and profiles the location, extent, previous occurrences, and future probability of natural hazards that can impact the participating jurisdictions, as highlighted in Figure II.1 below. The information in this section was paired with the information in Section 2 – Community Overview during the planning process to identify issues and develop actions aimed at reducing overall risk, or the area of overlap in the figure below.

Figure II.1. Understanding Risk

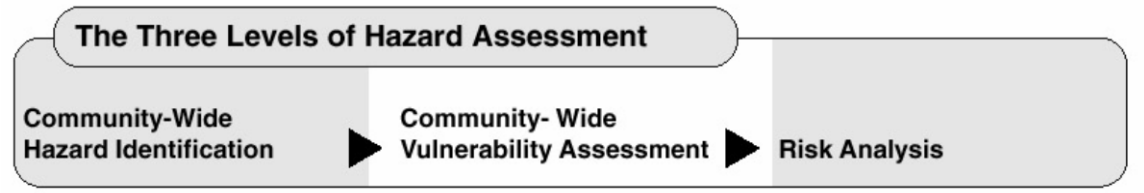


This section drills down to local level information and results in an understanding of the risks that Curry County faces. In addition to local data, the information here relies upon the Region 1 (Oregon Coast) Regional Risk Assessment in the State Oregon's Natural Hazards Mitigation.

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 II.2. The three phases of a risk assessment



Source: Planning for Natural Hazards: Oregon Technical Resource Guide, 1998

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.[26]

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 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.[27]

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

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

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

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.

Probability and Vulnerability Assessments

The hazard annexes in Volume II describe each hazard's probability of future occurrence within Curry County, as well as the county's overall vulnerability to each hazard. To facilitate connections with the State of Oregon's Natural Hazards Mitigation Plan, Curry County used the same rating scales as provided within Oregon Emergency Management's Hazard Analysis Methodology template, and are listed below. Probability estimates are based on the frequency of previous events, and vulnerability estimates are based on potential impacts of the hazard to Curry County.

Probability scores address the likelihood of a future major emergency or disaster within a specific period of time as follows:

High = One incident likely within a 10-35 year period

Moderate = One incident likely within a 35-75 year period

Low = One incident likely within a 75-100 year period

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

High = More than 10% affected

Moderate = 1-10% affected

Low = Less than 1% affected

The probability and vulnerability scores in each hazard annex, with the exception of the coastal erosion hazard, are taken from the 2007 Curry County Hazard Analysis. Scores were reviewed by the Curry County steering committee members during the plan update process.

Volume II: Hazard Annex
Coastal Erosion

Causes and Characteristics of the Hazard

Coastal erosion is a natural process that continually affects the entire coast. Erosion becomes a hazard when human development, life and safety are threatened. Beaches, sand spits, dunes and bluffs are constantly affected by waves, currents, tides and storms resulting in chronic erosion, landslides and flooding. Changes may be gradual over a season or many years. Changes may also be drastic, occurring during the course of a single storm event.

Erosion may be caused by large waves, storm surges, rip cell embayments, high winds, rain, runoff, flooding, or increased water levels and ocean conditions caused by periodic El Niños. Coastal dunes and bluffs comprised of uplifted marine terrace deposits are especially vulnerable to chronic and catastrophic hazards.

Natural hazards that cause erosion and other impacts on coastal areas can be divided into two general classes: chronic and catastrophic.

Chronic hazards are those that we can often see clear evidence of along the ocean shore and include the following:

- Periodic high rates of beach, dune and bluff erosion;
- Mass wasting of sea cliffs in the form of landslides and slumps due to wave attack and geologic instability;
- Storm surges, high ocean waves and the flooding of low-lying lands during major storms;
- Sand inundation;
- Erosion due to the occurrence of El Niños and from rip embayments; and
- Recession of coastal bluffs due to long-term changes in mean sea level and the magnitude and frequency of storm systems.

Chronic hazards are usually local in nature, and the threats to human life and property that arise from them are generally less severe than those associated with catastrophic hazards. However, wide distribution and frequent occurrence of chronic hazards makes them more of an immediate concern.

The damage caused by chronic hazards is usually gradual and cumulative. However, storms that produce large winter waves, heavy rainfall and/or high winds may result in very rapid erosion or other damage that can affect properties and infrastructure over a matter of hours. The regional, oceanic and climatic environments that result in intense winter storms determine the severity of chronic hazards along the Oregon Coast.

History of the Hazard in Curry County

Coastal erosion occurs throughout the year in Curry County, but is accelerated during the winter months when storms increase the rate of erosion. Coastal erosion is gradually eroding the Nesika Beach area, north of Gold Beach, threatening beachfront homes (see Figures 1 and 2 below). Harris State Park experiences coastal erosion on a regular basis, and in 2004, erosion destroyed a hiking trail in Otter Point State Park. In the Dawson Tract Subdivision north of Brookings, a home had to be torn down due to coastal erosion. Finally, in February 1998, heavy surf damaged Port Orford's sewage treatment plant, causing approximately $300,000 in damage and eroding the dune that separates the ocean from Garrison Lake, which is one of Port Orford's sources of water. The dune breach has since been repaired and is monitored regularly.

Figure 1 Coastal erosion in Nesika Beach area.

Source: John Woodland, March 2010.

Figure 2 Coastal erosion in Nesika Beach.

Source: Oregon Partnership for Disaster Resilience, March 2010.

Risk Assessment

How are Hazard Areas Identified?

There are a variety of identifiable factors that affect shoreline stability. Dune-backed shorelines, which are most susceptible to wave attack, extend across portions of Curry County's coastline. Processes of wave attack, including undercutting and wave overtopping, are the primary processes affecting shoreline stability in dune-backed shorelines. Bluff backed shorelines, while less susceptible to rapid shoreline retreat from wave attack, are nonetheless impacted over time by coastal erosion, particularly during large storm events which result in the formation of rip cell embayments.

Curry County's coastline is characterized by dune-backed shorelines along the northern half of the county, interspersed with bluff-backed shorelines. These bluff-backed shorelines include Cape Blanco, Port Orford Heads, Humbug Mountain, Otter Point State Park, and Cape Sebastian. South of Crook Point, Curry County's coast is largely comprised of bluff-backed shorelines until the California border.

Although Curry County's entire coastline is vulnerable to the coastal erosion hazard, some areas experience more erosion than others. The Curry County Steering Committee identified these areas as:

- Nesika Beach;
- Dawson Tract subdivision north of Brookings;

- Otter Point State Park;
- Harris Beach State Park;

The degree of damage to structures, as well as injury and death to people caused by coastal erosion will depend upon: 1) whether the hazard events are catastrophic or chronic in nature, and 2) the proximity of people and property to the event.

The extent of the coastal erosion hazard depends on a number of factors, including wave height and sea level. Research completed in January 2010 suggests that wave heights along the Oregon Coast are increasing, and this may impact the rate of coastal erosion. According to the study, the highest waves may be as much as 46 feet, up from estimates of only 33 feet that were made as recently as 1996, a 40 percent increase. December and January are the months such waves are most likely to occur. However, the study also noted that summer waves are also significantly higher than previously estimated.[28]

Finally, the Department of Geology and Mineral Industries (DOGAMI) is currently mapping coastal areas in Curry County that will identify the location and extent of the coastal erosion hazard. These new maps will be based on newly acquired Light Detection and Ranging (LIDAR) data. Map products will become effective for planning purposes early 2011 after a review by the Oregon Department of Land Conservation and Development (DLCD) and the Federal Emergency Management Agency (FEMA).

Probability of Future Occurrence

Coastal erosion is a chronic hazard that affects Curry County's entire coastline. Although the county's hazard analysis did not consider coastal erosion hazards, the Curry County Steering Committee believes that coastal erosion's probability of occurrence is **high** meaning one incident is likely to occur within a 10 to 35 year period.

Vulnerability Assessment

Buildings, parks and various infrastructure located along the ocean shore are vulnerable to coastal erosion. This is most obvious in low-lying, dune backed shoreline areas adjacent to bays or the ocean; it is also the case in areas of bluff backed beaches where buildings and infrastructure have been located on readily erodible materials (e.g., consolidated sand, weakly cemented sandstone, siltstone, etc.). As noted above, developed areas such as Nesika Beach are vulnerable to coastal erosion as well as natural areas such as Otter Point State Park and Harris Beach State Park. Landslides along Highway 101 are also exacerbated by coastal erosion, and have

[28] Peter Ruggiero, Paul D. Komar, Jonathan C. Allan, "Increasing wave heights and extreme value projections: The wave climate of the U.S. Pacific Northwest," Coastal Engineering, Volume 57, Issue 5, May 2010, Pages 539-552.

forced the highway to close (see the landslide hazard annex for more information).

Curry County's 2007 Hazard Analysis did not consider coastal erosion hazards. The Curry County Steering Committee determined that Curry County's vulnerability to coastal erosion hazards is **high,** meaning 1-10% of the population or region assets would likely be affected by a major emergency or disaster.

Risk Analysis

A risk analysis for the coastal erosion hazard has not yet been completed. However, given the county's high vulnerability to the coastal erosion hazard, a risk analysis should be completed when data is available (see Multi-Hazard Action # 16).

Community Hazard Issues

What is susceptible to damage during a hazard event?

Coastal erosion processes create special challenges for people living near the ocean. Attempts to stabilize the shoreline or beach are often futile because the forces that shape the coast are persistent and powerful. Inadequate understanding of the complex interaction of coastal land forms and waters and the various types of coastal erosion can result in serious threats to people, communities and infrastructure. Sound planning for coastal areas is required to minimize the potential dangers to life and property.

The effects from more frequent chronic hazards will in most instances be much less severe than catastrophic events that cover a much smaller area. However, a significant chronic hazard can still result in dangerous slides, flooding, and dangerous wave effects causing damage to buildings, roads, bridges, and other infrastructure located near the hazard area. Such impacts can be particularly hard on smaller-sized communities, isolated rural homes and farms, and large residential, resort, tourist and commercial developments located in or near areas of known hazards. Currently the most vulnerable area in Curry County is Nesika Beach approximately 7 miles north of Gold Beach where cliffs are eroding near homes. Within the city of Brookings, the bluff that the wastewater treatment plant is located is gradually eroding, putting the treatment plant at risk.

Human activities also influence, and in some cases intensify the effects of erosion and other coastal hazards. Major actions such as jetty construction and maintenance dredging can have long-term effects on large sections of the coast. This is particularly true along dune-backed and inlet-affected shorelines. The planting of European bunchgrass since the early 1900s has locked up sand in the form of high dunes. This in turn has contributed to the net loss of beach sand and increased beach erosion. Residential and commercial development can affect shoreline stability over shorter periods

of time and in smaller geographic areas. Activities such as grading and excavation, surface and subsurface drainage alterations, vegetation removal, and vegetative as well as structural shoreline stabilization can all reduce shoreline stability. Finally, heavy recreational use in the form of pedestrian and vehicular traffic can affect shoreline stability over shorter time frames and smaller spaces. Because these activities may result in the loss of fragile vegetative cover they are a particular concern along dune-backed shorelines. Graffiti carving along bluff-backed shorelines is another byproduct of recreational use that can damage fragile shoreline stability.

Existing Hazard Mitigation Activities

The Curry County Comprehensive Plan contains policies addressing the coastal erosion hazard. These include:

- Goal 7: Natural Hazards. Policy # 3 states: "Curry County has designated certain coastal areas which are subject to chronic natural hazards with a plan and zoning designation for 'Beaches and Dune Conservation' which recognizes the limitations of these areas for development."[29]

- Goals 17 and 18: Coastal Shorelands and Beaches and Dunes. Goals 17 and 18 contain 15 policies that serve to "conserve, protect, and where appropriate develop and where appropriate restore the resources and benefits of the county's shorelands, beaches, and dunes."[30]

Chapter 15 of Curry County's Comprehensive Plan identifies the areas of dunes and shorelands in Curry County and lists detailed policies for development and land use in these areas. Specific policies that relate to coastal erosion include:[31]

- Policy # 5, which requires the county to protect privately owned seacliffs and coastal headlands from development in accordance with the provisions of the comprehensive plan and zoning ordinance;

- Policy # 6, which requires any development on seacliffs and coastal headlands to have a geological hazard analysis;

- Policy # 10, which designates finding requirements for land use decisions in beach and active dune areas of the county. This policy

[29] Curry County Comprehensive Plan, Ordinance 98-5, Exhibit E, p. 8.

[30] Curry County Comprehensive Plan, Ordinance 98-5, Exhibit E, p. 21

[31] Curry County Comprehensive Plan, Ordinance 98-5, Exhibit F "Chapter 15-Coastal Shorelands, Beaches and Dune Areas," p. 5-7.

also states that areas under the beach and dune conservation zone may not be developed.

- Policy # 11, which states that residential, commercial, and industrial development is not permitted "on beaches, active foredunes, and other foredunes which are conditionally stable and that are subject to ocean undercutting or wave overtopping, and on interdune areas (deflation plains) that are subject to ocean flooding."
- Policy # 12, which only allows beach front protective structures for development existing prior to January 1, 1977.
- Policy # 14, which states that Curry County will regulate actions such as destruction of vegetation, exposure of stable and conditionally stable areas to erosion, and construction of shore structures that modify current or wave patterns, all of which can lead to beach erosion.

The Curry County Zoning Ordinance contains specific regulations for the Beaches and Dunes Conservation Zones that implement the policies described above (Section 3.210). The zoning ordinance also contains regulations for development in stabilized dune areas to minimize coastal erosion (Section 3.253). This section requires a site investigation report for a development in stabilized dune areas.

Finally, Curry County has development regulations (Section 8) for "Coastal High Hazard Areas" in the county's Flood Damage Prevention Ordinance. A coastal high hazard area is "an area of special flood hazard extending from offshore to the inland limit of a primary fontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources. The area is designated on the FIRM as Zone V1-V30, VE or V."[32]

Hazard Mitigation Action Items

The following actions have been identified by the Curry County steering committee, and are recommended for mitigating the potential effects of coastal erosion in Curry County. Please see full action item worksheets in Appendix A.

Coastal Erosion # 1: Continue to monitor the progression of coastal erosion in conjunction with sea level rise.

Multi-Hazard # 4: Further develop risk assessment maps to show areas at risk for all hazards.

[32] Curry County Flood Damage Prevention Ordinance, p. 3.

Multi-Hazard # 11: Incorporate the natural hazards mitigation plan into the Curry County Comprehensive Plan.

Multi-Hazard # 12: Encourage special districts (including ports) to develop addenda to the Curry County Natural Hazards Mitigation Plan.

Multi-Hazard # 15: Develop a multi-hazard public education campaign targeted to residents and tourists about the natural hazards Curry County is vulnerable to and mitigation measures they can implement.

Multi-Hazard # 16: Complete a risk analysis for the hazards addressed in this plan, when information is available, to estimate potential loss of life and damage to property.

Volume II: Hazard Annex
Drought

Causes and Characteristics of the Hazard

Drought can be defined in several ways. The American Heritage Dictionary defines drought as "a long period with no rain, especially during a planting season." The National Drought Mitigation Center and the National Center for Atmospheric Research further define the hazard 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 because it incorporates

both local conditions and mountain snow pack. The Oregon Drought Severity Index categorizes droughts as mild, moderate, severe, and extreme.

History of the Hazard in Curry County

Drought is a common occurrence in Curry County during the late summer months of August to October. During these months, surface water availability is limited for all uses. Occasionally, extreme drought events occur in Curry County. Dates for significant drought events include the following:

2004: Curry County experienced local drought conditions.

December 2002: State of Emergency declared for drought conditions in Curry County.[33]

2000-2001: General statewide drought.

1985-1997: A general dry period throughout the state, capped by an extreme drought in Curry County in 1988.

1976-1981: Intense drought in western Oregon. 1976-77 was the single driest year of century.

1961: Abnormally high temperatures in Curry County.

Risk Assessment

How are Hazard Areas Identified?

Droughts usually occur county-wide. In severe droughts, environmental and economic consequences can be significant, especially to the county's agriculture sector and to its extensive forests. Drought can exacerbate forest fires and can also contribute to tree diseases. The extent of the drought hazard depends on the length of time of the hazard and the local climatic conditions.

Probability of Future Occurrence

The 2007 Curry County Hazard Analysis did not include a probability rating for drought. The recurrence interval over the past 50 years for Curry County is roughly 15 years given the hazard history listed above. The Curry County Steering Committee rated the probability of a drought occurring as **high**, meaning one incident is likely within a 10-35 year period.

---

[33] Oregon executive order 02-07. http://arcweb.sos.state.or.us/governors/Kitzhaber/web_pages/governor/legal/execords.htm, accessed March 31, 2010.

Vulnerability Assessment

The effects of drought typically extend across the county. Drought can contribute to wildfires in Curry County and it played a role in the 2002 Biscuit Fire. In addition, rural residents who live on ridges or hills sometimes run out of water in the dry summer months. Finally, the cities of Port Orford and Brookings have water issues during dry periods. These drought impacts and others are further explained in the Community Hazard Issues section below.

The 2007 Curry County Hazard Analysis did not include a vulnerability rating for the drought hazard. However, given the potential impacts to local forests and residents described above, the Curry County Steering Committee rated Curry County's vulnerability to drought as **high** meaning more than 10% of the community's assets or population is likely to be affected by a major emergency or disaster.

Risk Analysis

A risk analysis estimating the potential loss of life and property for the drought hazard in Curry County has not been completed at this time. However, given the county's high vulnerability to the drought hazard, a risk analysis should be completed when data is available (see Multi-Hazard Action # 16).

Community Hazard Issues

What is susceptible to damage during a hazard event?

Drought is frequently an "incremental" hazard, meaning the onset and end is 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.

Drought can have significant impacts on the county's agricultural sector. Curry County has 966 acres devoted to berry production (ranked third in the state), which includes cranberry production.[34] Cranberry farmers require large amounts of water and during extended droughts, these businesses can suffer extensive losses.

Rural populations that depend on well water can also be impacted by droughts. The water table decreases during the months of August to October and is more severe during a dry year. As a result, some rural wells may run dry. The Curry County Steering Committee indicated that rural residents that live on ridges or hills have to drive to the nearest city to get water because wells can run dry.

---

[34] US Department of Agriculture, "2007 Census of Agriculture: Curry County," http://www.agcensus.usda.gov/Publications/2007/Full_Report/index.asp, accessed May 20, 2010.

Communities that rely on rivers or reservoirs for their drinking water can be significantly impacted by droughts. Port Orford obtains its drinking water from Hubbard Creek, but in a drought years, water levels can drop to the point where the city must curtail water supply and could potentially run out of water. Brookings relies on the Chetco River for its water, and in moderately low rainfall years, the city could be forced to curtail water supply. Brookings could face severe water shortages in a drought because the city only has 3-4 days of water storage capacity.

A prolonged drought in forests promotes an increase of insect pests, which in turn, damage trees already weakened by a lack of water. A moisture-deficient forest constitutes a significant fire hazard (see the Wildfire Hazard Annex). In addition, drought and water scarcity add another dimension of stress to species listed pursuant to the Endangered Species Act (ESA) of 1973.

Existing Hazard Mitigation Activities

Curry County currently addresses the drought hazard through water conservation measures and water monitoring during the dry summer months.

The USDA Farm Service for southwest Oregon currently works with local farmers to develop continuity of operations plans in the event of drought conditions in the county.

Many rural residents in Curry County rely on groundwater wells for their water needs. In some years these rural wells have run dry in the late summer months due to low rainfall. To address this need, local water districts sell water to rural residents. The State of Oregon also has a water master that works with rural resident to coordinate these efforts.

The city of Brookings has a water shortage emergency plan in the event of water shortages.

Section 3.045 of the Curry County Zoning Ordinance contains water storage requirements for rural dwellings.

Hazard Mitigation Action Items

The following actions have been identified by the Curry County steering committee, and are recommended for mitigating the potential effects of drought in Curry County. Please see full action item worksheets in Appendix A.

Drought # 1: Continue to enforce existing water requirement codes for rural residents.

Multi-Hazard # 5: Establish mutual aid agreements between government agencies and commercial businesses in the event of an emergency (e.g. fuel, heavy equipment, food, etc.).

Multi-Hazard # 11: Incorporate the natural hazards mitigation plan into the Curry County Comprehensive Plan.

Multi-Hazard # 15: Develop a multi-hazard public education campaign targeted to residents and tourists about the natural hazards Curry County is vulnerable to and mitigation measures they can implement.

Multi-Hazard # 16: Complete a risk analysis for the hazards addressed in this plan, when information is available, to estimate potential loss of life and damage to property.

Volume II: Hazard Annex
Earthquake

Causes and Characteristics of the Hazard

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

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

The specific hazards associated with an earthquake include the following:

Ground Shaking

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

Ground Shaking Amplification

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

Surface Faulting

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

Earthquake-Induced Landslides

These landslides are secondary hazards that occur from ground shaking.

Liquefaction

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

Tsunamis

Tsunamis are another secondary earthquake hazard created by events occurring under the ocean. A tsunami, often incorrectly referred to a "tidal wave," is a series of gravity-induced waves that can travel great distances from the earthquake's origin and can cause serious flooding and damage to coastal communities. More information about the tsunami hazard can be found in the tsunami hazard annex of this plan.

The severity of an earthquake is dependent upon a number of factors including: 1) the distance from the quake's source (or epicenter); 2) the ability of the soil and rock to conduct the quake'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 the Hazard in Curry County

Curry County has experienced only one significant earthquake in 1873. Geologic studies also indicate that a subduction zone earthquake has impacted Curry County in the past. Significant earthquakes that occurred in Curry County and in Oregon are listed in Table 1 below.

Table 1 Significant Earthquakes in Oregon

Date	Location	Magnitude (M)	Comments
4/2008	Newport, OR	5.0-5.4	Swarm of earthquakes occurred off the Central Oregon Coast.
8/2004	Newport, OR	4.7	Small earthquake recorded northeast of Newport, no damages.
7/2004	Newport, OR	4.9	Earthquake recorded southwest of Newport, no damages.
9/1993	Klamath Falls	5.9 to 6.0	Two earthquakes causing two deaths and extensive damage. $7.5 million in damage to homes, commercial, and government buildings. Crustal event (FEMA-1004-DR-OR).
3/1993	Scotts Mills	5.6	$28 million in damage. Damage to homes, schools, businesses, state buildings (Salem). Crustal Event (FEMA-985-DR-OR).
11/1962	Portland	5.2 to 5.5	Damage to many homes (chimneys, windows, etc.). Crustal event.
11/1873	Brookings area	7.3	Chimneys fell at Port Orford, Grants Pass, and Jacksonville. No aftershocks. Origin probably Gorda block of the Juan de Fuca plate. Intraplate event.
1/1700	Offshore, Cascadia Subduction Zone	Approximately 9.0	Generated a tsunami that struck Oregon, Washington, and Japan; destroyed Native American villages along the coast.

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

The Pacific Northwest Seismograph Network, *Notable Pacific Northwest Earthquakes Since 1993,* http://www.pnsn.org/SEIS/EQ_Special/pnwtectonics.html, accessed April 1, 2010.

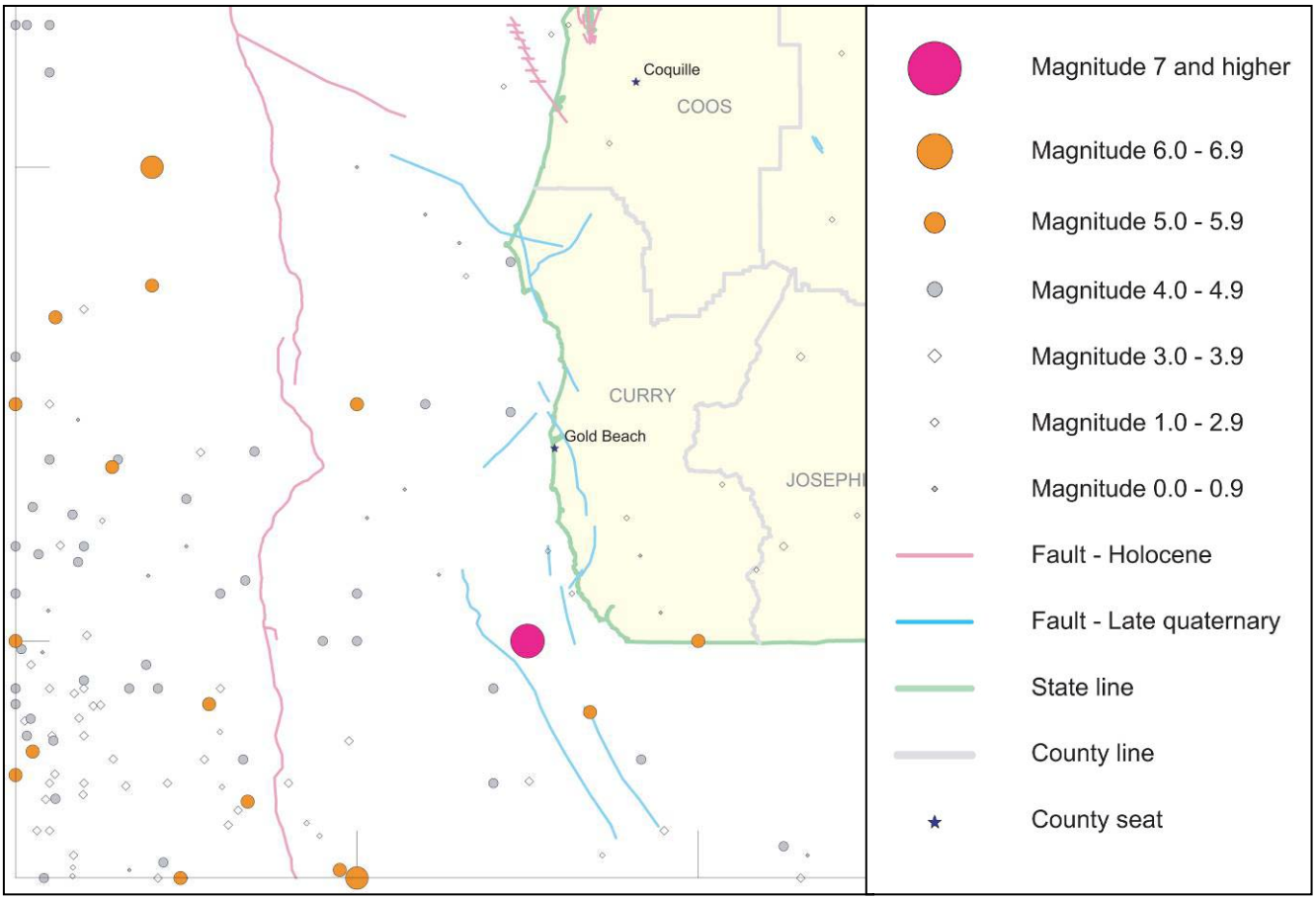
Science Daily, "Unusual Earthquake Swarm Off Oregon Coast Puzzles Scientists," April 14, 2008, http://www.sciencedaily.com/releases/2008/04/080413184801.htm, accessed April 21, 2010.

Risk Assessment

How are Hazard Areas Identified?

The earthquake hazard and its effects are prevalent over the entire county. The fault map in Figure 1 below shows the prevalence of subduction zone and crustal event earthquake faults and events near Curry County.

Figure 1 Earthquake Faults and Events In and Near Curry County.



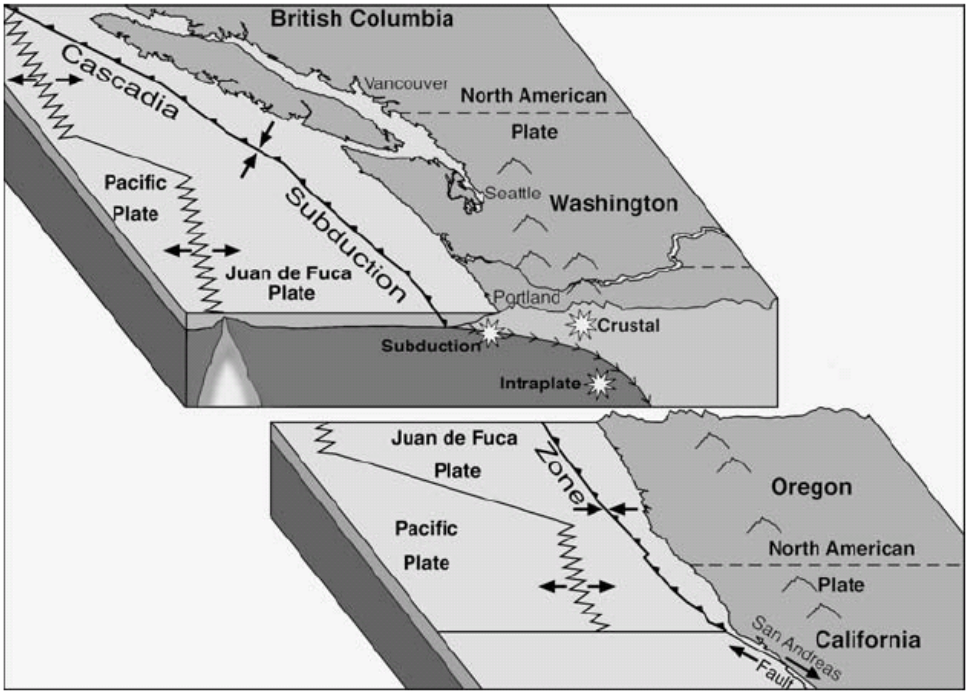
Source: Oregon Department of Geology and Mineral Industries (DOGAMI), *Map of Selected Earthquakes for Oregon, 1841 through 2002*, http://www.oregongeology.org/sub/earthquakes/images/EpicenterMap.pdf, accessed April 1, 2010.

The extent of the earthquake hazard depends on a number of factors including: 1) the distance from the quake's source (or epicenter); 2) the ability of the soil and rock to conduct the quake'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.

The Cascadia Subduction Zone (indicated by the Holocene fault line in Figure 1 above and illustrated in Figure 2 below,) has the potential to produce an earthquake of magnitude 9.0 or higher. A subduction zone earthquake is a significant threat to Oregon's coastal communities as they

will likely be closer to the epicenter, and will therefore suffer more shaking and collateral damage. The Cascadia event would result in buildings and infrastructure suffering varying amounts of damage. Large portions of Highway 101 and roads across the Coast Range would likely be impassable. This would for the most part sever travel between the coast and the Willamette Valley.

Figure 2 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.

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.[35] The 2007 Curry County Hazard Analysis rated the probability of a future seismic event as **moderate**, meaning one incident is likely within a 35-75 year period.

Vulnerability Assessment

The Curry County Steering Committee identified a number of community assets vulnerable to earthquakes in Curry County. These vulnerable community assets are detailed in the following two sections: "Risk Analysis" and "Community Hazard Issues." The 2007 Curry County Hazard Analysis rates Curry County's vulnerability to an earthquake as

[35] *Oregon Geology*, Volume 64, No. 1, Spring 2002.

high meaning that more than 10% of the community's assets are likely to be affected by a major emergency or disaster.

Risk Analysis

In 1999, the Department of Geology and Mineral Industries (DOGAMI) developed two earthquake loss models for Oregon based on the two most likely sources of seismic events: (1) the Cascadia Subduction Zone (CSZ), and (2) combined crustal events (500-year model). Both models are based on Hazards US (HAZUS), a computerized program, currently used by the Federal Emergency Management Agency (FEMA) as a means of determining potential losses from earthquakes. The CSZ event is based on a potential 8.5 earthquake generated off the Oregon Coast. The model does not take into account a tsunami, which probably would develop from the event. The 500-Year crustal model does not look at a single earthquake (as in the CSZ model); it encompasses many faults, each with a 10% chance of producing an earthquake in the next 50 years. The model assumes that each fault will produce a single "average" earthquake during this time. Neither model takes unreinforced masonry buildings into consideration

DOGAMI investigators caution that the models contain a high degree of uncertainty and should be used only for general planning purposes. Despite their limitations, the models do provide some approximate estimates of damage. Results are found in Tables 2-3 below.

Table 2 Projected Dollar Losses for Curry County Based on a M8.5 Subduction Event and a 500-Year Model Event

Total Economic Base in Thousands (1999)	Greatest Absolute Loss in Thousands (1999) from an M8.5 CSZ Event[36]	Greatest Absolute Loss in Thousands (1999) From a 500-Year Model Event[37][38]
$1,093,000	$371,000	$388,000

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

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

[37]Ibid.

[38] [2]Every part of Oregon is subject to earthquakes. The 500-year model is an attempt to quantify the risk across the state. The estimate does not represent a single earthquake. Instead, the 500-year model includes many faults, each with a 10% chance of producing an earthquake in the next 50 years. The model assumes that each fault will produce a single "average" earthquake during this time. More and higher magnitude earthquakes than used in this model may occur (DOGAMI, 1999).

Table 3 Estimated Losses in Curry County Associated with a M8.5 Subduction Event and a 500-Year Model.

Earthquake Model	Injuries	Deaths	Displaced Households	Economic Losses to Buildings	Operational the Day After the Quake[39]				Economic Losses To:[40]			Debris Generated (Thousands of Tons)
					Fire Stations	Police Stations	Schools	Bridges	Highways	Airports	Communications	
CSZ M8.5[41]	221	3	430	$328 million	9%	5%	6%	34%	$48 million	$11 million	$18 million	267
500-Year Model[42]	212	3	486	$328 million	n/a[43]	n/a	n/a	n/a	$44 million	$12 million	$15 million	261

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

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

[40] Ibid.

[41] Cascadia Subduction Zone (CSZ) is the most dangerous fault in Oregon. The entire coastline is essentially the epicenter. The earthquake could have a magnitude 8.5 (or M9.0). The event might last as long as four minutes. Within a few minutes, a tsunami would follow. (Tsunami damages are not included in the estimates for this earthquake, and would dramatically increase losses for coastal counties). A CSZ earthquake could affect a very large area. If the entire fault ruptures, destruction could occur from northern California to Canada. The number of deaths and injuries depends on the time of day, building type, occupancy class, and traffic pattern. (DOGAMI, Special Paper 29, 1999, p.4).

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

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

DOGAMI Rapid Visual Screening

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 ranked each building surveyed with 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.[44] To fully assess a building's potential for 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.

DOGAMI surveyed 37 buildings in Curry County. Buildings in unincorporated areas of the county that received a high rating include the Ophir Rural Fire Department. All other buildings located in unincorporated areas have either a moderate or low ranking.

The results for the entire county, including the cities, are summarized below, and ratings for specific buildings can be found in the RVS study on DOGAMI's website (www.oregongeology.org).

Schools
Very High Seismic Risk- 2 buildings
High Seismic Risk- 5 buildings
Moderate Seismic Risk- 5 buildings
Low Seismic Risk- 6 buildings

City Police Stations
High Seismic Risk- 1 building
Moderate Seismic Risk- 1 buildings

County/State Police Stations
High Seismic Risk- 1 building
Low Seismic Risk- 1 building

Hospitals
High Seismic Risk- 1 building

Rural Fire Stations
High Seismic Risk- 1 building
Moderate Seismic Risk- 4 buildings
Low Seismic Risk- 7 buildings

City Fire Stations
High Seismic Risk- 1 building

---

[44] 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.

ODOT Seismic Vulnerability Study of Oregon Bridges

In 2009 the Oregon Department of Transportation (ODOT) and Portland State University (PSU) conducted a seismic vulnerability study of Oregon's bridges. Using a computer program called REDARS2 that is able to predict ground motions for a specific location and magnitude of earthquake, researchers were able to simulate damage to bridges, calculate the cost of the damage, and calculate the cost to the public for traffic delays due to detours around damaged bridges. For the Oregon Coast, ODOT conducted the study using three different earthquake scenarios: a magnitude 9.0 Cascadia Subduction Zone (CSZ) event, a magnitude 8.3 CSZ event along the north coast, and a magnitude 8.3 CSZ event along the south coast. ODOT then rated each bridge in the area of study according to the potential damage that a bridge could sustain for the given scenario. Rating scales included the following: 1 (no damage), 2 (slight damage), 3 (moderate damage), 4 (extensive damage), and 5 (complete collapse).

Curry County would be most affected by a magnitude 9.0 CSZ event and an 8.3 CSZ event in the south coast. The bridges and their damage levels are indicated in Tables 4 and 5 below:

Table 4 Damage Level of Curry County Bridges in a M9 CSZ Event

Bridge Name	Damage Level	Damage State
US101 over Elk River at 00.9 MI S HWY 250 JCT	4	Extensive
US101 over Sixes River at 00.8 MI N HWY 250 JCT	4	Extensive
US101 over Crystal Creek at 01.0 MI N HWY 250 JCT	4	Extensive
US101 over Rinehart Creek at 10.4 MI S HWY 251 JCT	4	Extensive
US101 over Mussel Creek at 12.1 MI S HWY 251 JCT	4	Extensive
US101 over Myrtle Creek at 12.0 MI S HWY 251 JCT	4	Extensive
US101 over Garrison Slough at 01.0 MI N HWY 251 JCT	3	Moderate
US101 over Rogue River (Wedderburn) at Crossing Rogue River	3	Moderate
US101 over Pistol River at 11.5 MI S Rogue River	3	Moderate
US101 over Thomas Creek at 15.3 Mi N OF CA - OR Stateline	3	Moderate
US101 over Chetco River at 05.1 MI N OR - CALIF Stateline	3	Moderate

Source: Oregon Department of Transportation, PSU, *Seismic Vulnerabilities of Oregon State Bridges: Mitigation Strategies to Reduce Major Mobility Risks,* 2009. Curry County bridge data from ODOT's Curry County Office.

Table 5 Damage Level of Curry County Bridges in a M8.3 South Coast CSZ Event

Bridge Name	Damage Level	Damage State
US101 over Elk River at 00.9 MI S HWY 250 JCT	4	Extensive
US101 over Crystal Creek at 01.0 MI N HWY 250 JCT	4	Extensive
US101 over Rinehart Creek at 10.4 MI S HWY 251 JCT	4	Extensive
US101 over Mussel Creek at 12.1 MI S HWY 251 JCT	4	Extensive
US101 over Myrtle Creek at 12.0 MI S HWY 251 JCT	4	Extensive
US101 over Garrison Slough at 01.0 MI N HWY 251 JCT	3	Moderate
US101 over Sixes River at 0.8 MI N HWY 250 JCT	3	Moderate
US101 over Rogue River (Wedderburn) at Oxing Rogue River	3	Moderate
US101 over Pistol River at 11.5 MI S Rogue River	3	Moderate
US101 over Thomas Creek at 15.3 Mi N OF CA - OR Stateline	3	Moderate
US101 over Chetco River at 05.1 MI N OR - CALIF Stateline	3	Moderate

Source: Oregon Department of Transportation, PSU, *Seismic Vulnerabilities of Oregon State Bridges: Mitigation Strategies to Reduce Major Mobility Risks,* 2009. Curry County bridge data from ODOT's Curry County Office.

Community Hazard Issues

What is susceptible to damage during a hazard event?

The Curry County Hazard Mitigation Steering Committee identified a number of community assets that are vulnerable to earthquake hazards. Although the Curry County Steering Committee rated the probability of an earthquake recurring as moderate, the county's vulnerability is rated as high. Vulnerable community assets include vulnerable infrastructure, critical facilities, communities, populations, and economic vulnerabilities.

Infrastructure

Curry County's transportation infrastructure is highly vulnerable to the earthquake hazard. Highway 101 is the only paved highway that links Curry County to Coos County in the north and California to the south. There are no other paved highways running east-west. Critical to the highway network are the bridges that cross the rivers and estuaries in Curry County. The Curry County Steering Committee identified the Paterson Bridge, Lobster Creek Bridge, Pistol River Bridge, Chetco River Bridge, and Thomas Creek Bridge as critical bridges that are potentially vulnerable to earthquakes. Should Highway 101 or any of its bridges be damaged in an earthquake, rural residents and the major population centers would be isolated from the rest of the state.

Other transportation infrastructure vulnerable to earthquakes includes local airports and port facilities. Airports vulnerable to damage in Curry County include the Curry Coast Airpark in Brookings, the Gold Beach Airport, and the Cape Blanco Airport. The Gold Beach Municipal Airport is especially vulnerable because it is constructed on sand which is vulnerable to liquefaction in a strong earthquake. The airports bring

tourists to the county, and could be essential facilities in a response scenario if Highway 101 were damaged. Ports in Curry County include the Port of Port Orford, the Port of Gold Beach, and the Port of Brookings. The port facilities are important for bringing in tourists, and are also essential to the commercial and recreational fishing industries and logging industries. The Port of Gold Beach could suffer extensive damage in an earthquake because the facility is built on fill.

Curry County's power and communication network is also vulnerable to earthquakes. Power in Curry County is provided by Coos-Curry Electric Cooperative and supplied by the Bonneville Power Administration in the Columbia River Gorge. The county's source of power is a one-way feed; there is no other back-up power source in the county. Communication systems such internet and telephone are also a one-way feed into the county and lack redundancy.

Critical Facilities

Several critical facilities in Curry County are vulnerable to earthquakes. DOGAMI's Seismic Needs Assessment (explained in the "DOGAMI Rapid Visual Screening" section above) lists the number of critical facilities vulnerable to collapse in an earthquake. Other vulnerable critical facilities include:

- The wastewater treatment plants in Port Orford, Gold Beach, and Brookings are unreinforced vulnerable to damage in an earthquake.
- The underground water and wastewater pipes are constructed of asbestos-cement (AC) pipes which are very brittle and can easily break in an earthquake, causing leaks.
- All the county's services are housed in older buildings that do not meet current seismic codes.

Communities

Curry County has several communities that are vulnerable to earthquake events. Brookings and Gold Beach are the county's largest cities and contain the county's largest number of businesses and critical services such as medical services. Both cities are accessible only by bridge and could be isolated in an earthquake if the bridges were damaged. All of Curry County's three incorporated cities would be isolated if Highway 101 were damaged.

Several of Curry County's unincorporated communities could be impacted by an earthquake. Developments such as Gold Gate Development are being constructed on steep slopes, which could make homes vulnerable to earthquake induced landslide events. Vacation homes built on dune sand could also liquefy in a major earthquake event, causing extensive damage to the buildings.

Populations

Curry County has a number of vulnerable populations. The county has a high percentage of elderly residents who may be vulnerable to earthquake events if their retirement homes or foster homes are not properly retrofitted to withstand damage. Several mobile home retirement communities are constructed on dune sand which has the potential of liquefying in an earthquake. The disabled population is also vulnerable because they may have difficulty evacuating during or after an event. The rural population in Curry County may also be isolated from the rest of the county in an earthquake if bridges and roads are damaged. Finally, if Highway 101 were damaged in an earthquake during school hours, parents may not be able to reach their children, especially for parents who work in communities away from home.

During the summer months Curry County has a high tourist population that may be vulnerable to earthquakes. Tourists depend on Curry County's roads and business services to travel and meet basic necessities. If roads are disrupted or services are limited, tourists may find themselves isolated and without basic needs. Popular tourist destinations that rely on Highway 101 being operable include Cape Blanco State Park, Humbug Mountain State Park, and Harris Beach State Park.

Economy

Curry County's economy is highly vulnerable to the earthquake hazard. With large sectors of the economy reliant on tourism, earthquake damage to transportation infrastructure and recreational amenities can have detrimental economic impacts on local businesses that rely on tourists. These businesses include hospitality businesses and companies that offer boat and fishing tours on the Rogue River. The numerous state parks found along the coast would also suffer if transportation facilities were damaged. Some historic tourist attractions constructed of unreinforced masonry, such as the Cape Blanco Lighthouse, are vulnerable to earthquake damage.

Many of the small businesses in the county are located in unreinforced masonry buildings which are highly vulnerable to earthquakes.

Finally, Curry County's timber, agricultural, and fishing industries are dependent on facilities vulnerable to earthquakes. These include the ports in Port Orford, Gold Beach, and Brookings, and storage facilities on local farms.

Existing Hazard Mitigation Activities

Curry County has adopted the Uniform Building Code which includes regulations that address seismic hazards. However, while new buildings currently meet seismic codes, buildings built before 1993 are still vulnerable to earthquakes.

Hazard Mitigation Action Items

The following actions have been identified by the Curry County steering committee, and are recommended for mitigating the potential effects of earthquakes in Curry County. Please see full action item worksheets in Appendix A.

Earthquake # 1: Conduct regular earthquake safety drills.

Earthquake # 2: Conduct non-structural seismic retrofit workshops with government agencies, businesses, and residents to prevent damage from earthquakes.

Multi-Hazard # 1: Ensure that all critical facilities have backup power and/or emergency operations plans in place to deal with power outages.

Multi-Hazard # 2: Develop a voluntary registry of vulnerable populations that may need assistance in an emergency situation.

Multi-Hazard # 3: Identify and disseminate information regarding alternate transportation routes.

Multi-Hazard # 4: Further develop risk assessment maps to show areas at risk for all hazards.

Multi-Hazard # 5: Establish mutual aid agreements between government agencies and commercial businesses in the event of an emergency (e.g. fuel, heavy equipment, food, etc.).

Multi-Hazard # 6: Encourage citizens to prepare and maintain provisions for one week without services.

Multi-Hazard # 7: Support efforts to create a post-disaster redevelopment plan for Curry County.

Multi-Hazard # 8: Continue the development of Citizens Corps programs to ease the load on emergency services following a disaster.

Multi-Hazard # 9: Educate and encourage businesses, schools, and governmental organizations to develop continuity of operations plans.

Multi-Hazard # 10: Develop backup systems for county records.

Multi-Hazard # 11: Incorporate the natural hazards mitigation plan into the Curry County Comprehensive Plan.

Multi-Hazard # 12: Encourage special districts (including ports) to develop addenda to the Curry County Natural Hazards Mitigation Plan.

Multi-Hazard # 13: Identify Red Cross shelters that are seismically sound, and retrofit existing shelters.

Multi-Hazard # 14: Explore developing a redundant utility system to supply Curry County with continuous service.

Multi-Hazard # 15: Develop a multi-hazard public education campaign targeted to residents and tourists about the natural hazards Curry County is vulnerable to and mitigation measures they can implement.

Volume II: Hazard Annex
Flood

Causes and Characteristics of the Hazard

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

Riverine floods

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

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

Shallow area floods

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

Urban floods

Urban flooding occurs where land has been converted from fields or woodlands to developed areas consisting of homes, parking lots, and commercial, industrial and public buildings and structures. In such areas the previous ability of water to filter into the ground is often prevented by the extensive impervious surfaces associated with urban development. This in turn results in more water quickly running off into watercourses which causes water levels to rise above pre-development levels. During periods of urban flooding streets can rapidly become swift moving rivers and basements and backyards can quickly fill with water. Storm drains often may back up with yard waste or other flood debris leading to further localized flooding. Another source of urban flooding is grading associated with development. In some cases, such grading can alter changes in drainage direction of water from one property to another.

Coastal floods

Coastal flooding occurs in low-lying coastal areas and is caused by heavy rain, large waves, and even tsunamis produced by underwater seismic events. Areas exposed to this intensive wave action are termed by FEMA as high velocity zone, or "V-zones". Special regulations are usually

applied in these areas. See the Tsunami Hazard Annex for more information on coastal floods.

History of the Hazard in Curry County

Curry County, with its extensive estuaries and waterways, is vulnerable to coastal storms that can cause widespread flooding. Recent significant flood events are listed below.[45]

December 2007: Strong storms along the entire Oregon Coast down trees and cause flooding and landslides. Curry County was included in a presidential disaster declaration for the coast.

December 2005: Heavy flooding in Curry County due to heavy rains. Damages occurred in Curry, Coos, Josephine, and Jackson Counties.

November 1998: Stormy conditions prevailed with strong winds and heavy rain. Flash flood warnings and small stream advisories issued for Curry County.

January 1997: Flooding widespread throughout Oregon, with many roads closed due to high water and landslides. A state of emergency was declared in January by the governor due to heavy rains beginning December 21, 1996 that caused flooding, landslides and erosion in 18 Oregon counties, including Curry County.

November-December 1996: Oregon State of Emergency declared for Curry County due to flooding and landslides from heavy rains.

February 1996: Flooding occurred throughout Oregon and in Curry County. Region-wide damage estimates exceeded $1 billion.

December –January 1964-65: The December 1964 rainstorm was among the most severe in western Oregon since the late 1870's. Hundreds of miles of roads and highways were washed out or badly damaged, and thousands of people had to be evacuated due to ensuing floods. Rivers in Curry County were above flood stage and mudslides, bridge failures, and inundation closed several roads.

November 1953: Period of heavy rain from a wet winter storm. Gold Beach had a storm total of 9.8 inches of rain, while Port Orford recorded 7.25" of rain.

October 1950: Period of **h**eavy rainfall with 10 to 12 inches recorded for Curry County.

---

[45] State of Oregon Natural Hazards Mitigation Plan. Regional Risk Assessment. Region 1: Oregon Coast, "Flood-Related Hazards," p.20-21, January 2009.

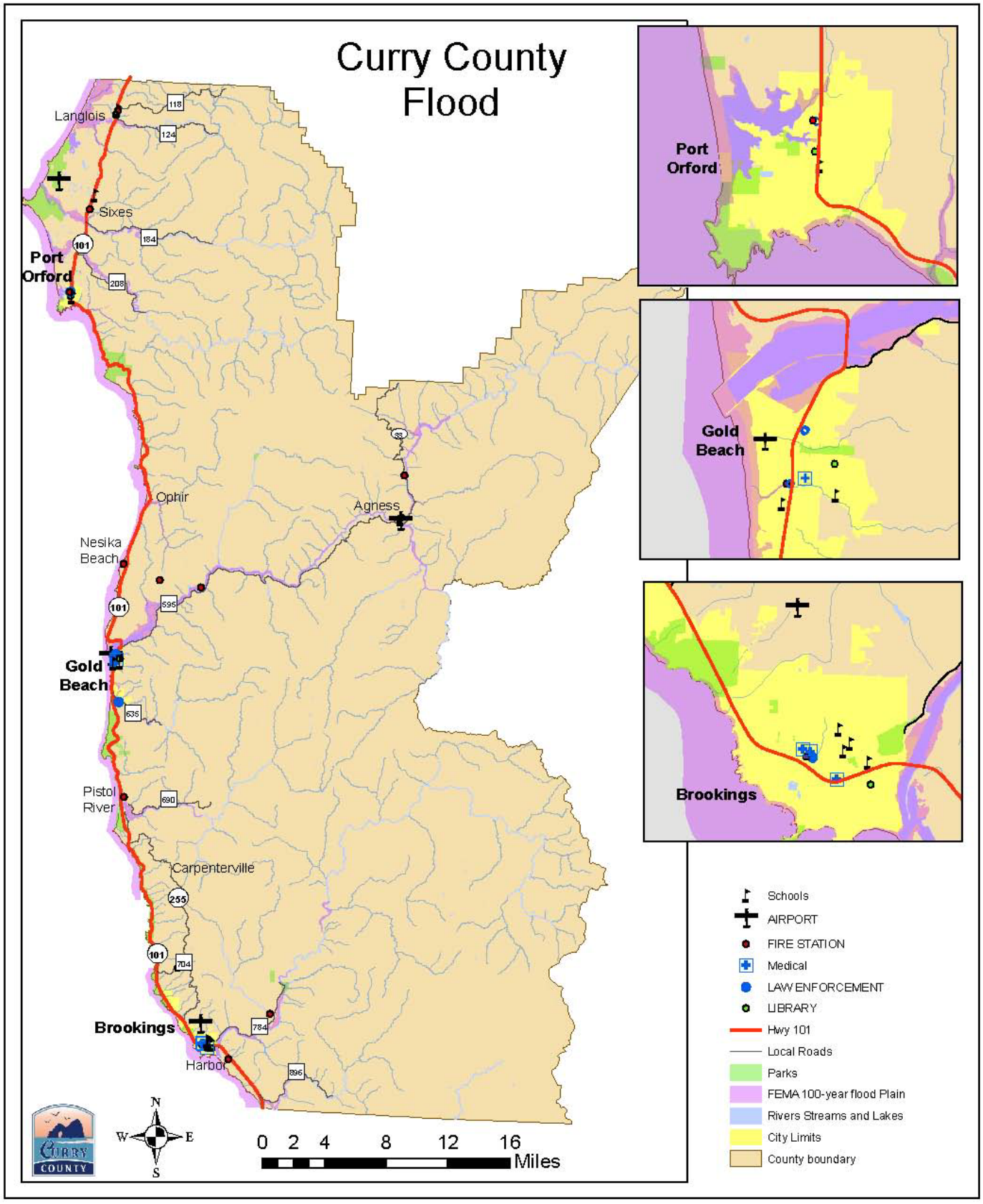
National Climatic Data Center, "Storm Events," http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms, accessed April 21, 2010.

Risk Assessment

How are Hazard Areas Identified?

Major riverine flood sources in Curry County include the Chetco River, Elk River, Pistol River, Rogue River, Sixes River, Winchuck River, and Hunter Creek. In addition to these inland sources, the entire Pacific coastline is vulnerable to coastal flooding events. Figure 1 below shows the location of the flood hazard in Curry County as delineated by the Federal Emergency Management Agency's Flood Insurance Rate Maps (FIRM).

Figure 1 Curry County 100-Year Floodplain.



Curry County is a participant in the National Flood Insurance Program (NFIP). As of April 12, 2010, there were 240 National Flood Insurance Program policies in force with a total value of $52,743,900. Between 1978 and April 2010, the NFIP paid $145,843 in claims for 34 total losses. Of these 34 losses, 19 have closed and 15 closed without payment. As of April 12, 2010, Curry County has no repetitive flood loss properties. Curry County's last Community Assistance Visit was February 23, 2001. Curry County's Flood Insurance Rate Maps are current as of September 25, 2009. Curry County is not a member of the Community Rating System (CRS).

Probability of Future Occurrence

Flooding events occur on a regular basis in Curry County. The most recent event that caused damage occurred in 2005. The 2007 Curry County Hazard Analysis rates the probability of a flood occurring in Curry County as **high**, meaning one incident is likely within a 10-35 year period.

Vulnerability Assessment

A number of community assets are vulnerable to the flood hazard, and are listed in the Community Hazard Issues section below.

The 2007 Curry County Hazard Analysis rates Curry County's vulnerability to floods as **high**, meaning more than 10% of the population or regional assets can be affected by floods.

Risk Analysis

A risk analysis estimating the potential loss of life and property for the flood hazard in Curry County has not been completed at this time. However, given the county's high probability and vulnerability to the flood hazard, a risk analysis should be completed when data is available (see Multi-Hazard Action # 16).

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.)

Elderly and disabled populations are vulnerable to the flood hazard because they may have limited ability to evacuate in a flood event. Rural populations are especially vulnerable to floods because they may find themselves isolated from the rest of the county. Rural populations include farming communities, and isolated communities such as Agness, located east of Gold Beach in the Rogue National Forest. Flooding along the Rogue River could damage roads leading to Agness, isolating the community from essential services.

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

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

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

Bridges are a major concern during flood events as they provide critical links in road networks by crossing water courses and other significant natural features. Bridges and their supporting structures can also be obstructions in flood-swollen watercourses and can inhibit the rapid flow of water during flood events. The Curry County Steering Committee identified the Paterson Bridge and Lobster Creek Bridge as vulnerable to flooding.

Roads can also be closed due to flooding events. Roads that are frequently flooded include portions of Highways 101 and roads along rivers such as Chetco River Road, Jerry's Flat Road, Elk River Road, and Sixes River Road.

Critical facilities vulnerable to flooding include the wastewater treatment plants in Gold Beach, Brookings, and Port Orford, and the port facilities in Gold Beach.

Existing Hazard Mitigation Activities

Communities in Curry County have taken a number of measures to lessen the impacts of local flooding events. Curry County is currently a participant in the National Flood Insurance Program.

In 2009, the Curry County Commission adopted the Flood Damage Prevention Ordinance that provides development guidelines for land in the floodplain. The ordinance was reviewed in September 2009 with the adoption of new floodplain maps. New construction in the floodplain must be certified by an engineer or architect to demonstrate it meets the requirements of the floodplain ordinance, and new construction must be one foot above the base flood elevation (BFE).

Policy # 5 in the Curry County Comprehensive Plan supports the county's participation in the National Flood Insurance Program (NFIP) and supports the protection of structures under Curry County's Flood Damage Prevention Ordinance.

Hazard Mitigation Action Items

The following actions have been identified by the Curry County steering committee, and are recommended for mitigating the potential effects of flooding in Curry County. Please see full action item worksheets in Appendix A.

Flood # 1: Continue to review and assess the county's floodplain ordinance to determine whether it meets current NFIP requirements.

Flood # 2: Take steps to qualify for participation in the National Flood Insurance Program's (NFIP) Community Rating System.

Flood # 3: Maintain the county's Flood Insurance Rate Maps (FIRM) when new data becomes available.

Flood # 4: Research flood prone areas and develop appropriate mitigation action items.

Multi-Hazard # 2: Develop a voluntary registry of vulnerable populations that may need assistance in an emergency situation.

Multi-Hazard # 3: Identify and disseminate information regarding alternate transportation routes.

Multi-Hazard # 4: Further develop risk assessment maps to show areas at risk for all hazards.

Multi-Hazard # 7: Support efforts to create a post-disaster redevelopment plan for Curry County.

Multi-Hazard # 9: Educate and encourage businesses, schools, and governmental organizations to develop continuity of operations plans.

Multi-Hazard # 11: Incorporate the natural hazards mitigation plan into the Curry County Comprehensive Plan.

Multi-Hazard # 12: Encourage special districts (including ports) to develop addenda to the Curry County Natural Hazards Mitigation Plan.

Multi-Hazard # 15: Develop a multi-hazard public education campaign targeted to residents and tourists about the natural hazards Curry County is vulnerable to and mitigation measures they can implement.

Multi-Hazard # 16: Complete a risk analysis for the hazards addressed in this plan, when information is available, to estimate potential loss of life and damage to property.

Volume II: Hazard Annex
Landslide

Causes and Characteristics of the Hazard

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

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

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

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

Landslides are classified based on causal factors and conditions and can be grouped into three basic categories.

Falls

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

Slides

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

Flows

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

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

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

Conditions Affecting Landslides

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

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

- Natural conditions and processes including the geology of the site, rainfall, wave and water action, seismic tremors and earthquakes and volcanic activity.

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

History of the Hazard in Curry County

Curry County has a long history of landslides in the community, especially along Highway 101. These typically follow significant rain events. The following is a list of previous landslides:

2008: Heavy rains cause approximately 3,000 tons of mud and debris cover Harbor Heights Road in the Harbor Hills area southeast of Brookings, blocking access to several homes.[46]

2001: Landslide on Highway 101 at Slide Creek (MP 310.6-310.8) which cost $1,100,000 to repair, and Humbug State Park near Bear Trap Creek (MP 307.06-307.16) which cost $175,000 to repair.[47]

2000: Landslide on Highway 101 at Reinhart Creek (MP 311.2-311.7) costing $1,300,000 to repair, and on Highway 101 at 80 Acres Road (MP 332.5-333) which cost $500,000 to repair.[48]

1999: Rockfall on Highway 101 at Brush Creek and Slide Creek (MP 310.22-310.32) which cost $550,000 to repair.

1998: Landslide on Highway 101 at Whaleshead Cove (MP 349.1-349.6) which cost $550,000 to repair.

Winter 1996-1997: Significant landslide events occurred in Curry County as a result of intense rainfall from the February storms. The governor declared two state of emergencies for Curry County during this period.[49]

1994-1995: Hooskaneden Slide closed down highway 101, 18 miles south of Gold Beach.[50]

---

[46] Curry County, Hazard Mitigation Grant Program Application DR-1824, Exhibit 9, November 12, 2009, available from Curry County Emergency Services.

[47] Oregon Department of Transportation, Major Slide Areas, available from Curry County ODOT office.

[48] Ibid.

[49] Oregon State Archives, Executive Orders 96-45, 97-05.

1993: The "Arizona Inn Slide" shut down Highway 101 for two weeks. ODOT has since installed new drainage systems. Previous slides occurred in the area in 1938, 1954, 1978, and 1981.

1953: Landslide near the Harbor Hills area (southeast of Brookings) damaged a home and closed Highway 101.[51]

Risk Assessment

How are Hazard Areas 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. A moderate hazard of shallow rapid landslide initiation can exist on slopes between 50 and 70 percent.

In general, areas at risk to landslides have steep slopes (25 percent or greater), and/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.[52]

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.

Curry County has mapped areas vulnerable to landslides in the county as shown in Figure 1 below. The map shows areas that have seen landslides in the past, and areas potentially vulnerable to future landslides.

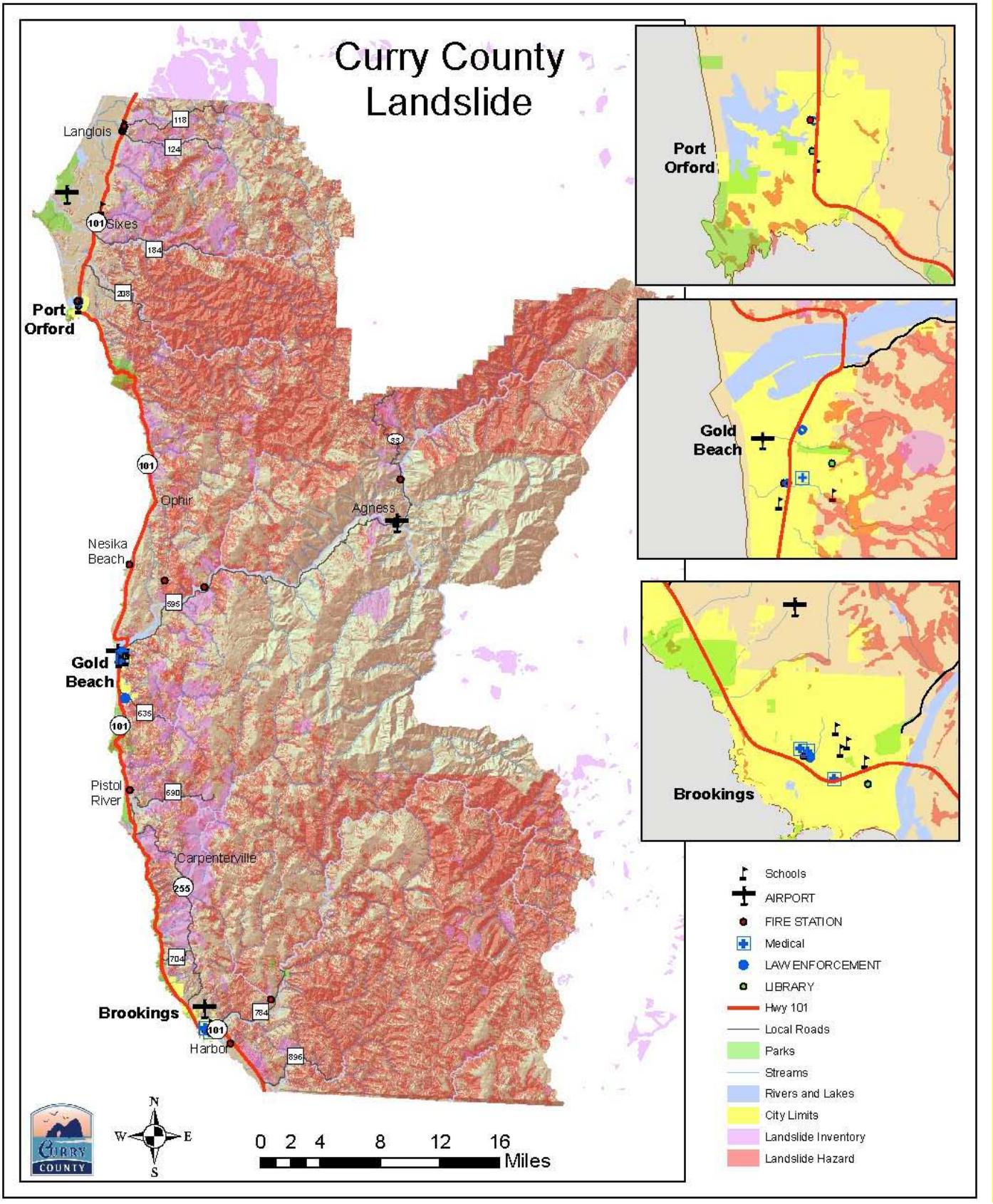
---

[50] Eugene Register Guard, October 9, 1996

[51] Curry County, Hazard Mitigation Grant Program Application DR-1824, Exhibit 8, November 12, 2009, available from Curry County Emergency Services.

[52] Oregon Department of Forestry, *Storm Impacts and Landslides of 1996: Final Report*, June 1999, http://www.oregon.gov/ODF/privateforests/docs/StormImpactsFinal.pdf, accessed April 9, 2010.

Figure 1 Landslide Hazard in Curry County.



Highway 101 in Curry County experiences regular rockfalls, landslides, and sinks as shown in the section "Previous Landslide Occurrences." The Oregon Department of Transportation regularly tracks these areas which are listed in Table 1 below.

Table 1 HWY 101 Major Landslide, Sink, and Rockfall Areas.

Landslide/Rockfall Area Name	Milepost	Major City
Dew Valley	279.5	
Rocky Creek	303-303.5	Port Orford MP 301
South Rocky Point Hump	303.9	
Retz Creek	304.3-304.8	
North Coal Point	305.2-305.4	
South of Coal Point	306.1-306.2	
Humbug Canyon Rockfall	307-308	
Slide Creek Rockfall	310.5	
Slide Creek Rockfall	301.7-310.9	
Reinhart Creek	311.4	
North Frankport	313.9	
Frankport	314.1	
South Frankport	314.4	
North Coy Creek	314.7-314.8	
Coy Creek	315-315.3	
316 Sink	315.9	
South 316 Sink	316.2	
Wedderburn Rockfall	327.1	Gold Beach MP 328
Hallejah Sink	331.5	
Eighty Acres Sink	332.6	
Turners	333.5-333.7	
South Cape Sebastian Quarter Sink	335.8	
Burnt Hill Sink	342.3	
Hooskanaden Sink	343.5-343.9	
Arch Rock Sink	344.4	
Whales Head Sink	349.25	
Eggers Sink	350.5	
Cape Ferrelo Sink	350.7	
Taylor Creek Sink	354	Brookings MP 356

Source: Oregon Department of Transportation

Probability of Future Occurrence

The probability of rapidly moving landslides occurring depends on a number of factors. These factors include steepness of slope, slope materials, local geology, vegetative cover, human activity, and water. There is a strong correlation between intensive winter rainstorms and the occurrence of rapidly moving landslides (debris flows). The Oregon

Department of Forestry tracks storms during the rainy season, monitors rain gauges in the area, and issues warnings as conditions warrant.

Given the history of landslide events in the county, the 2007 Curry County Hazard Analysis rated the probability of a landslide occurring as **high**, meaning one incident is likely in a 10-35 year period.

Vulnerability Assessment

Rain-induced landslides and debris flows can potentially occur during any winter along the coast. In Curry County, there is little developed property that is vulnerable to landslides. The greatest impacts occur to certain portions of Highway 101. To minimize future landslide impacts to new development, hazardous areas must continue to be identified and siting standards applied.[53]

Given the relatively small amount of developed property that is vulnerable to landslides, the 2007 Curry County Hazard Analysis rated the county's vulnerability to landslides as **low**, meaning less than 1% of the population or regional assets are likely to be affected by a landslide event.

Risk Analysis

A risk analysis estimating the potential loss of life and property for the landslide hazard in Curry County has not been completed at this time. However, on November 12, 2009, Curry County submitted a Hazard Mitigation Grant Program application (DR-1824) for DOGAMI to develop and interpret light detection and ranging (LIDAR) data for a 30 square mile area southeast of Brookings that has experienced landslide events in the past (see "Previous Occurrences" above). The LIDAR data would be used to develop a landslide hazard risk analysis and mitigation strategies for the area. Once complete, the information should be incorporated into the Curry County Natural Hazards Mitigation Plan (see Landslide Action # 1).

Community Hazard Issues

What is susceptible to damage during a hazard event?

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

---

[53] State of Oregon Natural Hazards Mitigation Plan. Regional Risk Assessment. Region 1: Oregon Coast, "Landslide-Related Hazards," p.31, January 2009.

Highway 101 and the Carpenterville Highway are vulnerable to landslide events. In 1993 and 1994, two different landslides forced the closure of Highway 101. Curry County also has several local roads that are vulnerable to landslides. These include Chetco River Road, Jerry's Flat Road, Elk River Road, and Sixes River Road. It is not cost effective to mitigate all potential slides due to limited funds and resources.

The Curry County Steering Committee also indicated that the reservoir systems in Gold Beach and Brookings are vulnerable to damage from landslides. The reservoir in Gold Beach is the city's primary water supply and damage could limit water availability and water quality.

The following factors increase the likelihood that landslides will occur:

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

- Allowing development on or adjacent to existing landslides or known landslide-prone areas raises the risk of future slides regardless of excavation and drainage practices. Homeowners and developers should understand that in many potential landslide settings that there are no development practices that can completely assure slope stability from future slide events. The Curry County Steering Committee noted that more development is occurring on steep slopes, including areas southeast of Brookings and east of Gold Beach. Development in these areas may increase the county's vulnerability to landslide events.

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

- Certain forest practices can contribute to increased risk of landslides. Forest practices may alter the physical landscape and its vegetation, which can affect the stability of steep slopes. Physical alterations can include slope steepening, slope-water effects, and changes in soil strength. Of all forest management activities, roads have the greatest effects on slope stability and can increase erosion on slopes. However, recent changes in road construction and maintenance practices are reducing the negative effects of roads on slope stability.

Existing Hazard Mitigation Activities

Curry County's Comprehensive Plan includes policies that address landslides. These include:

- Policy # 6: Curry County recognizes that areas within the county are subject to mass movements of soil and bedrock and has included maps of these areas in the comprehensive plan. The county will allow development in these areas only after the specific building site has been approved by a geologist or engineering geologist licensed by the State of Oregon and that all special construction techniques necessary to build on the site have been designed by an engineer licensed by the State of Oregon.

The Curry County Zoning Ordinance contains regulations for development along steep slopes. These are outlined in Section 3.250 "Natural Hazard Overlay Zone" and Section 3.252 "Development in Areas of Geologic Hazards."

Curry County submitted a Hazard Mitigation Grant Program application (DR-1824) on November 12, 2009 to further analyze the landslide hazard in an area southeast of Brookings. The project involves completing the following tasks:

1) Consolidate current information on geological and geologic hazards, available infrastructure data, and available data on historic landslides;

2) Map landslides using LIDAR-derived digital elevation models as a primary tool;

3) Perform a landslide risk analysis using available infrastructure data;

4) Shore the results with partners and assist in identification of landslide risk reduction activities;

5) Incorporate findings into the Curry County Natural Hazards Mitigation Plan, city and county GIS, and city and county codes and ordinances.

The project is expected to be completed sometime in 2011.

The Oregon Department of Transportation and the county road department alleviate landslide areas by grading slides and installing new or improving existing drainage systems on slopes to divert water. One example was the installation of a drainage system in the area of the Arizona Inn Slide that has so far reduced landslides in the area and prevented closure of highway 101. The Oregon Department of Transportation also conducts regular repairs of slide areas along Highway 101. Table 2 shows recent repair work completed in landslide areas:

Table 2 Highway 101 Landslide/Rockfall Repairs

Year	Slide Area Name	Milepost	Repair Cost
2004	Reinhart Creek Slide	311.2-311.7	$1,444,000
	Whaleshead Cove Slide	349.1-349.6	$980,000
	Rocky Creek Shoreline Protection	303.1-303.4	$3,256,000
2005	Brush Creek Rockfall	310.2-310.3	$295,000
	Frankport South Slide	315.0-315.1	$750,000
2006	Coal Point Slide	305.0-305.1	$900,000
	Turner Slide	333.5-333.7	$200,000

Source: Oregon Department of Transportation, Curry County Office.

Highway 101 repair work that has yet to be completed by ODOT is the Slide Creek Slide (MP 310.6-310.8) at a cost of $1,210,000 and Humbug State Park-Bear Trap Creek (MP 307.06-307.16) at a cost of $193,000.

Hazard Mitigation Action Items

The following actions have been identified by the Curry County steering committee, and are recommended for mitigating the potential effects of landslide in Curry County. Please see full action item worksheets in Appendix A.

Landslide # 1: Assess LIDAR maps to evaluate development in hazardous areas.

Landslide # 2: Continue to track landslide events along major roadways and develop appropriate mitigation measures.

Multi-Hazard # 1: Ensure that all critical facilities have backup power and/or emergency operations plans in place to deal with power outages.

Multi-Hazard # 2: Develop a voluntary registry of vulnerable populations that may need assistance in an emergency situation.

Multi-Hazard # 3: Identify and disseminate information regarding alternate transportation routes.

Multi-Hazard # 4: Further develop risk assessment maps to show areas at risk for all hazards.

Multi-Hazard # 5: Establish mutual aid agreements between government agencies and commercial businesses in the event of an emergency (e.g. fuel, heavy equipment, food, etc.).

Multi-Hazard # 6: Encourage citizens to prepare and maintain provisions for one week without services.

Multi-Hazard # 9: Educate and encourage businesses, schools, and governmental organizations to develop continuity of operations plans.

Multi-Hazard # 10: Develop backup systems for county records.

Multi-Hazard # 11: Incorporate the natural hazards mitigation plan into the Curry County Comprehensive Plan.

Multi-Hazard # 12: Encourage special districts (including ports) to develop addenda to the Curry County Natural Hazards Mitigation Plan.

Multi-Hazard # 14: Explore developing a redundant utility system to supply Curry County with continuous service.

Multi-Hazard # 15: Develop a multi-hazard public education campaign targeted to residents and tourists about the natural hazards Curry County is vulnerable to and mitigation measures they can implement.

Multi-Hazard # 16: Complete a risk analysis for the hazards addressed in this plan, when information is available, to estimate potential loss of life and damage to property.

Volume II: Hazard Annex
Tsunami

Causes and Characteristics of the Hazard

A tsunami generally begins as a single wave but quickly evolves into a series of ocean waves, generated by disturbances from earthquakes, underwater volcanic eruptions, or landslides (includes landslides that start below the water surface and landslides that enter a deep body of water from above the water surface). In these cases the initial tsunami wave mimics the shape and size of the sea floor deformation that causes it.

The wavelength of a tsunami generated by sea floor deformation may be 100 miles or more in the deep ocean, with a wave height of only a few feet or less. These waves may reach speeds of up to 500 m.p.h. As tsunamis approach land where the water depth decreases, the forward speed of the tsunami will slow, but wave heights increase to as much as 100 feet. For simplicity, tsunamis can be divided geographically into two categories: those of distant origin and those generated locally. The distant tsunami is one that is usually generated by a subduction zone earthquake elsewhere in the Pacific and would take up to 24 hours to reach the Oregon coastline. A local tsunami is generated by a subduction earthquake off the Oregon Coast and would take minutes to reach the Oregon coastline. The Oregon Coast has experienced both types.[54]

A tsunami from a local source will probably be stronger, higher and travel farther inland (overland and up river) than a distant tsunami. The tsunami wave may be traveling at 30 mph when it hits the coastline and have heights of 20 to 60 feet, and potentially higher depending on the coastal bathymetry (water depths) and geometry (shoreline features). The tsunami wave from a nearby earthquake will break up into a series of waves that will continue to strike the coast over an 8 to 10 hour period. Tsunami activity can continue even longer for a major Pacific-wide tsunami. The first wave is not always the most destructive; for example, some computer simulations for the Central Oregon Coast, show that waves arriving in the second or third hour may be as big as or bigger than the initial wave. The deep ocean trenches off the coasts of Alaska, Japan, and South America are known for their underwater subduction zone earthquakes and are the source of many tsunamis.

The Pacific Northwest is located at a convergent plate boundary, where the Juan de Fuca and North American tectonic plates meet. The two plates are

[54] State of Oregon Emergency Management Plan. *Natural Hazards Mitigation Plan: Tsunami*. 2002

converging at a rate of about 1-2 inches per year. This boundary is called the Cascadia Subduction Zone. It extends from British Columbia to northern California. Subduction zone earthquakes are caused by the abrupt release of slowly accumulated stress. Subduction zones similar to the Cascadia Subduction Zone have produced earthquakes with magnitudes of 8 or larger. Historic subduction zone earthquakes include the 1960 Chile earthquake (magnitude 9.5), the 1964 southern Alaska earthquake (magnitude 9.2), and the 2010 Chile earthquake (magnitude 8.8). These types of earthquakes have been known to produce tsunamis.

Tsunami destruction can come from both the tsunami wave and from the rapid retreat of the water from the coastline. Tsunami waves tend to be fast moving rising surges of water. As a tsunami wave enters coastal bays and rivers, it may move as a high velocity current or a breaking wave that travels up an estuary as a bore (wall of turbulent water like the waves at the coast after they break). This inland surge of water can often cause most or all of the damage from a distant tsunami. For example, in Seaside the damage from the 1964 Alaskan tsunami occurred along the Necanicum River and Neawanna Creek, well inland from the coast. In addition, storm waves ride on top of the tsunami waves and may cause even more destruction.[55]

History of the Hazard in Curry County

The earliest recorded historical tsunami event in the Pacific Northwest occurred on January 26, 1700 following a magnitude 9 subduction zone earthquake along the Oregon Coast. The earthquake generated a tsunami that caused damage along the entire Oregon Coast and as far away as Japan.

In November 1873, an earthquake in northern California generated a tsunami that damaged structures at the high tide line in Port Orford.

On April 1, 1946, a tsunami generated by a magnitude 7.8 earthquake in the Aleutian Islands of Alaska took the lives of 165 people and cost over $26 million (in 1946 dollars). The highest inundation waves occurred on the island of Hawaii, where a 12-meter run-up was recorded. The tsunami arrived at the island of Hilo 4.9 hours after the earthquake originated in the Aleutian Islands, and 96 people lost their lives. A 10 foot wave was recorded at Coos Bay and Bandon for that event, but no damages were recorded for Curry County.

[55] State of Oregon Emergency Management Plan: Natural Hazards Mitigation Plan: Tsunami, March 2002

On November 4, 1952, an earthquake in Kamchatka, Russia, caused a four foot tsunami in Bandon where log decks broke loose from their foundation piers. No damages were recorded for Curry County. [56]

In March 1964, a tsunami struck southeastern Alaska following an earthquake beneath Prince William Sound. The tsunami arrived along the Alaska coastline between 20 and 30 minutes after the quake, devastating coastal villages. The tsunami spread across the Pacific Ocean and caused damage and fatalities in other coastal areas, including Oregon. In Gold Beach, a wave of 9.4 feet caused $30,000 in damage.[57] Along the entire Oregon Coast damage was estimated to be between $750,000 and $1 million.

After the 1964 tsunami, Curry County has experienced events of a lesser magnitude in 1992 and 2007. None of these events caused damage in Curry County.[58]

Risk Assessment

How are Hazard Areas Identified?

Tsunami inundation modeling attempts to identify areas affected by tsunamis, and the water depths, current strengths, wave heights, and wave arrival times associated with an event. Generally this analysis is conducted for "worst case" scenarios, but it can also be used to look at damages from tsunamis of lesser magnitude. Areas along the coast, and low-lying areas along bays or inlets that connect to the ocean, should be designated as hazard zones. Areas along rivers that connect to the ocean should also be designated as tsunami hazard areas for at least three kilometers inland and as far as ten kilometers inland for large, flat coastal rivers.[59]

In 1995, the Department of Geology and Mineral Industries (DOGAMI) completed an analysis of the Oregon Coast that resulted in extensive tsunami inundation maps. The maps depict the expected inundation for tsunamis produced by a magnitude 8.8 to 8.9 undersea earthquake. The tsunami hazard maps were produced to help implement Senate Bill 379 (SB 379), which was passed by the 1995 regular session of the Oregon Legislature. SB 379, implemented as Oregon Revised Statutes (ORS) 455.446 and 455.447, and Oregon Administrative Rules (OAR) 632-005 limits construction of new essential facilities and special occupancy

---

[56] NOAA, "November 4, 1952 Kamchatka Tsunami," http://wcatwc.arh.noaa.gov/web_tsus/19521104/19521104.htm, accessed March 29, 2010.

[57] State of Oregon, *Region 1 Hazard Assessment-Tsunami*, http://opdr.uoregon.edu/stateplan/regional#region1, accessed March 29, 2010.

[58] Curry County Emergency Management, *2007 Curry County Hazard Vulnerability Assessment*, available at Curry County Emergency Management Services.

[59] Geohazards International. *Preparing Your Community for Tsunamis: A Guidebook for Local Advocates*. 2007.

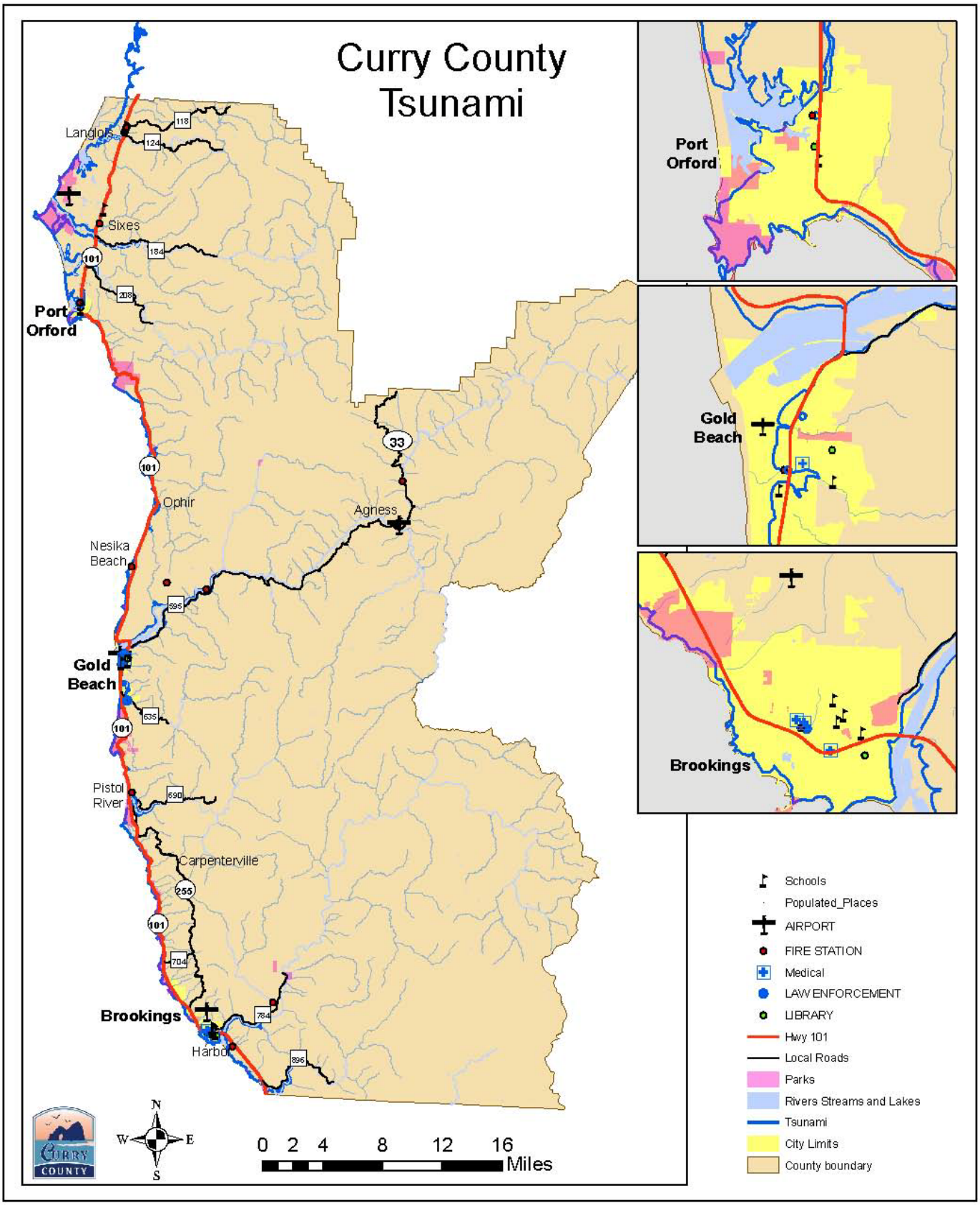
structures in tsunami flooding zones. In this analysis DOGAMI took into account topography, bathymetry data, and information about potential regional tsunami sources.

Figure 1 below indicates the location of the tsunami hazard in Curry County. The tsunami inundation line represents the upper limit of the area expected to be covered by flood water from a tsunami caused by a local magnitude 8.8 undersea earthquake. The extent of the tsunami hazard depends on where the tsunami originated, the magnitude of the earthquake that created the tsunami, and height of the local tides.

Figure 1 was developed based on information gathered in 1995. However, new models developed by the Department of Geology and Mineral Industries (DOGAMI) suggest that prior tsunami hazard assessments may underestimate the true hazard. The new models suggest the run-up of waves from a tsunami may be twice as high than what earlier assessments predicted, making Curry County significantly more vulnerable to tsunamis.[60] On February 12, 2010, DOGAMI announced it will remap the entire Oregon coastline under the TsunamiReady Program. The program will use computer modeling and laser based terrain mapping (light detection and ranging or LIDAR) to remap the coastal tsunami inundation zones and develop new tsunami evacuation maps for the entire coastline. The information will be available within the next few years and should be incorporated when Curry County updates its Natural Hazards Mitigation Plan in 2015.

[60] DOGAMI, "Oregon Geology Fact Sheet: Tsunami Hazards in Oregon," http://www.oregongeology.com/sub/publications/tsunami-factsheet_onscreen.pdf, accessed June 8, 2010.

Figure 1 Curry County Tsunami Inundation Zone.



Probability of Future Occurrence

It is difficult to predict when the next tsunami will occur. With respect to distant sources, Oregon has experienced ten tsunamis in the last 135 years with only three causing measurable damage. However, the time interval between events has been as little as one year and as much as 73 years. The two most destructive tsunamis occurred only four years apart (1960 and 1964) and originated from two different source areas (south central Chile and the Gulf of Alaska). Since only a few tsunamis caused measurable damage, a recurrence interval for distant tsunamis does not have much meaning for this region.[61]

Geologists predict a 10-14 percent chance that a Cascadia tsunami will be triggered by a shallow, undersea earthquake offshore Oregon in the next 50 years, causing a tsunami that will affect the Oregon Coast. This forecast comes from evidence for large but infrequent earthquakes and tsunamis that have occurred at the Oregon Coast every 500 years, on average.[62]

A tsunami originating from a Cascadia Subduction Zone (CSZ) event could be exceedingly destructive and thus is of greater concern than distant tsunamis. The average recurrence interval for a CSZ event is between 500 and 600 years. There have been seven CSZ events in the last 3500 years with time between individual events varying from 150 to 1000 years. It is assumed that all Cascadia tsunamis would cause extensive damage. The last CSZ event occurred approximately 300 years ago.[63]

The 2007 Curry County Hazards Analysis rates the probability of a tsunami occurring as **high,** meaning that a tsunami event is likely within a 10-35 year period.

Vulnerability Assessment

The entire Oregon Coast is at risk from tsunamis that originate from local and distant sources. In Curry County, there are a number of community assets that are vulnerable to the tsunami hazard, and are described in more detail in the section below, "Community Hazard Issues."

The 2007 Curry County Hazards Analysis rates Curry County's vulnerability to tsunamis as **high**, meaning that more than 10% of the population or regional assets are likely to be affected by a tsunami.

---

[61] State of Oregon Natural Hazards Mitigation Plan. Regional Risk Assessment. Region 1: Oregon Coast, "Tsunami-Related Hazards," p. 34, January 2009.

[62] Department of Geologic and Mineral Industries. *Oregon Geology Factsheet: Tsunami Hazards in Oregon*. http://www.oregongeology.org/pubs/fs/tsunami-factsheet_onscreen.pdf.

[63]Kenji Satake et al., 1995.

Risk Analysis

A risk analysis estimating loss of life and property for a tsunami event has not been completed for Curry County at this time. However, given the prevalence of data completed by the United State Geological Survey for the Oregon Coast (found in *Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon, 2007*), it would be possible to develop loss estimations for life and property for a given tsunami scenario. Useful data in *Variations in City Exposure and Sensitivity* to consider for a risk analysis includes the number of residents in the tsunami inundation zone, their age and housing status, the value of the tax lots in the inundation zone, and the volume of sales completed for businesses in the inundation zone. Completing a risk analysis for the tsunami hazard is included as Multi-Hazard Action # 16.

Community Hazard Issues

What is susceptible to damage during a hazard event?

A tsunami can have significant impacts to property and life in coastal areas in the inundation zone. Tsunami waves tend to be fast-moving rising surges of water. As a tsunami wave enters coastal bays and rivers, it may move as a high velocity current or a breaking wave that travels up an estuary as a bore (wall of turbulent water like the waves at the coast after they break). Tsunamis also arrive in multiple waves that can extend over a period of 8 to 10 hours. The high-velocity water contained in a tsunami wave, and its subsequent retreat into the ocean, is strong enough to destroy any building or structure in its path and cause significant loss of life.

The Curry County Steering Committee identified a number of community assets that are vulnerable to the tsunami hazard, which include communities, population, economy, infrastructure and critical facilities, and the environment.

Communities

All of Curry County's three incorporated cities have portions that are located in the tsunami inundation zone. These include Port Orford, Gold Beach, and Brookings. Large unincorporated areas of Curry County are also located in the tsunami inundation zone. Table 1 below shows the percentage of high and low-density developed land in the inundation zone for each of the incorporated cities and for unincorporated Curry County.

Table 1 Land Cover - High- and Low-Intensity Developed cells (30m cells) in the Tsunami Inundation Zone.

Community	Developed Land in Inundation Zone (km^2)	Total Developed Land (km^2) in Community	% of Developed Land in Inundation Zone
Port Orford	20	722	3%
Gold Beach	395	1,666	24%
Brookings	148	6,263	2%
Curry Co. (remainder)	1,081	14,276	8%

Source: Wood, Nathan. *Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon,* excel database, http://pubs.usgs.gov/sir/2007/5283/, accessed March 30, 2010.

As indicated in Table 1, Curry County has approximately 1,081 km^2 (267,121 acres) of low to highly developed land in the tsunami inundation zone. Unincorporated communities along the Curry County coast contain residences such as single and multi-family homes, retirement homes, elderly care facilities, and mobile home units; commercial buildings and industrial buildings. Unincorporated communities vulnerable to the tsunami hazard include:

- Floras Lake
- Sixes
- Nesika Beach
- Wedderburn
- Hunter Creek
- Jerry's Flat
- Pistol River
- Harbor

Curry County is also seeing more residential development occur along the coast, which increases the county's vulnerability to the tsunami hazard.

Populations

Curry County has relatively few residents living in the tsunami inundation zone as shown in Table 2 below. In the other incorporated cities the percentage is also low except for the city of Gold Beach which has approximately 15% of the community living in the inundation zone, which translates to 281 people.

Table 2 Residents in Tsunami Inundation Zone (2000 Census)

Community	Population in Inundation Zone	Total Community Population	% of Community in Inundation Zone
Port Orford	85	1,122	8%
Gold Beach	281	1,900	15%
Brookings	159	5,355	3%
Curry Co. (remainder)	873	12,759	7%

Source: Wood, Nathan. *Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon,* excel database, http://pubs.usgs.gov/sir/2007/5283/, accessed March 30, 2010.

Of the total residents in the tsunami inundation zone, a large percentage of this population is 65 years of age and over. In the unincorporated areas of Curry County, 257 residents in the inundation zone are 65 years or older. This is 29% of the total population that lives within the inundation zone. The incorporated cities also have high percentages of elderly residents in the inundation zone, as shown in Table 3 below.

Table 3 Population over 65 years (2000 Census) in the Tsunami Inundation Zone.

Community	Population 65 years and over in Inundation Zone	Total Community Population 65 years and over	% of Total Community Population	% of Total Population in Inundation Zone
Port Orford	32	300	10%	37%
Gold Beach	59	363	16%	21%
Brookings	42	1,276	3%	27%
Curry Co. (remainder)	257	3,689	7%	29%

Source: Wood, Nathan. *Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon,* excel database, http://pubs.usgs.gov/sir/2007/5283/, accessed March 30, 2010.

Elderly populations are more vulnerable to the tsunami hazard because they may require special needs before, during, and after a tsunami event. They may require assistance in evacuation because of mobility issues or health issues or there may be a reluctance to evacuate. Special medical equipment may also be needed at evacuation shelters. Should an evacuation happen during the winter, the elderly may also be exposed to low air temperatures or high precipitation levels, increasing their susceptibility to illness. As a result, shelters will need to have special accommodations for elderly residents.[64]

Curry County also has a large seasonal tourist population that visits the county's natural amenities—such as state parks—and its coastal cities. Curry County has several state parks located in or near the tsunami inundation zone. Coastal state parks include:

- Floras Lake
- Cape Blanco
- Paradise Point
- Humbug Mountain
- Arizona Beach
- Otter Point
- Cape Sebastian
- Pistol River
- Samuel H. Boardman
- Harris Beach

[64] Nathan Wood, *Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon,* http://pubs.usgs.gov/sir/2007/5283/, accessed March 30, 2010, p. 14.

- Winchuck

Tourists are especially vulnerable to tsunamis because they may not be aware of the hazard or know what the evacuation warning signs and sirens mean. Additionally, tourists that camp in remote areas along the coast may not be able to hear tsunami warning signals.

Infrastructure and Critical Facilities

Critical transportation infrastructure along the coast is vulnerable to the tsunami hazard. Portions of Highway 101 in Curry County, Port Orford, and Gold Beach, are located in the inundation zone. Highway 101 bridges such as the Paterson Bridge, Lobster Creek Bridge, and Pistol River Bridge are vulnerable to damage from a large tsunami event. The Gold Beach Airport in Gold Beach is entirely located in the tsunami inundation zone. Finally, the port facilities of Port Orford, Gold Beach, and Brookings are vulnerable to damage in a tsunami.

Disruption to road, air, and maritime transportation can limit the ability of the community to respond and recover from a tsunami event. Disruption to roads and bridges leading to the incorporated cities can limit services, such as medical services or access to food, to rural residents and tourists.

Critical facilities, such as the police and fire departments in Port Orford and Gold Beach, are located in the tsunami inundation zone. In addition, Curry County offices, which include the administrative offices, jail, 911 center, and ambulance are vulnerable to damage from a tsunami event. Damage to these facilities can disrupt response or recovery efforts in the community after a tsunami.

Economy

Of the developed areas in unincorporated Curry County, 23 businesses are located in the inundation zone, representing 19% of the county's businesses. Smaller percentages of community businesses are located in the inundation zone for each of the three incorporated cities, as shown in Table 4 below.

Table 4 Number of Businesses in Tsunami Inundation Zone (2005 infoUSA Employer Database)

Community	Number of Businesses in Inundation Zone	Total Community Businesses	% of Businesses in Tsunami Inundation Zone
Port Orford	0	109	0%
Gold Beach	15	318	5%
Brookings	32	643	5%
Curry Co. (remainder)	23	118	19%

Source: Wood, Nathan. *Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon,* excel database, http://pubs.usgs.gov/sir/2007/5283/, accessed March 30, 2010.

The Curry County Steering Committee also identified commercial and industrial buildings located in the tsunami inundation zone that are likely to be damaged in an event. These include:

- Fishing and shipping facilities in Port Orford, Gold Beach, and Brookings;
- Retail businesses in Gold Beach and Port Orford that provide basic necessities;

Damage to transportation infrastructure can also have significant impacts to the local economy. Long-term disruption to roads and bridges can disrupt the movement of goods and services, making it difficult for small businesses to survive. The forest products industry is also highly dependent on roads and marine facilities to transport goods. Finally, damage to roads can prevent tourists from visiting Curry County, impacting businesses such as restaurants, hotels, and campgrounds that depend on tourists for their income.

Environment

Curry County has a number of environmental assets that are vulnerable to hazardous materials that can be released into the environment as a result of tsunami impacts. The county's rivers and estuaries provide habitat for fish and shellfish, which in turn supports a commercial and recreational fishing industry. Hazardous materials located in marinas, local retail stores, and community wastewater treatment plants could cause significant damage to Curry County's rivers and estuaries. Examples of major hazardous materials sites and wastewater sites within the tsunami inundation zone include:

- Oregon Department of Transportation fuel stations;
- County shops that contain pesticides;
- Hardware stores with household chemicals;
- Fuel stations in each of the county's three ports;
- Lumber mill sites with glue resin and gasoline tanks located near rivers and the coast; and
- Wastewater treatment plants in Gold Beach, Brookings, and Port Orford.

Existing Hazard Mitigation Activities

Curry County participates in the Oregon Coast Tsunami Hazard program which has published tsunami evacuation maps for all major incorporated and unincorporated communities located in the tsunami inundation zone. These evacuation maps are currently being updated through the TsunamiReady Program sponsored by the National Oceanic and

Atmospheric Administration (NOAA) and DOGAMI. Curry County also posts this information about the tsunami hazard on the county's website.

Finally, Curry County has development regulations (Section 8) for "Coastal High Hazard Areas" in the county's Flood Damage Prevention Ordinance. A coastal high hazard area is "an area of special flood hazard extending from offshore to the inland limit of a primary fontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources. The area is designated on the FIRM as Zone V1-V30, VE or V."[65]

Hazard Mitigation Action Items

The following actions have been identified by the Curry County steering committee, and are recommended for mitigating the potential effects of tsunami in Curry County. Please see full action item worksheets in Appendix A.

Tsunami # 1: Conduct regular earthquake/tsunami evacuation drills.

Tsunami # 2: Seek funding to relocate critical services outside of the tsunami inundation zone.

Multi-Hazard # 1: Ensure that all critical facilities have backup power and/or emergency operations plans in place to deal with power outages.

Multi-Hazard # 2: Develop a voluntary registry of vulnerable populations that may need assistance in an emergency situation.

Multi-Hazard # 3: Identify and disseminate information regarding alternate transportation routes.

Multi-Hazard # 4: Further develop risk assessment maps to show areas at risk for all hazards.

Multi-Hazard # 5: Establish mutual aid agreements between government agencies and commercial businesses in the event of an emergency (e.g. fuel, heavy equipment, food, etc.).

Multi-Hazard # 6: Encourage citizens to prepare and maintain provisions for one week without services.

Multi-Hazard # 7: Support efforts to create a post-disaster redevelopment plan for Curry County.

Multi-Hazard # 8: Continue the development of Citizens Corps Programs to ease the load on emergency services following a disaster.

Multi-Hazard # 9: Educate and encourage businesses, schools, and governmental organizations to develop continuity of operations plans.

[65] Curry County Flood Damage Prevention Ordinance, p. 3.

Multi-Hazard # 10: Develop backup systems for county records.

Multi-Hazard # 11: Incorporate the natural hazards mitigation plan into the Curry County Comprehensive Plan.

Multi-Hazard # 12: Encourage special districts (including ports) to develop addenda to the Curry County Natural Hazards Mitigation Plan.

Multi-Hazard # 13: Identify Red Cross shelters that are seismically sound, and retrofit existing shelters.

Multi-Hazard # 15: Develop a multi-hazard public education campaign targeted to residents and tourists about the natural hazards Curry County is vulnerable to and mitigation measures they can implement.

Multi-Hazard # 16: Complete a risk analysis for the hazards addressed in this plan, when information is available, to estimate potential loss of life and damage to property.

Volume II: Hazard Annex
Wildfire

Community Wildfire Protection Plan

The Curry County Community Wildfire Protection Plan (CWPP) was developed in 2008 by the Curry County Wildfire Preparation Team with project facilitation and support provided by the Institute for a Sustainable Environment at the University of Oregon. The Curry County Wildfire Preparation Team (CWPT) includes representatives from local fire protection districts, the Curry Fire Chief's Association, Curry County Emergency Services, Bureau of Land Management – Coos Bay District, Rogue River-Siskiyou National Forest, Coos Forest Protective Association, County GIS, municipal governments, the South Coast Watershed Councils, and the Lower Rogue Watershed Councils. Each year the CWPT evaluates progress on implementing the CWPP and develops an annual action plan for implementation. Funding for the project was provided by a National Fire Plan Grant.

The CWPP expanded on the 2005 version of Curry County's Natural Hazards Mitigation Plan's wildfire chapter. The CWPP was designed to complement information in the mitigation plan, and relevant information has been integrated into this chapter. However, the Curry County CWPP will remain the primary plan for wildfire mitigation in Curry County. For a complete copy of the CWPP, please see Curry County's website.

Causes and Characteristics of the Hazard

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 unwanted or unplanned fires burning in forests or wildland areas that threaten to destroy life, property, or natural resources.[66] Areas of wildfire risk exist throughout the state with areas in central, southwest and northeast Oregon having the highest risk. The Oregon Department of Forestry has estimated that there are about 200,000 homes in areas of serious wildfire risk.

The impact on communities from wildfire can be significant. 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

[66] Virginia Department of Forestry, Fire and Wildfire Glossary, http://www.dof.virginia.gov/fire/glossary.shtml, accessed April 22, 2010.

homes threatened and 44 homes were lost. The 2002 Biscuit fire in Curry and Josephine Counties affected over 500,000 acres and cost $150 million to suppress.

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

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 wildland settings.

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

Wildland Fires

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

Conditions Contributing to Wildfires

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

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

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

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

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

History of the Hazard in Curry County

Curry County has a long history of wildfires. A list of significant Curry County fires can be found below.[67]

2002: The Biscuit Fire burned roughly 500,000 acres for a total cost of $150 million.

1987: The Silver Fire occurred in the Southern Coast Range and burned 97,000 acres.

1936: The Bandon Fire in Coos and Curry Counties burned over 225,000 acres and 484 structures[68]. Temperatures went above 90 degrees and humidity dropped below 6%.

1868: The Coos Bay Fire burned 90% of Elliot State Forest (roughly 300,000 acres) and the town of Port Orford.

Risk Assessment

How are Hazard Areas Identified?

The entire county is vulnerable to wildfires; however areas at greatest risk are the heavily forested eastern portions of Curry County, and areas closer to the coast that are infested with non-native Gorse and Scotch Broom.

Gorse, which is native to Western and Central Europe, has become a major weed of agriculture and forestry on the West Coast. Gorse grows well on shady slopes with high soil moisture and good drainage. As a result, the spiny evergreen shrub thrives in southwest Oregon. Dense and stiff, forming impenetrable thickets, vigorous stands grow outward, crowding out all other vegetation and forming a center of dry dead vegetation. This, in combination with the oil content of the plant, presents a major fire hazard.

The extent of the wildfire hazard depends on a number of factors, including topography, temperature, fuel conditions, and humidity.

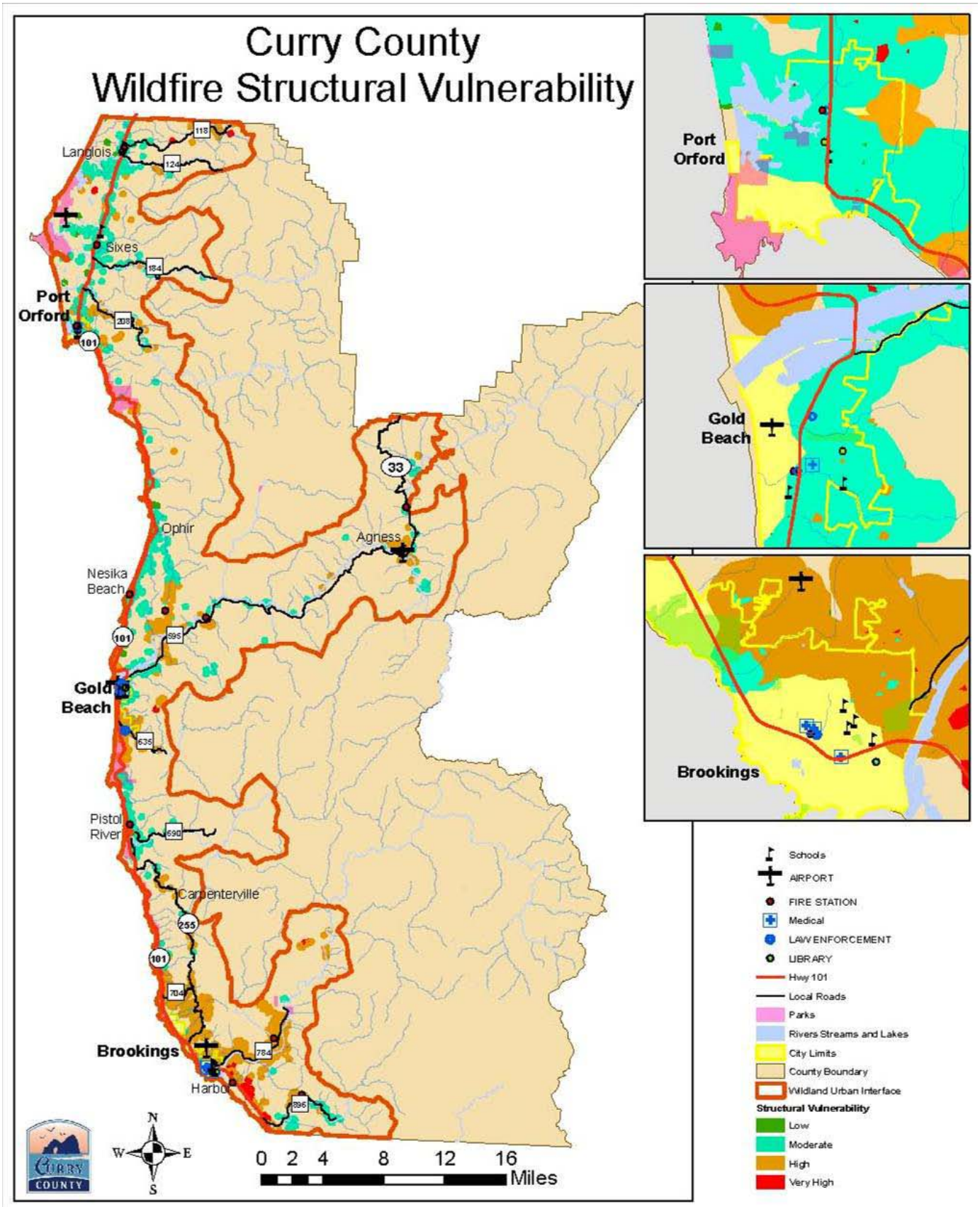
Figure 1 below identifies the location of the wildfire hazard and the level of risk for Curry County communities.

---

[67] Curry County Community Wildfire Protection Plan, "Curry County Profile: History of Wildfire in Curry County," 2008, p. 3-3.

[68] 2008 Curry County Community Wildfire Protection Plan, pg 3-3

Figure 1 Curry County Wildfire Structural Vulnerability



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 probability. Dry and diseased forests can be mapped accurately and some statement can be made about the probability of lightning strikes. Each forest is different and consequently has different probability/recurrence estimates.

Wildfires have always been a natural part of forest, brush, or grassland ecosystems, sometimes with devastating effects. Wildfires result from natural causes (e.g., lightning strikes), a mechanical failure (Oxbow Fire), or human-caused (unattended campfire, debris burning, or arson).

The 2007 Curry County Hazard Analysis rates Curry County as having a **high** level of probability for wildfire, meaning one incident is likely within a 10-35 year period.

Vulnerability Assessment

An understanding of risk begins with the knowledge that wildfire is a natural part of forest and grassland ecosystems. Past forest practices included the suppression of all forest and grassland fires. This practice, coupled with hundreds of acres of dry bush 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.[69] Curry County's wildfire hazard is aggravated by widespread infestation of Gorse and Scotch Broom and heavier fuel types such as old growth forest.

Each year a significant number of people build homes within or on the edge of the forest (urban/wildland interface), thereby increasing wildfire hazards. In Oregon, many communities (incorporated and unincorporated) are within or abut areas subject to serious wildfire hazards. Such development has greatly complicated firefighting efforts and significantly increased the cost of fire suppression.[70]

In 2006, the Oregon Department of Forestry developed an assessment of 564 Oregon communities at risk to wildfire. Each community received a high, moderate, or low rating based upon its level of *risk* (the likelihood of a fire occurring), *hazard* (resistance to control once a wildfire starts, being the weather, topography and fuel that adversely affects suppression efforts), its *protection capability* (risks associated with inadequate wildfire protection capabilities), the *value* (human and economic values associated with communities or landscapes), and an *overall* risk assessment. Table 1 lists the "Interface Communities/Jurisdictions" within Curry County and their respective ratings. Note that the ratings listed below were developed

[69] State of Oregon Natural Hazards Mitigation Plan. Regional Risk Assessment. Region 1: Oregon Coast, "Wildfire-Related Hazards," p.15-16, January 2009.

[70] Ibid.

statewide, so the ratings of Low, Medium, and High are relative to other communities.

Table 1 Curry County Communities at Risk to Wildfire

2006 Communities At Risk	Risk	Hazard	Protection	Value	Overall
Agness-Illahe Vol (RFPD)	M	H	M	L	M
Brookings (CITY)	H	M	L	H	M
Cape Ferrelo RFPD (RFPD)	H	M	M	H	M
Curry (COUNTY)	M	M	M	H	M
Dawson Tract (RFPD)	H	M	M	H	M
Gold Beach (CITY)	H	L	M	H	M
Gold Beach Fire Dept (RFPD)	H	L	M	H	M
Langlois RFPD (RFPD)	M	L	M	H	M
Ophir RFPD (RFPD)	M	L	M	H	M
Pistol River Vol FD (RFPD)	M	L	M	H	M
Port Orford (CITY)	H	L	M	H	M
Port Orford FD (RFPD)	H	L	M	H	M
Sixes River RFPD (RFPD)	H	L	M	H	M
Squaw Valley N Bank RFPD (RFPD)	M	L	M	H	M
Upper Chetco (RFPD)	H	M	M	H	M
Winchuck RFPD (RFPD)	H	M	M	L	M

Source: Oregon Department of Forestry, Oregon's Communities at Risk Assessment, September 2006, http://www.oregon.gov/ODF/FIRE/docs/PREV/06CAR.pdf, accessed April 30, 2010.

The 2007 Curry County Hazard Analysis rates Curry County as having a **high** vulnerability to wildfire, meaning that more than 10% of the population or regional assets are likely to be affected by a major wildfire emergency or disaster.

Risk Analysis

Curry County has not completed a risk analysis that estimates the potential loss of life in communities vulnerable to wildfire. However, the 2008 Curry County Community Wildfire Protection Plan (CWPP) has completed a risk assessment that analyzes structural vulnerability and probability of hazard occurrence.

In the table below, each community is assessed for: 1) the average rating based upon overall risk (all 5 factors); 2) structural vulnerability only; and 3) hazard only. In addition, an estimate of the number of high risk homes was determined by counting improved lots within areas with moderate-high structural vulnerability AND high overall risks.

Ratings were then ranked for each factor based upon being in the highest 1/3rd of communities (shaded and bold font), middle 1/3rd (shaded), or lowest 1/3rd. For determining an overall community ranking, a score was calculated for each community by summing a value for each factor based upon being in the top 1/3rd (3 points), middle 1/3rd (2 points), or lowest

1/3rd (1 point). Table 2 below is replicated from the 2008 Curry County CWPP.

Table 2 Curry County Communities at Risk to Wildfire

Community	Mean of Various Ratings by Community			Estimated High Risk Homes	Overall Priority Score
	Overall Risk	SVA	Hazard		
NORTH					
Port Orford RFPD	2.97	2.33	1.32	342	6
Langlois RFPD	2.58	2.00	1.47	33	6
Sixes RFPD	2.09	2.23	1.38	9	4
CENTRAL					
Cedar Valley RFPD	**3.10**	2.39	1.71	143	9
Gold Beach-Wedderburn FD/RFD	**2.97**	2.15	1.08	**1167**	8
Agness Illahe Vol. FD	2.64	**3.01**	**2.01**	39	9
Ophir RFPD	1.92	2.44	1.65	6	6
SOUTH					
Harbor RFPD	**3.59**	2.44	1.45	**793**	9
Cape Ferrelo RFPD	**3.49**	**2.57**	**1.85**	**614**	**12**
Upper Chetco RFPD	**3.47**	**2.95**	**1.84**	130	**11**
Winchuck RFPD	2.94	**2.53**	**1.79**	82	**10**
Brookings FD/RFD	2.52	**2.69**	1.79	**1163**	9
Pistol River RFPD	2.25	2.44	1.60	43	7
County (No Fire Protection)	2.55	2.50	**1.80**	**935**	**10**

Source: Curry County Community Wildfire Protection Plan, February 2008, pg 6-10, https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/5865/Curry_CWPP_2-13-08_web.pdf?sequence=1; accessed May 3, 2010.

Community Hazard Issues

What is susceptible to damage during a hazard event?

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

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

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

- Combustible roofing material (for example cedar shakes)
- Wood construction
- Homes and other structures with no defensible space
- Roads and streets with substandard width, grades, weight-load and connectivity standards making evacuation and fire response more difficult
- Subdivisions and homes surrounded by heavy natural fuel types
- Structures on steep slopes covered with flammable vegetation
- Limited on-site or community water supply
- Locations with normal prevailing winds over 30 miles per hour

The Curry County steering committee indicated that growth in the wildland-urban interface is increasing, especially on forested hillsides with views of the ocean. These properties typically consist of large single-family homes that are vulnerable due to their proximity to fuels, but also because access to the homes is limited, making fire suppression difficult.

The steering committee also noted that wildfires may leave certain rural residents isolated from the Highway 101 corridor. Lastly, the timber and tourist industries would be impacted by a wildfire.

Existing Hazard Mitigation Activities

Curry County has completed a Community Wildfire Protection Plan in 2008. This plan addresses the risk of wildfire in Curry County and develops appropriate mitigation action items. The Community Wildfire Preparation Team (CWPT) is responsible for implementing actions in the CWPP. CWPT activities related to wildfire mitigation include conducting wildfire risk reduction trainings for the public, working with property owners to increase defensible space, and removing noxious weeds such as gorse and scotch broom.

In 1997, the Oregon Legislature passed Oregon Senate Bill (SB) 360 (Forestland / Urban Interface Protection Act, 1997). Senate Bill 360: 1) establishes legislative policy for fire protection, 2) defines urban/wildland interface areas for regulatory purposes, 3) establishes standards for locating homes in the urban/wildland interface, and 4) provides a means

for establishing an integrated fire protection system. Under SB 360, property owners in identified forestland-urban interface areas are required to reduce excess vegetation around structures and along driveways. In some cases, it may be necessary to create fuel breaks along property lines and roadsides. Forestland-urban interface areas are identified in each county by a classification committee who also applies fire-risk classifications to the areas. The classifications range from "low" to "extreme," and the classification is used by a property owner to determine the size of a fuel break that needs to be established around a structure.

Section 3.040 of the Curry County Zoning Ordinance includes development standards for the "Timber" zone. Section 3.045 lists Fire Fighting Standards for dwellings and structures in this zone, such as inclusion of the property in a rural fire protection district, water storage requirements for fire fighting, road access, a required fire-proof roof, limiting development on slopes of 40 percent or less, and inclusion of primary and secondary fire safety areas around the property.

Hazard Mitigation Action Items

The following actions have been identified by the Curry County steering committee, and are recommended for mitigating the potential effects of wildfire in Curry County. Please see full action item worksheets in Appendix A.

Wildfire # 1: Implement actions in the Curry County Community Wildfire Protection Plan.

Wildfire # 2: Encourage new development to incorporate wildfire mitigation measures and ensure adequate emergency access.

Multi-Hazard # 1: Ensure that all critical facilities have backup power and/or emergency operations plans in place to deal with power outages.

Multi-Hazard # 2: Develop a voluntary registry of vulnerable populations that may need assistance in an emergency situation.

Multi-Hazard # 3: Identify and disseminate information regarding alternate transportation routes.

Multi-Hazard # 4: Further develop risk assessment maps to show areas at risk for all hazards.

Multi-Hazard # 5: Establish mutual aid agreements between government agencies and commercial businesses in the event of an emergency (e.g. fuel, heavy equipment, food, etc.).

Multi-Hazard # 6: Encourage citizens to prepare and maintain provisions for one week without services.

Multi-Hazard # 7: Support efforts to create a post-disaster redevelopment plan for Curry County.

Multi-Hazard # 11: Incorporate the natural hazards mitigation plan into the Curry County Comprehensive Plan.

Multi-Hazard # 12: Encourage special districts (including ports) to develop addenda to the Curry County Natural Hazards Mitigation Plan.

Multi-Hazard # 14: Explore developing a redundant utility system to supply Curry County with continuous service.

Multi-Hazard # 15: Develop a multi-hazard public education campaign targeted to residents and tourists about the natural hazards Curry County is vulnerable to and mitigation measures they can implement.

Volume II: Hazard Annex
Wind Storm

Causes and Characteristics of the Hazard

High wind events are a regular occurrence Curry County, particularly in exposed coastal areas and during the winter months. Wind storms with destructive force are less frequent, though their pattern is fairly well known. These storms form over the North Pacific during the cool months (October through March), move along the coast and swing inland in a northeasterly direction. Wind speeds vary with the intensity of the storms. Gusts exceeding 100 miles per hour have been recorded at several coastal locations, but generally lessen as the storms move inland. These large storms can be very destructive to life and property. Less destructive storms can still topple trees, power lines, and cause building damage.

Coastal wind storms typically occur during winter months, and are often accompanied by heavy precipitation. This precipitation usually falls in the form of rain, but cold winter temperatures can lead to snow and ice. However, these snow and ice events are typically short-lived.

A windstorm is generally a short duration event involving straight-line winds and/or gusts in excess of 50 mph. Although windstorms can affect all of Curry County, they are especially dangerous in developed areas with significant tree stands and major infrastructure, especially above ground utility lines. A windstorm will frequently knock down trees and power lines, damage homes, businesses, public facilities, and create tons of storm related debris.

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

Although rare, tornados can and do occur in Oregon. Curry County has experienced two tornadoes in the past 20 years. In November 2002, a tornado made landfall south of Brookings causing $500,000 in damage. A tornado touched down in Curry County on March 22, 1983, causing $25,000 in property damage.

History of the Hazard in Curry County

Curry County has a long history of wind storms. The following list describes previous wind storm events:[71]

December 2006: A wind storm with winds over 90 mph caused $225,000 in damage for Coos, Curry, and Douglas Counties.

November 2006: Storm with winds measured at 70 mph, caused a total of $10,000 in damages in Curry County.

November 2002: Tornado touches down in Brookings causing $500,000 in damage.

February 2002: Wind storm with 88 mph winds recorded in Bandon, severe damage to utilities and roads caused by falling trees. State of Emergency declared for Coos, Curry, Douglas, Lane, and Linn Counties.

November 1996: Heavy rain in Curry County.

December 1995: State of Emergency declared throughout western Oregon due to a major wind storm.

March 1983: Tornado touched down in Brookings, causing $25,000 damage.

October 1967: Severe wind damage along the coast, winds 100 to 110 mph.

October 1962: Columbus Day Storm. Most destructive wind storm in Oregon's history, and caused widespread damage in Curry County.

February 1961: Heavy gusts and significant rain cause widespread damage in Curry County.

November 1958: Wind storm, with gusts between 80 and 100 mph, over a billion board feet of timber fell, roads in Curry County blocked.

December 1951: Large windstorm, with coastal winds between 60 and 100 mph. Damage across the state.

January 1950: Severe winter weather with snow, sleet, and freezing rain which closed down highways and downed power lines. Brookings had six inches of snow, Gold Beach recorded three inches.

January 1921: Hurricane-force winds along coast.

---

[71] Sources: State of Oregon Natural Hazards Mitigation Plan. Regional Risk Assessment. Region 1: Oregon Coast, "Wind Storm-Related Hazards," p. 40-42, January 2009.

National Climatic Data Center, "Storm Events," http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms, accessed April 21, 2010.

Risk Assessment

How are Hazard Areas Identified?

All of Curry County is vulnerable to wind storms. The extent of the hazard is due to a multitude of variables, such as wind speed, direction, and temperature. Each storm is capable of causing extensive damage in any part of the county.

Probability of Future Occurrence

Wind storms occur several times annually in Curry County. Occasionally a severe windstorm exceeding 100 mph will occur, causing damage to buildings, power lines, and toppling trees.

The 2007 Curry County Hazard Analysis rates the probability of a windstorm occurring as **high** meaning that one incident is likely within a 10-35 year period.

Vulnerability Assessment

Windstorms can cause power outages, transportation, and economic disruptions. Structures most vulnerable to high winds in Curry County include insufficiently-anchored manufactured homes and older buildings with roof structures not designed for anticipated wind loads. Structures in highly sought after coastal locations are particularly susceptible to wind damage due to their exposed locations. Fallen trees and debris are common and can block roads for long periods, in addition to bringing down power and/or utility lines.

Wind-driven waves are common along the Oregon Coast and are responsible for road and highway wash-outs and the erosion of beaches and headlands. These problems are addressed under Flood Hazards (i.e., Ocean flooding and wave action).

The 2007 Curry County Hazard Analysis rates the county's vulnerability to windstorms as **high**, meaning that more than 10% of the population or regional assets would be affected.

Risk Analysis

A risk analysis estimating the potential loss of life and property for the windstorm hazard in Curry County has not been completed at this time. Currently data does not allow for specific estimates of life and property losses during a given scenario. However, given the county's high probability and vulnerability to windstorms, a risk analysis should be completed when data is available (see Multi-Hazard Action # 16).

Community Hazard Issues

What is susceptible to damage during a hazard event?

The damaging effects of windstorms may extend for distances of 100 to 300 miles from the center of storm activity. Positive wind pressure is a direct and frontal assault on a structure, pushing walls, doors, and windows inward.

Negative pressure also affects the sides and roof: passing currents 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 and remove the building protective envelope (doors, windows, and walls), internal pressures rise and result in roof or leeward building component failures and considerable structural damage. The Curry County Steering Committee identified a number of buildings vulnerable to windstorms which include single-family residential homes, multi-family buildings, retirement homes or elderly care facilities, manufactured homes, and hotels. Buildings in exposed areas along the coast are the most vulnerable.

Windstorms can result in collapsed or damaged buildings, damaged or blocked roads and bridges, damaged traffic signals, streetlights, and parks, among others. 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. They can also sustain direct losses to buildings, personnel, and other vital equipment. There are direct consequences to the local economy resulting from windstorms related to both physical damages and interrupted services.

Existing Hazard Mitigation Activities

Curry County adopts the Uniform Building Code that sets standards for structures to withstand 90 mph winds, with additional requirements addressing high exposure areas.

Hazard Mitigation Action Items

The following actions have been identified by the Curry County steering committee, and are recommended for mitigating the potential effects of wind storms in Curry County. Please see full action item worksheets in Appendix A.

Windstorm # 1: Educate the public about the role of proper tree pruning and care in preventing damage during windstorms.

Windstorm # 2: Encourage utilities to use underground construction methods where possible to reduce loss of service from windstorms.

Multi-Hazard # 1: Ensure that all critical facilities have backup power and/or emergency operations plans in place to deal with power outages.

Multi-Hazard # 2: Develop a voluntary registry of vulnerable populations that may need assistance in an emergency situation.

Multi-Hazard # 3: Identify and disseminate information regarding alternate transportation routes.

Multi-Hazard # 5: Establish mutual aid agreements between government agencies and commercial businesses in the event of an emergency (e.g. fuel, heavy equipment, food, etc.).

Multi-Hazard # 6: Encourage citizens to prepare and maintain provisions for one week without services.

Multi-Hazard # 7: Support efforts to create a post-disaster redevelopment plan for Curry County.

Multi-Hazard # 8: Continue the development of Citizens Corps Programs to ease the load on emergency services following a disaster.

Multi-Hazard # 9: Educate and encourage businesses, schools, and governmental organizations to develop continuity of operations plans.

Multi-Hazard # 10: Develop backup systems for county records.

Multi-Hazard # 11: Incorporate the natural hazards mitigation plan into the Curry County Comprehensive Plan.

Multi-Hazard # 14: Explore developing a redundant utility system to supply Curry County with continuous service.

Multi-Hazard # 15: Develop a multi-hazard public education campaign targeted to residents and tourists about the natural hazards Curry County is vulnerable to and mitigation measures they can implement.

Multi-Hazard # 16: Complete a risk analysis for the hazards addressed in this plan, when information is available, to estimate potential loss of life and damage to property.

Appendix A: Action Items

Curry County NHMP Action Item Matrix

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals					
					Save Lives and Reduce Injuries	Minimize and Prevent Damage	Reduce Economic Losses	Increase Cooperation and Coordination	Increase Education and Outreach	Protect Natural and Cultural Resources
Coastal Erosion # 1	Continue to monitor the progression of coastal erosion in conjunction with sea level rise.	State Parks-ODOT	Planning Division, Coast Watch, County Road Department, County Commission, ODOT, OSU, DLCD	LT		X			X	X
Drought # 1	Continue to enforce existing water requirement codes for rural residents.	Curry County Planning Division	Curry County Cities, Coos Forest Protective Association, State of Oregon Water Resources Department, Community Wildfire Protection Team	Ongoing		X			X	
Earthquake # 1	Conduct regular earthquake safety drills.	Curry County Emergency Management	Cities, schools, businesses, hospitals, American Red Cross, FEMA, OEM	Ongoing	X			X	X	
Earthquake # 2	Conduct non-structural seismic retrofit workshops with government agencies, businesses, and residents to prevent damage from earthquakes.	Curry County Emergency Services Department	Curry County Departments, local businesses, hospitals, chamber of commerce, community groups	ST	X	X			X	

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals					
					Save Lives and Reduce Injuries	Minimize and Prevent Damage	Reduce Economic Losses	Increase Cooperation and Coordination	Increase Education and Outreach	Protect Natural and Cultural Resources
Flood # 1	Continue to review and assess the county's floodplain ordinance to determine whether it meets current NFIP requirements.	Curry County Planning Division	County Commission, Planning Commission, FEMA, DOGAMI, DLCD	LT	X	X	X	X		
Flood # 2	Take steps to qualify for participation in the National Flood Insurance Program's (NFIP) Community Rating System.	Curry County Planning Division	Curry County Emergency Services, Curry County Road Department, FEMA, OEM, CRS Program, Property owners impacted	LT	X	X	X			
Flood # 3	Maintain the county's Flood Insurance Rate Maps (FIRM) when new data becomes available.	Curry County Planning Division	County Commission, Planning Commission, FEMA, DOGAMI, DLCD	LT	X	X	X	X		
Flood # 4	Research flood prone areas and develop appropriate mitigation action items.	Curry County Road Department	Curry County Planning Division, Emergency Services, FEMA, OEM	LT		X	X			
Landslide # 1	Assess LIDAR maps to evaluate development in hazardous areas.	Curry County Planning Division	Curry County Emergency Services, FEMA, DOGAMI, DLCD	LT	X	X				

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals					
					Save Lives and Reduce Injuries	Minimize and Prevent Damage	Reduce Economic Losses	Increase Cooperation and Coordination	Increase Education and Outreach	Protect Natural and Cultural Resources
Landslide # 2	Continue to track landslide events along major roadways and develop appropriate mitigation measures.	Curry County Road Department	Curry County Planning Division, Emergency Services, ODOT, FEMA, DOGAMI	ST	X	X	X			
Tsunami # 1	Conduct regular earthquake/tsunami evacuation drills.	Curry County Emergency Services	Curry County Planning, Curry County Sheriff, Fire Departments, Oregon State Parks, DOGAMI, FEMA, DLCD	ST	X			X	X	
Tsunami # 2	Seek funding to relocate critical services outside of the tsunami inundation zone.	Curry County Commission	Curry County Road Department, FEMA, OEM	LT	X	X				
Wildfire # 1	Implement actions in the Curry County Community Wildfire Protection Plan.	Community Wildfire Protection Team (CWPT)	Curry County Emergency Services, BLM, Oregon Department of Forestry, US Forest Service, cities, property owners	LT	X	X	X	X		X
Wildfire # 2	Encourage new development to incorporate wildfire mitigation measures and ensure adequate emergency access.	Curry County Planning Division	Curry County Emergency Services, Oregon Department of Forestry, FEMA	Ongoing	X	X				X

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals					
					Save Lives and Reduce Injuries	Minimize and Prevent Damage	Reduce Economic Losses	Increase Cooperation and Coordination	Increase Education and Outreach	Protect Natural and Cultural Resources
Wind Storm # 1	Educate the public about the role of proper tree pruning and care in preventing damage during windstorms.	Curry County Emergency Services	Curry County Planning Division, Coos-Curry Electric Cooperative	Ongoing		X			X	
Wind Storm # 2	Encourage utilities to use underground construction methods where possible to reduce loss of service from windstorms.	Coos-Curry Electric Cooperative	Curry County Emergency Services, Curry County Road Department, Other public utilities	LT		X	X			
Multi-Hazard # 1	Ensure that all critical facilities have backup power and/or emergency operations plans in place to deal with power outages.	Curry County Emergency Services	All Curry County Departments, FEMA, OEM	LT	X	X				
Multi-Hazard # 2	Develop a voluntary registry of vulnerable populations that may need assistance in an emergency situation.	Curry County Emergency Services	Curry County Public Health, Special needs populations, health care providers.	ST	X					
Multi-Hazard # 3	Identify and disseminate information regarding alternate transportation routes.	Curry County Road Department	Curry County Emergency Services, Forest Service, ODOT, DOGAMI, Curry County Aviation	ST	X				X	
Multi-Hazard # 4	Further develop risk assessment maps to show areas at risk for all hazards.	Curry County Commission	Curry County Road Department, Curry Emergency Services, DOGAMI, FEMA, OEM	ST	X	X				

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals					
					Save Lives and Reduce Injuries	Minimize and Prevent Damage	Reduce Economic Losses	Increase Cooperation and Coordination	Increase Education and Outreach	Protect Natural and Cultural Resources
Multi-Hazard # 5	Establish mutual aid agreements between government agencies and commercial businesses in the event of an emergency (e.g. fuel, heavy equipment, food, etc.).	Curry County Emergency Services	Curry County Road Department, Curry County Sheriff, Board of Commissioners, local businesses, FEMA, OEM	LT	X		X	X		
Multi-Hazard # 6	Encourage citizens to prepare and maintain provisions for one week without services.	Curry County Emergency Services	CERT, Sheriff, Board of Commissioners, DOGAMI, FEMA, OEM, hospitals	LT	X				X	
Multi-Hazard # 7	Support efforts to create a post-disaster redevelopment plan for Curry County.	Curry County Board of Commissioners	All county departments, Fire Department, Sheriff, cities, OPDR	ST	X		X	X		
Multi-Hazard # 8	Continue the development of Citizens Corps Programs to ease the load on emergency services following a disaster.	Curry County Emergency Services	Curry County Police Departments, Fire Departments, local residents, Curry County Citizens for Emergency Preparedness, Cities	ST				X	X	
Multi-Hazard # 9	Educate and encourage businesses, schools, and governmental organizations to develop continuity of operations plans.	Curry County Emergency Management	All county departments, FEMA, OEM, cities, chamber of commerce, OPDR	ST		X	X		X	

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals					
					Save Lives and Reduce Injuries	Minimize and Prevent Damage	Reduce Economic Losses	Increase Cooperation and Coordination	Increase Education and Outreach	Protect Natural and Cultural Resources
Multi-Hazard # 10	Develop backup systems for county records.	Curry County Board of Commissioners	GIS, Pulic Services, Curry County Emergency Services, cities, OEM	LT		X				
Multi-Hazard # 11	Incorporate the natural hazards mitigation plan into the Curry County Comprehensive Plan.	Curry County Planning Division	County Commission, Planning Commission, DLCD, FEMA	Ongoing	X	X		X	X	
Multi-Hazard # 12	Encourage special districts (including ports) to develop addenda to the Curry County Natural Hazards Mitigation Plan.	Curry County Commission	Curry County Emergency Services, Special Districts	LT		X		X		
Multi-Hazard # 13	Identify Red Cross shelters that are seismically sound, and retrofit existing shelters.	Red Cross	Curry County Emergency Services, Police, Fire, Schools, OEM, FEMA	LT	X	X				
Multi-Hazard # 14	Explore developing a redundant utility system to supply Curry County with continuous service.	Curry County Commission	Curry County Economic Development, Curry County Emergency Services, Coos-Curry Electric, other utility providers	LT		X		X		

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals					
					Save Lives and Reduce Injuries	Minimize and Prevent Damage	Reduce Economic Losses	Increase Cooperation and Coordination	Increase Education and Outreach	Protect Natural and Cultural Resources
Multi-Hazard # 15	Develop a multi-hazard public education campaign targeted to residents and tourists about the natural hazards Curry County is vulnerable to and mitigation measures they can implement.	Curry County Emergency Services	Planning Division, Police, Fire, Coos Forest Protective Association, Community Wildfire Protection Team, DOGAMI, FEMA, OEM	Ongoing	X	X		X	X	
Multi-Hazard # 16	Complete a risk analysis for the hazards addressed in this plan, when information is available, to estimate potential loss of life and damage to property.	Curry County GIS	Emergency Services, Planning Division, Road Department, DOGAMI, OEM, FEMA	LT		X	X			
Plan Implementation # 1	Consider adopting the South Coast Emergency Management Advisory Committee as the coordinating body for the Curry County Natural Hazards Mitigation Plan.	Mitigation Plan Coordinating Body	Curry County Emergency Services, Coos County, SCEMAC members	ST				X		

Coastal Erosion # 1

Proposed Action Item:	Alignment with Plan Goals:
Continue to monitor the progression of coastal erosion in conjunction with sea level rise.	*Minimize and prevent damage* *Increase education and outreach* *Protect natural resources*

Alignment with Existing Plans/Policies:

Curry County Zoning Ordinance

Rationale for Proposed Action Item:

New research conducted in January 2010 suggests that wave heights along the Oregon coast are increasing which may impact the rate of coastal erosion. According to the study, the highest waves may be as much as 46 feet, up from estimates of only 33 feet that were made as recently as 1996, a 40 percent increase. December and January are the months such waves are most likely to occur, although summer waves are also significantly higher. (Peter Ruggiero, Paul D. Komar, Jonathan C. Allan, "Increasing wave heights and extreme value projections: The wave climate of the U.S. Pacific Northwest," Coastal Engineering, Volume 57, Issue 5, May 2010, Pages 539-552) Given this new data, Curry County and Oregon State Parks should monitor rates of coastal erosion in areas zoned for development and consider reassessing development standards to prevent coastal erosion from damaging future buildings and infrastructure.

The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that reduce the effects of hazards on a new buildings and infrastructure [201.6(c)(3)(ii)]. Monitoring rates of coastal erosion to understand the problem, and reassessing coastal development standards to account for an increase in erosion will reduce the effects of coastal erosion on new buildings and infrastructure.

Ideas for Implementation:

Identify areas where development is permitted and coordinate efforts among Oregon State Parks, local organizations such as Coast Watch, and Oregon State University to monitor rates of coastal erosion in these areas.

Identify development standards to be reassessed that will account for an increase in coastal erosion.

Coordinating Organization:	State Parks

Internal Partners:	External Partners:
Planning Division Coast Watch, County Road Department, County Commission	ODOT, OSU Marine Biology Extension Office, DLCD

Potential Funding Sources:	Estimated cost:	Timeline:
		☐ Short Term (0-2 years) √ Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Drought # 1

Proposed Action Item:	Alignment with Plan Goals:
Continue to enforce existing water requirement codes for rural residents.	*Minimize and prevent damage* *Increase education and outreach*

Alignment with Existing Plans/Policies:

Curry County Zoning Ordinance

Rationale for Proposed Action Item:

Curry County has water storage requirements for rural residents that are outlined in the Curry County Zoning Ordinance. These requirements are enforced to combat drought as well as wildfire. Continuing to enforce existing water requirement codes for rural residents will ensure that water is available to address potential drought conditions and an increased vulnerability to wildfire due to drought.

The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that reduce the effects of hazards on a new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Enforcing existing water requirements will ensure the necessary water is present if rural residents need to protect their property from wildfires.

Ideas for Implementation:

Continue to enforce water requirements for rural residents.

Educate rural residents about the dangers of drought and wildfire in Curry County.

Coordinating Organization:	Curry County Planning Division

Internal Partners:	External Partners:	
Curry County cities	Coos Forest Protective Association, State of Oregon Water Resources Department, Community Wildfire Protection Team	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		□ Short Term (0-2 years) □ Long Term (2-4+ years) √ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Earthquake # 1

Proposed Action Item:	Alignment with Plan Goals:
Conduct regular earthquake safety drills.	*Save lives and reduce injuries* *Increase education and outreach* *Increase cooperation and coordination*

Alignment with Existing Plans/Policies:

Curry County Emergency Operations Plan

Rationale for Proposed Action Item:

Earthquake safety drills, such as "drop, cover, and hold," can prepare community members with strategies to protect themselves in an earthquake. Earthquake drills can be conducted at the county level or individually with local government agencies, schools, businesses, hospitals, and police and fire stations. The drills can raise awareness of the importance of earthquake safety and about Curry County's earthquake hazard.

Education programs play a pivotal role in reducing risk from hazards. Techniques used for hazard preparedness by an individual are primarily a function of their level of awareness. Realistic perceptions can minimize potential risk by influencing siting and design decisions. An educated community has a greater likelihood of making decisions that will reduce risk in coastal hazard situations. (*Oregon Technical Resource Guide*. July 2000. Community Planning Workshop. Eugene, OR: University of Oregon. p. 6-26) Conducting earthquake safety drills can play an important role in general education of the earthquake hazard in Curry County and prepare Curry County citizens in how to safely withstand an earthquake event.

The Disaster Mitigation Act of 2000 requires that communities continue to involve the public beyond the original planning process [201.6(c)(4)(ii)]. Conducting earthquake safety drills would be a way to keep the public informed of, and involved in, the county's actions to prepare for earthquakes. (Oregon Natural Hazards Workgroup. Lane County Natural Hazard Mitigation Plan (Draft). October 2005. Community Service Center, University of Oregon, Eugene, OR. p. 45

Ideas for Implementation:

Coordinate earthquake safety drills with the following organizations: county and city governments, schools, businesses, hospitals, and police and fire stations to raise awareness of Curry County's earthquake hazard.

Conduct earthquake safety drills together with tsunami evacuation drills.

Earthquake safety drill materials are available from Oregon Emergency Management, the "Great Shakeout (California)" at www.shakeout.org, the Federal Emergency Management Agency (www.fema.gov), and the American Red Cross.

Coordinating Organization:	Curry County Emergency Services Department

Internal Partners:	External Partners:
All county departments	American Red Cross, FEMA, OEM, Cities, schools, businesses, hospitals

Potential Funding Sources:	Estimated cost:	Timeline:
		□ Short Term (0-2 years) □ Long Term (2-4+ years) √ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Earthquake # 2

Proposed Action Item:	Alignment with Plan Goals:
Conduct non-structural seismic retrofit workshops with government agencies, businesses, and residents to prevent damage from earthquakes.	*Save lives and reduce injuries* *Minimize and prevent damage* *Increase education and outreach*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Seismic hazards pose a real and serious threat to many communities in Oregon, requiring local governments, planners, and engineers to consider their community's safety. Earthquake damage occurs because we have built structures that cannot withstand severe shaking. Buildings, ports, and lifelines (highways, telephone lines, gas, water, etc.) suffer damage in earthquakes. Damage and loss of life can be very severe if structures are not designed to withstand shaking, are on ground that amplifies shaking, or ground which liquefies due to shaking.[1]

Nonstructural retrofits protect building contents with little cost and effort. Examples of retrofits include:

- Securing water heaters, large appliances, bookcases, pictures and bulletin boards;
- Latching cabinet doors; and
- Using safety film on windows.

The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that reduce the effects of hazards on a new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Hazard impacts to government agencies, businesses, and residents can be reduced by pursuing non-structural retrofits to existing buildings.

Ideas for Implementation:

Develop informational brochures about individual mitigation opportunities and post on the city's website, include in the water bill, and make available on the front counters at the police and public works departments. Include recommendations regarding non-structural retrofits in these brochures. Use the following modes of communication or events to educate the public: Quarterly Newsletter, Website, Flyers, National Night Out, Safety Fair

Distribute a "Homeowner's Guide to Non-Structural Retrofit" (or something similar) found here: http://www.seattle.gov/DPD/cms/groups/pan/@pan/@emergprep/documents/web_informational/dpds_005877.pdf

Coordinating Organization:	Curry County Emergency Management

Internal Partners:	External Partners:
Curry County Departments	Local businesses, hospitals, chamber of commerce, community groups

Potential Funding Sources:	Estimated cost:	Timeline:
		√ Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Flood # 1

Proposed Action Item:	Alignment with Plan Goals:

[1] State of Oregon Natural Hazards Mitigation Plan, Earthquake Chapter.

Continue to review and assess the county's floodplain ordinance to determine whether it meets current NFIP requirements.	*Save lives and reduce injuries* *Minimize and prevent damage* *Reduce economic loss* *Increase cooperation and coordination*

Alignment with Existing Plans/Policies:

Curry County Zoning Ordinance

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. Curry County reviewed and updated its floodplain ordinance in September 2009 when it adopted new floodplain maps developed by FEMA. Curry County will continue to review and assess its floodplain ordinance to determine whether it meets the current National Flood Insurance Program requirements.

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:

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; and 3) assisting the community in implementing effective flood loss reduction measures when program deficiencies or violations are discovered.

Conduct an assessment of NFIP ordinances when new floodplain maps are available to ensure they reflect current flood hazards.

Mitigate areas that are prone to flooding and/or have the potential to flood.

Coordinating Organization:	Curry County Planning Division	
Internal Partners:	**External Partners:**	
County Commission, Planning Commission	FEMA, DOGAMI, DLCD	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing
Form Submitted by:	Curry County Steering Committee	
Action Item Status:	**New Action (2010)**	

Flood # 2

Proposed Action Item:	Alignment with Plan Goals:
Take steps to qualify for participation in the National Flood Insurance Program's (NFIP) Community Rating System.	*Save lives and reduce injuries* *Minimize and prevent damage* *Reduce economic losses*

Alignment with Existing Plans/Policies:

Curry County Zoning Ordinance; Curry County Flood Damage Prevention Ordinance

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. (*Oregon Technical Resource Guide*. July 2000. Community Planning Workshop. Eugene, OR: University of Oregon. p. 4-34.)

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)]. Joining the CRS program will further protect existing buildings in Curry County from flooding events by mitigating homes beyond the minimum standards of the NFIP.

Ideas for Implementation:

Visit the CRS website to find out specifics on what Curry County can do to qualify for the CRS program and improve their CRS rating. CRS website: http://training.fema.gov/EMIWeb/CRS/. Example actions include: relocating structures in the floodplain, maintaining drainage systems, preserving open space, mapping areas not on a FIRM.

Determine whether becoming member of the CRS is cost-effective

Coordinating Organization:	Curry County Planning

Internal Partners:	External Partners:	
Curry County Emergency Services, Curry County Road Department	FEMA, OEM, CRS Program, Property Owners Impacted	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Flood # 3

Proposed Action Item:	Alignment with Plan Goals:
Maintain the county's Flood Insurance Rate Maps (FIRM) when new data becomes available.	*Save lives and reduce injuries* *Minimize and prevent damage* *Reduce economic loss* *Increase cooperation and coordination*

Alignment with Existing Plans/Policies:
Curry County Development Code

Rationale for Proposed Action Item:
Curry County has Flood Insurance Rate Maps current as of September 2009. The Department of Geology and Mineral Industries (DOGAMI) is currently developing digital maps of the county using Light Detection and Ranging (LIDAR) data. The LIDAR data may be useful in redrawing FIRM maps because they can be used to develop detail geologic photos of the landscape. The Disaster Mitigation Act of 2000 requires communities to identify geographic extent of hazards known to impact the community [201.6(c)(2)(i)]. Updated Flood Insurance Rate Maps can assist Curry County in better defining the flood hazard within the community based on the most recent data.

Ideas for Implementation:
If there are areas that need to be revised for the flood map, complete the MT-2 Forms Package (Application Forms for Conditional Letters of Map Revision and Letters of Map Revision). The forms and instructions are designed to assist requesters (community officials or individuals via community officials) in gathering the data that the FEMA needs to determine whether the effective NFIP map and Flood Insurance Study report for a community should be revised. Once LIDAR maps have been completed, Curry County may want to incorporate the new data into their existing FIRMs to reflect the latest information and new vulnerabilities, where applicable.

Coordinating Organization:	Curry County Planning Division

Internal Partners:	External Partners:	
County Commission, Planning Commission	FEMA, DOGAMI, DLCD	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		☐ Short Term (0-2 years) √ Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Flood # 4

Proposed Action Item:	**Alignment with Plan Goals:**
Research flood prone areas and develop appropriate mitigation action items.	*Minimize and prevent damage*

Alignment with Existing Plans/Policies:

Curry County Flood Damage Prevention Ordinance, Curry County Flood Insurance Study

Rationale for Proposed Action Item:

In Curry County, the Euchre, Chetco, Hunter's Creek, Rogue, Winchuck, Humbug Creek all have potential flooding issues. Curry County recently updated its Flood Insurance Rate Maps to reflect new floodplain information for these areas. Researching these areas using Light Detection and Ranging (LIDAR) data to identify potential vulnerabilities, and developing appropriate mitigation action items will prevent floods from causing future damage.

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)]. Determining flood prone areas and developing appropriate mitigation actions can reduce any impacts that floods would have along the above rivers and creeks.

Ideas for Implementation:

Using updated Flood Insurance Rate Maps (FIRM), the Curry County Road Department can determine potential flood prone areas and take the necessary and relevant steps to reduce the impacts of flooding on county infrastructure.

Coordinating Organization:	Curry County Road Department

Internal Partners:	**External Partners:**
Planning Division, Emergency Services	FEMA, OEM

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Flood Mitigation Assistance		□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Landslide # 1

Proposed Action Item:	Alignment with Plan Goals:
Assess LIDAR maps to evaluate development in hazardous areas.	*Save lives and reduce injuries* *Minimize and prevent damage*

Alignment with Existing Plans/Policies:

Curry County Zoning Ordinance

Rationale for Proposed Action Item:

The Department of Geology and Mineral Industries (DOGAMI) is developing Light Detection and Ranging (LIDAR) maps for Coos and Curry counties. LIDAR is a mapping tool that provides very precise, accurate, and high-resolution images of the surface of the earth, vegetation, and the built environment for use in determining landslide areas, mapping wetlands, and analyze flood and tsunami areas. LIDAR data can determine areas and buildings at risk to landslides and can inform how the community should revise its comprehensive and land use policies to address new information. Example policies could include development of a landslide hazard overlay zone or updating current landslide policies and maps in the county's comprehensive plan.

The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Using LIDAR data to determine at-risk buildings and infrastructure will significantly reduce the effects of landslides on new and existing developments in hazard-prone areas.

Ideas for Implementation:

Review and analyze LIDAR data and review comprehensive plan policies and land use policies that address the landslide hazard.

Publicize information about the new hazard maps to the public and to potentially affected property owners. Outreach methods could include Town Hall meetings or posting information on the website.

Support completion of DOGAMI's interpretation of LIDAR data for southwest Curry County (Application HMGP DR-1824) to better understand the landslide hazard risk in the area and incorporate information into the Curry County NHMP.

Coordinating Organization:	Curry County Planning Division

Internal Partners:	External Partners:
Curry County Emergency Services	FEMA, DOGAMI, DLCD

Potential Funding Sources:	Estimated cost:	Timeline:
Hazard Mitigation Grant Program Pre-Disaster Mitigation Program		□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Landslide # 2

Proposed Action Item:	Alignment with Plan Goals:
Continue to track landslide events along major roadways and develop appropriate mitigation measures.	*Save lives and reduce injuries* *Minimize and prevent damage* *Reduce economic losses*

Alignment with Existing Plans/Policies:

Curry County Transportation Systems Plan

Rationale for Proposed Action Item:

The Curry County Steering Committee rates the probability of a landslide occurring as high, meaning that one event is likely in a 10-35 year period. Curry County's risk assessment also notes that the landslide hazard is most prevalent along county roads and Highway 101. Continuing to track landslide events along major roadways and developing appropriate mitigation measures will reduce the impact of landslides on existing county transportation routes.

The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Tracking landslide events along major roadways, and developing appropriate mitigation measures can reduce the impact to existing infrastructure in the county.

Ideas for Implementation:

Use DOGAMI's LIDAR maps of Curry County showing landslide hazard areas to identify potential landslide areas and track them on a regular basis.

Coordinate efforts with the Oregon Department of Transportation (ODOT) to develop appropriate mitigation measures along the Highway 101 corridor.

Coordinating Organization:	Curry County Road Department

Internal Partners:	External Partners:	
Curry County Planning Division, Emergency Management	ODOT, FEMA, DOGAMI	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		√ Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**Deferred from 2005 NHMP due to the ongoing nature of the action item. Originally Short Term Landslide Action # 2. Action reworded for the 2010 update.**

Tsunami # 1

Proposed Action Item:	Alignment with Plan Goals:
Conduct regular earthquake/tsunami evacuation drills.	*Save lives and reduce injuries* *Increase education and outreach* *Increase cooperation and coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Education programs play a pivotal role in reducing risk from coastal hazards. Techniques used for hazard preparedness by an individual are primarily a function of their level of awareness. Realistic perceptions can minimize potential risk by influencing siting and design decisions. An educated community has a greater likelihood of making decisions that will reduce risk in coastal hazard situations. (Oregon Technical Resource Guide. July 2000. Community Planning Workshop. Eugene, OR: University of Oregon. p. 6-26) Tsunami evacuation drills can play an important role in general education of the tsunami hazard in Curry County and prepare Curry County citizens in how to evacuate and respond to tsunami events.

The Disaster Mitigation Act of 2000 requires that communities continue to involve the public beyond the original planning process [201.6(c)(4)(ii)]. Conducting regular tsunami evacuation drills would be a way to keep the public informed of, and involved in, the county's actions to mitigate hazards. (Oregon Natural Hazards Workgroup. Lane County Natural Hazard Mitigation Plan (Draft). October 2005. Community Service Center, University of Oregon, Eugene, OR. p. 45)

To increase natural hazard mitigation and emergency preparedness in a community, "residents must be aware of the risk and know what they should do before and after the disaster occurs. Outreach and awareness campaigns need to be carefully organized and developed to ensure that residents receive critical information." (Oregon Natural Hazards Workgroup. Lane County Natural Hazard Mitigation Plan (Draft). October 2005. Community Service Center, University of Oregon, Eugene, OR. p. 46.)

Ideas for Implementation:

Coordinate evacuation drills with DOGAMI's Tsunami Prepared program and Oregon State Parks.

Publicize tsunami evacuation drills in the local media to get all residents involved in the drill. Consider targeting specific organizations or vulnerable assets such as retirement homes.

Coordinating Organization:	Curry County Emergency Services

Internal Partners:	External Partners:	
Curry County Planning Division, Curry County Sheriff	Oregon State Parks, DOGAMI, FEMA, DLCD	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		√ Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Tsunami # 2

Proposed Action Item:	Alignment with Plan Goals:
Seek funding to relocate critical services outside of the tsunami inundation zone.	*Save lives and reduce injuries* *Minimize and prevent damage*

Alignment with Existing Plans/Policies:

Curry County Capital Improvements Plan.

Rationale for Proposed Action Item:

Curry County's tsunami risk assessment has identified several critical facilities in the county's tsunami inundation zone. These include:

- Police and fire departments in Port Orford and Gold Beach
- All Curry County governmental offices in Gold Beach

Seeking funds to relocate these critical services outside of the tsunami inundation zone will make Curry County more resilient to tsunamis and better able to respond and recover from a tsunami event.

The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Relocating critical services outside of the tsunami inundation zone would be a step towards safeguarding critical services.

Ideas for Implementation:

Determine what funding sources are available for moving critical services outside of the tsunami inundation zone and begin applying for that funding.

Identify potential locations for relocating or rebuilding critical service facilities.

Coordinating Organization:	Curry County Commission

Internal Partners:	External Partners:
Curry County Road Department	FEMA, OEM

Potential Funding Sources:	Estimated cost:	Timeline:
Department of Homeland Security Pre-Disaster Mitigation Program		□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action Item (2010)**

Wildfire # 1

Proposed Action Item:	**Alignment with Plan Goals:**
Implement actions in the Curry County Community Wildfire Protection Plan.	*Save lives and reduce injuries* *Minimize and prevent damage* *Reduce economic losses* *Increase cooperation and coordination* *Protect natural and cultural resources*

Alignment with Existing Plans/Policies:
Curry County Community Wildfire Protection Plan

Rationale for Proposed Action Item:
A Community Wildfire Protection Plan (CWPP) identifies a community's wildfire risk and develops long and short term mitigation strategies to reduce the impacts of wildfire. Curry County completed a CWPP in 2008. Implementing CWPP actions will significantly reduce Curry County's risk to wildfire and potential damage that the county may face. The Disaster Mitigation Act of 2000 requires communities to identify geographic extent of hazards known to impact the community [201.6(c)(2)(i)]. The wildfire risk assessment indicates that Curry County has a high probability and high vulnerability to wildfires. Implement mitigation actions in the Curry County CWPP will significantly reduce the county's wildfire vulnerability.

Ideas for Implementation:
Coordinate planning efforts with Curry County Emergency Management and local communities. Develop strategies to involve the public to gather feedback on the wildfire risk in Curry County and strategies to reducing that risk.

Coordinating Organization:	Community Wildfire Protection Team (CWPT)

Internal Partners:	**External Partners:**
Curry County Emergency Services	BLM, Oregon Department of Forestry, US Forest Service, cities, property owners

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Identified in the Curry County CWPP.		√ Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Wildfire # 2

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage new development to incorporate wildfire mitigation measures and ensure adequate emergency access.	*Save lives and reduce injuries* *Minimize and prevent damage* *Protect natural resources*

Alignment with Existing Plans/Policies:

Curry County Community Wildfire Protection Plan, Curry County Zoning Ordinance

Rationale for Proposed Action Item:

According to the wildfire risk assessment, Curry County continues to see growth in forested areas and along steep slopes, factors which increase these developments' vulnerability to wildfires. In addition, there are several properties in the Wildland-Urban Interface that are considered at risk to wildfires. Encouraging new and existing developments in the WUI to incorporate wildfire mitigation measures and ensure adequate emergency access will protect new developments from future wildfire events.

The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Encouraging new and existing development to incorporate wildfire mitigation and ensure adequate emergency access will protect both new and existing buildings.

Ideas for Implementation:

Continue enforcement of zoning and development codes for new construction.

Conduct outreach with WUI communities/properties about wildfire mitigation and assess properties for wildfire risk

Coordinating Organization:	Curry County Planning Division

Internal Partners:	**External Partners:**
Curry County Emergency Services	Oregon Department of Forestry, FEMA

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		□ Short Term (0-2 years) □ Long Term (2-4+ years) √ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Wind Storm # 1

Proposed Action Item:	Alignment with Plan Goals:
Educate the public about the role of proper tree pruning and care in preventing damage during windstorms.	*Minimize and prevent damage* *Increase education and outreach*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

High winds can topple trees and break limbs which in turn can result in downed power lines and power outages. Damaging windstorms that cause extended power outages can also disrupt businesses and critical facilities such as hospitals and care centers. Educating the community about the risk of downed power lines and proper tree pruning and care can reduce the impact of power outages on the community.

According to Curry County's risk assessment, the county has a high probability of a wind storm occurring and a high vulnerability to wind storms. Given these high probability and vulnerability ratings, Curry County is also susceptible to experiencing downed power lines and extended power outages. Educating the community about the risk of downed power lines and developing appropriate preparedness measures for power outages will raise awareness about the risks of downed power lines and reduce the community's overall vulnerability to power outages.

Ideas for Implementation:

Use brochures and public outreach activities to disseminate information to community members.

Post information on the county's website about the risk of downed power lines and preparedness measures that community members can take in the event of a power outage.

Coordinating Organization:	Curry County Emergency Management

Internal Partners:	External Partners:
Curry County Planning Division	Coos-Curry Electric Cooperative

Potential Funding Sources:	Estimated cost:	Timeline:
		□ Short Term (0-2 years) □ Long Term (2-4+ years) √ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Wind Storm #2

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage utilities to use underground construction methods where possible to reduce loss of service from windstorms.	*Minimize and prevent damage* *Reduce economic losses*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Tree falls during wind or winter storm events can be a risk to overhead power lines. During a wind or winter storm, tree falls have the potential to down overhead power lines, causing electric power failures. Curry County's development code requires that all new subdivisions have underground utilities, however, undergrounding utilities outside of subdivisions and in older subdivisions can reduce the effect of ice loading and tree falls to reduce a community's risk to wind or winter storms, and limit disruptions in service.

Curry County experiences severe wind storm events annually and is vulnerable to windstorm events in the future. The wind/winter storm risk assessment notes that Curry County's probability of a windstorm recurring is high and the county's vulnerability to windstorm events is also high. Undergrounding critical power lines to reduce the effect tree falls can help mitigate a community's risk to wind storms, and limit disruptions in service.

The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on both new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Supporting electrical utilities to use underground construction methods where possible can reduce future power outages from windstorms.

Ideas for Implementation:

Support/encourage Coos-Curry Electric to use underground construction methods outside of new subdivisions and in older subdivisions, or where possible, to reduce power outages from windstorms.

Consider providing incentives to utilities or property owners to underground utilities.

Coordinating Organization:	Coos-Curry Electric

Internal Partners:	**External Partners:**	
Curry County Emergency Services, Curry County Road Department	Other public utilities	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Pre-Disaster Mitigation Funding Hazard Mitigation Grant Funding		□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Multi-Hazard # 1

Proposed Action Item:	**Alignment with Plan Goals:**
Ensure that all critical facilities have backup power and/or emergency operations plans in place to deal with power outages.	*Save lives and reduce injuries* *Minimize and prevent damage*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

After hurricane Katrina, Harrison County Mississippi noted that "It is important that critical facilities function during and after disasters. Local units of government want to insure continuous service by strengthening essential facilities such as fire stations, city halls, shelters, and police stations. In addition, emergency backup generators should be provided to each critical facility." (Harrison County Community Recovery Plan. August 2006. FEMA ESF-14 in support of the state of Mississippi. p. 61) Ensuring that all critical facilities have backup power and emergency operations plans to deal with power outages will assist residents in recovering from a natural disaster as well as make the process easier.

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)]. Ensuring that all critical facilities have backup power and emergency operations plans to deal with power outages will help protect existing buildings and infrastructure and allow for continuous service.

Ideas for Implementation:

Conduct an assessment of critical facilities to determine their priority in an emergency and whether they should have backup generators and emergency operations plans.

Seek funding from Federal and state resources to obtain generators and to develop emergency operations plans

Coordinating Organization:	Curry County Emergency Services

Internal Partners:	**External Partners:**
Curry County Departments	FEMA, Oregon Emergency Management

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Multi-Hazard # 2

Proposed Action Item:	Alignment with Plan Goals:
Develop a voluntary registry of vulnerable populations that may need assistance in an emergency situation.	*Save lives and reduce injuries*

Alignment with Existing Plans/Policies:
Curry County Emergency Operations Plan

Rationale for Proposed Action Item:
According to the Federal Emergency Management Agency 80% of the disaster burden falls on the public.[2] Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities, and low income persons. In 2008, 13% of Curry County's population is between the ages of 0 and 14 and approximately 29% are considered elderly (over 65 years of age). In general, children are more vulnerable to heat and cold, and require assistance to access medical facilities. Elderly individuals may require special consideration due to sensitivities to heat and cold, and reliance upon medications, Addressing the needs of special needs groups through natural hazards mitigation is important to improve their overall resilience to natural hazards.

Ideas for Implementation:
Work with heath care and social service providers to develop a voluntary registry of people who feel they may need assistance in emergency situations. Coordinate efforts with Curry County GIS to develop a map of vulnerable populations that may need special assistance in an emergency.

Coordinating Organization:	Curry County Emergency Services

Internal Partners:	External Partners:
Curry County Public Health	Special-needs populations, health care providers

Potential Funding Sources:	Estimated cost:	Timeline:
		√ Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

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

Multi-Hazard # 3

Proposed Action Item:	**Alignment with Plan Goals:**
Identify and disseminate information regarding alternate transportation routes.	*Save lives and reduce injuries* *Increase education and outreach*

Alignment with Existing Plans/Policies:
Curry County Emergency Operations Plan

Rationale for Proposed Action Item:
Flood, earthquake, tsunami, wind storms, landslides, or wildfire could disrupt transportation routes throughout the county, especially Highway 101 which is the primary highway through Curry County. Identifying alternate transportation routes and disseminating information to the public about these routes can facilitate evacuation efforts and prevent loss of life to natural hazard events.

Ideas for Implementation:
Identify alternate transportation routes in coordination with the County Sheriff, local Fire Departments, and ODOT. Map alternative transportation routes using GIS software

Coordinating Organization:	Curry County Roads

Internal Partners:	**External Partners:**
Curry County Emergency Services	Forest Service, ODOT, DOGAMI, Curry County Aviation

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		√ Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**Deferred action from 2005 Plan, originally Wildfire Action # 1, but changed into a multi-hazard action.**

Multi-Hazard # 4

Proposed Action Item:	**Alignment with Plan Goals:**
Further develop risk assessment maps to show areas at risk for all hazards.	*Save lives and reduce injuries* *Minimize and prevent damage*

Alignment with Existing Plans/Policies:

Curry County Comprehensive Plan, Curry County Development Code

Rationale for Proposed Action Item:

Developing risk assessment maps that show areas at risk for all hazards can improve land use planning efforts in Curry County and can prevent future damage to property caused by natural hazard events. Rural areas in Curry County are experiencing growth and some of these areas have not been adequately mapped. The Department of Geology and Mineral Industries (DOGAMI) is currently developing new maps using Light Detection and Ranging (LIDAR) data that can show areas at risk to landslides tsunamis, and floods. When they are available, these hazard inventories should be incorporated into the zoning and land development ordinance. Developing risk assessment maps using the latest hazard data that show areas at risk for all hazards can prevent future damage to buildings and infrastructure.

The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new buildings and infrastructure [201.6(c)(3)(ii)]. Developing risk assessment maps showing the hazard risk for all hazards can reduce the impact to new buildings and infrastructure.

Ideas for Implementation:

Coordinate with the Department of Geologic and Mineral Industries (DOGAMI), the Federal Emergency Management Agency (FEMA), and Oregon Emergency Management (OEM) to develop and update risk assessment maps for Curry County.

Coordinating Organization:	Curry County Commissioners

Internal Partners:	**External Partners:**
Curry County Road Department, Curry Emergency Services	DOGAMI, FEMA, OEM

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		√ Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**Deferred from 2005 NHMP, originally Landslide Action # 1 but modified to address multiple natural hazards. Action reworded for 2010 update.**

Multi-Hazard # 5

Proposed Action Item:	**Alignment with Plan Goals:**
Establish mutual aid agreements between government agencies and commercial businesses in the event of an emergency (e.g. fuel, heavy equipment, food, etc.)	*Increase cooperation and coordination* *Save lives and reduce injuries* *Reduce economic losses*

Alignment with Existing Plans/Policies:
Curry County Emergency Operations Plan

Rationale for Proposed Action Item:
Mutual aid agreements and assistance agreements are agreements between agencies, organizations, and jurisdictions that provide a mechanism to quickly obtain emergency assistance in the form of personnel, equipment, materials, and other associated services. The primary objective is to facilitate rapid, short-term deployment of emergency support prior to, during, and after an incident. (Source: FEMA NIMS Resource Center) Developing formal agreements with internal and external partners could assist the partners in collaborating and sharing the responsibility of natural hazard mitigation. Such actions to form collaborative partnerships and commitments to mitigation can assist the city in reducing its risk to the natural hazards addressed by the Natural Hazards Mitigation Plan.

Ideas for Implementation:
Identify and pursue MOUs with potential external partners such as non-profit organizations or state and federal agencies that may be able to assist in implementing pre-disaster mitigation activities. Renew MOUs for each calendar year so that they can be updated to reflect the changing needs and conditions of the community and internal and external partners; have both internal and external partners resign the updated MOUs each calendar year. Develop a continuity of operations plan for city functions. Identify opportunities for mutual-aid where needed.

Coordinating Organization:	Curry County Emergency Services

Internal Partners:	**External Partners:**
Curry County Road Department, Curry County Sheriff's Department, Curry Board of Commissioners	Local businesses, FEMA, OEM

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
	none	□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Multi-Hazard # 6

Proposed Action Item:	Alignment with Plan Goals:
Encourage citizens to prepare and maintain provisions for one week without services.	*Save lives and reduce injuries* *Increase education and outreach*

Alignment with Existing Plans/Policies:

Curry County Emergency Operations Plan

Rationale for Proposed Action Item:

Given the importance of Highway 101 to Curry County and its proximity to numerous potential hazards, in the event of a catastrophic disaster it is likely that many residents of Curry County will be cut-off from their regular transportation and food systems. By encouraging citizens to prepare and maintain provisions for one week without services will increase the resiliency of community members to natural hazard events.

The Disaster Mitigation Act of 2000 requires that communities continue to involve the public beyond the original planning process [201.6(c)(4)(ii)]. Developing public education programs for hazard risk mitigation and preparedness would be a way to keep the public informed of, and involved in, the county's actions to mitigate and prepare for hazards.

Ideas for Implementation:

Provide educational material and examples of how to assemble the necessary provisions to residents of the city and employees. Outreach and awareness campaigns need to be carefully organized and developed to ensure that residents receive critical information. Information can be disseminated through the city's website or in the local newspaper. Involving the local chambers of commerce can also help to reach out to businesses

Coordinating Organization:	Curry County Emergency Services

Internal Partners:	External Partners:
CERT, Curry County Sheriff, Curry County Board of Commissioners	DOGAMI, FEMA, OEM, hospitals

Potential Funding Sources:	Estimated cost:	Timeline:
		□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Multi-Hazard # 7

Proposed Action Item:	**Alignment with Plan Goals:**
Support efforts to create a post-disaster redevelopment plan for Curry County.	*Save lives and reduce injuries* *Reduce economic losses* *Increase cooperation and coordination*

Alignment with Existing Plans/Policies:

Curry County Development Code

Rationale for Proposed Action Item:

Curry County is currently in the process of developing a post-disaster recovery plan (effort started in the fall of 2009). Developing a post-disaster recovery plan will improve the county's resilience to natural hazards (i.e. the ability to survive future natural disasters with minimum loss of life and property).

Decisions taken in the heat of the emergency period immediately following a disaster often compromise significant opportunities to rebuild a safer community for the future. The pressure exerted by residents and property owners to have their disaster-stricken community rebuilt to its pre-disaster form and condition as quickly as possible remains a powerful factor in local, state, and federal emergency management to this day. There are ways to restrain such pressures and maintain mitigation and other post-disaster goals as high priorities during the process of long-term reconstruction even as the ashes, the rubble, and the water are receding or being cleared away. The secret lies in identifying in advance those decisions that will need to be made after a disaster that are most likely to have long-term repercussions for hazard mitigation.

Pre-disaster and post-disaster mitigation should be two parts of a seamless whole in a sound plan for post-disaster recovery and reconstruction. The only difference is one of scale, of accelerating the pace with which existing mitigation plans are implemented, as a result of the influx of outside assistance. What is important about planning for post-disaster hazard mitigation is that the additional resources that facilitate hazard mitigation in the aftermath of a disaster do not materialize by accident. Local governments manage to secure such resources in large part because they have planned to do so. (Source: FEMA, "Policies for Guiding Planning for Post-Disaster Recovery and Reconstruction")

Ideas for Implementation:

Support efforts currently underway to develop a post-disaster recovery plan.

Designate a recovery management team that is empowered to monitor the process and implement the community's post-disaster recovery policies. This team should also serve as the post-disaster recovery planning team, and can/should include persons involved in pre-disaster mitigation planning efforts. Involve a wide range of stakeholders and community leaders/volunteers. Discuss post-disaster recovery planning at future mitigation plan meetings.

Coordinating Organization:	Curry County Board of Commissioners

Internal Partners:	**External Partners:**	
All county departments	Fire Department, Sheriff Department, cities, Oregon Partnership for Disaster Resilience	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Department of Homeland Security		√ Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Multi-Hazard # 8

Proposed Action Item:	Alignment with Plan Goals:
Continue the development of Citizens Corps Programs to ease the load on emergency services following a disaster.	*Increase cooperation and coordination* *Increase education and outreach*

Alignment with Existing Plans/Policies:

Curry County Emergency Operations Plan

Rationale for Proposed Action Item:

Citizen Corps was created to help coordinate volunteer activities that will make communities safer, stronger, and better prepared to respond to any emergency situation. It provides opportunities for people to participate in a range of measures to make their families, their homes, and their communities safer from the threats of crime, terrorism, and disasters of all kinds. Citizen Corps programs build on the successful efforts that are in place in many communities to prevent crime (Neighborhood Watch) and respond to emergencies (CERT). Citizen Corps is coordinated nationally by the Department of Homeland Security's Federal Emergency Management Agency. In this capacity, FEMA works closely with other federal entities, state and local governments, first responders and emergency managers, the volunteer community, and the Corporation for National & Community Service. Continuing the development of Citizens Corps Programs can ease the load on emergency services following a disaster.

The Disaster Mitigation Act of 2000 requires communities to identify how the community will continue to involve the public in the plan maintenance process [201.6(c)(4)(iii)]. Continuing the development of Citizens Corps Programs in Curry County is a potential outreach tool to educate the public and keep them informed of what is being done in regards to mitigation, response, and recovery.

Ideas for Implementation:

Seek funding to continue the development of Citizen Corps Programs.

Distribute information about Citizens Corps Programs through the county's website, and post public announcements in the local newspaper and cable TV channel.

Coordinating Organization:	Curry County Emergency Services

Internal Partners:	External Partners:	
Curry County Police Departments, Fire Departments	Local residents, Curry County Citizens for Emergency Preparedness, Cities	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		√ Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Multi-Hazard # 9

Proposed Action Item:	**Alignment with Plan Goals:**
Educate and encourage businesses, schools, and governmental organizations to develop continuity of operations plans.	*Minimize and prevent damage* *Reduce economic losses* *Increase education and outreach*

Alignment with Existing Plans/Policies:

Curry County Emergency Operations Plan

Rationale for Proposed Action Item:

It is important for Curry County businesses, schools and governmental organizations to stay open for both economic and societal benefits. In particular, the retail, fishing, timber and hospitality industries are some of the most important in Curry County.

Research conducted by Richard Wilson has shown that staff turnover is likely to occur after a disaster. Veteran staff is critical after a disaster. It is important to prevent turnover so that existing personnel do not have to take on extra responsibilities during an already stressful time. Continuity planning can also help lessen turnover by ensuring competitive salaries and benefits and by reducing the amount of stress that staff will have to endure.

The Disaster Mitigation Act of 2000 requires communities to develop actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Educating businesses, schools and governmental organizations about the importance of developing continuity of operations plans can encourage the development of plans and make businesses and governmental organizations more resilient to natural hazards.

Ideas for Implementation:

Place links to business continuity best practices on the Curry County Emergency Services website for easy access.

For governmental organizations, research and review completed continuity of operations plans (COOPs) to provide a foundation of expected content and issues to review. The COOP should ensure shelter housing for critical staff and family members such as city officials, public works employees, emergency response, and others.

Assess and prioritize critical positions and resources vital to the continuance of important County functions.

Incorporate government COOP into the existing Emergency Operations Plans where applicable.

Coordinating Organization:	Curry County Emergency Management

Internal Partners:	**External Partners:**
All county departments	FEMA, OEM, Cities, Chambers of Commerce

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		√ Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Multi-Hazard # 10

Proposed Action Item:	Alignment with Plan Goals:
Develop back-up systems for county records.	*Minimize and prevent damage*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

County records are pivotal in ensuring Curry County or any county can conduct the county's business. Without a back-up system for those records, it leaves the county vulnerable to data loss in the event of a natural disaster.

After hurricane Katrina, Harrison County Mississippi noted that "It is important that critical facilities function during and after disasters. Local units of government want to ensure continuous service by strengthening essential facilities such as fire stations, city halls, shelters, and police stations."[3] Ensuring that Curry County has a backup system for its records will assist in the county's recovery from a natural disaster and assist in continuing to provide essential county services.

The Disaster Mitigation Act of 2000 requires communities to develop actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Developing a back-up system for county records would reduce the impact and loss of government continuity.

Ideas for Implementation:

Determine what system or systems (electronic or otherwise) would be most beneficial in helping Curry County back-up county records.

Coordinating Organization:	Curry County Commissioners

Internal Partners:	External Partners:	
GIS, Planning Division, Curry County Emergency Services	Cities, OEM	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action 2010**

[3] Source: Harrison County Community Recovery Plan. August 2006. FEMA ESF-14 in support of the state of Mississippi. p. 61.

Multi-Hazard # 11

Proposed Action Item:	Alignment with Plan Goals:
Incorporate the natural hazards mitigation plan into the Curry County Comprehensive Plan.	*Save lives and reduce injuries* *Minimize and prevent damage* *Increase education and outreach* *Increase cooperation and coordination*

Alignment with Existing Plans/Policies:

Curry County Comprehensive Plan, Curry County Zoning Ordinance

Rationale for Proposed Action Item:

Goal 7 requires every local comprehensive plan to include an inventory of natural hazards within the jurisdiction of the community and to enact plan policies and implementing ordinances to direct development away from or otherwise safeguard it from the risks posed by future hazard events. Several other state goals (2, 5, 17 and 18) also contain provisions pertaining to natural hazards. New risk assessment information continually becomes available. The county believes it is important to update their Comprehensive Plan as needed to reflect new hazard information.

The goals of mitigation planning closely mirror and advance many of the underlying objectives of sound land use planning in guiding the current and future development of the community and meeting the physical, economic, social and environmental interests of its residents. The importance of linking mitigation and land use planning is recognized in the federal Disaster Mitigation Act of 2000 (DMA2K) which requires communities to incorporate natural hazard mitigation into existing plans and policies. A periodic review of the appropriate planning documents to integrate new risk assessment information would help to integrate natural hazard mitigation into more routine tasks.

Ideas for Implementation:

Review latest vulnerability assessment and policies addressing natural hazards. The county's vulnerability assessments highlight earthquakes, landslides, coastal erosion, wildfire, tsunamis, and severe windstorms as the natural hazards most likely to create severe impacts within the community (in terms of population and/or resources affected). Implement mitigation actions that depend upon land use plans, policies and regulations to regulate the design, location, intensity, type and impact of development in hazardous areas.

Amend comprehensive plans, policies and implementation strategies to reflect future development in seismic and tsunami hazard areas, if needed. Enact policies and implementing ordinances to direct development away from hazardous areas.

Coordinating Organization:	Curry County Planning Division

Internal Partners:	External Partners:	
County Commission, Planning Commission	DLCD, FEMA	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		□ Short Term (0-2 years) □ Long Term (2-4+ years) √ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**Action item continued from the 2005 NHMP and was originally Short Term Earthquake and Tsunami Action # 1. Action has been reworded to address incorporating information from multiple hazards into the Curry County Comprehensive Plan.**

Multi-Hazard # 12

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage special districts (including ports) to develop addenda to the Curry County Natural Hazards Mitigation Plan.	*Increase cooperation and coordination* *Minimize and prevent damage*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Special districts are important parts of Curry County. They provide critical services to the public. By encouraging the special districts (ports included) to become involved in the Curry County Natural Hazard Mitigation Plan by creating addenda, all of Curry County is made less vulnerable to natural hazard events.

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)]. Special districts creating addenda would help protect future and existing buildings and infrastructure from all natural hazards affecting the county.

Ideas for Implementation:

Contact special districts during when the 2010 Curry County Natural Hazard Mitigation Plan needs to be updated in 2015 and explain the potential benefits to them if they create addenda to the plan.

Coordinating Organization:	Curry County Commissioners

Internal Partners:	**External Partners:**
Curry County Emergency Services	Special districts

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Pre-Disaster Mitigation Funding		□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**Action item continued from 2005 NHMP because it has only been partially completed due to a lack of resources. Action item originally Flood & Winter Storm # 2. Action has been reworded to address multiple districts in addition to the ports that may require strategies to mitigate future hazard impacts.**

Multi-Hazard # 13

Proposed Action Item:	**Alignment with Plan Goals:**
Identify Red Cross shelters that are seismically sound, and retrofit existing shelters.	*Save lives and reduce injuries* *Minimize and prevent damage*

Alignment with Existing Plans/Policies:

Curry County Emergency Operations Plan

Rationale for Proposed Action Item:

Red Cross shelters are important after a catastrophic disaster. In the event of a natural hazard emergency, residents as well as vulnerable populations, such as the very young, the elderly, and tourists, may need to seek shelter. The elderly, the very young, and tourists that visit the county are particularly vulnerable because they may require special accommodations. Identifying the Red Cross shelters that are seismically sound and retrofitting existing shelters will ensure that shelters are available to the public in the event of a natural disaster.

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)]. Seismically retrofitting existing shelters would help protect future and existing buildings and infrastructure.

Ideas for Implementation:

Determine the current seismic stability of existing Red Cross shelters, and pursue funding for seismic retrofits to any building found seismically unsound.

Coordinate efforts with the police and fire stations and schools.

Coordinating Organization:	Red Cross

Internal Partners:	**External Partners:**	
Curry County Emergency Services, Police, Fire	Schools, OEM, FEMA	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
State seismic rehabilitation program Pre-Disaster Mitigation Program Hazard Mitigation Grant Program		□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New Action (2010)**

Multi-Hazard # 14

Proposed Action Item:	**Alignment with Plan Goals:**
Explore developing a redundant utility system to supply Curry County with continuous service.	*Minimize and prevent damage* *Increase cooperation and coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Only one power line from the north supplies power to all of Curry County, making the county vulnerable to widespread power outages in the event of a disaster. In the event of a large-scale natural disaster, it is possible and even likely that Curry County would be without power for an extended period of time. Exploring the possibility of a redundant power supply will help ensure continuous service in the county.

The Disaster Mitigation Act of 2000 requires communities to develop actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Developing a redundant utility system for Curry County would help reduce the impact of natural disasters.

Ideas for Implementation:

Determine the Curry County's electrical need and whether or not it would be feasible to provide that energy by developing a redundant utility system.

Coordinate efforts with Coos-Curry Electric and other utility providers to the south.

Coordinating Organization:	Curry County Commission	
Internal Partners:	**External Partners:**	
Curry County Economic Development, Curry County Emergency Services	Coos-Curry Electric, other utility providers	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing
Form Submitted by:	Curry County Steering Committee	
Action Item Status:	**New Action (2010)**	

Multi-Hazard # 15

Proposed Action Item:	Alignment with Plan Goals:
Develop a multi-hazard public education campaign targeted to residents and tourists about the natural hazards Curry County is vulnerable to and mitigation measures they can implement.	*Save lives and reduce injuries* *Minimize and prevent damage* *Increase cooperation and coordination* *Increase education and outreach*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Developing educational campaigns to conduct education and outreach efforts regarding natural hazards can improve Curry County's resiliency to natural hazard events.

The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. By educating residents and tourists about natural hazards in Curry County, they are then empowered to make intelligent choices about their own homes, businesses and behaviors.

Ideas for Implementation:

Educate residents and tourists about the earthquake and tsunami risks. Post information in well-traveled areas, including restaurants, hotels, parks, and campgrounds.
Continue wildfire education & outreach activities during wildfire season (fall).
Target tsunami education & outreach to the following populations residing in the tsunami-inundation zone: persons 65 years of age and older; singer-mother households; and renters.
Develop education & outreach activities to occur during earthquake awareness month (April).
Evaluate feasibility and applicability of a standardized siren system in beach residential and recreational areas.
Assess the placement of tsunami warning signs throughout the coastal communities and Highway 101 corridor.
Provide fire safety and fire prevention information pamphlets in easy to read and understandable formats.
Target areas frequented by tourists such as motels, RV parks, community and state parks, restaurants, real estate offices, and the chamber of commerce. Provide these areas with kiosks for display of information if necessary.
Establish weekly fire prevention articles in local print media during fire season.

Coordinating Organization:	Curry County Emergency Services

Internal Partners:	External Partners:
Planning Division, Police, Fire	Coos Forest Protective Association, Community Wildfire Protection Team, DOGAMI, FEMA, OEM

Potential Funding Sources:	Estimated cost:	Timeline:
		□ Short Term (0-2 years) □ Long Term (2-4+ years) √ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**Continued action from 2005 NHMP. Originally Short Term Wildfire Action # 2 and Short Term Earthquake Action # 2. Action item has been reworded to address multiple hazards.**

Multi-Hazard # 16

Proposed Action Item:	**Alignment with Plan Goals:**
Complete a risk analysis for the hazards addressed in this plan, when information is available, to estimate potential loss of life and damage to property.	*Minimize and prevent damage* *Reduce economic losses*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

A 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. Hazards US (HAZUS) is a risk assessment software program for analyzing potential losses from floods, hurricane winds and earthquakes and can assist communities in completing the risk analysis phase. In HAZUS-MH current scientific and engineering knowledge is coupled with the latest geographic information systems (GIS) technology to produce estimates of hazard-related damage before, or after a disaster occurs. Completing a risk analysis with available data for the hazards listed in this plan can help Curry County in prioritizing areas for natural hazards mitigation.

The Disaster Mitigation Act of 2000 recommends that communities estimate the potential dollar losses to vulnerable structures. [201.6(c)(2)(ii)(B)]. Completing a risk analysis for hazards addressed in this plan will provide Curry County with an estimate of the potential effects impacts of a hazard event.

Ideas for Implementation:

Order the HAZUS-MH software free of charge from the FEMA Publication Warehouse. Information can be found at http://www.fema.gov/plan/prevent/hazus/index.shtm. Federal, State, and local government agencies and the private sector can order this information.

Coordinate efforts to complete a risk analysis with the Department of Geology and Mineral Industries (DOGAMI) who has used HAZUS-MH software for several counties and cities across Oregon.

Use the results from the HAZUS software to update Curry County's vulnerability assessment and develop appropriate mitigation actions as needed.

Coordinating Organization:	Curry County GIS

Internal Partners:	**External Partners:**
Emergency Services, Planning Division, Road Department	DOGAMI, OEM, FEMA

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New action (2010)**

Plan Implementation Action Item # 1

Proposed Action Item:	**Alignment with Plan Goals:**
Consider adopting the South Coast Emergency Management Advisory Committee as the coordinating body for the Curry County Natural Hazards Mitigation Plan.	*Increase cooperation and coordination*

Alignment with Existing Plans/Policies:

South Coast Emergency Management Advisory Committee Bylaws (2004)

Rationale for Proposed Action Item:

In 2004, Coos and Curry Counties created the South Coast Emergency Management Advisory Committee (SCEMAC) which advises Coos and Curry County and city governments about their emergency management programs. To avoid duplicating activities between the mitigation plan's coordinating body and SCEMAC, the coordinating body should consider adopting SCEMAC as the coordinating body for the mitigation plan if it so chooses and if it improves the ability of the counties to implement local mitigation actions.

Ideas for Implementation:

Review the activities of the mitigation plan's coordinating body and the SCEMAC to determine if activities are being duplicated.

If efficiencies can be obtained, revise the SCEMAC bylaws and Section 4 of the Curry County Natural Hazards Mitigation Plan to make SCEMAC the mitigation plan's coordinating body.

Coordinating Organization:	Mitigation Plan Coordinating Body

Internal Partners:	**External Partners:**
Curry County Emergency Services	Coos County, SCEMAC members

Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		√ Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Curry County Steering Committee
Action Item Status:	**New action (2010)**

Appendix B:
Planning and Public Process

Table of Contents

2010 Mitigation Plan Update

Memo

To: Federal Emergency Management Agency (FEMA)

From: Oregon Partnership for Disaster Resilience

Date: May 21, 2010

Re: **List of changes to the 2005 Curry County NHMP for the 2010 Plan Update**

Purpose

This memo describes the changes made to the 2005 Curry County Natural Hazards Mitigation Plan (NHMP) during the 2010 plan update process. Major changes are documented by plan section.

Project Background

In November 2009, Curry County partnered with the Oregon Partnership for Disaster Resilience (OPDR) to update the 2005 Curry County Natural Hazards Mitigation Plan. 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 Mitigation Grant Program (HMGP) funding. OPDR met with members of the Curry County Steering Committee (Committee) in February and March to update the county's risk assessment, discuss the plan goals and action items in the 2005 NHMP, develop new goals and actions items for the 2010 update, and review all changes made for the 2010 update prior to submittal to FEMA.

OPDR and the Committee made several major changes to the 2005 NHMP. The major changes are documented and summarized in this memo for each section of the mitigation plan.

2010 Plan Update Changes

The sections below only discuss *major* changes made to the 2005 Curry County NHMP during the 2010 plan update process. Major changes include 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 changed significantly to fit within OPDR's plan templates. Table B1 below lists the 2005 plan section names and the corresponding 2010 section names, as updated. This memo will use the 2010 plan update section names to reference any changes, additions, or deletions within the plan.

Table B1. 2005 and 2010 Plan Sections

2005 Curry County NHMP	2010 Curry County NHMP
Section 1: Executive Summary Promulgation Letter	Section 1: Introduction Section 3: Mission, Goals and Actions Section 4: Plan Implementation and Maintenance Appendix C: Economic Analysis of Natural Hazard Mitigation Projects
Section 2: Community Profile	Section 2: Community Overview
Section 3.1: Wildfire	Hazard Annex: Wildfire
Section 3.2: Flooding & Severe Winter Storms	Hazard Annex: Flood Hazard Annex: Wind Storm
Section 3.3: Landslide	Hazard Annex: Landslide
Section 3.4: Earthquake & Tsunami	Hazard Annex: Earthquake Hazard Annex: Tsunami
Appendix A: Individual Community Actions	Volume III: City Addenda
Appendix B: Bibliography	Deleted, references incorporated into each section
Appendix C: Hazard Analysis Summary	Deleted, hazard analysis incorporated into hazard annexes
Appendix D: Comprehensive Plan Maps	Deleted, hazard maps incorporated into relevant hazard annexes.

The 2010 Curry County NHMP also added several new sections. The Committee added two new hazards, coastal erosion and drought to maintain consistency with the State of Oregon Natural Hazards Mitigation Plan Region 1 Risk Assessment. The 2010 NHMP also includes the following additional appendices:

- Appendix A: Action Items
- Appendix B: Public Process
- Appendix D: Regional Household Preparedness Survey
- Appendix E: Grant Programs

Cover Page and Acknowledgements

1. The Cover Page for the Curry County NHMP has been revised to include 2010 update information and the agencies involved in developing the plan update.

2. The Acknowledgements section now lists 2010 participants, rather than 2005 participants.

Volume I

Volume I provides the overall plan framework for the 2010 NHMP update. Volume I contains the following sections: 1) Introduction; 2) Community Overview; 3) Mission, Goals, and Action Items; and 4) Plan Implementation and Maintenance.

Section 1: Introduction
Section 1 includes an introduction and purpose for the plan, summarizes the process for developing the 2005 NHMP and the 2010 update, and provides an overview of the entire plan. The major changes in Section 1 include the following:

1. Most of Section 1 includes new information added by OPDR and replaces out of date text found in the 2005 NHMP. The new text defines mitigation, gives examples of mitigation strategies, and lists federal programs that communities with FEMA-approved mitigation plans are eligible for. These programs include the Pre-Disaster Mitigation (PDM) Program, the Flood Mitigation Assistance (FMA) Program, and the Hazard Mitigation Grant Program (HMGP).

2. Section 1 of the 2005 plan included information that was moved to other sections in the 2010 update. Information about mission, goals, and actions was moved to Section 3: Mission, Goals, and Actions. Information about plan implementation and maintenance moved to Section 4: Plan Implementation and Maintenance. Information about conducting economic analysis and cost benefit analysis was moved to Appendix C and Section 4: Plan Implementation and Maintenance.

3. New text was added about the planning process for the 2010 Plan Update.

4. The planning process for the 2005 NHMP was summarized for the 2010 NHMP, and the details of each meeting placed in this memo. The complete planning and public involvement process for the 2005 NHMP is summarized as follows:

2005 Plan Development Process

In 2003, Curry County hired the President of Diversified Safety Management to develop the Curry County Natural Hazards Mitigation Plan. Diversified Safety Management served as the project lead, facilitating local steering committee meetings and public workshops and writing the mitigation plan. Mike Murphy, Curry County Emergency Services Coordinator, assisted Diversified Safety Management by identifying local steering committee members and coordinating committee meetings and workshops. Diversified Safety Management developed the mitigation plan with assistance from the Oregon Natural Hazards Workgroup, who provided a series of plan development trainings between September 2003 and January 2004. Diversified Safety Management used information from these trainings to structure the plan development process, which covered the following topics:

1. *Organizing the community;*
2. *Identifying natural hazards, local vulnerabilities, goals and action items;*
3. *Finalizing the mitigation plan; and*
4. *Public involvement.*

Organizing the Community

On July 29, 2003, Diversified Safety Management and Curry County Emergency Management held a kickoff meeting in Gold Beach to provide a basic introduction to the natural hazard mitigation planning process and provide an overview of the project. Local government representatives from the county, the incorporated cities, and special districts were invited to attend. Topics discussed included: (1) the benefits of developing a natural hazards mitigation plan; (2) planning process to be followed that will incorporate the cities; (2) identifying which natural hazards impact the infrastructure and people in the county; (3) current mitigation planning projects; and (4) current priorities for natural hazards mitigation. This meeting resulted in an identification of critical infrastructure mitigation projects jurisdictions are completing and any plans/policies that address natural hazards mitigation. Various stakeholders agreed to host future steering committee meetings in their communities to become more familiar with their partners.

Identifying Natural Hazards, Community Vulnerabilities, and Goals and Actions

Diversified Safety Management and Curry County Emergency Management held five meetings between August 2003 and December 2003 with the plan development steering committee to identify local natural hazards. Meetings were held on August 38 (ODOT-Hunter Creek Office), September 25 (Brookings), October 29 (in Port Orford), November 19 (in Gold Beach), and December 10 (in Brookings). During these meetings, the steering committee identified the local hazards (landslides, wildfire, flood, and winter storms), their location and extent, damage information, community vulnerabilities, and preliminary action items and mitigation plan goals. Information from these meetings was used by Diversified Safety Management to develop the local risk assessments and action items.

On March 31, 2004, Diversified Safety Management held an interview with the Harbormaster of the Port of Gold Beach to discuss the impact of winter storms on Curry County and the deterioration of the jetty at Gold Beach.

Finalizing the Mitigation Plan

Diversified Safety Management and Curry County Emergency Management held a steering committee meeting on May 26, 2004 to finalize the mitigation plan. First drafts of the plan were given to attendees for review and attendees further refined the plan's action items. In June, Diversified Safety Management incorporated recommendations from committee members, finalized the document, and submitted the plan to Oregon Emergency Management and the Federal Emergency Management Agency (FEMA) for final review. Curry County received formal approval of its mitigation plan on August 8, 2005.

Public Involvement

Diversified Safety Management and Curry County Emergency Management involved the public during the planning process through a number of strategies. Throughout the plan development process, the public was able to attend local steering committee meetings which were held once a month except in April 2004. A variety of public agencies, citizens, non-profit organizations, businesses, and industry groups attended steering committee meetings to help define the goals of the plan and refine the action items for reducing risk and preventing loss from natural hazards.

On February 18, 2004, the city of Port Orford and Diversified Safety Management held a public meeting to discuss a dune breach on Garrison Lake and potential solutions to the problem. In 1998, a storm surge breached a critical dune that separated the Pacific Ocean from the freshwater Garrison Lake, endangering Port Orford's wastewater treatment plant, homes located along the lake, and a source of drinking water for the city. The breach also endangered wildlife in the lake. Approximately 100 people attended the meeting, and it included representatives from the Curry County Commission, Oregon Department of Fish and Wildlife, Oregon State Parks, Confederated Tribes, Curry County Emergency Management, and the Department of Environmental Quality. Two contractors discussed the issue and options to solve the problem which included:

1) *Dredge the lake and use the sand to rebuild the dune; and*
2) *Let the dune rebuild itself naturally which would take time, and could continue to endanger the community surrounding the lake.*

No decisions were made at this meeting, but it was used to provide information and gather input on potential solutions.

Finally, Diversified Safety Management conducted a presentation during the March 31, 2004 Curry County Commission meeting to explain the purpose of the Natural Hazards Mitigation Plan and the natural hazards issues it addressed. This meeting was open to the public.

Section 2: Community Overview

Section 2 describes the community in a variety of ways. This section highlights demographic, employment, housing, transportation, and land use characteristics. Changes to this section include:

1. Demographic, employment, housing, transportation, and land use information was updated to incorporate the latest information.

2. The 2005 plan included 18 pages about the history of Curry County, its geology, and its waterways; however, much of this information was considered to be irrelevant to the mitigation plan. Irrelevant information was deleted, and useful information was incorporated in the 2010 update.

3. The 2010 plan now includes information about Curry County's government structure, existing plans, and organizations that could assist with implementing natural hazard mitigation strategies.

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.

1. The Committee reviewed the 2005 mitigation plan's mission statement and goals and agreed to replace them with the mission and goal statements currently identified in Section 3.

   The 2005 NHMP mission statement read as follows:

   The mission of the Plan is to promote sound public policy and practices designed to protect citizens, critical facilities, infrastructure, private property, the environment and delicate ecosystems from natural hazards. This can be accomplished by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities. The Plan serves as a guide to the county and each community toward building safer more resilient communities.

   The 2005 mitigation plan goals read as follows:

   Protect Life and Property

   - *Explore and implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to natural hazards.*
   - *Identify high impact areas affected by natural hazards through past events, to determine future projections.*
   - *Provide overall direction for the participating cities, special districts and residents in planning short and long term goals for mitigation measures.*
   - *Define risk reduction plans.*

   Public Awareness

   - *Develop public awareness through public education programs.*
   - *Provide information on preparedness and increase public awareness of the risks associated with natural hazards.*

   Natural Systems

   - *Balance hazard reduction measures with natural resource management.*
   - *Determine rehabilitative measures to preserve natural systems and the environment.*

   Emergency Services

   - *Ensure mitigation projects and policies for critical facilties, services and infrastructure.*

- *Coordinate natural hazard mitigation activities with emergency operations plans and procedures.*

Partnerships and Implementation

- *Establish communication and coordination among public agencies, citizens, non-profit organizations, businesses, and industry.*
- *Coordinate partnerships within public and private sector organizations to identify, prioritize and implement action items between local and county governments, and to implement mitigation activities.*

2. New text was added to reflect the structure of OPDR's action item forms.

3. At the March 16, 2010 plan update meeting, the Committee reviewed each mitigation action item found in the 2005 plan and determined whether they had been completed or not completed and whether any of the action items should be continued (deferred) in the 2010 update or deleted. The steering committee also discussed new action items for the 2010 update. The new list of action items, which includes deferred action items, can be found in Appendix A of this plan.

   The 2005 mitigation plan actions and their status are listed below:

Wildfire #1 Long Term:

<table>
<tr><th colspan="2">Proposed Action Item:</th><th>Alignment with Plan Goals:</th></tr>
<tr><td colspan="2">Identify and map all roads, private drives, logging trails to increase the ability of firefighters to locate and gain access to provide service and/or evacuations.</td><td>Emergency Services, Partnerships and Implementation</td></tr>
<tr><th colspan="3">Ideas for Implementation:</th></tr>
<tr><td colspan="3">• Explore fire agencies using GPS for pre arrival response planning and mapping.
• Seek funding for countywide GPS for mapping purposes.
• Partner with logging companies to compare road and trailmaps.
• Create current road and trail maps of region.
• Share information gained through this process with all county emergency response agencies, 9-1-1 PSAP and secondary PSAP's, and emergency medical responders.</td></tr>
<tr><td colspan="2">Coordinating Organization:</td><td>Natural Hazard Mitigation Committee
Oregon Department of Forestry
Coos Forest Protective Association
U.S. Forest Service
Industrial Partners, (logging companies)
BLM</td></tr>
<tr><th>Timeline:</th><th colspan="2">Action Item Status:</th></tr>
<tr><td>2 – 5 years</td><td colspan="2">Action item partially completed. The Curry County CWPP currently addresses this action item. Due to the ongoing nature of this action, and it's applicability to multiple hazards, the action item is being continued as multi-hazard action # 3 and reworded for the 2010 NHMP update.</td></tr>
</table>

Wildfire #2 Short Term:

Proposed Action Item:	**Alignment with Plan Goals:**
Public Education Program enhancing existing programs. Program to target residents, tourists enjoying area sport fishing and hunting in wildland areas through multi agency coordination including local industry.	Protect Life and Property, Public Awareness

Ideas for Implementation:

- Provide fire safety and fire prevention information pamphlets in easy to read and understand format.
- Target areas frequented by tourists such as motels, RV parks, Community and state parks, restaurants, real estate offices, and chamber of commerce for local cities.
- Provide these areas with kiosks for display of information if necessary.
- Provide information to schools and colleges in the area.
- Provide informational videos for local government access TV as well as local TV Stations.
- Establish weekly fire prevention articles in local print media during fire season.

Coordinating Organization:	Natural Hazard Mitigation Committee Oregon Department of Forestry Coos Forest Protective Association U.S. Forest Service

Timeline:	**Action Item Status:**
2 Years	Action item is ongoing. Due to the ongoing nature of this action, and it's applicability to multiple hazards, the action item is being continued as multi-hazard action # 15 and reworded for the 2010 NHMP update.

Wildfire # 3 Short Term:

Proposed Action Item:	**Alignment with Plan Goals:**
Through multi agency coordination, develop an abatement plan for control of Noxious Weeds, specifically Gorse, Scotch Broom and Butterfly Brush.	Protect Life and Property Partnerships and Implementation

Ideas for Implementation:

- Develop a map of gorse infested areas to be targeted.
- Collaboratively determine the best strategy for controlling the spread of gorse.
- Seek funding to replace cutters that can no longer be repaired due to age and the unavailability of replacement parts for use to cut back noxious weeds.
- Explore funding options to procure herbicides for noxious weed mitigation.

Coordinating Organization:	Natural Hazard Mitigation Committee Oregon Department of Forestry Coos Forest Protective Association U.S. Forest Service

Timeline:	**Action Item Status:**
1-2 Years	Action Item completed but ongoing due to the widespread prevalence of noxious weeds such as gorse and scotch broom. Action item is being deleted from the 2010 NHMP because it is currently addressed in the Curry County CWPP.

Flooding & Winter Storm Short Term # 1

Proposed Action Item:	**Alignment with Plan Goals:**
Review current County and City Building and Land Use Ordinances to assess current applicability and feasibility, and identify mitigation options.	Protect Life and Property Partnerships and Implementation
Ideas for Implementation:	
• Identify appropriate and feasible mitigation activities for identified repetitive flood properties. • Locate and identify 'non insured' repetitive loss properties and contact property owners to determine interest in mitigation activities. • Contact insured repetitive loss property owners to discuss mitigation opportunities and determine interest should future project opportunities arise. • Explore mitigation funding sources for assessments and any defined projects as a result of mitigation planning and project identification.	
Coordinating Organization:	Hazard Mitigation Planning Committee Curry County Planning Department
Timeline:	**Action Item Status:**
1 – 2 Years	Action Item has been completed by Curry County Planning Department. Curry County currently does not have any repetitive flood losses. Action deleted for the 2010 NHMP.

Flood & Winter Storm Short Term # 2

Proposed Action Item:	**Alignment with Plan Goals:**
Analyze the Port Jetty's in Gold Beach and Brookings for stability and identify mitigation options.	Protect Life and Property, Partnerships and Implementation
Ideas for Implementation:	
• Survey maintenance needs of Port Jetty's for stability. • Explore alternatives for maintenance. • Explore funding sources for work needed.	
Coordinating Organization:	Hazard Mitigation Planning Committee Port of Gold Beach Port of Brookings Army Corp of Engineers
Timeline:	**Action Item Status:**
1-2 years	Action item has been partially completed for both Brookings and Gold Beach. The port jetties were cataloged when the new FEMA flood maps came into effect, but mitigation options have not yet been identified due to a lack of resources. Action item is being continued as Multi-Hazard Action # 12 to address jurisdictions besides the ports that may require more comprehensive risk assessments and mitigation strategies to address natural hazards issues.

Flooding & Winter Storm Long Term # 3

Proposed Action Item:	**Alignment with Plan Goals:**
Analyze alternatives for the repair of the dune breach at Garrison Lake.	Protect Life and Property Partnerships and Implementation, Natural Systems
Ideas for Implementation:	
• Identify best possible measures to reroute or rebuild the dune at Garrison Lake. • Explore alternative funding resources to facilitate any survey, proposal and mitigation activities.	
Coordinating Organization:	Hazard Mitigation Planning Committee City of Port Orford ODFW DEQ Confederated Tribes Oregon Park Service Army Corps of Engineers
Timeline:	**Action Item Status:**
1-2 years	Action item has been completed in cooperation with Oregon State Parks and the dune is being continually monitored. Action item deleted for the 2010 NHMP.

Landslide Short Term # 1

Proposed Action Item:	**Alignment with Plan Goals:**
Identify and map high risk slide areas to create an accurate logistical assessment.	Protect Life and Property, Partnerships and Implementation, Natural Systems
Ideas for Implementation:	
• Develop a regional committee to include private companies (logging) with specific knowledge of extreme rural areas, to study high-risk areas. • Develop a regional map of high-risk areas.	
Coordinating Organization:	Hazard Mitigation Planning Committee Curry County Roads Department Oregon Department of Transportation Private Industry (logging)
Timeline:	**Action Item Status:**
1-2 Years	Action item completed by DOGAMI, first with the Statewide Landslide Information Database (SLIDO), and now with the LIDAR mapping being completed. However, due to the action item's applicability to multiple hazards, this action is being continued in the 2010 NHMP as Multi-Hazard Action # 4, and reworded.

Landslide Short Term # 2

Proposed Action Item:	**Alignment with Plan Goals:**
Evaluate current and high hazard slides for prioritization and explore mitigation possibilities.	Protect Life and Property, Emergency Services, Partnerships and Implementation

Ideas for Implementation:

- Explore ditching possibilities in high impact areas where reoccurring slides create a continual hazard to residents and roadways.
- Reassess geo-hazard areas for stabilization priorities and possibilities.
- Develop engineering studies of chronic slide areas for mitigation strategies.
- Explore funding sources for geo studies and assessments.
- Explore funding sources for required equipment and materials for repair of slide damage.

Coordinating Organization:	Hazard Mitigation Planning Committee, Curry County Roads Department Oregon Department of Transportation Private Industry (logging)

Timeline:	**Action Item Status:**
1-2 years	Action item partially completed. Evaluation of current high hazard slide areas has occurred, but identification of mitigation possibilities has not occurred. Action item being continued in the 2010 NHMP as Landslide Action # 2 and reworded.

Earthquake & Tsunami Short Term # 1

Proposed Action Item:	**Alignment with Plan Goals:**
Review of county and community comprehensive plans for the need to update to reflect the latest information on seismic hazards in each community.	Protect Life and Property

Ideas for Implementation:

• Review latest vulnerability assessment and policies addressing seismic hazards.
• Amend comprehensive plans, policies and implementations to reflect future development in seismic hazard areas, where/ if needed.

Coordinating Organization:	Hazard Mitigation Plan Committee

Timeline:	**Action Item Status:**
1-2 Years	Action item not completed. The Curry County Comprehensive Plan contains an earthquake section, but may not include the latest information. Action item being continued as multi-hazard action # 11 and has been reworded to address incorporating all natural hazard information from the NHMP into the Curry County Comprehensive plan.

Earthquake & Tsunami Short Term # 2

Proposed Action Item:	**Alignment with Plan Goals:**
Public Education Program enhancing existing programs.	Protect Life and Property, Public Awareness
Ideas for Implementation:	
• Evaluate feasibility and applicability of a standardized siren system in beach areas. • Explore the feasibility of tsunami warning signs in the Bandon Beach Loop and other beach areas. Assess the placement of tsunami warning signs throughout the coastal communities and Hwy 101 corridor.	
Coordinating Organization:	Hazard Mitigation Advisory Committee
Timeline:	**Action Item Status:**
1-2 Years	Action item has been completed. Curry County has developed a siren system for beach areas and has placed tsunami warning signs throughout the Highway 101 corridor. Due to the ongoing nature of public outreach, this action item is being reworded to address multiple hazards and continued in the 2010 update. The action is listed as Multi-Hazard Action # 15.

Section 4: Plan Implementation and Maintenance

This section details the formal process that will ensure that the Curry County Natural Hazards Mitigation Plan remains an active and relevant document.

1. A project prioritization process was added to this section.

2. At the March 16, 2010 plan update meeting, the Committee reviewed and updated the 2005 plan's method and schedule for monitoring, evaluating, and updating the plan. The Committee identified the convener (Curry County Emergency Management Services Coordinator) and the members of the coordinating body for implementing the 2010 NHMP, and adopted a new schedule for implementing and updating the NHMP. All these components were added to the 2010 NHMP.

3. Strategies for involving the public over the next five years were added to the 2010 NHMP.

Volume II Hazard Annexes

Volume II contains an introduction and hazard annexes. The hazard annexes provide detailed risk assessments for coastal erosion, drought earthquake, flood, landslide, tsunami, wildfire, and wind storms. For the 2010 update, most of the changes involved adding new information regarding hazards' causes and characteristics, updating hazard histories, including information from new studies or reports, identifying more specific community impacts to the hazards, and

providing updated probability and vulnerability assessments. Specific changes made to each hazard annex include the following:

Hazard Annex: Coastal Erosion

1. The committee developed a new coastal erosion risk assessment for the 2010 NHMP because of previous coastal erosion occurrences in Curry County and to remain consistent with the State of Oregon Natural Hazards Mitigation Plan Region 1 Risk Assessment.

Hazard Annex: Drought

1. The committee developed a new drought risk assessment for the 2010 NHMP because of previous drought occurrences in Curry County and to remain consistent with the State of Oregon Natural Hazards Mitigation Plan Region 1 Risk Assessment.

Hazard Annex: Earthquake

1. Added new information about the hazard's causes and characteristics, location, and extent. Added a coastal earthquake map to show major fault lines and previous earthquake events.

2. Updated the hazard's previous occurrences to address events as they relate to Curry County.

3. Added more specific community vulnerability information gathered during the February 16, 2010 plan update meeting.

4. Expanded on the HAZUS risk analysis information found in the 2005 NHMP to include more data on estimated losses in Curry County.

5. Added information from DOGAMI's 2007 Rapid Visual Survey data.

6. The 2005 NHMP combined the earthquake and tsunami hazards into one chapter. For the 2010 update, the tsunami hazard was made into its own hazard annex.

7. The 2010 update includes new vulnerability and probability assessments.

Hazard Annex: Flood

1. The 2005 NHMP had a combined "Severe Winter Storm and Flood" chapter. For the 2010 NHMP, these chapters were separated into a Flood Hazard Annex and a Wind Storm Hazard Annex.

2. The 2005 NHMP flood section contained a great deal of historical and ecological information about Curry County's waterways. This information was removed in the

2010 plan update because the information is not useful in understanding or mitigating Curry County's flood hazard.

3. New information was included to describe the causes and characteristics of the flood hazard, its location, and extent. Flood hazard maps were added to the chapter to illustrate the location of the flood hazard.

4. The 2010 update includes additional previous occurrences of floods.

5. The 2010 update includes information about repetitive flood losses and National Flood Insurance Program (NFIP) claim information.

6. The 2010 update added more specific community vulnerability information gathered during the February 16, 2010 plan update meeting.

7. The 2010 update includes new vulnerability and probability assessments.

Hazard Annex: Landslide

1. The 2010 update includes previous landslide events as they relate to Curry County. The 2005 plan did not list any landslide events specific to Curry County, only to Oregon as a whole.

2. New information was included to describe the causes and characteristics of the landslide hazard, its location, and extent. A landslide hazard map developed by Curry County GIS was added.

3. The 2010 update includes new vulnerability and probability assessments.

4. The 2010 update added more specific community vulnerability information for landslides gathered during the February 16, 2010 plan update meeting.

Hazard Annex: Tsunami

1. The 2010 NHMP includes a new chapter for the tsunami hazard which was previously located in the earthquake chapter of the 2005 NHMP. A full risk assessment detailing how tsunamis affect Curry County was developed for the 2010 update.

Hazard Annex: Wildfire

1. The 2010 NHMP included new information to describe the causes and characteristics of the wildfire hazard, its location, and extent. Wildfire hazard maps were added to the chapter to illustrate the hazard's location.

2. The 2010 update includes new vulnerability and probability assessments.

3. The 2010 update added more specific community vulnerability information for wildfire gathered during the February 16, 2010 plan update meeting.

Hazard Annex: Wind Storm

1. The 2005 NHMP included a chapter called "Severe Winter Storms and Flood." For the 2010 update, these chapters were separated into a Flood Hazard Annex and a Wind Storm Hazard Annex.

2. The Severe Winter Storm chapter of the 2005 NHMP contained two different sections describing winter storms and wind storms. However, both sections duplicated information for the two hazards, primarily discussing the effects of wind storms. Since Curry County's winter storms are usually characterized by heavy winds and rain rather than snow and ice, the Committee decided to only discuss the wind storm hazard. In addition, the State of Oregon Natural Hazards Mitigation Plan Regional Risk Assessment only discusses the "Wind Storm" hazard. To remain consistent with the Oregon Natural Hazards Mitigation Plan, the 2010 NHMP consolidated information from the 2005 NHMP to only discuss the wind storm hazard and named the hazard annex "Wind Storm."

3. The 2010 update includes new vulnerability and probability assessments.

4. The 2010 update added more specific community vulnerability information for wind storms gathered during the February 16, 2010 plan update meeting.

Volume III Resource Appendices

All appendices are new to the 2010 update and were included as resources for those maintaining and implementing the plan.

Appendix A: Mitigation Action Items

Appendix A lists the action items operative for the 2010 NHMP. It is a compilation of deferred actions from the 2005 NHMP and new actions discussed at the March 16, 2010 plan update meeting. Each action item includes a rationale, ideas for implementation, a coordinating organization, information about the action's relevance to existing plans and policies, and documentation about which plan goals that the action item addresses.

Appendix B: Planning and Public Process

Appendix B contains the Plan Update Changes Memo, meeting agendas and sign-in sheets from plan update steering committee meetings, and minutes from previous meetings held to maintain and implement the mitigation plan.

Appendix C: Economic Analysis of Natural Hazard Mitigation Projects

Appendix C discusses how to prioritize mitigation action items with a special emphasis on the process of benefit-cost analysis.

Appendix D: Regional Household Preparedness Survey
This appendix includes the survey instrument and results from the regional household preparedness survey implemented by OPDR. The survey aims to gauge household knowledge of mitigation tools and techniques to assist in reducing the risk and loss from natural hazards, as well as assessing household disaster preparedness.

Appendix E: Grant Programs
Appendix E lists grant programs that could be used to fund mitigation projects as well as some response-oriented projects.

Meeting: Curry County Plan Update Introductory Meeting
Date: November 17, 2009
Time: 9:00 am – 10:30 am
Location: USDA Forest Services Building, 29279 Ellensburg Ave, Gold Beach, OR

AGENDA

1. Introductions & Partnership Overview (***5 minutes***)
   - Josh Bruce, OPDR
2. Background Mitigation Plan Update & Recovery Initiatives (***15 minutes***)
   - Josh Bruce
3. Mitigation Plan Update Timeline (***15 minutes***)
   - Gregoor Passchier, OPDR
4. Steering Committee Roles & Responsibilities (***10 minutes***)
   - Gregoor Passchier
5. Identification of Additional Steering Committee Members/Stakeholders (***10 minutes***)
   - Gregoor Passchier
6. Previous NHMP Meetings (***10 minutes***)
   - Gregoor Passchier
7. Resources for Plan Development (***5 minutes***)
   - Gregoor Passchier
8. Questions (***15 minutes***)

Meeting Sign-In

Curry County Mitigation Plan Update Introductory Meeting. November 17, 2009; 9 am -10:30 am
USDA Forest Services Building. 29279 Ellensburg Ave, Gold Beach, OR.

Name	Representing	Email	Telephone
Mike Robison	Coos Forest Protective Ass'n	MRobison@odf.State.OR.us	541-267-3161
Megan Harper Mike Pope	Bureau of Land Mgmt - Coos Bay	megan_harper@blm.gov michael_pope@blm.gov	541-756-0100
DON KENDALL	GOLD BEACH city	donkendall@goldbeachoregon.gov	541.373-0510
MONTY EDWARDS	USFS GOLD BEACH FIRE	montyedwards@fs.fed.us	541-247-3699
Jeff Riepe	US Forest Service - Rogue River-Siskiyou NF	jriepe@fs.fed.us	541 247 3698
Kim Hunter	U.S. Forest Service Rogue River-Siskiyou National Forest	Kimmariehunter@fs.fed.us	541 247-3636
Maggie McHugh	Lower Rogue Watershed Council	maggie.mchugh@oregon.gov	541.247.3771 ext 4

Name	Representing	Email	Telephone
Alan Vardiver.	U.S. Forest Service/Rogue River-Siskiyou NF, Gold Beach Ranger District.	avardiver@fs.fed.us	541-531-3419.
Albert Harrell	Curry County EM	harrella@co.curry.or.us	541-247-3308
John Flannigan	Coos Forest Protective Assn.	jflannigan@odf.state.or.us	541-247-6241

Curry County Natural Hazard Mitigation Plan Update

Project Background

A Natural Hazard Mitigation Plan (NHMP) provides short and long-term strategies 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 from future disasters to lives, property, and the economy.

Jurisdictions with Federal Emergency Management Agency (FEMA) approved mitigation plans are eligible for federal grant funding to implement mitigation strategies identified in the plan. These federal funding programs include FEMA's Pre-Disaster Mitigation, Flood Mitigation Assistance, and Hazard Mitigation Grant Programs. However, to maintain grant eligibility, jurisdictions are required to review, update, and obtain FEMA approval of their plans every five years.

Curry County adopted the Curry County Multi-Jurisdictional Natural Hazards Mitigation in 2005 and it is due for its five-year update on August 5, 2010. The Oregon Partnership for Disaster Resilience (OPDR) has agreed to work with Curry County to facilitate the plan update process. This process will occur concurrently with the recovery forums OPDR is facilitating in Curry County because many of the participants for each planning initiative are the same. The mitigation plan update is being funded through a 2006 Pre Disaster Mitigation Grant from the Federal Emergency Management Agency.

Plan Update Process

The planning process will last from October 2009 to June 2010 and consists of six stages, described briefly below:

Stage I – Getting Started (October –December 2009)

- OPDR will work with Curry County to develop the plan update steering committee
- OPDR will facilitate a preliminary plan update committee meeting November 16, 2009

Stage II – Review and Update Risk Assessment (February 2010)

- First Steering Committee Meeting
  - Overview of Plan Update Process
  - Identify an appropriate public involvement process
  - Review and update the NHMP hazard identification and vulnerability assessments

Stage III – Review and Update Mitigation Strategy (mid-March 2010)

- Second Steering Committee Meeting
  - Review and update NHMP goals
  - Review and existing mitigation action items and document status
  - Develop new mitigation action items

Stage IV – Review and Update Plan Implementation and Maintenance (April 2010)

- Third Steering Committee Meeting
  - Review and update plan implementation and maintenance structures
  - Review plan changes

Stage V – Preparation for and Final FEMA Review (April-June 2010)

- OPDR will prepare a final plan draft to be reviewed by the plan update steering committee
- Final draft submitted to FEMA for review May 1, 2010
- Upon receiving pre-approval, the Curry County Commission will adopt the NHMP by resolution

Stage VI – Implementation and Maintenance (July-August 2010)

- OPDR will assist the NHMP's designated Coordinating Body with implementing the NHMP

Steering Committee Roles and Responsibilities

Participation by the plan update steering committee is essential throughout the update process to ensure that the updated NHMP addresses issues relevant to the county's various stakeholders. A steering committee that is representative of the broader community is a means of involving the public in the update process, and members serve as the primary source of information about local hazard events, community vulnerabilities, and the status of mitigation action items.

The plan update steering committee will have the following roles and responsibilities:

- Attend and participate in plan update steering committee meetings;
- Accurately represent the broader Curry County community;
- Ensure that neighboring jurisdictions and appropriate regional, state, tribal, and federal agencies participate in plan development;
- Guide the plan update process by identifying appropriate mitigation activities and identifying and implementing a public involvement process;
- Review plan drafts and provide feedback in a timely manner.

OPDR will always provide due dates for any review or edits asked of the steering committee and will be responsible for coordinating and facilitating the plan update process.

Project Outcome

Our primary measure of success for this project will be the adoption of an updated Curry County Natural Hazards Mitigation Plan by June 2010. However, over the long-term, it will be the process communities go through in the planning effort and the eventual implementation of the plans, not the plans themselves, which will be the true indicators of success that result from this project.

Meeting: Curry County NHMP Kickoff
Date: February 16, 2010
Time: 8 am – 10:30 am
Location: Curry County Fairgrounds, Showcase Building, 29392 Ellensburg Avenue, Gold Beach

AGENDA

9. Welcome & Introductions ***(10 minutes)***

10. Overview of Plan Update Needs ***(30 minutes)***

11. Steering Committee Roles and Responsibilities ***(5 minutes)***

12. Community Involvement ***(15 minutes)***

Break (10 minutes)

13. Overview of Vulnerability/Probability ***(15 minutes)***

14. Work Session ***(60 minutes)***

15. Next Steps: ***(5 minutes)***

Oregon Partnership for Disaster Resilience
Community Service Center • 1209 University of Oregon
Eugene • Oregon • 97403-1209
Phone: 541.346.2305 • Fax: 541.346.2040

Meeting Sign-In

Curry County Mitigation Plan Update Meeting # 1: Reviewing Risk Assessment. February 16, 2010; 8 am - 10:30 am
Curry County Fairgrounds, Showcase Building, 29392 Ellensburg Avenue in Gold Beach

Name	Representing	Email	Telephone
JOHN WOODLAND	AT LARGE	johnw@scesd.k12.or.us	541-247-6681 X 2803
BOB RECTOR	SHERIFF'S OFFICE	rectorb@co.curry.or.us	541-247-3296
KAREN Heim	ODOT	Karen.L.Heim@Odot.State.OR.us	541-332-5711
Laurake Gray	Brookings	lgray@brookings.or.us	5414691131
Michael Murphy	City of Port Orford	mmurphy@portorford.org	541-332-3681
Albert Harrell	Curry County ES Coordinator	harrella@co.curry.or.us	541-247-3202
Ellen Barnes	City of Gold Beach	ebarnes@goldbeachoregon.gov	541-247-7029

B23

Name	Representing	Email	Telephone
John Flannigan	Coos Forest Protective Assn.	jflannigan@odf.state.or.us	541-247-6241
MARGARET McHUGH	LOWER ROGUE WATERSHED COUNCIL	MAGGIE.mchugh@OACD.ORG	541/247-2755 4th
John Hawkins	Curry Co GIS	[illegible]	541-247-3808
ROB SCHAFER	CURRY Co. ROAD DEPT	SCHAFERR@CO.CURRY.OR.US	247-7097

Issue Identification Worksheet-Curry

Instructions: In the left hand column below, identify specific population issues your community could face in the event of a disaster. Please be as detailed as possible. Use the columns on the right hand side to choose which natural hazards may cause these issues to occur. Check all that apply.

Population	Drought	Earthquake	Tsunami	Landslide	Wildfire	Flood	Wind/Winter Storm	Coastal Erosion
• Where are the high population densities for residents? Are any in hazard zones? • Are there special-needs populations in hazardous areas? ex: elderly, disabled, minorities, children, infants • Where are there significant non-residential populations? ex. residents, employees, tourists								
Example: *High concentration of elderly populations in retirement communities along the Willamette River. Vulnerable to power outages, and buildings are potentially in floodplain.*						**X**	**X**	
Isolated communities throughout the county				**X**				

Issue Identification Worksheet-Curry

Instructions: In the left hand column below, identify specific economic issues your community could face in the event of a disaster. Please be as detailed as possible. Use the columns on the right hand side to choose which natural hazards may cause these issues to occur. Check all that apply.

Economy								
• Are businesses vulnerable to natural hazards? What types of businesses? Which ones are location-dependent and which can be relocated? • What businesses represent significant components of your community's economy, in terms of employees, sales volume, or tax base? • Are alternate commercial spaces available if current stock is damaged? • Which cultural or historic resources also represent significant economic assets? Examples: landmarks, archeological sites, historic buildings	Drought	Earthquake	Tsunami	Landslide	Wildfire	Flood	Wind/Winter Storm	Coastal Erosion
Example: *Small businesses may not have continuity of operations plans. The downtown community is comprised of over 50 small businesses. Alternate commercial spaces are not currently available.*		X		X			X	
Agriculture economy important to Curry County, and hazards can cause damage to buildings and livestock.						X		

Issue Identification Worksheet-Curry

Instructions: In the left hand column below, identify specific land use & development issues your community could face in the event of a disaster. Please be as detailed as possible. Use the columns on the right hand side to choose which natural hazards may cause these issues to occur. Check all that apply.

Land Use & Development								
• Do current development patterns or land use plans minimize development in the hazardous areas? • Is your community growing or projected to grow denser in hazardous zones? • Are there policies in place to address post-disaster redevelopment? • Is the community capable of providing temporary shelter and housing?	Drought	Earthquake	Tsunami	Landslide	Wildfire	Flood	Wind/Winter Storm	Coastal Erosion
Example: *The community grew by 15% between 2000 and 2008. Development is occurring in desirable steep slope areas, and the city currently does not limit development in these areas.*		X		X				
Current growth and development into wildland areas. What areas are growing?					X			
Buildings are vulnerable to windstorms (IDENTIFY SPECIFICS)								

Issue Identification Worksheet-Curry

Instructions: In the left hand column below, identify specific environmental issues your community could face in the event of a disaster. Please be as detailed as possible. Use the columns on the right hand side to choose which natural hazards may cause these issues to occur. Check all that apply.

Environment								
• Are there any hazardous material sites in your community? • What significant environmental resources are within your community? Examples: watersheds, recreation areas, parks, reservoirs, forests, wildlife populations, etc.	Drought	Earthquake	Tsunami	Landslide	Wildfire	Flood	Wind/Winter Storm	Coastal Erosion
Example: *The city allows for inventoried wetlands to be developed with the provision that mitigation will occur outside city limits. There is the potential for increased urban flooding to occur in city limits as a result (over the long term).*						X		
Prevalence of gorse throughout the county					X			
Water supplies limited in communities.					X			

Issue Identification Worksheet-Curry

Instructions: In the left hand column below, identify critical infrastructure & services issues your community could face in the event of a disaster. Please be as detailed as possible. Use the columns on the right hand side to choose which natural hazards may cause these issues to occur. Check all that apply.

Critical Infrastructure & Services	Drought	Earthquake	Tsunami	Landslide	Wildfire	Flood	Wind/Winter Storm	Coastal Erosion
Examples: Communications, Electrical Power, Fire Department, Hospitals / Health Care, Police Services, Public Works Operations, Transportation etc. • What types of critical infrastructure & services do your residents rely upon? • What types of critical infrastructure & services does your local economy rely upon? • Describe the relationship between infrastructure and land use & development in your community.								
Example: *Police services must be continued during a disaster at normal or increased service load. The police station is located in an older building (constructed before 1970) that may be susceptible to earthquakes.*		**X**						
Roads and bridges that cross floodways and along steep slopes are at risk. (IDENTIFY THESE)								

Meeting: Curry County NHMP Plan Update-Meeting # 2
Date: March 16, 2010
Time: 8 am – 12:00 pm
Location: Curry County Fairgrounds, Showcase Building, 29392 Ellensburg Avenue, Gold Beach

AGENDA

16. Welcome & Introductions	***(10 minutes)***
17. Work Session: Review of Plan Goals	***(15 minutes)***
18. Action Item Overview	***(10 minutes)***
19. Work Session: Review Existing Actions	***(30 minutes)***
20. Work Session: Review New Actions	***(55 minutes)***
Break (10 minutes)	
21. Work Session: Identifying Future Participants	***(15 minutes)***
22. Work Session: Plan Maintenance & 5-Year Update Requirements	***(30 minutes)***
23. Work Session: Continued Public Involvement	***(30 minutes)***
24. Grant Opportunities & Resources	***(10 minutes)***
25. Project Prioritization & Process	***(20 minutes)***
26. Next Steps	***(5 minutes)***

Meeting Sign-In

Curry County Mitigation Plan Update Meeting # 2: Action Items & Plan Implementation. March 16, 2010; 8 am - 12 pm
Curry County Fairgrounds, Showcase Building, 29392 Ellensburg Avenue in Gold Beach

Name	Representing	Email	Telephone
MICHEAL POPE	BUREAU OF LAND MANAGEMENT COOS BAY DISTRICT	MPOPE@OR.BLM.GOV	541-751-4288
JOHN WOODLAND	CITIZENS FOR EMERGENCY PREPAREDNESS	johnw@scesd.k12.or.us	541-247-6681 x2803
DON KENDALL	GOLD BEACH - CITY EMERG. SERVICE	donkendall@directv.net	541-373-0510
John Hawkins	Curry County	hawkinsj@co.curry.or.us	541-247-3388
BRIAN WATJEN	ODOT - South Coast Hwy Maint.	Brian.Watjen@odot.state.or.us	541-332-5711
KAREN HEIM	ODOT - South Coast Hwy Maint.	Karen.L.Heim@odot.state.or.us 541-332-5711	
Kim Hunter	U.S. Forest Service	Kimmariehunter@fs.fed.us	(541) 247-3630

B31

Name	Representing	Email	Telephone
Albert Harrell	Curry County Emergency Services	harrella@co.curry.or.us	541-247-3208 541 254 0731 cell
Megan Harper	Bureau of Land Mgmt	mlharper@blm.gov	541-751-4353

B32

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 State Police – Office of Emergency Management, 2000), and Federal Emergency Management Agency Publication 331, *Report on Costs and Benefits of Natural Hazard Mitigation*. This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

Why Evaluate Mitigation Strategies?

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred. Evaluating possible natural hazard mitigation activities provides decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, police, utilities, and schools. Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce "ripple-effects" throughout the community, greatly increasing the disaster's social and economic consequences.

While not easily accomplished, there is value, from a public policy perspective, in assessing the positive and negative impacts from mitigation activities, and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

What are some Economic Analysis Approaches for Evaluating Mitigation Strategies?

The approaches used to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into three general categories: benefit/cost analysis, cost-effectiveness analysis and the STAPLE/E approach. The distinction between the three methods is outlined below:

Benefit/Cost Analysis

Benefit/cost analysis is a key mechanism used by the state Office of Emergency Management (OEM), the Federal Emergency Management Agency, and other state and federal agencies in evaluating hazard mitigation projects, and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

Benefit/cost analysis is used in natural hazards mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoiding future damages, and risk. In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented. A project must have a benefit/cost ratio greater than 1 (i.e., the net benefits will exceed the net costs) to be eligible for FEMA funding.

Cost-Effectiveness Analysis

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

Investing in Public Sector Mitigation Activities

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated monetarily, but still affect the public in profound ways. Economists have developed methods

to evaluate the economic feasibility of public decisions which involve a diverse set of beneficiaries and non-market benefits.

Investing in Private Sector Mitigation Activities

Private sector mitigation projects may occur on the basis of one or two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

1. Request cost sharing from public agencies;
2. Dispose of the building or land either by sale or demolition;
3. Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
4. Evaluate the most feasible alternatives and initiate the most cost effective hazard mitigation alternative.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchases. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

STAPLE/E Approach

Considering detailed benefit/cost or cost-effectiveness analysis for every possible mitigation activity could be very time consuming and may not be practical. There are some alternate approaches for conducting a quick evaluation of the proposed mitigation activities which could be used to identify those mitigation activities that merit more detailed assessment. One of those methods is the STAPLE/E approach.

Using STAPLE/E criteria, mitigation activities can be evaluated quickly by steering committees in a synthetic fashion. This set of criteria requires the committee to assess the mitigation activities based on the Social, Technical, Administrative, Political, Legal, Economic and Environmental (STAPLE/E) constraints and opportunities of implementing the particular mitigation item in your community. The second chapter in FEMA's How-To Guide "Developing the Mitigation Plan – Identifying Mitigation Actions and Implementation Strategies" as well as the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process" outline some specific considerations in analyzing each aspect. The following are suggestions for how to examine each aspect of the STAPLE/E approach from the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process."

Social: Community development staff, local non-profit organizations, or a local planning board can help answer these questions.

- Is the proposed action socially acceptable to the community?
- Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Will the action cause social disruption?

Technical: The city or county public works staff, and building department staff can help answer these questions.

- Will the proposed action work?
- Will it create more problems than it solves?
- Does it solve a problem or only a symptom?
- Is it the most useful action in light of other community goals?

Administrative: Elected officials or the city or county administrator, can help answer these questions.

- Can the community implement the action?
- Is there someone to coordinate and lead the effort?
- Is there sufficient funding, staff, and technical support available?
- Are there ongoing administrative requirements that need to be met?

Political: Consult the mayor, city council or county planning commission, city or county administrator, and local planning commissions to help answer these questions.

- Is the action politically acceptable?
- Is there public support both to implement and to maintain the project?

Legal: Include legal counsel, land use planners, risk managers, and city council or county planning commission members, among others, in this discussion.

- Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Are there legal side effects? Could the activity be construed as a taking?
- Is the proposed action allowed by the comprehensive plan, or must the comprehensive plan be amended to allow the proposed action?
- Will the community be liable for action or lack of action?
- Will the activity be challenged?

Economic: Community economic development staff, civil engineers, building department staff, and the assessor's office can help answer these questions.

- What are the costs and benefits of this action?
- Do the benefits exceed the costs?

- Are initial, maintenance, and administrative costs taken into account?
- Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private?)
- How will this action affect the fiscal capability of the community?
- What burden will this action place on the tax base or local economy?
- What are the budget and revenue effects of this activity?
- Does the action contribute to other community goals, such as capital improvements or economic development?
- What benefits will the action provide? (This can include dollar amount of damages prevented, number of homes protected, credit under the CRS, potential for funding under the HMGP or the FMA program, etc.)

Environmental: Watershed councils, environmental groups, land use planners and natural resource managers can help answer these questions.

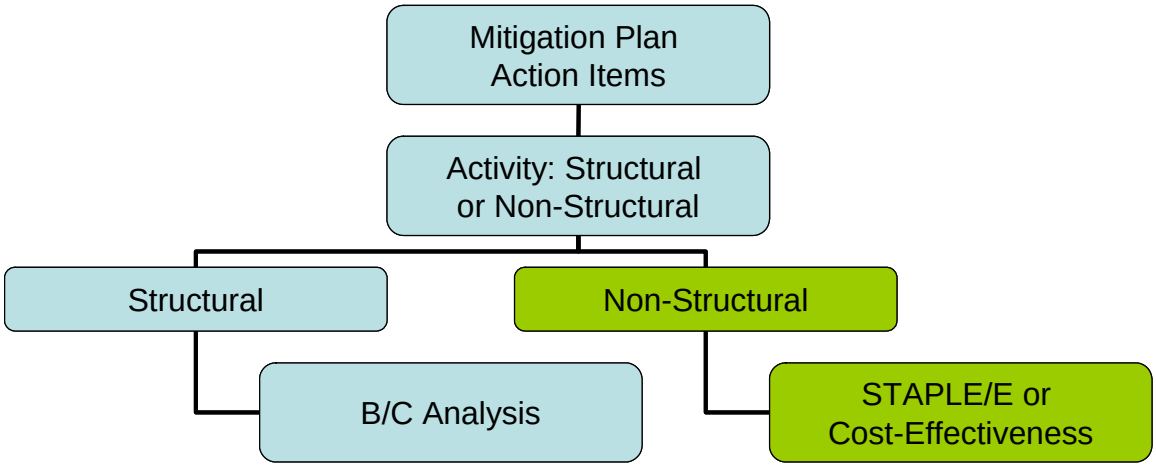
- How will the action impact the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

The STAPLE/E approach is helpful for doing a quick analysis of mitigation projects. Most projects that seek federal funding and others often require more detailed benefit/cost analyses.

When to use the Various Approaches

It is important to realize that various funding sources require different types of economic analyses. The following figure is to serve as a guideline for when to use the various approaches.

Figure A.1: Economic Analysis Flowchart



Source: Oregon Partnership for Disaster Resilience at the University of Oregon's Community Service Center, 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 State Police, Office of Emergency Management, July 1999.

Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan*, (Oregon State Police – Office of Emergency Management, 2000.)

Risk Management Solutions, Inc., *Development of a Standardized Earthquake Loss Estimation Methodology*, National Institute of Building Sciences, Volume I and II, 1994.

VSP Associates, Inc., *A Benefit/Cost Model for the Seismic Rehabilitation of Buildings*, Volumes 1 & 2, Federal Emergency management Agency, FEMA Publication Numbers 227 and 228, 1991.

VSP Associates, Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects: Section 404 Hazard Mitigation Program and Section 406 Public Assistance Program, Volume 3: Seismic Hazard Mitigation Projects*, 1993.

VSP Associates, Inc., *Seismic Rehabilitation of Federal Buildings: A Benefit/Cost Model*, Volume 1, Federal Emergency Management Agency, FEMA Publication Number 255, 1994.

Appendix D:
Region 1 Household Preparedness Survey

Region 1: Oregon Coast Household Natural Hazards Preparedness Survey

Survey Report for:

Clatsop County, Oregon
Tillamook County, Oregon
Lincoln County, Oregon
Lane County, Oregon
Douglas County, Oregon
Coos County, Oregon
Curry County, Oregon

Prepared by:

Oregon Partnership for Disaster Resilience

Community Service Center
1209 University of Oregon
Eugene, OR 97403-1209
Phone: 541.346.3588
Fax: 541.346.2040
Email: kristam@uoregon.edu
http://www.oregonshowcase.org

January 2008

Special Thanks & Acknowledgements

Project Staff:

Krista Dillon, Associate Director, Oregon Partnership for Disaster Resilience

André LeDuc, Executive Director, Oregon Partnership for Disaster Resilience

Robert Parker, Managing Director, Community Service Center

Bethany Johnson, Associate Director, Community Planning Workshop

Jenny Pearce, Intern, Oregon Partnership for Disaster Resilience

Natural Hazard Household Preparedness Survey

The Oregon Partnership for Disaster Resilience (*Partnership, OPDR*) is a coalition of public, private, and professional organizations working collectively toward the mission of creating a disaster resilient and sustainable state. The *Partnership* is recognized by the Institute for Business & Home Safety (IBHS) as a Showcase State for Disaster Resilience. Developed and coordinated by the Community Service Center (CSC) at the University of Oregon the *Partnership* employs a service learning model to increase community capacity and enhance disaster safety and resilience statewide.

The *Partnership's* current planning initiatives cover over two-thirds of the geographic area of Oregon. It is working with Central Oregon, Southeast Oregon, Northeast Oregon, and the Oregon Coast through Pre-Disaster Mitigation Planning Grants to support staff in developing local natural hazard mitigation plans. CSC staff serve as the lead project coordinator providing plan development support, technical resources, and a proven planning process / framework for each county.

As part of the PDM Program, OPDR is assisting the Coastal region of Oregon with the citizen involvement components of the natural hazard mitigation planning process. Citizen involvement is a key component in the natural hazard mitigation planning process. Citizens have the opportunity to voice their ideas, interests and concerns about the impact of natural disasters on their communities. To that end, the Disaster Mitigation Act of 2000[1] requires citizen involvement in the natural hazard mitigation planning process. It states:

> "An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:
>
> 1. An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.
> 2. An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and

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

agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process."

The benefits of citizen involvement, according to Bierle[2], include the following: (1) educate and inform public; (2) incorporate public values into decision making; (3) improve substantially the quality of decisions; (4) increase trust in institutions; (5) reduce conflict; and (6) ensure cost effectiveness. To gather public input into the planning process, OPDR administered a survey to randomly selected households.

This report summarizes the results of the Oregon Coast Household Natural Hazards Preparedness Survey. The survey helps the counties of the Coastal region - Clatsop, Tillamook, Lincoln, Lane (only coastal portion), Douglas (only coastal portion), Coos, and Curry Counties - realize Bierle's five benefits of citizen involvement in the natural hazard mitigation planning process.

Methodology

To conduct the household survey, OPDR used a modified version of a survey administered statewide in 2002. The purpose of the 2002 survey was to better understand the perceptions of risk to natural hazards held by citizens, as well as the level of preparedness and types of risk reduction activities in which citizens have engaged. The primary goal of the 2002 survey was to gauge the overall perception of natural disasters and determine a baseline level of loss reduction activity for residents in the community. OPDR adapted the statewide survey to include questions about citizens' support for different types of community planning actions. Planning actions mentioned included protecting critical facilities, disclosing natural hazard risks during real estate transactions, and the use of tax dollars to compensate land owners for not developing in hazardous areas.

This survey was sent to 1200 households in the Coastal region, which includes: Clatsop, Tillamook, Lincoln, Lane (only coastal portion), Douglas (only coastal portion), Coos, and Curry Counties. The households were randomly selected and population weighted based on registered voter lists provided to OPDR by each of the counties.

The mailing contained a cover letter, the survey instrument, and a postage-paid return envelope. Completed surveys were returned to OPDR at the University of Oregon. A second postcard was sent to remind households to send in the survey or to access an online version of the survey. OPDR received 206 valid responses from the mailed survey, for a 20% response

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

rate. (Only 1034 of the 1200 addresses were valid addresses.) Only two people completed the online version of the survey; therefore, these responses were not analyzed because of the very low sample size.

Limitations

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

Organization of Report

The survey results are organized into the following sections:

Characteristics of Survey Respondents: This section reports information about respondent characteristics including: educational attainment, age, and length of time as an Oregon resident.

Perception of Risk: This section identifies the general level of concern over natural hazards risk.

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

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

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

Section II. Characteristics of Survey Respondents

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

There were 206 individuals who responded to the survey, giving the survey a 20% response rate. Of the seven counties the survey was mailed to, the majority of surveys (31%) returned came from residents of Coos County (Table 1). This is not surprising as Coos County has the greatest number of residents in the region with 62,905 of the total region residents (PSU population estimate). It is difficult to know the exact number of

residents living in the region as only part of Lane and Douglas counties are included in the coastal region. If all of Lane and Douglas counties are included in the resident total, the region would contain 634,920 (2006 Region 1:Profile and Risk Assessment, OPDR).

Zip codes provide a more specific location of the survey respondents than the county level data. Of the 37 different zip codes indicated, the most respondents live in the 97103 zip code (Astoria) (Table 2).

Table 1. Per County Sample Distribution and Survey Response

County	Sample Distribution	Survey Responses
Coos	30%	31%
Lincoln	21%	19%
Clatsop	17%	17%
Tillamook	12%	12%
Lane	7%	9%
Curry	10%	9%
Douglas	3%	3%

Source: Household Natural Hazards Preparedness Survey, Oregon Partnership for Disaster Resilience, (Nov. 2007).

Table 2. Percent of Surveys by Zipcode

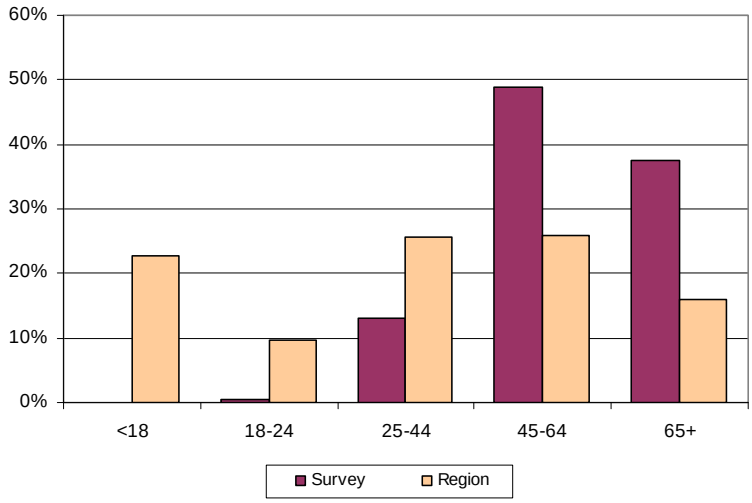
Zip Code	City	Percent
97103	Astoria	17.2
17420	Coos Bay	11.8
97439	Florence	8.3
97459	North Bend	6.9
97415	Brookings	6.4
97423	Coquille	5.4
97365	Newport	4.9
97141	Tillamook	4.4
Other		34.7

Source: Household Natural Hazards Preparedness Survey, Oregon Partnership for Disaster Resilience, (Nov. 2007).

Age and Gender

Figure 1 compares the ages of survey respondents to the 2000 U.S. Census. This shows that younger people were underrepresented while older people were overrepresented in the sample. Women accounted for 58% of survey respondents.

Figure 1. Percentage of Coastal Oregon Population and Survey Respondents by Age Category (persons 18 and over)

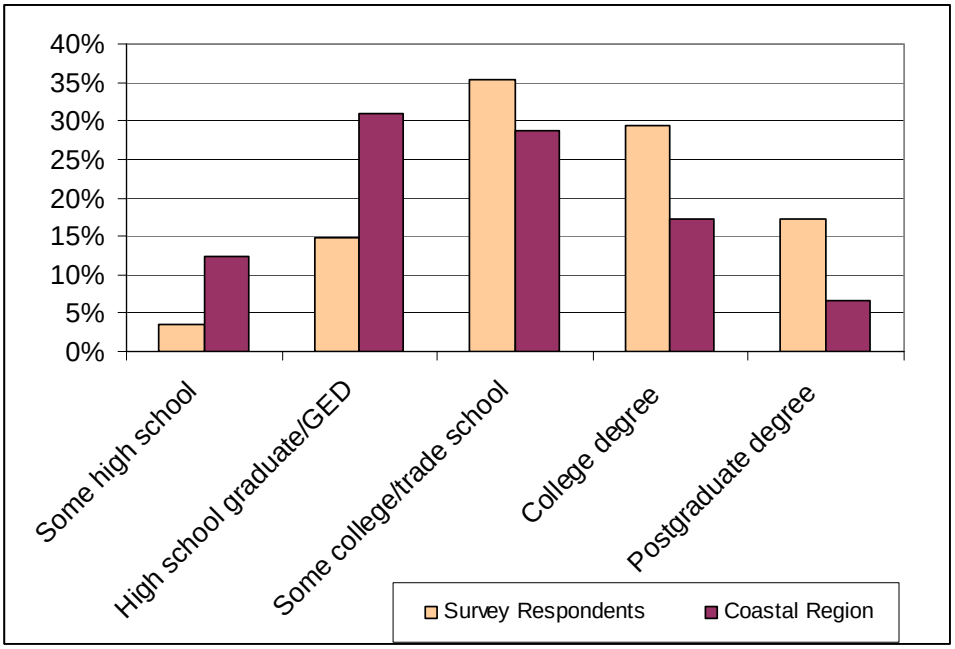


Source: U.S. Census Bureau: www.census.gov (2000) and Household Natural Hazards Preparedness Survey, Oregon Partnership for Disaster Resilience, (Nov. 2007).

Level of Education

In general, survey respondents were relatively well educated. Figure 2 compares the level of education of survey respondents with the 2000 U.S. Census for the region. About 80% of survey respondents have attended some college or gone to a trade school, obtained a college degree, or have a postgraduate degree. In contrast, figures from the Census show that approximately 50% of Coastal residents have achieved this level of educational attainment. Survey respondents were much more likely to have completed a higher educational level than the overall population of the Coastal region.

Figure 2. Level of Education of Coastal Oregon Population and Survey Respondents

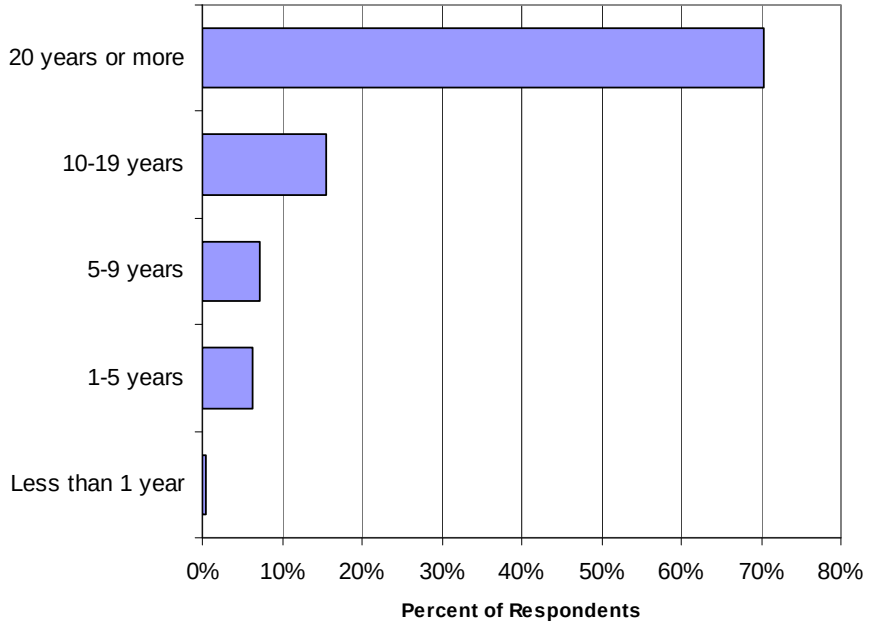


Source: U.S. Census Bureau: www.census.gov (2000) and Household Natural Hazards Preparedness Survey, Oregon Partnership for Disaster Preparedness, (Nov. 2007)

Oregon Residency

Approximately 70% percent of survey respondents have lived in Oregon for 20 years or more (see Figure 3). Respondents who have lived in Oregon for fewer than 20 years have most commonly moved from California (17%).

Figure 3. Length of Time Survey Respondents Have Lived in Oregon



Source: Household Natural Hazards Preparedness Survey, Oregon Partnership for Disaster Resilience, (Nov. 2007)

Housing Characteristics

Housing characteristics are important variables in creating effective education and outreach programs. Knowledge of the percentage of homeowners in a community can help target the programs. Homeowners might be more willing to invest time and money in making their homes more disaster resilient. The majority of survey respondents own their own home (88%). Almost 79% of survey respondents live in single-family homes, 11% live in manufactured homes, 3% in apartments of 5 or more units, 2% live in duplexes, and less than 0.5% live in condominiums/townhomes or apartments with 3-4 units. In addition, 79% said they have access to the internet.

Section III. Perception of Risk

It is helpful to understand community members' experiences and their perceptions of risk to natural hazards to make informed decisions about natural hazard risk reduction activities. The survey asked respondents about their level of concern for specific hazards in the Coastal region. The primary objective of this question was to create a "natural hazard profile" of respondents to better understand how Coastal residents perceive natural hazards.

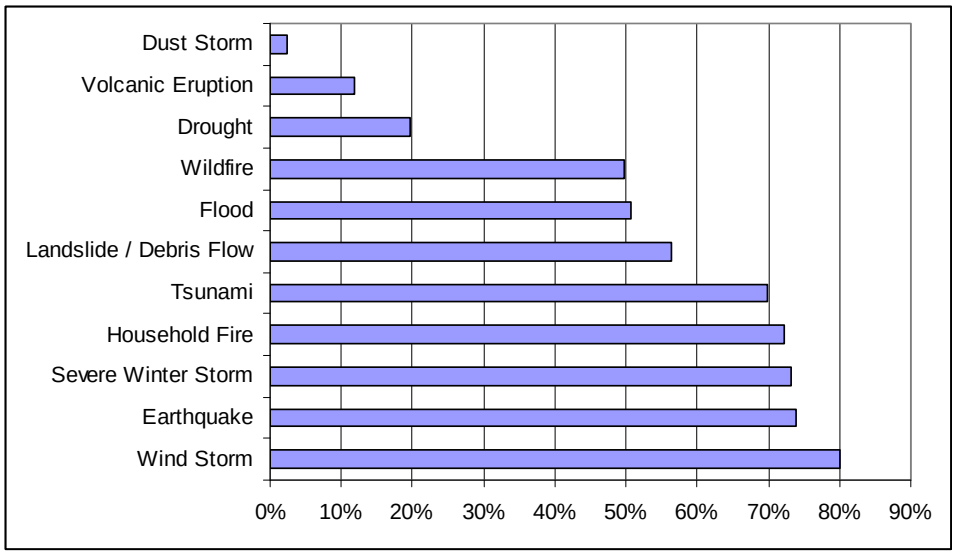
The survey asked respondents to rank their personal level of concern for specific natural disasters affecting their community (Table 3). The results show that respondents were most concerned about windstorm, earthquake, severe winter storm and household fire. The respondents are least concerned about volcanic eruptions and dust storm. Figure 5 shows the percent of respondents that identified their level of concern as either "Very Concerned" or "Somewhat Concerned".

Table 3. Survey Respondents' Level of Concern Regarding Natural Hazards in the Coastal Region

Natural Disaster	Very Concerned	Somewhat Concerned	Neither Concerned nor Unconcerned	Not Very Concerned	Not Concerned
Drought	5.9%	13.7%	18.1%	22.5%	39.7%
Dust Storm	0.5%	2.0%	10.3%	17.2%	70.0%
Earthquake	19.7%	54.2%	9.9%	10.8%	5.4%
Flood	14.9%	35.8%	14.4%	16.4%	18.4%
Landslide / Debris Flow	20.8%	35.6%	10.9%	18.3%	14.4%
Wildfire	16.7%	33.0%	14.3%	20.2%	15.8%
Household Fire	21.9%	50.2%	11.4%	12.9%	3.5%
Volcanic Eruption	1.5%	10.4%	17.9%	16.9%	53.2%
Wind Storm	32.8%	47.3%	10.4%	5.5%	4.0%
Severe Winter Storm	24.3%	49.0%	11.4%	7.9%	7.4%
Tsunami	26.1%	43.8%	13.3%	6.4%	10.3%

Source: Household Natural Hazards Preparedness Survey, Oregon Partnership for Disaster Resilience, (Nov. 2007)

Figure 4. Percentage of Survey Respondents' Who Are "Very Concerned" or "Somewhat Concerned" about Natural Hazards



Source: Household Natural Hazards Preparedness Survey, Oregon Partnership for Disaster Resilience, (Nov. 2007)

Section IV. Household Preparedness and Risk Reduction

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

Property Protection

Exactly half (50%) of the respondents considered the possible occurrence of a natural hazard when they bought or moved into their current homes. The need to have adequate provisions for financial and property recovery when natural disasters do occur is a necessary component of natural hazard preparedness. Only ten percent of the respondents indicated they have flood insurance leaving 90% without insurance. However, 65% of those who don't have flood insurance indicated the reason is because their home is not located in the floodplain and 15% felt it was not necessary. Many more respondents (37%) indicated they have earthquake insurance. The top two reasons given by those who don't have earthquake insurance were "not familiar with it/don't know" (30%) or "it is not necessary" (20%).

Table 4. Survey Respondents' Reasons For Not Having Flood and/or Earthquake Insurance

Flood Insurance		Earthquake Insurance	
Not located in the floodplain	64%	Not familiar with it/don't know	30%
Not necessary	14%	Not necessary	20%
Not familiar with it/don't know	7%	Too Expensive	19%
Too Expensive	6%	Deductible too high/not worth it	14%
Not available	3%	Other	10%
Other	3%	Not available	7%
Deductible too high/not worth it	3%		

Source: Household Natural Hazards Preparedness Survey, Oregon Partnership for Disaster Resilience, (Nov. 2007)

Over sixty percent of respondents have talked with members of their households about what to do in the case of a natural disaster or emergency whereas only twenty percent have braced unreinforced masonry, concrete walls and chimneys. Table 5 summarizes the activities respondents indicated they have done, plan to do, have not done, or were unable to do to prepare for natural disasters.

Table 5. Survey Respondents' Household Disaster Preparedness Activities

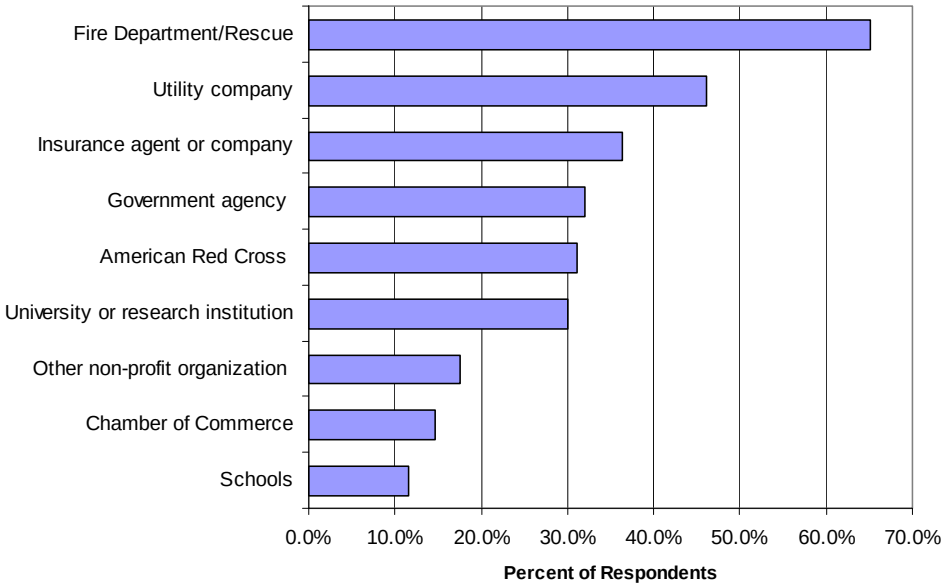
In your household, have you or someone in your household:	Have Done	Plan To Do	Not Done	Unable To Do	Does Not Apply
A. Attended meetings or received written information on natural disasters or emergency preparedness?	52.7%	5.4%	40.9%	1.0%	
B. Talked with members in your household about what to do in case of a natural disaster or emergency?	62.4%	13.9%	20.1%	3.6%	
C. Developed a "Household/Family Emergency Plan" in order to decide what everyone would do in the event of a disaster?	38.5%	24.6%	33.8%	3.1%	
D. Prepared a "Disaster Supply Kit" (Stored extra food, water, batteries, or other emergency supplies)?	46.2%	27.1%	26.1%	0.5%	
E. In the last year, has anyone in your household been trained in First Aid or Cardio-Pulmonary Resuscitation (CPR)?	35.4%	3.1%	57.9%	3.6%	
F. Have you secured your water heater, cabinets and bookcases to the wall?	31.8%	6.0%	56.7%	3.0%	2.5%
G. Have you fit your gas appliances with flexible connections?	25.6%	1.0%	14.1%	2.0%	57.3%
H. Used fire-resistant building or roofing materials?	54.0%	2.5%	28.3%	6.1%	9.1%
I. Secured your home to its foundation?	54.4%	2.1%	26.4%	7.3%	9.8%
J. Braced unreinforced masonry, concrete walls, and chimney?	20.3%	2.0%	31.5%	9.1%	37.1%
K. Elevated your home in preparation for floods?	6.5%	1.0%	20.1%	9.5%	62.8%

Source: Household Natural Hazards Preparedness Survey, Oregon Partnership for Disaster Resilience, (November 2007)

Preferred Sources and Formats of Information

To develop and implement effective outreach and education activities, it is important to understand the mechanisms for information dissemination. Of the listed organizations that might provide information to households about household preparedness for natural disasters, respondents most frequently preferred the fire department or rescue organization. Figure 5 shows that schools were the least preferred organization to be the primary information source.

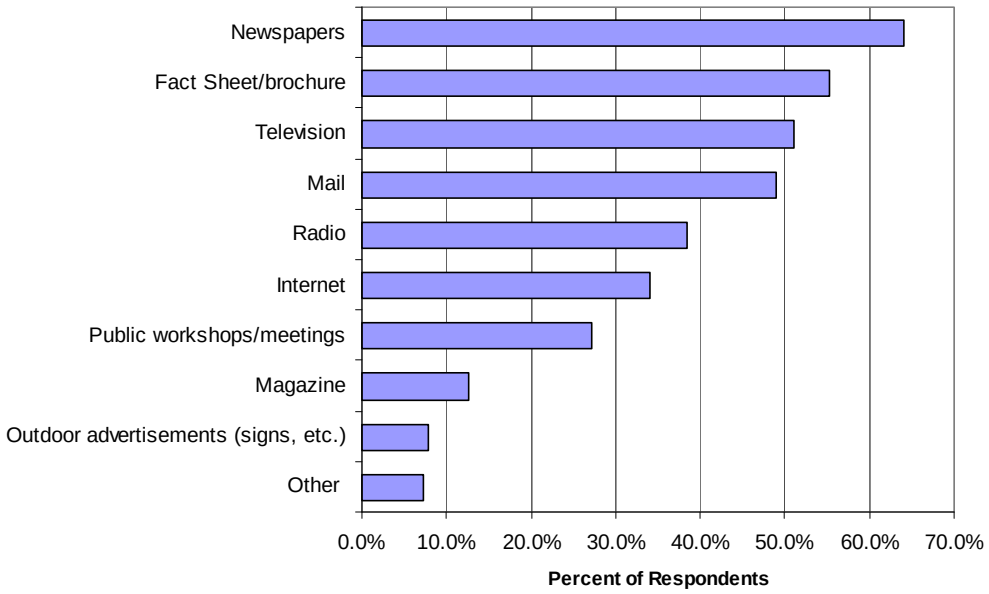
Figure 5. Survey Respondents' Preferred Sources of Information Regarding Household Preparedness



Source: Household Natural Hazards Preparedness Survey, Oregon Partnership for Disaster Resilience, (Nov. 2007)

When asked what the most effective way was to receive information, respondents indicated that the local newspaper (64%), fact sheet/brochure (55%), television (51%), and mail (49%) were the most effective. Figure 6 shows how survey respondents rated the effectiveness of dissemination methods presented in the survey.

Figure 6. Survey Respondents' Ranking of Effectiveness of Selected Preparedness Outreach Methods



Source: Household Natural Hazards Preparedness Survey, Oregon Partnership for Disaster Resilience, (November 2007)

Section V. Community Natural Hazard Preparedness

To assist the preparation of natural hazard mitigation plans, it is essential to understand the importance community members place on specific community-level risk reduction actions. These questions could help Coastal communities determine their citizens' priorities when planning for natural hazards. They also provide an idea of which types of risk reduction strategies citizens would be willing support. Table 6 illustrates the importance respondents placed on each potential natural hazard goal.

Over 95% of respondents indicated that it is very important or somewhat important to protect private property, protect critical facilities, and protect and reduce damage to utilities. The statement with the lowest priority (74%) is to protect historical and cultural landmarks.

Table 6. Survey Respondents' Goal Prioritization

Statements	Very Important	Somewhat Important	Neither Important nor Unimportant	Not Very Important	Not Important
A. Protecting private property	66.0%	29.0%	2.0%	2.5%	0.5%
B. Protecting critical facilities (e.g., transportation networks, hospitals, fire stations)	90.5%	8.5%	0.5%	0.5%	0.0%
C. Preventing development in hazard areas	58.7%	28.9%	9.0%	2.0%	1.5%
D. Enhancing the function of natural features (e.g., streams, wetlands)	49.0%	32.0%	11.5%	5.0%	2.5%
E. Protecting historical and cultural landmarks	26.4%	48.3%	15.9%	5.0%	4.5%
G. Protecting and reducing damage to utilities	74.1%	24.4%	1.0%	0.0%	0.5%
H. Strengthening emergency services (e.g.,- police, fire, ambulance)	73.4%	20.7%	3.9%	1.5%	0.5%
I. Disclosing natural hazard risks during real estate transactions	64.9%	25.7%	6.4%	2.0%	1.0%

Source: Household Natural Hazards Preparedness Survey, Oregon Partnership for Disaster Resilience, (Nov. 2007)

There are a number of activities a community can undertake to reduce the risk from natural hazards. These activities can be both regulatory and non-regulatory. Table 7 shows respondents' general level of agreement regarding the community-wide strategies included in the survey.

Table 7. Survey Respondents' General Level of Agreement by Percentage Regarding Community-wide Strategies

Community-wide Strategies	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Not Sure
A. I support a regulatory approach to reducing risk.	19.4%	36.7%	20.4%	9.2%	9.7%	4.6%
B. I support a non-regulatory approach to reducing risk.	15.1%	41.1%	27.6%	7.3%	3.1%	5.7%
C. I support a mix of both regulatory and non-regulatory approaches to reducing risk.	27.3%	37.9%	18.7%	7.1%	3.5%	5.6%
D. I support policies to prohibit development in areas subject to natural hazards.	37.0%	36.0%	15.0%	6.5%	2.0%	3.5%
E. I support the use of tax dollars (federal and/or local) to compensate land owners for not developing in areas subject to natural hazards.	6.1%	8.1%	28.4%	33.5%	20.3%	3.6%
F. I support the use of local tax dollars to reduce risks and losses from natural disasters.	8.5%	46.3%	23.4%	9.0%	6.5%	6.5%
G. I support protecting historical and cultural structures.	12.5%	50.5%	27.0%	5.5%	2.5%	2.0%
H. I would be willing to make my home more disaster-resistant.	23.0%	52.0%	19.5%	2.0%	0.5%	3.0%
I. I support steps to safeguard the local economy following a disaster event.	21.6%	52.8%	18.6%	1.5%	1.5%	4.0%
J. I support improving the disaster preparedness of local schools.	39.8%	46.8%	10.9%	1.5%	0.0%	1.0%
K. I support a local inventory of at-risk buildings and infrastructure.	24.8%	46.5%	21.3%	2.5%	1.0%	4.0%
L. I support the disclosure of natural hazard risks during real estate transactions.	8.5%	46.3%	23.4%	9.0%	6.5%	6.5%

Source: Household Natural Hazards Preparedness Survey, Oregon Partnership for Disaster Resilience, (Nov. 2007)

As shown in Table 7, 87% of respondents indicated that they strongly agree or agree improving the disaster preparedness of local schools. Conversely, only 14% indicated that they strongly agree or agree to the use of tax dollars to compensate land owners for not developing in areas subject to natural hazards.

Summary

Survey respondents are most concerned about wind storms, earthquakes, and severe winter storms. Only half of them considered the possible occurrence of a natural hazard when they bought their homes. However, approximately sixty percent have talked with members of their household about what to do in the case of a natural hazard and twenty-five percent plan to develop a "Household/Family Emergency Plan". The best way to

communicate with these survey respondents is through the newspaper and they prefer information from the fire or rescue department. They think that the community should be involved in preparing for natural disasters, specifically by improving the preparedness of schools and developing a local inventory of at-risk buildings.

Open-ended Survey Responses

Q3.1 If "NO" for flood, what is the main reason your household doesn't not have insurance for flood events? (Other)

- Location not likely to be flooded
- The insurance companies use "act of god" as a clause for getting out of paying Insurers
- Located 200 ft above Col. River
- Had flood insurance 3 years. They did not send yearly bill around 2002. By the time I realized it my policy lapsed. To renew the premium doubled.

Q4.1 If "NO" for earthquake, what is the main reason your household does not have insurance for earthquake events? (Other)

- Never talked to insurance agent about it
- An insurance company likely not to pay out on large catastrophic widespread events…example is Katrina.
- Have not checked
- Rent
- The insurance companies use "act of god" as a clause for getting out of paying Insurers
- Would have to modify foundation
- Inspection rq'd not done
- Event unlikely
- Did not cover in the event of tsunami tidal surge
- No common earthquake action, but they expect a big one
- Faults offshore, homes on solid rock

Q12 County

- Clatsop (38)
- Coos (61)
- Curry (14)
- Douglas (5)
- Lane (18)
- Lincoln (36)
- Tillamook (24)

Q15 Please indicate your level of education (Other)

- Hotel-Motel MGMT
- Art

- State Certified CNA
- CDA
- Fire/police certified

Q17 Do you rent/own? (Other)

- Trailer (3)
- Single apartment over garage
- Cattle Ranch
- Mobile
- Farm
- Travel Trailer
- Business
- 2nd home/commercial
- Lakefront property

Q18 If you have lived in Oregon for less than 20 years, in what state did you live before you moved to Oregon? (Other)

- Arizona (2)
- Arkansas
- Florida (2)
- Louisiana
- Maine
- Maryland
- Minnesota
- Missouri
- Nevada (3)
- New York (3)
- North Carolina
- Ohio
- Pennsylvania
- Texas
- Utah (2)
- Vermont
- Wisconsin
- U.S.A.F-moved a lot
- 4th gen. Oregon
- Canada

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

- Had earthquake insurance with Allstate, but the now no longer cover earthquakes. Terribly expensive to pick it up elsewhere!!!
- I do not believe the government (i.e. tax dollars) or insurance co. should be required to cover losses in areas known to be subjected to frequent natural risk.

- If building in known hazard area- any services needed in time of an emergency-should be paid by the builder/owner.
- Living on high hill in Astoria, Oregon. Have summer home at Cannon Beach, Oregon. Risky, as close to the ocean, but town has warning whistles, and good escape routes to high hills for safety.
- If this questionnaire is being used to assess individual preparedness in the event of a disaster, then I applaud it. I f it is going to be used to implement invasive, expensive gout programs to "safeguard" us, please reconsider. Political finger-pointing, has never been a good, substitute for well-trained, organized local efforts by police, fire, church, and individuals. Some will always be unprepared and some will be capable.
- Some areas of our valley (Hidden Valley-Toledo, OR) are in flood plain. I have neighbors with a great deal of their ranch –that is wetlands-for last several months-they have been spreading human waste over a large area. Water sources have been affected-Animals have been affected-also bringing in untreated animals-running them on human waste-they have brought in black-leg and pink eye-among other disasters in our area-including overuse of Round Up.
- I would be interested to hear your findings from this survey.
- I work for Oregon State Parks about 15 miles from our community. In order to take the job, I had to agree to have an emergency survival pack fro 2 persons, including an axe and first-aid kit for sutures, or sign a waiver stating OSP would not be responsible if I got stuck unprepared. I was amazed; given a list of necessary items I would need but never thought of (i.e. can opener, alcohol (whiskey), and H2O purification tabs). Educate.
- We took down a beautiful fir tree in front yard in 2006 because of possible falling hazard to house, wires and neighbors. More people should do more tree/shrub/brush trimming for falling/other hazards.
- New buildings should be required to be built to current knowledge for protection of feature occupants and hazards should be revealed on sale of any property.
- I hope you are using this information to educate. Non-regulatory education programs should be an incentive for home owners/land owners to get breaks on their insurance. Personally, I feel Insurance/other agencies use disasters to pump up economics (Disaster economics).
- With on degree in Geology and one in Biology, I'm painfully aware of where I live and I'm probably more prepared for an earthquake or tsunami than anyone living in my town. Enough said…
- Volunteer firefighter for 35 years. When possible, own generator.
- We live in a flood, fire, landslide, earthquake prone state…Most citizens are ignorant of that fact…That needs to change!
- Too many are either unaware or hazards or choose to disregard them, especially if doing so is more financially beneficial to them personally. Thank you for your efforts and interest pertaining to disaster preparedness.

- People who insist on developing in flood hazard and landslide hazard areas should not receive tax dollars to rebuild after a disaster.
- Since I live alone and in a very rural area, a lot of the questions do not necessarily affect me.
- Government intervention stops many projects near our small community. I am leery or our Willamette Valley. They control our communities with their uneducated ideas. What is happening in my community?
- Thank you.
- This state does not need more government to regulate citizens. LCDC is an excellent example of polarizing the public!
- A lot of planning needs to be done. We live in an area where there are many senior citizens who would need help in an emergency. With our tall trees, fire could easily cause a great problem, but no one seems to be concerned. We are! Thanks for your efforts. Keep it going.
- We need to plan to deal with the possibility that bridges along the Oregon coast might be damaged such as from an earthquake or tsunami. If bridges cannot be reinforced, then they should be replaced with more earthquake resistant structures. Also, if the coastal area would be cut off, can supplies be airlifted in? Is there such a plan in place? What about fuel supplies for emergency vehicles? How much medicine should one stockpile for emergencies?
- I would gladly do all I could to protect my family & home – cost is an obstacle, especially for home reinforcement. It is certainly hard to trust FEMA, et al – easier to trust local author. As more personally invested, but again, resources are a likely problem. Thanks for the chance to be involved.
- Disaster preparedness procedures for the disabled in resource poor areas.
- Preparing for natural disasters falls off the radar screen for most busy households! Unless it is in front of us (like the "Enter tsunami zone" signs) to remind us that we should be prepared, aware, plan for, etc. it just won't happen. The California wildfires showed us that recently.
- Living on the coast in Pacific City, the concern of a tsunami and its impact. How to deal with loss of roads, bridges, possibly home, etc.
- Our neighborhood has a disaster preparedness committee & information in our local phone book. We store water & water.
- The one disaster prep in this area is the tsunami warning. Every time they announce a trial run the locals all run to the ocean to see the "big wave" arrive. I can only envision more tax dollars wasted on such endeavors.
- I spent several hours reviewing this before answering. In my opinion it tells you nothing!! The information requested is too vague! It is biased in both political & financial concepts of the person filling it out. An example – I am totally opposed to development in hazard areas, but I support Measure 39 & oppose Measure 49. Government doesn't belong in this business because the wealthy are opposed can fight regulation,

but the middle & lower class cannot!! You have not dealt w/the interagency & intra-agency jurisdictional process that resulted in the Katrina fiasco. No one wants to be in charge (except egoist law enforcement) due to issues of liability & probably court & legal processes. No one has budgets for interagency tracking nor will agencies respond using the NIMNS structure. No agency is willing to release authority nor take on responsibility beyond what scope is provided by legislative action. I worked 27 years in emergency response in 4 different counties – you just can't make it happen. When the big one comes you better duck!!

- I believe it is unethical & often tragic to allow building on hazardous areas. Extremely short-sighted – self-defeating – to allow building on fragile ecosystems. I have to work to remember that the word "developer" is not a curse. Obviously, some developers are meticulous ethical. I feat that very few are & money motivates!
- Both husband & wife answered questions.
- Q-6. None of these choices are what I would describe as a "preferred choice!"
- I support any federal money to help/assist families upgrading homes and so on. Also, to assist emergency services (medical, FD), use of National Guard/Military to enforce public safety. DO NOT SUPPORT any spending for local gov. Private business, developers – these only help rich get richer at the expense of poor & middle class.
- Coastal communities are isolated by mountains to the east. Hwy 101 is the only link north & south and to roads leading east. Tsunamis are forecasted to hit Hwy 101, isolating many communities. I have seen nothing to indicate any planning to help isolated areas, nor plans to build additional roads.
- I think this subject is important and there are reasons why to bring it up. However, the chance of a natural disaster is very slim. I worry more about being in war with other nations. I also worry about issues like finding a better job, my son to go to a drug-free school, and to improve my financial and moral status for the good of my family!

Appendix E: Grant Programs

Hazard Mitigation Programs

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/government/grant/hmgp/
- 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/services/disasterassistance/index.html

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/government/grant/pdm/index.shtm
- 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/government/grant/fma/index.shtm

Detailed program and application information for federal post-disaster and pre-disaster programs can be found in the FY10 Hazard Mitigation Assistance Unified Guidance, available at http://www.fema.gov/library/viewRecord.do?id=3649

For Oregon Emergency Management grant guidance on Federal Hazard Mitigation Assistance, visit: http://www.oregon.gov/OMD/OEM/plans_train/grant_info/hma.pdf

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://www.hud.gov/offices/cpd/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.oweb.state.or.us/

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&org=SES

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/plan/prevent/fhm/index.shtm
- 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/ncgmpstandards/
- 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/

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://www.hud.gov/offices/cpd/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/NFP/index.shtml
- 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.firegrantsupport.com/
- 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/programs/EWP/
- Rural Development Assistance – Utilities, USDA. Direct and guaranteed rural economic loans and business enterprise grants to address utility issues and development needs. http://www.usda.gov/rus/
- 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/rhs/
- 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/government/grant/pa/index.shtm

- 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/business/nfip/
- 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://www.hud.gov/offices/cpd/communitydevelopment/programs/dri/driquickfacts.cfm
- Emergency Management Performance Grants, FEMA. Helps state and local governments to sustain and enhance their all-hazards emergency management programs. http://www.fema.gov/government/grant/empg/index.shtm#0
- 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.doi.gov/partnerships/wetlands.html
- 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/flp_questions.html
- Wetlands Reserve program, USDA-NCRS. Financial and technical assistance to protect and restore wetlands through easements and restoration agreements. http://www.nrcs.usda.gov/Programs/WRP/
- Secure Rural Schools and Community Self-Determination Act of 2000, US Forest Service. Reauthorized for FY2008-2011, 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.fed.us/srs/

More resources at: http://www.oregonshowcase.org/stateplan/part4
(Click on Appendix 5 of the State's Enhanced Natural Hazard Mitigation Plan: Hazard Mitigation Funding Programs)