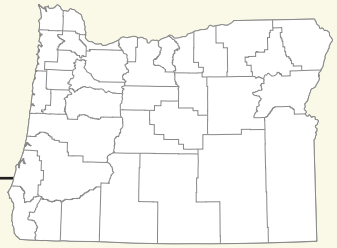
Coos County

Multi-Jurisdictional Natural Hazards Mitigation Plan



Report for: Coos County and the cities of Bandon, Coos Bay, Coquille, Lakeside, Myrtle Point, North Bend, and Powers

Photos: Gary Halvorson, Oregon State Archives

Coos County

Multi-jurisdictional
Natural Hazards Mitigation Plan

Plan for:

Coos County
Bandon
Coos Bay
Coquille
Lakeside
Myrtle Point
North Bend
Powers

Prepared by:

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

July 2010

PARTNERSHIP FOR DISASTER RESILIENCE
OPDR.UOREGON.EDU

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

FEMA

August 27, 2010

Kevin Stufflebean, Chair
Coos County Board of Commissioners
250 N. Baxter
Coquille, Oregon 97423

Dear Chairman Stufflebean:

The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has approved the ***Coos County Multi-Hazard Mitigation Plan*** as a multi-jurisdictional local plan as outlined in 44 CFR Part 201. With approval of this plan, the following entities are now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through August 27, 2015:

Coos 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,

for

Mark Carey, Director
Mitigation Division

Enclosure

cc: Dennis Sigrist, Oregon Emergency Management

BH:bb

BOARD OF COMMISSIONERS
COUNTY OF COOS
STATE OF OREGON

In the Matter of adoption of the Natural Hazard Mitigation Plan for Coos County by the Coos County Board of Commissioners.	RESOLUTION _10-06-085C__

NOW BEFORE THE Board of Commissioners sitting for the transaction of County Business on the 6th day of July 2010, is the approval and adoption of the Natural Hazard Mitigation Plan for Coos County by the Board of Commissioners.

WHEREAS, Coos 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, Coos County fully participated in the FEMA-prescribed mitigation planning process to prepare this five-year update to the *Coos 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 *Coos County Multi-Jurisdictional Natural Hazards Mitigation Plan* dated July 18, 2005, updated (May 10, 2010), and pre-approved (June 23, 2010) contingent upon this official adoption of the participating governments and entities;

NOW, THEREFORE, BE IT RESOLVED, that the Coos County Commission adopts the *Coos County Multi-Jurisdictional Natural Hazards Mitigation Plan* dated July 18, 2005 and updated (July 6, 2010); and

BE IT FURTHER RESOLVED, the Coos County Commission 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 7th day of July, 2010.

BOARD OF COMMISSIONERS

Chair

Commissioner

Commissioner

Approved as to form:

Office of Legal Counsel

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
- Department of Land Conservation and Development (DLCD)
- Coos County

Project Steering Committee:

- Coos County Emergency Management
- Coos County Planning Department
- US Department of Agriculture Farm Service Agency Coos/Curry
- City of Powers
- City of Myrtle Point
- City of Bandon
- City of Lakeside
- City of Coquille
- City of Coos Bay
- City of North Bend
- City of Lakeside
- Coos County Road Department
- Oregon State Parks
- Coos County Public Health

Project Managers:

- Glenda Hales, Coos County Emergency Management Program Manager
- Gregoor Passchier, Oregon Partnership for Disaster Resilience
- Josh Bruce, Oregon Partnership for Disaster Resilience

Community Service Center Staff:

Andre LeDuc, Director, Oregon Partnership for Disaster Resilience

Krista Dillon, Associate Director, Oregon Partnership for Disaster Resilience

Josh Bruce, Project 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

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Executive Summary

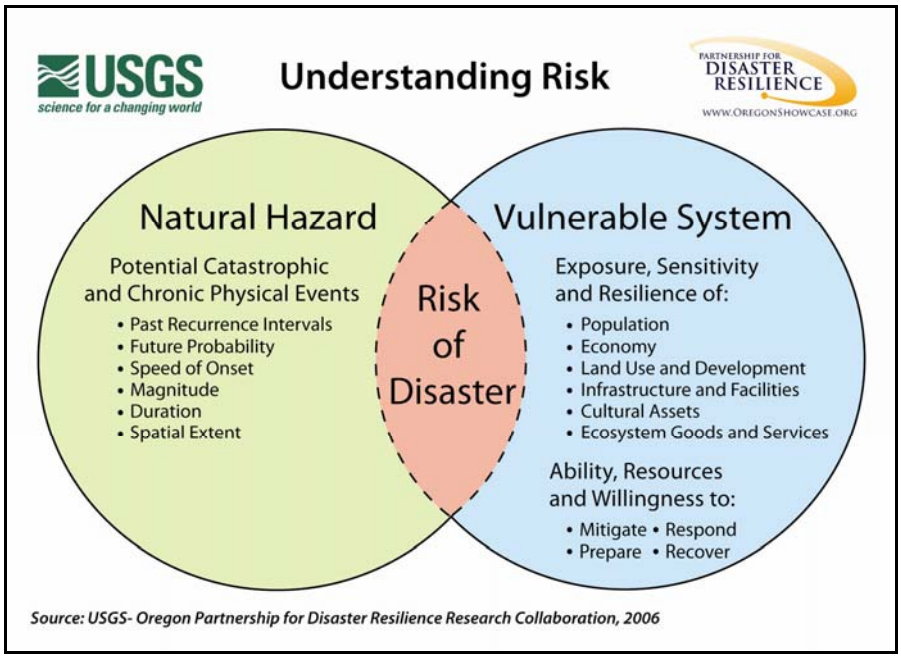
Coos County developed this multi-jurisdictional Natural Hazard Mitigation Plan in an effort to reduce future loss of life and damage to property resulting from natural hazards. This plan was developed with and for the following jurisdictions: Coos County and the cities of Bandon, Coos Bay, Coquille, Lakeside, Myrtle Point, North Bend, and Powers. These are the same jurisdictions that were represented in the 2005 Coos 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 Coos County and the cities of Bandon, Coos Bay, Coquille, Lakeside, Myrtle Point, North Bend, and Powers reduce the risk from natural hazards by identifying resources, information, and strategies for risk reduction. It will also help guide and coordinate mitigation activities throughout the 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 Coos County become better equipped to identify and implement actions aimed at reducing the overall risk to natural hazards.

Who Participated in Updating the Plan?

The 2010 update of the Coos 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 Coos County Natural Hazard 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 Coos County Emergency Management Program Manager served as the convener for Coos County's Natural Hazards Mitigation Plan update process. The Emergency Management Program Manager developed a new plan steering committee to review and update the mitigation plan and to oversee the plan update 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 County Emergency Management
- Coos County Planning
- USDA Farm Service Agency Coos/Curry
- City of Powers
- City of Myrtle Point
- City of Bandon
- City of Lakeside
- City of Coquille
- City of Coos Bay
- City of North Bend
- City of Lakeside
- Coos County Road Department
- Oregon State Parks
- Coos County Public Health

The Coos County Emergency Management Program Manager 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 of the mitigation plan. Public involvement in the planning process was achieved by including members from different organizations to provide representation in the steering committee meetings, engaging the public in a final plan review, conducting stakeholder interviews with various county departments, and submitting drafts of the mitigation plan to various community organizations for review, which included:

- Saltwater conservation groups
- Coos Forest Protective Association
- Lakeside Community Development Group
- Port of Coos Bay
- Port of Bandon
- Coos Soil and Water Conservation District
- Airport District
- Coquille Tribe

Finally, as part of the regional Pre-Disaster Mitigation planning grant, OPDR implemented a region-wide household preparedness survey in January 2008 to engage the public in disaster planning. 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. While the survey gathered information on community members' attitudes of household risks to natural hazards, the survey also served to remind residents of the need to prepare for natural hazard events. Results of the survey are documented in an independent report in Appendix D.

What is the Plan's Mission?

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

Create a disaster resilient Coos County.

What are the Plan Goals?

The plan goals describe the overall direction that the participating jurisdictions' agencies, organizations, and citizens can take toward mitigating risk from natural hazards. The goals for the Coos 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 a matrix (located at the end of this summary), which lists all the multi-hazard and hazard-specific action items included in the mitigation plan. Data collection and research and the public participation process resulted in the development of these action items. The action item matrix portrays the overall plan framework and identifies linkages between the plan goals, and actions. The matrix documents the title of each action along with the coordinating organization, timeline, and the plan goals addressed.

How will the plan be implemented?

The plan maintenance section of this plan details the formal process that will ensure that the Coos County Natural Hazards Mitigation Plan remains an active and relevant document. The plan will be implemented, maintained and updated by a 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 Coos County Emergency Program Manager 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 Coos 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.

Coos 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, outreach, and awareness	Protect Natural and Cultural Resources
Coastal Erosion # 1	Monitor rates of coastal erosion in areas zoned for development and reassess development standards to prevent damage to future buildings and infrastructure.	Oregon State Parks	Coast Watch, County Road Department, Planning Department, County Commission, ODOT, OSU Marion Biology Extension Office, DLCD	LT		X				X
Earthquake # 1	Encourage residents and businesses to consider the purchase of earthquake insurance.	Coos County Emergency Management	Coos County Commissioners, DOGAMI, Private Insurers, FEMA, State of Oregon Insurance Division	Ongoing	X		X			
Earthquake # 2	Conduct regular earthquake safety drills.	Coos County Emergency Management	County and city governments, local businesses, schools hospital, police, fire, American Red Cross, FEMA, OEM	Ongoing	X			X	X	
Earthquake # 3	Have local emergency responders continue to take bridge assessment classes.	Coos County Emergency Management	County Road Department, ODOT	Ongoing		X				

Flood # 1	Continue to review and assess the county's floodplain ordinance to determine whether it meets current National Flood Insurance Program (NFIP) requirements.	County Planning	County Commission, Planning Commission, FEMA, DOGAMI, DLCD	LT	X	X	X	X		
Flood # 2	Take steps for the county to qualify for participation in the National Flood Insurance Program's (NFIP) Community Rating System.	Coos County Planning	Coos County Road Department, FEMA, OEM, CRS Program, Property Owners Impacted	LT	X	X				
Flood # 3	Update the county's Flood Insurance Rate Maps (FIRM).	Coos County Planning	County Commission, Planning Commission, FEMA, DOGAMI, DLCD	LT	X	X	X	X		
Flood # 4	Conduct an analysis of flooding issues in the Libby Drainage District and Englewood Diking District and develop mitigation strategies to prevent future floods from damaging property in the area.	Englewood Diking District	Coos County Planning, Coos County Emergency Management, Army Corps of Engineers, FEMA, OEM, Libby Drainage District	LT	X	X		X		X
Flood # 5	Complete a risk analysis for the flood hazard using newly acquired Light Detection and Ranging (LIDAR) data.	Coos County Planning	Coos County Emergency Management, DOGAMI, FEMA, OEM	ST		X		X		
Flood # 6	Consult with property owners and explore mitigation actions for repetitive flood loss properties in Coos County.	Coos County Emergency Management	Coos County Planning, FEMA, OEM, DLCD	ST		X		X		
Landslide # 1	Assess LIDAR maps to evaluate development in hazardous areas.	Coos County Planning Department	Coos County Emergency Management, DOGAMI, FEMA, DLCD	ST	X	X				
Landslide # 2	Continue to track landslide events along major roadways and develop appropriate mitigation measures.	Coos County Road Department	Coos County Planning, Emergency Management, ODOT, FEMA, DOGAMI	Ongoing	X	X	X			

Tsunami # 1	Conduct regular tsunami evacuation drills.	Coos County Emergency Management	Coos County Planning, Sheriff, Oregon State Parks, DOGAMI, FEMA, DLCD	Ongoing	X			X	X	
Wildfire # 1	Develop a Community Wildfire Protection Plan.	Coos County Emergency Management	Coos Forest Protective Association, BLM, Oregon Department of Forestry, US Forest Service, cities, property owners	ST	X	X	X	X		X
Wildfire # 2	Encourage new and existing developments in the WUI to incorporate wildfire mitigation measures and ensure adequate emergency access.	Coos Forest Protective Association (CFPA)	Coos County Planning, Coos County Emergency Management, Oregon Department of Forestry, FEMA	Ongoing	X	X				X
Wildfire # 3	Through multi-agency coordination, continue abatement efforts to control noxious weeds, specifically Gorse, Scotch Broom and Butterfly Brush.	Coos Forest Protective Association (CFPA)	Coos County Planning, Emergency Management, Oregon Department of Forestry, FEMA, BLM, ODOT, cities, logging companies	Ongoing	X	X				X
Wind Storm # 1	Educate the public about the dangers of downed power lines after a windstorm.	Coos-Curry Electric Cooperative	Coos County Emergency Management, Coos County Planning, Sheriff, Cities, Rural Fire Departments	Ongoing	X					
Wind Storm # 2	Encourage all critical facilities to have backup power and/or emergency operations plans in place to deal with power outages.	Coos County Emergency Management	County Road Department, FEMA, OEM	LT	X	X				
Wind Storm # 3	Upgrade lines and poles to improve wind loading and underground critical power lines.	Coos-Curry Electric	Coos County Road Department, Coos County Emergency Management, other public utilities	LT		X	X			
Wind Storm # 4	Enhance strategies for debris management for severe wind storm events.	Coos County Emergency Management	Coos Road Department, Public utilities, ODOT	LT		X	X			

Multi-Hazard # 1	Identify and disseminate information regarding alternate transportation routes.	Coos County Road Department	County Sheriff, Coos County Emergency Management, 911 Dispatch, Coos Forest Protective Association, ODOT	LT	X				X	
Multi-Hazard # 2	Develop risk assessment maps to show areas at risk for all hazards.	Coos County Planning Department	County Road Department, DOGAMI, FEMA, OEM	ST	X	X				
Multi-Hazard # 3	Establish mutual aid agreements between government agencies and commercial businesses in the event of an emergency (e.g. fuel, heavy equipment, food, etc.)	Coos County Emergency Management	Coos Road Department, Sheriff, local businesses, Curry County, FEMA, OEM	ST	X		X	X		
Multi-Hazard # 4	Educate and encourage major businesses, service providers, schools, and governmental organizations to develop continuity of operations plans.	Coos County Emergency Management	All county departments, cities, Chamber of Commerce, OPDR	LT			X	X		
Multi-Hazard # 5	Develop a post-disaster recovery plan for Coos County.	Coos County Emergency Management	All county departments, County Commission, Fire Department, Sheriff Department, cities, OPDR	ST			X	X		
Multi-Hazard # 6	Encourage citizens and businesses to prepare and maintain provisions for one week without services.	Coos County Emergency Management	Coos County Sheriff, Fire Departments, Rural Fire Districts, hospitals, cities	LT	X				X	
Multi-Hazard # 7	Incorporate the natural hazards mitigation plan into the Coos County Comprehensive Plan.	Coos County Planning Department	County Commission, Planning Commission, FEMA, DLCD	Ongoing					X	
Multi-Hazard # 8	Continue public education efforts about the natural hazards Coos County is vulnerable to and mitigation measures residents can implement.	Coos County Emergency Management	All County Departments, Coos Forest Protective Association, DOGAMI, OEM, USGS, ODF, Oregon State Parks	Ongoing	X	X	X		X	
Plan Implementation # 1	Consider adopting the South Coast Emergency Management Advisory Committee as the coordinating body for the Coos County Natural Hazards Mitigation Plan.	NHMP Coordinating body	Coos County Emergency Management, Curry County, SCEMAC members	ST				X		

Section 1:
Introduction

What is Natural Hazard Mitigation?

Natural hazard mitigation is defined as permanently reducing or alleviating the losses of life, property and injuries resulting from natural hazards through long and short-term strategies. Example strategies include policy changes, such as updated ordinances, projects, such as seismic retrofits to critical facilities, 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.

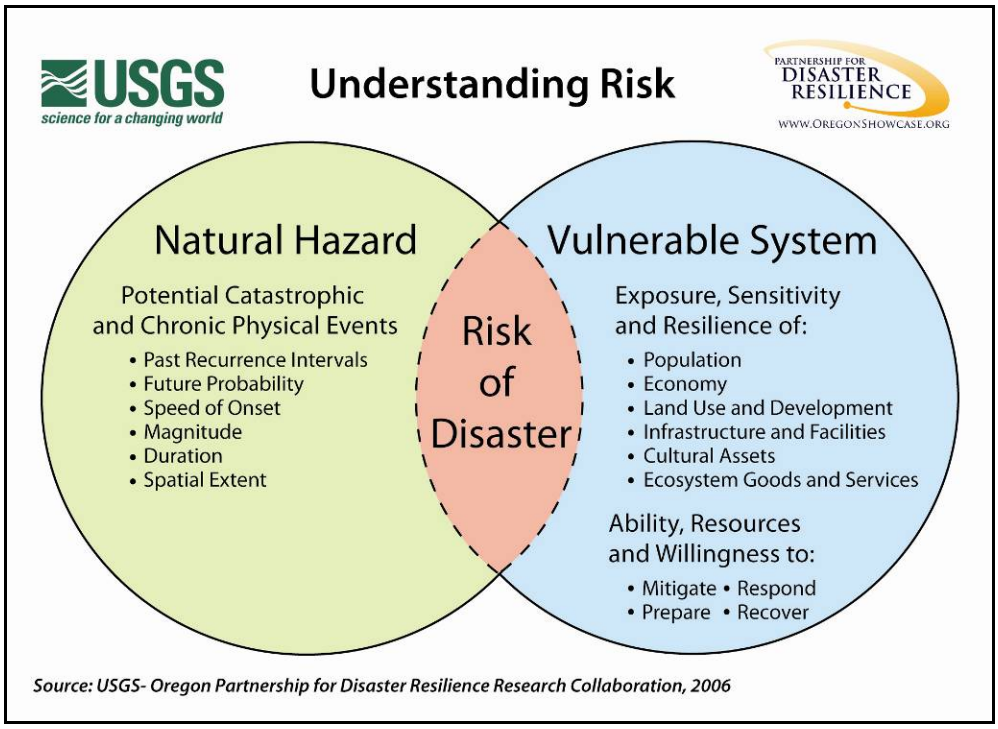
Engaging in mitigation activities provides jurisdictions with a number of benefits, including reduced loss of life, property, essential services, critical facilities and economic hardship; reduced short-term and long-term recovery and reconstruction costs; increased cooperation and communication within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

Why Develop a Mitigation Plan?

Coos 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: Coos County and the cities of Bandon, Coos Bay, Coquille, Lakeside, Myrtle Point, North Bend, and Powers. These are the same jurisdictions that were represented in the 2005 Coos County Natural Hazards Mitigation Plan. It is impossible to predict exactly when natural 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 used throughout the plan to illustrate the concepts of risk reduction.

Figure 1.1. Understanding Risk



A natural hazard mitigation plan can assist Coos 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 Coos 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 Coos County Oregon, which include coastal erosion, drought, earthquake, flood, landslide, tsunami, wildfire, 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) indicates 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 its risk from natural hazards by identifying resources, information, and strategies for risk reduction.

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

[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 and framework 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 Coos County Comprehensive Plan, the Coos County Zoning and Land Development Ordinance, the Coos County Emergency Response and Recovery Plans, the Coos, Curry, Douglas Six-Year Regional Investment Strategy, the Coos County Transportation Systems Plan, and the State of Oregon Natural Hazards Mitigation Plan.

The plan provides a set of actions that, if implemented, will reduce Coos County's vulnerabilities to natural hazards. Proposed actions include preventative activities, property protection strategies, public education and awareness, natural resource protection, 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, Coos County hired the President of Diversified Safety Management to develop the Coos 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. Glenda Hales, Coos County Emergency Management Program Manager, 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 to develop the plan;
2. Identifying natural hazards;
3. Identifying local vulnerabilities;
4. Developing plan goals and action items;
5. Finalizing the mitigation plan
6. Public Involvement

Coos County received formal approval for its Natural Hazards Mitigation Plan on July 18, 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

Following Coos County's formal approval of the natural hazards mitigation plan, the Coos County Emergency Management Program Manager convened quarterly meetings with the Coos County Natural Hazard Mitigation Committee (Committee) to discuss available grant programs and mitigation activities. The Committee consisted of representatives from the following organizations:

- Coos County Emergency Management
- Coos County Planning
- Coos County Roads
- South Coos Hospital
- City of Bandon
- City of Coos Bay
- City of Coquille
- City of Lakeside
- City of Myrtle Point
- City of North Bend
- City of Powers
- Oregon Department of Fish and Wildlife
- Coos Forest Protection Association
- Oregon Department of Forestry
- Fairview Rural Fire Protection District
- U.S. Forest Service – Powers
- Representative for Residents – Englewood Diking District & Libby Drainage District
- Coos County Citizens Corps

A total of ten meetings were held between November 2005 and May 2008. Public involvement was achieved by opening meetings to the public and inviting a variety of community stakeholders to the meetings. Minutes for each meeting can be found in Appendix B Planning and Public Process.

2010 Plan Update Process

The 2010 update of the Coos County Natural Hazards Mitigation Plan was funded by an 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 Coos County Emergency Management Program Manager served as the convener for Coos County's Natural Hazards Mitigation Plan update process. The Emergency Management Program Manager 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 County Emergency Management
- Coos County Planning

- USDA Farm Service Agency Coos/Curry
- City of Powers
- City of Myrtle Point
- City of Bandon
- City of Lakeside
- City of Coquille
- City of Coos Bay
- City of North Bend
- City of Lakeside
- Coos County Road Department
- Oregon State Parks
- Coos County Public Health

The planning process and associated resources used to update Coos 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

Coos County Plan Update Introductory Meeting (November 2009)

On November 16, 2009, OPDR met with the Coos County Emergency Management Program Manager and representatives from the local community 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 drought and coastal erosion hazards 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 Planning and Public Process.

Plan Update Kickoff and Vulnerability Assessment Meeting (February 2010)

On February 17, 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 hazards. Using the information gathered from this meeting, OPDR updated the hazard chapters of the

Coos 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 17 meeting can be found in Appendix B Planning and Public Process.

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

On March 15, 2010, OPDR held a goals, action items, and plan implementation and maintenance work session with Coos 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 and evaluating the plan, and (6) discuss the process for prioritizing mitigation action items.

Meeting materials and sign-in sheets for the March 15 work session can be found in Appendix B Planning and Public Process.

Public Involvement

Stakeholder Interviews

As part of the county's public involvement effort, OPDR conducted stakeholder interviews with the following organizations to gather information about specific natural hazards and community vulnerabilities. These stakeholders were chosen by the Coos County Emergency Management Program Manager and represent organizations and government agencies that may be impacted by natural hazards in Coos County.

- Libby Drainage District
- Englewood Diking District
- Coos County Planning Department
- Coos Forest Protective Association (CFPA)

Information from these interviews was used to inform the mitigation plan's risk assessment and mitigation actions. Interview questions can be found in Appendix B Planning and Public Process.

Plan Review

The Coos County Steering Committee served as the primary plan review body. Upon completion of a final draft, Coos 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 Coos County website and sent to all media outlets on April 27, 2010 regarding the comment period on the draft natural hazards mitigation

plan. The Coos County website posted the following information for the public to review:

(Coquille, OR) – Coos 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, the Coos County will maintain its eligibility to apply for federal funding towards natural hazard mitigation projects.

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 Coos County Natural Hazards Mitigation Plan will be available for public comment between April 26 and May 7, 2010. Copies of the plan will be available on the Coos County website and at opdr.uoregon.edu.

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

In addition, the Coos County Emergency Management Program Manager submitted drafts of the plan to the following organizations:

- Saltwater conservation groups
- Coos Forest Protective Association
- Lakeside Community Development Group
- Port of Coos Bay
- Port of Bandon
- Coos Soil and Water Conservation District
- Airport District
- Coquille Tribe

All public outreach occurred between April 27 and May 7, 2010. The committee implemented public feedback recommendations where appropriate.

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.

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.

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 resilient Coos 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 Coos 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 five-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 hazard specific annexes included with this plan are the following:

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

Volume III: City/Special District Addendums

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

Volume IV: Resource Appendices

The resource appendices are designed to provide the users of Coos 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, stakeholder interview questions, invitation lists,

agendas, sign-in sheets, and minutes to plan maintenance 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 analyses for 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.

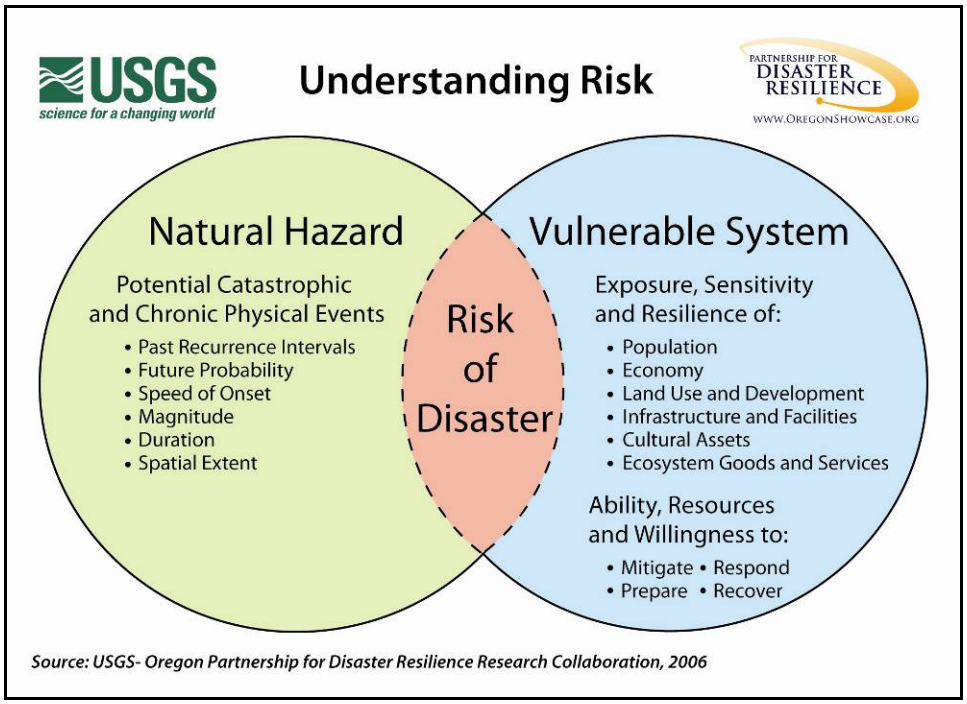
Appendix E: Grant Programs

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

Section 2:
Community Overview

The community overview describes Coos 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 in time of the current sensitivity and resilience factors in the county when the plan was developed. The information documented below, along with the hazard assessments located in the Hazard Annex, should be used as the local level rationale for the risk reduction actions identified in Section 3 – Mission, Goals, and Action Items. The identification of actions that reduce the county's sensitivity and increase its 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

Coos County is located in southwest coastal Oregon and encompasses 1,629 square miles. The county is bounded to the north and east by Douglas County, to the south by Curry County, and to the west by the Pacific Ocean.

Coos County has a diverse geography. The terrain along the coast and in the river valleys is relatively flat, while the Coast Range, which runs through majority of the county, gives the inland areas a mountainous topography. The county's highest elevation is Mt. Bolivar at 4,319 ft located in the southern portion of the county. Elevations in the Blue Ridge area in the north of the county are somewhat lower, averaging 1,600 feet. Major rivers in Coos County include the Coquille River and its tributaries in the south and the Coos River and its tributaries in the north. Figure 2.2 shows the general physiography of Coos County.

Coos 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 Range. Average January temperatures are 44.2 degrees, and average July temperatures are 60.9 degrees.[2]

Average annual rainfall in Coos County is 56.8 inches.[3] Rainfall amounts vary depending on the location. Along the lower coastal elevations, rainfall averages between 60 to 95 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 Coos County.

Although Coos 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]

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[2] Oregon Bluebook, Coos County, http://bluebook.state.or.us/local/counties/counties06.htm, accessed April 20, 2010.

[3] Ibid.

[4] Oregon Climate Service, "Climate of Coos County," http://www.ocs.orst.edu/, accessed January 13, 2010.

[5] Oregon Climate Service, "Climate of Coos County," http://www.ocs.orst.edu/, accessed January 13, 2009.

Figure 2.2. Coos County Physiography

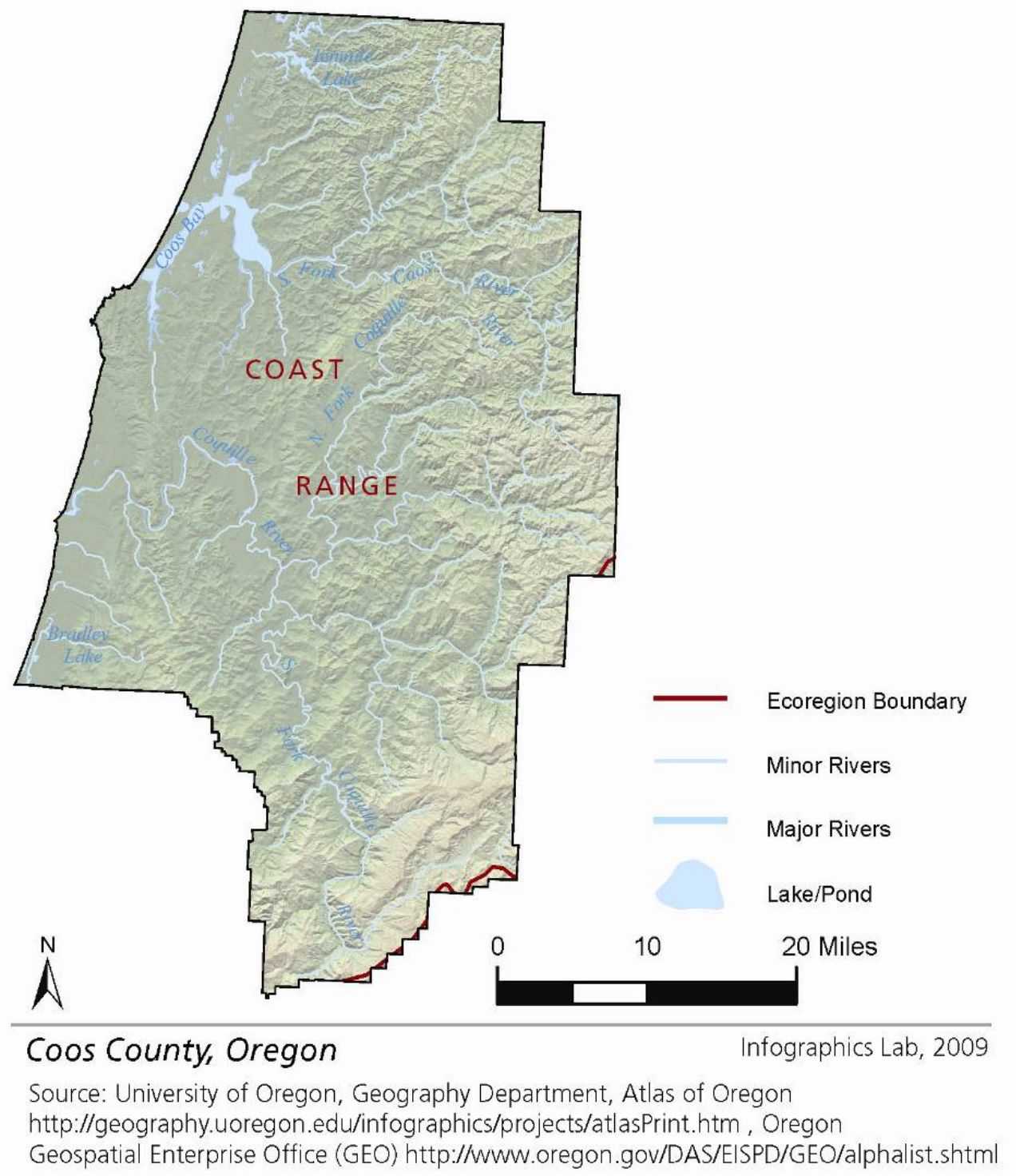
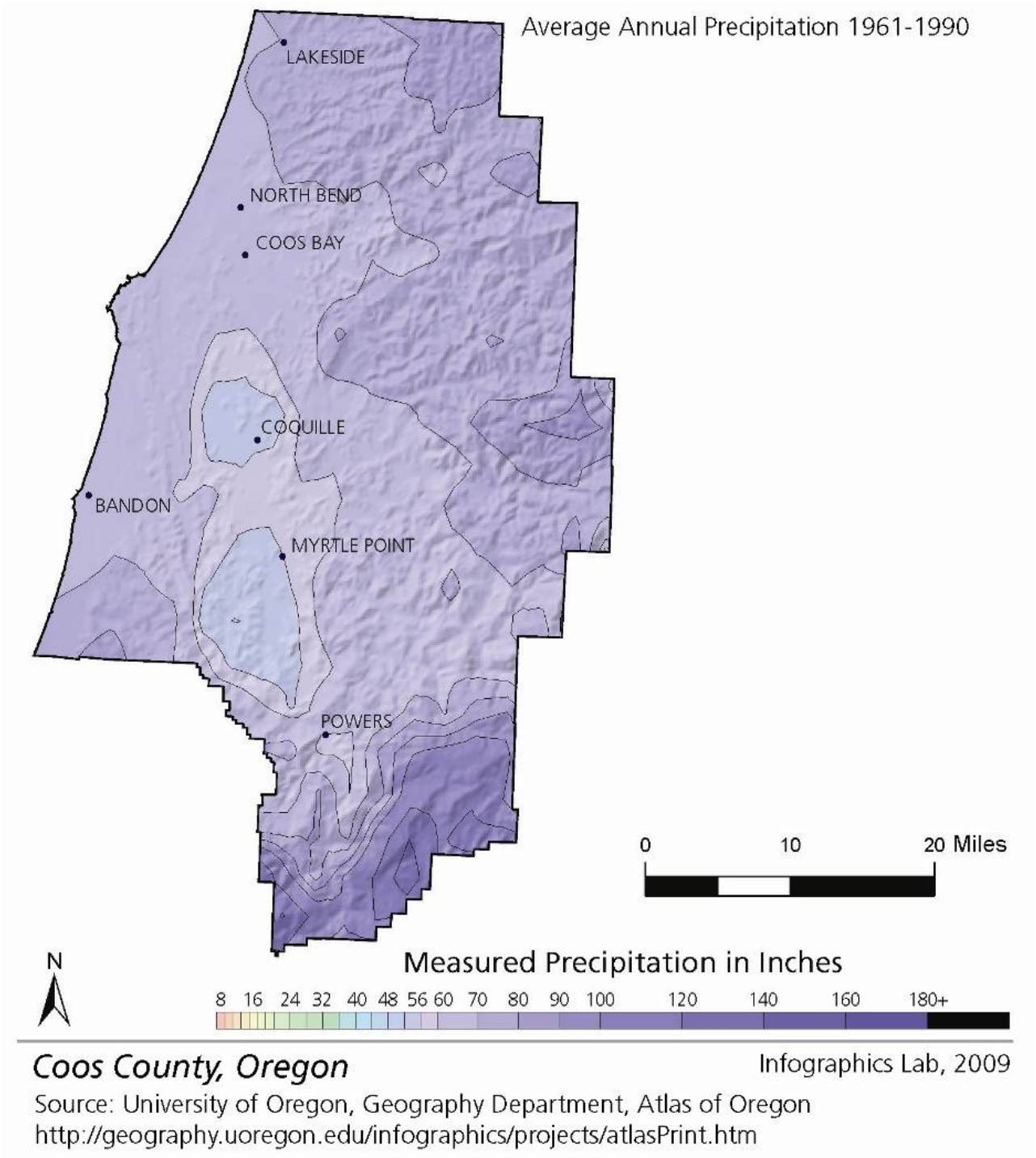


Figure 2.3. Coos County Average Annual Precipitation



Population & Demographics

Coos County has seen little population change over the past decade. In 2009, the county's population was 63,065, an increase in only 0.5% from 2000 when the population was 62,779.[6] However, the county has experienced significant demographic changes. Between 2000 and 2008, the 20 to 24 age group increased by 19.7%, the 55 to 59 age group increased by 29.8%, and the 60 to 64 age group increased by 28.8%. Conversely, population groups under age 19 saw a decline, and the 35 to 44 age group saw a population decline of 21.4%. Table 2.1 below shows Coos County's population by age.

Table 2.1. Coos County Population by Age, 2000-2008

Age Range	2000*	2008**	%Change
Under 5	3,052	2,925	-4.2%
5 to 9	3,584	3,251	-9.3%
10 to 14	4,342	3,848	-11.4%
15 to 19	4,446	4,198	-5.6%
20 to 24	2,798	3,350	19.7%
25 to 34	6,045	6,325	4.6%
35 to 44	9,020	7,086	-21.4%
45 to 54	9,890	9,846	-0.4%
55 to 59	4,018	5,215	29.8%
60 to 64	3,564	4,590	28.8%
65 to 74	6,300	6,781	7.6%
75 to 84	4,222	4,148	-1.7%
85 and over	1,498	1,647	10.0%
Total	**62,779**	**63,210**	**0.7%**

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, 16% of Coos County's population is between the ages of 0 and 14 and approximately 20% 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 have a 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. Coos County Youth and Senior Populations, 2008

Age Range	Number	% of Population
0-14	10,024	16%
65-74	6,781	11%
75+	5,796	9%

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.

Coos County has a variety of different housing types. In 2008, 67% of Coos County's homes were single-family residences; 14% were multi-family homes; 18% were mobile homes, and 1% are boats/RV's, vans, etc.[8] Coos 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.

Coos County also has a large number of older housing structures that may be vulnerable to earthquakes. Approximately 79% 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, "Coos County Selected Housing Characteristics," 2006-2008 American Community Survey 3-Year Estimates, www.census.gov.

Table 2.3. Coos County Housing Age

Year Built	Total Structures	% of Structures
2005 or later	839	2.8%
2000 to 2004	1,383	4.6%
1990 to 1999	4,176	13.9%
1980 to 1989	3,088	10.3%
1970 to 1979	6,353	21.2%
1960 to 1969	3,705	12.3%
1950 to 1959	4,215	14%
1940 to 1949	2,498	8.3%
1939 or earlier	3,758	12.5%
Total	**30,015**	**100%**

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

In 2008, Coos County had 30,015 housing units. Of those, 91% were occupied (27,317) and 9% were vacant (2,698).[9] Of the occupied housing units, 67.6% (18,456) were owner-occupied, and 32.4% (8,861) 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

Coos County has a moderately diverse economy in the State of Oregon. According to the Oregon Employment Department, Coos County's 2006 economic diversity rating was 26 (with 1 being the most diverse, and 36 being the least).[13] An economy that is heavily dependent upon a few key industries may have a more difficult time recovering after a natural disaster than one with a more diverse economic base.

Economic resilience to natural disasters is particularly important for the major employment sectors in the region. If these sectors are negatively

[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.

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, local government is the largest employer in Coos County, providing 21.6% of the county's jobs. The retail sector is the second largest industry providing 13% of all the county's jobs. In the event of a natural disaster, the government sector may not be as vulnerable as other sectors, because funding streams are established annually and they are eligible to receive outside funding sources. However, the retail industry 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, Coos County's third largest industry sector, is 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. It is predominantly dependent on people who come to the area as tourists, on business, or simply passing through. The sector 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.

Coos County's agricultural sector is also an important component to Coos County's overall economy. While representing a smaller percentage of employment when compared to local government or the leisure and hospitality sector, it produced and sold $44,305,000 in goods in 2007.[14] The agricultural sector is also highly vulnerable to natural hazard events. Floods, and wind/winter storms can damage farm facilities and agricultural products, and road closures caused by landslides, wildfires, or earthquakes can impact the delivery of goods and services.

[14] US Department of Agriculture, "2007 Census of Agriculture, Coos County," www.agcensus.usda.gov, accessed March 29, 2010.

Table 2.4. Coos County Employment by Major Industry, 2008

Industry	Total Persons Employed	% of Workforce
Trade, Transportation, & Utilities	**4,364**	**19.2%**
Wholesale	361	
Retail	3,049	
Transportation, Warehousing & Utilities	954	
Leisure & Hospitality	**2,522**	**11.1%**
Arts, Entertainment & Recreation	142	
Accommodations & Food Services	2,380	
Education & Health Services	**2,305**	**10.1%**
Education	96	
Health & Social Assistance	2,209	
Professional & Business Services	**2,123**	**9.3%**
Manufacturing	**1,593**	**7.0%**
Natural Resources & Mining	**1,028**	**4.5%**
Crop production	18	
Animal production	90	
Forestry and logging	549	
Fishing, hunting and trapping	27	
Agriculture and forestry support activity	291	
Oil and gas extraction	n/a	
Mining, except oil and gas	n/a	
Construction	**961**	**4.2%**
Financial Activities	**768**	**3.4%**
Finance & Insurance	517	
Real Estate Rental & Leasing	251	
Other Services	**703**	**3.1%**
Information	**253**	**1.1%**
Total Federal Government	**340**	**1.5%**
Total State Government	**986**	**4.3%**
Total Local Government	**4,786**	**21.1%**
Total employment	**22,736**	

Source: Oregon Employment Department, "Coos County Nonfarm Employment 2008," www.qualityinfo.org, accessed March 29, 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 Coos County was $38,279.[15] This is almost $14,000 below the 2008 national median household income of $52,175 and roughly $11,500 below the median

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

income for Oregon.[16] Between 2000 and 2008, the county's median household income increased 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. Coos County Median Household Income 2000 to 2008

Area	2000	2008	% Change
United States	$41,994	$52,175	24%
Oregon	$40,916	$49,863	22%
Coos County	$31,542	$38,279	21%

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

Coos County's poverty rate has remained relatively stable between 2000 and 2008 as shown in Table 2.6. 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. Coos County Poverty 2000 and 2008

	2000		2008	
Ages	Total Persons	% of Population	Total Persons	% of Population
All Ages in Poverty	9,257	15%	9,592	15.1%
Under 18 in Poverty	2,628	4.2%	-	-

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 impact of disasters is important. Coos County has 50 historic sites listed on the National Register of Historic Places.[17] Those with available site location information are listed in Table 2.7 below.

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

[17] 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. Coos County Buildings and Sites Listed on the National Register of Historic Places

Site Name	Location	Year Built
Breuer Building	Bandon	1905
Coquille River Life Boat Station	Bandon	1939
Coquille River Lighthouse	Bandon	1896
Chandler Hotel and Annex	Coos Bay	1909
J.S. Coke Building	Coos Bay	1910
Coos Bay Carnegie Library	Coos Bay	1914
Coos Bay National Bank Building	Coos Bay	1923
Hub Department Store Building	Coos Bay	1914
Koski Building	Coos Bay	1926
Marshfield City Hall	Coos Bay	1923
Marshfield Elks Temple	Coos Bay	1920
Marshfield Sun Printing Plan	Coos Bay	1895
Marshfield Hotel	Coos Bay	1925
Myrtle Arms Apartment Building	Coos Bay	1914
Nasburg-Lockhart House	Coos Bay	1884
Hjalte Nerdrum House	Coos Bay	1912
Nerdrum-Conrad House	Coos Bay	unknown
Olsson, Capt. Bror W, House	Coos Bay	1913
Seelig-Byler House	Coos Bay	1869
Tower, Major Morton, House	Coos Bay	1869
Tower-Flanagan House	Coos Bay	1872
Tribal Hall of the Confederate Tribes	Coos Bay	1940
Cape Arago Lighthouse	Coos Bay vicinity	1934
Cary, Leo J, House	Coquille	1912
Coquille City Hall	Coquille	1912
Harlocker, Judge Lintner	Coquille	1891
Paulson, John E & Christina, House	Coquille	1906
Sherwood, AJ, House	Coquille	1901
St. James Episcopal Church,	Coquille	1897
Black, AH & Company, Building	Myrtle Point	1890
Reorganized Church of Latter Day Saints	Myrtle Point	1910
Abernethy, Edwin & Ethel, House	Myrtle Point vicinity	1905
Gearhart, John Neal & Dora, House	Myrtle Point vicinity	1900
McCullough Memorial Bridge	North Bend	1936
Hotel North Bend	North Bend	1922
Powers Hotel	Powers	1915
Sandy Creek Bridge	Remote	1936

Source: Oregon State Historic Preservation Office, http://www.oregon.gov/OPRD/HCD/, accessed April 1, 2010.

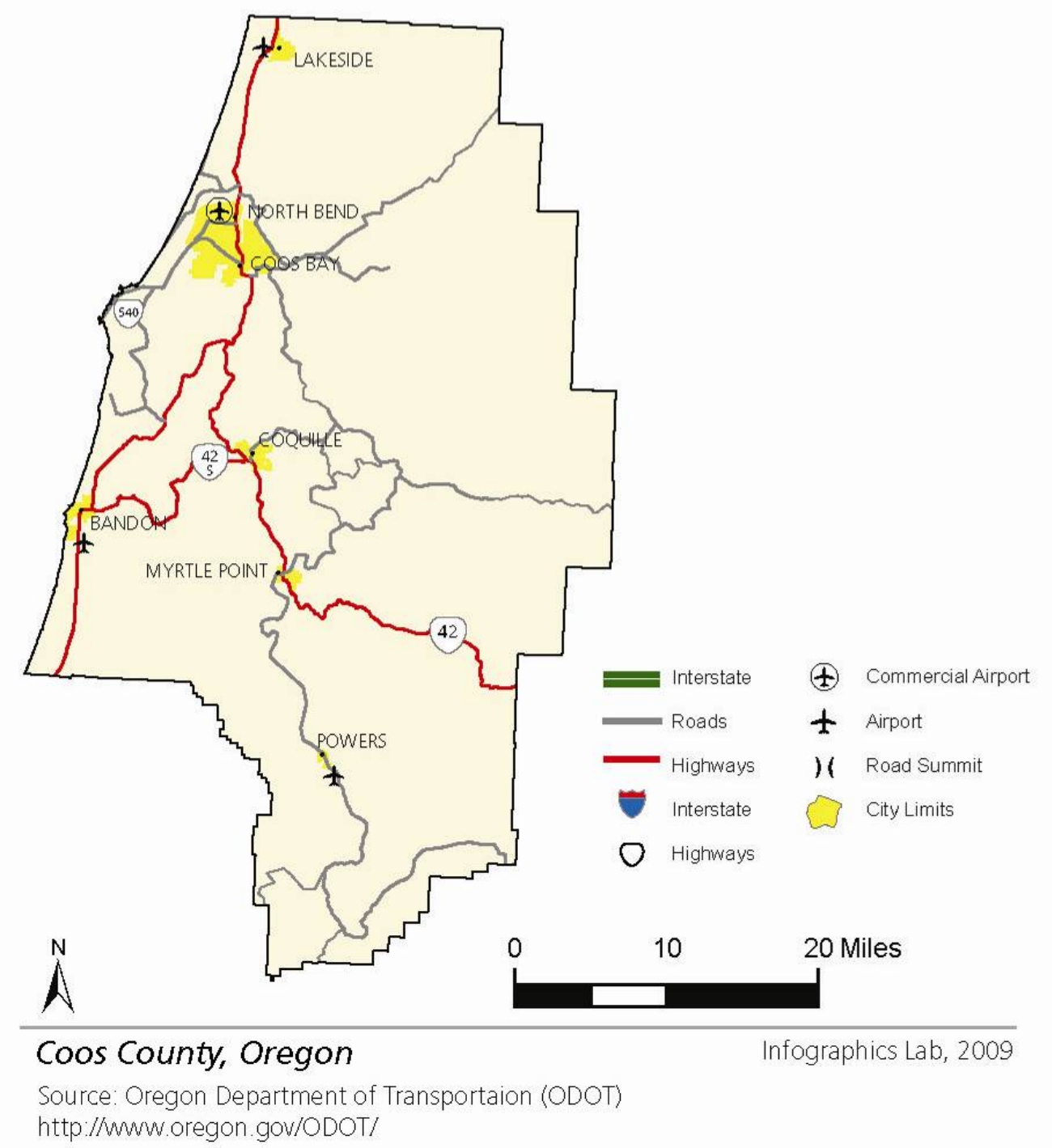
Archaeological sites have not been included in Table 2.7; a complete list can be found on the state of Oregon's State Historic Preservation Office website.

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-disaster 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 Coos County's infrastructure to natural hazards.

There are three primary modes of transportation in Coos County: roads, air, and marine. Two State Highways (US 101 and OR 42) are located in Coos County, along with four District Highways (OR 42S, OR 240, OR 241 and OR 242). State Highway 42 runs east-west connecting Highway 101 with Interstate 5, and State Highway 101 runs north-south, connecting Coos County with Curry County to the south and Douglas County to the north. Highway 101 is the most important north-south corridor west of Interstate 5, providing access for all coastal communities to the rest of the state. Figure 2.4 shows the county's primary transportation routes.

Figure 2.4. Coos County Transportation Routes



Highways 42 and 101 carry relatively high traffic volumes for the county. In 2008, the location of highest average daily traffic volume for OR 42 within Coos County occurred just south of the intersection with Hwy 101 (9,700 vehicles).[18] On Highway 101 south of Coos Bay, average daily traffic volumes were 24,300 vehicles.[19] Catastrophic disasters can disrupt major roadways, disrupting automobile traffic and commercial activity, and making any response or recovery effort difficult. Focusing mitigation efforts on these roadways and busy intersections will make Coos County more resilient to natural disasters.

The condition of the county's bridges can also impact the county's risk to natural hazards. Most bridges in Coos County do not meet current seismic codes, making Coos County vulnerable to the earthquake hazard. Damaged bridges can disrupt traffic and exacerbate economic losses because of the inability of industries to transport services and products to clients. There are 468 bridges and culverts in Coos County, of which 138 bridges are in use by state highways and 115 bridges are in use by county highways.[20]

The county's marine transportation consists primarily of shipping in and out of the port of Coos Bay, and to a lesser extent, the Port of Bandon. There are also four small airports Coos County; the county-owned Southwest Oregon Regional Airport in North Bend is the largest and provides the most services.

Critical facilities are those facilities that are essential to government response and recovery activities (e.g., police and fire stations, public hospitals, public schools). Coos County has three hospitals with 152 beds, nine police stations, and 19 fire & rescue stations.[21] The location of these critical facilities is depicted in Figure 2.5 below. The county also has six school districts (Coos Bay, North Bend, Myrtle Point, Coquille, Bandon, and Powers) and one community college.[22] While not considered a critical facility, 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. In addition, a local fiber optic network operated by Comspan provides high-speed internet, cable, and telephone access to Coos County and is located in Bandon.

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[18] 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.

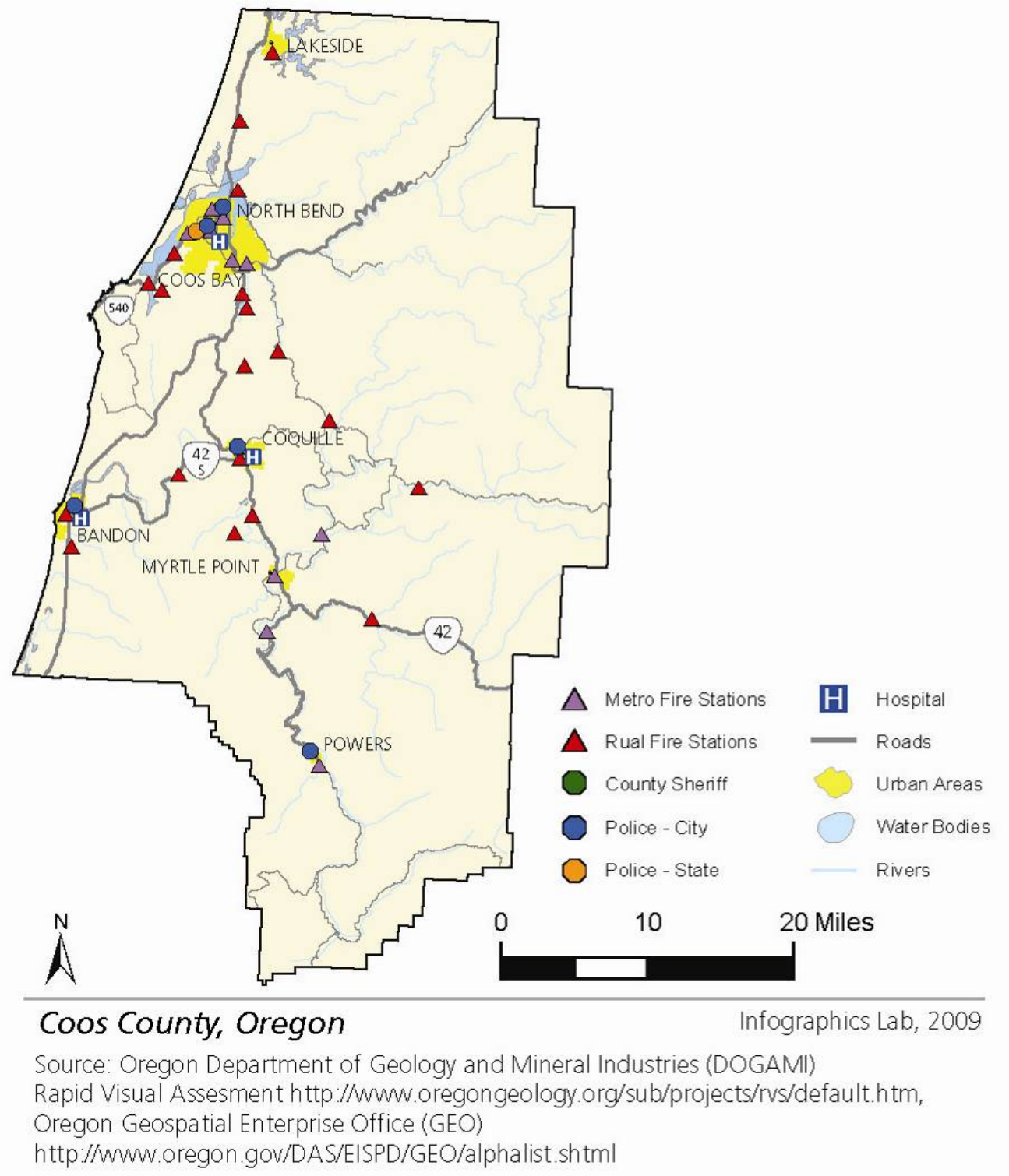
[19] Ibid.

[20] State of Oregon Natural Hazard Mitigation Plan. Part 2: Hazard Chapters. "Risk Assessment" March, 2006.

[21] Ibid.

[22] Ibid.

Figure 2.5. 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. Coos County has 27 dams.[23] Dams are ranked with hazard ratings of low, significant, or high, and define the downstream consequences of a sudden dam failure.[24] Table 2.9 lists the two high hazard rated dams found in Coos County. A high hazard rating does not indicate that a dam has a high risk of failure, but that if it should fail, it would lead to direct loss of human life and significant property damage. Further evaluation of the high hazard dams are needed to determine if they pose a hazard risk to human life.

Table 2.9. Coos County High Hazard Dams

Dam	Storage
Pony Creek - Upper	6,245
Pony Creek - Lower	400

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

Land Use & Development

Coos County contains a variety of land uses that reflects the county's diverse geography. Approximately 900,000 acres, 87.4% of the total land area is considered commercial forestland. The acreage is divided among the public, small private parcels, and forest industry ownership. The majority of standing saw timber in the county (55%) is located on public lands as opposed to 29% on forest industry lands and 16% on small private lots.

As shown in Table 2.10 and Figure 2.6 below, over half of the land in Coos County is publicly owned.

Table 2.10. Coos County Land Ownership by Acreage

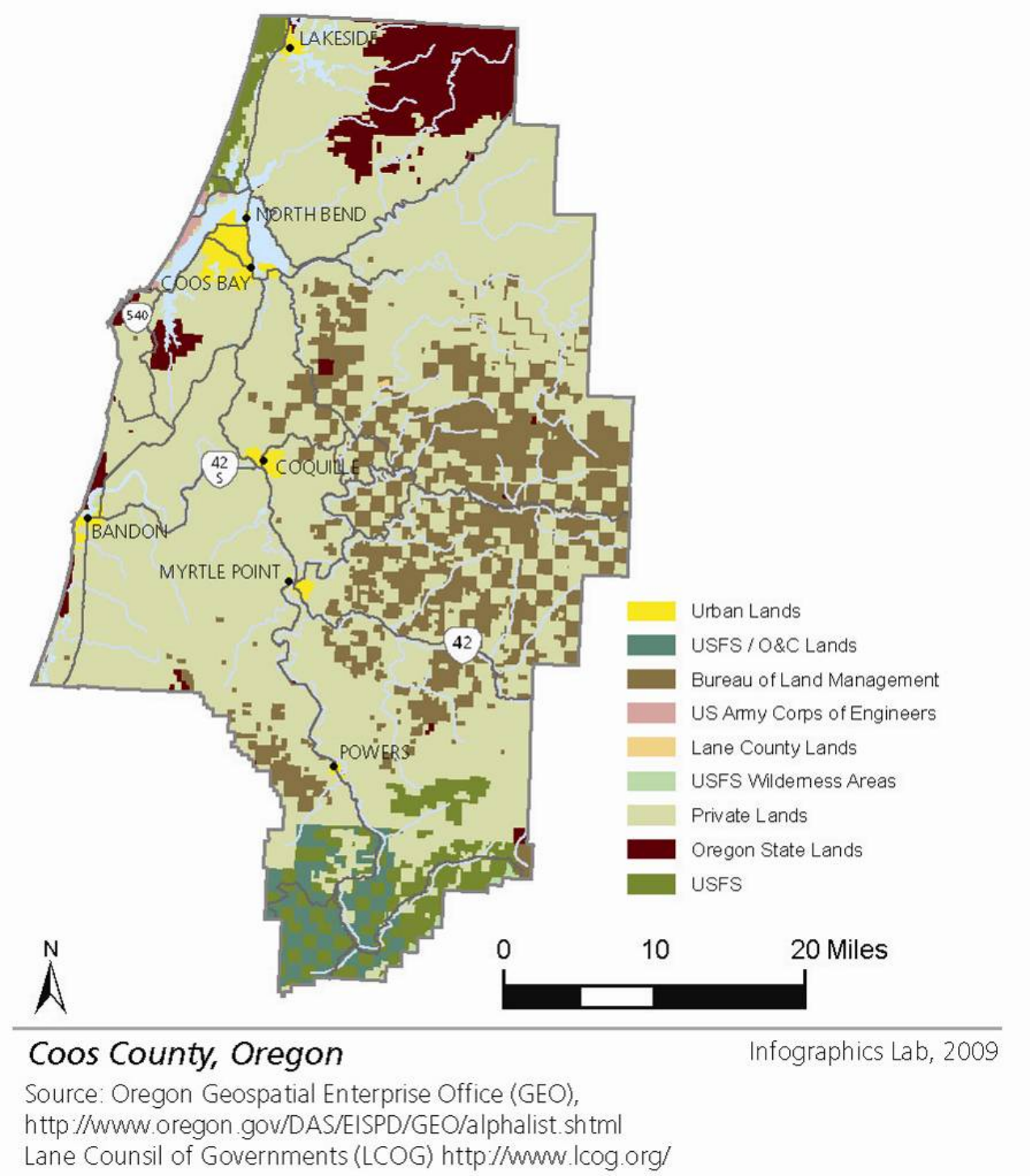
Landowner Entity	Acres
Private Ownership	675,000
Bureau of Land Management	593,000
US Forest Service	79,000
State of Oregon	80,000
Other	23,000
Total County Acreage	**1,008,000**

Source: University of Oregon Press, Atlas of Oregon

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

[24] Ibid.

Figure 2.6. Coos County Land Ownership



In addition to the seven incorporated communities of Bandon, Coos Bay, Coquille, Lakeside, Myrtle Point, North Bend and Powers, Coos County also has a large unincorporated population. Unincorporated communities are settlements located outside urban growth boundaries that are primarily residential, but have at least two other commercial, industrial or public land uses.[25] A survey completed by the Department of Land Conservation and Development identified 21 unincorporated communities in Coos County. A list of these communities is found in table 2.11 below.

Table 2.11. Coos County Unincorporated Communities

Allegany	Glasgow
Arago	Greenacres
Bridge	Hauser
Bandon Dunes	Hollow Stump
Broadbent	Laurel Grove
Bunker Hill/Mill	Lower Lee Valley
Charleston/Barview	Norway
Cooston	Riverton
Dew Valley	Sumner
Dora	Sunnyhill
Fairview	

Source: Department of Land Conservation and Development Survey of Oregon Unincorporated Communities, 1997, http://www.oregon.gov/LCD/docs/adminrules/div022a.pdf, accessed April 1, 2010.

Table 2.12 below depicts the percentage of Coos County's population living within incorporated areas in 2000 and 2008.

Table 2.12. Coos County Urban/Rural Populations

Incorporated Population		% Change
2000	2008	2000-2008
58.1%	61.4%	3.3%

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

Government Structure

Local governments and their departments can encourage natural hazard mitigation at the county level 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 Coos County's county government departments that can be useful for hazards mitigation.

Coos 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 elects three commissioners, a

[25] Oregon Administrative Rule 660, Division 22, "Definitions," 660-022-0010.

district attorney, assessor, clerk, sheriff, surveyor, and treasurer, and includes the following additional departments:

Emergency Management: responsible for a managing the Emergency Operations Center (EOC), which is fully equipped to handle all disasters. Emergency Management is also responsible for managing the Emergency Operations Plan (EOP) and other related plans which include the Debris Management Plan, Special Needs Population Plan, and Mass Commodities Plan. Finally, Emergency Management is responsible for meeting requirements under the National Incident Management System, conducting Incident Command System (ICS) trainings, and conducting plan exercises with County departments. In addition to its emergency response duties, the Emergency Management Department also coordinates hazard mitigation activities.

Forestry Department: responsible for land management services for the 15,000 acres of county forest. Included in land management responsibilities are preparing, selling, and administering timbers sale contracts. Additionally, the Forest Department administers the Special Forest Products program and sells commercial permits for forest resource extraction activities. The Forest Department can incorporate wildfire mitigation measures in county-owned forest.

Human Resources: responsible for the advertising of any job openings in the different departments within Coos County, for the distribution of the applications to the appropriate department, the orientation and in-processing for the individuals who have been selected to fill the positions. All personnel records are maintained in the Human Resources Office and are updated as necessary. Human Resources may assist in education and outreach to county departments about natural hazards mitigation.

Law Enforcement: The Coos County Sheriff's office provides law enforcement services, protecting the life and property of Coos County citizens, and ensures that the constitutional rights of all persons are protected.

Mental Health: works to enable each citizen of Coos County to function at their maximum mental and emotional potential. Coos County Mental Health is responsible for meeting the needs and preferences of individuals with mental health disorders, and supporting families with guiding services.

Parks: responsible for the maintenance of Coos County's seven parks.

Planning Department: responsible for land use planning, zoning administration, and building inspection. The Department administers the Comprehensive Plan, Zoning Ordinance, and other County codes relative to planning issues. Relevant mitigation strategies can be incorporated into Coos County's Zoning and Land Development Ordinance.

Public Health: responsible for preventing disease and injury, promoting healthy behaviors and healthy families, and protecting the community's health. In 2009, Coos County Public Health had a staff of 30 individuals, including part time and temporary workers.

Road: responsible for the maintenance of county roads. The Road Department can implement mitigation actions that transportation infrastructure in the county.

Existing Plans & Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. These 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.[26]

The Coos County Natural Hazards Mitigation Plan includes a range of recommended action items that, when implemented, will increase the county's ability to effectively and efficiently mitigate the potential impacts of natural hazards. Many of these actions 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 Coos County.

Name: Coos County Transportation Systems Plan
Date of Last Revision: February 2004
Author / Owner: DKS Associates/Coos County Road Department.
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 Hazard Mitigation: Transportation systems are important in evacuating and responding to natural disasters. Mitigation actions that focus on strengthening the transportation system can be incorporated into the Transportation Systems Plan.

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

Name: Coos County Zoning and Land Development Ordinance
Date of Last Revision: 2003
Author / Owner: Coos County Planning 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 Hazard Mitigation: Regulations in the zoning and development ordinance can be linked to action items that reduce the county's risk to catastrophic disasters by avoiding development in hazardous areas or reducing the impact of disaster on existing development. The zoning ordinance is also linked to how the county will implement Oregon's Statewide Planning Goal 7 requirements.

Name: Coos County Comprehensive Plan
Date of Last Revision: 2001
Author/Owner: Coos County Planning Department
Description: Provides a policy framework for future development in Coos County. Contains policies that relate to the following topics: citizen involvement; implementation strategies for land use and community development planning; agricultural lands; forest lands; mineral and aggregate resources; fish and wildlife habitats; historical and natural resources; water resources; unique scenic resources; coastal and dune resources; natural hazards; air, land and water quality; minor estuaries; ocean resources; population projections; industrial and commercial lands; housing; public facilities; transportation; recreation; energy; urbanization; south slough sanctuary.
Relation to Hazard Mitigation: Mitigation actions can be incorporated into various components of the Coos County Comprehensive Plan to provide a policy framework for mitigation and risk reduction.

Name: Coos, Curry, Douglas Six-Year Regional Investment Strategy
Date of Last Revision: November 2007
Author/Owner: Coos, Curry, Douglas Regional Investment Board
Description: Provides a regional investment strategy for Coos, Curry, and Douglas Counties to expand business, create jobs, improve infrastructure, and prepare industrial sites for development.
Relation to Hazard Mitigation: Mitigation actions can be incorporated into this strategic plan to encourage sustainable economic development in Coos, Curry and Douglas Counties.

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 Mitigation
			Businesses	Children	Disabled	Elders	Families	Low Income	
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 recovery efforts
Southwestern Oregon Community College, Coos County Campus 1988 Newmark Ave., Coos Bay, OR 97420 (541) 888-2525	Provides high quality learning opportunities for individuals in Coos County	Coos County	✓		✓	✓	✓	✓	• Education and outreach • Information dissemination • Participate in mitigation efforts
Boys and Girls Club of Southwestern Oregon P.O. Box 1082 3333 Walnut Avenue Coos Bay, OR 97420	Provides diverse activities that meet the interest of all youth	Coos County		✓					• Education and outreach • Information dissemination
Bridges Advocacy and Outreach Center 2389 Sherman Ave. Ste. 106 North Bend, OR 97459 (541) 297-5542	Empowering families to effectively advocate for quality service and education	Coos County		✓	✓	✓	✓	✓	• Education and outreach • Information dissemination
OSU Extension Service Coos County Ohlsen Baxter Building 631 Alder St. Myrtle Point, OR 97458 (541) 572-5263	Offers a wealth of non-formal educational programs and information services	Coos County		✓	✓	✓	✓	✓	• Education and outreach • Information dissemination
Coos Bay Habitat for Humanity PO Box 986 Coos Bay, OR 97420 (541) 756-9080	Works in partnership with people in need to build safe, decent housing	Coos County		✓	✓	✓	✓	✓	• 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	
US Department of Agriculture Natural Resources Conservation Service 382 North Central Coquille, Oregon 97423-1296 (541) 396-2841	Provide technical assistance to private landowners to improve soil and water conservation. Maintains an "emergency plan" for continuity of operations and assistance to producers.	Coos County and Curry Counties	✓						• Education and outreach • Information dissemination • Participate in mitigation efforts
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

Existing Mitigation Activities

Existing mitigation activities include current and past mitigation programs and activities that are being implemented to reduce the county's overall risk to natural hazards. Documenting these efforts can assist participating jurisdictions to better understand how they implement mitigation activities and can assist in documenting successes.

Coastal Erosion: Section 5.10 of Coos County's Comprehensive Plan outlines policies for "Dunes, Ocean, and Coastal Lake Shorelands." Coastal shorelands are categorized by whether or not they are suitable for development. Development in areas considered "Not Suitable" is prohibited.[27] Development in "Suitable" and "Limited Suitability" areas contain development restrictions that are designed to limit exposure to coastal erosion and prevent damage to natural features. Policy # 10 states that Coos County shall:

> [P]refer non-structural solutions to problems of erosion and flooding to structural solutions in ocean, coastal lake or minor estuary shorelands. Where shown to be necessary, water and erosion control structures, such as jetties, bulkheads, seawalls, and similar protective structures and fill shall be designed to minimize adverse impacts on water currents, erosion, and accretion patterns.[28]

This policy is based "on the recognition that non-structural solutions are often more cost effective as corrective measures but that carefully designed structural solutions are occasionally necessary."[29]

Buildings in residential, commercial, and industrial zones areas subject to coastal erosion may be protected by riprap if they were built prior to October 1977 or if they are public facilities.[30] Due to the detrimental impacts of riprap, buildings built after October 1977 cannot use riprap.

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

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

Many rural residents in Coos County rely on groundwater wells for their water needs. In some years these rural wells have run dry in the late

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[27] Coos County Comprehensive Plan, 5.10.3.

[28] Coos County Comprehensive Plan, 5.10.10.

[29] Ibid.

[30] Coos County Zoning and Development Ordinance, 4.2.900 (84).

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. Real estate agents inform new residents about the drought hazard in Coos County.

Earthquake: Coos County has adopted the International 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. The Coos County Comprehensive Plan includes policies under Section 5.11 "Natural Hazards" that support the State Building Code Division's building code enforcement program to provide maximum structural protection to safeguard against seismic hazards.

Flood: Communities in Coos County have taken a number of measures to lessen the impacts of local flooding events. Coos County is currently a participant in the National Flood Insurance Program. The county also dredges rivers such as the Coquille River to reduce to reduce the impacts of flooding.

Coos County's Land Use and Development Ordinance contains a floodplain overlay zone (Article 4.6.2) 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).

The Coos County Comprehensive Plan contains policies (Section 5.11) that support the county's participation in the National Flood Insurance Program (NFIP) and adopts FEMA's Flood Insurance Rate Maps (FIRM). Currently, Coos County is undergoing improved mapping efforts led by DOGAMI.

In 2006, FEMA elevated five properties and acquired 5 properties in the Libby Drainage District and Englewood Diking District that were flooded during severe storms in 2005/2006. Funding was provided through the Hazard Mitigation Grant Program (Grant # DR-1632 HMGP). Only one property has not been acquired or elevated and is still vulnerable to flooding.

Landslide: Coos County's zoning and development ordinance contains regulations for development on steep slopes. These include:

- Section 4.8.700, Fire Safety Standards: Dwellings cannot be located on a slope steeper than 40%.
- Section 6.5, Subdivision and Partitions: Regulations for lot size and placement of dwellings and roadways based on slope. Roadways require a geologic report to be completed.

The Coos County Road Department also regularly monitors known landslide hazard areas.

Tsunami: Coos 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. Coos County also posts this information about the tsunami hazard on the county's website.

Finally, the Coos County Zoning and Land Development Ordinance has development regulations (Section 4.6.281) for "Coastal High Hazard Areas" which are "areas subject to high velocity waters, including but not limited to, storm surge or tsunamis. These areas are designated on the FIRM as Zone V1-V30, VE or V."[31]

Wildfire Coos County is in the process of writing a Community Wildfire Protection Plan (CWPP) to better address the risk of wildfire in Coos County and develop appropriate mitigation action items. No date for completion has been set.

The Coos Forest Protection Association (CFPA) actively promotes wildfire mitigation in Coos County. Recent activities include mailings to 6,000 Coos County residents living in wildland-urban interface areas encouraging them to create defensible space around structures. The CFPA also conducts wildfire outreach programs in local elementary and middle schools, state parks, county fairs and home shows, and work with property owners to provide open burn and incinerator burn permits. Finally, CFPA provides information about Firewise, a program developed within the National Wildland-Urban Interface Fire Protection Program and is the primary federal program addressing interface fire. Firewise offers online wildfire protection information and checklists, as well as listings of other publications, videos and conferences.

The Coos Forest Protective Association is working with 33 property owners who have been identified as having a moderate risk to wildfires as defined by Oregon Senate Bill 360.

Finally, the Coos County Development Code (Section 4.4.400) contains regulations for setbacks for rural developments for a fire break around new development. Section 4.8.700 contains fire safety regulations for any new development in the forest zone.

[31] Coos County Zoning and Land Development Ordinance, p. II-5.

Wind Storm: The Oregon Building Code sets standards for structures to withstand 80 mph winds, with additional requirements addressing high exposure areas.

Hazard Overview

The following is a brief overview of the hazards that can impact Coos County. Each of the hazards is described in more detail in the risk assessments found in this mitigation plan.

Coastal Erosion: Coastal erosion occurs throughout the year in Coos County, but is accelerated during the winter months when storms increase the rate of erosion. Two notable coastal erosion events occurred in Sunset Bay north of Cape Arago State Park. In January 1939, high tides and a heavy wind storm destroyed the Sunset Beach Resort located on Sunset Bay. In 2003, Sunset Bay State Park lost a parking lot to coastal erosion and two children died. Since then, the damage to facilities has been repaired, but coastal erosion still continues.

Drought: Drought conditions are not uncommon in Coos County. The environmental and economic consequences can be significant, especially for Coos County's agricultural and recreational employment sectors.

Earthquake: Coos County has not experienced any major earthquake events in recent human 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 Coos County. The geographical position of Coos County makes it susceptible to deep intraplate events within the subducting Juan de Fuca Plate, and shallow crustal events within the North American Plate.

Flood: Flooding occurs frequently in Coos County. Riverine flooding, in particular, is the leading cause of flooding events. Every winter extensive sections of the lower Coquille River valley are flooded by heavy winter rainfall. A number of Presidential Disaster Declarations have been announced in Coos County due to flooding.

Landslide: Coos 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.

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. 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. Several disastrous wildfires have occurred in Coos County during the last century, causing millions of dollars of damage.

Wind Storm: Many buildings, utilities, and transportation systems in the county are vulnerable to wind damage caused by winter storms. 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 Coos County's mission, goals and action items; and (3) explains how Coos County intends to incorporate the mitigation strategies outlined in the plan into existing planning mechanisms and programs such as the county comprehensive land use planning process, capital improvement planning process, and building codes enforcement and implementation. 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 Coos 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 Coos 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 Coos 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 Coos County Plan Update Steering Committee, developed the following mission statement for the Coos County Natural Hazards Mitigation Plan:

Create a disaster resilient Coos County.

This mission statement replaces the mission statement found in the 2005 Coos 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 15, 2010 Steering Committee Meeting reviewed the 2005 plan's mission statement and agreed that the above mission statement better defines why Coos 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 Coos 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 Coos 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 15, 2010 Steering Committee Meeting evaluated the previous mitigation plan goals and adopted the goals listed above because they more adequately describe what Coos 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: Partnership for Disaster Resilience, 2006

The Coos County Plan Update 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 16 Steering Committee meeting, 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 Coos County Steering Committee identified which actions from the 2005 plan had been completed or not completed, and whether or not these actions would be deferred in the 2010 update. The actions for the 2010 update are located in Appendix A. 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 Coos 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 item lists existing plans and programs that might be used to implement the action. Coos 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, Coos County will work to incorporate the recommended mitigation action items into existing programs and procedures.

Many of the Coos 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, Coos 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.[32] Implementing the Natural Hazard Mitigation Plan's action items through such plans and policies increases their likelihood of being supported and implemented.

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[32] 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 Coos 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 Coos 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, Coos 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, and the Flood Mitigation Assistance Program. Following county adoption, the participating jurisdictions should adopt their addendums.

Convener

The Coos County Emergency Management Program Manager will be the convener for the Coos County Natural Hazards Mitigation Plan. The convener's responsibilities include:

- Coordinating steering committee meetings, dates, times, locations, agendas, and member notification;
- Documenting the discussions and outcomes of committee meetings;
- Serving as a communication conduit between the steering committee and the public stakeholders;
- Identifying emergency management-related funding sources for natural hazards mitigation projects;

- Coordinating plan update processes (to include review of the risk assessment, goals, action items, and plan implementation and maintenance strategies) beginning in July 2014;
- Submitting future plan updates to Oregon Emergency Management for review; and
- Coordinating the local adoption process.

Coordinating Body

The Coos County Mitigation Steering Committee serves as the coordinating body for the mitigation plan. Roles and responsibilities of the coordinating body include:

- Attending future plan maintenance and plan update meetings (or designating an alternate representative);
- Serving as the local evaluation committee for funding programs like 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 Coos County coordinating body include:

- Coos County Emergency Management Program Manager (convener)
- Coos County Road Master
- City representatives:
  - Bandon City Recorder
  - Coos Bay Emergency Manager
  - Coquille Public Works Director or City Manager
  - Lakeside City Recorder
  - Myrtle Point City Manager
  - North Bend Planning Director
  - Powers City Recorder
- Coos Forest Protection Association Unit Forester

- US Department of Agriculture County Executive Director
- Coos County Public Health Preparedness Coordinator
- Citizen Representative

To make the coordination and review of the Coos 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 if it so chooses. 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 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.

Annual Meetings

The coordinating body will meet on an annual basis, and bi-annually if necessary, to complete the following tasks:

Years 1&3:

- 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).

Years 2&4:

- 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.

Year 5:

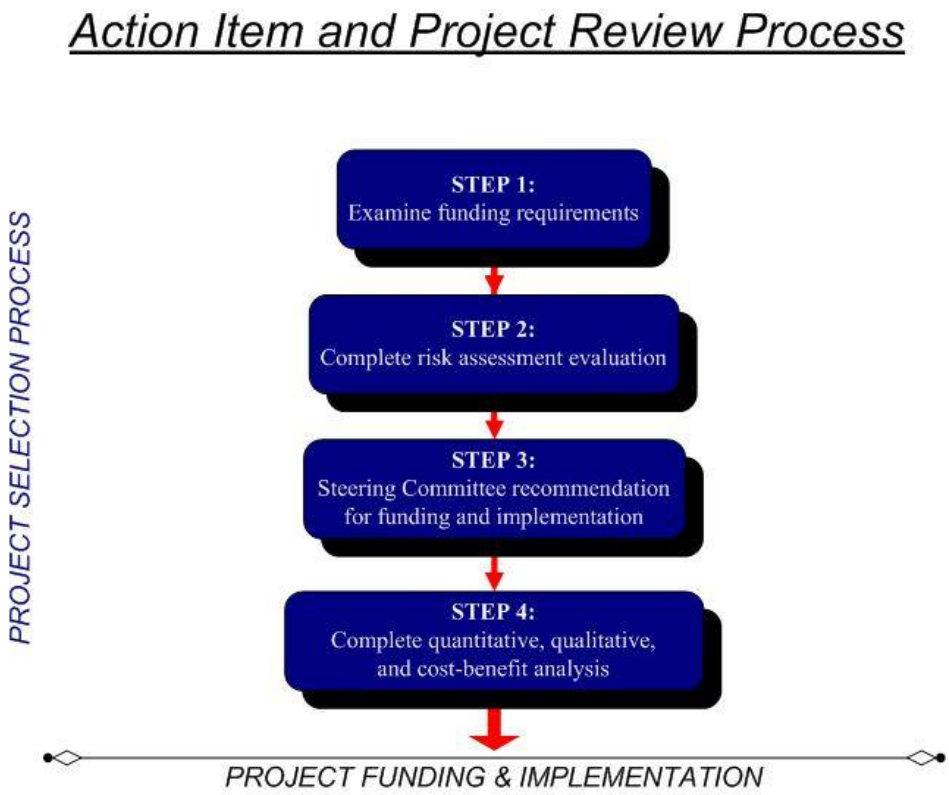
- Complete a full update of the county's natural hazards mitigation plan. Two or more meetings may be needed in Year 5. Likewise, the convener may need to assign plan-update tasks to the committee (as needed).

The convener will be responsible for documenting the outcome of the meetings in Appendix B. The process the coordinating body will use to prioritize mitigation projects is detailed in the section below. The plan's format allows the county and participating jurisdictions to review and update sections when new data becomes available. New data can be easily incorporated, resulting in a natural hazards mitigation plan that remains current and relevant to the participating jurisdictions.

Project Prioritization Process

The Disaster Mitigation Act of 2000 requires that jurisdictions identify a process for prioritizing potential actions. Potential mitigation activities often come from a variety of sources; therefore the project prioritization process needs to be flexible. Projects may be identified by committee members, local government staff, other planning documents, or the risk assessment. Figure 4.1 illustrates the project development and prioritization process.

Figure 4.1. Project Prioritization Process



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

Step 1: Examine funding requirements

The first step in prioritizing the plan's action items is to determine which funding sources are open for application. Several funding sources may be appropriate for the county's proposed mitigation projects. Examples of mitigation funding sources include but are not limited to: FEMA's Pre-Disaster Mitigation competitive grant program (PDM), Flood Mitigation Assistance (FMA) program, Hazard Mitigation Grant Program (HMGP), National Fire Plan (NFP), Community Development Block Grants (CDBG), local general funds, and private foundations, among others. Please see Appendix 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.

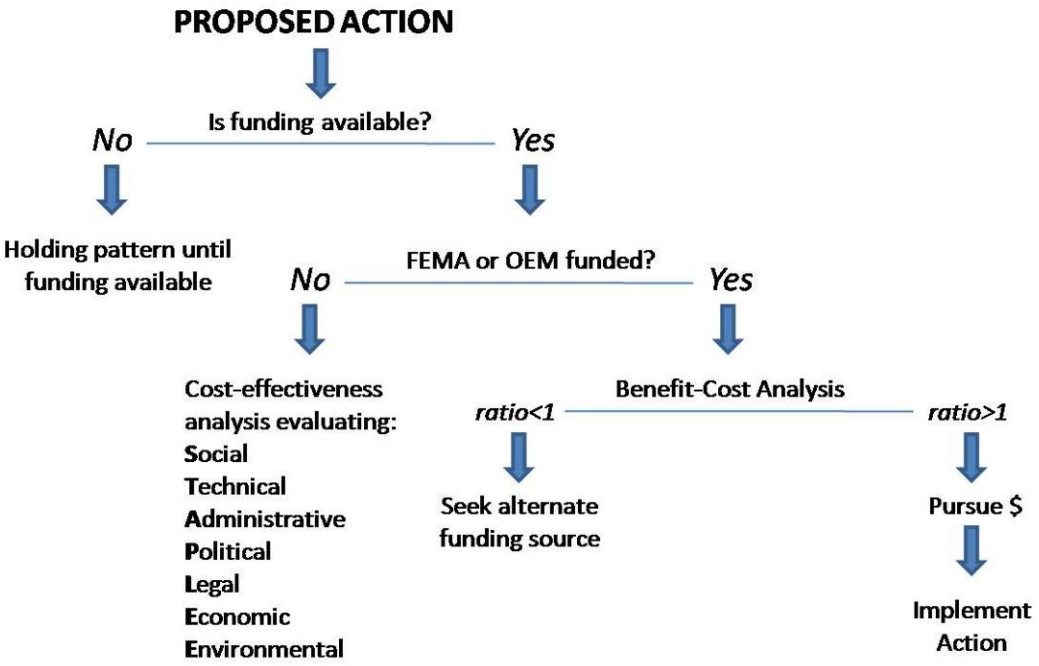
Step 3: Coordinating body recommendation

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: Community Service Center's Partnership for Disaster Resilience at the University of Oregon, 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 Coos 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, Coos County and participating jurisdictions will:

- Provide an electronic copy of the plan to local libraries;
- Post an electronic copy of the plan on the Coos County website;
- Publicly announce coordinating body meetings;
- Post meeting announcements on the Lakeside electronic newspaper; and
- Continue discussing the importance of natural hazards mitigation at trainings conducted by the Coos County Emergency Management Program Manager.

In addition to the involvement activities listed above, Coos County's multi-jurisdictional Natural Hazards Mitigation Plan has been archived and posted within 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 Coos County Natural Hazards Mitigation Plan is due to be updated on July 6, 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?			

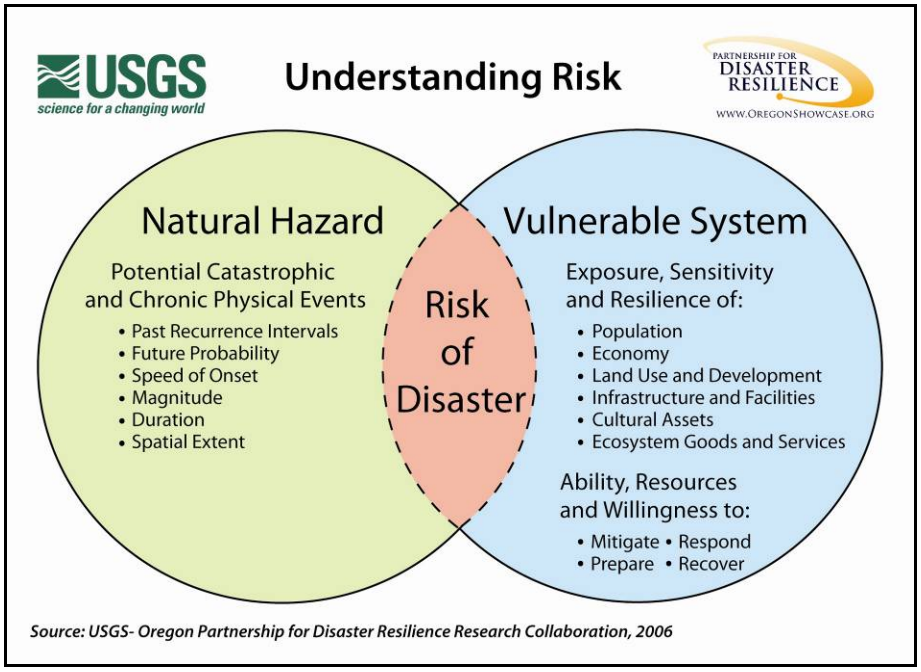
Mitigation Plan Update Toolkit			
Question	*Yes*	*No*	*Plan Update Action*
Did the plan document and/or address National Flood Insurance Program repetitive flood loss properties?			Document any changes to flood loss property status
Did the plan identify the number and type of existing and future buildings,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

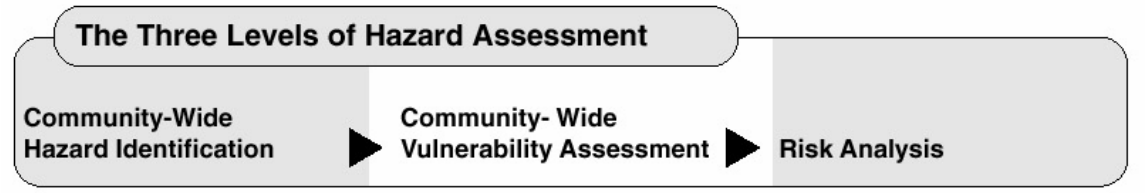


This section drills down to local level information and results in an understanding of the risks the communities face. In addition to local data, the information here relies upon the Region 1 (Oregon Coast) Regional Risk Assessment in the State of Oregon's Natural Hazard Mitigation Plan.

What is a Risk Assessment?

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

Figure 3.1 The Three Phases of a Risk Assessment



Source: Planning for Natural Hazards: Oregon Technical Resource Guide, 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.[33]

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.[34]

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

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

[34] 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 Coos 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, Coos 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 Coos 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 region assets likely to be affected by a major emergency or disaster, as follows:

High = More than 10% affected

Moderate = 1-10% affected

Low = Less than 1% affected

The probability and vulnerability scores in each hazard annex, with the exception of the coastal erosion hazard, are taken from the 2008 Coos County Hazard Analysis. Scores were reviewed by the Coos County steering committee members during the plan update process.

Hazard scores in the 2008 Coos County Hazard Analysis are based upon an analysis of risk conducted by local public safety officials, which include the Coos Bay Fire Chief, Coos County Public Health Director, Coos County Public Health Preparedness Coordinator, North Bend Police Chief, Myrtle Point City Manager, and Coos County Emergency Management Program Manager. It was last revised in February 2008.[35]

[35] 2008 Coos County Hazard Analysis, available from Coos County Emergency Management, p. 1.

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 Coos County

Coastal erosion occurs throughout the year in Coos County, but is accelerated during the winter months when storms increase the rate of erosion. Two notable coastal erosion events occurred in Sunset Bay north of Cape Arago State Park. In January 1939, high tides and a heavy wind storm destroyed the Sunset Beach Resort located on Sunset Bay. In 2003, Sunset Bay State Park lost a parking lot to coastal erosion and two children died. Since then, the damage to facilities has been repaired, but coastal erosion still continues.

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 the majority of Coos 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. Coos County's only bluff-backed shorelines are located around Cape Arago, south of Charleston and near Seven Devil's State Park north of Bandon.

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

- Bullard's Beach State Park near the Coquille River Lighthouse
- South Jetty in Bandon
- East Bay Road
- Pony Creek Slough
- Sunset Bay

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 and its magnitude and duration.

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 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.[36]

Finally, the Department of Geology and Mineral Industries (DOGAMI) is currently mapping coastal areas in Coos 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 Coos County's entire coastline. Although the county's hazard analysis did not include coastal erosion, the Coos County Steering Committee determined 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.). Coos County does not have any major roads in areas subject to erosion; however natural areas and coastal developments are vulnerable to the erosion hazard.

Coos County's 2008 Hazard Analysis did not include coastal erosion. The Coos County Steering Committee determined that Coos County's vulnerability to coastal erosion hazards is **moderate** 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 moderate vulnerability to the coastal erosion hazard, a risk analysis should be completed.

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[36] 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.

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, high winds and dangerous wave effects causing major damage to roads, bridges, homes, schools, businesses and infrastructure. 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. In Coos County, areas subject to coastal erosion include Bullard's Beach and Sunset Bay State Parks, and the Bandon Dunes Golf Course located along the beach north of Bandon.

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 such as the Heceta Head and Cape Arago littoral cells. 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

Section 5.10 of Coos County's Comprehensive Plan outlines policies for "Dunes, Ocean, and Coastal Lake Shorelands." Coastal shorelands are

categorized by whether or not they are suitable for development. Development in areas considered "Not Suitable" is prohibited.[37] Development in "Suitable" and "Limited Suitability" areas contain development restrictions that are designed to limit exposure to coastal erosion and prevent damage to natural features. Policy # 10 states that Coos County shall:

> [P]refer non-structural solutions to problems of erosion and flooding to structural solutions in ocean, coastal lake or minor estuary shorelands. Where shown to be necessary, water and erosion control structures, such as jetties, bulkheads, seawalls, and similar protective structures and fill shall be designed to minimize adverse impacts on water currents, erosion, and accretion patterns.[38]

This policy is based "on the recognition that non-structural solutions are often more cost effective as corrective measures but that carefully designed structural solutions are occasionally necessary."[39]

Buildings in residential, commercial, and industrial zones areas subject to coastal erosion may be protected by riprap if they were built prior to October 1977 or if they are public facilities.[40] Due to the detrimental impacts of riprap, buildings built after October 1977 cannot use riprap.

Hazard Mitigation Action Items

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

Coastal Erosion # 1: Monitor rates of coastal erosion in areas zoned for development and reassess development standards to prevent damage to future buildings and infrastructure.

Multi-Hazard # 2: Develop risk assessment maps to show areas at risk for all hazards.

Multi-Hazard # 8: Continue public education efforts about the natural hazards Coos County is vulnerable to and mitigation measures residents can implement.

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[37] Coos County Comprehensive Plan, 5.10.3.

[38] Coos County Comprehensive Plan, 5.10.10.

[39] Ibid.

[40] Coos County Zoning and Development Ordinance, 4.2.900 (84).

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 Coos County

Drought is a common occurrence in Coos 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 Coos County. Dates for significant drought events include the following:

December 2002: State of Emergency Declared for drought conditions in Coos and Curry Counties.[41]

2000-2001: General statewide drought.

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

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

1961: Abnormally high temperatures in Coos and Curry Counties.

Risk Assessment

How are Hazard Areas Identified?

Droughts usually occur county-wide. In severe droughts, environmental and economic consequences can be significant, especially for the county's agriculture sector. 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 recurrence interval over the past 50 years for Coos County is roughly 15 years given the hazard history listed above. The Coos County Steering Committee rated the probability of a drought occurring as **high**, meaning one incident is likely within a 10-35 year period. The high ranking is consistent with the 2008 Coos County Hazard Analysis.

Vulnerability Assessment

The effects of drought typically extend across the county. There are a number of community sectors that are vulnerable to drought, and those are further explained in the Community Hazard Issues section below.

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

The Coos County Steering Committee rated Coos County's vulnerability to drought as **moderate** meaning that 1-10% of the community's assets or population is likely to be affected by a major emergency or disaster. The moderate ranking is consistent with the 2008 Coos County Hazard Analysis.

Risk Analysis

A risk analysis estimating the potential loss of life and property for the drought hazard in Coos County has not been completed at this time.

Community Hazard Issues

What is susceptible to damage during a hazard event?

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

Drought can have significant impacts on the county's agricultural sector which depends on water to grow hay and for irrigation. Every five years, Coos County experiences a drought that is severe enough to cause pasture losses and hay losses. The cranberry and wine industries, both of which are heavily water dependent, can suffer losses from the drought hazard as well.

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.

A prolonged drought in forests promotes an increase of insect pests, which in turn, damage trees already weakened by a lack of water. A moisture-deficient forest constitutes a significant fire hazard (see the Wildfire summary). 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

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

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

Many rural residents in Coos 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. Real estate agents inform new residents about the drought hazard in Coos County.

Hazard Mitigation Action Items

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

Multi-Hazard # 7: Incorporate the natural hazards mitigation plan into the Coos County Comprehensive Plan.

Multi-Hazard # 8: Continue public education efforts about the natural hazards Coos County is vulnerable to and mitigation measures residents can implement.

Note: the Coos County steering committee does not believe that implementing a drought-specific action item will be cost effective at this time. Two multi-hazard mitigation actions may, however, assist in mitigating drought hazards: Multi-Hazard #7, and Multi-Hazard #8.

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 Coos County

Coos County has not experienced a significant earthquake in recorded history; however geologic studies indicate earthquakes have impacted Coos County in the past. Significant earthquakes that occurred near Coos 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.

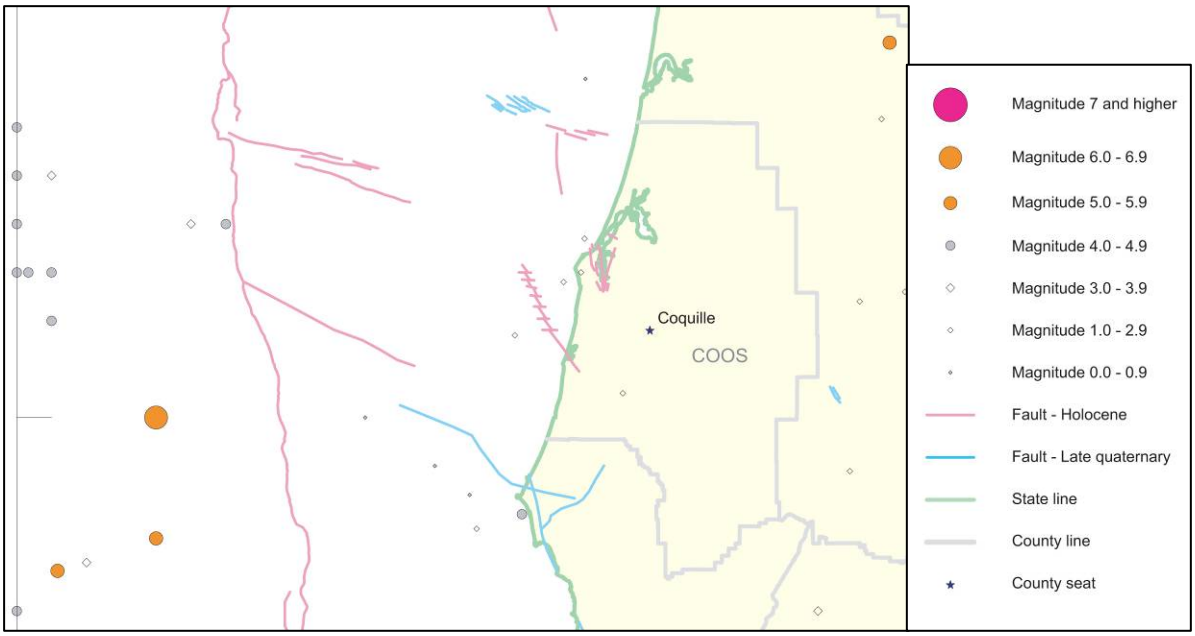
Science Daily, "Unusual Earthquake Swarm Off Oregon Coast Puzzles Scientists," April 14, 2008, http://www.sciencedaily.com/releases/2008/04/080413184801.htm, accessed April 21, 2010.

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 Coos County.

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

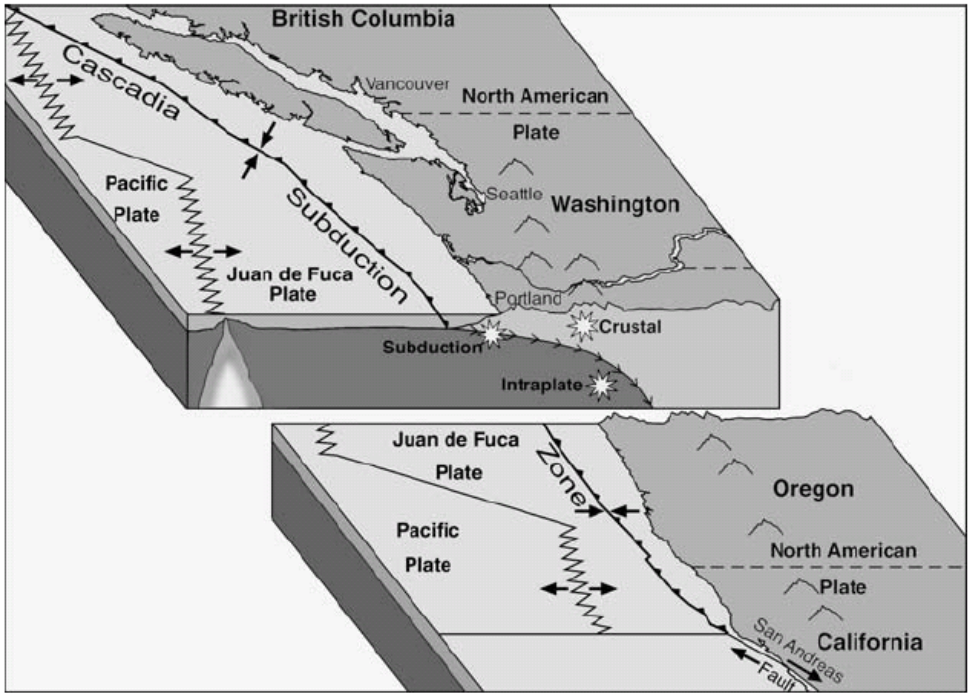


Source: Oregon Department of Geology and Mineral Industries (DOGAMI), *Map of Selected Earthquakes for Oregon, 1841 through 2002*, http://www.oregongeology.org/sub/earthquakes/images/EpicenterMap.pdf, accessed April 1, 2010.

The extent of the earthquake hazard depends on its magnitude and proximity to Coos County.

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.[42] The Coos County Steering Committee rated the probability of a future seismic event as **moderate**, meaning that one incident is likely within a 35-75 year period. The moderate ranking is consistent with the 2008 Coos County Hazard Analysis.

Vulnerability Assessment

The Coos County Steering Committee has identified a number of community assets vulnerable to earthquakes in Coos County. These vulnerable community assets are detailed in the following two sections: "Risk Analysis" and "Community Hazard Issues." The Coos County Steering Committee rated Coos County's vulnerability to an earthquake as **high** meaning that more than 10% of the community's assets are likely to

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

be affected by a major emergency or disaster. The high ranking is consistent with the 2008 Coos County Hazard Analysis.

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 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 Coos 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[43]	Greatest Absolute Loss in Thousands (1999) From a 500-Year Model Event[4445]
$3,263,000	$1,339,000	$1,429,000

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

[43]"…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)

[44]Ibid.

[45] [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 Coos 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[46]				Economic Losses To:[47]			Debris Generated (Thousands of Tons)
					Fire Stations	Police Stations	Schools	Bridges	Highways	Airports	Communications	
CSZ M8.5[48]	854	16	2,069	$1.4 billion	10%	6%	8%	44%	$44 million	$20 million	$25 million	853
500-Year Model[49]	845	16	2,521	$1.4 billion	n/a[50]	n/a	n/a	n/a	$49 million	$20 million	$2 million	864

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

[46] "…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).

[47] Ibid.

[48] 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).

[49] 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)

[50] 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.[51] To fully assess a building's potential of collapse, a more detailed engineering study completed by a qualified professional is required, but the RVS study can help to prioritize which buildings to survey.

DOGAMI surveyed 108 buildings in Coos County. Buildings in unincorporated areas of the county that received a high rating include the Coquille Rural Fire Department, the Charleston Rural Fire Department, the Lakeside Rural Fire Department, and the North Bay Rural Fire Department.

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).

Southwestern Oregon Community College

High Seismic Risk- 6 buildings
Moderate Seismic Risk- 2 buildings
Low Seismic Risk- 2 buildings

Schools

Very High Seismic Risk- 4 buildings
High Seismic Risk- 30 buildings
Moderate Seismic Risk- 4 buildings
Low Seismic Risk- 15 buildings

Police Stations

Very High Seismic Risk- 2 buildings
High Seismic Risk- 3 buildings
Moderate Seismic Risk- 1 buildings
Low Seismic Risk- 2 buildings

Hospitals

Low Seismic Risk- 4 buildings

[51] 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.

Rural Fire Stations

High Seismic Risk- 4 buildings
Moderate Seismic Risk- 3 buildings
Low Seismic Risk- 14 buildings

City Fire Stations

Very High Seismic Risk- 1 building
High Seismic Risk- 5 buildings
Moderate Seismic Risk- 1 building
Low Seismic Risk- 4 buildings

Community Hazard Issues

What is susceptible to damage during a hazard event?

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

Infrastructure

Coos County's transportation infrastructure is highly vulnerable to the earthquake hazard. Coos County has three primary highways that if damaged could limit access to communities and services in the county. The primary highways in Coos County are Highway 42, Highway 101, and Highway 542. Critical to the highway network are the 204 bridges that cross the many rivers and bays in Coos County. Vulnerable bridges include the Conde McCullough Memorial Bridge across Coos Bay, the system of Highway 101 bridges south of Coos Bay, and the Bandon Bridge that crosses the Coquille River. Damage to bridges leading into Coos Bay and North Bend can limit access to the county's three largest hospitals, one of which has the only kidney dialysis center in the county.

Other transportation infrastructure vulnerable to earthquakes includes the Southwest Regional Airport in North Bend, and the harbors in Coos Bay, Charleston, and Bandon. The airport is essential in bringing tourists to the county, especially tourists who visit to play golf. The harbors bring in tourists as well, and they also help to sustain local industries such as fishing, shipping, and logging. Coos County is considered the best deepwater port between San Francisco and Puget Sound.[52]

[52] Oregon State Archives, Oregon Historical County Records Guide: Coos County, http://arcweb.sos.state.or.us/county/cpcooshome.html, accessed April 21, 2010.

Coos County's power network is also vulnerable to earthquakes. Power in Coos 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. In addition to the power lines, the electrical substations are vulnerable to earthquakes.

Critical Facilities

Several critical facilities in Coos 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 plant in Coos Bay is at or below sea level and is vulnerable to damage from an earthquake.
- Coos County's communication network is changing to a microwave system that is vulnerable to failure if only one tower is damaged.
- The North Bend Annex building provides mental health services, public health services, courts, and drug/alcohol services but is located in an old building that will not be able to withstand an earthquake.
- The Coos County Courthouse and Jail in Coquille is vulnerable to earthquakes.

Communities

Coos County has a number of communities that are vulnerable to earthquake events. Coos Bay and North Bend 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. The city of Powers would be severely isolated if an earthquake damaged Highway 542.

Several of Coos County's unincorporated communities could be impacted by an earthquake. Vacation homes around Saunders Lake and on the beach are all built on fill or dune sand which could liquefy in a major earthquake event, causing extensive damage to the buildings. The Coquille Indian housing facility south of Charleston is also vulnerable to the earthquake hazards.

Populations

Coos County has a number of vulnerable populations. The county has a high percentage of elderly residents who may be vulnerable to earthquake events due to their retirement homes or foster homes not being properly retrofitted to withstand damage. The disabled population is also vulnerable because may have difficulty evacuating during or after an event. The rural

population in Coos County may also be isolated from the rest of the county in an earthquake if bridges and roads are damaged.

During the summer months Coos County has a high tourist population which may be vulnerable to earthquakes. Tourists depend on Coos County's transportation system and business services to travel and meet basic necessities. If the transportation system is disrupted or services are limited, tourists may find themselves isolated and without basic needs. In addition, a number of tourist destinations are located in hazardous areas such as Sunset Bay, Bullard's Beach, Cape Arago Campground, and Bastendorf Campground. These areas also rely on Highway 101 being operable.

Economy

Coos 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 assets such as the Bandon Dunes Golf Resort, and the numerous state parks found throughout the county. Historic tourist attractions such as the Coquille River Lighthouse, the Cape Arago Lighthouse, and Old Town are also vulnerable to earthquake damage because they are constructed of unreinforced masonry.

Many of the small businesses in the county are located in unreinforced masonry buildings which are highly vulnerable to earthquakes. These include small businesses in Bandon, Coos Bay, North Bend, and Coquille.

Finally, Coos County's agricultural and fishing industries are dependent on facilities vulnerable to earthquakes. These include the ports in Charleston, Coos Bay, Bandon, and storage facilities on local farms.

Existing Hazard Mitigation Activities

Coos County has adopted the International 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.

The Coos County Comprehensive Plan includes policies under Section 5.11 "Natural Hazards" that support the State Building Code Division's building code enforcement program to provide maximum structural protection to safeguard against seismic hazards.

Hazard Mitigation Action Items

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

Earthquake # 1: Encourage residents and businesses to consider the purchase of earthquake insurance.

Earthquake # 2: Conduct regular earthquake safety drills.

Earthquake # 3: Have local emergency responders continue to take bridge assessment classes.

Multi-Hazard # 1: Identify and disseminate information regarding alternate transportation routes.

Multi-Hazard # 2: Develop risk assessment maps to show areas at risk for all hazards.

Multi-Hazard # 3: 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 # 4: Educate and encourage major businesses, service providers, schools, and governmental organizations to develop continuity of operations plans.

Multi-Hazard # 5: Develop a post-disaster recovery plan for Coos County.

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

Multi-Hazard # 7: Incorporate the natural hazards mitigation plan into the Coos County Comprehensive Plan.

Multi-Hazard # 8: Continue public education efforts about the natural hazards Coos County is vulnerable to and mitigation measures residents can implement.

Volume II: Hazard Annex
Flood

Causes and Characteristics of the Hazard

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

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

Riverine floods

Riverine floods occur when water levels in rivers and streams overflow their banks. Communities in Coos 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 Coos County

Coos County, with its extensive estuaries and waterways, is particularly vulnerable to coastal storms that can cause widespread flooding. Recent significant flood events are listed below.[53]

December 2008: Brummit Creek and the west fork of Brummit Creek floods after heavy rains, inundating several homes in Sitkum and closing Sitkum Lane at Milepost 24. The Coquille River rose above flood stage, but did not do any damage.

December 2006: Two separate floods on the Coquille River inundate several roads, including Highways 42 and 42S.

December 2005: Significant flooding in southwest Oregon. Coalbank Slough south of Coos Bay flooded the Libby and Englewood Diking Districts damaging 10 homes. Damaged properties have been the focus of flood mitigation efforts between 2006 and 2008.

February 7, 2002: Presidential Disaster Declaration for Coos County due to a severe winter storm.

February 1999: Flooding along Coquille River, crop damage worth $5 million.

November 30, 1998: Coquille River flooded, including the North Fork at Myrtle Point.

November 23rd, 1998: Stormy conditions, with strong winds and heavy rain. Flash flood warnings and small stream advisories issued for Coos and Curry Counties. Coquille River at flood stage.

November-December, 1996: Presidential Disaster Declaration for continued flooding, land and mudslides in Coos County, for period of November 17 to December 11. Oregon State of Emergency Declared.[54]

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[53] 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.

Interview Libby and Englewood Diking Districts, April 22, 2010.

[54] Oregon Executive Orders: 96-42, 97-09, http://arcweb.sos.state.or.us/governors/Kitzhaber/web_pages/governor/legal/execords.htm, accessed March 31, 2010.

Record-breaking precipitation throughout much of Oregon caused local flooding, landslides, and power outages over much of the state from November 18 – 20. All-time one-day precipitation records were set at many locations. North Bend was one of the locations, with a recorded 6.67" of rain in 24 hours.

February 1996: Four days of heavy rain produced a State of Emergency in Coos County, and nearly every county in the state received a disaster declaration (Oregon Executive Order 96-18). Five Oregon residents died, thousands of people were sheltered and hundreds of homes were destroyed. Regional damage estimates exceeded one billion dollars. Federal disaster aid to Coos County was broadened to include repair and reconstruction of public facilities damaged in the February floods in the wake of storms on February 4 and 21. Coos County had already been designated for Individual Assistance to help with emergency housing needs and replacement of essential lost or damaged property.

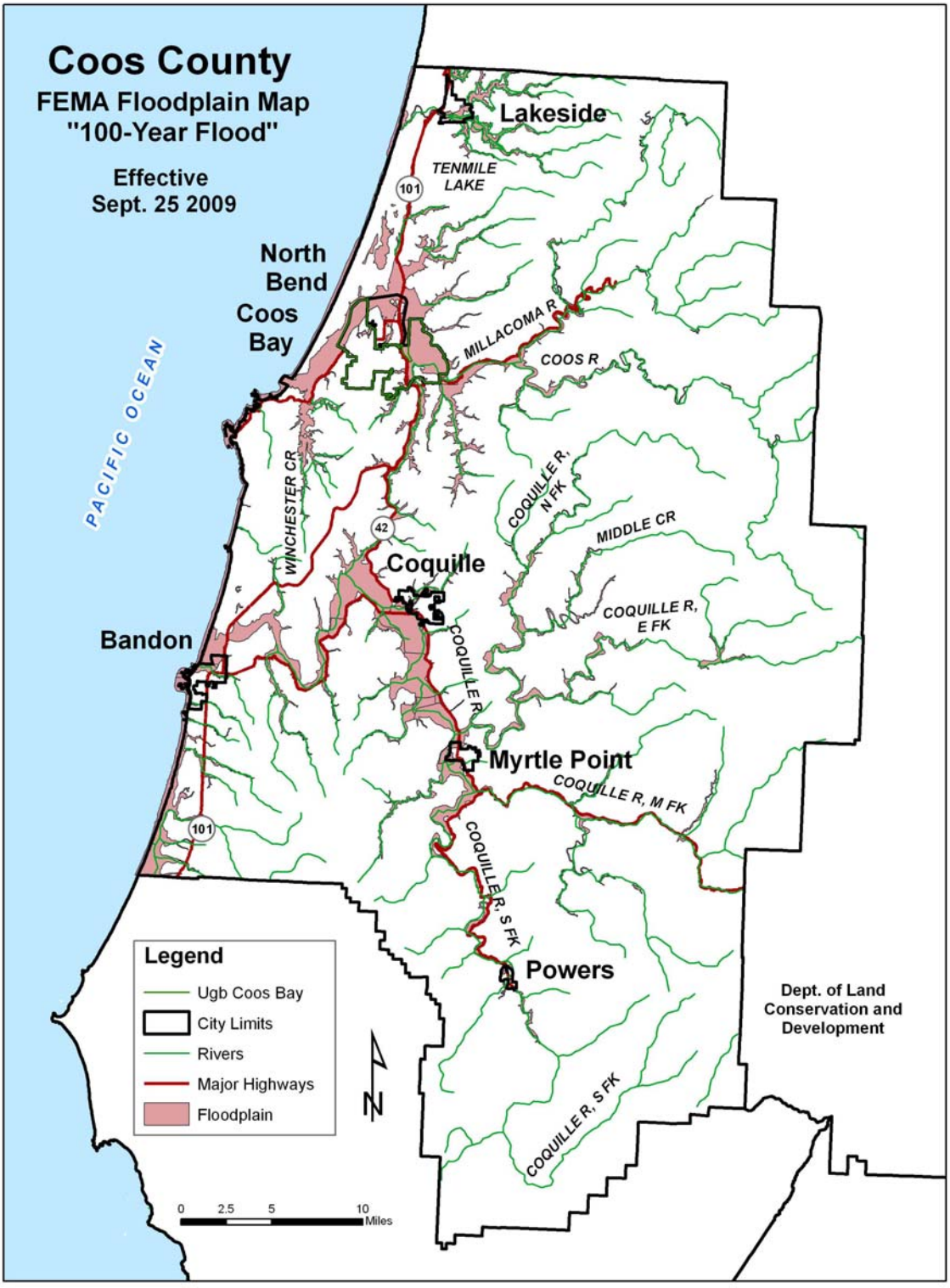
January 1995: Heavy rain caused $2.5 to $3 million worth of damage to roads, highways, residences, and parks in Coos County. Coquille River had serious flooding.

Risk Assessment

How are Hazard Areas Identified?

Major riverine flood sources in Coos County include the Coquille River, Willicoma River, Ten Mile Creek, Palouse Creek, Larson Creek, Pony Creek, Kentuck Slough, Coalbank Slough, and the Willanch Slough. 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 Coos County.

Figure 1. Coos County FEMA Floodplain Map.



Source: Department of Land Conservation and Development (DLCD), Natural Hazards Planning Division, May 2010.

The Libby Drainage District and the Englewood Diking District south of Coos Bay have experienced previous flooding problems. The Libby Drainage District is located south of Coalbank Slough and protects unincorporated residential and agricultural areas from floods using a system of levees and tidegates. The Englewood Diking District is located north of the Libby Drainage District west of Coalbank Slough and protects both unincorporated and incorporated residential areas as well as agricultural pasturelands. While the levees and tidegates have protected both districts in moderate flooding events, both districts experienced flooding in 2005 when heavy rainfall combined with a high tide prevented water from properly draining the Libby Drainage District. Floodwaters breached the Libby levee on Old Wireless Lane and flowed into the Englewood Diking District, flooding 10 homes and closing down Southwest Boulevard. Since the flood, five properties have been bought out and the others have been elevated above the base flood elevation using hazard mitigation grant program funds (DR-1632 HMGP). However, one property and Southwest Boulevard remain vulnerable to future flood events.

Coos County's Flood Insurance Rate Maps are current as of September 25, 2009. As of April 12, 2010, there were 220 National Flood Insurance Program (NFIP) policies in force with a total value of $46,270,100. Between 1978 and April 2010, the NFIP paid $635,356 in claims for 60 total losses. Of these 60 losses, 51 have closed and nine closed without payment. As of April 12, 2010, Coos County has three repetitive flood loss properties with payments totaling $164,171. Coos County's last Community Assistance Visit was September 25, 2002. Coos County is not a member of the Community Rating System (CRS).

Probability of Future Occurrence

Flooding events occur on a regular basis in Coos County. The most recent event that caused major damage occurred in 2006. The Coos County Steering Committee rated the probability of a flood occurring as **high**, meaning that one incident is likely within a 10-35 year period. The high ranking is consistent with the 2008 Coos County Hazard Analysis.

Vulnerability Assessment

A number of community assets are vulnerable to the flood hazard, and those are listed in the Community Hazard Issues section below. According to the 2008 Coos County Hazard Analysis, approximately 1,418 people in 434 homes live in the floodplain (approximately 2% of the population).

The Coos County Steering Committee rated Coos County's vulnerability to floods as **high**, meaning that more than 10% of the population or regional assets can be affected by floods. Given that 1,418 people live in the floodplain, portions of Highway 42 are in the floodplain, and that Highway 42S is almost entirely in the floodplain, the high vulnerability

rating is accurate for this assessment. The high ranking is consistent with the 2008 Coos County Hazard Analysis.

Risk Analysis

A risk analysis estimating the potential loss of life and property for the flood hazard in Coos County has not been completed at this time. However, data is currently being gathered by the Department of Geology and Mineral Industries (DOGAMI) that can assist in developing a flood risk analysis and included as flood action item # 5. DOGAMI is re-drawing floodplain boundaries in Coos County based on newly acquired Light Detection and Ranging (LIDAR) data. The LIDAR data can be used to identify the number and value of the buildings located in the 100 year and 500 year floodplain. 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).

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 Powers. Only two roads-Highway 542 and County Highway 219 – link the City of Powers to the rest of the county and portions of both highways are in the Coquille River's floodplain.

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.

Heavy winter storms have caused local sewage treatment plants to overflow, affecting local water quality. Recent documented events include the following:[55]

December 14, 2001: City of Powers overflow of raw sewage into South Fork Coquille River.

November 21, 2001: Myrtle Point overflow of partially treated sewage due to heavy rain.

July 24, 2001: North Bend raw sewage overflow into Pony Slough (flows to Coos Bay).

May 15, 2001: Myrtle Point overflow of partially treated sewage into S. Fork Coquille River, caused by heavy rain.

May 7, 2001: Coos Bay raw sewage spill.

January 11, 2000: Powers raw sewage overflow into Coquille River caused by heavy rain.

January 11, 2000: Myrtle Point raw sewage overflow caused by heavy rain storm.

December 7, 1999: Myrtle Point sewage spill into Coquille River, caused by heavy rain.

November 6, 1999: City of Coquille sewage spill due to power outage and excess rain.

March 23, 1998: City of Powers bypass of raw sewage.

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

Flood events impact businesses by damaging property and interrupting commerce. Flood events can cut off customer access and close businesses for repairs. A quick response to the needs of businesses affected by flood

[55] Information from the 2005 Coos County Natural Hazards Mitigation Plan, no citation listed.

events can help a community maintain economic viability in the face of flood damage.

Coos County's agricultural sector can be adversely impacted by floods. Portions of Coos County's dairy farms and flat farmland are located in a floodplain. Farm buildings which contain food, feed, and fertilizer can be damaged or released during a flood. Livestock can also be harmed or isolated in a flood event. Finally, disruption to transportation routes could prevent materials from being shipped to farms, or transporting goods to outside markets. This is especially important for Coos County's dairy industry.

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 Coos County Steering Committee identified the Bandon Bridge and the Coquille River Bridge in the city of Coquille as highly vulnerable to flooding.

Roads can also be closed due to flooding events. Roads that are frequently flooded include portions of Highways 101, 42 and 42S. Southwest Boulevard, located south of Coos Bay has also experienced floods when floodwaters breached the Libby Drainage District and Englewood Diking District. Southwest Boulevard is an important access road for unincorporated areas about the Libby Drainage District.

Flooding and events can cause damage to infrastructure in the Libby Drainage District and Englewood Diking Districts, making properties in these districts vulnerable to floods. High water erodes the levees and tide gates along Coalbank Slough and these must be reinforced and maintained annually to prevent levee breaches. The porous fill that was used to construct the 19th century levees also tend to leak and settle, lowering the levee crown and weakening the levee system. In addition, new developments in the Libby Drainage District have accelerated the accumulation of sediment in drainage ditches, making them less effective at draining water in the area. Ditches must now be maintained on a more frequent basis to ensure proper drainage in floods, but future developments in the area may exacerbate the problem. Should a levee be breached, flooding can damage homes in the districts.

Other critical facilities vulnerable to flooding include the Coos Bay wastewater treatment plant; the Southwest Regional Airport in North Bend; and the harbor navigation aids, dikes, and piers which are located in Charleston, Coos Bay, North Bend, and Bandon.

Existing Hazard Mitigation Activities

Communities in Coos County have taken a number of measures to lessen the impacts of local flooding events. Coos County is currently a participant

in the National Flood Insurance Program. The county also dredges rivers such as the Coquille River to reduce to reduce the impacts of flooding.

Coos County's Land Use and Development Ordinance contains a floodplain overlay zone (Article 4.6.2) 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).

The Coos County Comprehensive Plan contains policies (Section 5.11) that support the county's participation in the National Flood Insurance Program (NFIP) and adopts FEMA's Flood Insurance Rate Maps (FIRM).

Currently, Coos County is undergoing improved mapping efforts led by DOGAMI (see Section Risk Analysis above).

In 2006, FEMA elevated five properties and acquired 5 properties in the Libby Drainage District and Englewood Diking District that were flooded during severe storms in 2005/2006. Funding was provided through the Hazard Mitigation Grant Program (Grant # DR-1632 HMGP). Acquired homes were burned by the Coos County Fire Department for training events (see Figure 2 below). Only one property has not been acquired or elevated and is still vulnerable to flooding.

Figure 2. Acquisition through "Burn to Learn" of Flooded Properties on Old Wireless Lane, Libby Drainage District.

Source: Oregon Emergency Management, DR-1632 HMGP Acquisitions, May 2008.

Hazard Mitigation Action Items

The following actions have been identified by the Coos County steering committee, and are recommended for mitigating the potential effects of floods in Coos 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 National Flood Insurance Program (NFIP) requirements

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

Flood # 3: Update the county's Flood Insurance Rate Maps (FIRM).

Flood # 4: Conduct an analysis of flooding issues in the Libby Drainage District and Englewood Diking District and develop mitigation strategies to prevent future floods from damaging property in the area.

Flood # 5: Complete a risk analysis for the flood hazard using newly acquired Light Detection and Ranging (LIDAR) data.

Flood # 6: Consult with property owners and explore mitigation actions for repetitive flood loss properties in Coos County

Multi-Hazard # 1: Identify and disseminate information regarding alternate transportation routes.

Multi-Hazard # 2: Develop risk assessment maps to show areas at risk for all hazards.

Multi-Hazard # 3: 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 # 4: Educate and encourage major businesses, service providers, schools, and governmental organizations to develop continuity of operations plans.

Multi-Hazard # 5: Develop a post-disaster recovery plan for Coos County.

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

Multi-Hazard # 7: Incorporate the natural hazards mitigation plan into the Coos County Comprehensive Plan.

Multi-Hazard # 8: Continue public education efforts about the natural hazards Coos County is vulnerable to and mitigation measures residents can implement.

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 a 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 Coos County

Coos County has a long history of landslides in the community. These typically follow significant rain events in Coos County. The following is a list of previous landslide events:

February 2004: Landslide covered the only paved road leading to the city of Powers, blocking the access to and from the city.

November 1996- January 1997: Severe rains caused multiple landslides in Coos County. Five homes in Myrtle Creek fell off their foundations when a clear-cut gave way. Bill's Creek Road southeast of Bandon washed out, contributing to flooding in Ferry Creek in Bandon (see Figure 1 below).

January 1989: Landslides caused by winter weather.

March 1972: Landslide caused by rains caused $28,000 in damages.

February 1926: Landslide closed Roosevelt Highway between Coos Bay and Coquille, causing at least $25,000 in damages.

Figure 1. Bill's Creek Road – 30 ft Deep Washout, November 1996, caused flooding in Ferry Creek in Old Town Bandon.

Source: From 2005 Coos County Natural Hazards Mitigation Plan

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

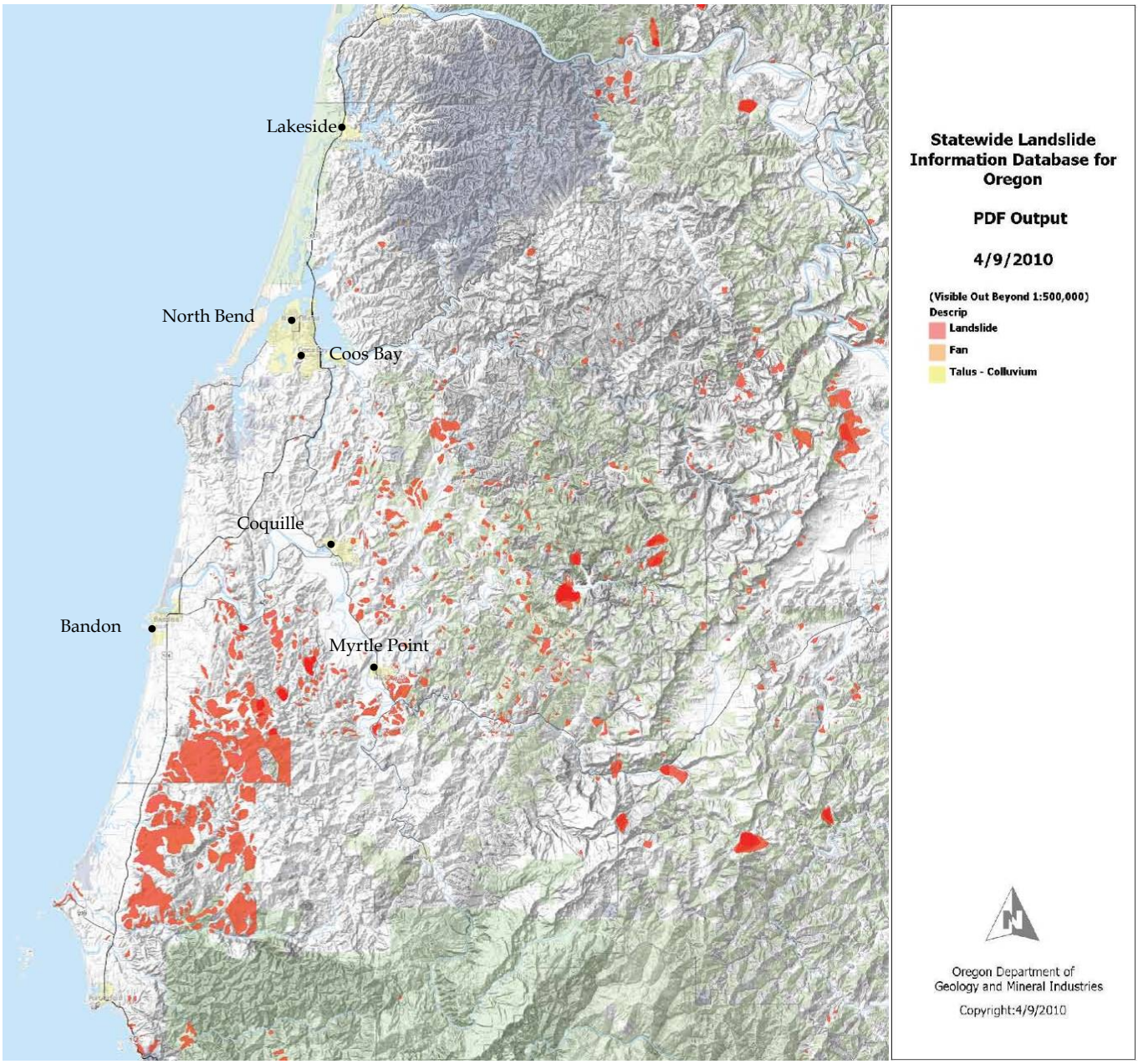
hazards are related to excavation and drainage practices, or the reactivation of preexisting landslide hazards.[56]

In 2008, the Department of Geology and Mineral Industries (DOGAMI) developed the Statewide Landslide Information Database of Oregon (SLIDO) to improve the understanding of the landslide hazard in Oregon and to create a statewide base level of landslide data. The database includes more than 15,000 landslide and landslide-related features extracted from 257 published and non-published studies. Using this database, DOGAMI developed the interactive SLIDO map. Figure 2 from the SLIDO identifies documented landslide hazards in Coos County.

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.

[56] 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 2. Landslide Hazard in Coos County.



Source: DOGAMI, *Statewide Landslide Information Database Oregon*, http://www.oregongeology.org/interactivemaps/slido/, accessed April 9, 2010.

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 gages in the area, and issues warnings as conditions warrant.

The Coos County Steering Committee rated the probability of a landslide occurring as **high**, meaning that one incident is likely in a 10-35 year period. The high ranking is consistent with the 2008 Coos County Hazard Analysis.

Vulnerability Assessment

Rain-induced landslides and debris flows can potentially occur during any winter along the coast. In Coos County, there is little developed property that is vulnerable to landslides. The greatest impacts occur to the east-west roadways that carry traffic to and from the coast. To minimize future landslide impacts to new development, hazards areas must continue to be identified and siting standards applied.[57]

The Coos County Steering Committee rated the county's vulnerability to landslides as **low**, meaning that less than 1% of the population or regional assets will be affected by a landslide event. The low ranking is consistent with the 2008 Coos County Hazard Analysis.

Risk Analysis

A risk analysis estimating the potential loss of life and property for the landslide hazard in Coos County has not been completed at this time. However, data is currently being gathered by the Department of Geology and Mineral Industries (DOGAMI) that can assist in developing a landslide risk analysis. DOGAMI is mapping landslide areas in Coos County based on newly acquired Light Detection and Ranging (LIDAR) data. The LIDAR data can be used to identify the number and value of the buildings located landslide areas. 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).

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

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.

State highways in Coos County that are vulnerable to landslides include Highways 101, 42, 42 S, 240, 241, and 242. A 2004 landslide on highway 242 blocked the only paved access to the city of Powers. Coos County has also seen landslide events on local roads, such as Bill's Creek Road (see Figure 1 above). Other local roads vulnerable to landslides include Beach Loop, Ocean Blvd, Bald Hill, North Fork Road, Lampa Mountain Road, East Bay Road. It is not cost effective to mitigate all slides due to limited funds and resources, especially when the vulnerable area is still moving. The county road department alleviates problem areas by grading slides and installing new or improving existing drainage systems on slopes to divert water.

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.
- 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

Coos County's zoning and development ordinance contains regulations for development on steep slopes. These include:

- Section 4.8.700, Fire Safety Standards: Dwellings cannot be located on a slope steeper than 40%.
- Section 6.5, Subdivision and Partitions: Regulations for lot size and placement of dwellings and roadways based on slope. Roadways require a geologic report to be completed.

The Coos County Road Department regularly monitors known landslide hazard areas. The following is a list of landslide mitigation activities completed by the Coos County Road Department.

Table 1. Coos County's Previous Landslide Mitigation Activities

Work #	Location	Cost
9A	Fairview Road	$60,000 - $70,000
9G	Fairview Road – gravel portion	$100,000
2A	Lee Valley Road	$50,000
60B	Lone Pine Lane	$50,000
195G	Sumerlin Road – all gravel	$25,000
12	North Fork Road	$100,000
11	Two Mile Lane	$25,000
4C	Lampa Lane to the end (Hwy 42)	$25,000
1B	Sitkum Lane	$50,000 - $75,000
55	Daniel's Creek Road	$25,000
6A	South Coos River Lane	$10,000
186G	North Lake Lane	$50,000
18	Ross Inlet Road	$50,000
205	West Catching Road	$5,000
45	East Bay Road	$9,000,000
217	Whiskey Run Lane	$25,000

Source: 2005 Coos County Natural Hazards Mitigation Plan.

Hazard Mitigation Action Items

The following actions have been identified by the Coos County steering committee, and are recommended for mitigating the potential effects of landslides in Coos 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: Identify and disseminate information regarding alternate transportation routes.

Multi-Hazard # 2: Develop risk assessment maps to show areas at risk for all hazards.

Multi-Hazard # 5: Develop a post-disaster recovery plan for Coos County.

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

Multi-Hazard # 7: Incorporate the natural hazards mitigation plan into the Coos County Comprehensive Plan.

Multi-Hazard # 8: Continue public education efforts about the natural hazards Coos County is vulnerable to and mitigation measures residents can implement.

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.[58]

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, 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 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

[58] 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 (magnitude 9.5) and 1964 southern Alaska (magnitude 9.2) earthquakes. 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.[59]

History of the Hazard in Coos 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.

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.

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.[60]

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

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

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

coastal villages. The tsunami spread across the Pacific Ocean and caused damage and fatalities in other coastal areas, including Oregon. In Coos County, Coos Bay suffered $20,000 in damage.[61] Along the entire Oregon Coast damage was estimated to be between $750,000 and $1 million.

After the 1964 tsunami, Coos County has experienced events of a lesser magnitude in 1986, 1996, and 2005. None of these events caused damage in Coos County.[62]

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, 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.[63]

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

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

[62] Coos County Emergency Management, *2008 Coos County Hazard Vulnerability Assessment*, available at Coos County Emergency Management Dept, p 6.

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

Figures 1 to 11 indicate the location of the tsunami hazard in Coos County.[64] 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.

[64] These maps were produced in 1995. On February 12, 2010, DOGAMI announced it will remap the entire Oregon coastline under the TsunamiReady, TsunamiPrepared Program. The program will use computer modeling and laser based terrain mapping (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 the Coos County updates its Natural Hazards Mitigation Plan in 2015.

Figure 1. Lakeside Tsunami Inundation Hazard Map.

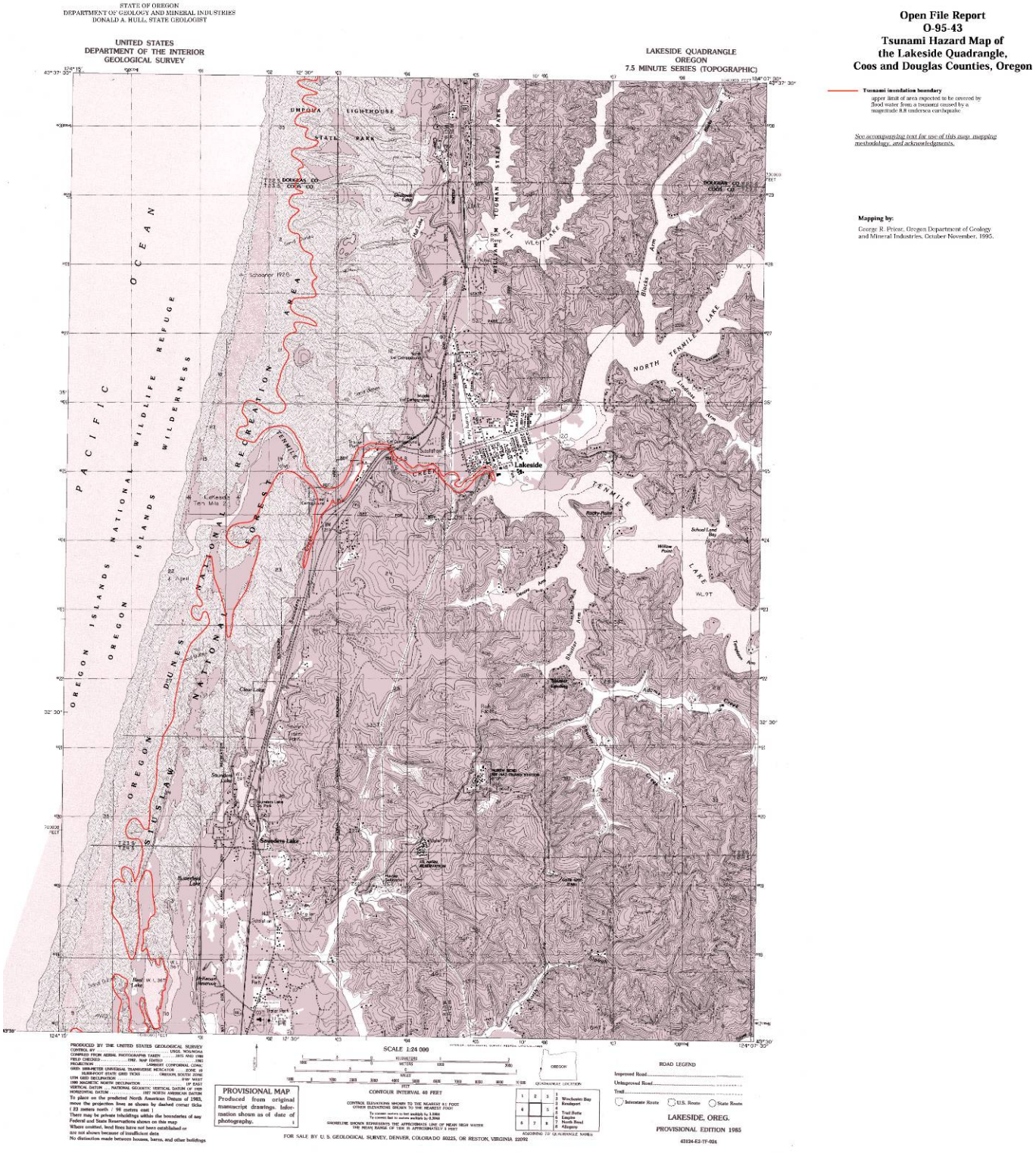


Figure 2. Empire Quadrangle Tsunami Inundation Hazard Map.

Figure 3. North Bend Quadrangle Tsunami Inundation Hazard Map.

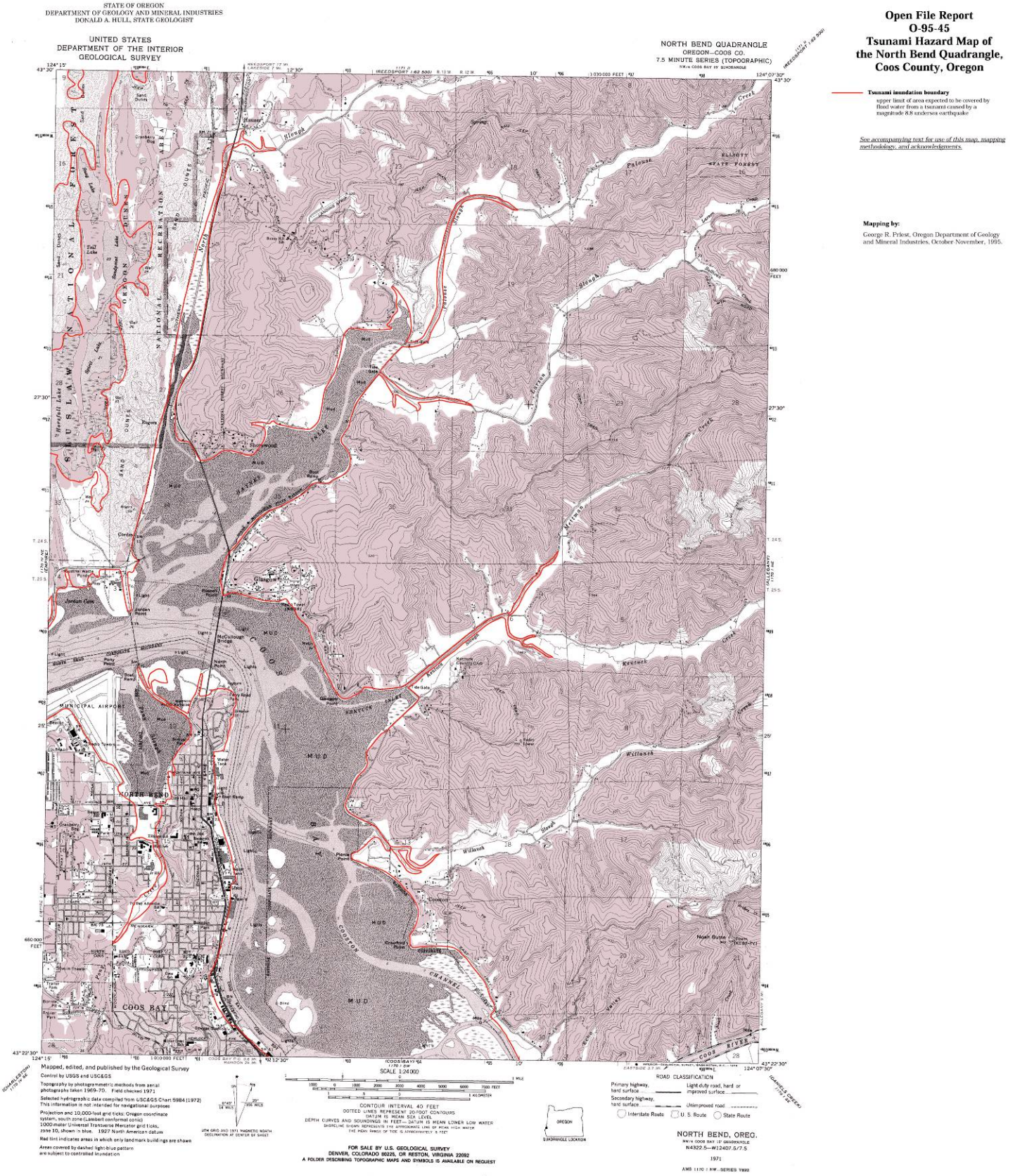


Figure 4. Cape Arago Tsunami Inundation Hazard Map.

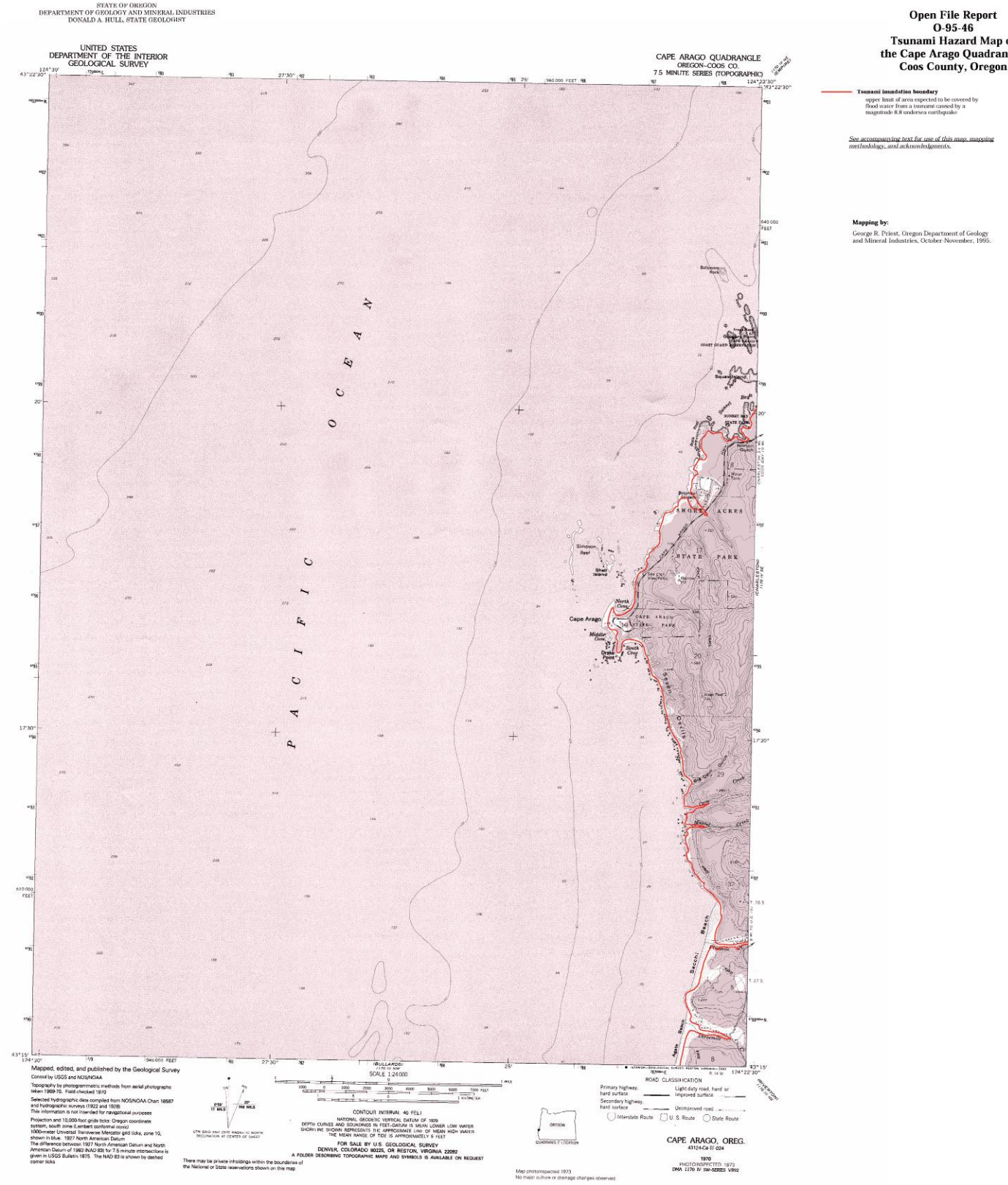


Figure 5. Charleston Quadrangle Tsunami Inundation Hazard Map.

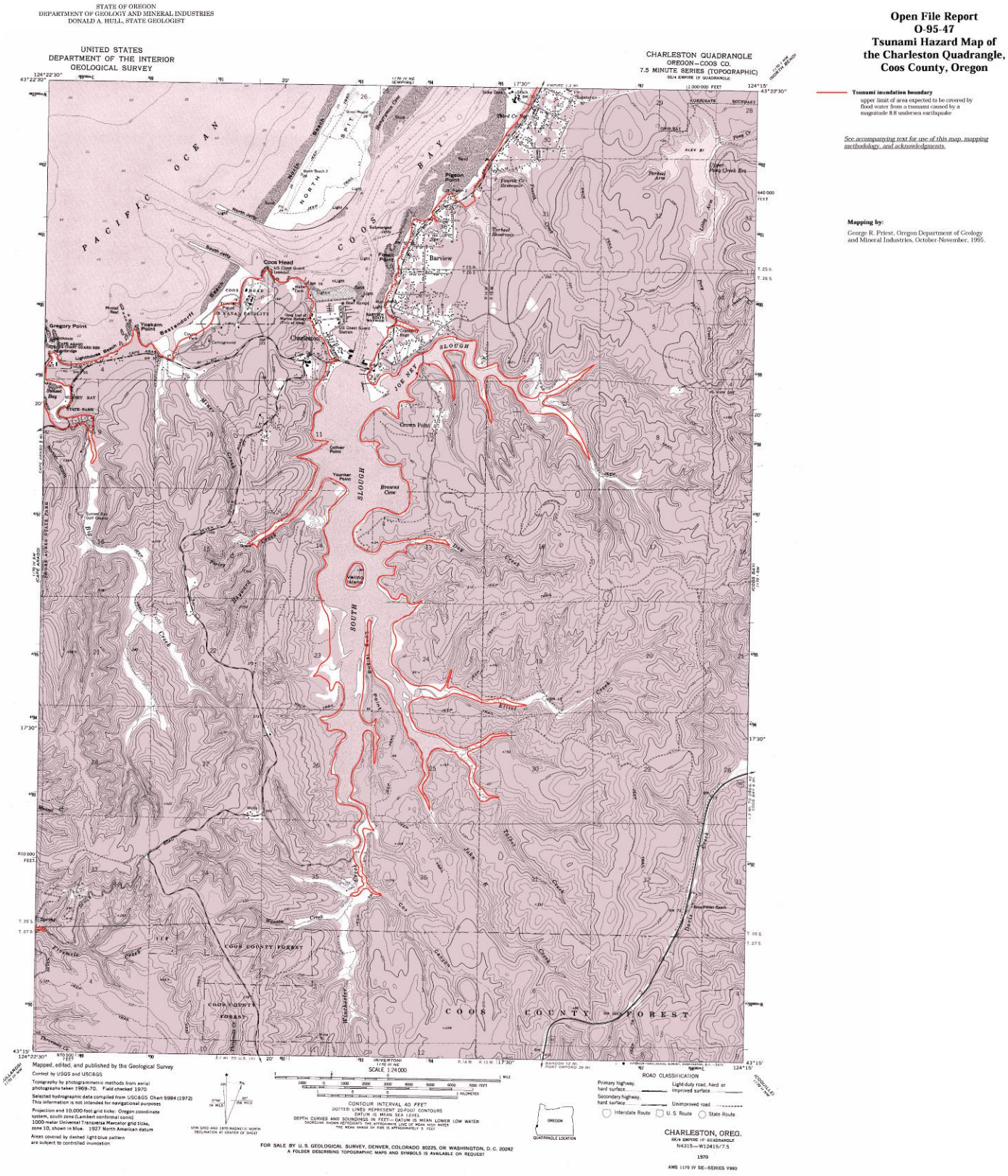


Figure 6. Coos Bay Tsunami Inundation Hazard Map.

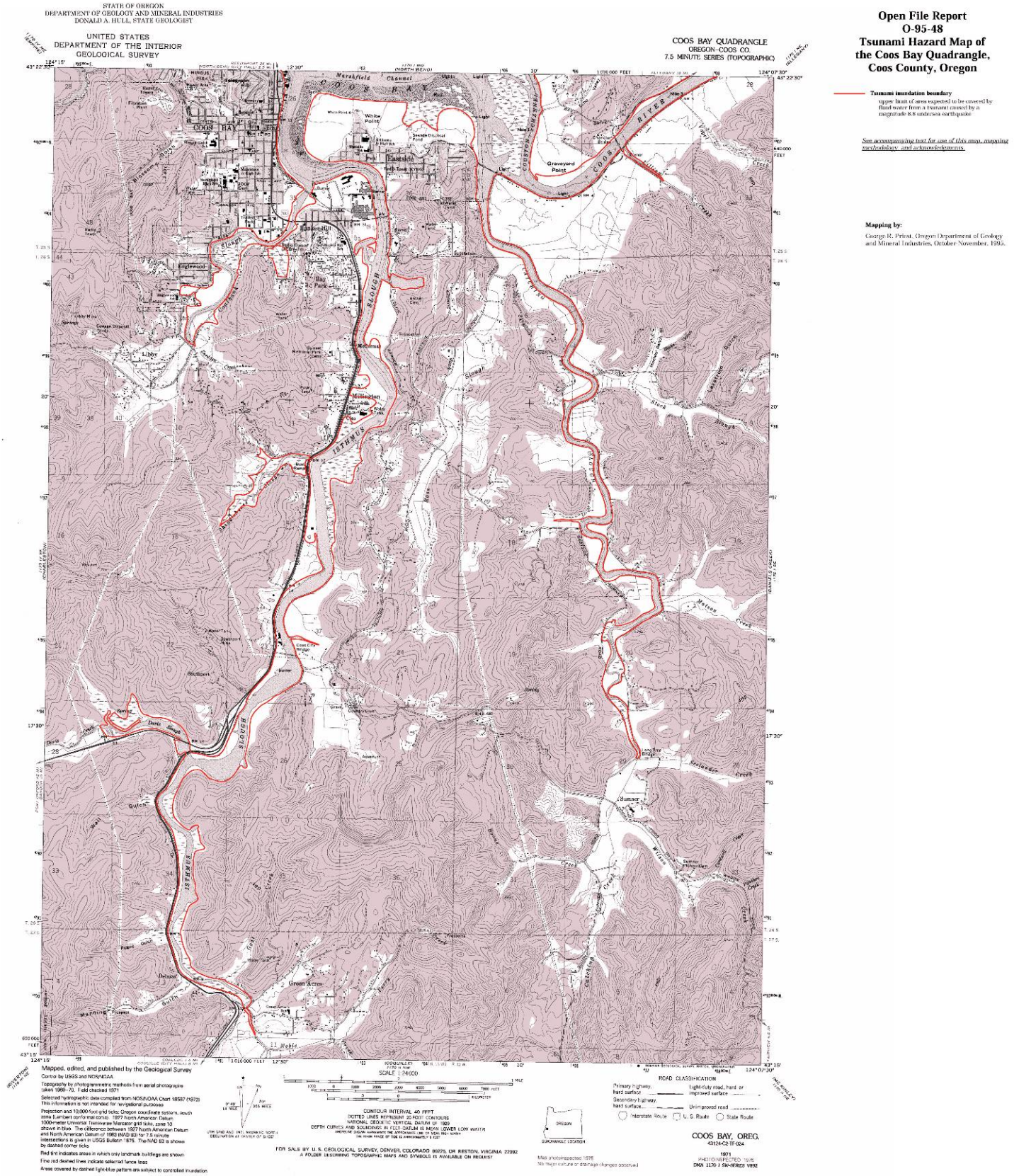


Figure 7. Bullards Beach State Park Tsunami Inundation Hazard Map.

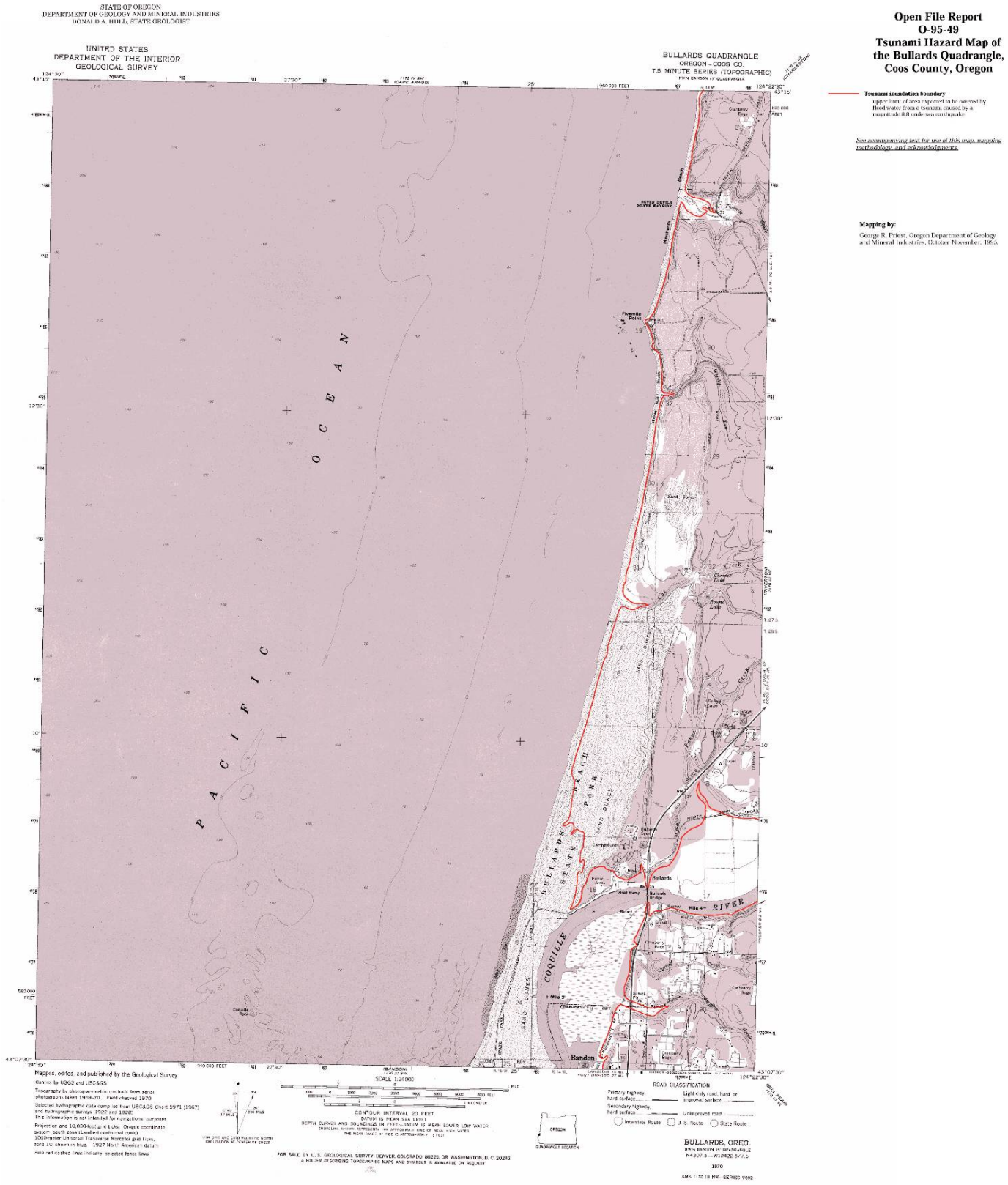


Figure 8. Riverton Quadrangle Tsunami Inundation Hazard Map.

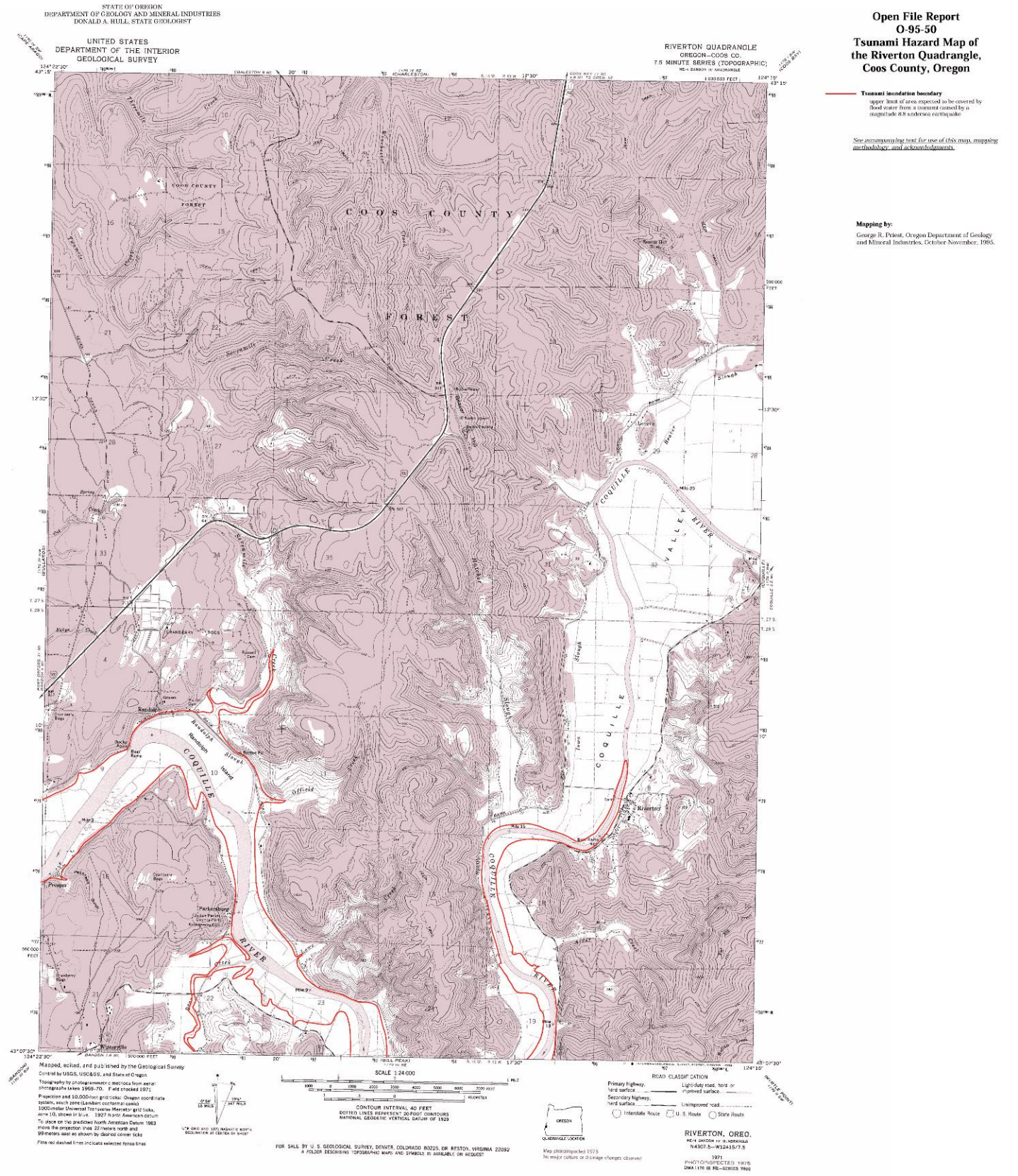


Figure 9. Bandon Tsunami Inundation Hazard Map.

Figure 10. Bill Peak Tsunami Inundation Hazard Map.

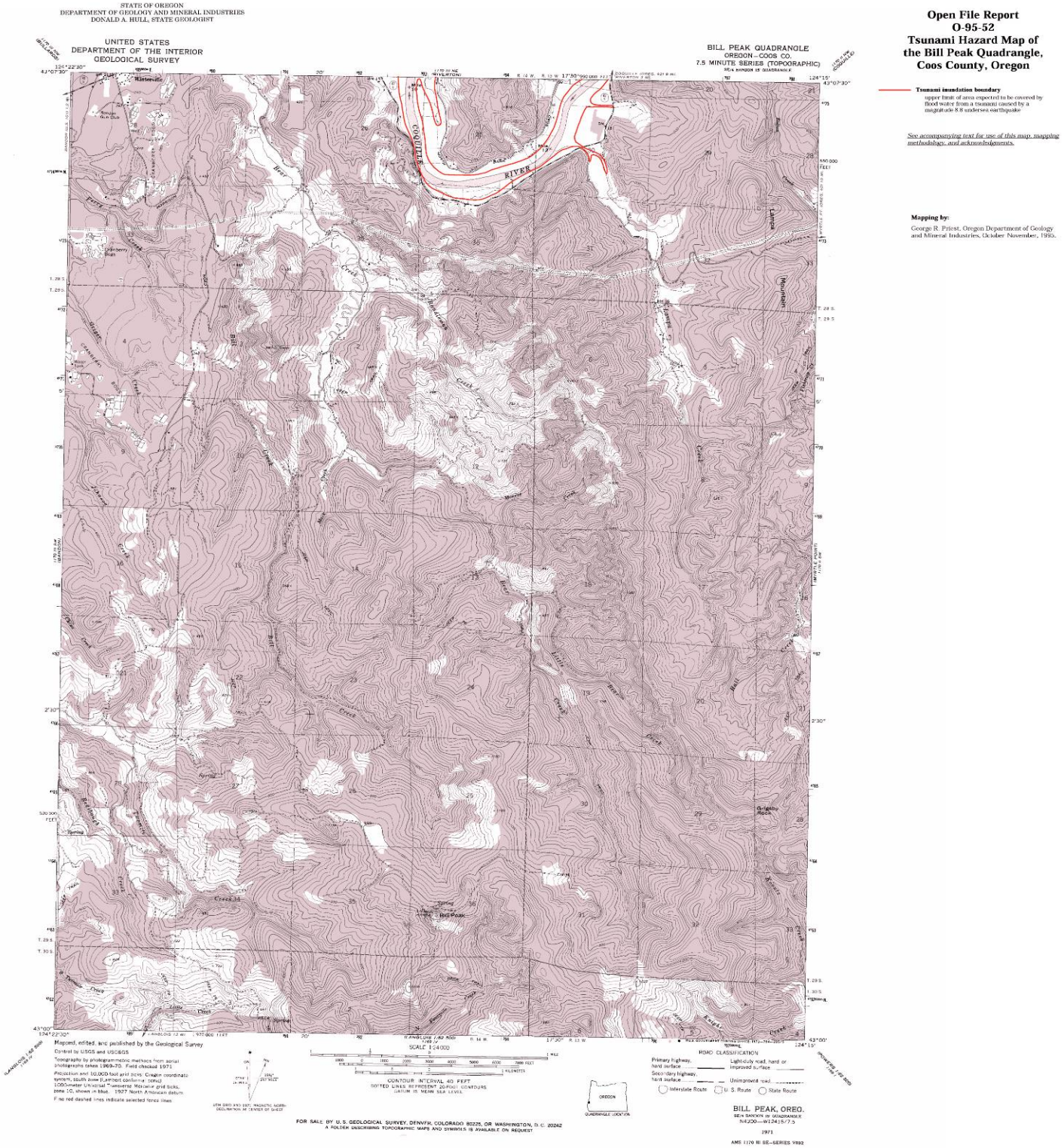
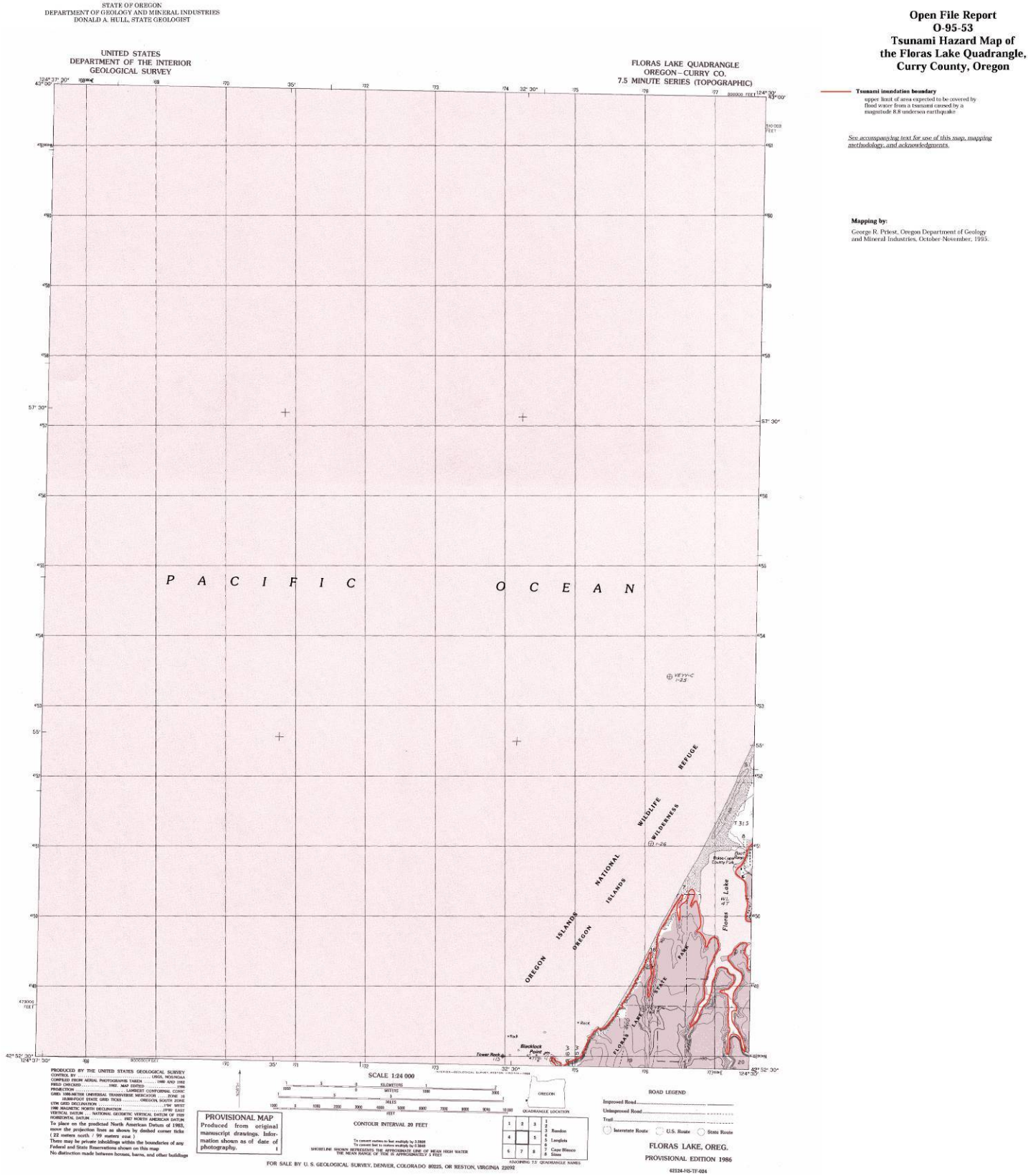


Figure 11. Floras Lake Tsunami Inundation Hazard Map.



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.[65]

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.[66]

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.[67]

The Coos County Steering Committee rated the probability of a tsunami occurring as **high,** meaning that a tsunami event is likely within a 10-35 year period. The high ranking is consistent with the 2008 Coos County Hazard Analysis.

Vulnerability Assessment

The entire Oregon Coast is at risk from tsunamis that originate from local and distant sources. In Coos 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 Coos County Steering Committee rated Coos 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. The high ranking is consistent with the 2008 Coos County Hazard Analysis.

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

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

[67] 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 Coos 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.

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

Communities

Portions of four Coos County communities are located in the tsunami inundation zone: North Bend, Coos Bay, Bandon, and Lakeside. Large unincorporated areas of Coos 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 Coos 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
Lakeside	17	1,196	1%
North Bend	960	5,986	16%
Coos Bay	383	7,381	5%
Bandon	197	1,887	10%
Coos Co. (remainder)	1,061	14,498	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.

As indicated in Table 1, Coos County has approximately 1,061 km² (262,178 acres) of low to highly developed land in the tsunami inundation zone. Unincorporated communities along the Coos 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:

- Charleston/Barview
- Bandon Dunes
- Bunker Hill
- Cooston
- Glasgow
- Hollow Stump

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

Populations

Coos 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 Bandon which has approximately 8% of the community living in the inundation zone.

Table 2. Residents in Tsunami Inundation Zone (2000 Census)

Community	Population in Inundation Zone	Total Community Population	% of Community in Inundation Zone
Lakeside	26	1,360	2%
North Bend	227	9,549	2%
Coos Bay	166	15,312	1%
Bandon	236	2,815	8%
Coos Co. (remainder)	1,014	33,744	3%

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 Coos County, 196 residents in the inundation zone are 65 years or older. This is 19% 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
Lakeside	8	409	2%	31%
North Bend	66	1643	4%	29%
Coos Bay	26	2935	1%	15%
Bandon	106	829	13%	45%
Coos Co. (remainder)	196	6204	3%	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.

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.[68]

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

- Sunset Bay State Park
- Shore Acres State Park
- Cape Arago State Park
- Seven Devils State Recreation Area
- Bullards Beach State Park
- Face Rock State Scenic Viewpoint
- Bandon State Natural Area

[68] 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.

Federal recreational areas along the coast include the Oregon Dunes National Recreational Area and the Oregon Islands National Wildfire Refuge. 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

Critical transportation infrastructure along the coast is vulnerable to the tsunami hazard. Portions of Highway 101 in Coos Bay and Bandon, and portions of Highway 42S near Coquille, are located in the inundation zone. Highway 101 bridges that cross Coos Bay and the Coquille River in Bandon are vulnerable to damage from a large tsunami event. The Southwest Oregon Regional Airport in North Bend is entirely located in the tsunami inundation zone. Finally, the port facilities in Charleston, Bandon, Coos Bay and North Bend 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 Coos Bay and North Bend can limit access to Coos County's major hospitals in North Bend and Coos Bay. This can significantly impact access to care for elderly residents in Coos County and for any residents injured from a tsunami.

Economy

Of the developed areas in unincorporated Coos County, only two businesses are located in the inundation zone. However, in each of the four incorporated cities, a larger percentage of the community's businesses are located in the inundation zone as shown in Table 4 below. These businesses are highly vulnerable to the tsunami hazard.

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
Lakeside	2	48	4%
North Bend	79	602	13%
Coos Bay	20	1015	2%
Bandon	71	360	20%
Coos Co. (remainder)	2	487	0%

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

- The lumber mills located in the bay of Coos Bay;
- Port facilities in Coos Bay and Bandon;
- Charleston's entire fishing fleet and fish processing facilities;
- University of Oregon's Institute of Marine Biology adjacent to Charleston's port.

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. This is especially important for Coos County's dairy industry that must transport dairy products in a timely manner. The forest products industry is also highly dependent on water and road transportation to ship goods. Damage to roads and the Southwest Oregon Regional Airport in North Bend can prevent tourists from visiting Coos County.

Environment

Coos 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 industrial sites along Coos Bay and community wastewater treatment plants could cause significant damage to Coos County's rivers and estuaries. Examples of major hazardous materials sites and wastewater sites within the tsunami inundation zone include:

- Fuel tank farms located at Bay Shore;
- Lumber mill sites with glue resin and gasoline tanks located along Coos Bay;
- Ammonia within Charleston's ice-making plant;
- Wastewater treatment plants in Coos Bay, Sunset Bay State Park, and Bullard's Beach State Park.

Existing Hazard Mitigation Activities

Coos 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. Coos County also posts this information about the tsunami hazard on the county's website.

Finally, the Coos County Zoning and Land Development Ordinance has development regulations (Section 4.6.281) for "Coastal High Hazard Areas" which are "areas subject to high velocity waters, including but not limited to, storm surge or tsunamis. These areas are designated on the FIRM as Zone V1-V30, VE or V."[69]

Hazard Mitigation Action Items

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

Tsunami # 1: Conduct regular tsunami evacuation drills.

Multi-Hazard # 1: Identify and disseminate information regarding alternate transportation routes.

Multi-Hazard # 2: Develop risk assessment maps to show areas at risk for all hazards.

Multi-Hazard # 3: 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 # 4: Educate and encourage major businesses, service providers, schools, and governmental organizations to develop continuity of operations plans.

Multi-Hazard # 5: Develop a post-disaster recovery plan for Coos County.

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

Multi-Hazard # 7: Incorporate the natural hazards mitigation plan into the Coos County Comprehensive Plan.

Multi-Hazard # 8: Continue public education efforts about the natural hazards Coos County is vulnerable to and mitigation measures residents can implement.

[69] Coos County Zoning and Land Development Ordinance, p. II-5.

Volume II: Hazard Annex
Wildfire

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.[70] 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 homes threatened and 44 homes were lost. The 2002 Biscuit fire in southern Oregon affected over 500,000 acres and cost $150 million to suppress.

Wildfire 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.

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

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 Coos County

Coos County has had 68 large fires since 1917. Of those 68 fires, 7 have been over 1,000 acres and of those 7 fires, 1 has been over 6,000 acres, and 2 have been over 30,000 acres in size.[71] The following is a list of wildfires that have occurred in Coos County:[72]

2005: Camas Creek wildfire burned 178 acres.

August-Oct. 1999: Wildfire in Coos County, no specific details.

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[71] 2008 Coos County Hazard Analysis. Available from Coos County Emergency Management.

[72] Hazard History gathered from Coos Forest Protective Association.

1966: Wildfire burns 1,636 acres of state forest in Coos County.

1965: Wildfire burns 1,860 acres of state forest.

1952: Williams River fire burns 2,679 acres.

June 1945: Coos Bay waterfront fire burns 689 acres.

Sept. 1936: Bandon Wildfire, 146,000 acres burned. Bandon destroyed, $1,000,000 in damages. Wildfire fueled primarily by the large amount of Gorse that surrounded the community.

Sept 1936: Temperatures reach 90 degrees and humidity drops to 6%, sparking wildfires throughout Coos and Curry Counties.

1921: Front Street fire in Marshfield, 23 businesses and 4 residences destroyed.

1918: Coquille destroyed by fire.

1914: Three-block area in Bandon destroyed by fire. Damage estimated at close to half a million dollars.

1892: Coquille's Front Street business district destroyed by fire.

Sept. 1872: Fire rages from South Slough, burning as far east as Coalbank Slough and north to Coos Bay.

1868: Coos Bay Fire. 90% of Elliott State Forest burns. Fire is stopped when it reaches the ocean after burning through 296,000 acres.

Risk Assessment

How are Hazard Areas Identified?

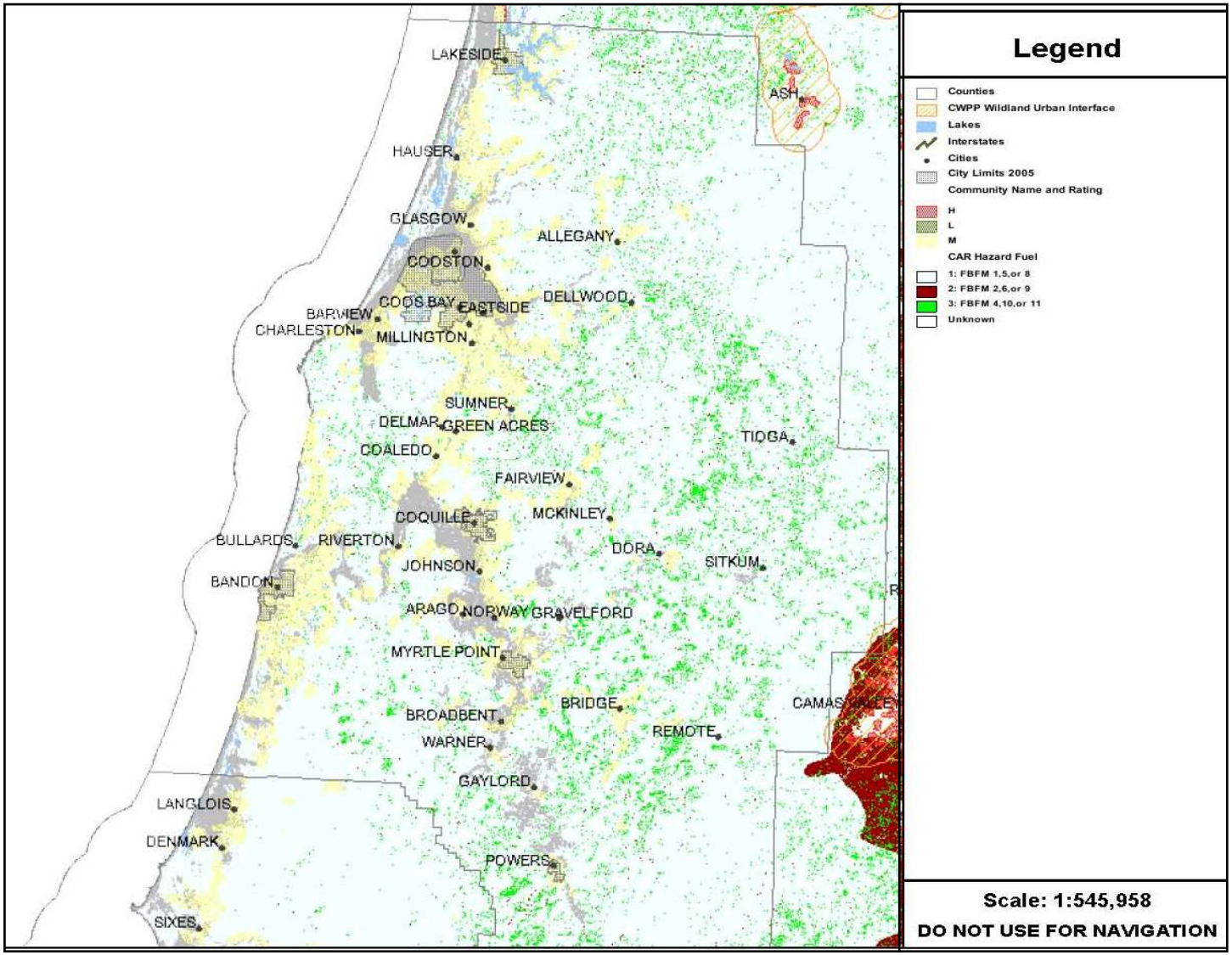
The entire county is vulnerable to wildfires; however areas at greatest risk are the heavily forested eastern portion of Coos County, and areas closer to the coast that are infested with non-native Gorse and Scotch Broom.

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 general location of the wildfire hazard and the level of risk for Coos County communities

Figure 1. Coos County Wildfire Hazard.



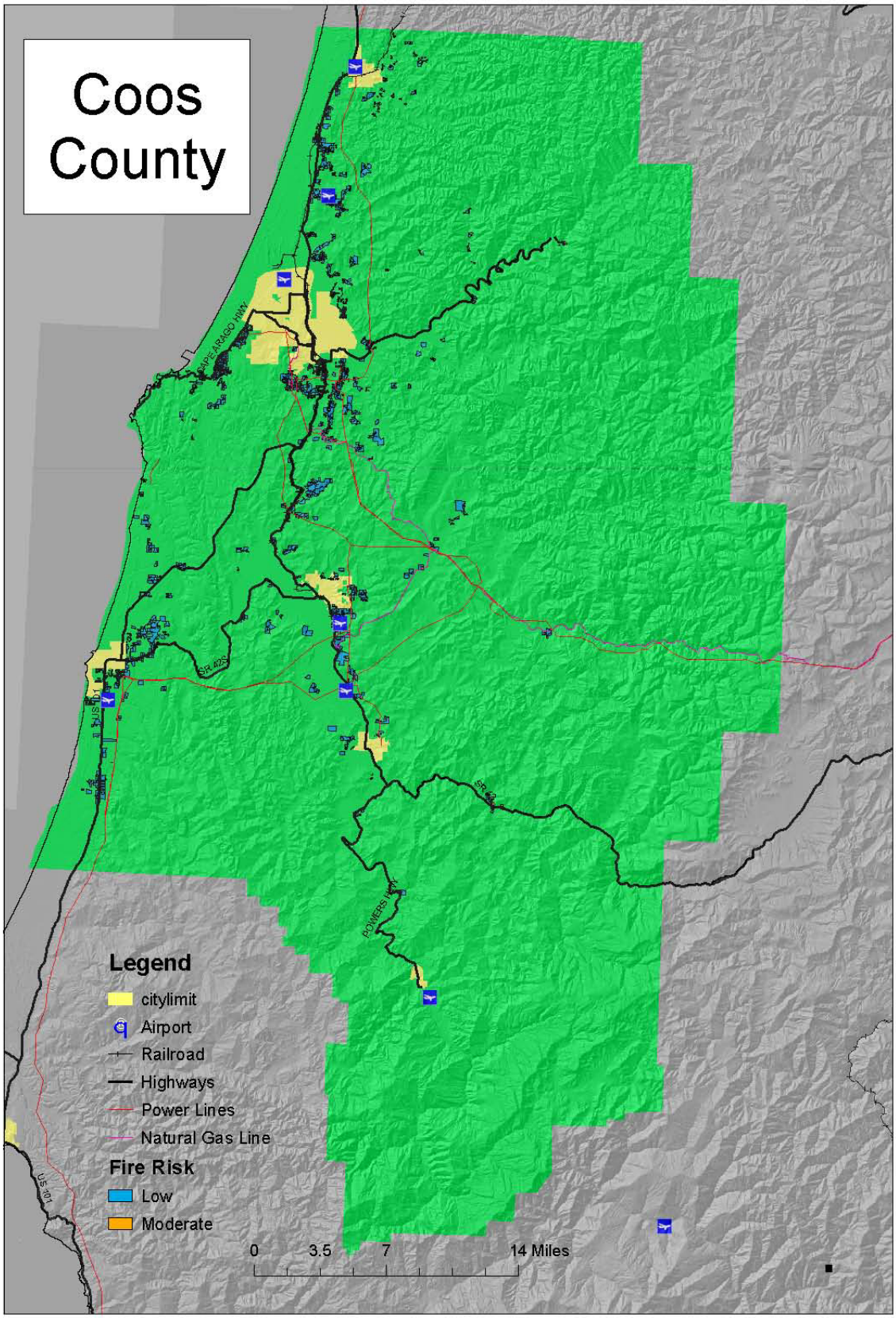
Source: Oregon State University, Oregon Hazards Explorer, http://www.oregonexplorer.info/hazards/, accessed April 8, 2010.

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.

Coos County has identified 7,094 urban/wildland interface properties.[73] Of these properties, 33 have a moderate fire risk and the remaining properties have a low fire risk. The Coos Forest Protective Agency is currently working with these 33 property owners to reduce the risk of wildfire on their property. Figure 2 below identifies the location of the 7,094 urban/wildland interface properties.

[73] Coos Forest Protective Association, telephone interview, April 23, 2010.

Figure 2. Oregon Forestland-Urban Interface Fire Protection Act Properties.



Source: Coos Forest Protective Association, May 2010.

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 Coos County Steering Committee rated the probability of a wildfire occurring as **high**, meaning one incident is likely within a 10-35 year period. The high ranking is consistent with the 2008 Coos County Hazard Analysis.

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.[74] Coos 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.[75]

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 Coos County and

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

[75] Ibid.

their respective ratings. Note that the ratings listed below were developed statewide, so the ratings of Low, Medium, and High are relative to other communities.

Table 1. Coos County Communities at Risk to Wildfire

2006 Communities At Risk	Risk	Hazard	Protection	Value	Overall
Bandon (City)	H	L	L	H	M
Bandon FRPD # 18	H	L	L	H	M
Bridge Vol (RFPD)	H	M	M	H	M
Bunker Hill (RFPD)	H	L	L	H	M
Charleston RFPD (RFPD)	H	L	H	H	M
Coos (County)	H	L	M	H	M
Coos Bay (City)	H	L	L	H	M
Coos, Lower Umpqua and Siuslaw (Reservation)	H	L	M	H	M
Coquille (City)	M	L	L	H	M
Coquille (Reservation)	H	L	H	H	M
Coquile Fire Dept (RFPD)	H	L	M	H	M
Dora-Sitkum (RFPD)	M	M	M	M	M
Fairview RFPD (RFPD)	M	L	M	H	M
Greenacres RFPD (RFPD)	H	L	M	H	M
Hauser RFPD (RFPD)	H	L	M	H	M
Lakeside (City)	H	L	M	H	M
Libby (RFPD)	H	L	L	H	M
Millington Fire Dist # 5 (RFPD)	H	L	M	H	M
Myrtle Point (City)	H	L	M	H	M
North Bay RFPD (RFPD)	H	L	M	H	M
North Bend (City)	H	L	L	H	M
Powers (City)	H	M	M	M	M
Sumner RFPD (RFPD)	H	L	M	H	M
Timber Park (RFPD)	H	L	M	H	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 March 25, 2010.

The Coos County Steering Committee rated the county's vulnerability to wildfire events as **moderate**, meaning that 1-10% of the population or regional assets are likely to be affected by a major wildfire emergency or disaster. The moderate ranking is consistent with the 2008 Coos County Hazard Analysis.

Risk Analysis

A risk analysis estimating the potential loss of life and property for the landslide hazard in Coos County has not been completed at this time. However, Coos County is undergoing efforts to develop Community Wildfire Protection Plan which will provide more detailed information to complete a risk analysis of the wildfire hazard in Coos County.

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 Coos 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.

Forest fires can also have an impact on Coos County's economy and environment. The forestry and logging sector employs 549 people in Coos

County.[76] Employment in the forestry and logging sector could be impacted if forest fires destroy large stands of timber. In addition, the Coos County Steering Committee noted that after a forest fire, erosion increases, affecting the Coquille River watershed. This can have an impact on water quality and fish habitat.

Critical facilities and infrastructure vulnerable to wildfires include power lines running through forested areas, the natural gas pipeline that runs between Coos Bay and Roseburg, and isolated rural fire stations. In addition, the Bandon Airport is surrounded by gorse, a highly flammable weed, especially during the dry summer months.

Finally, the Coos County Steering Committee noted that water supply to fight wildfires can be limited in rural areas making fire suppression difficult. Many rural residents rely on wells or springs for water, and sometimes these water supplies are inadequate to fight a wildfire, or can run dry during the summer months.

Existing Hazard Mitigation Activities

Coos County is in the process of writing a Community Wildfire Protection Plan (CWPP) to better address the risk of wildfire in Coos County and develop appropriate mitigation action items. No date for completion has been set.

The Coos Forest Protection Association (CFPA) actively promotes wildfire mitigation in Coos County. Recent activities include mailings to 6,000 Coos County residents living in wildland-urban interface areas encouraging them to create defensible space around structures. The CFPA a.sl conducts wildfire outreach programs in local elementary and middle schools, state parks, county fairs and home shows, and work with property owners to provide open burn and incinerator burn permits. Finally, CFPA provides information about Firewise, a program developed within the National Wildland-Urban Interface Fire Protection Program and is the primary federal program addressing interface fire. Firewise offers online wildfire protection information and checklists, as well as listings of other publications, videos and conferences.

The Coos Forest Protective Association is working with 33 property owners who have been identified as having a moderate risk to wildfires as defined by Oregon Senate Bill 360.

The Coos County Development Code (Section 4.4.400) contains regulations for setbacks for rural developments for a fire break around new development. Section 4.8.700 contains fire safety regulations for any new development in the forest zone.

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[76] Oregon Employment Department, "Coos County Nonfarm Employment 2008," www.qualityinfo.org, accessed March 29, 2010.

Hazard Mitigation Action Items

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

Wildfire # 1: Develop a Community Wildfire Protection Plan.

Wildfire # 2: Encourage new and existing developments in the WUI to incorporate wildfire mitigation measures and ensure adequate emergency access.

Wildfire # 3: Through multi-agency coordination, continue abatement efforts to control noxious weeds, specifically Gorse, Scotch Broom and Butterfly Brush.

Multi-Hazard # 1: Identify and disseminate information regarding alternate transportation routes.

Multi-Hazard # 2: Develop risk assessment maps to show areas at risk for all hazards.

Multi-Hazard # 3: 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 # 4: Educate and encourage major businesses, service providers, schools, and governmental organizations to develop continuity of operations plans.

Multi-Hazard # 5: Develop a post-disaster recovery plan for Coos County.

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

Multi-Hazard # 7: Incorporate the natural hazards mitigation plan into the Coos County Comprehensive Plan.

Multi-Hazard # 8: Continue public education efforts about the natural hazards Coos County is vulnerable to and mitigation measures residents can implement.

Volume II: Hazard Annex
Wind Storm

Causes and Characteristics of the Hazard

High wind events are a regular occurrence Coos 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 Coos 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. In 1997, a tornado touched down near the Coquille River Lighthouse but did not cause any damage.[77] Other tornados on the coast have caused damage, the most

[77] 2005 Coos County Natural Hazards Mitigation Plan.

recent occurring in November 2009 in Lincoln County which damaged 20 to 30 homes north of Lincoln City.[78]

History of the Hazard in Coos County

Coos County has a long history of wind storms. The following list describes the history of wind storms in Coos County.[79]

December 2007: A relentless storm pummeled the Oregon and Washington Coasts for 3 days bringing the strongest winds the area has seen since the Columbus Day storm.

December 2006: Wind storms with winds over 90 mph caused $225,000 for Coos, Curry, and Douglas counties.

November 2006: Storms with winds measured at 70 mph, total of $10,000 in damages.

November 2002: Presidential Disaster Declaration in Coos County due to severe storm.

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.

February 1999: Gale force winds along the coast cause the freighter New Carissa to run aground new Coos Bay.

November 1981: Severe windstorms cause widespread damage in Coos County, ripping off a roof, and causing 1,500 residents in Coos Bay to lose power for 3 days.

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 Coos County.

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

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

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[78] Salem News.com, "Tornado Touches Down Damaging Oregon Beachfront Houses," November 7, 2009, http://www.salem-news.com/articles/november072009/storm_lc.php.

[79] 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.

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.

January 1921: Hurricane-force winds along the entire coast.

Risk Assessment

How are Hazard Areas Identified?

All of Coos County is vulnerable to wind. 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 Coos County. Occasionally a severe windstorm exceeding 100 mph will occur, causing damage to buildings, power lines, and toppling trees.

The Coos County Steering Committee rated the probability of a windstorm occurring as **high** meaning that one incident is likely within a 10-35 year period. The high ranking is consistent with the 2008 Coos County Hazard Analysis.

Vulnerability Assessment

Windstorms can cause power outages, transportation, and economic disruptions. Structures most vulnerable to high winds in Coos 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). Bridges spanning bays such as the McCullough Memorial Bridge are often closed during these high wind events.

The Coos County Steering Committee rated the county's vulnerability to windstorms as **high**, meaning that more than 10% of the population or regional assets would be affected. The high ranking is consistent with the 2008 Coos County Hazard Analysis.

Risk Analysis

A risk analysis estimating the potential loss of life and property for the windstorm hazard in Coos 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.

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 Coos 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

The Oregon Building Code sets standards for structures to withstand 80 mph winds, with additional requirements addressing high exposure areas.

Hazard Mitigation Action Items

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

Wind Storm # 1: Educate the public about the dangers of downed power lines after a windstorm.

Wind Storm # 2: Encourage all critical facilities to have backup power and/or emergency operations plans in place to deal with power outages.

Wind Storm # 3: Upgrade lines and poles to improve wind loading and underground critical power lines.

Wind Storm # 4: Enhance strategies for debris management and removal for severe wind storm events.

Multi-Hazard # 1: Identify and disseminate information regarding alternate transportation routes.

Multi-Hazard # 2: Develop risk assessment maps to show areas at risk for all hazards.

Multi-Hazard # 3: 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 # 4: Educate and encourage major businesses, service providers, schools, and governmental organizations to develop continuity of operations plans.

Multi-Hazard # 5: Develop a post-disaster recovery plan for Coos County.

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

Multi-Hazard # 7: Incorporate the natural hazards mitigation plan into the Coos County Comprehensive Plan.

Multi-Hazard # 8: Continue public education efforts about the natural hazards Coos County is vulnerable to and mitigation measures residents can implement.

Appendix A: Action Items

Coos 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, outreach, and awareness	Protect Natural and Cultural Resources
Coastal Erosion # 1	Monitor rates of coastal erosion in areas zoned for development and reassess development standards to prevent damage to future buildings and infrastructure.	Oregon State Parks	Coast Watch, County Road Department, Planning Department, County Commission, ODOT, OSU Marion Biology Extension Office, DLCD	LT		X				X
Earthquake # 1	Encourage residents and businesses to consider the purchase of earthquake insurance.	Coos County Emergency Management	Coos County Commissioners, DOGAMI, Private Insurers, FEMA, State of Oregon Insurance Division	Ongoing	X		X			
Earthquake # 2	Conduct regular earthquake safety drills.	Coos County Emergency Management	County and city governments, local businesses, schools hospital, police, fire, American Red Cross, FEMA, OEM	Ongoing	X			X	X	
Earthquake # 3	Have local emergency responders continue to take bridge assessment classes.	Coos County Emergency Management	County Road Department, ODOT	Ongoing		X				

Flood # 1	Continue to review and assess the county's floodplain ordinance to determine whether it meets current National Flood Insurance Program (NFIP) requirements.	County Planning	County Commission, Planning Commission, FEMA, DOGAMI, DLCD	LT	X	X	X	X		
Flood # 2	Take steps for the county to qualify for participation in the National Flood Insurance Program's (NFIP) Community Rating System.	Coos County Planning	Coos County Road Department, FEMA, OEM, CRS Program, Property Owners Impacted	LT	X	X				
Flood # 3	Update the county's Flood Insurance Rate Maps (FIRM).	Coos County Planning	County Commission, Planning Commission, FEMA, DOGAMI, DLCD	LT	X	X	X	X		
Flood # 4	Conduct an analysis of flooding issues in the Libby Drainage District and Englewood Diking District and develop mitigation strategies to prevent future floods from damaging property in the area.	Englewood Diking District	Coos County Planning, Coos County Emergency Management, Army Corps of Engineers, FEMA, OEM, Libby Drainage District	LT	X	X		X		X
Flood # 5	Complete a risk analysis for the flood hazard using newly acquired Light Detection and Ranging (LIDAR) data.	Coos County Planning	Coos County Emergency Management, DOGAMI, FEMA, OEM	ST		X		X		
Flood # 6	Consult with property owners and explore mitigation actions for repetitive flood loss properties in Coos County.	Coos County Emergency Management	Coos County Planning, FEMA, OEM, DLCD	ST		X		X		
Landslide # 1	Assess LIDAR maps to evaluate development in hazardous areas.	Coos County Planning Department	Coos County Emergency Management, DOGAMI, FEMA, DLCD	ST	X	X				
Landslide # 2	Continue to track landslide events along major roadways and develop appropriate mitigation measures.	Coos County Road Department	Coos County Planning, Emergency Management, ODOT, FEMA, DOGAMI	Ongoing	X	X	X			

Tsunami # 1	Conduct regular tsunami evacuation drills.	Coos County Emergency Management	Coos County Planning, Sheriff, Oregon State Parks, DOGAMI, FEMA, DLCD	Ongoing	X			X	X	
Wildfire # 1	Develop a Community Wildfire Protection Plan.	Coos County Emergency Management	Coos Forest Protective Association, BLM, Oregon Department of Forestry, US Forest Service, cities, property owners	ST	X	X	X	X		X
Wildfire # 2	Encourage new and existing developments in the WUI to incorporate wildfire mitigation measures and ensure adequate emergency access.	Coos Forest Protective Association (CFPA)	Coos County Planning, Coos County Emergency Management, Oregon Department of Forestry, FEMA	Ongoing	X	X				X
Wildfire # 3	Through multi-agency coordination, continue abatement efforts to control noxious weeds, specifically Gorse, Scotch Broom and Butterfly Brush.	Coos Forest Protective Association (CFPA)	Coos County Planning, Emergency Management, Oregon Department of Forestry, FEMA, BLM, ODOT, cities, logging companies	Ongoing	X	X				X
Wind Storm # 1	Educate the public about the dangers of downed power lines after a windstorm.	Coos-Curry Electric Cooperative	Coos County Emergency Management, Coos County Planning, Sheriff, Cities, Rural Fire Departments	Ongoing	X					
Wind Storm # 2	Encourage all critical facilities to have backup power and/or emergency operations plans in place to deal with power outages.	Coos County Emergency Management	County Road Department, FEMA, OEM	LT	X	X				
Wind Storm # 3	Upgrade lines and poles to improve wind loading and underground critical power lines.	Coos-Curry Electric	Coos County Road Department, Coos County Emergency Management, other public utilities	LT		X	X			
Wind Storm # 4	Enhance strategies for debris management for severe wind storm events.	Coos County Emergency Management	Coos Road Department, Public utilities, ODOT	LT		X	X			

Multi-Hazard # 1	Identify and disseminate information regarding alternate transportation routes.	Coos County Road Department	County Sheriff, Coos County Emergency Management, 911 Dispatch, Coos Forest Protective Association, ODOT	LT	X				X	
Multi-Hazard # 2	Develop risk assessment maps to show areas at risk for all hazards.	Coos County Planning Department	County Road Department, DOGAMI, FEMA, OEM	ST	X	X				
Multi-Hazard # 3	Establish mutual aid agreements between government agencies and commercial businesses in the event of an emergency (e.g. fuel, heavy equipment, food, etc.)	Coos County Emergency Management	Coos Road Department, Sheriff, local businesses, Curry County, FEMA, OEM	ST	X		X	X		
Multi-Hazard # 4	Educate and encourage major businesses, service providers, schools, and governmental organizations to develop continuity of operations plans.	Coos County Emergency Management	All county departments, cities, Chamber of Commerce, OPDR	LT			X	X		
Multi-Hazard # 5	Develop a post-disaster recovery plan for Coos County.	Coos County Emergency Management	All county departments, County Commission, Fire Department, Sheriff Department, cities, OPDR	ST			X	X		
Multi-Hazard # 6	Encourage citizens and businesses to prepare and maintain provisions for one week without services.	Coos County Emergency Management	Coos County Sheriff, Fire Departments, Rural Fire Districts, hospitals, cities	LT	X				X	
Multi-Hazard # 7	Incorporate the natural hazards mitigation plan into the Coos County Comprehensive Plan.	Coos County Planning Department	County Commission, Planning Commission, FEMA, DLCD	Ongoing					X	
Multi-Hazard # 8	Continue public education efforts about the natural hazards Coos County is vulnerable to and mitigation measures residents can implement.	Coos County Emergency Management	All County Departments, Coos Forest Protective Association, DOGAMI, OEM, USGS, ODF, Oregon State Parks	Ongoing	X	X	X		X	
Plan Implementation # 1	Consider adopting the South Coast Emergency Management Advisory Committee as the coordinating body for the Coos County Natural Hazards Mitigation Plan.	NHMP Coordinating body	Coos County Emergency Management, Curry County, SCEMAC members	ST				X		

Coastal Erosion # 1

Proposed Action Item:	Alignment with Plan Goals:
Monitor rates of coastal erosion in areas zoned for development and reassess development standards to prevent damage to future buildings and infrastructure.	*Minimize and prevent damage* *Protect Natural and Cultural Resources*

Alignment with Existing Plans/Policies:

Coos County Zoning and Land Development Ordinance

Rationale for Proposed Action Item:

The Coos County Zoning and Land Development Ordinance includes development standards for coastal areas. New coastal developments are coordinated with Oregon State Parks. 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, Coos County and Oregon State Parks should monitor rates of coastal erosion in areas zoned for development and reassess 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 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 areas where development standards should be reassessed to account for an increase in coastal erosion.

Coordinating Organization:	Oregon State Parks

Internal Partners:	External Partners:
Coast Watch, County Road Department, Planning 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:	Coos County Steering Committee
Action Item Status:	**New action (2010).**

Earthquake #1

Proposed Action Item:	Alignment with Plan Goals:
Encourage residents and businesses to consider the purchase of earthquake insurance	*Save lives and reduce injuries* *Reduce economic losses*

Alignment with Existing Plans/Policies:

Not applicable.

Rationale for Proposed Action Item:

Earthquake insurance can protect a property owner's home and its contents, however, it often must be purchased separately because a typical homeowner's insurance policy does not cover damage related to earthquakes. Federal assistance may also not be adequate to replace a home and its contents. According to the California Earthquake Authority, "government disaster-relief programs are designed to help you get partly back on your feet but not to replace your home and everything you lose. The primary form of federal disaster relief is the low-interest loan—as a loan, it must be repaid. Because it is a loan, some people may qualify for the loan. FEMA grants for post-disaster emergency home repairs and temporary rent assistance are only available to individuals and households who do not qualify for loans." (http://www.earthquakeauthority.com/index.aspx?id=13) Encouraging residents and businesses to consider purchasing earthquake insurance can make Coos County more resilient to earthquakes.

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)]. Encouraging property owners to purchase earthquake insurance can assist in making communities more resilient to earthquakes by providing the financial means to recover after an event.

Ideas for Implementation:

Continue encouraging homes and businesses to purchase earthquake insurance to protect their buildings and contents from damage during an earthquake.

Incorporate discussion about earthquake insurance during public outreach about natural hazards in Coos County.

Post information on earthquake insurance on the Coos County website.

Coordinating Organization:	Coos County Emergency Management

Internal Partners:	External Partners:
Coos County Commissioners	DOGAMI, Private Insurers, FEMA, State of Oregon Insurance Division

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

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

Earthquake # 2

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:

Coos 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 Coos 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 Coos County and prepare Coos County citizens in how survive 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. 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 Coos 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:	Coos County Emergency Management

Internal Partners:	External Partners:
County and city governments, local businesses, schools, hospital, police and fire	American Red Cross, FEMA, OEM,

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

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

Earthquake # 3

Proposed Action Item:	Alignment with Plan Goals:
Have local emergency responders continue to take bridge assessment classes.	*Minimize and prevent damage*

Alignment with Existing Plans/Policies:

Coos County Transportation Systems Plan

Rationale for Proposed Action Item:

According to the Oregon Department of Transportation (ODOT), "with a majority of state owned bridges designed and built between 1950 and 1980, the state of Oregon would face a devastating post earthquake situation if a major event occurred in the state." (ODOT, *Seismic Vulnerability of Oregon State Highway Bridges*, p. 6). ODOT also predicts that in the event of a major 9.0 magnitude Cascadia Subduction Zone earthquake, 13 bridges on Highway 42 would face extensive losses, and one bridge would face complete loss. Furthermore, ODOT predicts the cost would be $147 million to repair the bridges. In the initial aftermath of an earthquake, it is important to identify which bridges are seismically stable enough to serve in a recovery or response role, and there may not be adequate staff to assess bridge condition. Having local emergency responders continue to take bridge assessment classes to assist in bridge assessments will allow Coos County to more effectively respond and recover from an earthquake.

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)]. Having local emergency responders take bridge assessment classes will allow the county to respond and recovery faster from an earthquake.

Ideas for Implementation:

Coordinate bridge assessment classes with ODOT

Identify key personnel in Coos County and the cities that is qualified to conduct bridge assessments

Practice conducting bridge assessments in the field

Coordinating Organization:	Coos County Emergency Management

Internal Partners:	External Partners:
County Road Department	ODOT,

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

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

Flood # 1

Proposed Action Item:	Alignment with Plan Goals:
Continue to review and assess the county's floodplain ordinance to determine whether it meets current National Flood Insurance Program (NFIP) requirements.	*Save lives and reduce injuries* *Minimize and prevent damage* *Reduce economic loss* *Increase cooperation and coordination*

Alignment with Existing Plans/Policies:

Coos County Zoning and Development Ordinance-Floodplain Overlay Zone

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

The Department of Geology and Mineral Industries (DOGAMI) is re-drawing floodplain boundaries in Coos County based on newly acquired Light Detection and Ranging (LIDAR) data. Map products will become effective early 2011 after a review by the Oregon Department of Land Conservation and Development (DLCD) and the Federal Emergency Management Agency (FEMA). Once the maps have been completed, Coos County will re-evaluate its floodplain ordinance to ensure they are consistent with the new maps.

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:	County Planning		
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:	Coos County Steering Committee		
Action Item Status:	**Deferred action from 2005 NHMP, formerly Short Term Flood Action # 1. Action reworded for 2010 update.**		

Flood # 2

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

Alignment with Existing Plans/Policies:

Coos County Zoning and Land Development 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.) Coos County is currently not a participant in the Community Rating System. Joining the CRS program will further protect existing buildings in Coos County from flooding events by mitigating homes beyond the minimum standards of the NFIP.

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 Coos County from flooding events by mitigating homes beyond the minimum standards of the NFIP.

Ideas for Implementation:

Visit CRS website to find out specifics on what Coos 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:	Coos County Planning

Internal Partners:	External Partners:
Coos 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:	Coos County Steering Committee
Action Item Status:	**New Action (2010)**

Flood # 3

Proposed Action Item:	Alignment with Plan Goals:
Update the county's Flood Insurance Rate Maps (FIRM).	*Save lives and reduce injuries* *Minimize and prevent damage* *Reduce economic loss* *Increase cooperation and coordination*

Alignment with Existing Plans/Policies:

Coos County Zoning and Development Ordinance-Floodplain Overlay Zone
Federal Emergency Management Agency (FEMA) FIRM

Rationale for Proposed Action Item:

Coos County has Flood Mitigation Rate Maps current as of September 2009. The Department of Geology and Mineral Industries (DOGAMI) is currently re-drawing floodplain boundaries in Coos County based on newly acquired Light Detection and Ranging (LIDAR) data. Map products will become effective early 2011 after a review by the Oregon Department of Land Conservation and Development (DLCD) and the Federal Emergency Management Agency (FEMA). Once the maps have been completed, Coos County's FIRMs should be updated to address new information and new vulnerabilities, as well as any new land use developments occurring in the community.

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 Coos 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.

Coordinating Organization:	Coos County Planning

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:	Coos County Steering Committee
Action Item Status:	**New Action (2010)**

Flood # 4

Proposed Action Item:	Alignment with Plan Goals:
Conduct an analysis of flooding issues in the Libby Drainage District and Englewood Diking District and develop mitigation strategies to prevent future floods from damaging property in the area.	*Save lives and reduce injuries* *Minimize and prevent damage* *Increase cooperation and coordination* *Protect natural resources*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

The Libby Drainage District and the Englewood Diking District south of Coos Bay protect residential and agricultural property within their boundaries. While the levees and tidegates have protected both districts in moderate flooding events, they require constant maintenance and are frequently eroded by Coalbank Slough. Both districts experienced flooding in 2005 when heavy rainfall combined with a high tide prevented water from properly draining the Libby Drainage District. Floodwaters breached the Libby levee on Old Wireless Lane and flowed into the Englewood Diking District, flooding 10 homes and closing down Southwest Boulevard. Since the flood, five properties have been bought out and the others have been elevated above the base flood elevation using hazard mitigation grant program funds (DR-1632 HMGP). However, one property and Southwest Boulevard remain vulnerable to future flood events. An analysis of flooding issues in the Libby Drainage District and Englewood Diking Districts is required and should includes recommendations for further flood mitigation to prevent damage to properties in both districts.

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)]. Conducting an analysis of flooding issues in the Libby Drainage District and Englewood Diking District, and developing appropriate mitigation measures can reduce the impacts of flood to new and existing buildings and infrastructure.

Ideas for Implementation:

Coordinate efforts with property owners, the Army Corps of Engineers, FEMA, OEM, and the Libby Drainage District to develop solutions to the flooding problems in the Englewood Diking District.

Identify contractors to conduct an analysis of flood issues and appropriate mitigation strategies for the Libby Drainage District and Englewood Diking District.

Coordinating Organization:	Englewood Diking District

Internal Partners:	External Partners:	
Coos County Planning Department,	Army Corps of Engineers, FEMA, OEM, Libby Drainage District	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
Army Corps of Engineers	n/a	□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Coos County Steering Committee
Action Item Status:	**Deferred action from 2005 NHMP, formerly Flood Action # 3. Action item reworded for 2010 update.**

Flood # 5

Proposed Action Item:	Alignment with Plan Goals:
Complete a risk analysis for the flood hazard using newly acquired Light Detection and Ranging (LIDAR) data.	*Minimize and prevent damage* *Increase cooperation and coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

The Department of Geology and Mineral Industries (DOGAMI) is re-drawing floodplain boundaries in Coos County based on newly acquired Light Detection and Ranging (LIDAR) data. The LIDAR data can be used to identify the number and value of the buildings located in the 100 year and 500 year floodplain. Map products will become effective early 2011 after a review by the Oregon Department of Land Conservation and Development (DLCD) and the Federal Emergency Management Agency (FEMA) and can be used to develop a flood risk analysis.

The Disaster Mitigation Act of 2000 recommends that mitigation plans describe vulnerability in terms of an estimate of the potential dollar losses to vulnerable structures [§201.6(c)(2)(ii)(B)]. Using DOGAMI's LIDAR maps for the flood hazard, it would be possible to develop a risk analysis for Coos County.

Ideas for Implementation:

HAZUS-MH software can be used to develop a risk analysis for the flood hazard using data gathered from the LIDAR maps.

Coordinate risk analysis efforts with DOGAMI, FEMA, and OEM.

Coordinating Organization:	Coos County Planning

Internal Partners:	External Partners:
Coos County Emergency Management	DOGAMI, FEMA, OEM

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

Form Submitted by:	Coos Steering Committee
Action Item Status:	**New action (2010)**

Flood # 6

Proposed Action Item:	Alignment with Plan Goals:
Consult with property owners and explore mitigation actions for repetitive flood loss properties in Coos County.	*Minimize and prevent damage* *Increase cooperation and coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Coos County has three repetitive flood loss properties with total payments of $164,171. Repetitive loss properties are insurable buildings that have had at least two paid flood losses of more than $1,000 paid by the National Flood Insurance Program within any rolling 10-year period, since 1978. Mitigating these properties for floods will reduce the property's NFIP premiums, help save lives, and reduce the cost to Coos County should a response be required.

The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Consulting with property owners to explore mitigation options will reduce the flood risk to the existing repetitive flood loss properties in Coos County.

Ideas for Implementation:

Consult with OEM, and DLCD to develop appropriate mitigation activities for property owners.

Conduct a cost benefit analysis for flood mitigation projects for each of the three properties.

Seek funding to pay for flood mitigation activities, such as through the federal Flood Mitigation Assistance (FMA) Program.

Coordinating Organization:	Coos County Emergency Management	
Internal Partners:	**External Partners:**	
Coos County Planning Department	FEMA, OEM, DLCD	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		√ Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing
Form Submitted by:	Coos Steering Committee	
Action Item Status:	**Deferred action item from 2005 NHMP, formerly Short Term Flood Action # 1. Action reworded for 2010 update.**	

Landslide # 1

Proposed Action Item:	Alignment with Plan Goals:
Assess Light Detection and Ranging (LIDAR) landslide maps to evaluate development in hazardous areas.	*Save lives and reduce injuries* *Minimize and prevent damage*

Alignment with Existing Plans/Policies:

Coos County Zoning and Land Development Ordinance

Rationale for Proposed Action Item:

The Department of Geology and Mineral Industries (DOGAMI) is developing 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.

Coordinating Organization:	Coos County Planning Department

Internal Partners:	External Partners:	
Coos County Emergency Management,	FEMA, DOGAMI, DLCD	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		√ Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Coos Steering Committee
Action Item Status:	**New action item (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:

County Capital Improvements Plan.

Rationale for Proposed Action Item:

The Coos County Steering Committee rates the probability of a landslide occurring as high, meaning that one event is likely in a 10-35 year period. Coos County's risk assessment also notes that the landslide hazard is most prevalent along county roads and highways. Continuing to track landslide events along major roadways and developing appropriate mitigation measures will reduce the impact of landslides on existing county transportation routes.

Areas vulnerable to landslides include: Beach Loop, Coos River Highway, Ocean Blvd. Bald Hill, North Fork Road, U.S. Highway 101, Lampa Mountain Road, State Hwy. #242 – to Powers, East Bay Road.

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 Coos 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:	Coos County Road Department

Internal Partners:	External Partners:
Coos Planning Department, 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:	Coos 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 tsunami evacuation drills.	*Save lives and reduce injuries* *Increase education and outreach* *Increase cooperation and coordination*

Alignment with Existing Plans/Policies:

Coos County Emergency Response Plan

Rationale for Proposed Action Item:

The Coos County steering committee rated the probability of a tsunami occurring as high, meaning that one event is likely in a 10-35 year period. The steering committee also rated the vulnerability of the tsunami hazard in Coos County as high, meaning that more than 10% of the population and regional assets are vulnerable.

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 Coos County and prepare Coos 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:	Coos County Emergency Management

Internal Partners:	External Partners:
Coos County Planning, Coos 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:	Coos County Steering Committee
Action Item Status:	**New action (2010)**

Wildfire # 1

Proposed Action Item:	Alignment with Plan Goals:
Develop a Community Wildfire Protection Plan (CWPP).	*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:

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. Coos County began developing a CWPP but has not yet completed the process and efforts have stopped. The process to complete the CWPP will likely begin in 2010. Completion of a CWPP will not only identify communities at risk to wildfire, but will also make Coos County eligible for wildfire mitigation funds.

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)]. Developing a CWPP will identify areas in Coos County at risk to wildfires that can protect new and existing buildings and infrastructure.

Ideas for Implementation:

Reconvene the committee responsible for developing the original CWPP and develop strategies for developing and completing a CWPP for Coos County.

Coordinate planning efforts with Coos County Emergency Management and local communities.

Develop strategies to involve the public to gather feedback on the wildfire risk in Coos County and strategies to reducing that risk.

Coordinating Organization:	Coos County Emergency Management

Internal Partners:	External Partners:	
Coos Forest Protection Association	BLM, Oregon Department of Forestry, US Forest Service, cities, property owners.	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		√ Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

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

Wildfire # 2

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage new and existing developments in the Wildland Urban Interface (WUI) 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:
Coos Zoning and Land Development Ordinance

Rationale for Proposed Action Item:
According to the wildfire risk assessment, Coos County continues to see growth in forested areas and along steep slopes, factors which increase these developments' vulnerability to wildfires. In addition, 33 properties in the WUI are considered a moderate 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:	Coos Forest Protection Association (CFPA)

Internal Partners:	**External Partners:**
Coos County Planning, Coos Emergency Management	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:	Coos Steering Committee
Action Item Status:	**New action (2010)**

Wildfire # 3

Proposed Action Item:	**Alignment with Plan Goals:**
Through multi-agency coordination, continue abatement efforts to control noxious weeds, specifically Gorse, Scotch Broom and Butterfly Brush.	*Save lives and reduce injuries* *Minimize and prevent damage* *Protect natural resources*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Gorse grows well in shady slopes with high soil moisture and good drainage. As a result this spiny evergreen shrub thrives in southwest Oregon. Dense and stiff, forming impenetrable thickets, vigorous stands grow outward, crowing 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, especially when gorse

Gorse seeds are extremely persistent in the soil. Water-impermeable seed coats allow them to remain viable in the soil for 25 to 40 years, creating a very sizable seed bank. Fire, soil disturbance, and/or soil moisture can stimulate germination. Gorse is extremely competitive, displacing cultivated and native plants, and impoverishing the soil. It creates an extreme fire hazard due to its oily, highly flammable foliage and seeds, and abundant dead material in the plant's center. It not only increases the risk of fire, but also produces a hotter fire than most weeds.

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)]. This action item will address the effect of noxious weeds (especially gorse) in the cause & continuation of wildfire hazards.

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:	Coos Forest Protective Association (CFPA)

Internal Partners:	**External Partners:**	
Coos County Planning, Coos Emergency Management	Oregon Department of Forestry, FEMA, BLM, ODOT, cities, Logging Companies	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		□ Short Term (0-2 years) □ Long Term (2-4+ years) √ Ongoing

Form Submitted by:	Coos Steering Committee
Action Item Status:	**Deferred action from 2005 NHMP because action is ongoing. Formerly short-term Wildfire Action # 3.**

Wind Storm # 1

Proposed Action Item:	**Alignment with Plan Goals:**
Educate the public about the dangers of downed power lines after a wind storm.	*Save Lives and Reduce Injuries*

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 wind storms 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 preparedness measures community members can take in the event of a power outage will reduce the impact of power outages on the community.

According to Coos 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, Coos 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 existing brochures and public outreach activities to disseminate information to community members. These include brochures available to the public in the Coos County Planning Department.

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:	Coos-Curry Electric Cooperative

Internal Partners:	**External Partners:**
Coos County Emergency Management, Coos County Planning, Sheriff	Cities, Rural Fire Departments

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

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

Wind Storm # 2

Proposed Action Item:	Alignment with Plan Goals:
Encourage all critical facilities to 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:

Coos County Emergency Operations Plan

Rationale for Proposed Action Item:

According to Coos County's risk assessment, the county has a high probability of a wind storm occurring and a high vulnerability to wind storms. Ensuring that all critical facilities have backup power and emergency operations plans to deal with power outages will allow for continuous service.

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 recovery 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.

Coordinate obtaining generators with planning efforts for developing/updating the Coos County Emergency Operations Plan.

Coordinating Organization:	Coos County Emergency Management

Internal Partners:	External Partners:
Road Department	FEMA, Oregon Emergency Management

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

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

Wind Storm # 3

Proposed Action Item:	Alignment with Plan Goals:
Upgrade lines and poles to improve wind loading and underground critical power lines.	*Minimize and prevent damage* *Reduce economic losses*

Alignment with Existing Plans/Policies:

Coos County Zoning and Development Code

Rationale for Proposed Action Item:

Tree falls during wind storm events can be a risk to overhead power lines. During a wind storm, tree falls have the potential to down overhead power lines, causing electric power failures. Coos 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 tree falls to reduce a community's risk to wind storms, and limit disruptions in service.

Coos County experiences severe wind storm events annually and is vulnerable to windstorm events in the future. The wind storm risk assessment notes that Coos County's probability of a wind storm recurring is high and the county's vulnerability to wind storm events is also high. Upgrading lines and poles to improve wind loading and undergrounding critical power lines to reduce the effect of ice loading and 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 and upgrading lines and poles to improve wind loading can reduce future power outages from wind storms.

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.

Develop a hazardous tree inventory for all community properties.

Coordinating Organization:	Coos-Curry Electric

Internal Partners:	External Partners:	
Coos Road Department, Coos County Emergency Management	Other public utilities	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing

Form Submitted by:	Coos Steering Committee
Action Item Status:	**New action (2010)**

Wind Storm # 4

Proposed Action Item:	**Alignment with Plan Goals:**
Enhance strategies for debris management and removal for severe wind storm events.	*Minimize and prevent damage* *Reduce economic losses*

Alignment with Existing Plans/Policies:

Coos County Emergency Operations Plan

Rationale for Proposed Action Item:

Wind storms have the potential to cause severe damage to trees, buildings, and infrastructure. During a wind storm, tree falls can cover roads, damage buildings, and potentially down overhead power lines, causing electric power failures. High winds can also cause direct damage to buildings, especially buildings that are not securely tied to a foundation such as mobile homes. After a wind storm, debris removal can be a significant challenge, especially if debris is scattered over a wide area and roads are inaccessible. Developing strategies for managing debris removal will improve local response efforts and lead to a speedy recovery after a wind storm.

Coos County experiences severe wind storm events annually and is vulnerable to wind storms in the future. The wind storm risk assessment notes that Coos County's probability of a wind storm recurring is high and the county's vulnerability to wind storm events is also high. Enhancing strategies for debris management and removal will improve Coos County's response and recovery to wind storms.

Ideas for Implementation:

Develop coordinated management strategies for hazardous tree removal, and clearing debris from public and private property.

Explore funding for the purchase of needed equipment for wind storm clean up.

Develop strategies in coordination with the Coos County Road Department and Oregon Department of Transportation.

Coordinating Organization:	Coos County Emergency Management

Internal Partners:	**External Partners:**
Coos Road Department	Public utilities, Oregon Department of Transportation

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

Form Submitted by:	Coos Steering Committee
Action Item Status:	**Deferred action from the 2005 NHMP, formerly Severe Winter Storm and Wind # 1. Action item implementation currently in progress. Action item reworded for the 2010 update.**

Multi-Hazard # 1

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:
Coos County Emergency Operations Plan

Rationale for Proposed Action Item:
According to Coos County's risk assessment, the county has a high probability and vulnerability rating to wildfire, wind storms, flood, and tsunami; a high probability and moderate vulnerability to the earthquake hazard; and a high probability and low vulnerability to landslides. Any of these natural hazard events could disrupt transportation routes throughout the 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. Identify alternative transportation routes as part of the CWPP development process for Coos County.

Coordinating Organization:	Coos County Road Department

Internal Partners:	**External Partners:**
County Sheriff, Coos Emergency Management, 9-11 Dispatch (GIS)	Coos Forest Protective Association, ODOT

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

Form Submitted by:	Coos County Steering Committee
Action Item Status:	**Deferred action from 2005 NHMP, formerly Short Term Wildfire Action # 1. Changed to multi-hazard action due its applicability to several natural hazards. Action item reworded for 2010 update.**

Multi-Hazard # 2

Proposed Action Item:	**Alignment with Plan Goals:**
Develop risk assessment maps using the latest hazard data to show areas at risk for all hazards.	*Save lives and reduce injuries* *Minimize and prevent damage*

Alignment with Existing Plans/Policies:

Coos County Zoning and Land Development Ordinance

Rationale for Proposed Action Item:

Developing risk assessment maps that show areas at risk for all hazards can improve land use planning efforts in Coos County and can prevent future damage to property caused by natural hazard events. Rural areas in Coos County are experiencing moderate growth and some of these areas have not been adequately mapped. Coos County currently has hazard inventories for landslides, floods, and coastal dune areas, but these are outdated. The Department of Geology and Mineral Industries (DOGAMI) is currently developing new maps for these hazards. When they are available, these hazard inventories should be incorporated into the zoning and land development ordinance. Currently there are no maps showing earthquake vulnerability or wildfire vulnerability, and Coos County should support efforts to develop maps for these hazards. 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 Coos County.

Coordinating Organization:	Coos County Planning Department

Internal Partners:	**External Partners:**
County Road Department,	DOGAMI, FEMA, OEM

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

Form Submitted by:	Coos 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 # 3

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:

Coos 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:	Coos County Emergency Management

Internal Partners:	External Partners:	
Coos Road Department, Coos County Sheriff's Department	Local businesses, Curry County, FEMA, OEM	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
	none	√ Short Term (0-2 years) □ Long Term (2-4+ years) □ Ongoing

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

Multi-Hazard # 4

Proposed Action Item:	Alignment with Plan Goals:
Educate and encourage major businesses, service providers, schools, and governmental organizations to develop continuity of operations plans.	*Reduce economic losses* *Increase cooperation and coordination*

Alignment with Existing Plans/Policies:

Coos County Emergency Operations Plan

Rationale for Proposed Action Item:

Coos County is vulnerable to a number of natural hazards that could affect the administration and management of local government and of local businesses. According to Coos County's risk assessment, the county has a high probability and vulnerability rating to wind storms, flood, and tsunami; and a high probability and moderate vulnerability to the earthquake hazard. Any of these natural hazard events could disrupt business and government activity. Educating businesses and governmental organizations about the importance of continuity of operations plans will encourage their development and assist in making local governments and businesses more disaster resilient.

Research conducted by Richard Wilson has shown that staff turnover is likely to occur after a disaster. Veteran staff is critical after a disaster. It is important to prevent turnover so that existing personnel do not have to take on extra responsibilities during an already stressful time. Continuity planning can also help lessen turnover by ensuring competitive salaries and benefits and by reducing the amount of stress staff will have to endure.

The Disaster Mitigation Act of 2000 requires communities to develop actions that reduce the impact of a natural hazard [201.6(c)(3)(ii)]. Educating businesses and governmental organizations about the importance of continuity of operations plans can encourage the development of plans and make businesses and governmental organizations more resilient to natural hazards.

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 would be a way to keep the public involved in Coos County's efforts to mitigate hazards.

Ideas for Implementation:

For governmental organizations, research and review completed continuity of operations plans to provide a foundation of expected content and issues to review. The COOP should ensure shelter housing for critical staff and family members such as city officials, public works employees, emergency response, and others.

Assess and prioritize critical positions and resources vital to the continuance of important County functions.

Incorporate COOP into the existing Emergency Operations Plans where applicable.

Coordinating Organization:	Coos County Emergency Management

Internal Partners:	External Partners:	
All county departments	Cities, Chamber of Commerce, Oregon Partnership for Disaster Resilience	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing

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

Multi-Hazard # 5

Proposed Action Item:	Alignment with Plan Goals:
Develop a post-disaster recovery plan for Coos County.	*Save lives and reduce injuries* *Reduce economic losses* *Increase cooperation and coordination*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

Coos County is currently in the planning process to develop a post-disaster recovery plan. Developing a post-disaster recovery plan will help the county achieve sustainability (the ability to survive future natural disasters with minimum loss of life and property) and make the county more resilient to natural hazard events.

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 planning 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:	Coos County Emergency Management

Internal Partners:	External Partners:
All county departments, County Commission	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:	Coos County Steering Committee
Action Item Status:	**New action (2010)**

Multi-Hazard # 6

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage citizens and businesses to prepare and maintain provisions for one week without services.	*Save lives and reduce injuries* *Increase education and outreach*

Alignment with Existing Plans/Policies:

Coos County Emergency Operations Plan

Rationale for Proposed Action Item:

According to Coos County's risk assessment, the county has a high probability and vulnerability rating to wind storms, flood, and tsunami; a and high probability and moderate vulnerability to the earthquake hazard. In a major disaster, utilities transportation networks, and businesses could be disrupted, and it may take days or weeks until vital services are restored. Preparing and maintaining provisions for one week can help community members survive on their own without relying too heavily on emergency services.

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 city's actions to mitigate and prepare for hazards.

Ideas for Implementation:

Provide educational material and examples of how to assemble emergency provisions to residents of Coos County and its employees. Outreach and awareness campaigns need to be carefully organized and developed to ensure that residents receive critical information. Distribute information through newsletters and press releases. Alternatively, post information about on the county's website.

During National Emergency Preparedness Month or National Night Out, use first responders and community members to host educational presentations to groups within the community to encourage individuals to put together their own provisions.

Resources like www.preparedness.gov or www.72hours.org can provide content needs for developing emergency provisions.

Coordinating Organization:	Coos County Emergency Management	
Internal Partners:	**External Partners:**	
Coos County Sheriff Department, Fire Departments	Rural Fire Districts, hospitals, cities	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		□ Short Term (0-2 years) √ Long Term (2-4+ years) □ Ongoing
Form Submitted by:	Coos County Steering Committee	
Action Item Status:	**New action (2010)**	

Multi-Hazard # 7

Proposed Action Item:	**Alignment with Plan Goals:**
Incorporate the natural hazards mitigation plan into the Coos County Comprehensive Plan.	*Increase cooperation and coordination*

Alignment with Existing Plans/Policies:

Coos County Zoning and Land Development Ordinance: Comprehensive Plan Policies

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, 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:	Coos County Planning Department	
Internal Partners:	**External Partners:**	
County Commission, Planning Commission	DLCD, FEMA	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
None		□ Short Term (0-2 years) □ Long Term (2-4+ years) √ Ongoing
Form Submitted by:	Coos County Steering Committee	
Action Item Status:	**Deferred from 2005 NHMP due to ongoing nature of action. Formerly Earthquake/Tsunami Action # 1. Wording changed to become a 'multi-hazard' action due to applicability to several natural hazards.**	

Multi-Hazard # 8

Proposed Action Item:	Alignment with Plan Goals:
Continue public education efforts about the natural hazards Coos County is vulnerable to and mitigation measures residents can implement.	*Save lives and reduce injuries* *Minimize and prevent damage* *Reduce economic loss* *Increase education and outreach*

Alignment with Existing Plans/Policies:

Rationale for Proposed Action Item:

According to Coos County's risk assessment, the county has a high probability and vulnerability rating to wildfire, wind storms, flood, and tsunami; and a high probability and moderate vulnerability to the earthquake hazard. All of these hazards can threaten life and property in the county. Different agencies in Coos County currently conduct education and outreach efforts regarding natural hazards which include mitigation measures that residents and tourists can implement. These include:

- Wildfire outreach programs conducted by the Coos Forest Protection Agency;
- Drought outreach to rural residents coordinated by the State of Oregon water master, local water districts, and local real estate companies;
- Tsunami/earthquake awareness programs coordinated by Coos County Emergency Management and DOGAMI and the cities;
- Outreach regarding flooding hazards conducted by the Coos County Planning Department.

Continuing these educational programs and/or expanding them to include different populations as well as businesses and local governments can improve Coos County's resiliency to natural hazard events.

Ideas for Implementation:

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. Suggested ideas for implementation include:

- Educate residents and tourists about the earthquake and tsunami risks. Post information in well-traveled areas, including restaurants, hotels, parks, and campgrounds.
- Continue drought education programs to new homeowners not located in water districts and to existing county residents.
- 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:	Coos County Emergency Management

Internal Partners:	External Partners:	
County Road Department, all departments	Coos Forest Protection Association, DOGAMI, OEM, USGS, ODF, Oregon State Parks	
Potential Funding Sources:	**Estimated cost:**	**Timeline:**
		□ Short Term (0-2 years) □ Long Term (2-4+ years) √ Ongoing
Form Submitted by:	Coos County Steering Committee	
Action Item Status:	**Deferred action from 2005 NHMP due to ongoing nature of action item. Action item incorporates several public education and outreach actions from 2005 plan, including Earthquake/Tsunami # 2 and Wildfire # 2. Action item reworded for 2010 update.**	

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 Coos 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 Coos County Natural Hazards Mitigation Plan to make SCEMAC the mitigation plan's coordinating body.

Coordinating Organization:	Mitigation Plan Coordinating Body

Internal Partners:	**External Partners:**
Coos County Emergency Management	Curry County, SCEMAC members

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

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

Appendix B:
Planning and Public Process

Table of Contents

Memo

To: Federal Emergency Management Agency (FEMA)

From: Oregon Partnership for Disaster Resilience

Date: May 11, 2010

Re: **List of changes to the 2005 Coos County NHMP for the 2010 Plan Update**

Purpose

This memo describes the changes made to the 2005 Coos County Natural Hazards Mitigation Plan (NHMP) during the 2010 plan update process. Major changes are documented by plan section.

Project Background

In November 2009, Coos County partnered with the Oregon Partnership for Disaster Resilience (OPDR) to update the 2005 Coos 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 Grant Mitigation Program (HMGP) funding. OPDR met with members of the Coos 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 Coos 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 Coos County NHMP	2010 Coos 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 Tab 1: Fire	Hazard Annex: Wildfire
Section 3 Tab 2: Flood	Hazard Annex: Flood
Section 3 Tab 3: Landslide	Hazard Annex: Landslide
Section 3 Tab 4: Wind Storm	Hazard Annex: Wind Storm
Section 3 Tab 5: Earthquake Tsunami	Hazard Annex: Earthquake Hazard Annex: Tsunami
Section 3 Tab 6: Probability	Deleted, probability assessments incorporated into hazard annexes.
Appendix A: Individual Community Actions	Volume III: City Addenda
Appendix B: Maps	Deleted, hazard maps incorporated into relevant hazard annexes.
Appendix C: Hazard Analysis Summary	Deleted, hazard analysis incorporated into hazard annexes
Appendix D: Bibliography	Deleted, references incorporated into each section

The 2010 Coos 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 Coos 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 and details of each meeting placed in this memo. The complete planning and public involvement process for the 2005 NHMP read as follows:

2005 Plan Development Process

In 2003, Coos County hired the President of Diversified Safety Management, to develop the Coos 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. Glenda Hales, Coos County Emergency Program Manager, 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 to develop the plan;*
2. *Identifying natural hazards;*

3. *Identifying local vulnerabilities;*
4. *Developing plan goals and action items;*
5. *Finalizing the mitigation plan*

Organizing the Community

On September 4, 2003, Diversified Safety Management and Coos County Emergency Management held a kickoff meeting 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) and planning process to be followed that will incorporate the cities; (2) identifying which natural hazards impact 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

Diversified Safety Management and Coos County Emergency Management held five meetings between September 2003 and January 2004 with the plan development steering committee to identify local natural hazards. Meetings were held on September 30 (in Bandon), October 28 (in North Bend), November 20 (in Coquille), December 17 (in Bandon), and January 15 (in Coquille). During these meetings, the steering committee identified the local hazards, their location and extent, damage information, and preliminary action items. Information from these meetings was used by Diversified Safety Management to develop the local risk assessments.

Identifying Community Vulnerabilities

Between January and February 2004, Diversified Safety Management conducted stakeholder interviews with various organizations and government entities to identify community vulnerabilities and hazard issues. Interviews were conducted with the following organizations/agencies:

- *City of Myrtle Point (January 26) to discuss the wastewater treatment plant in the floodplain;*
- *Coos County Road Department (January 27) to obtain additional hazard maps;*
- *City of North Bend (January 30) to identify flood and landslide hazards;*
- *Oregon Department of Fish and Wildlife (January 30) regarding impacts of mitigation action items on fish and wildlife;*
- *City of Coos Bay (February 3) to identify flood hazards and discuss the Englewood Diking District and Libby Drainage District flooding issues;*

- *City of Bandon (February 10) to identify action items for specific areas of the city.*

Developing Plan Goals and Action Items

Diversified Safety Management and Coos County Emergency Management held three steering committee meetings to identify preliminary action items and review the community overview. Meetings were held on February 17, March 18, and April 1, 2004.

Finalizing the Mitigation Plan

Diversified Safety Management and Coos County Emergency Management held three final steering committee meetings to finalize the mitigation plan. Steering committee meetings were held on April 29, May 27, and June 17 to finalize the plan's action items and review and finalize drafts of the plan.

A final draft of the plan was completed on July 16, 2004, and submitted to Oregon Emergency Management and the Federal Emergency Management Agency (FEMA) for final review. Coos County received formal approval of its mitigation plan on July 18, 2005.

Public Involvement

Diversified Safety Management and Coos 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. 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 9, 2004, Coos County Emergency Management and Diversified Safety Management held a public meeting at the Coos Bay Public Library to discuss flooding issues in the Englewood Diking District and Libby Drainage District. Approximately 27 people attended the meeting. Citizens who did not have National Flood Insurance Program policies were encouraged to attend and discuss flooding issues, repetitive flood loss information, and develop potential action items. Documentation gathered at these meetings was used to calculate the costs of the flood hazard on private property.

Finally, Diversified Safety Management met individually with representatives from the following agencies to refine hazard assessments, and action items:

- *Coos County Road Department*
- *City of Bandon*
- *City of Coquille*
- *City of Coos Bay*
- *City of Lakeside*
- *City of Myrtle Point*
- *City of North Bend*

- *Oregon Department of Fish and Wildlife*
- *Coos Forest Protection Association*
- *Oregon Department of Forestry*
- *U.S. Forest Service – Powers*
- *Englewood Diking District Representative*
- *Libby Drainage District Representative*

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 Coos 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 Coos 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 15, 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

Identify and map all roads, private drives, and logging trails to increase the ability of firefighters to locate and gain access to provide service and/or evacuations. New 9-1-1 PSAP communications equipment and geo files have been obtained. This effort is to assist in completing geo file information for rural unincorporated areas.

Implementation Strategy:

- Explore fire agencies using GPS for pre arrival response planning and mapping.
- Seek funding for a countywide GPS for mapping purposes.
- Partner with logging companies to compare road and trail maps.
- 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.

Coordinating Organization:

Natural Hazard Mitigation Committee
Oregon Department of Forestry
Coos Forest Protective Association
Coos County Road Department
Industrial Partners
BLM

Timeline: 5 years

Plan Goals Addressed: Emergency Services

Status: Not completed. Action item continued in 2010 NHMP as Multi-Hazard Action Item # 1 and reworded to address alternative transportation routes.

Wildfire #2 Short Term

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.

Implementation Strategy:

- 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 Agencies:
Hazard Mitigation Planning Committee
Oregon Department of Forestry
U.S. Department of Forestry
Coos Forest Protection Association
Coos County Road Department
Industrial Partners (Logging)
BLM
Timeline: 2 Years
Plan Goals Addressed: Protect Life and Property, Public Awareness
Status: Completed. The Coos Forest Protective Association and forest agencies conduct regular public outreach about the wildfire hazard. Due to its ongoing nature, this action is being continued in 2010 NHMP as Multi-Hazard Action # 8 and has been reworded.

Wildfire #3 Short Term
Through multi agency coordination, develop an abatement plan for control of Noxious Weeds, specifically Gorse, Scotch Broom and Butterfly Brush.
Implementation Strategy:

- 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.
- Explore funding options to purchase adequate water trucks.
- Explore funding options to purchase a 2" trash pump.
- Encourage the hiring of personnel to work in abatement program.
- Explore the use of 'Community Service' hours imposed by the courts, for abatement work.
- Explore the use of Coos County Jail, trustees for abatement work.

Coordinating Agencies:
Hazard Mitigation Planning Committee
Coos County Sheriff
Oregon Department of Forestry
Coos Forest Protective Association
Coos County Roads Department
The City of Bandon
Timeline: 2 Years
Plan Goals Addressed: Protect Life and Property
Status: Complete but ongoing due to the continued presence of noxious weeds. Continued in the 2010 NHMP as Wildfire Action # 3 and reworded.

Flooding Short Term #1:
Review current County and City Building and Land Use Ordinances to assess current applicability and feasibility, and identify mitigation options.
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
Coos County Planning Department
Timeline: 1 – 2 Years
Plan Goals Addressed: Protect Life and Property, Partnerships and Implementation
Status: The Committee agreed that the intended purpose of this action is vague. The Committee believes, however, that the action has been partially completed. Flood loss properties in the Libby Drainage District and Englewood Diking District were acquired and relocated, or raised above base flood elevation after a 2005 flood event (see the Flood Hazard Annex). Coos County recently adopted a new floodplain ordinance and maps within the Coos County Zoning and Land Development Ordinance. However, Coos County still has repetitive flood loss properties. This action has been continued as Flood Action # 1 and # 6 in the 2010 NHMP, and it has been reworded to be more specific.

Flooding # 2 Short Term
Review current storm water capabilities to determine necessity for new or additional mitigation actions.
Implementation:

- Identify and map critical areas of flooding.
- Necessity for an engineering study for storm water mitigation in the mapped areas.
- Determine 50 and 20 year flood inundation areas.
- Explore funding options for replacing required flood fighting equipment that is no longer serviceable.

Coordinating Organization:
Hazard Mitigation Planning Committee
Coos County Planning Department
Coos County Road Department
City of Coos Bay
Oregon Department of Transportation
Timeline: On going
Plan Goals Addressed: Protect Life and Property, Partnerships And Implementation

Status: Partially completed. Critical areas of flooding have been identified and addressed, but the Committee believed this was not a significant issue for the county. Action item has been deleted for the 2010 NHMP.

Flood # 3 Short Term

Explore alternative actions to mitigate flooding in Libby Drainage District and Englewood Diking District.

Implementation:

- Review current tide-gate maintenance program for applicability to current mitigation problems.
- Explore feasibility of dredging and uplifting the dikes.
- Review existing (20 year old) mitigation study of diking districts to determine current applicability.
- Study mitigation actions for transportation arteries in diking district, which lie in the flood plain.
- Implement feasibility study of the possibility of raising homes in 100-year flood plain.
- Explore funding options for feasibility studies and determined mitigation actions.

Coordinating Organization:
Hazard Mitigation Planning Committee
Coos County Planning
City of Coos Bay
Inglewood Diking District
Libby Drainage District
U.S. Army Corps of Engineers

Timeline: On Going

Plan Goals Addressed: Protect Life and Property, Partnerships and Implementation

Status: Completed; flooded properties in both districts have either been acquired and relocated, or elevated. Because flooding is an ongoing issue in this area, this action has been continued as flood action # 4 in the 2010 NHMP and has been reworded.

Landslide # 1 Short Term

Identify and map high risk slide areas to create an accurate logistical assessment.

Implementation:

- Develop a regional committee to include private companies with specific knowledge of rural areas to study high-risk areas.
- Develop a regional map of high-risk areas.

Coordinating Organization:
Coos County Highway Department
Oregon Department of Transportation
Private Companies (logging)
Hazard Mitigation Advisory Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property, Partnerships and Implementation, Natural Systems
Status: Currently in progress. The Department of Geology and Mineral Industries (DOGAMI) is mapping landslide areas in Coos County using LIDAR. This action is being reworded to address multiple hazards and continued as Multi-Hazard Action # 2 in the 2010 NHMP.

Landslide # 2 Short Term
Evaluate current and high hazard slides for prioritization and explore mitigation possibilities.

- 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 and areas prone to slide due to flooding for mitigation strategies, specifically:
  - Beach Loop
  - Coos River Highway
  - Ocean Blvd.
  - Bald Hill
  - North Fork Road
  - U.S. Highway 101
  - Lampa Mountain Road
  - State Hwy. #242 – to Powers
  - East Bay Road
- Explore funding sources for geo studies and assessments.
- Explore funding sources for required equipment for repair of slide damage.

Coordinating Organization:
Hazard Mitigation Advisory Committee
Coos County Highway Department
Oregon Department of Transportation
Timeline: 1-2 years
Plan Goals Addressed: Protect Life and Property, Emergency Services, Partnerships and Implementation
Status: Partially complete, ongoing action item. Due to the ongoing nature of this action, the action item is being continued in the 2010 NHMP as landslide action # 2 and has been reworded.

Severe Winter Storm & Wind # 1 Short Term
Enhance strategies for debris management for severe winter storm events.
Implementation:

- Develop coordinated management strategies for hazardous tree removal, and clearing debris from public and private property.
- Explore funding for the purchase of needed equipment for winter storm clean up.

Coordinating Organization:
Hazard Mitigation Advisory Committee
Coos County Road Department
Oregon Department of Transportation
Timeline: On Going
Plan Goals Addressed: Emergency Services, Partnerships and Implementation, Protect Life and Property
Status: Partially completed action; a debris management plan is being included in the Coos County Emergency Operations Plan. Due to the ongoing nature of this action, it is continued as Wind Storm Action # 4.

Earthquake & Tsunami # 1 Short Term
Review of county and community comprehensive plans for the need to update to reflect the latest information on seismic hazards in each community.
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: 1-2 Years
Plan Goals Addressed: Protect Life and Property
Status: Currently in progress; information is being incorporated into the Coos County Emergency Operations Plan. This action has been reworded, and is continued in the 2010 NHMP as Multi-Hazard Action # 7.

Earthquake & Tsunami # 2 Short Term
Public Education Program enhancing existing programs.
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 Agencies: Hazard Mitigation Advisory Committee
Timeline: 1-2 Years
Plan Goals Addressed: Protect Life and Property, Public Awareness
Status: Completed and ongoing. Due to the ongoing nature of public education and outreach, this action has been reworded and is continued in the 2010 NHMP as Multi-Hazard Action # 8.

Section 4: Plan Implementation and Maintenance
This section details the formal process that will ensure that the Coos 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 15, 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 (Coos County Emergency Program Manager) 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 Coos 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 Coos 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 Coos County.

3. Added more specific community vulnerability information gathered during the February 17, 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 Coos 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 contained a great deal of historical and ecological information about Coos County's waterways. This information was removed in the 2010 plan update because the information is not useful in understanding or mitigating Coos County's flood hazard.

2. 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.

3. The 2010 update includes additional previous occurrences of floods.

4. The 2010 update includes information about repetitive flood losses and National Flood Insurance Program (NFIP) claim information.

5. The 2010 update added more specific community vulnerability information gathered during the February 17, 2010 plan update meeting.

6. The 2010 update includes new vulnerability and probability assessments.

Hazard Annex: Landslide

1. The 2010 update includes previous landslide events as they relate to Coos County. The 2005 plan did not list any landslide events specific to Coos 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 using DOGAMI's State Landslide Information Database of Oregon (SLIDO) 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 17, 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 Coos 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 17, 2010 plan update meeting.

Hazard Annex: Wind Storm

1. The 2005 NHMP included a chapter called "Severe Winter Storms and Wind," but it duplicated information for the two hazards, primarily discussing the effects of wind storms. Since Coos County's winter storms are 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, and to consolidate information from the 2005 NHMP, the 2010 NHMP changed the title from "Severe Winter Storms and Wind" to "Wind Storm" and discussed the effects of wind storms on Coos County.

2. The 2010 update includes new vulnerability and probability assessments.

3. The 2010 update added more specific community vulnerability information for wind storms gathered during the February 17, 2010 plan update meeting.

Volume III Resource Appendices

All appendices are new to the 2009 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 15, 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: Coos County Plan Update Introductory Meeting
Date: November 16, 2009
Time: 3:00 pm – 4:30 pm
Location: Courthouse Planning Conference Room, 201 N. Adams St, Coquille, 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

Coos County Mitigation Plan Update Introductory Meeting. November 16, 2009; 3 pm -4:30 pm
Courthouse Planning Conference Room. 201 N. Adams St, Coquille, OR.

Name	Representing	Email	Telephone
Joseph M. George	Power Oregon 97466	City Powers	439-2340
Bret A. Harris	USDA - Farm Service Agency Coos/Curry	bret.harris@or.usda.gov	541-396-4323, Ext. 25
Glenda Hales	Coos Co. EM	ghales@co.coos.or.us	541-756-8213
Connie Bunnell	Public	cbn11@isp.com	541-267-3216

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Coos 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.

Coos County adopted the Coos County Multi-Jurisdictional Natural Hazards Mitigation in 2005 and it is due for its five-year update on July 5, 2010. The Oregon Partnership for Disaster Resilience (OPDR) has agreed to work with Coos County to facilitate the plan update process. This process will occur concurrently with the recovery forums OPDR is facilitating in Coos 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 Coos 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 Coos 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 Coos 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 Coos 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: Coos County NHMP Kickoff
Date: February 17, 2010
Time: 8 am – 11:00 am
Location: Owen Building, Planning Conference Room, 225 N. Adams Street, Coquille, Oregon

AGENDA

9. Welcome & Introductions ***(10 minutes)***

10. Overview of Plan Update Needs ***(30 minutes)***

11. Roles and Responsibilities ***(5 minutes)***

12. Community Involvement ***(15 minutes)***

Break (10 minutes)

13. Overview of Vulnerability/Probability ***(15 minutes)***

14. Work Session ***(90 minutes)***

15. Next Steps ***(5 minutes)***

Meeting Sign-In

Coos County Mitigation Plan Update Meeting # 1: Reviewing Risk Assessment. February 17, 2010; 8 am - 11 am
Courthouse Planning Conference Room. 201 N. Adams St, Coquille, OR.

Name	Representing	Email	Telephone
Connie Bennell	Land Owner	cbnll@isp.com	541-267-3216
Bret Harris	USDA - FSA	bret.harris@or.usda.gov	541-396-4323 x25
Michelle Wyatt	Coos County Public Health	mwyatt@co.coos.or.us	541-756-2020 x514
Jim Hossley	City of Coos Bay	jhossley@coosbay.org	541-269-1181 x 250
David Voss	City of North Bend	planner@uci.net	541-756-8535
Derek Windham	City of North Bend	djw@uci.net	541-756-8505
John Higgins	City of Coquille	jhiggins@cityofcoquille.org	541-396-2115
Stan Gibson	City of Coos Bay	sgibson@fire.coosbay.org	541-269-1191

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Name	Representing	Email	Telephone
Robert Smith	Oregon Parks & Recreation Dept	robert.j.smith@state.or.us	503/986-0665
Ben Fisher	Oregon Parks & Rec Dept.	ben.fisher@state.or.us	541.347.2209

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Issue Identification Worksheet-Coos

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	Flood	Landslide	Tsunami	Wildfire	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	
Large and isolated rural population.						X		
Rural residents' expectation of services when not always available						X		

Issue Identification Worksheet-Coos

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	Flood	Landslide	Tsunami	Wildfire	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	

Issue Identification Worksheet-Coos

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	Flood	Landslide	Tsunami	Wildfire	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 in the wildland urban interface						X		

Issue Identification Worksheet-Coos

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	Flood	Landslide	Tsunami	Wildfire	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**		
Limited water supplies in rural areas.						**X**		

Issue Identification Worksheet-Coos

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	Flood	Landslide	Tsunami	Wildfire	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						
Local sewage treatment plants can be damaged			X					
Roads and bridges that cross floodways and along steep slopes are at risk. (IDENTIFY THESE)			X	X			X	X
Storm water systems are antiquated or inadequate (LOCATIONS?)			X					
Power lines are disrupted in community						X	X	

Meeting: Coos County NHMP Plan Update-Meeting # 2
Date: March 15, 2010
Time: 1:30 pm – 5:00 pm
Location: Owen Building, Planning Conference Room, 225 N. Adams Street, Coquille, Oregon

AGENDA

16. Welcome & Introductions ***(10 minutes)***

17. Work Session: Review of Plan Goals ***(10 minutes)***

18. Action Item Overview ***(10 minutes)***

19. Work Session: Review Existing Actions ***(30 minutes)***

20. Work Session: Review New Actions ***(40 minutes)***

Break (10 minutes)

21. Work Session: Identifying Future Participants ***(15 minutes)***

22. Work Session: Plan Maintenance & 5-Year Update Requirements ***(20 minutes)***

23. Work Session: Continued Public Involvement ***(20 minutes)***

24. Grant Opportunities & Resources ***(20 minutes)***

25. Project Prioritization & Process ***(20 minutes)***

26. Next Steps ***(5 minutes)***

Meeting Sign-In

Coos County Mitigation Plan Update Meeting # 2: Action Items & Plan Implementation March 15, 2010; 1:30 pm - 5 pm
Courthouse Planning Conference Room. 201 N. Adams St, Coquille, OR.

Name	Representing	Email	Telephone
Glenda Hales	Coos Co. EM	ghales@co.coos.or.us	541-756-8213
Stan Gibson	City of Coos Bay	sgibson@coosbay.org	541-269-1191
Jim Hossley	City of Coos Bay	jhossley@coosbay.org	541-2648918
Michelle Wyatt	Coos Co. Public Health	mwyatte@co.coos.or.us	541-756-2020 x514
Bon Fisher	Oregon State Parks	bon.fisher@state.or.us	541-347-2209
David Voss	North Bend	[illegible]	541-756-[illegible]
Brad Harris	USDA ~~FSA~~	bradaharris@or.nacdn.net	541-396-4323 x5
Connie Bunnell	Land Owner.	cbnlt@izp.com	541-267-3216

B31

Name	Representing	Email	Telephone
Ted Ross	Lakeside Fire Dept City of Lakeside	Tedross@Charter.net	541-297-5694

Stakeholder Interview Questions

The natural hazards addressed in the plan include flood, tsunamis, earthquake, landslide, coastal erosion, drought, wildfire, and wind storm.

Questions

1. What is your role in Coos County?
2. What are the natural hazards that you typically deal with?
3. What are the impacts of these hazards on population, local economy, and infrastructure?
4. What are some mitigation activities you could propose to address some of the issues you have discussed?
5. Are there areas of growth that attribute to problems in Coos County as far as natural hazards are concerned?
6. How is your organization currently mitigating natural hazards?
7. What are the ways you would like to see agencies, organizations or individuals in Coos County participate and coordinate to reduce risk in Coos County?
8. Is there anything else you would like to discuss?

11-14-05
09:00 am Coquille EOC
Notes taken by Desiree
First Quarterly meeting with Steering Committee NHMP

Attended by: Desiree Garcia – Coos County EM, Randy Whobrey – Myrtle Point, Donna Holland - Lakeside, Glenda Hales – Coos County EM, Joan Morrison Englewood Diking District, and Joseph Murray (by phone)-OEM.

Meeting called to order at 09:06 AM.

09:06 phoned Joseph Murray/OEM. Discussed e-mail from Joseph regarding repetitive flood losses and using FEMA grant funds mitigation. Repetitive flood loss is the key component on flood assistance program. FEMA wants to reduce the loss of homes making repetitive claims. Joseph sees flood loss in 3 ways: 1. Elevate structure, 2. Relocate structure on same parcel, and 3. Acquisition Buy-out structure – person who owns end ups with .75 on dollar buy-out at 75%, Owner takes 25% loss. They do not necessarily occur in that 1, 2, 3 order.

Joseph did not go to the PDM workshop in Roseburg but gave a brief summary.

3 grant programs, two already mentioned and one post disaster that does not apply to us. On a national basis, not nearly as much money in the pot as in recent years. Last year their was 150 to 200 million in the pot, this year only 50 million in pot for projects. Joseph had not heard of any parts or project being favored. Benefit cost analysis most is the most factor. Positive benefit to cost ratio – pass/fail item. 50 points last year went to benefit cost out of 100. If he would speculate, emphasis would be on seismic mitigation and hurricane mitigation. PDM strictly online application process through e-grant. Possibly Dennis would help out.

Per Randy – Confirms only 50 million for projects.

Joseph out 9:20

Randy – Did attend the PDM workshop in Roseburg on 11/09/05. Confirms no paper applications being accepted, only online through e-grants. Applications must be submitted no later than 12-16-05. E-grants will also receive any supporting documents scanned into computer. Randy also had a disc named “Mitigation BCA Toolkit” (BCA – Benefit Cost Analysis) and advised you would need that before you proceed with any BCA grants, and a single training may possibly be provided on BCA. Myrtle Point is not working on any projects at this time. Randy stated they are about 2-3 years on their sewer treatment plant.

Donna – Taking back printed hard copy of Dennis Siegrist Power Point.

Glenda and Desiree – Siren meetings are taking place. Requested $8,000.00 from NWS to install siren on Charleston Bridge. Discovered last week that Day-Wireless would required an approximate $10,000.00 to have the siren set-off by a radio frequency in County Dispatch.

Joan – Taking back CD of Dennis Siegrist Power Point to Karen. She has spoken with Barbara Ford who sent her legal documents regarding the forming of the dike district in 1984. John is having a meeting on 12-06-05 and will be resigning as superintendent if she does not gain any support. The taxes were raised in the district from $7.50 per acre to $30.00 per acre. She purchased $500.00 Insurance that expires on January 1, 2006. Scott Newfeld/Loss Control Officer will be inspection the dick on 11-21-05 from 3:00 – 3:30 PM and then give 30 days notice that the insurance will expire.

Need representation from North Bend. Joan offered to call several days ahead of meeting to be sure they are going to send a representative.

Next meeting dates:

2nd Monday of each quarter

January 9, 2006 9:00 AM

April 10, 2006 9:00 AM

July 10, 2006 9:00 AM

These meetings will be held at the Coos County EOC (unless anybody wants to volunteer to host a meeting)

NHMP Quarterly Meeting
1-9-06
Coos County EOC/ EM Office

Attended:
Glenda Hales - County
Randy Whobrey – City of Myrtle Point
Karen Turner – City of Coos Bay
Charli Davis – City of Bandon
Joan Morrison – Englewood Dike District

Matt Whitty – City of North Bend - called in – unable to attend

Others not in attendance – no representative from Powers, Lakeside, Coquille

Correction to the agenda – Discussion on Libby Dike should have read Englewood Dike.

Meeting started at 9:15 a

The main topic was the breech of the Libby Drainage Dike flooding homes on Red Dike, Old Wireless, and Illinois. Joan showed pictures of damage and gave a brief report for both the district and her personal experiences.

Glenda started at the bottom of the agenda with discussion on the installation and funding through NOAA for the tsunami siren to be placed on the Charleston bridge with the help of ODOT and Charleston Fire. We are waiting approximately $8,000 from NOAA. An email was sent to Ryan Sandler 1-6-06 requesting information.

Glenda reported on the installation of the sirens for Coos Bay North Bend Water Board and the City of North Bend as per report from Matt Whitty.

Glenda asked if anyone had any projects they wanted to add to the plan and none were proposed.

Group discussion, once again, voicing concern over projects identified that did not qualify for PDM funding.

Discussion turned to other possible funding sources. I had sent out to the group following the meeting in which Sharon and Joseph attended in Coos Co. a sheet Joseph had put together that indicated other possible funding sources. I will try to locate and send it once again.

Joan reported to the group on the Englewood Dike meeting held on 12-28-05 with Commissioner Ross, John Craig CORPS, David Koch Co. Counsel, Dave McDaniel, Desiree Garcia, and Glenda Hales, Emergency Management.

The FY05-06 requirements for jurisdictions were not directly discussed but did appear on the agenda which read:

3. Jurisdictions that have FEMA approved NHMP must address the following and report:

a. Begin implementation of priority projects, including – as appropriate – identifying specific staff and funding needs;

b. Convene natural hazards committee periodically for plan implementation and maintenance;

c. Discuss potential mitigation projects and measures with committee.

After you have read these, if you have questions or discussion, please call me. I feel we have met a., b., and c.

We have continued to look for additional financial resources for the identified projects such as with the sirens through NOAA, the dike issues with the CORPS.

With no further business, it was adjourned at 10:00 a.m.

The next meeting was set for April 10, 2006 rather than the March 27, 2006 date as mentioned in the meeting. That is actually Glenda's date to send out reminders for the April 10, 2006 meeting. It will be held at the EOC

NHMP Quarterly Meeting Minutes
4-10-06
Coos County EOC/EM Office

Attended:

Randy Whobrey – City of Myrtle Point
Joan Morrison – Englewood Dike District
Glenda Hales – Coos County EM

Not in Attendance:

Karen Turner – City of Coos Bay
Charli Davis – City of Bandon
Matt Whitty – City of North Bend
Susan Chauncy – City of Lakeside
Ben McMakin – City of Powers
Terrance O'Connor – City of Coquille

Glenda discussed the installation of the siren for the Coos Bay North Bend Water Board which will be activated by the City of North Bend for both flood and tsunami for the Pony Slough area. Subsequently, North Bend in conjunction with the Coos Bay North Bend Water Board held a Town Hall meeting May 31, 2006 to inform and discuss the topic matter with the public. There was a mailing out to all residences affected prior to the event. They received the DOGAMI tsunami inundation maps and information bulletin from the Water Board. There were 16 in attendance along with others who called the water board, the City of North Bend, and the County EM for further information. The World newspaper covered the story in detail.

There was no one in attendance to report on the installation of the siren for the Coquille Indian Tribe. Glenda will do follow-up with Cary Palm with the Tribe for the next meeting.

The siren in Charleston has been installed and tested by Charleston Fire Department. The grant application will be submitted June 21, 2006 to NOAA for reimbursement of approximately $8,000. to Charleston Fire for the work to restore and install the donated siren. This siren will be activated by the Coos County Dispatch Center as required.

Glenda announced the accomplishment of Coos County becoming a Tsunami Ready community. The presentation to the BOC by NWS will be held 4-18-06.

Glenda discussed the projects be conducted surrounding SB 2,3,4, and 5.

Randy summarized the wastewater project being a 3 year project. He also discussed the wind and landside proposed projects in the NHMP for the City of Myrtle Point. Randy submitted information regarding a grant received in the amount of $16,000 from DLCD for geohazard maps. The project was completed April 2005 by HBH engineering and covered the city.

Much discussion took place regarding the Englewood and Libby flooding due to the breeched portion of the dike in the Libby area. There have been many meetings and presentations by the state and federal agencies along with Coos County EM and the two districts to discuss response and recovery issues. Coos County has been selected along with Jackson county (who also received flood damages to homes during the Dec 05 flood event) to receive mitigation dollars attached to the flood event.

Subsequent meetings and interviews have been held regarding the mitigation opportunity.

Joan reported activity regarding the Englewood District in response to the flood event with dirt moved, temporary tide gate installed, and the overall frustration and homelessness of residents in the flooded area.

Much discussion regarding the Corps work and the temporary dike and what must take place on behalf of the districts to secure the dike as a permanent fixture.

With time coming to a close, the meeting adjourned. The next meeting was set for July 10, 2006 at the EOC beginning at 9:00 a.m.

(Due to scheduling – Glenda will be gone July 10, 2006 – therefore, the meeting date has been changed to **July 17, 2006 starting at 8:30a**.)

7-17-2006
8:30 a at EOC/EM office
Notes taken by Glenda

Attended:
Randy Whobrey – Myrtle Point
Karen Turner – Coos Bay
Joan Morrison – Libby/Englewood Districts
Glenda Hales – County

Others not in attendance – Lakeside, Powers, Coquille, and Bandon

Glenda reviewed the EMPG requirement for mitigation concerning the committee to include the importance of each jurisdictions attendance as well as review of projects and priority to those projects to include potential funding opportunities for projects.

Karen agreed to talk to Matt Whitty about attending the meetings.

Glenda indicated that she would contact Coquille, Lakeside, and Bandon regarding attendance to the meetings.

Glenda will also talk with Patty in planning to get someone from there office to participate in the planning quarterly meetings.

Glenda informed the committee of Ben's illness and being out for an extended period and would try to get someone from Powers City Council to attend the meetings.

Glenda and Joan updated the committee regarding the flood event and mitigation project with 404 grant funds regarding Old Wireless, Illinois, Red Dike, and Fruitdale streets. She indicated that Stan Gibson, City of Coos Bay Fire Chief is the project manager and is working with an engineer and obtaining appraisals for those involved properties. Joan indicated that in a meeting with the districts and Stan that the total dollars available will be less than expected.

Joan mentions that Stan had indicated that the city would pick up the 25% cost share for the individual land owner and Glenda is to get clarification from Stan on this statement.

Glenda indicated that she would contact Cary Palm from the tribe to get an update on the siren purchase and installation for the tribe.

Randy indicated that he had attempted through PDM for two projects one being the waste water project and the second being tree removal for wind damage and they were both in eligible under that program.

Karen indicated that two projects for roads were underway one being SW Blvd which involves the district and flooding for December 05 to be raised in the next year. Listed as priority one following the completion of an emergency road project that took precedence.

Glenda discussed the new website for DOGAMI regarding soil types to the committee.

Glenda indicated to the committee that she is working diligently to get IT to post the executive summary to the website as it was left off during the original posting.

The committee will review the plan and those specific to each and submit new projects and review those already listed and then provide an update of the plan to OEM an FEMA for approval. Those changes will then be posted to the website.

With no further business the meeting was adjourned at 9:45a.

10-09-2006
9:00a at EOC/EM office
Notes taken by Glenda

Attended:
Karen Turner – Coos Bay
Joan Morrison – Libby/Englewood Districts
Glenda Hales – County

Others not in attendance – North Bend, Lakeside, Powers, Coquille, County planning, and Bandon

Glenda passed out the agenda for this meeting and minutes from the previous meeting for review and noted that she missed North Bend as being "others not in attendance".

Glenda addressed the committee concerning the EMPG requirement for mitigation to include the importance of each jurisdictions attendance as well as review of projects and priority to those projects to include potential funding opportunities for projects. Karen noted that the plan must be updated and promulgated every five years which would make it year 2010 for Coos County.

Karen stated she talked to Matt Whitty about attending the meetings.

Glenda stated that she had talked to Patty in planning and she agreed to get someone from there office to participate in the planning quarterly meetings, however, no one attended.

Glenda and Joan updated the committee regarding the flood event and mitigation project with 404 grant funds regarding Old Wireless, Illinois, Red Dike, and Fruitdale streets. The meetings with applicants were held two weeks ago in Coos Bay with folks from Old Wireless and Illinois to also include Mr. Davis from Red Dike. Glenda indicated that the letters had gone out to those not in the program who were in the original interview process.

Glenda reported that Jack Lenox from the tribe who has replaced Cary Palm was to attend the meeting today but did not. However, he is involved and is attending the tsunami sub committee meeting(s) and report that the siren should be purchase in October early November and will be installed near tribal housing between Charleston and Empire.

Karen indicated that the city is working with FEMA to finalize projects on flood damages with the Presidential Declaration from December flooding.

Glenda reported she is working diligently to get IT to post the executive summary to the website as it was left off during the original posting.

The committee will review the plan and those specific to each and submit new projects and review those already listed and then provide an update of the plan to OEM an FEMA for approval. Those changes will then be posted to the website.

To encourage attendance, the committee has decided to move the meetings from the EOC in Coquille to having each representative of the committee host a quarterly meeting. The meeting scheduled for January 8, 2007 at 9:00 a.m. we hope to hold in North Bend so that Matt Whitty may attend. We are hoping to get Lakeside to participate this way as well.

Glenda agreed to send each city their portion of the plan electronically so they may review and update their section prior to the next meeting on specific project work.

The next meeting was scheduled for January 8, 2006 starting at 9:00 a.m. to be held at North Bend City Hall providing Matt Whitty can host. An email was sent to confirm.

With no further business the meeting was adjourned at 10:45a.

3-5-07 Meeting Minutes
Natural Hazards Mitigation Quarterly Meeting
Held at the EOC in Coquille

In Attendance:

Karen Turner, City of Coos Bay
Joan Morrison, Englewood Dike District
Randy Whobrey, City of Myrtle Point
Glenda Hales, Coos County EM

The purpose of the meeting is to provide updates to each city and county goal sections for progress on listed goals/projects and add to the list ideas for additional goals.

Randy provided Glenda with a two page progress report on listed goals to make changes within the plan for the City of Myrtle Point.

Karen will provide a list for both the district and the city prior to the next meeting.

Glenda stated she was scheduling time each month to work at updating the text of the plan under each section except for the city portions.

The group discussed the concern of the other cities of Bandon, Coquille, Lakeside, North Bend, and Powers in their lack of participation in the quarterly meetings. Glenda agreed to contact by phone, email, or in person to address the concern and encourage a representative to participate. She would also ask they provide the updates for the goals within their perspective sections of the plan. Karen agreed to talk to Matt Whitty, City of North Bend to encourage participation.

It was noted that Susan Chauncy no longer works for the City of Lakeside.
It was also noted that Ben McMakin no longer works for the City of Powers.
Glenda was provided by Randy a contact name for the City of Powers – Mayor Barbara Cottom and the Public Works Director of Paul Strater.

Glenda agreed to meet with Terrance O'Connor, City of Coquille to inquire as to a representative join the group on their behalf.

Joan gave an extensive update on the actions of the dike district and the status of the temporary dike. Glenda indicated that the flood fight plan is still waiting on Stan, City of Coos Bay to complete his section to then submit to the Corps – Les Miller in Portland. Karen indicated she would talk to Stan.

Glenda gave an update on the status of the river gages with the need to address the BOC with a work session to include the USGS; Water Resource Dept; NWS; EM; and Communications.

The next meeting was set to be held in Coos Bay at the City Hall Managers Conference Room on April 9, 2007 starting at 9:00a.m. Karen confirmed that via email following the meeting.

With no further business the meeting was adjourned.

Respectfully,

Glenda Hales, Coos County EM

4-9-07 Meeting Minutes
Natural Hazards Mitigation Quarterly Meeting
Held at the Conference Room in Coos Bay City Hall

In Attendance:
Karen Turner – City of Coos Bay – Thank you for hosting
Randy Whobrey – City of Myrtle Point
Charlie Hill – City of Lakeside
Barbara Cottom – City of Powers
Charli Davis – City of Bandon
Matt Whitty – City of North Bend
Glenda Hales – Coos County
Joan Morrison – Englewood Diking District

No corrections to the previous meeting minutes were brought to the committee.

Glenda reported that she had received both Coos Bay's and Myrtle Point's updates to their Activities listed in the NHMP and asked the other cities in attendance to provide their updates by email as attachments within the next two weeks.

Once received Glenda will update those sections of the plan. It was discussed to add activities such as education and awareness. Once the plan pages have been updated in each city section and the hazard sections have been revised and reviewed, all updates will be sent to OEM to FEMA and placed onto the website as updated.

Glenda will continue to work on the updates to the plan. Once each section is complete, she will forward to each committee member to proof and return with comments.

The committee agreed to rotate the meetings with each hosting every other year. It was also agreed by the committee that who ever hosted would type the minutes and then provide to Glenda to distribute. Glenda agreed to continue to do the meeting notices.

The topic of sirens was discussed in that the City of Bandon has two more bringing the total to 5 for the City of Bandon. The Tribe has installed and tested their siren now at the housing area near Charleston.

Glenda gave a report on the Tsunami Committee which also meets quarterly. The committee is addressing after action items identified following the June 14, 2005 tsunami warning.

Glenda gave an update on the EMPG requirements concerning hazard mitigation.

Bandon is considering a Safety Day and Glenda indicated that ARC is presenting a Safety Day April 14 in the Coos Bay/North Bend area. It was suggested she reach ARC for suggestions.

It was mentioned that Bandon and Lakeside could use tsunami brochures. Glenda indicated she would get to storage and work at getting those out to them.

Joan mentioned her concern for a siren for tsunami warning in the Coos Bay area.

Glenda agreed to contact Drew Solomon to find out if the fire halls could activate their fire hall sirens for a tsunami warning. The discussion was held as to how would citizens know if it was for fire or for tsunami. Glenda will follow up with Drew on this conversation.

Matt Whitty from North Bend asked if anyone on the committee was aware of any funding sources for flood and slides. There are two areas in North Bend that are significant and need immediate attention. Glenda indicated she could email Joseph and Dennis to inquire.

Glenda reported to the committee that the GIS work has been done and the company working with OEM – GeoSolve has provided the data to the county through the MSAG coordinator – Cynde Black.

With no further business the meeting was adjourned at approximately 10:30p. The next meeting will be held in Lakeside at the City Hall building located at 915 N. Lake Road. Host will be Charlie Hill. She will also take minutes for that meeting. The date was set for July 9, 2007 at 9:00 a.m.

July 9, 2007
Coos County Natural Hazards Mitigation Plan
Quarterly Meeting

Those in attendance were:
Glenda Hales-Coos County EM
Charlie Hill-City of Lakeside
Randy Whobrey-City of Myrtle Point
Karen Turner-City of Coos Bay

Not in attendance:
City of North Bend
City of Powers
City of Coquille
City of Bandon
Englewood Dike District

Glenda opened the meeting at 9:10 a.m at City Hall in Lakeside.

Glenda reported she had sent an email to Dennis two weeks ago regarding funding, but has not heard back from him yet.

Glenda wants to turn this plan over to the Planners. With staff Desiree Garcia cut, Glenda has to cut her workload.

To save on travel fees, we could possibly do meetings by conference phone.

There has been a reprieve of 6 months for updates on projects.
Charlie reported at City of Lakeside May 10th City Council Meeting, she informed the public of Pandemic Flu information and included preparedness packets that will also work for Tsunami preparedness. Glenda said we just need to note in the minutes, the date and whom we gave Tsunami and other training to and this will meet one of the requirements.

Karen reported they received a letter on their dikes.

Karen also reported the tide gate is in design and they have funding for it.

Glenda reported the plan of earthquake faults should be included in earthquake section of the book.

Glenda said new from Jim Aldrich Tsunami Task Force-Fire Chief came up with Coastal All Hazard Task Force meeting in Florence July 20, 2007 10 a.m. to Noon.

Glenda will email Dennis again today on the funding.

Next meeting will be October 8th 9:00 a.m. We will have North Bend, Lakeside meet at Coos Bay and Coquille, Myrtle Point, Bandon meet at County EOC and conference call.

Glenda said there is going to be a meeting with Red Cross who said we have a duplication of services. Coos Bay, North Bend, Myrtle Point and Lakeside are welcome to come, she will call Powers. Glenda will email later.

Meeting adjourned at 9:50 a.m.
Minutes taken and submitted by Charlie Hill, Lakeside

Memo

Date: February 11, 2008

Location: Coquille - Emergency Operations Center, OR

Subject: Coos County – Natural Hazard Mitigation Plan: Risk Assessment Meeting

Attendees
Michael Scharenbroich, RARE – South Coast
Jo Anne Lepley, City of Bandon
Charli Davis, City of Bandon
Joan Morrison – Board Member, Englewood Diking District
Thomas Gollihur – Board Member Englewood Diking District
David Voss – City of North Bend Planning Department
Glenda Hales, Emergency Management Coos County

Minutes

1. Check In / Welcome
   Introduction and greetings.

2. Michael Scharenbroich – RARE participant, South Coast Mitigation Project
   a. For the Phase II meeting I will need the following items to complete the Risk Assessment Section.

- **Location of Hazards**
  Wildfires
  Landslides
  Floods
  Tsunami
  Earthquake
  Winter storms

What data sources are available to identify the hazard areas that are locally significant?

- Hazards maps
- Flood plain inundation zone maps
- Soil and slope topographical maps
- Wildfire inundation areas
- Newspaper articles from previous disasters

- **Past mitigation activities**

  What current mitigation actions/activities exist for the city?

  - Have cities, special districts, and or private individuals received hazard mitigation program money in the past?

- **Mitigation plans and policies**

  - Copies of Hazard Zoning regulations/requirements
  - Hazard appendix in Comprehensive plan
  - Steep slope Ordinances
  - Wildfire reduction ordinances

- **Community Hazard issues**
  What are the most important parts of your community? Who and what is vulnerable to various hazards in your area?

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.

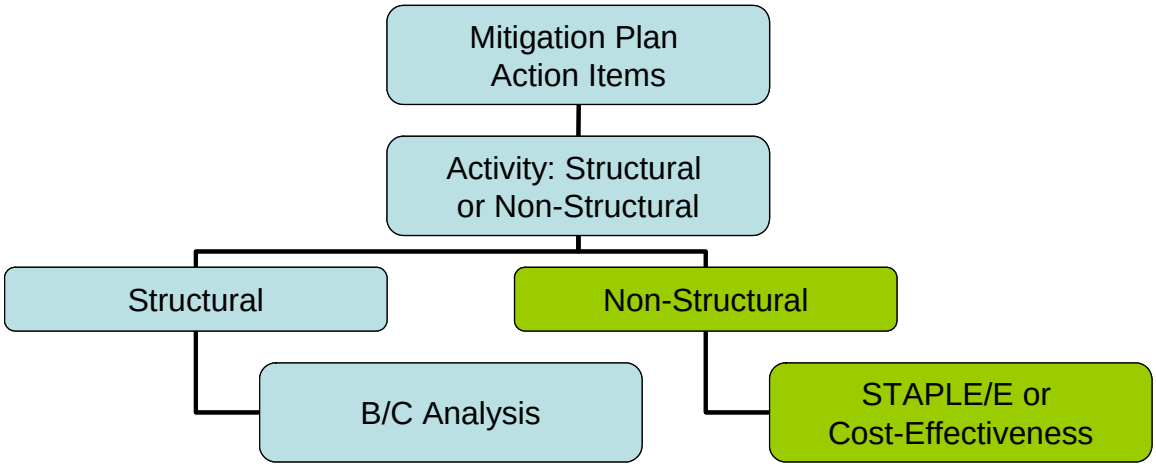
- How will the action impact the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

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.

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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

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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

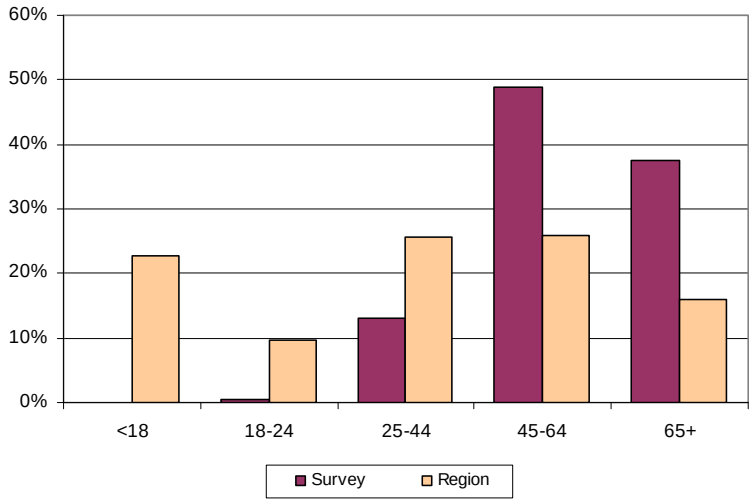
Zip Code	City	Percent
97103	Astoria	17.2
17420	Coos Bay	11.8
97439	Florence	8.3
97459	North Bend	6.9
97415	Brookings	6.4
97423	Coquille	5.4
97365	Newport	4.9
97141	Tillamook	4.4
Other		34.7

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)

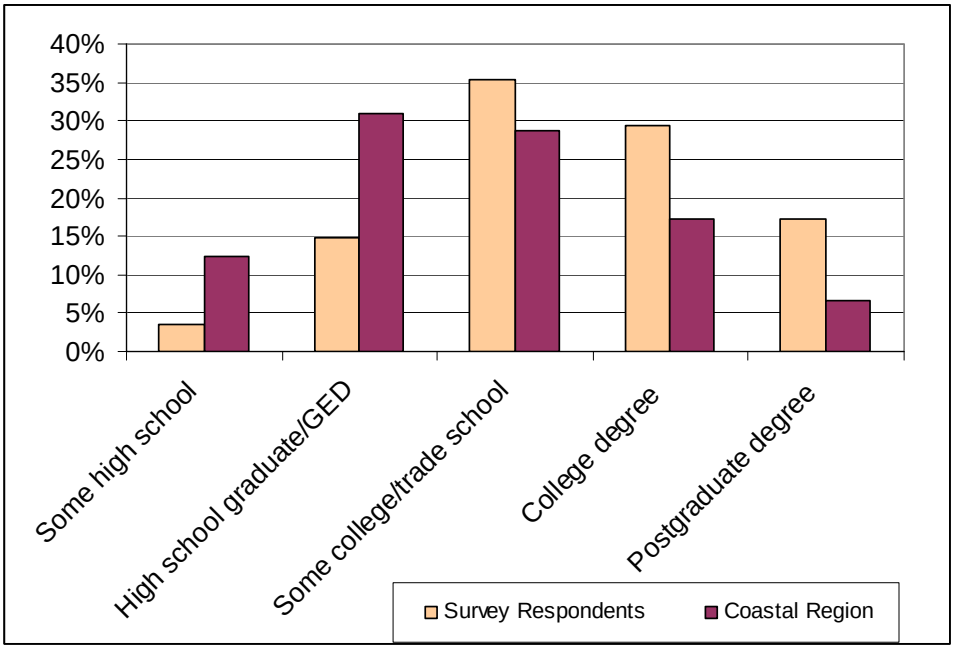


Source: U.S. Census Bureau: www.census.gov (2000) and Household Natural Hazards Preparedness Survey, Oregon Partnership for Disaster Resilience, (Nov. 2007).

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

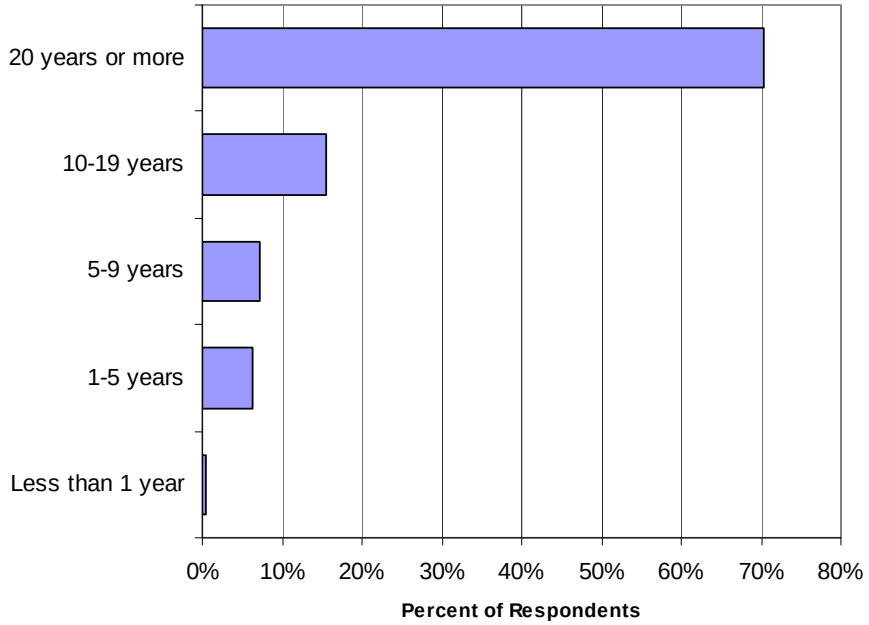


Source: U.S. Census Bureau: www.census.gov (2000) and Household Natural Hazards Preparedness Survey, Oregon Partnership for Disaster Preparedness, (Nov. 2007)

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.

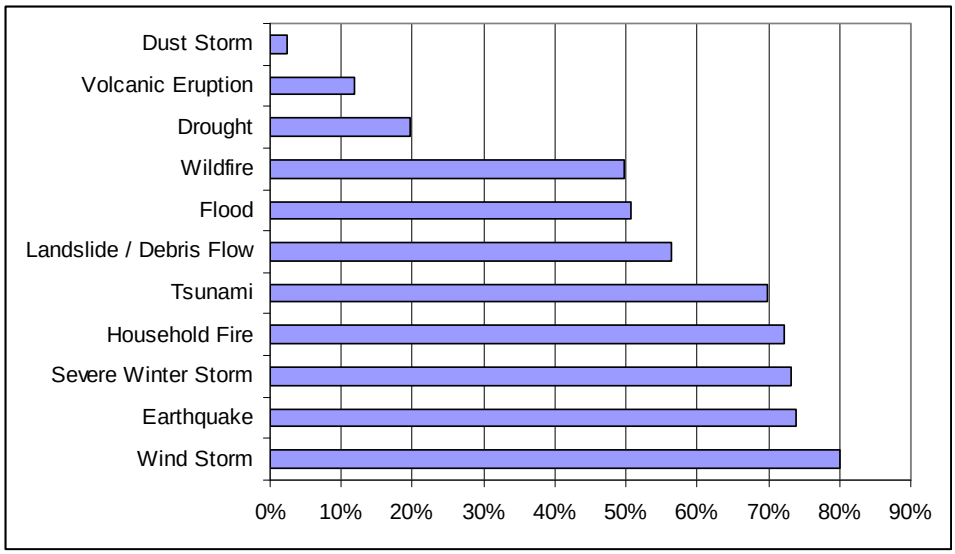
The survey asked respondents to rank their personal level of concern for specific natural disasters affecting their community (Table 3). The results show that respondents were most concerned about windstorm, earthquake, severe winter storm and household fire. The respondents are least concerned about 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

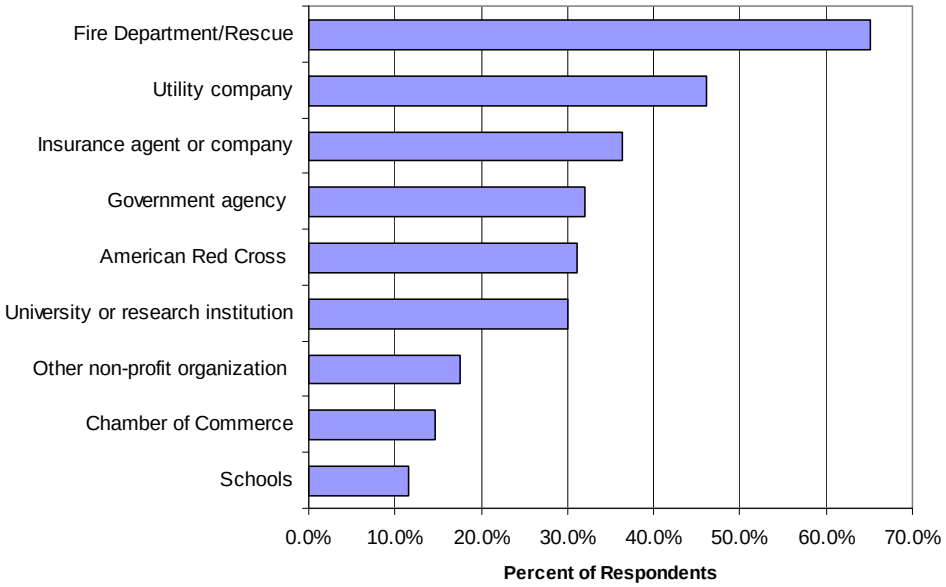
In your household, have you or someone in your household:	Have Done	Plan To Do	Not Done	Unable To Do	Does Not Apply
A. Attended meetings or received written information on natural disasters or emergency preparedness?	52.7%	5.4%	40.9%	1.0%	
B. Talked with members in your household about what to do in 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.

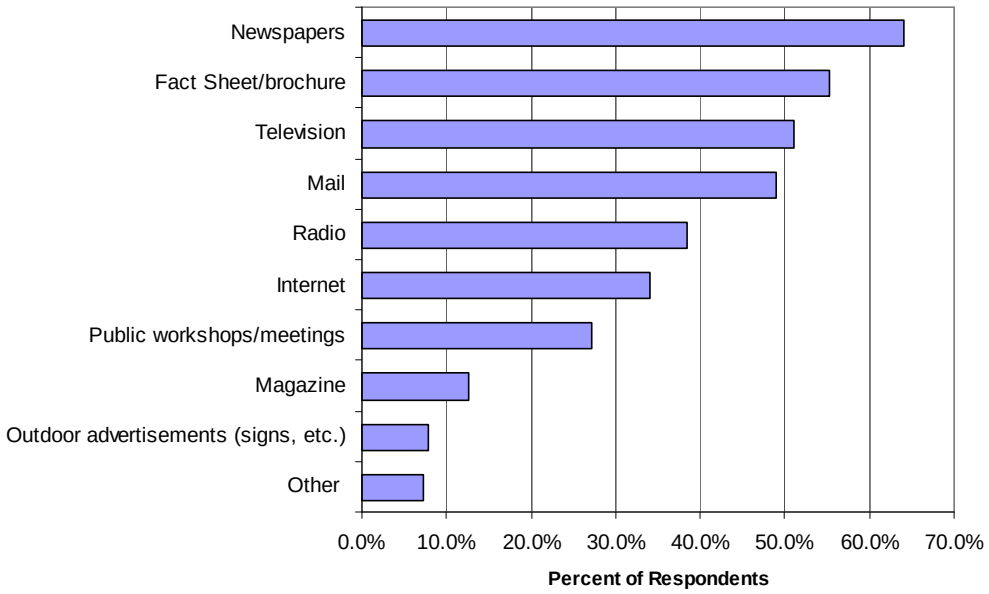
Figure 5. Survey Respondents' Preferred Sources of Information Regarding Household Preparedness



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)