Lincoln County

Multi-Jurisdictional Natural Hazards Mitigation Plan

Prepared for: Lincoln County, Depoe Bay, Lincoln City, Newport, Siletz, Toledo, Waldport and Yachats

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Lincoln County

Multi-Jurisdictional Natural Hazards Mitigation Plan

Report for:

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City of Lincoln City
801 SW Highway 101, Lincoln City, OR 97367

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March 2009

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Special Thanks & Acknowledgements

The Lincoln County Multi-Jurisdictional 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 support the development of natural hazard mitigation plans for the region. The region's planning process utilized a four-phased planning process, plan templates and plan development support provided by the Oregon 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
- FEMA Region X

Project Steering Committee:

- Lincoln County Department of Planning and Development: Matt Spangler-Director, Jessica Bondy - Senior Planner
- Lincoln County Office of Emergency Services: Jim Hawley - Director
- Lincoln County Public Works: Jim Buisman - Director
- Lincoln County Sheriff's Office: Sheriff Dennis Dotson
- North Lincoln Fire and Rescue: Chief Don Baker
- Cities of Depoe Bay & Waldport: Larry Lewis - Planner
- City of Yachats: Nancy Batchelder - City Recorder

Project Managers:

- Matt Spangler – Director
- Jessica Bondy – Senior Planner
- David Farr – RARE Participant

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LINCOLN COUNTY
Natural Hazards Mitigation Plan
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Executive Summary

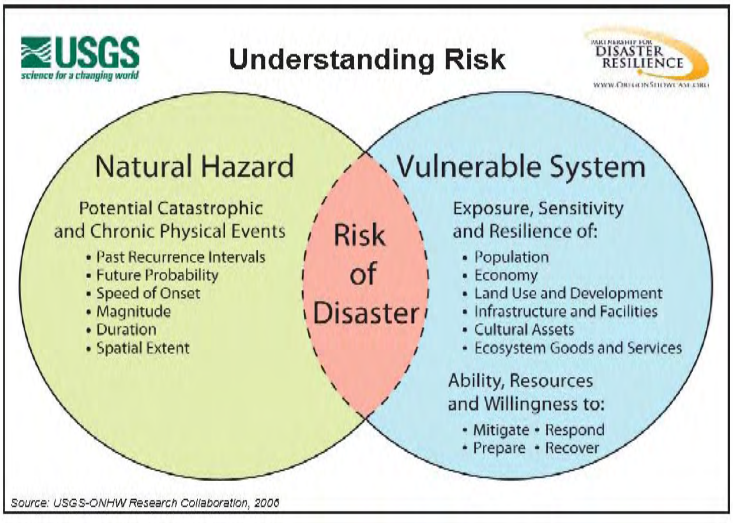
Lincoln County developed this multi-jurisdictional Natural Hazard Mitigation Plan (Plan) in an effort to reduce future loss of life and damage to property resulting from natural hazards. This plan was developed with and for the following jurisdictions: Lincoln County, Depoe Bay, Lincoln City, Newport, Siletz, Toledo, Waldport, and Yachats. It is impossible to predict exactly when these hazards will occur, or the extent to which they will affect the community. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to 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 Lincoln County, Lincoln City, Depoe Bay, Newport, Toledo, Waldport and Yachats to reduce the risk from natural hazards by identifying resources, information, and strategies for risk reduction. It will also help guide and coordinate mitigation activities throughout the County. The figure below is utilized throughout the Plan to illustrate the concept of risk reduction.

Figure i.1 Understanding Risk



A natural hazard 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 Lincoln County become better equipped to identify and implement actions aimed at reducing the overall risk to natural hazards.

Who Participated in Developing the Plan?

In the fall of 2006, the Oregon Partnership for Disaster Resilience (the Partnership/OPDR) at the University of Oregon's Community Service Center partnered with the Oregon Emergency Management (OEM) and Clatsop and Lincoln Counties to develop a Pre-Disaster Mitigation Grant proposal. Both counties joined the Partnership by signing (through their County Commissioners) a Memorandum of Understanding for this planning project. FEMA awarded the Oregon Coast Region with a grant to support the development of the natural hazard mitigation plans for the two counties and cities therein. The Partnership, OEM, and the participating communities were awarded the grant in the fall of 2006 and local planning efforts began in the fall of 2007.

The Lincoln 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. A project steering committee guided the plan development process. The steering committee was comprised of representatives from the following organizations.

- Lincoln County Department of Planning and Development: Matt Spangler-Director, Jessica Bondy-Senior Planner
- Lincoln County Office of Emergency Services: Jim Hawley-Director
- Lincoln County Public Works: Jim Buisman-Director
- Lincoln County Sheriff's Office: Sheriff Dennis Dotson
- North Lincoln Fire and Rescue: Chief Don Baker
- Cities of Depoe Bay & Waldport: Larry Lewis- Planner
- City of Yachats: Nancy Batchelder- City Recorder

The Lincoln County Planning and Development Department was designated as the plan's convener and will take the lead in implementing, maintaining and updating the plan. Public participation played a key role in the development of goals and action items. Public involvement activities used to develop the plan included: stakeholder interviews, posting of online contacts for public viewing and feedback, and an open house which gave the public an opportunity for input.

What is the Plan's Mission?

The mission of the Lincoln County Mitigation Plan is to promote public policy and mitigation activities which will enhance the safety to life and property from natural hazards.

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.

- Protect life and property
- Preserve natural areas and features;
- Coordinate and enhance emergency services;
- Enhance and promote public education;
- Promote partnerships and coordination to improve implementation

How are the Action Items Organized?

The action items are organized within an action matrix (located at the end of this Summary), which lists all the multi-hazard and hazard-specific action items included in the mitigation plan. Data collection and research and the public participation process resulted in the development of these action items. The Action Item Matrix portrays the overall plan framework and identifies linkages between the plan goals, and actions. The matrix documents 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 Lincoln County Natural Hazard 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 addendums to the plan will also designate a convener and will work closely with the county convener to keep the plans coordinated. The pan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing a plan revision every five years. This section describes how the communities will integrate public participation throughout the plan maintenance process.

Plan Adoption

After the plan is locally reviewed and deemed complete, the Lincoln County Department of Planning and Development and the Emergency Services Department will be responsible for submitting it to the State Hazard Mitigation Officer at Oregon Emergency Management. OEM will then

submit the plan to FEMA 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 jurisdictions' conveners will be responsible for ensuring local adoption of the Lincoln County multi-jurisdictional Natural Hazard 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 funds, and the Flood Mitigation Assistance program funds.

The success of a multi-jurisdictional natural hazards 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.

Lincoln County NHMP Action Item Matrix

Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals				
					Protect life and property	Preserve natural areas and features	Coordinate and enhance emergency services;	Enhance and promote public education	Promote partnerships and coordination to improve
Coastal Erosion #1	Improve knowledge of coastal erosion hazard areas and understanding of vulnerability and risk to life and property in hazard prone areas.	Lincoln County Planning and Development	Lincoln County GIS, Public Works, Emergency Services, DOGAMI, Cities	ST	X			X	X
Coastal Erosion #2	Improve knowledge of effects of climate change and understanding of vulnerability and risk to life and property in hazard prone areas.	Lincoln County Planning and Development	Lincoln County Public Works, Emergency Services, DOGAMI, Cities	LT	X			X	
Coastal Erosion #3	Evaluate revising existing county coastal hazard area regulations based on the DOGAMI risk zone mapping.	Lincoln County Planning and Development	Lincoln County Emergency Services, GIS, Public Works, DOGAMI	LT	X	X			
Earthquake #1	Integrate new earthquake hazard mapping data for Lincoln County and improve technical analysis of earthquake hazards.	Lincoln County GIS	Lincoln County Public Works, Emergency Services, GIS, OSU, USGS, BLM, MWVCOG, OEM, FEMA, DOGAMI	ST	X	X		X	X
Earthquake #2	Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices.	Lincoln County Emergency Services	Lincoln County Building, Planning, Risk Management, City building officials, school districts, builders. associations, IBHS, Red Cross, DOGAMI, Lincoln Fire, FEMA, OEM	ST	X	X	X		X

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					Protect life and property	Preserve natural areas and features	Coordinate and enhance emergency services;	Enhance and promote public education	Promote partnerships and coordination to improve
Earthquake #3	Encourage purchase of earthquake hazard insurance by forming partnerships with the insurance and real estate industries.	Lincoln County Emergency Services	local insurance agencies, mortgage companies, insurance and real estate industries, DOGAMI	ST	X	X		X	
Earthquake #4	Promote and enforce building code standards.	Lincoln County Emergency Services	Lincoln County Planning and Development, builders, developers, property owners.	LT	X	X		X	
Earthquake #5	Use seismic strength evaluations of critical facilities to identify vulnerabilities and to meet current seismic standards.	Lincoln County Emergency Services	Lincoln County Planning, Building, City planning departments; water service providers; OAWU; school districts, hospitals, ODOT, colleges and universities; architects, Oregon Building Codes Division,	LT	X	X	X	X	X
Earthquake #6	Identify funding sources for and implement high priority structural and nonstructural retrofits of structures that are identified as seismically vulnerable.	Lincoln County Emergency Services	Lincoln County Planning, Building, County Assessor, local banks, credit unions, Rural Development (USDA), OECDD; FEMA, OEM	LT				X	X
Flood #1	Explore steps needed to qualify Lincoln County for participation in the NFIP Community Rating System (CRS)	Lincoln County Planning and Development	Lincoln County Emergency Services, Public Works, DLCD, FEMA, Insurance Services Office (ISO)	ST	X			X	X

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					Protect life and property	Preserve natural areas and features	Coordinate and enhance emergency services;	Enhance and promote public education	Promote partnerships and coordination to improve
Flood #2	Formalize process for providing warnings of flood events to property owners in flood hazard areas.	Lincoln County Emergency Services	Lincoln County GIS, Sheriff's Office, Fire and Rescue Providers	ST	X		X	X	X
Flood #3	Update the Lower Siletz Flood Mitigation Action Plan; develop flood mitigation action plan(s) for the lower Alsea and Salmon River, and Drift Creek and other areas.	Lincoln County Planning and Development	Lincoln County Emergency Services, OEM; FEMA Region X	LT	X			X	X
Flood #4	Work with affected property owners to elevate or relocate non-conforming, pre-FIRM structures in flood hazard areas	Lincoln County Planning and Development	Lincoln County Emergency Services, OEM; FEMA Region X	LT	X			X	X
Flood # 5	Continue compliance with the National Flood Insurance Program (NFIP).	Lincoln County Planning and Development	Public Works Department FEMA	LT	X		X		
Landslide #1	Encourage construction, site location and design that can be applied to steep slopes to reduce the potential threat of landslides.	Lincoln County Planning and Development	Lincoln County Emergency Services, Building and Public Works, DLCD, Cities	ST	X	X			
Landslide #2	Increase public education related to landslide hazards by distributing DOGAMI landslide informational brochure.	Lincoln County Planning and Development	Lincoln County Public Works, Emergency Services, DOGAMI, OEM, DLCD	ST				X	X

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					Protect life and property	Preserve natural areas and features	Coordinate and enhance emergency services;	Enhance and promote public education	Promote partnerships and coordination to improve
Landslide #3	Mitigate activities in identified potential and historical landslide areas through public outreach.	Lincoln County Planning and Development, Emergency Services	Lincoln County Public Works, ODF, Cities, mortgage companies	LT	X			X	X
Landslide #4	Protect existing development in landslide-prone areas.	Lincoln County Emergency Services, Public Works	Lincoln County Planning and Development, GIS, DLCD, OEM,	LT	X	X		X	X
Tsunami #1	Determine ways of mitigating the vulnerability of assets (fire stations, equipment, utilities) likely to be impacted by tsunami.	Lincoln County Emergency Services	Lincoln County Planning and Development, DOGAMI	ST	X		X	X	
Tsunami #2	Work with coastal communities, citizen groups, property owners, recreation areas, emergency responders, schools and businesses in promoting tsunami awareness and evacuation.	Lincoln County Planning and Development	Lincoln County Emergency Services, City Planning Departments	ST	X		X	X	
Tsunami #3	Improve technology capacity of communities, agencies and responders needed to adequately map hazard areas, broadcast warnings, inform, and educate residents and visitors of tsunami dangers	Lincoln County Emergency Services	Lincoln County GIS, Cities, Radio, DOGAMI	LT	X		X	X	X
Tsunami #4	Ensure coordination of the local coastal tsunami warning system with the current National Weather Service system.	Lincoln County Emergency Services	Lincoln County Public Works, Cities, Coastal Fire Agencies, ODOT	LT	X		X	X	X

Lincoln County NHMP Action Item Matrix

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Wildfire #1	Develop a Community Wildfire Protection Plan for Lincoln County	Lincoln County Emergency Services	Lincoln County GIS, Planning and Development, ODF, North and South Lincoln Fire Districts, City Fire Districts	ST	X			X	X
Windstorm #1	Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during windstorm events.	Lincoln County Public Works, Planning and Development	Lincoln County GIS, Public Works, Emergency Services, DOGAMI, Cities, Cities, USFS, BLM, State Parks, utility providers	ST	X	X	X	X	X
Windstorm #2	Develop and implement, or enhance strategies for debris management and/or removal after windstorm events.	Lincoln County Emergency Services, Solid Waste District	Lincoln County Public Works, ODOT, cities, regional recycling facilities	ST		X	X		X
Windstorm #3	Map and publicize locations around the county that have the highest incidence of extreme windstorms.	Lincoln County Emergency Services	Lincoln County Planning and Development, GIS, FEMA, NCDC, OCS, NWS	LT	X	X			
Windstorm #4	Increase public awareness of windstorm mitigation activities.	Lincoln County Emergency Services	Lincoln County Planning and Development, Utilities, cities, FEMA	LT	X	X	X	X	
Windstorm #5	Continue and enhance windstorm resistant construction methods where possible to reduce damage and power outages from windstorms.	Lincoln County Planning and Development	Lincoln County Emergency Services, Cities, utilities	LT	X			X	

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Action Item	Proposed Action Title	Coordinating Organization	Partner Organizations	Timeline	Alignment with Plan Goals				
					Protect life and property	Preserve natural areas and features	Coordinate and enhance emergency services;	Enhance and promote public education	Promote partnerships and coordination to improve
Windstorm #6	Encourage critical facilities to secure emergency power.	Lincoln County Emergency Services	Lincoln County Planning and Development, Cities, neighboring counties, Lincoln Fire, police stations, water systems	LT		X	X		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; 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.

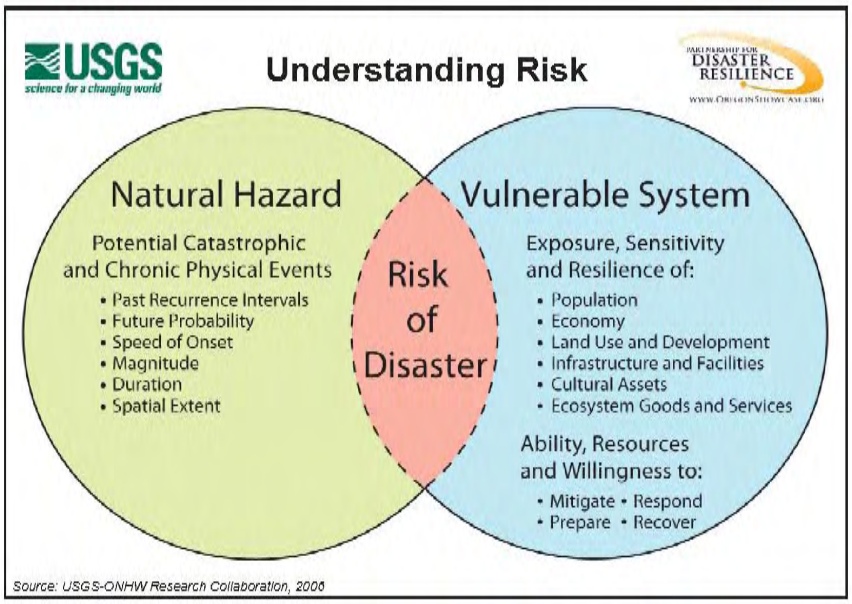
Engaging in mitigation activities provides jurisdictions with a number of benefits, including reduced loss of life, property, essential services, critical facilities and economic hardship; reduced short-term and long-term recovery and reconstruction costs; increased cooperation and communication within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

Why Develop a Mitigation Plan?

Lincoln 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: Lincoln County, Depoe Bay, Lincoln City, Newport, Siletz, Toledo, Waldport, and Yachats. It is impossible to predict exactly when these disasters will occur, or the extent to which they will affect the County. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize the losses that can result from natural hazards.

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

Figure 1.1 Understanding Risk



Source: USGS – The Partnership for Disaster Resilience Research Collaborative, 2006

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

This plan focuses on the primary natural hazards that could affect Lincoln County, Oregon, which include drought, coastal erosion, flood, earthquake, landslide, tsunami, volcano, wildfire, and windstorm. 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 Sciences Multi-hazard Mitigation Council (MMC) highlights that for every dollar spent on mitigation, society can expect an average savings of $4.[1]

This multi-jurisdictional Natural Hazard 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 foundation for coordination and collaboration among agencies and the public in the county; (2) identification and prioritization of future mitigation activities; and (3) aid in meeting federal planning requirements and qualifying for assistance programs. The mitigation plan works in conjunction with other county and city plans and programs including, the Lincoln County Comprehensive Plan, Lincoln County Development Code, Lincoln County Transportation System Plan, as well as the State of Oregon Natural Hazard Mitigation Plan.

The plan provides a set of actions to prepare for and reduce the risks posed by natural hazards through education and outreach programs, the development

of partnerships, and the implementation of preventative activities such as land use or watershed management. The actions described in the plan are intended to be implemented through existing plans and programs within the County.

Policy Framework for Natural Hazards in Oregon

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

Statewide land use planning Goal 7: Areas Subject to Natural Hazards calls for local plans to include inventories, policies and ordinances to guide development in 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?

In the fall of 2006, the Oregon Partnership for Disaster Resilience (the Partnership/OPDR) at the University of Oregon's Community Service Center partnered with the Oregon Emergency Management (OEM) and Clatsop and Lincoln Counties to develop a Pre-Disaster Mitigation Grant proposal. Both counties joined the Partnership by signing (through their county commissioners) a Memorandum of Understanding for this planning project. FEMA awarded the Oregon Coast Region with a grant to support the development of the natural hazard mitigation plans for the two counties and cities therein. The Partnership, OEM, and the participating communities were

awarded the grant in the fall of 2006 and local planning efforts began in the fall of 2007.

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

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

Each community was responsible for facilitating the mitigation planning process locally, utilizing the resources provided by the Partnership, OEM and other state partners. Participating jurisdictions reviewed the resources provided by the various organizations and applied local knowledge, information and data about community characteristics, assets and resources in order to identify potential mitigation actions aimed at reducing overall risk.

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

Phase I: Getting Started

A Rural Assistance for Rural Environments (RARE) participant was hired via the Oregon Partnership for Disaster Resilience to manage the hazard mitigation planning process, develop the plan, and facilitate community meetings. The mission of the RARE Program is to increase the capacity of rural communities to improve their economic, social, and environmental conditions, through the assistance of trained graduate-level participants who live and work in communities for 11 months. Qualified college graduates (with a bachelor's degree) and graduate-level students who are selected as RARE participants assist communities and agencies in the development and implementation of plans for achieving a sustainable natural resource base and improving rural economic conditions while gaining community building and leadership skills.

OPDR staff assisted in the development and facilitation of the planning process. The RARE participant served as the primary local contact, identifying steering committee members for community meetings, organizing community meetings, and fielding questions from local community members.

In October 2007, the RARE participant and the Lincoln County Department of Planning and Development identified community members to serve on the

Lincoln County Hazard Mitigation Steering Committee. The steering committee functioned as the community body responsible for overseeing the mitigation planning process, and included representatives from the following organizations:

- Lincoln County Department of Planning and Development
- Lincoln County Public Works
- Lincoln County Sherriff
- Lincoln County Office of Emergency Services
- North Lincoln Fire and Rescue
- City of Yachats
- City of Waldport
- City of Depoe Bay

The committee members worked collaboratively with the RARE participant and Lincoln County Department of Planning and Development to provide local input and feedback to the planning process. On November 29, 2007 the Steering Committee met for the first time to discuss hazard mitigation in Lincoln County and the roles and responsibilities expected of committee members. An agenda, sign-in sheet and minutes for this meeting are available in the Appendix B: Planning and Public Process. Participation among key community members in the steering committee served as the primary method for ensuring public participation during Phase I. The RARE participant invited community members and stakeholders from around Lincoln County to participate in the planning process and provide representation from their organization's point of view. Committee members were also encouraged to speak with their local representatives to inform them of the mitigation planning process currently being undertaken by their organization.

To supplement information gathered from steering committee members, the RARE participant also conducted stakeholder interviews with the following organizations in Lincoln County:

- Hatfield Marine Science Center (HMSC)
- Samaritan Pacific Communities Hospital (PCH)
- Oregon Department of Forestry (ODOF)
- Port of Newport
- Central Oregon Coast Association (COCA)
- Department of Geology and Mineral Industries (DOGAMI)
- Oregon Coastal Zone Management Association (OCZMA)
- Oregon Parks and Recreation Department OPRD)
- Kernville-Gleneden Water District
- Georgia Pacific West, Inc.
- Siuslaw National Forest
- Community Emergency Response Team (CERT)

Interviews conducted with the above organizations provided information on the extent of natural hazards found within Lincoln County, as well as information on mitigation or other emergency management planning efforts being undertaken within the county. The county's project webpage located on the Oregon Partnership for Disaster Resilience's website (www.OregonShowcase.org) served as an outreach tool to the community. The webpage was used to provide local contact information and updates on the planning process. The final adopted and approved plan will be posted on the University of Oregon Libraries' Scholar's Bank Digital Archive. The final adopted plan will also be posted on the Lincoln County webpage at www.co.lincoln.or.us and will be available for review at the local Newport Public Library, the Driftwood Library in Lincoln City, the Toledo Public Library and the Siletz Library.

As part of the regional Pre-Disaster Mitigation grant, the Partnership implemented a region-wide household preparedness survey. The survey gauged household knowledge of mitigation tools and techniques and assessed household disaster preparedness. The survey results improve public/private coordination of mitigation and preparedness for natural hazards by obtaining more accurate information on household understanding and needs. Results of the survey are documented in an independent report in Appendix E.

Phase II: Risk Assessment

The plan's risk assessment is documented within two components of the Plan. In Section 2, 'Community Profile,' the community's assets, resources, and existing capabilities to address mitigation are documented. Second, each hazard addressed in the Plan has an accompanying hazard annex. Each hazard annex consists of the following components: causes and characteristics of the hazard, a history of the hazard in Lincoln County, risk assessment, probability of future occurrence, vulnerability assessment, a review of community hazard issues, existing hazard mitigation activities, and hazard mitigation action items. Together, information in the community profile and the hazard annexes help to define the community's risk, as is depicted in Figure 1.1 above.

On April 7, 2008, the RARE participant facilitated a risk assessment workshop with the Lincoln County Steering Committee to: 1) discuss the natural hazards that occur, or may occur within Lincoln County; and 2) to identify community assets in Lincoln County that may be vulnerable to natural hazards. The community asset and vulnerabilities identification focused on the following five themes:

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

To assist in information gathering, staff of the Lincoln County Department of Planning and Development distributed worksheets that listed information for each of the five themes. Participants had a few moments to fill in any information the Planning Department may have missed. The worksheets were also distributed to participants several weeks prior to the meeting to help facilitate discussion among community members. A copy of the Community Assets and Vulnerabilities Worksheets are documented in Appendix B.

Additionally, the committee discussed the hazards' potential impacts within the county. The RARE participant documented the workshop's results within Volume II: Hazard Annexes. Please see Appendix B for the meeting's agenda and minutes.

Phase III: Developing a Mission, Goals and Action Items

The plan's mission statement and goals direct the plan's action items and reflect the priorities found in the community. The RARE participant, in consultation with the Lincoln County Mitigation Steering Committee, developed a mission statement and goals for the plan. On July 22, 2007, the RARE participant facilitated the Mission, Goals, and Action Items Steering Committee Meeting, where members conducted a final review and approved the stated goals and action items. (For an agenda, sign-in sheet and meeting minutes, see Appendix B: Planning and Public Process in this plan.) The mission statement for the plan, while simple, is intended to be a timeless statement that can work with current goals and objectives and amendments that may occur to the plan over time. The goals reflect the broad needs found within the community.

In addition to the mission and goals, the plan also includes action items which are specific mitigation activities the county can implement to reduce its vulnerability to natural hazards. The RARE participant, in consultation with the Lincoln County Natural Hazards Mitigation Steering Committee, identified actions based on previous steering committee meetings and stakeholder interviews. At the July 22, 2008 Mission, Goals, and Action Items Steering Committee meeting, members reviewed each action item and approved them after necessary changes. The action items for the Lincoln County Natural Hazard Mitigation Plan address all major natural hazards identified in the plan and include a comprehensive range of activities to be completed. The approved action items are found in Section 4 of this plan.

Phase IV: Plan Implementation and Maintenance

The implementation and maintenance structure for the plan relies on continued community involvement. On August 27, 2008, the steering committee met to discuss the plan implementation and maintenance process. The steering committee identified the Lincoln County Department of Planning and Development as the convener for organizing and prioritizing implementation of action items, and steering committee members as the members of the coordinating body to oversee implementation of the plan. The steering committee agreed that the coordinating body will meet on a semi-annual basis to review the plan and review implementation of the action items. The steering committee also agreed that continued public involvement is essential to maintaining the plan and obtaining community support for

mitigation action items. Appendix B contains the agenda, sign-in sheet and meeting minutes of the August 27, 2008 steering committee meeting.

The Lincoln County Department of Planning and Development invited area residents to an open house on Thursday August 21, 2008 to hear about work involving the development of a multi-jurisdictional Natural Hazards Mitigation Plan. Staff members were available to describe the mitigation planning process and to take comments and questions. Maps displaying community assets, critical facilities, and hazard zones and as well as the final draft of the plan were available for residents to discuss and provide feedback. A copy of the Press Release prepared by Lincoln County and issued in the Newport News-Times, a local newspaper covering general circulation in all of Lincoln County, along with the sign-in sheet can be found in Appendix B. The Press Release was also broadcast on a local radio station. Also contained in this Appendix is a map of Lincoln County produced by the Department of Information Technology (IT) using a Geographic Information System (GIS), illustrating certain natural hazards (100year flood events and DOGAMI generated tsunami mapping) in relation to various community assets and critical facilities.

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 promote public policy and mitigation activities which will enhance the safety to life and property from natural hazards. 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 Addenda.

Section 2: Community Overview

This section provides an overall description of Lincoln County. The section includes a brief community profile, discussion of the government structure, listing of existing plans, policies, and programs, listing of community organizations, summary of existing mitigation actions, and an overview of the hazards addressed in the plan. This section allows readers to gain an understanding of the county's sensitivities – those community assets and characteristics that may be impacted by natural hazards, as well as the county's resilience – the ability to manage risk and adapt to hazard event impacts. A community overview for each participating city and special district is located in Volume III: City/Special District Addendums.

Section 3: Mission, Goals and Action Items

This section documents the plan's mission, goals, and actions and also describes the components that guide implementation of the identified mitigation strategies. Actions are based on community sensitivity and resilience factors and the hazard assessments in Section 2 and the Hazard Annexes. City and special district action items 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 updating the plan to be completed at the semi-annual and 5-year review meetings. The participating cities and special districts will utilize this implementation and maintenance process as well.

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, vulnerability, impacts, and probability.

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

- Coastal Erosion;
- Drought;
- Earthquake;
- Flood;
- Landslide/Debris Flow;
- Tsunami;
- Volcanic Event;
- Wildfire; and
- Windstorm

Volume III: City/Special District Addenda

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

Volume IV: Resource Appendices

The resource appendices are designed to provide the users of the Lincoln County multi-jurisdictional Natural Hazard Mitigation Plan with additional information to assist them in understanding the contents of the mitigation plan, and provide them with potential resources to assist with plan implementation.

Appendix A: Action Item Forms

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

Appendix B: Planning and Public Process

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

Appendix C: Economic Analysis of Natural Hazard Mitigation Projects

This appendix describes FEMA's requirements for benefit cost analysis in natural hazards mitigation, as well as various approaches for conducting economic analysis of proposed mitigation activities. This appendix was developed by the Partnership. It has been reviewed and accepted by FEMA as a means of documenting how the prioritization of actions shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

Appendix D: Regional Household Preparedness Survey

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

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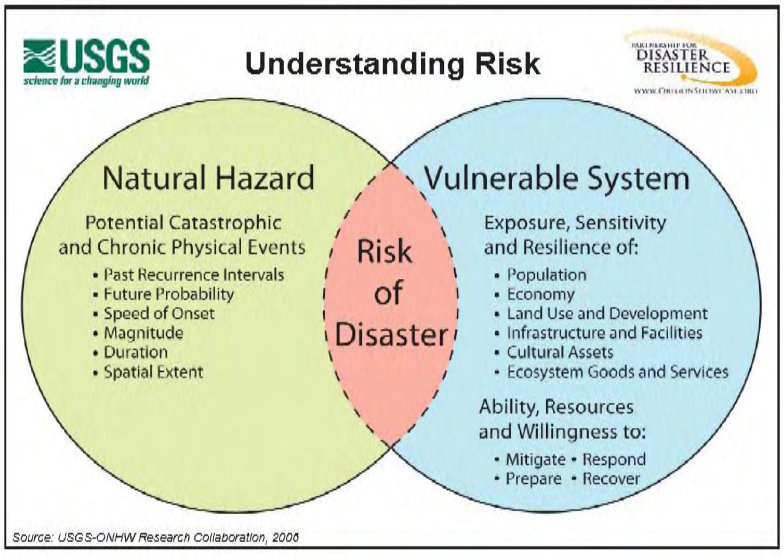
[1] National Institute of Building Sciences Multi-hazard Mitigation Council. (2005) "*Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities.*"

Section 2:
Community Overview

The following section describes the county from a number of perspectives in order to help define and understand the county's sensitivity and resilience 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. 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 - Partnership for Disaster Resilience Research Collaborative, 2006.

Geography & Climate

Lincoln County is located on the central coast of Oregon. Lincoln County has a land area of 992 square miles and approximately 60 miles of coastline. The county includes seven incorporated cities: Depoe Bay, Lincoln City, Newport, Siletz, Toledo, Waldport, and Yachats. Newport is the county's largest incorporated city with a population of 10,555.

Land Forms

The beauty of Lincoln County can be attributed to its unique and diverse landscapes. The principle landforms of Lincoln County are: the Coast Range mountains; rivers, streams, and associated floodplain alluvium; estuaries and associated tidal wetlands; headlands, ocean beaches, marine terraces, and coastal freshwater lakes.

Many perennial streams are dispersed throughout the Coast Range in Lincoln County. Nearly all of these year-round streams flow directly into the Pacific Ocean, the exception being a small area of the County's northeast area which flows into the Willamette system. The major rivers of Lincoln County, ranked by size of watershed are: the Alsea, Siletz, Yaquina, Salmon, and Yachats.

The estuaries and associated tidal wetlands of Lincoln County vary in size and character from the Yaquina estuary (largest), to the Alsea, Siletz, Salmon and Yachats (smallest.) Other minor estuaries include Depoe Bay, Big Creek and Beaver Creek.

Headlands composed of erosion resistant materials are found along the coastline of Lincoln County. These major landmarks are among the features first described by explorers searching for the "Northwest Passage." Headlands in Lincoln County include Cape Foulweather, Yaquina Head, and Cape Perpetua. Between these headlands lay beaches and elevated marine sedimentary terraces upon which the greatest percentage of the County's population is located.

Several freshwater lakes and marshes are present along Lincoln County's coast. Devils Lake, adjacent to Lincoln City, is the largest of the coastal lakes with an approximate surface area of one square mile. It is the focus of considerable residential and recreational activity.

Climate

The climate of Lincoln County is characterized by wet winters, relatively dry summers, and mild temperatures throughout the year. Winter storms, bearing wet marine air from the North Pacific regions, reach the coast moving from southwest to northeast. These bring heavy rains during the months of October through March. Areas of Lincoln County are known to get as much as 200 inches of annual precipitation which can lead to flooding. Marine high pressure systems are characteristic of the summer months and create northwesterly winds. Of far less frequency are the high pressure systems that move from the interior to the ocean. These systems generally come from the east/northeast, and bring clear, dry, and either warm or cold weather depending on the season.[1]

Population & Demographics

Lincoln County has grown in population from 44,479 in 2000 to 46,199 in 2006, a change of 3.9%. The Oregon Office of Economic Analysis projects Lincoln County's population to grow at a fairly consistent rate from 2000 to 2040 as shown in the table below.

Table 2.1 Population Forecast of Lincoln County

	2000	2003	2005	2010	2015	2020	2025	2030	2035	2040
Lincoln	44,600	45,000	45,365	46,945	48,776	50,379	52,039	53,710	55,364	57,247

Oregon Office of Economic Analysis, Long Term County Forecast, Lincoln County
http://www.oea.das.state.or.us/DAS/OEA/demographic.shtml#Long_Term_County_Forecast[2]

In 2006, the population was 92.1% White, 0.5% African American, 3.3% Native American and Alaska Native, 1.0% Asian, and 0.2% Pacific Islander. A total of 2.9% identified with two or more races and 6.7% were of Hispanic or Latino descent.

In 2006, the 18 and younger age group represented 19.4% of the County's population while the 65 and over age group represented 19.0%. In 2004 Lincoln County's Median household income was $34, 175 compared to the state average of $42,568. The percentage of persons below the poverty line in Lincoln County was 15.3% as compared with the state average of 12.9%.[3]

In 1998 there were between 2.5 and 3.0 million tourists who visited Lincoln County. These visitors were split roughly equal between overnight guests and day-trippers. Overnight guests stayed an average of 2.9 nights in the County, generating 3.99 million visitor-nights.[4]

Employment & Economics

The county's economy is based in tourism, commercial fishing, and forestry and wood products. Nearly one third of the workforce is employed in the tourism industry. The Confederated Tribes of the Siletz Chinook Winds Casino in Lincoln City remains Lincoln County's largest employer. Newport's Yaquina Bay is home to one of the west coast's largest and most active commercial fishing fleets. In 1998 Newport was ranked 11th among all ports in the United States in seafood landings with 118 million pounds of landed fish. Crab and salmon fisheries have had record catches in recent years. Lincoln County ranks tenth in the state in timber harvests even though a third of the County's forests are federally owned.

Newport is a center for marine and oceanographic research, anchored by Oregon State University's Hatfield Marine Science Center (HMSC). In addition to the University's research and education facilities, several state and federal agencies involved in marine research and management have a sizable presence at the HMSC complex in South Beach, south of Newport.

Table 2.2: Lincoln County's Largest Employers (2000)

#	Employer	Number of FTE Employees
1	Confederated Tribes of the Siletz	904
2	Lincoln County School District	613
3	Samaritan Health Services	572
4	Georgia-Pacific	500
5	Lincoln County	385
6	Oregon State University / Hatfield Marine Science Center Campus	295*
7	Salishan Lodge/Resort	215
8	Pacific Shrimp	150
9	Central Lincoln PUD	142
10	Shilo Inns	142
11	Fred Meyer	127
12	Inn at Spanish Head	118
13	Wal-Mart	114
14	City of Lincoln City	98
15	City of Newport	95
16	The Embarcadero Resort	85
17	Safeway Stores	85
18	Newport Shrimp	80
19	Oregon Coast Aquarium	75

*This is an aggregated figure which includes Oregon State University, and various state and federal government agency employment.

Central Coast Economic Development Alliance, Employment: http://www.coastbusiness.info/?dir_cat=16036

Housing

Table 2.3: Housing Characteristics

YEAR STRUCTURE BUILT	Number	Percent
Built 1999 to March 2000	670	2.5
Built 1995 to 1998	2,986	11.1
Built 1990 to 1994	3,107	11.6
Built 1980 to 1989	3,972	14.8
Built 1970 to 1979	5,945	22.1
Built 1960 to 1969	3,336	12.4
Built 1950 to 1959	2,416	9
Built 1940 to 1949	1,889	7
Built 1939 or earlier	2,568	9.6
Median	1975	(X)

US Census Bureau

In 2000, there were 26,889 housing units in Lincoln County. Occupied housing units consisted of 19,296. Of those 19,296, 12,674 (65.7%) were owner occupied housing units, while 6,662 (34.3%) were renter occupied housing units. [5]

Land use & Development

Lincoln County is designated as a rural county by the Oregon Economic Development Department. Thirty –five percent (216,000 acres) of the county is publicly owned, while sixty-five percent (417,880 acres,) is privately owned. Most of the county is made up of timber land.

Table 2.4: Lincoln County Zoning, Acreage and Percent of Total County Land Mass

Zoning	Acreage	Percent of Total County Land Mass
Forest	572,000	90
Urban	18,500	3 (includes commercial and industrial)
Farm	14,000	2
Rural	13,000	2 (residential, service)
Other	17,380	3 (roads, water areas, other miscellaneous categories)

Central Coast Economic Development Alliance, General Information: Lincoln County, Oregon: http://www.coastbusiness.info/home.cfm?dir_cat=16039

Urban areas exist predominately along the coastline and have grown along with coastal tourism. Smaller rural communities and rural residential areas coincide with agricultural areas which exist along major rivers.

Transportation & Commuting Patterns

There is a comprehensive system of private and public roads in Lincoln County. The major public highways include Highways 101, 34, 20, 229, and 18. Most of the major highways, as well as many county roads, are located along streams and rivers, or the coast. Highway 101 runs along the coast, connecting the coastal cities and communities. Highway 34 runs from Corvallis to Waldport. Highway 20 connects Corvallis to Newport. Highway 229 stretches north-south and connects Toledo to Siletz and then connects to the coast and Highway 101. Highway 18 connects Lincoln City to Salem.

Figure 2.2: Transportation System Map

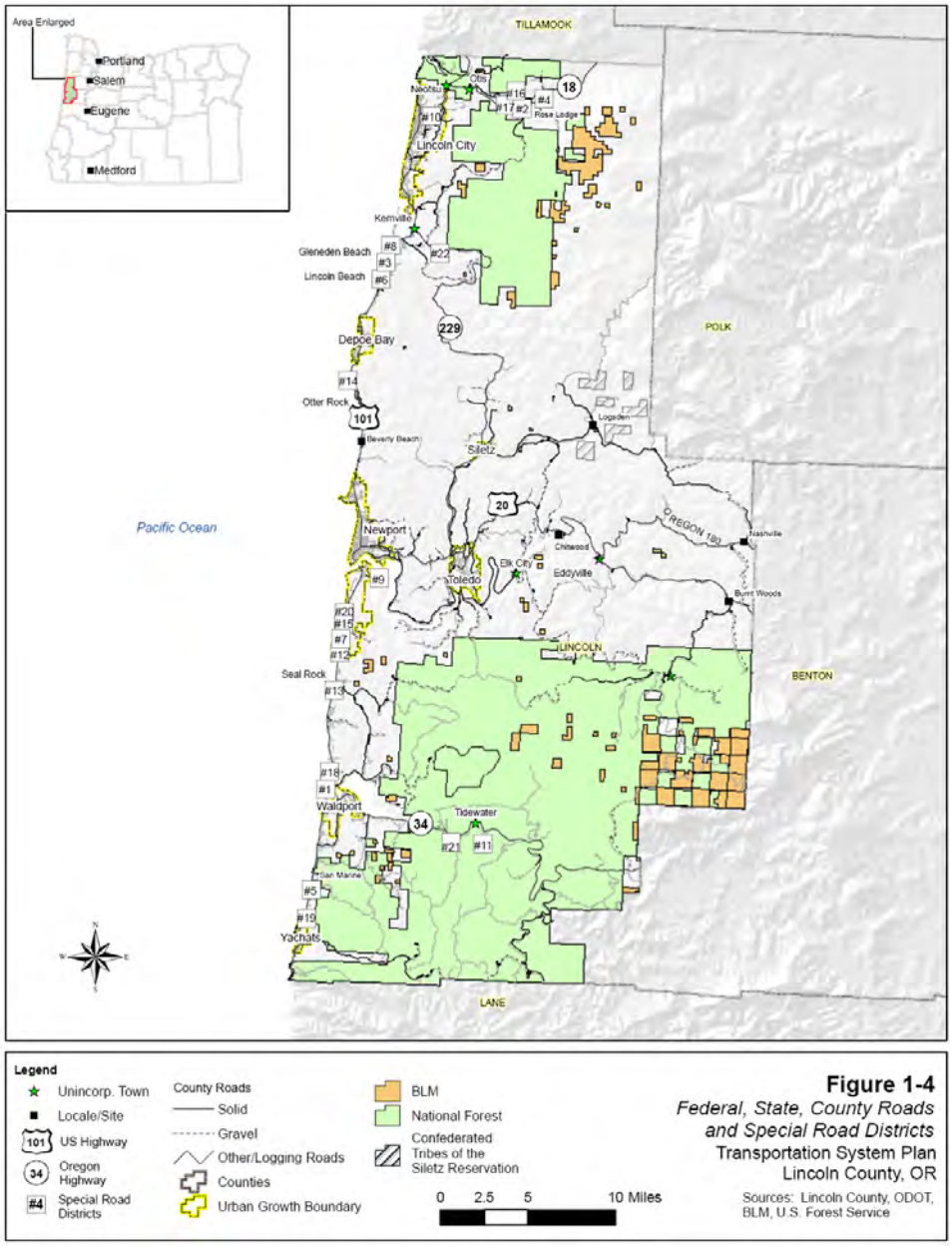


Figure 1-4
Federal, State, County Roads and Special Road Districts
Transportation System Plan
Lincoln County, OR
Sources: Lincoln County, ODOT, BLM, U.S. Forest Service

Critical Facilities & Infrastructure

Critical facilities are those that support government and first responders' ability to take action in an emergency. They are a top priority in any comprehensive hazard mitigation plan. Facilities critical to government response and recovery activities include 9-1-1 centers, emergency operations centers, police and fire stations, public works facilities, sewer and water facilities, hospitals, bridges and roads, and shelters. Critical transportation infrastructure is also necessary in preparation for and action after an emergency.

Table 2.5: Critical Facilities

Category	# of Facilities
ASSISTED CARE FACILITIES	17
DAY CARE	23
NURSING HOMES	4
CABLE	3
NEWSPAPERS	2
RADIO STATIONS	42
TELECOMMUNICATION SITES	102
PORTS	3
COLLEGES	3
HEAD START PROJECT	1
PUBLIC SCHOOLS	22
EOC CENTERS	5
EMS STATIONS	6
FIRE STATIONS	19
MORGUES	3
POLICE STATIONS	4
REFRIGERATION	2
PARKS	66
MEDICAL CLINICS	14
DOCTOR OFFICES	8
HOSPITALS	2
MEDICAL FACILITIES	4
PHARMACIES	9
VETERINARY CLINICS	7
AIRPORTS	4
BUS STATION	1
HELICOPTER PADS	2
PRIVATE WATER	3
PUBLIC WASTEWATER	8
PUBLIC WATER	8

Lincoln County GIS

Historical and Cultural Resources

Lincoln County is rich in cultural and historical resources. With over 60 miles of coast line stretching from Cascade Head to Cape Perpetua, the County is particularly renowned for its spectacular coastal scenery and beautiful beaches. Recreational opportunities abound, especially along the County's ocean shore, fostered by abundant public access, provided by more State Parks and public waysides than in any other county in the state.

This landscape and its associated natural resources fostered a rich native culture. Although knowledge of the pre-history of the area's native settlement is limited, a number of native cultural sites throughout the County provide evidence of a lifestyle clearly adapted to the environment of the central coast. The early history of European settlement is preserved through a number of historical buildings and sites, evidencing the development of the County's economy and culture through the 19th and 20th centuries. Table 2.6 provides a list of significant historical sites in the County.

Table 2.6: Historical Places

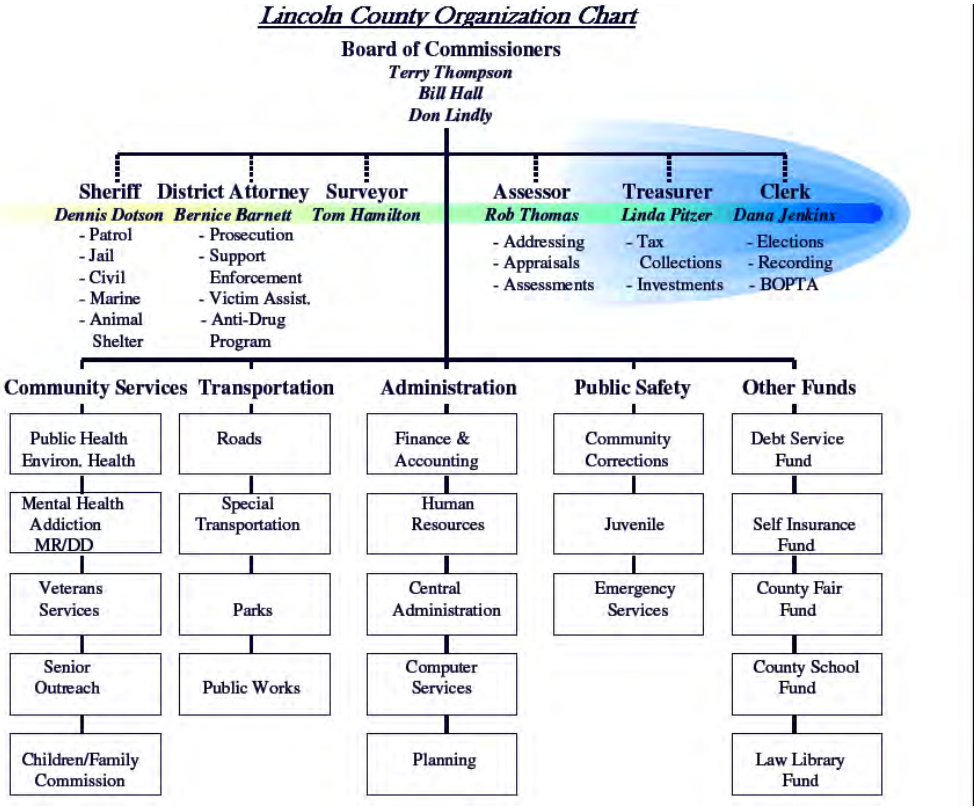
Name	Location
Boiler Bay Site	Depoe Bay
Cape Perpetua Shelter and Parapet	Yachats
Chitwood Bridge	Chitwood
Devil's Punch Bowl	Otter Rock
Dorchester House	Lincoln City
Drift Creek Bridge	Lincoln City
Elk City Bridge	Elk City
Fisher School Bridge	Fisher
Government Point Site	Depoe Bay
New Cliff House	Newport
North 804 Midden	Yachats
North Fork of the Yachats Bridge	Yachats
Old Yaquina Bay Lighthouse	Newport
Pacific Spruce Saw Mill Tenant Houses	Toledo
Rocky Creek Site	Depoe Bay
Roper, Charles and Theresa, House	Newport
Sam's Creek Bridge	Siletz
Seal Rock	Seal Rock
Siletz Agency Site	Siletz
Smelt Sands Midden	Yachats
St. John's Episcopal Church	Toledo
Tradewinds Kingfisher	Depoe Bay
Trail 804 Midden #3	Yachats
US Spruce Production Railroad XII, Spur 5	Yachats
Yachats Trail 804 MIdden	Yachats
Yaquina Head Lighthouse	Newport

National Register of Historic Places, Oregon- Lincoln County

Government Structure

Lincoln County government provides services citizens value and desire. The governance of Lincoln County is by three elected commissioners. The Board of County Commissioners manage Lincoln County affairs, in conjunction

with other elected officials and Department heads. Below is an organization chart illustrating county operations.



Commissioner's report: State of the County 2008

Existing Plan & Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances, and technical reports or studies. Plans and policies already in existence have support from local residents, businesses and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.[6]

The Lincoln County multi-jurisdictional Natural Hazard Mitigation Plan includes a range of recommended action items that, when implemented, will reduce the County's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the County's existing plans and policies. Linking existing plans and policies to the Natural Hazard Mitigation Plan helps identify what resources already exist that can be used to implement the action items identified in the Plan. Implementing the natural hazards mitigation plan's action items through existing plans and policies increases their likelihood of being supported and getting updated, and maximizes the county's resources.

The following are existing plans and policies already in place within Lincoln County:

- Lincoln County Comprehensive Plan
- Lincoln County Land Use Code
- Lincoln County Economic Development Strategic Plan
- Lincoln County Transportation System Plan
- Lincoln County Ten-Year Housing plan

The following table further defines each of these plans and policies.

Table 2.7: Lincoln County Existing Plans and Policies

Name	Date of Last Revision	Author/Owner	Description	Relation to Natural Hazard Mitigation
Lincoln County Land Use Code	2004	Lincoln County Department of Planning and Development	Administer Development Code and zoning ordinance governing land uses in Lincoln County	Land use ordinances may be used or developed to direct future development away from known hazard areas.
Lincoln County Comprehensive Land Use Plan	Jun-00	Lincoln County Department of Planning and Development	To anticipate and plan for future land use within Lincoln County in accordance with Statewide Land Use Planning Program	Section VII "Natural Disasters and Hazards Goal" outlines limitations and regulations abided by in regard to flooding, earthquakes, erosion and deposition (landslides), wildfires, and the exposure of hazardous soils and soil conditions. It concludes with the statement that developments shall not be planned in areas known to be subject to these threats without appropriate safeguards. The identification and prioritization of specific areas subject to each hazard can help in creating action items.
Lincoln County Economic Development Strategic Plan	Dec-05	Lincoln County Economic Development Alliance	The purpose of this document is to guide the activities of the Lincoln County Economic Development Council for the years of 2000 to 2020. The Plan should ensure that these activities are articulated to the residents of Lincoln County	An Economic Development Strategic Plan can be utilized to implement mitigation measures aimed at creating a disaster resilient economy.
Lincoln County Transportation System Plan	Jun-05	Prepared by Lincoln County Planning and Development Dept., Angelo Eaton and Associates, and CH2M Hill	The Lincoln County Transportation System Plan (TSP) addresses the County's anticipated transportation needs. It has been prepared to meet state and federal regulations that require urban areas to conduct long-range planning. The long-range planning is intended to serve as a guide for Lincoln County in managing their existing transportation facilities and developing future transportation facilities.	The Transportation Plan may be a resource to identify which roads and transportation systems are most vulnerable to natural disasters. Likewise, the TSP can be utilized to implement mitigation measures aimed at protecting "transportation disadvantaged" populations in emergency situations. When updated in 2025, the TSP can also include mitigation elements in its implementation considerations.
Lincoln County Ten-Year Housing Plan	Dec-07	Lincoln County Commissioners	A plan to set the communities of Lincoln County on a path that will one day see homelessness disappear and every citizen has a decent, safe and affordable place to call home.	The Plan includes Planning and Zoning Policies: The County Planning Commission will review recommendations in the Ten-Year Plan addressing planning, zoning and fee issues related to housing creation and make recommendations to the Board of Commissioners for potential changes. The development of affordable housing needs to take into account high risk/vulnerability areas.

Community Organizations and Programs

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

The following list highlights organizations that are active within the community and may be potential partners for implementing 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.

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

- Federal Emergency Management Agency Region X
- U.S. Fish and Wildlife Service
- U.S. Forest Service
- U.S. Coast Guard
- U.S. Department of Agriculture
- Department of Land Conservation and Development
- Oregon Department of Environmental Quality
- Oregon Department of Fish and Wildlife
- Oregon Department of Forestry
- Oregon Department of Geology and Mineral Industries

- Oregon Department of Transportation
- Division of State Lands
- Oregon Department of Parks and Recreation
- Oregon Emergency Services
- Oregon State Building Codes
- Local Fire Districts
- Local Sewer and Water Districts
- Lincoln County Emergency Management
- Lincoln County Public Works Department
- Lincoln County Department of Information Technology
- Lincoln County Department of Planning and Development
- Lincoln County Community Emergency Response Team (CERT)
- Local Utility Providers
- City Agencies
- Chamber of Commerce Office
- Insurance Companies
- Samaritan Pacific Hospital
- Oregon Coast Community College
- Central Oregon Coast Association
- Hatfield Marine Science Center
- City Community/Recreational Centers
- Lincoln County Public School District
- Lincoln County Community Health Center
- Coastal Transport Services
- Central Coast Economic Development Alliance
- Confederated Tribes of Siletz

Existing Mitigation Activities

Existing mitigation activities include current mitigation programs and activities that are being implemented by the community in an effort to reduce the community's overall risk to natural hazards. Documenting these efforts can assist participating jurisdictions in better understanding risk and can assist in documenting successes. Three County Departments are principally engaged in mitigation activities. The Lincoln County Department of Planning and Development administers the Lincoln County Comprehensive Plan and Land Use Code, the State Structural Specialty Code (Building Division), and locally administers the Department of Environmental Quality On-Site Waste Management Program. Mitigation is approached in two ways- from a regulatory standpoint and by public outreach and education. The mission of the **Lincoln County Office of**

Emergency Services is to coordinate and facilitate emergency plans, preparedness, response and recovery within the County. The Lincoln County Office of Emergency Services engages in quarterly educational programs, exercises, drills, and training, in emergency management job functions and materials and activities that promote public awareness and educate audiences about all phases of natural hazards. Their function is also to support government agencies, volunteer organizations, private sector and organizations with special needs. The **Lincoln County Department of Public Works** is responsible for most of the physical assets of Lincoln County. It is the philosophy of the department that preventative maintenance is cost effective and preferable to repair or reconstruction.

Widely applied ongoing mitigation activities are described below.

The **Lincoln County Code** contains plan policies and zoning regulations addressing the following areas: LCC Section 1.005(3) Natural hazards, LCC Section 1.0010/0015: Land Use Planning Goals and Policies, LCC Section 1.0050/0055 Natural Hazards Goals and Policies, LCC Section 1.0060/0065 Forest Land Goals and Policies, LCC Section 1.0090/0095 Coastal Shorelands Goals and Policies, LCC Section 1.0100/1015 Beaches and Dunes Goals and Policies, LCC Section 1.1375 Timber Conservation Zone, LCC Section 1.1381 Coastal Shorelands Overlay Zone, LCC Section 1.1395 Flood Hazard Overlay Zone, LCC Section 1.1925 Geologic Hazards, and LCC Section 1.1930 Beaches and Dunes. The objective of implementing development standards pursuant to the above criteria is to mitigate for activities occurring in areas subject to a variety of natural hazards. The Lincoln County Comprehensive Plan and Land Use Code can be found in Appendix E-Resource Directory. In addition, the Lincoln County Department of Planning and Development makes available and distributes to the public a manual prepared by the Oregon Department of Geology and Mineral Industries in 199 entitled "Special Paper 31 Mitigating Geologic Hazards in Oregon: A Technical Reference manual". This manual takes a multi-hazard approach and covers a wide variety of topics ranging from characterizing hazards to legal considerations. A copy of this manual is included in Appendix E- Resource Directory. Finally, The Office of Information Technology produced a Geographic Information System map identifying the location of a variety of assets such as communications, education, medical, care, and utility facilities in relation to mapped 100-year flood and the tsunami inundation zones. This map is available for review at the Lincoln County Department of Planning and Development. A copy can be found in Appendix E-Resource Directory.

The Lincoln County Office of Emergency Services, in accordance with OEM, prepared a Hazard Analysis Matrix in June 2007, (addendum May 2008) a copy of which is included in Appendix E. Lincoln County, in partnership with other local agencies and the American Red Cross, developed a booklet entitled, "Disaster Preparedness for You and Your Household- June 2007". A copy can be found on Appendix E-Resource Directory. Also, the Office of Emergency Services has developed a program with the local fishing fleet and charter boats to assist in response and recovery in the event of a natural

disaster. This is an on-going program that will continue to evolve. The Radio Auxiliary Communications Specialists (RATS) are an emergency communications unit that provides Lincoln County with a variety of unpaid professional skills, including administrative, technical and operational support for governmental communications systems. The RATS work as staff under the direct supervision of the Office of Emergency Services. The Office of Emergency Services makes regular appearances on radio broadcasts to educate and inform the public about all natural hazards potentially affecting the population and community of Lincoln County.

In addition to the above activities, Lincoln County is continuously engaged in a rigorous public awareness outreach campaign with regards to flood and coastal erosion hazards, earthquake and tsunami preparedness and annual windstorm activity. Lincoln County's website, www.co.lincoln.or.us, contains an abundance of information and links to other sites with respect to natural hazards in our coastal environment. The entire Lincoln County Code, including the Lincoln County Comprehensive Plan and Land Use Code, is accessible on the website. Special attention is paid to Flood, Earthquake and Tsunami preparedness on the Office of Emergency Services webpage. Numerous maps, explanations and evacuation routes are provided on this page.

Other current mitigation activities employed by these departments are described below.

Flood

Lincoln County Department of Planning and Development

Lincoln County administers the Comprehensive Plan and Land Use Code implementing land use regulations in compliance with ORS 197 and the Statewide Planning Goals. The County participates in the National Flood Insurance Program in accordance with FEMA requirements. Lincoln County Code Section 1.1395, Flood Hazard Overlay Zone, administers the NFIP at the local level. The purpose of the Flood Hazard Overlay Zone is to promote the public health, safety and welfare, and to minimize public and private losses due to flood conditions in specific areas, all in accordance with LCDC Statewide Planning Goal 7 and Lincoln County Comprehensive Plan Natural Hazard Policies. The zone applies to all areas within the 100-year flood boundary as identified on the Flood Boundary and Floodway Maps and the Flood Insurance Rate Maps (FIRM) as published by FEMA. The regulations are designed to reduce the risk of flood damage to new and substantially improved structures within known flood hazard areas. The County regularly distributes informational hand-outs, along with copies of LCC Section 1.1395 to the public, agencies, insurance companies, lenders, among others. The County keeps detailed records of permit activity within flood hazard areas. The County also distributes a number of FEMA generated informational hand-outs, including but not limited to "Questions and Answers on the National Flood Insurance Program", and "Protect Your Home from Flood Damage- Mitigation Ideas for Reducing Flood Losses". A

copy of the Lincoln County Comprehensive Plan and Land Use Code can be found in Appendix E: Resource Directory. Also in Appendix E is a copy of each of the informational hand-outs and permit forms and FEMA generated hand-outs referenced above.

Lower Siletz Flood Mitigation Project

Following the November 1999 flood, the County worked with Oregon Emergency Management and FEMA Region 10 to apply for and secure grant funds for flood mitigation activities. These grants may be used to fund mitigation activities that will reduce damage potential from future flood events. The first grants were secured in March 1999, with subsequent funding for further work received in both 2001 and 2002. The final grant-funded mitigation projects were completed in early 2003. Activities supported by this grant funding included the development of the Lower Siletz Flood Mitigation Plan along with mitigation activities pursuant to the plan on individual properties, primarily in the form of structure elevations. A copy of the Lower Siletz Flood Mitigation Plan and Final Report can be found in Appendix E: Resource Directory.

Digitized Flood Hazard Area Map

As part of the development of the County's Geographic Information System (LIS), the County has completed the digitizing of the Flood Insurance Rate Maps (FIRM) and the Flood Boundary and Floodway maps. This digital layer is now applied in conjunction with the County's digital tax lot layer to more readily identify individual properties and structures in relation to the mapped flood hazard area boundaries. It should be noted that this digital layer has no official status for regulatory or insurance purposes; the FIRMs are the officially adopted maps for these purposes. And, since the original source of this digital layer (the FIRMs) was produced at a large scale and low level of detail, the overlay of this information on the County's more geodetically accurate tax lot layer must be viewed as an approximation of the flood hazard area boundary. Nonetheless, this information has proven to be a very useful tool in assisting planners and property owners in generally identifying flood prone properties, and especially in identifying areas where more detailed field reconnaissance (e.g. elevation survey) is needed.

Office of Emergency Services

Lincoln County Emergency Services maintains a phone list for selected owners and residents of properties in flood hazard areas along the County's major rivers. In most cases, these contacts are for residents and owners of homes in the lowest elevation portions of the flood plain, and thus the first to be threatened in the event of a flood. When a flood event is predicted, Emergency Services makes contact with these affected homeowners and advises them of the forecasted conditions. These owners participate in a phone tree, and make additional calls within their neighborhood to advise other property owners of the probable timing and extent of flooding in their area. Throughout a flood event, Emergency Services maintains contact with these selected owners and residents as they monitor current and forecasted conditions.

Department of Public Works

Lincoln County Road Department, using the culvert inventory, annually inspects and cleans culverts on county roads. Culverts needing to be replaced are identified and targeted for replacement. Culverts during past flooding events that could not handle the flow are identified for replacement with a larger capacity culvert.

County bridges have a structural inspection performed by an outside consulting firm every two years. The Lincoln County Public Works Department visually inspects bridges every six months. During flood events crews keep a visual check on bridges for drift buildup. After a major flood, crews are dispatched to recheck bridges for flood damage.

Windstorm

Lincoln County Department of Planning and Development

The Oregon building code prescribes standards for structures which require specific design for identified wind load, with additional requirements addressing high exposure areas.

Office of Emergency Services

The Office of Emergency Services makes regular appearances on radio broadcasts to educate and inform the public about preparedness over annual windstorm activity. The department keeps weather watches and in the event of high winds or an impending storm, radio announcements are made on all local stations.

Department of Public Works

Lincoln County Public Works faces a variety of winter related storms. The primary goal is to keep the roads open for emergency vehicles. Information is passed to different crews by radio. The county has two repeater sites and can communicate with Lincom (dispatch service) as to emergency calls received. Lincoln County Road Dept. has access to the National Weather Service, which provides us with updated information.

Inter-agency agreements exist to coordinate services, manpower and equipment during major events. Managers constantly monitor weather reports during the late fall, winter and early spring seasons.

The Lincoln County Public Works Department works collaboratively with the Central Lincoln Public Utilities District to identify and remove potentially hazardous trees near utility corridors, along roads, and near vital infrastructure. This often involves working with abutting property owners. This work is scheduled through out the year in an attempt to reduce storm related events. However, in Lincoln County there are a great many trees and the problem can never be eliminated. Public Works also works collaboratively with the Lincoln County Solid Waste District in debris removal after a windstorm.

When a wind storm is forecasted, as one was in 2007, the road crew is placed on alert and assigned to different locations through out the county for quick

response. Each crew is in radio contact and notified when a hazard has occurred. Each crew carries a power saw for removal of trees that have blown over. The vehicle (pickup) is equipped with a snow plow that allows the crew to quickly push the tree off of the road. This reduces the amount of time exposed to additional trees blowing over and opens the road quickly and efficiently. Crews must evaluate each occurrence as to the possibility of down power lines and the potential for additional blow down.

Earthquake

Lincoln County Department of Planning and Development

The Oregon State Building Codes Division adopts statewide standards for building construction that are administered by the state, cities and counties throughout Oregon. The codes apply to new construction and to the alteration of, or addition to, existing structures. Within these standards are six levels of design and engineering specifications for seismic safety that are applied to areas according to the expected degree of ground motion and site conditions.

The structural code requires a site-specific seismic hazard report for critical facilities such as hospitals, fire and police stations, emergency response facilities, and special occupancy structures, such as schools and prisons. The seismic hazard report required by the structural code for essential facilities and special occupancy structures considers factors such as the seismic zone, soil characteristics including amplification and liquefaction potential, any known faults, and potential landslides. The findings of the seismic hazard report must be considered in the design of the building. The residential code incorporates prescriptive requirements for foundation reinforcement and framing connections based on the applicable seismic zone for the area.

Retrofitting of existing buildings may be required when such buildings are altered or their occupancy is changed. Requirements vary depending on the type and size of the alteration and whether there is a change in the use of the building that is considered more hazardous.

The Lincoln County Department of Planning and Development also makes available an informational hand-out entitled "Protect Your Home Against Earthquake Damage" produced by the Institute for Business and Home Safety. A copy can be found in Appendix E-Resource Directory.

Office of Emergency Services

The Office of Emergency Services works with the local community and coordinates with a variety of agencies, the business community, emergency responders, and institutions in outreach, education and exercises regarding earthquake preparedness. They also make regular appearances on radio broadcasts to educate and inform the public about earthquake preparedness.

Department of Public Works

Once an earthquake occurs, an evaluation of roadways and bridges for damages will occur. Initial damage assessment will be logged and a plan of action developed. Life-line routes (arterial routes) have been identified and

will receive priority. It is expected that inter-agency support will be critically needed. Lincoln County Public Works participates in inter-agency drills intended to improve capability to respond to events such as earthquakes.

Lincoln County bridges are inspected every two years. Bridges are inspected in accordance with National Bridge Inspection Standards (NBIS). The County uses the NBIS inspections to guide bridge maintenance work. In the event of a critical finding, emergency repair work may be initiated. Bridges found to be incapable of carrying legal loads are posted with load limits.

Geographic Information Systems (GIS) for Lincoln County has also mapped all of the critical facilities and major public buildings so that inspections of these facilities can be assigned quickly when an earthquake occurs.

Tsunami

Lincoln County Department of Planning and Development

The department maintains the latest edition of Department of Geology and Mineral Industries' tsunami inundation zone map. The Building Division administers the State Structural Specialty Code which regulates construction or alteration of certain critical facilities and structures located within the Tsunami Inundation Zone. These regulations can be found in Oregon Revised Statute 455.

Office of Emergency Services

The Office of Emergency Services works with the local community and coordinates with a variety of agencies, the business community, emergency responders, and institutions in outreach, education and exercises regarding earthquake preparedness. They also make regular appearances on radio broadcasts to educate and inform the public about tsunami preparedness.

Department of Public Works

Once a tsunami occurs, an evaluation of roadways and bridges for damages will occur. Initial damage assessment will be logged and a plan of action developed. Life-line routes (arterial routes) have been identified and will receive priority. It is expected that inter-agency support will be critically needed. Lincoln County Public Works Department participates in inter-agency drills intended to improve capability to respond to events such as a tsunami.

Lincoln County bridges are inspected for structural integrity every two years. Bridges are inspected in accordance with National Bridge Inspection Standards (NBIS). The County uses the NBIS inspections to guide bridge maintenance work. In the event of a critical finding, emergency repair work may be initiated. Bridges found to be incapable of carrying legal loads are posted with load limits.

Landslide

Lincoln County Department of Planning and Development

The department maintains maps of areas subject to geologic hazards, including landslides. These maps include Oregon Department of Geology

and Mineral Industries (DOGAMI) publications addressing the identification of areas subject to landslide hazard for Lincoln County: Environmental Geology of Lincoln County (Bulletin 81, 1973) and Evaluation of Coastal Erosion Hazard Zones in Lincoln County, Oregon (Open File Reports 0-04-01 and 0-07-01).

In addition, as part of the Lincoln County Comprehensive Plan, hazards along the developed coastal area were identified and mapped in Environmental Hazard Inventory of Coastal Lincoln County, RNKR Associates, 1978. Hazard areas may also be determined by other means including site specific geotechnical reports. Maps included in the RNKR study are part of the Lincoln County Comprehensive Plan Inventory and are available at the Department of Planning and Development.

Lincoln County addresses development in areas subject to geologic hazards in Section 1.1925 of the Lincoln County Code. This section outlines standards for development in identified landslide areas, including requirements for site specific engineering geologic reports.

In addition, the Building Division applies requirements in landslide prone areas in accordance with the State Structural Specialty Code. The Lincoln County Planning Department also provides a informational hand-out to the public entitled "Homeowner's Landslide Guide- For Hillside Flooding, Debris Flows, Erosion and Landslide Control" prepared by FEMA and OEM. A copy can be found in Appendix E-Resource Directory.

Department of Public Works

Lincoln County Public Works Department monitors areas in the county road system susceptible to landslide. Where feasible, the department will attempt to stabilize failing slopes with the use of rip rap, jersey barriers or other appropriate means. Likewise, trees within a slide area that are determined to be hazardous are removed. Once stable, hydro-seeding occurs to restart vegetation growth.

As noted, landslides usually occur during high precipitation events. Maintenance of culverts and other components of drainage systems are critical in preventing slope and road bed failures, and are monitored closely during storm events.

In the case of large landslides, such as the one that occurred on Immonen Road in the fall of 2006, the Public Works Department attempts keep the road open to vehicular traffic. If this is not possible, the department attempts to provide a detour route. Large landslides generally can not be "fixed." As they stabilize over time, the department makes repairs to the road. Large, stabilized landslides are monitored for new movement.

Coastal Erosion

Lincoln County Department of Planning and Development

Lincoln County land use regulations addresses development on lands subject to ocean erosion. Section 1.1925 of the land use code establishes requirements for

ocean front setbacks for new development designed to compensate for identified shoreline recession. In addition, Section 1.1930 establishes standards for development in beach and dune areas intended to prevent development in identified critical hazard areas and reduce adverse impacts of development on shoreline stability.

As previously noted, coastal erosion hazards are identified in Environmental Hazard Inventory of Lincoln County, RNKR Associates, 1978, and in DOGAMI Open File Reports 0-04-09 and 0-07-01. Maps included in these studies are available at the Lincoln County Department of Planning and Development.

A copy of the Environmental Hazard Inventory for coastal Lincoln County can be found in Appendix E-Resource Directory. In addition, the Building Division applies requirements in areas subject to coastal erosion in accordance with the State Structural Specialty Code.

Wildfire

Lincoln County Department of Planning and Development

Lincoln County has enacted a Comprehensive Land Use Plan and implementing land use regulations in compliance with ORS 197 and the Statewide Planning Goals. As a part of the comprehensive plan, the county has placed large portions of the county in farm and forest use zones, which serves to limit most forms of development in rural portions of the county, development that would likely increase wildfire hazard.

In addition, the county has enacted land use regulations which address fire protection for new development in both urban and rural settings, and include provisions for access, water supply, fuel breaks and similar fire safety issues.

The Lincoln County Planning Department makes available and readily distributes a manual prepared by the Oregon Department of Forestry entitled "Planning for Survival- How to protect your home from wildfire" Revised March 1988. A copy of the manual can be found in Appendix E- Resource Directory. The County is in the process of obtaining more current information available from Oregon Department of Forestry and local fire districts, which will be made available for public dissemination.

Office of Emergency Services

Lincoln County partners with other agencies in the area of wildfire management (ODF). The Oregon Department of Forestry is involved with local fire chiefs and fire departments as well as rural fire protection districts to provide training. Firefighters get a broad range of experience from exposure to wildland firefighting. Local firefighters can also obtain their red card (wildland fire training documentation), 3.1. 22 and attend extensive workshops combining elements of structural and wildland firefighting, defending homes, and operations experience. ODF has been involved with emergency managers to provide support during non-fire events as well as working with industrial partners such as timber companies to share equipment in extremely large events.

Hazard Summary

The following is a brief overview of the hazards than can impact Lincoln County. Each of the hazards is described in more detail in the Hazard Annexes of the plan.

Coastal Erosion

Coastal erosion is a natural process that continually affects the entire coast. Ocean erosion is caused by various combinations of large waves, storm surges, rip cell embayments, high winds, rain, runoff, flooding, or increased water levels and ocean conditions caused by El Nino events. Coastal erosion hazard poses a threat to structure structures and other development through the retreat of the shoreline. Coastal erosion is considered a chronic hazard, meaning it is usually local in nature, and the threats to human life and property that arise from it are generally less sever than those associated with catastrophic hazards. However, the wide distribution and frequent occurrence to chronic hazards such as coastal erosion makes them more of an immediate concern. The damage caused by coastal erosion is usually gradual and cumulative. Chronic coastal erosion has impacted development along the Lincoln County coast for decades.

Drought

Drought can be defined in several ways. The American Heritage Dictionary defines drought as a "long period with no rain, especially during a planting season". Another definition of drought is a deficiency in surface and subsurface water supplies. In socioeconomic terms, drought is present when a physical water shortage begins to affect people, individually and collectively, and the area's economy. There are no records of a severe drought in Lincoln County Drought is generally averted as a result of the County's high rainfall from moist air masses that move onto land from the Pacific Ocean, especially during winter months.

Earthquake

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 area susceptible to earthquakes from three sources: 1) the offshore 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 specific hazards associated with an earthquake include the following: ground shaking, ground shaking amplification, surface faulting, earthquake induced landslides, liquefaction, and tsunamis. The area of Oregon west of the Cascade Mountain Range is at high risk from earthquakes and their collateral damage.

Flood

The principal types of flooding that occur in Lincoln County include: 1) riverine flooding, caused mostly by prolonged, high intensity rainfall events, and 2) ocean flooding from high tides and large, wind-driven waves. The greatest period of risk for riverine and ocean flooding ranges from late fall to early spring. Riverine flooding events with significant damage potential are relatively frequent in Lincoln County; historically, floods with an estimate recurrence interval of 10 to 15 years have caused substantial property damage. Records for ocean flooding are mostly anecdotal, but the recurrence of damaging ocean floods has been less frequent than riverine floods. Other type of floods include: flash floods, shallow area floods, urban floods, and coastal floods. FEMA Flood Insurance Rate Maps (FIRMS) and the accompanying Flood Boundary and Floodway Maps are the most comprehensive resource for identifying areas subject to flood hazards in Lincoln County.

Landslide

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 pose serious risk to people and property. 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. Landslides are classified based on causal factors and conditions and exist in three basic categories: 1)falls, 2) slides, and 3) flows. Landslides accompany almost every major storm system that impacts western Oregon. Although most landslides occur in the undeveloped forested areas of the county, landslides have occurred in more developed areas.

Volcano

The Cascade Range of the Pacific Northwest has more than a dozen active volcanoes. The familiar snow-clad peaks are part of the 1,000 mile–long chain of volcanically active mountains which extends from southern British Columbia to northern California. Cascades volcanoes tend to erupt explosively and eruptions have occurred at an average rate of 1-2 per century during the last 4000 years. Future eruptions are certain. The effects of a major volcanic event can be widespread and devastating. Although there are no active volcanoes in Lincoln County, it is important for counties to know the potential impacts of nearby volcanoes. While the immediate danger area around a volcano is approximately 20 miles, ash fall problems may occur as much as 100 miles or more from a volcano's location. The closest volcanoes to Newport are the in the Three Sisters area approximately 125 miles to the east.

Wildfire

Fire is an essential part of Oregon's ecosystem, but can also pose a serious threat to life and property particularly in the state's growing rural communities. Wildfires occur in areas with large amounts of flammable

vegetation that require a suppression response. Wildfire can be divided into three categories: interface, wildland, and firestorms. Interface fires are the most likely to happen in Lincoln County. The development of a wildfire risk assessment will help prioritize areas for uses of available financial and human resources. Lincoln County is currently beginning the development of a Community Protection Plan.

Windstorms

High winds are a regular occurrence in Lincoln County, particularly in exposed coastal areas. Wind storms with destructive force are less frequent, though their pattern is fairly well know. 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 storms can be very destructive as documented by the now infamous Columbus Day Storm of October 1962. A windstorm is generally a short duration event involving straight-line winds and/or gusts in excess of 50-mph. Although windstorms can affect the entirety of Lincoln County, they are especially dangerous on developed areas with significant tree stands and major infrastructure especially above ground utility lines.

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[1] Lincoln County Planning and Development. (2007.) *Lincoln County Comprehensive Plan.*

[2] Oregon Office of Economic Analysis. *Long Term County Forecast, Lincoln County.* (2006) http://www.oea.das.state.or.us/DAS/OEA/demographic.shtml#Long_Term_County_Forecast

[3] U.S. Census Bureau. (2006) *Lincoln County Oregon Fact Sheet*

[4] Warren Cooley/Edcon. (1999) *Lincoln County Events Center Planning and Siting Study*. Retrieved from http://www.co.lincoln.or.us/study/

[5] U.S. Census Bureau. (2000) *Lincoln County: Profile of Selected Housing Characteristics*. Retrieved from http://factfinder.census.gov/servlet/QTTable?_bm=y&-geo_id=05000US41041&-qr_name=DEC_2000_SF3_U_DP4&-ds_name=DEC_2000_SF3_U&_lang=en&-_sse=on

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

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 the components that guide implementation of the identified mitigation strategies and is based on strategic planning principles. This section provides information on the process used to develop a mission, goals and action items. This section also includes an explanation of how the 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.

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

Mitigation Plan Mission

The mission of the Lincoln County Mitigation Plan is to promote public policy and mitigation activities which will enhance the safety to life and property from natural hazards. The mission statement was developed and approved at the Steering Committee meeting on November 28, 2007.

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.

- Protect life and property
- Preserve natural areas and features;

- Coordinate and enhance emergency services;
- Enhance and promote public education;
- Promote partnerships and coordination to improve implementation

The plan goals were developed and approved at the Steering Committee meeting on November 28, 2007.

Mitigation Plan Action Items

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

Figure 3.1 Action Item Sources

Source: Partnership for Disaster Resilience, 2006

The action items presented in this plan were developed by the Lincoln County Steering Committee and are derived from a variety of different sources, including stakeholder interviews, the County's risk assessment, and existing plans developed by the Oregon Partnership for Disaster Resilience

(OPDR.) The action items address the following natural hazards found in Lincoln County:

- Flood
- Wildfire
- Landslide
- Windstorm
- Earthquake
- Coastal Erosion
- Tsunami

Local information, as well as federal and state sources, was used to support each action item. The action items found in this plan were reviewed by the Lincoln County Mitigation Steering Committee at the July 22, 2007 meeting, as well as individually by steering committee members. The County has chosen not to address the volcano and drought hazards at this time; due to their very low probability of occurrence, the Committee agreed that efforts to mitigate the effects of volcano and/or drought would currently not be cost-effective. The Committee will review these hazards during semi-annual meetings, and will add actions if necessary.

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

Rationale or Key Issues Addressed

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

Ideas for Implementation

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

Implementation through Existing Programs

The Lincoln 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. Lincoln 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, Lincoln County will work to incorporate the recommended mitigation action items into existing programs and procedures.

Many of the Lincoln County multi-jurisdictional Natural Hazard Mitigation Plan's recommendations are consistent with the goals and objectives of the County's existing plans and policies. Where possible, Lincoln 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. [1] Implementing the Natural Hazard Mitigation Plan's action items through such plans and policies increases their likelihood of being supported and implemented. Plans that are able to incorporate mitigation action items include the Lincoln County Comprehensive Plan, the Lincoln County Transportation Plan, the Lincoln County Ten Year Housing Plan, Developing Residential Property in Lincoln County, and the Lincoln County Development Code. Because these plans are used on a regular basis, incorporating mitigation actions into these plans will likewise facilitate their implementation.

Coordinating Organization

The coordinating organization is the public agency with the jurisdictional authority 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.

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

Section 4: Plan Implementation and Maintenance

This section details the formal process that will ensure that the Lincoln County multi-jurisdictional Natural Hazard Mitigation Plan remains an active and relevant document. The plan implementation and maintenance process includes a schedule for monitoring and evaluating the Plan annually, as well as producing an updated plan every five years. Finally, this section describes how the County 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, the Lincoln County Department of Planning and Development submits it to the State Hazard Mitigation Officer at OEM. OEM submits the plan to FEMA. This review addresses the federal criteria outlined in the FEMA Interim Final Rule 44 CFR Part 201. Upon acceptance by FEMA, the County will adopt the plan via resolution. At that point the County will gain eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and Flood Mitigation Assistance program funds. Following County adoption, the participating jurisdictions should adopt their addendums.

Convener

Lincoln County Planning and Development and Emergency Services Department will be responsible for the implementation and maintenance of the plan. Some communities have chosen to have joint conveners from the Emergency Management and Planning Departments. The roles and responsibilities of Lincoln County Planning and Development and Emergency Services Department will include the following:

- Coordinate Steering Committee meeting dates, times, locations, agendas, and member notification;
- Document outcomes of Committee meetings;
- Serve as a communication conduit between the Steering Committee and key plan stakeholders;
- Identify emergency management-related funding sources for natural hazard mitigation projects;
- Incorporate, maintain, and update the County's natural hazard risk GIS data elements; and Utilize the Risk Assessment as a tool for prioritizing proposed natural hazard risk reduction projects.

Coordinating Body

The Steering Committee serves as the coordinating body for the mitigation plan. The roles and responsibilities of the coordinating body include:

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

Members

The following organizations were represented and served on the Steering Committee during the development of the Lincoln County multi-jurisdictional Natural Hazard Mitigation Plan:

- Lincoln County Planning and Development
- Lincoln County Office of Emergency Services
- Lincoln County Sheriff's Office
- Lincoln County Public Works
- North Lincoln Fire and Rescue
- City of Waldport
- City of Depoe Bay
- City of Yachats

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

Plan Maintenance

Plan maintenance is a critical component of the natural hazard mitigation plan. Proper maintenance of the plan ensures that this plan will maximize

the County's and city/special district's efforts to reduce the risks posed by natural hazards. This section was developed by the University of Oregon's Partnership for Disaster Resilience and includes a process to ensure that a regular review and update of the plan occurs. The Steering Committee and local staff are responsible for implementing this process, in addition to maintaining and updating the plan through a series of meetings outlined in the maintenance schedule below.

Semi-Annual Meetings

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

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

During the second meeting of the year the Committee will:

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

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

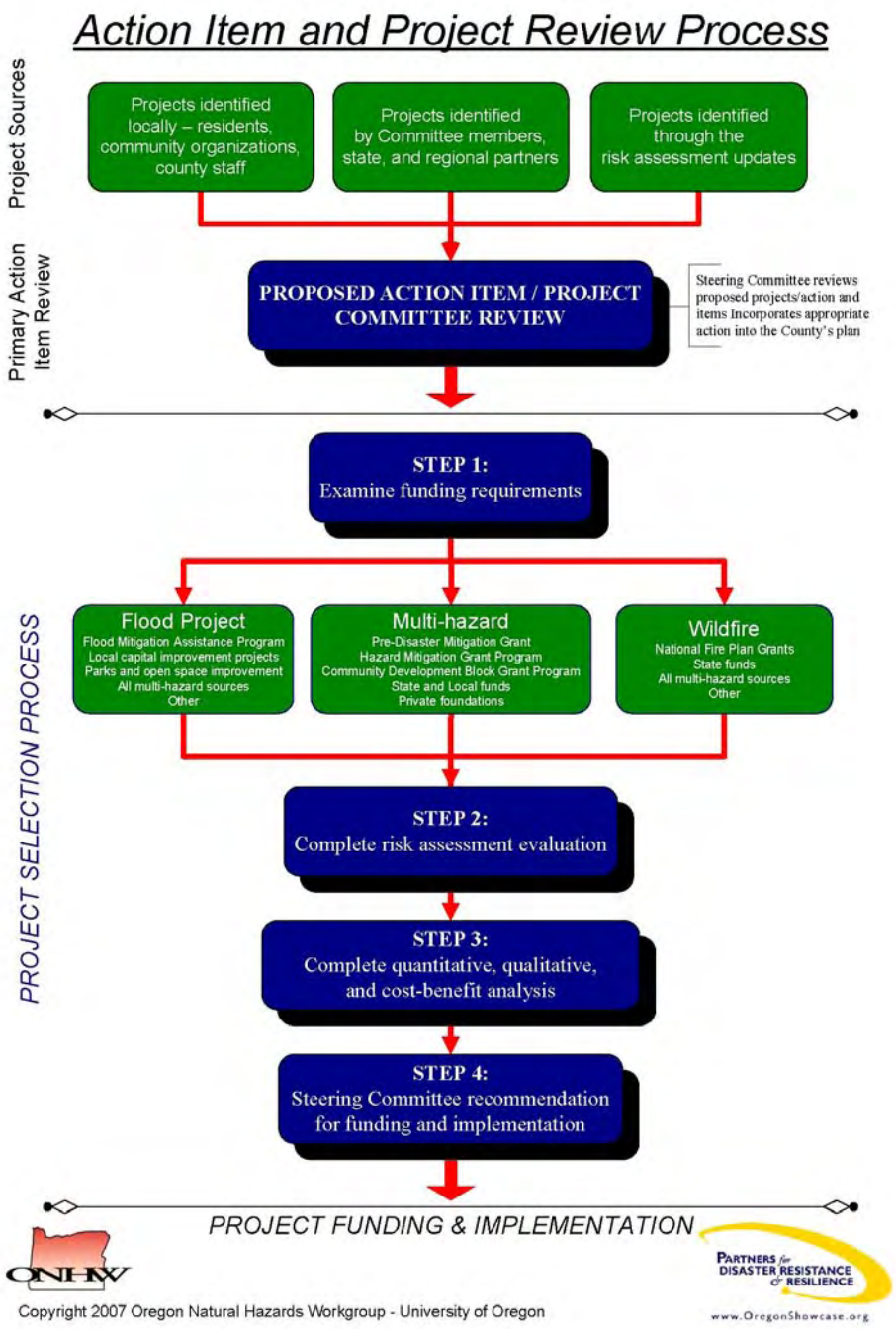
Project Prioritization Process

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

Depending on the potential project's intent and implementation methods, several funding sources may be appropriate. Examples of mitigation funding sources include, but are not limited to: FEMA's Pre-Disaster Mitigation competitive grant program (PDM), Flood Mitigation Assistance program

(FMA), National Fire Plan (NFP), Community Development Block Grants (CDBG), local general funds, and private foundations. Some of these examples are used in Figure 4.1 on the next page to illustrate the project development and prioritization process.

Figure 4.1: Project Prioritization Process



Source: Partnership for Disaster Resilience, 2006.

Step 1: Examine funding requirements

The Steering Committee will identify how best to implement individual actions within the appropriate existing plans, policies, or programs. The committee will examine the selected funding stream's requirements to ensure that the mitigation activity would be eligible through the funding source. The Committee may consult with the funding entity, Oregon Emergency Management, or other appropriate state or regional organizations about the project's eligibility.

Step 2: Complete risk assessment evaluation

The second step in prioritizing the plan's action items is to examine which hazards they are associated with and where these hazards rank in terms of community risk. The Committee will determine whether or not the plan's risk assessment supports the implementation of the mitigation activity. This determination will be based on the location of the potential activity and the proximity to known hazard areas, historic hazard occurrence, vulnerable community assets at risk, and the probability of future occurrence documented in the plan.

Step 3: Committee Recommendation

Based on the steps above, the committee will recommend whether or not the mitigation activity should be moved forward. If the committee decides to move forward with the action, the coordinating organization designated on the action item form will be responsible for taking further action and documenting success upon project completion. The Committee will convene a meeting to review the issues surrounding grant applications and to share knowledge and/or resources. This process will afford greater coordination and less competition for limited funds.

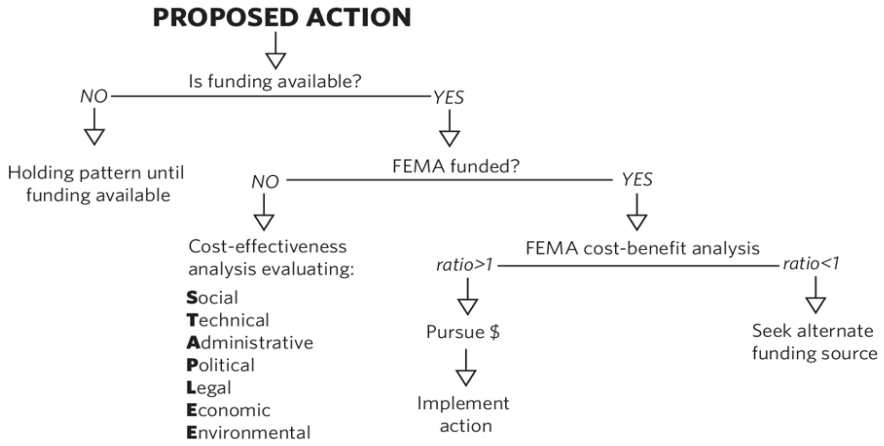
The Committee and the community's leadership have the option to implement any of the action items at any time, (regardless of the prioritized order). This allows the committee to consider mitigation strategies as new opportunities arise, such as funding for action items that may not be of the highest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

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

The third step is to identify the costs and benefits associated with natural hazard mitigation strategies, measures or projects. Two categories of analysis that are used in this step are: (1) benefit/cost analysis, and (2) cost-effectiveness analysis. Conducting benefit/cost analysis for a mitigation activity 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 method of analysis.

Figure 4.2: Benefit Cost Decision Criteria



Source: Community Service Center's Partnership for Disaster Resilience at the University of Oregon, 2006.

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

For non-federally funded or nonstructural projects, a qualitative assessment will be completed to determine the project's cost effectiveness. The committee will use a multivariable assessment technique called STAPLE/E to prioritize these actions. STAPLE/E stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental. Assessing projects based upon these seven variables can help define a project's qualitative cost effectiveness. The STAPLE/E technique has been tailored for use in natural hazard action item prioritization by the 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 Lincoln County multi-jurisdictional Natural Hazard Mitigation Plan. Although members of the

Steering Committee represent the public to some extent, the public will also have the opportunity to continue to provide feedback about the Plan.

During plan development, public participation was incorporated into every stage of the plan and development process.

To supplement information gathered from Steering Committee members, the RARE participant conducted stakeholder interviews with the following organizations in Lincoln County:

- Hatfield Marine Science Center
- Samaritan Pacific Hospital
- Oregon Department of Forestry
- Port of Newport
- Central Oregon Coast Association
- Department of Geology and Mineral Industries
- Oregon Coastal Zone Management Association
- Oregon Parks and Recreation Department
- Gleneden-Kernville Water District
- Georgia Pacific West, Inc.
- Siuslaw National Forest
- Citizen Emergency Response Team

Interviews conducted with the above organizations provided information on the extent of natural hazards found within Lincoln County, as well as information on mitigation or other emergency management planning efforts being undertaken within the County. The County's project webpage located on the Partners for Disaster Resistance and Resilience website (www.OregonShowcase.org) served as an outreach tool to the community. The webpage was used to provide local contact information and updates on the planning process. The Lincoln County Department of Planning and Development invited area residents to an open house on Thursday August 21, 2008 to hear about work involving the development of a multi-jurisdictional Natural Hazards Mitigation Plan. Staff members were available to describe the mitigation plan and process and take comments and questions. A map of the County displaying assets, critical facilities, and hazard zones and as well as the final draft of the plan were available for residents to discuss and provide feedback.

To ensure that these opportunities will continue, the County will provide an electronic copy of the mitigation plan on the County's website as well as providing a means of feedback. By making the plan available to the public, the public will have the opportunity to continue to be involved in the mitigation planning process. The County also plans on having an annual open house to advertise the plan and give the opportunity for local residents to provide feedback. The County will also make a copy of the final adopted

Plan is available at the Newport Public Library. Periodic news releases will be announced via the local newspaper and by radio broadcast regarding the availability of the Plan for public review and input. The County intends on making contact with public schools and hold seminars with local students. The Plan can also be made available for public review annually during the Lincoln County Fair and Rodeo. Future stakeholder interviews may be conducted with the following entities: American Red Cross, Oregon Department of Transportation, Oregon Department of Fish and Wildlife, Lincoln County Housing Authority, Special Road Districts, Newport News times (local newspaper), local radio stations, neighborhood associations and churches.

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

Five-Year Review of Plan

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

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

- Has the community been affected by any disasters? Did the plan accurately address the impacts of this event?

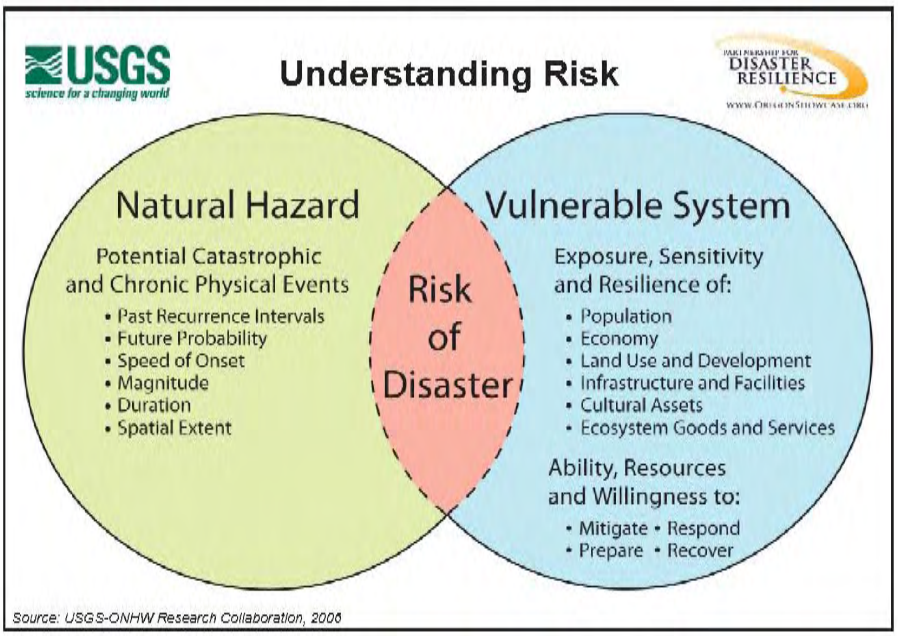
The questions above will help the Committee determine what components of the mitigation plan need updating. The Committee will be responsible for updating any deficiencies found in the plan based on the questions above.

Volume II: Hazard Annex Introduction

The foundation of the Lincoln County multijurisdictional 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 identified and profiles the location, extent, previous occurrences, and future probability of natural hazards that can impact the participating jurisdictions, as highlighted in Figure 11.1 below. The information in this section was paired with the information in Section 2 – Community Overview during the planning process in order 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



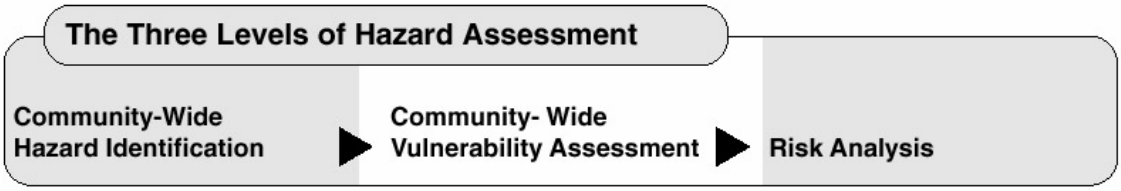
Source: USGS – The Partnership for Disaster Resilience Research Collaborative, 2006

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 Regional Risk Assessment in the State Natural Hazard Mitigation.

What is a Risk Assessment?

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

Figure 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.[1]

The second phase, vulnerability assessment, combines the information from the hazard identification with an inventory of the existing (or planned) property and population exposed to a hazard, and attempts to predict how different types of property and population groups will be affected by the hazard. This step can also assist in justifying changes to building codes or development regulations, property acquisition programs, policies concerning critical and public facilities, taxation strategies for mitigating risk, and informational programs for members of the public who are at risk.[2]

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

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

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

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

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 episodic and recurrent erosion. Shoreline retreat may be gradual over a season or many years, or it can be drastic, with the loss of substantial upland area during the course of a single storm event.

Ocean erosion is caused by various combinations of large waves, storm surges, rip cell embayments, high winds, rain, runoff, flooding, or increased water levels and ocean conditions caused by periodic El Niño events. Coastal bluffs comprised of uplifted marine terrace deposits and especially coastal dunes are vulnerable to both chronic erosion hazards.

Coastal erosion hazard poses a threat to structures and other development through the retreat of the shoreline from periodic high rates of beach, dune and bluff erosion and from mass wasting of sea cliffs in the form of landslides and slumps due to wave attack and geologic instability.

Coastal erosion is considered a chronic hazard, meaning it is usually local in nature, and the threats to human life and property that arise from it are generally less severe than those associated with catastrophic hazards. However, the wide distribution and frequent occurrence of chronic hazards such as coastal erosion makes them more of an immediate concern.

The damage caused by coastal erosion 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 in a matter of hours. The regional, oceanic and climatic environments that result in intense winter storms determine the severity of chronic erosion hazards along the Oregon coast.

History of the Hazard in Your Community

Chronic coastal erosion has impacted development along the Lincoln County coast for decades. Examples include the Jump Off Joe area in Newport, where a landslide, undermined by ocean wave attack, accelerated during the mid 1940s, carrying roads, drain pipes, and 15 houses seaward to their destruction.[1] Other examples include the severe erosion which took place on the Salishan Spit in the early 1970s, resulting in the destruction of one home under construction. Only a massive effort to armor the shoreline saved the

remaining development on the spit. In similar episodes, development on the Bayshore Spit at the mouth of Alsea Bay was threatened by rapid erosion, first in the 1985 El Nino, and again in similar conditions in the winter of 1998. Most recently, emergency shore front hardening was employed to save several homes in the Gleneden Beach area which were threatened by bluff face failure.

Risk Assessment

How are Hazard Areas Identified?

There are a variety of identifiable factors which affect shoreline stability. Dune-backed shorelines, which are most susceptible to wave attack, make up only a small portion of the Lincoln County coast. Processes of wave attack, including undercutting and wave overtopping, are the primary processes affecting shoreline stability in these areas. 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.

Coastal recession rates for Lincoln County were estimated and mapped in the Environmental Hazard Inventory of Coastal Lincoln County, RNKR Associates, 1978. More recently DOGAMI produced two publications documenting the known extent and location of coastal erosion and associated hazards: Coastal Erosion Hazard Zones for Lincoln county, Oregon (Open File Reports 0-07-01 and 0-04-01) Maps from both the RNKR and DOGAMI reports are available at the Department of Planning and Development.

Probability of Future Occurrence

Coastal erosion is a chronic hazard affecting the entire Lincoln County Coast. Although the county's Hazard Analysis did not include coastal erosion, the Lincoln County Steering Committee determined that the probability of occurrence is "high" meaning one incident is likely to occur within a 10 to 35 year period. *Note: this is not an official estimate.*

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.). The problem is historic.

There are numerous examples of buildings and infrastructure threatened or damaged by wave attack/erosion (e.g. Salishan Spit, Bayshore Spit).

Highway 101 is the major infrastructure component vulnerable to coastal erosion. In Lincoln County, much of the problem is linked to the local geology. Bedrock conditions can and do change abruptly within very short

distances. This results in an inconsistent highway foundation; some sections are more susceptible to erosion than others and require continuous maintenance. There is no practical solution outside of relocation of the highway; in most cases, this option is not financially feasible at this point in time.

The County's Hazard Analysis did not include coastal erosion. The Lincoln County Steering Committee determined that the vulnerability assessment for coastal erosion is "moderate" meaning that 1-10% of the population or region assets would likely be affected by a major emergency or disaster. *Note: this is not an official estimate.*

Community Hazard Issues

What is susceptible to damage during a hazard event?

Coastal erosion can affect utilities, transportation networks, and essential structures. Coastal erosion can cause immediate threat to life and property. Disruption of infrastructure, roads, and critical facilities may also have a long-term effect on the residents and economy of Lincoln County. If roads, lifelines, and critical facilities aren't accessible due to coastal erosion, this compounds hazard events. Highway 101 is highly susceptible to coastal erosion and in many stretches, is the only connecting road going north-south. For example, in the event of a tsunami, those injured by the initial wave may not be able to reach area hospitals due to wave induced coastal erosion which could potentially make Highway 101 impassable. Therefore, construction, repair, and inspection of transportation networked with essential structures should receive high priority.

Property and structures subject to damage consist primarily of ocean front residences and commercial uses, such as motels. The susceptibility to damage of these properties can be influenced and, in some cases, intensified by human activities. Major actions such as jetty construction and maintenance dredging can have long-term effect on large sections of the coast. This is particularly true along dune-backed and inlet-affected shorelines. The planting of European beach grass 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 of particular concern along dune-backed shorelines. Graffiti carving along bluff-backed shorelines is another byproduct of recreational use that can damage fragile shoreline stability. [2]

Existing Hazard Mitigation Activities

Lincoln County Land Use Planning

Lincoln County land use regulations addresses development on lands subject to ocean erosion. Section 1.1925 of the land use code establishes requirements for ocean front setbacks for new development designed to compensate for identified shoreline recession. In addition, Section 1.1930 establishes standards for development in beach and dune areas intended to prevent development in identified critical hazard areas and reduce adverse impacts of development on shoreline stability.

As previously noted, coastal erosion hazards are identified in Environmental Hazard Inventory of Lincoln County, RNKR Associates, 1978, and in DOGAMI Open File Reports 0-04-09 and 0-07-01. Maps included in these studies are available at the Lincoln County Department of Planning and Development.

Hazard Mitigation Action Items

Short-term Coastal Erosion Action Items

Short-term coastal erosion action items include general mitigation activities that agencies are capable of implementing during the next two years, given their existing resources and authorities.

Short Term Action Item #1: Improve knowledge of coastal erosion hazard areas and understanding of vulnerability and risk to life and property in hazard prone areas.

Ideas for Implementation

- Incorporate the results of the DOGAMI coastal erosion hazard zone mapping effort into the County Natural Hazards Mitigation Plan Risk Assessment, and the comprehensive plan inventory.
- Identify the location and extent of hazard areas and establish a factual base to support implementation of future measures.
- Analyze the risk of these areas to life, property, and infrastructure.
- Develop public information to emphasize economic risk when building on lands subject to coastal erosion.
- Coordinating Organization: Planning
- Internal Partner: GIS, Public Works, Emergency Services

- External Partner: DOGAMI, cities
- Timeline: 2 years, On-going
- Plan Goals Addressed: Education & Outreach; Partnerships; Protection.

Long-term Coastal Erosion Action Items

Long-term coastal erosion action items include general mitigation activities that are likely to take more than two years to implement and may require new or additional resources and/or authorities.

Long Term Action Item #1: Improve knowledge of effects of climate change and understanding of vulnerability and risk to life and property in hazard prone areas.

Ideas for Implementation

- Incorporate new scientific studies into the Lincoln County Natural Hazards Mitigation Plan Risk Assessment, and the comprehensive plan inventory.
- Coordinating Organization: Planning
- Internal Partner: Emergency Services, Public Works
- External Partner: DOGAMI, Cities
- Timeline: Ongoing
- Plan Goals Addressed: Protection; Education and Outreach

Long Term Action Item #2: Evaluate revising existing county coastal hazard area regulations based on the DOGAMI risk zone mapping.

Ideas for Implementation

- Use DOGAMI hazard mapping (Open File Reports 0-04-09 and 0-07-01) as well as other sources as a potential basis for new code.
- Use financial incentives or disincentives to promote development outside the identified risk areas.
- Coordinating Organization: Planning
- Internal Partner: Emergency Services, GIS, Public Works
- External Partner: DOGAMI, DLCD
- Timeline: 3 to 5 years
- Plan Goals Addressed: Protection; Natural Resources.

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[1] DOGAMI. Geologic Hazards on the Oregon Coast: Coastal Landslides. http://www.oregongeology.com/sub/earthquakes/Coastal/CoastalLandslides.htm

[2] Department of Land Conservation and Development. Coastal Hazards Alleviation Technique

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." Another definition of drought is a deficiency in surface and sub-surface water supplies. In socioeconomic terms, drought is present when a physical water shortage begins to affect people, individually and collectively, and the area's economy.

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

History of the Hazard in Lincoln County

There are no records of a severe drought in Lincoln County. Drought is generally averted as a result of the County's high rainfall from moist air masses moving onto land from Pacific Ocean, especially during winter months. Table 1 describes drought that affected the entire state of Oregon, but no recorded damages in Lincoln County could be found.

Table 1 Historic Droughts in Oregon

DATE	DESCRIPTION
1904-1905	A drought period of about 18 months throughout Oregon
1917-1931	A very dry period, punctuated by brief wet spells in 1920-21 and 1927 throughout Oregon
1939-1941	A three-year intense drought in Oregon
1976-1981	Intense drought in western Oregon; 1976-77 single driest year of century
1985-1997	Generally a dry period, capped by statewide droughts in 1992 and 1994
2000-2001	General statewide drought

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

Risk Assessment

How are Hazard Areas Identified?

Lincoln County rarely experiences drought conditions. At the time the plan was developed, no data existed to assist in identifying the location or extent of the drought hazard in Lincoln County. Typically, droughts occur as regional events and often affect more than one county. In severe droughts, environmental and economic consequences can be significant. Although Lincoln County has not experienced the effects of a severe drought, the location and extent would presumably be county-wide. In recent years, the State has addressed drought emergencies through the Oregon Drought Council. This interagency (state/federal) council meets to discuss climate outlooks, water and soil conditions, and advise the Governor as the need arises.

Probability of Future Occurrence

Droughts are not uncommon in the State of Oregon, nor are they just an "east of the mountains" phenomenon. They occur in all parts of the state, in both summer and winter. Oregon's drought history reveals many short-term and a few long-term events. The average recurrence interval for severe droughts in Oregon is somewhere between 8 and 12 years. Lincoln County's Natural Hazards Mitigation Steering Committee believes that the County's probability of experiencing a drought is "low," meaning one incident is likely within a 75 – 100 year period. The Region 1 Oregon Coast Profile and Risk Assessment, however, describes Lincoln County as having a "high" probability for experiencing a drought event. Although the latter ranking is based on a regional analysis of risk conducted by county emergency managers,[1] the Steering Committee felt that the County's probability should be much lower.

Vulnerability Assessment

Lincoln County is less vulnerable to drought impacts than most of Oregon, but droughts can still be problematic. Potential impacts to community water supplies are the greatest threat. Long-term drought periods of more than a year can impact forest conditions and set the stage for potentially destructive wildfires. Additional impacts are described in the following section, Community Hazard Issues. The Lincoln County Natural Hazards Steering Committee rated Lincoln County as having a "low" vulnerability to drought hazards, meaning less than 1% of the region's population or assets would be affected by a major emergency or disaster. This vulnerability rating is supported by the Region 1 Oregon Coast Profile and Risk Assessment.[2]

Risk Analysis

The Lincoln County Office of Emergency Management completed a hazard analysis for the county in 2007. The hazard analysis addresses the vulnerability, maximum threat, probability, and history for each natural hazard and attributes a final hazard analysis score. The scores range from 20

to 240, and are only meant to evaluate risk based on past information and to assist future mitigation and emergency management planning efforts. The Lincoln County hazard analysis score for drought is 105, meaning drought has a score of 70 for probability, 5 for vulnerability, 10 for maximum threat, and 20 for frequent history. [3] Estimations for losses of life and property are not available at this time.

Community Hazard Issues

What is susceptible to damage during a hazard event?

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

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

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

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

More information on the drought hazard can be found in the Drought chapter of the State of Oregon's Natural Hazards Mitigation Plan.

Existing Hazard Mitigation Activities

None

Hazard Mitigation Action Items

None. There is no significant risk of drought in Lincoln County.

[1] Oregon Emergency Management. (2003) *County Hazard Analysis Scores*.

[2] Oregon Emergency Management, July 2003, County Hazard Analysis Scores

[3] Lincoln County Emergency Management. (2007) *Hazard Analysis Matrix*.

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), shown in Figure 2. 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

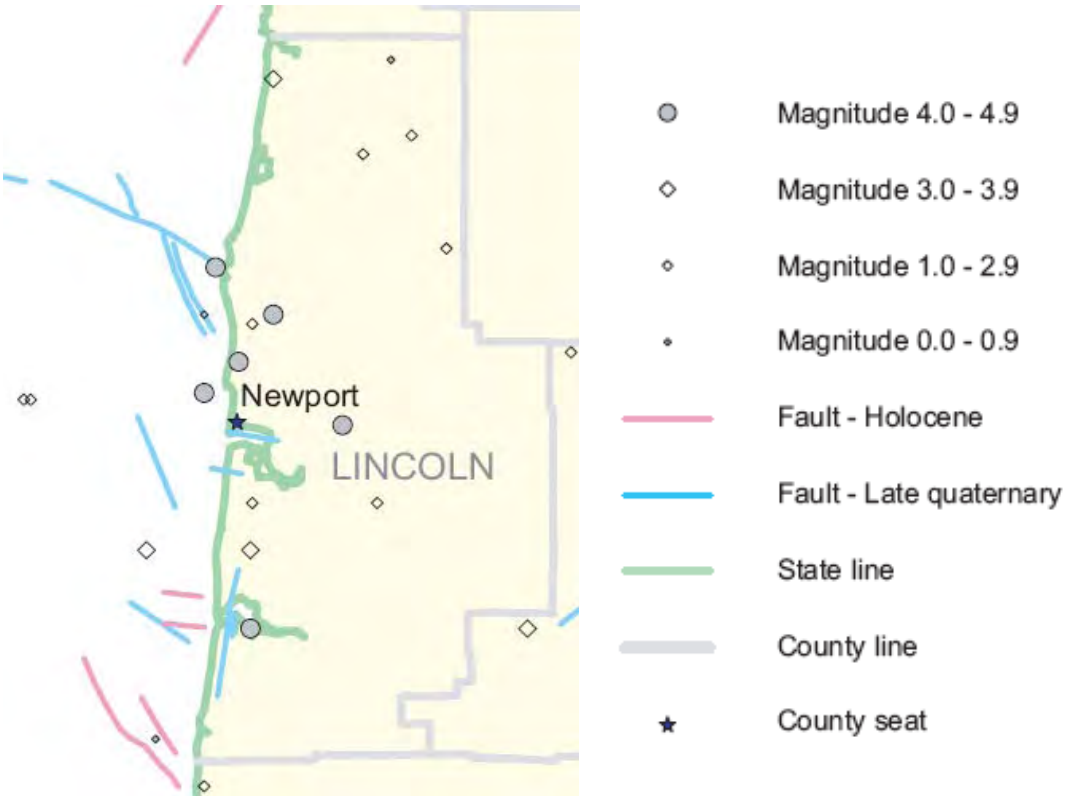
Tsunamis are another secondary earthquake hazard created by events occurring under the ocean. A tsunami, often incorrectly referred to a "tidal wave," is a series of gravity-induced waves that can travel great distances from the earthquake's origin and can cause serious flooding and damage to coastal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

The severity of damage caused by 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 Lincoln County

The area of Oregon west of the Cascade Mountain Range is at high risk from earthquakes and their collateral damage. Risk is ultimately dependant upon location of the epicenter, soil conditions, and building construction.

Figure 1 Map of Selected Earthquakes for Lincoln County, 1841 through 2002



http://www.oregongeology.com/sub/earthquakes/images/EpicenterMap.pdf

The earthquakes shown in Figure 1 are relatively insignificant. They were felt by a number of citizens but little to no structural/property damage resulted. There is no historic record of significant crustal earthquakes centered in the region in the past 153 years, although Oregon has experienced crustal earthquakes that originated outside the region. The geologic record shows that movement has occurred along numerous offshore faults as well as some onshore faults. The faulting has occurred over the past 20,000 years.

The Scotts-Mill Earthquake, which occurred 54 miles south of Portland on March 25, 1993, is largely considered Oregon's most significant earthquake in written history, and was felt as far away as Newport. It had a magnitude of 5.7 and caused widespread, though generally minor, damage in the central and northern Willamette Valley. The damage estimate for this quake was 28.4 million dollars. The Klamath Falls earthquakes on September 21, 1993, caused two deaths and approximately 7.5 million dollars in damage. One person was killed when the car he was driving was crushed by a boulder in an earthquake-induced rock fall, and another person died of a heart attack. More than 1,000 homes and commercial buildings were damaged. [1]

More recently there have been a number of earthquakes off of the Lincoln County coast. In 2003 there was a magnitude 6.3 earthquake along the Blanco Fracture Zone, one of several seismically active transform faults off the coast of Oregon. In July of 2004 there was a magnitude 4.9 earthquake located 19 miles west of Yachats. Within a 3 week period in April of 2008, there were more than 600 tremors, three of which were magnitude 5 or higher. [2]

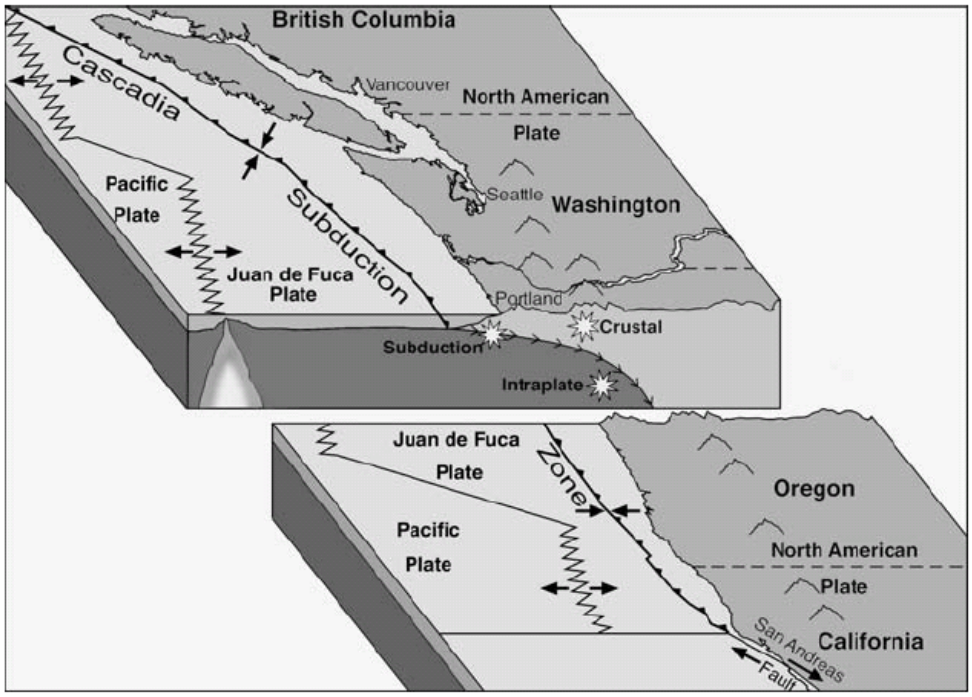
The last known great earthquake to hit the Lincoln County area was in January of 1700. This CSZ event also produced a tsunami which is discussed in the Tsunami chapter.

Risk Assessment

How are Hazard Areas Identified?

Until recently, earthquakes were thought to pose little risk to Oregon and its residents. Through geologic investigation and more recent earthquake events, this perception has changed drastically. The Cascadia Subduction Zone (illustrated in Figure 2 below) presents the potential for an earthquake of magnitude 9.0 or higher. This presents 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

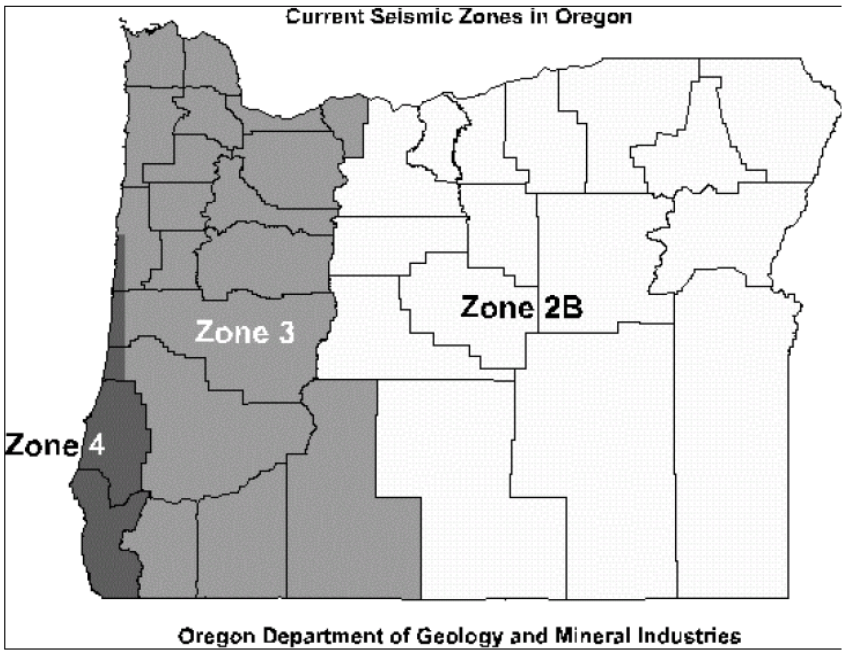


Source: Shoreland Solutions. Chronic Coastal Natural Hazards Model Overlay Zone. Salem, OR: Oregon Department of Land Conservation and Development (1998) Technical Guide-3.

In recent years the Department of Geology and Mineral Industries (DOGAMI), in partnership with other state and federal agencies, has commenced a program to identify seismic hazards and risks. A number of studies have recently been published. Among other data, DOGAMI has created maps that identify areas in selected Oregon communities that will suffer more damage, relative to other areas, during a damaging earthquake.

As previously noted, coastal areas are subject to significant subduction type seismic activity. For structural code purposes, the northern coast is currently designated as Seismic Zone 3, while the coast from Otter Rock (just north of Newport) to the southern border of the state is designated as Seismic Zone 4, as shown in Figure 3. These are the two highest risk zones addressed by building codes. The codes contain provisions for the design and construction of buildings to resist lateral loads from earthquakes, including prescriptive requirements for foundation reinforcement and framing connections based on the applicable seismic zone for the area.

Figure 3 Current Seismic Zones in Oregon



Probability of Future Occurrence

It is difficult to estimate recurrence intervals from available data. Paleoseismic studies along the Oregon coast indicate that the state has experienced seven Cascadia Subduction Zone (CSZ) events possibly as large as magnitude 9 in the last 3500 years. These events are estimated to have an average recurrence interval between 500 and 600 years, although the time interval between individual events has ranged from 150 to 1000 years.[3] Scientists estimate the chance in the next 50 years of a great subduction zone earthquake is between 10 and 20 percent, assuming that the recurrence is on the order of 400 ± 200 years.[4] The last CSZ event occurred slightly more than 300 years ago. Lincoln County's probability of future earthquakes is ranked as high, meaning one incident is likely within a 10-35 year period.[5] This ranking is based primarily on the County's proximity to the CSZ.

Vulnerability Assessment

The effects of earthquakes cover an expansive area. Any structures, residences, infrastructure, and other community assets within the seismic area are vulnerable. Due to the more recent discovery of Oregon's seismic risk, many structures have not been built to withstand the impending earthquake. In a subduction zone quake, unreinforced masonry buildings, which are numerous in Lincoln County, are especially vulnerable. Areas of high liquefaction potential largely follow river and stream drainage channels, marshy areas, areas near lakes, and along the coast. In addition, areas that have been filled or graded are highly vulnerable to liquefaction. The land around the Hatfield Marine Science Center and the surrounding facilities is an example of an area that would be highly susceptible to liquefaction during

a large scale seismic event. Lincoln County vulnerability to earthquakes is ranked as "moderate." [6]

Table 2 projected dollar losses based on a M8.5 subduction event and a 500 year model for Lincoln County

Economic base in thousands	Greatest absolute loss in thousands (1999) from an M8.5 CSZ event	Greatest absolute loss in thousands (1999 from a 5000 year model
$2,668,000	$624,000	$793,000

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

Risk Analysis

Recent research suggests that the Cascadia Subduction Zone is capable of producing magnitude 9 earthquakes. Projected losses in the Cascadia region alone could exceed $12 billion with over 30,000 destroyed buildings and 8,000 lives lost in the event of a magnitude 8.5 Cascadia Subduction Zone earthquake.

Table 2 presents damage figures for Lincoln County for both an 8.5 Cascadia subduction zone event and a 500-year event. It should be noted that the figures have a high degree of uncertainty and should be used only for general planning purposes.

Table 2 Estimated losses associated with a M8.5 subduction event and a 500 year model

	8.5 Cascadia Subduction event	500-Year model
Injuries	358	436
Deaths	7	9
Displaced Households	592	847
Operational the Day after the Quake		
Fire Stations	26%	N/A
Police Stations	22%	N/A
Schools	19%	N/A
Bridges	51%	N/A
Economic losses to		
Highways	$16 mil	$22 mil
Airports	$9 mil	$12 mil
Communications	$9 mil	$10 mil
Debris generated (thousands of tons)	446	525
Total economic loss in thousands	$624,000	$793,000

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

Community Hazard Issues

What is susceptible to damage during a hazard event?

Earthquake damage occurs because structures cannot withstand severe shaking or the secondary effects of earthquakes. Buildings, airports, schools, essential structures, roads, bridges, and gas and water lines suffer damage in earthquakes and can cause death or injury to humans. Addressing the structural integrity and resilience of buildings, critical facilities, and infrastructure in order to understand the potential costs to government, businesses, and individuals as a result of an earthquake, are challenges faced by Lincoln County.

Buildings

Unreinforced buildings can collapse and trap people, putting lives at risk and creating costs to clean up the damages. There have been recent changes in the state building code to address seismic safety: In 2007, for example, all of Lincoln County was updated to seismic zone D2 which requires an increase in construction standards. Structures built after the late 1960s in the Northwest use earthquake resistant designs and construction techniques. However, many buildings have been built before these building code updates. Generally the older the building, the more susceptible it is to damage from an earthquake. Table 3 shows a list of construction dates for structures built in Lincoln County.

Table 3 Housing Characteristics

YEAR STRUCTURE BUILT	Number	Percent
Built 1999 to March 2000	670	2.5
Built 1995 to 1998	2,986	11.1
Built 1990 to 1994	3,107	11.6
Built 1980 to 1989	3,972	14.8
Built 1970 to 1979	5,945	22.1
Built 1960 to 1969	3,336	12.4
Built 1950 to 1959	2,416	9
Built 1940 to 1949	1,889	7
Built 1939 or earlier	2,568	9.6
Median	1975	(X)

U.S. Census Bureau

Infrastructure and Communication

Residents in Lincoln County rely mostly on main highways to travel and commute from community to community. Highways are also needed for emergency service vehicles, access to hospitals, and incoming supplies. An earthquake can greatly damage bridges and roads, hampering or preventing the movement of people and goods. Bridges can be especially susceptible, as even modern bridges can sustain damage during earthquakes, leaving them impassable. Water lines are often attached to bridges and can also fail in the event of excess shaking. Figures 7-10 show examples of bridges, among many

others in Lincoln County, that could be susceptible to damage from seismic activity.

7.Depoe Bay Bridge

1927 and 1940, MP 127.61. A reinforced concrete deck arch located at the mouth of Depoe Bay, the world's smallest bay. A stairway on the bayside and a walkway at the north end provide an opportunity to look under the bridge. Listed on the National Register.

8.Rocky Creek Bridge

1927,MP 130.03. The bridge spans a small gorge on Otter Crest, a bypassed section of the original US 101 alignment. It is also known as the Ben Jones Bridge, for the "Father of the Coast Highway." Jones introduced legislation for construction of the Roosevelt Military Highway (the original name for the Oregon Coast Highway) in 1919 and convinced the federal government to finance half its cost. Listed on the National Register.

9.Yaquina Bay Bridge

1936, MP 141.68. This bridge, located in Newport, has a combination of both steel and concrete arches. The main span of the 3,223-foot structure is a 600-foot steel through arch flanked by two 350-foot steel deck arches. There are five reinforced concrete deck arch secondary spans on the south end. Each end has a pedestrian plaza with elaborate stairways leading to observation areas. Listed on the National Register.

10.New Alsea Bay Bridge

1991, MP 155.54. Begun in 1988, this visually stunning bridge was designed with bold Y-shaped piers and a towering steel arch at its center to preserve the memory of the 1936 multiple arch reinforced concrete bridge that it replaced. An interpretive center, located at the south end of the bridge, documents the old bridge and features the life and work of Conde B. McCullough. Designed by Howard Needles Tammen and Bergendoff with State Bridge Engineer Walter Hart.

Oregon Department of Transportation
(http://www.oregon.gov/ODOT/HWY/BRIDGE/docs/SpanningOregonsCoast/newest_spanning_brochure.pdf)

Bridges are a vital transportation link – with even minor damages making some areas inaccessible. In the event that bridges become impassible, alternate transportation routes/means would need to be identified and utilized.

Damage to Lifelines

Ground shaking and amplification can cause pipes to break, power lines to fall, roads and railways to crack or move, and radio and telephone communication to cease. Disruption to transportation makes it especially difficult to bring in supplies or services in an emergency situation. It is important that the services of critical facilities (hospitals, police stations, fire stations) remain operational during and after an earthquake.

Existing Hazard Mitigation Activities

Individual Preparedness

At an individual level, preparedness for an earthquake is minimal as perception and awareness of earthquake hazards are low. Strapping down

heavy furniture, water heaters and expensive personal property as well as having earthquake insurance are steps toward earthquake mitigation.

Local Programs

City and county building officials enforce building codes for new construction and can coordinate inspection activities in the event of an earthquake. Lincoln County GIS department has also mapped critical facilities and major public buildings so that inspections of these facilities can be assigned quickly when an earthquake occurs.

State Building Codes

The Oregon State Building Codes Division adopts statewide standards for building construction that are administered by the state, cities and counties throughout Oregon. The codes apply to new construction and to the alteration of, or addition to, existing structures. Within these standards are six levels of design and engineering specifications for seismic safety that are applied to areas according to the expected degree of ground motion and site conditions. The structural code requires a site-specific seismic hazard report for critical facilities such as hospitals, fire and police stations, emergency response facilities, and special occupancy structures, such as schools and prisons. The seismic hazard report required by the structural code for essential facilities and special occupancy structures considers factors such as the seismic zone, soil characteristics including amplification and liquefaction potential, any known faults, and potential landslides. The findings of the seismic hazard report must be considered in the design of the building. The residential code incorporates prescriptive requirements for foundation reinforcement and framing connections based on the applicable seismic zone for the area.

Retrofitting of existing buildings may be required when such buildings are altered or their occupancy is changed. Requirements vary depending on the type and size of the alteration and whether there is a change in the use of the building that is considered more hazardous.

Lincoln County Public Works

Once an earthquake occurs, an evaluation of roadways and bridges for damages will occur. Initial damage assessment will be logged and a plan of action developed. Life-line routes (arterial routes) have been identified and will receive priority. It is expected that inter-agency support will be critically needed. Lincoln County Public Works participates in inter-agency drills intended to improve capability to respond to events such as earthquakes.

Lincoln County bridges are inspected every two years. Bridges are inspected in accordance with National Bridge Inspection Standards (NBIS). The County uses the NBIS inspections to guide bridge maintenance work. In the event of a critical finding, emergency repair work may be initiated. Bridges found to be incapable of carrying legal loads are posted with load limits.

Hazard Mitigation Action Items

Short-term Earthquake Action Items

Short-term earthquake action items include general mitigation activities that agencies are capable of implementing during the next two years, given their existing resources and authorities.

Short Term Action Item #1: **Integrate new earthquake hazard mapping data for Lincoln County and improve technical analysis of earthquake hazards.**

Ideas for Implementation

- Update Lincoln County earthquake HAZUS data using more localized data; and
- Conduct risk analysis incorporating HAZUS data and hazard maps, using GIS technology to identify risk sites and further assist in prioritizing mitigation activities.
- Coordinating Organization: GIS
- Internal Partners: Public Works, Planning, Emergency Services, GIS
- External Partners: OSU, USGS, BLM, MWVCOG, OEM, FEMA, DOGAMI
- Timeline: 2 years
- Plan Goals Addressed: Education & Outreach; Partnerships; Protection; Natural Resources

Short Term Action Item #2: **Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices.**

Ideas for Implementation

- Provide information to government building and school facility managers and teachers on securing bookcases, filing cabinets, light fixtures, and other objects that can cause injuries and block exits;
- Encourage facility managers, business owners, and teachers to refer to FEMA.s practical guidebook, *Reducing the Risks of Nonstructural Earthquake Damage*;
- Encourage homeowners and renters to use *Is Your Home Protected from Earthquake Disaster? A Homeowner's Guide to Earthquake Retrofit* (IBHS) for economic and efficient mitigation techniques;
- Work with local building supply outlets to feature checklists/retrofit kits for reducing nonstructural risk;
- Explore partnerships to provide retrofitting classes for homeowners, renters, building professionals, and contractors;
- Coordinating Organization: Emergency Services

- Internal Partners: Building, Planning, Risk Management
- External Partners: City building officials, school districts, builders associations, IBHS, Red Cross, DOGAMI, Lincoln Fire, FEMA, OEM
- Timeline: 1 to 2 years, on-going
- Plan Goals Addressed: Emergency Operations; Protection; Natural Resources; Implementation

Short Term Action Item #3: **Encourage purchase of earthquake hazard insurance by forming partnerships with the insurance and real estate industries.**

Ideas for Implementation

- Provide earthquake insurance information to Lincoln County residents;
- Coordinate with insurance companies and organizations such as the Insurance Information Service of Oregon and Idaho (IISOI) to produce and distribute earthquake insurance information;
- Make contacts with insurance industry representatives to keep current about their requirements, rates, and plans; and
- Coordinating Organization: Emergency Services
- External Partners: local insurance agencies, insurance and real estate industries, DOGAMI
- Timeline: On-going
- Plan Goals Addressed: Education & Outreach; Protection; Natural Resources

Long-term Earthquake Action Items

Long-term earthquake action items include general mitigation activities that are likely to take more than two years to implement and may require new or additional resources and/or authorities.

Long Term Action Item #1: **Promote and continue building code standards.**

Ideas for Implementation

- Continue building code education, promotion, and utilization to ensure earthquake resistant new construction.
- Coordinating Organization: Planning and Development
- Internal Partner: Emergency Services
- External Partners: builders, developers, property owners
- Timeline: On-going

- Plan Goals Addressed: Education & Outreach; Protection; Natural Resources

Long Term Action Item #2: **Encourage seismic strength evaluations of critical facilities to identify vulnerabilities and to meet current seismic standards.**

Ideas for Implementation

- Develop an inventory of schools, universities, and critical facilities that do not meet current seismic standards;
- Retrofit older public buildings to bring them up to current earthquake standards.
- Encourage owners of non-retrofitted reservoirs to upgrade them to meet seismic standards; and
- Encourage all water providers to replace all old cast iron pipes with more ductile iron, and identify partnership opportunities with other agencies for pipe replacement.
- Coordinating Organization: Emergency Services
- Internal Partners: Planning, Building
- External Partners: City planning departments; water service providers; OAWU; school districts, hospitals, ODOT, colleges and universities; architects, Oregon Building Codes Division,
- Timeline: On-going
- Plan Goals Addressed: Emergency Operations; Education & Outreach; Partnerships; Protection;
- Implementation

Long Term Action Item #3: **Identify funding sources for and implement high priority structural and nonstructural retrofits of structures that are identified as seismically vulnerable.**

Lack of capital to upgrade structures is a major reason why many public and privately owned buildings and bridges are not retrofitted to stricter seismic standards.

Ideas for Implementation

- Evaluate grant and foundations that support earthquake mitigation activities;
- Provide information for property owners, small businesses, and organizations on sources of funds (loans, grants, etc.);
- Explore options for including seismic retrofitting in existing programs such as low-income housing, insurance reimbursements, and pre- and post-disaster repairs; and
- Coordinating Organization: Emergency Services
- Internal Partner: Planning and Development

- External Partners: local banks, credit unions, Rural Development (USDA), OECDD; FEMA, OEM
- Timeline: On-going
- Plan Goals Addressed: Education & Outreach; Partnerships.

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[1] USGS, Earthquake Hazards Program, Historic Earthquakes http://earthquake.usgs.gov/regional/states/historical.php?

[2] Milstein, Michael, The Oregonian, Earthquakes continue off Oregon Coast: April 14, 2008. http://blog.oregonlive.com/breakingnews/2008/04/quakes_continue_off_oregon_coa.html

[3] University of Oregon's Community Service Center, 2007. Region 1: Oregon Coast: Profile and Risk Assessment.

[4] DOGAMI. Spring 2002. Geologic Hazards on the Oregon Coast: Earthquakes and tsunamis documented at southern Oregon coast. http://www.oregongeology.com/sub/earthquakes/Coastal/OrGeoEqNTsu.htm

[5] Oregon Emergency Management, July 2003, County Hazard Analysis Scores

[6] Oregon Emergency Management, July 2003, County Hazard Analysis Scores

Volume II: Hazard Annex
Flood

Causes and Characteristics of the Hazard

The principal types of flooding that occur in Lincoln County include: (1) riverine flooding, caused mostly by prolonged, high intensity rainfall events, and (2) ocean flooding from high tides and large, wind-driven waves. The greatest period of risk for both riverine and ocean flooding ranges from late fall to early spring. Riverine flooding events with significant damage potential are relatively frequent; historically, floods with an estimated recurrence interval of 10 to 15 years have caused substantial property damage. Records for ocean flooding are mostly anecdotal, but the recurrence of damaging ocean floods has been less frequent than riverine floods.

Riverine floods

Riverine floods occur when water levels in rivers and streams overflow their banks. In Lincoln County, riverine flooding occurs primarily on lands in the five major river valleys (Salmon, Siletz, Yaquina, Alsea, and the Yachats River) and along the larger tributaries. Most communities located along such water bodies have the potential to experience this type of flooding after spring rains, heavy thunderstorms or rapid runoff from snow melt. Riverine floods can be slow or fast-rising, but usually develop over a period of days.

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

Flash floods

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

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

Shallow area floods

These floods are a special type of riverine flooding. FEMA defines a shallow area flood hazard as an area that is inundated by a 100-year flood with a

flood depth between one and 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.

History of the Hazard in Your Community

Table 1. Lincoln County Flood History

Date	Location	Comments
February 1890	All coastal rivers	Highest (estimated) level Alsea River
February 1907	Western Oregon	Estimated levels; no gauge records
November 1921	All coastal rivers	Highest (estimated) level on the Siletz River
December 1964-January 1965	Pacific Northwest	Rain on snow; record flood on many Oregon rivers. Highest measured level on the Alsea River
January 1972	Western Oregon	Severe flooding; some river levels approached 1964
January 1974	Western Oregon and John Day	$65 million in damages statewide, moderate damage in Lincoln County
November-December 1977	Western Oregon	Rain on snow even; $16.5 million in damages statewide
January 1980	North coast	Moderate damage
February 1996	Nearly Statewide	Widespread damage statewide and in Lincoln County; flood did not reach 100 year levels in Lincoln County
December 1998	North Coast	Similar levels in 1996; significant damage
November 1999	Primarily Salmon River and Siletz River	Highest measure level on the Siletz River, exceeding 1964
November 2006	Siletz, Salmon, and Alsea Rivers	Moderate damage

Risk Assessment

How are Hazard Areas Identified?

FEMA Flood Insurance Rate Maps (FIRMs) and the accompanying Flood Boundary and Floodway maps are the most comprehensive resource for identifying areas subject to flood hazards in Lincoln County. FIRMs and Floodway maps delineate the boundaries of areas subject to inundation by the "base flood." The base flood is defined as an event having a 100-year recurrence interval or a 1% probability of occurring in any year. The maps also provide, in areas of detailed study, projected water surface elevations for the base flood. In general, based on experience with the flood events of the past two decades, Lincoln County's FIRM maps have proven to be fairly accurate in depicting areas subject to riverine flooding. There have been no large magnitude ocean flooding events since the FIRMs were issued in 1980, so the accuracy of the maps in relation to ocean flooding is largely untested.

Probability of Future Occurrence

Lincoln County has a "high" probability of future flooding.[1] This ranking indicates that at least one incident is likely within a 10 to 35 year period. As can be seen from the recent history of flood events in the county, riverine floods with recurrence intervals of 10-15 years, can be expected to result in moderate to substantial property damage.

Recent research has documented a pattern of climate variability in the Northern Pacific known as the Pacific Decadal Oscillation (PDO.) The PDO is a long-lived pattern of climate variability with alternating warm/dray-cool/wet cycles, which persist for 20-30 years. The predictability for this climate oscillation is not currently known but it is suggested that the riverine floods associated with high intensity precipitation events may tend to "cluster" in the decades of the cool/wet cycle of the PDO. [2]

Although ocean storms can be expected every year, property damage associated with ocean flooding is rare in Lincoln County.

El Niño effects, which tend to raise ocean levels and produce higher intensity storms, occur about every three to five years.[3] V zones (wave velocity zones,) depicted on FEMA's Flood Insurance Rate Maps, are areas subject to 100-year flood events (i.e., 1% chance in any given year). The Flood Insurance Rate Maps also show areas vulnerable to sheet-flow from waves over-topping dunes (AO and AH zones).

Vulnerability Assessment

Lincoln County is considered "moderately" vulnerable to floods, meaning 1-10% of the population is likely to be affected by a flood event.[4]

Low-lying areas along the lower portions of the County's major rivers (Salmon, Siletz, Yaquina, Alsea, Yachats) and larger tributaries are the areas most vulnerable to flood hazards. Here, riverine flooding can be exacerbated by high tides. Also, along the lower portions of the Salmon, Siletz and Alsea Rivers, rural subdivisions and substantial recreational and second home development took place in the 1960s and 1970s, (before Lincoln County entered the National Flood Insurance Program and implemented a system of flood hazard area regulation.) As a result, there are numerous structures located in flood hazard areas along these rivers that are classified as 'pre-FIRM", meaning their construction predates requirements to elevate above the base flood level, and are therefore subject to damage during larger flood events. The county has worked actively, mostly along the Siletz River (Lower Siletz Mitigation Project,) to assist property owners in retrofitting many of these pre-FIRM residences to meet current elevation requirements. This project has been a success for both homeowners and the government agencies that assisted. Having these homes elevated and out of harm's way will certainly reduce the amount of property losses as well as insurance payments in the future.[5] There are still, however, substantial numbers of structures in harm's way in these areas.

Also, some areas along major rivers, highways and roads, in particular Highway 229 along the lower Siletz River, are subject to inundation and damage by flood waters. Highway 229 was flooded and therefore closed as recently as November 2006.

In general, the following are subject to damage by riverine flooding:

- Pre-FIRM residential structures, especially repetitive loss structures/properties as shown in Table 2.
- Manufactured homes inside manufactured home parks
- Roads and highways

The primary economic activities at risk from riverine flood events include:

- RV park and campground operations
- Other businesses that rely on road and highway transportation corridors that may be interrupted by flooding.

There are no known critical facilities located within identified flood hazard areas in Lincoln County.

Coastal developments within FEMA-designated Velocity (V) zones and A-O zones include the Bayshore development on Alsea spit and the Salishan development on the Siletz spit. The majority of residences in both developments are post-FIRM, meaning that they are built in compliance with current flood hazard area regulations. There has been no record of significant damage from flooding in either of these areas.

Table 2 lists details regarding all repetitive flood loss properties in Lincoln County. These are the homes and properties that have been damaged more than once by floods.

Table 2. Lincoln County Repetitive Loss Properties

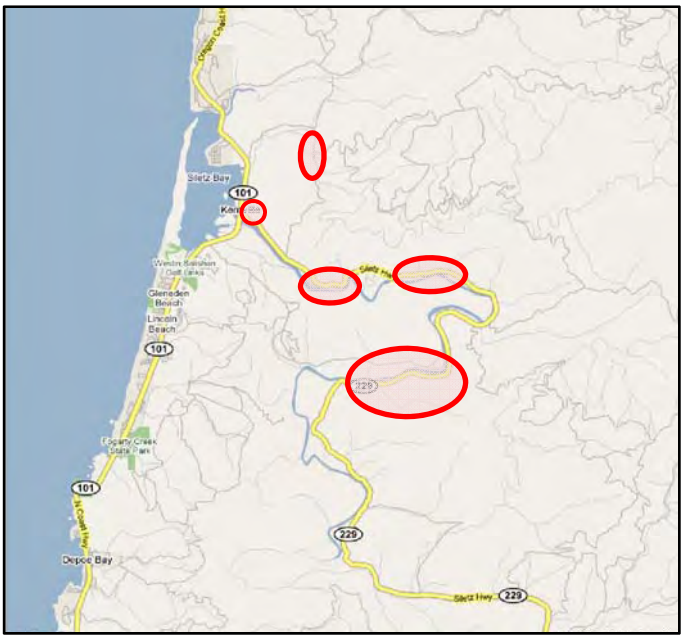
Community Name	Building Payments	Contents Payments	Total Payments	Average Payment	Losses	Properties
Lincoln City, City Of	399,789.89	101,493.48	501,283.37	29,487.26	17	6
Lincoln County *	1,233,557.73	341,306.27	1,574,864.00	15,748.64	100	44
Waldport, City Of	23,985.74	0.00	23,985.74	11,992.87	2	1
Yachats, City Of	5,952.54	0.00	5,952.54	2,976.27	2	1

Source: Department of Land Conservation and Development

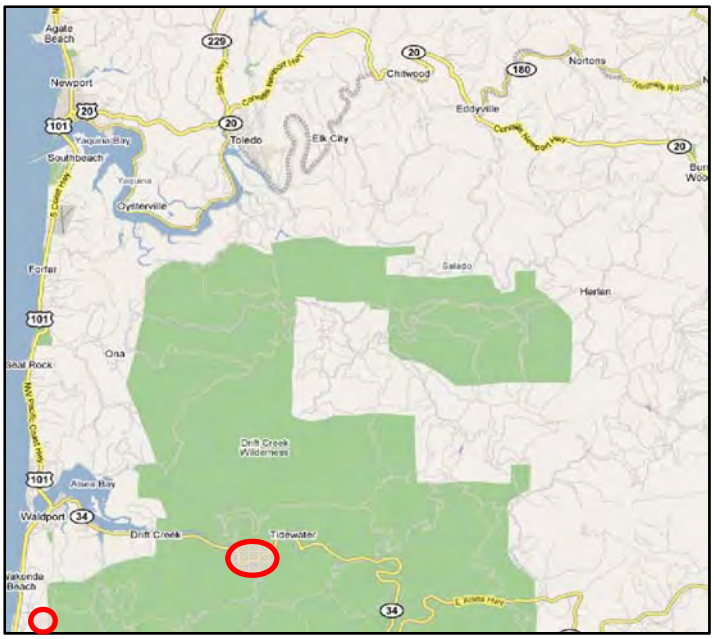
Of the 52 repetitive loss properties, 22 were insured. None of the properties have been mitigated. The following map shows the general areas in each community where repetitive loss properties are located.

Repetitive Loss Properties (General Location)

Lincoln County



Lincoln County & Waldport



Yachats

Lincoln City

Lincoln County has conducted a general inventory for the purposes of estimating the number of buildings that are vulnerable to damage from either riverine or ocean flooding. Based on this inventory it is estimated that there a total of 5,830 structures located within regulated (1% recurrence probability) flood hazard areas. This estimated was arrived at by performing a manual count of visible structures within FEMA mapped flood hazard zones using aerial photography from July, 2007. It should be noted that this count identifies all structures, including garages, sheds, barns and similar buildings, in addition to residences and public and commercial buildings.

Table 3 summarizes flood insurance policy coverage and claims information for Lincoln County and its incorporated cities. As can be seen from this data, the number of flood insurance policies in effect is far lower than the number of buildings present in regulated flood hazard areas. Though many improved properties may include more than one structure, it is still apparent that there are many structures located in flood hazard areas that are not covered by flood insurance. The bulk of these uncovered structures are located in the unincorporated portions of the County. Claims history also indicates that flood hazard areas in the unincorporated county are those with the greatest exposure to flood damage.

Table 3. NFIP Coverage, Policies and Claims in Lincoln County

Community Name	Number of Policies	Total Coverage	Total Claims Paid Since 1978	Total Paid Since 1978
Depoe Bay	141	$31,302,300	2	$5,222
Lincoln City	725	$108,712,600	32	$646,123
Lincoln County	1,196	$277,521,200	220	$3,860,578
Newport	223	$50,563,400	0	0
Siletz	19	$2,998,500	1	$58,797
Toledo	8	$1,525,000	1	$48,157
Waldport	114	$23,943,000	17	$82,525
Yachats	122	$33,743,000	5	$21,833
County Total	2548	$530,309,000	278	$4,723,235

Source: Federal Emergency Management Agency - National Flood Insurance Program Report, 2008

Community Hazard Issues

What is susceptible to damage during a hazard event?

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

caused by water saturating materials susceptible to loss (e.g., wood, insulation, wallboard, fabric, furnishings, floor coverings and appliances.)

If not properly protected from the entry of flood waters, mechanical, electrical and similar equipment can also be damaged or destroyed by flooding.

Older, pre-FIRM manufactured homes are particularly susceptible to flood damage, as many have a lower level of structural stability than "stick-built" (standard wood frame construction) homes. Current regulations require manufactured homes in floodplain zones to be both elevated and anchored to provide structural stability during flood events comparable to site built homes.

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

Bridges are a major concern during flood events as they provide critical links in road networks by crossing water courses and other significant natural features. However bridges and their supporting structures can also be obstructions in flood-swollen watercourses and can be damaged by debris jams and erosion scour.

Existing Hazard Mitigation Activities

Lincoln County has actively pursued several flood hazard mitigation activities in an effort to reduce vulnerability to damage and disruption from flooding events.

Lincoln County Comprehensive Plan and Land Use Code

Lincoln County has enacted a Comprehensive Land Use Plan and is implementing land use regulations in compliance with ORS 197 and the Statewide Planning Goals. The County has enacted and enforces a flood hazard area overlay zone, which is applied to all areas mapped as subject to inundation by the base flood. The regulations are designed to reduce the risk of flood damage to new and substantially improved structures within known flood hazard areas.

Lincoln County Public Works

Lincoln County Road Dept. annually, using the culvert inventory, visually inspects and cleans culverts on county roads. Culverts needing replaced are identified and targeted for replacement. Culverts during past flooding events that could not handle the flow are looked at for replacement with a larger culvert.

Bridges are inspected by an outside consulting firm every two years. The Lincoln County Road Dept. inspects bridges every six months. During flood

events crews keep a visual check on bridges for drift buildup. After a major flood, crews are dispatched to recheck bridges for flood damage.

National Flood Insurance Program

Lincoln County participates in the National Flood Insurance Program, which enables property and business owners to qualify for federally underwritten flood insurance. Flood insurance policies in effect in the County and the coverage provided by these policies are depicted in Table 2. The County's flood hazard area overlay zone, discussed above, comprises the county's NFIP qualifying flood plain regulation. These standards require all new development to be elevated above the projected level of the base flood, along with a number of other building design and construction standards intended to reduce the risk of flood damage. In several regards, the County's flood hazard area development regulations exceed minimum NFIP standards. Strict enforcement of these regulations is required to maintain eligibility for participation in the NFIP; the Lincoln County Department of Planning and Development is charged with this responsibility.

Digitized Flood Hazard Area Map

As part of the development of the County's Land Information System (LIS), the County has completed the digitizing of the Flood Insurance Rate Maps (FIRM) and the Flood Boundary and Floodway maps. This digital layer can now be applied in conjunction with the County's digital tax lot layer to more readily identify individual properties and structures in relation to the mapped flood hazard area boundaries. It should be noted that his digital layer has no official statues for regulatory or insurance purposes; the FIRMs are the officially adopted maps for these purposes. And, since the original source of this digital layer (the FIRMs) was produced at a large scale and low level of detail, the overlay of this information on the County's more geodetically accurate tax lot layer must be viewed as an approximation of the flood hazard area boundary. Nonetheless, this information has proven to be a very useful tool in assisting planners and property owners in generally identifying flood prone properties, and especially in identifying areas where more detailed field reconnaissance (e.g. elevation survey) is needed.

Emergency Services Notification

Lincoln County Emergency Services maintains a phone list for selected owners and residents of properties in flood hazard areas along the County's major rivers. In most cases, these contacts are for residents and owners of homes in the lowest elevation portions of the flood plain, and thus the first to be threatened in the event of a flood. When a flood event is predicted, Emergency Services makes contact with these affected homeowners and advises them of the forecasted conditions. These owners participate in a phone tree, and make additional calls within their neighborhood to advise other property owners of the probable timing and extent of flooding in their area. Throughout a flood event, Emergency Services maintains contact with these selected owners and residents as they monitor current and forecasted conditions.

Lower Siletz Flood Mitigation Project

In 1999, the County launched an effort to reduce future flood damages along the lower Siletz River. Utilizing funding provided through FEMA's Hazard Mitigation Grant Program (HMGP) and Flood Mitigation Assistance (FMA) grant program, the Lincoln County Planning and Development Department developed the Lower Siletz Flood Mitigation Plan (2000.) Plan implementation activities, also using HMGP and FMA funding, were undertaken by the Planning and Development Department over the following two years. This work focused primarily on providing funding and technical assistance to property owners for elevating or removing existing pre-FIRM structures. In all, 59 residential structures within the project area were mitigated through elevation or removal, including 31 (out of a total of 44) repetitive loss properties. In total, an estimated $1.68 million was invested in mitigation within the project area, which represented a combination of grant funds, ICC insurance settlements, and private funds. The Lower Siletz Flood Mitigation Action Plan and a report on the mitigation activities accomplished to date in this project are included as Appendix (X).

Hazard Mitigation Action Items

Flood mitigation action items identify activities that organizations and citizens in Lincoln County can undertake to reduce risk and prevent loss from flood events. Action items are categorized as either short-term, which are activities that may be accomplished within a two year time frame, or long term, which are activities which will likely take more than two years to implement. These action items are intended to meet the goals of the Lincoln County Natural Hazard Mitigation Plan. Each action item is followed by ideas for implementation, which can be used by local decision makes to pursue implementation strategies. The identification of these action items as either short term or long term is based in part on an assessment of the resources available to and capabilities of the identified responsible partners, which may be subject to change.

Short-term Flood Action Items

Short-term flood action items include general mitigation activities that agencies are capable of implementing during the next two years, given their existing resources and authorities.

Short Term Action Item #1: **Explore steps needed to qualify Lincoln County for participation in the NFIP Community Rating System (CRS).**

Ideas for Implementation:

- Determine CRS eligibility requirements
- Document existing activities which are creditable under the CRS guidelines; and
- Complete and submit CRS application

- Coordinating Organization: Lincoln County Planning and Development
- Internal Partner: Emergency Services; Public Works
- External Partners: DLCD, FEMA, Insurance Services Office (ISO)
- Timeline: 1-2 years
- Plan Goals Addressed: Protection, Education and Outreach, Partnerships

Short Term Action Item #2: **Formalize process for providing warnings of flood events to property owners in flood hazard areas.**

Ideas for Implementation:

- Use GIS to develop and maintain a comprehensive data base of property owner names and addresses, and contact information for properties in flood hazard areas
- During periods of forecasted flood events, maintain active links on the County's web site to provide access to real time information of flooding conditions and forecasts, including first hand information from area residents
- Coordinating Organization: Lincoln County Emergency Services
- Internal Partners: GIS department; Lincoln County Sheriff's Office;
- External Partners: Fire and Rescue Service providers
- Timeline: 1-2 years
- Plan Goals Addressed: Protection, Education and Outreach, Emergency Operations, Partnerships

Long-term Flood Action Items

Long-term flood action items include general mitigation activities that are likely to take more than two years to implement and may require new or additional resources and/or authorities.

Long Term Action Item #1: **Update the Lower Siletz Flood Mitigation Action Plan; develop flood mitigation action plan(s) for the lower Alsea and Salmon River, and Drift Creek and other areas.**

Ideas for Implementation:

- Seek grant funding to update the existing Siletz plan and develop additional plans for identified areas on other rivers
- Coordinating Organization: Lincoln County Planning and Development
- Internal Partners: Emergency Services
- External Partners: OEM; FEMA Region X
- Timeline: Ongoing

- Plan Goals Addressed: Protection, Education and Outreach, Partnerships

Long Term Action Item #2: **Work with affected property owners to elevate or relocate non-conforming, pre-FIRM structures in flood hazard areas.**

Ideas for Implementation:

- Seek grant funding for structure elevation and relocation;
- Establish eligibility criteria, focusing on repetitive loss properties and structures located at the lowest elevations; and
- Implement public outreach and information campaigns to identify and inform property owners of the program.
- Coordinating Organization: Lincoln County Planning and Development
- Internal Partners: Emergency Services
- External Partners: OEM; FEMA Region X
- Plan Goals Addressed: Protection, Education and Outreach, Partnerships

Long Term Action Item #3: **Continue compliance with the National Flood Insurance Program.**

Ideas for Implementation:

- Actively participate with DLCD and FEMA during Community Assistance Visits.
- Conduct assessment of Lincoln County floodplain ordinances to ensure they reflect current flood hazards.
- Coordinating Organization: Lincoln County Planning and Development
- Internal Partners: Emergency Services, Building and Public Works
- External Partners: DLCD, Lincoln County cities
- Plan Goals Addressed: Protection, Coordination

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[1] Oregon Emergency Management, July 2003, County Hazard Analysis Scores

[2] Mantua, Nathan. The Pacific Decadal Oscillation. University of Washington, Seattle, WA.

[3] Taylor, G.H. and Hatton, R.R. The Oregon Weather Book: A State of Extremes. Oregon State University Press, Corvallis, OR. 1999

[4] Oregon Emergency management, July 2003, County Hazard Analysis Scores

[5] State of Oregon Emergency Management Plan: Natural Hazards Mitigation Plan: Flood.

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 to prospective homeowners 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 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 usually relatively slow moving. Slow moving slides cause the most property damage in developed areas. On-site landslide hazards include features called slumps, earthflows and block slides. "Off-site" slides typically are rapidly 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 roads, traveled at a high velocity and resulted in five fatalities and a number of injuries, in addition to substantial property damage.

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

Falls

This type of landslide involves the movement of rock and soil which detaches from a steep slope or cliff and falls through the air and/or bounces or rolls down the 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 type of landslide exists where the slide material moves in contact with the underlying surface. Here the slide moves along a plane and either

slumps by moving along a curved surface (called a rotational slide) or along a flat surface (called a translational slide). While slow-moving slides can occur on relatively gentle slopes and are less likely to cause serious injuries or fatalities, they can result in significant property damages.

Flows

Flow landslides are characterized as plastic or liquid in nature where the slide material breaks up and flows during movement. A flow occurs when a landslide moves down slope as a semi-fluid mass scouring or partially scouring rock and soils from the slope along its path. A flow landslide is typically rapidly 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 event 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 for most of landslide-related deaths and injuries during the 1996 storm in Oregon.

Conditions Affecting Landslides

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

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

- Natural conditions and processes including the geology of the site, rainfall, wave and water action and seismic tremors, including 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 Your Community

Landslides accompany almost every major storm system that impacts western Oregon. Although most landslides occur in the undeveloped forested areas of the county, landslides have also occurred in more developed areas. In recent history, particularly noteworthy landslides accompanied storms in 1964, 1966, 1982, and 1996. A major winter storm in November 1996 produced more than 9,500 landslides throughout western Oregon, including Lincoln County. More recently, similar winter storm events have resulted in significant slide damages in Lincoln County, including closures of Highway 101 at Cape Perpetua and Cape Foulweather, on Highway 18, and on old Highway 101, which lost a bridge. This isolation due to highway failures became problematic for business and commerce as well as for emergency response vehicles. Private property damage due to landslides has also occurred in recent years, including damage to a restaurant in Toledo, the destruction of a house on the Yaquina Bay Road near Newport, and damage to homes and streets at the west end of NW 57th Street in Newport. Most recently, heavy rains in November 2006 triggered a 17-18 acre landslide near Immonen Road, a county road located in the northern portion of the county. This slide continues to be active and has caused extensive damage to the county road.

Numerous slow moving slides affect portions of Highway 101 along the coast, including the very large Johnson Creek slide just south of Cape Foulweather.

Figure 1: Johnson Creek Landslide on Highway 101

http://www.oregongeology.com/sub/FIELDOFFICES/George/JOHNSON1.HTM (Johnson Creek Slide Project)

The Johnson Creek landslide, as seen in Figure 1, is located along the Oregon coast south of Cape Foulweather and is a result of coastal processes. The landslide has a long history of impacting U.S. Highway 101, which passes over the middle section of the slide. The slide is up to 26 m thick, 200 m long, and 360 m wide. Total movement of the slide, as estimated from geologic cross-sections, is 28 m horizontally and 6 m vertically. The most recent significant movement of the slide occurred in early 2002, when it moved approximately 25 cm horizontally and several centimeters vertically.[1]

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 steepness. 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.

The Oregon Department of Geology and Mineral Industries (DOGAMI) is active in developing maps and collecting data on hazard risk. DOGAMI publications addressing the identification of areas subject to landslide hazard for Lincoln County include Environmental Geology of Lincoln County (Bulletin 81, 1973) and Evaluation of Coastal Erosion Hazard Zones in Lincoln County, Oregon (Open File Reports 0-04-01 and 0-07-01).

In addition, as part of the Lincoln County Comprehensive Plan, hazards along the developed coastal area were identified and mapped in Environmental Hazard Inventory of Coastal Lincoln County, RNKR Associates, 1978. Hazard areas may also be determined by other means including site specific geotechnical reports. Maps included in the RNKR study are part of the Lincoln County Comprehensive Plan Inventory and are available at the Department of Planning and Development.

Probability of Future Occurrence

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

The County's Hazard Analysis did not include landslide. The Lincoln County Steering Committee, however, determined that the probability of a future major emergency or disaster related to landslide is "moderate", meaning one incident is likely to occur within a 35 to 75 year period. *Note: this is not an official estimate.*

Vulnerability Assessment

To a large degree, landslides are very difficult to predict. Both location and extent of landslide hazard are affected by a variety of variables. Many people are unaware of their exposure to landslide risk. Therefore there are a large number of structures, infrastructure, and other community assets within

Lincoln County potentially vulnerable to landslides. New private development is subject to regulations which are intended to reduce risk from known landslide hazards. However, there is substantial private development in the county which pre-dates land use or building code regulations and is therefore subject to increased risk.

Landslides contribute a large amount of infrastructure damage on an annual basis. Given the widespread nature of the landslide hazard throughout the county, roads, drainage facilities and other public facilities are often, of necessity, located in areas subject to landslide hazards.

The County's Hazard Analysis did not include landslide. The Lincoln County Steering Committee, however, decided that the vulnerability assessment is "high" meaning % of the population is likely to be affected by a hazard event. *Note: this is not an official estimate*.

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.

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

- Improper excavation practices, sometimes aggravated by drainage issues, can reduce the stability of otherwise stable slopes.
- Allowing development on or adjacent to existing landslides or known landslide-prone areas raises the risk of future slides regardless of excavation and drainage practices. Homeowners and developers should understand that in many potential landslide settings that there are no development practices that can completely assure slope stability from future slide events.
- Building on fairly gentle slopes can still be subject to landslides that begin a long distance away from the development. Sites at greatest risk are those situated against the base of very steep slopes, in confined stream channels (small canyons), and on fans (rises) at the mouth of these confined channels. Home siting practices do not cause these landslides, but rather put residents and property at risk of landslide impacts. In these cases, the

simplest way to avoid such potential effects is to locate development out of the impact area, or construct debris flow diversions for the structures that are at risk.

- 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, although changing road construction and maintenance practices are reducing the effects of forest roads on landslides.

- Lincoln County is susceptible to extreme winter storms and rainfall. High rainfall accumulation in a short period of time increases the probability of landslide. An extreme winter storm can produce up to 6 inches of rainfall in a 24 hour period; if the storm occurs well in into the winter season, when the ground is already saturated, the hydraulic overload effect is heightened.

Existing Hazard Mitigation Activities

Oregon Department of Geology and Mineral Industries (DOGAMI)

As previously noted, DOGAMI has engaged in an extensive program to identify and measure the extent of landslides in Oregon. Several DOGAMI publications specific to Lincoln County provide information and mapping of landslide areas. These maps are available at the Lincoln County Planning and Development Department and are often referenced by prospective home buyers and builders, and are also used in the administration of hazard area regulations.

Lincoln County Land Use Planning

Lincoln County addresses development in areas subject to geologic hazards Section 1.1925 of the Lincoln County Code. This section outlines standards for development in identified landslide areas, including requiring site specific engineering geologic reports.

Lincoln County Public Works

Lincoln County Public Works Department monitors areas in the county road system susceptible to landslide. Where feasible, the department will attempt to stabilize failing slopes with the use of rip rap, jersey barriers or other appropriate means. Likewise, trees within a slide area that are determined to be hazardous are removed. Once stable, hydro-seeding occurs to restart vegetation growth.

As noted, landslides usually occur during high precipitation events. Maintenance of culverts and other components of drainage systems are critical in preventing slope and road bed failures, and are monitored closely during storm events.

In the case of large landslides, such as the one that occurred on Immonen Road in the fall of 2006, the Public Works Department attempts keep the road open to vehicular traffic. If this is not possible, the department attempts to provide a detour route. Large landslides generally can not be "fixed." As they stabilize over time, the department makes repairs to the road. Large, stable landslides are monitored for new movement.

Hazard Mitigation Action Items

Short-term Landslide Action Items

Short-term landslide action items include general mitigation activities that agencies are capable of implementing during the next two years, given their existing resources and authorities.

Short Term Action Item #1: Encourage construction, site location and design that can be applied to steep slopes to reduce the potential threat of landslides.

Ideas for Implementation:

- Encourage erosion control techniques, such as the temporary use of straw bales, diversion dams, or other physical changes to control storm water runoff during road and site construction.
- Provide information to property owners on reducing water input into slopes from building roof drains, storm drains, and surface runoff.
- Increase communication and coordination between Lincoln County Public Works and Building Departments.
- Coordinating Organization: Planning
- Internal Partner: Emergency Services, Building and Public Works
- External Partners: DLCD, Cities
- Timeline: 1 to 3 years
- Plan Goals Addressed: Education & Outreach; Partnerships; Protection; Natural Resources.

Short Term Action Item #2: Increase public education related to landslide hazards by distributing DOGAMI landslide informational brochure.

NOTE: DOGAMI produced an information brochure on landslide hazards.
Ideas for Implementation:

- Distribute the DOGAMI landslide informational brochure.
- Coordinating Organization: Planning
- Internal Partner: Public Works, Emergency Services
- External Partners: DOGAMI, OEM, DLCD
- Timeline: 1 to 2 years
- Plan Goals Addressed: Education & Outreach; Partnerships

Long-term Landslide Action Items

Long-term landslide action items include general mitigation activities that are likely to take more than two years to implement and may require new or additional resources and/or authorities.

Long Term Action Item #1: Mitigate activities in identified potential and historical landslide areas through public outreach.

Ideas for Implementation:

- Distribute the DOGAMI landslide informational brochure.
- Provide information on hazard location to future residents Provide information on hazard location to future residents.
- Distribute other landslide educational materials to the public.
- Identify and use existing mechanisms for public outreach (e.g., SWCD, NRCS, watershed councils, OSU Extension, etc.).
- Coordinating Organization: Planning, Emergency Services
- Internal Partners: Public Works
- External Partners: ODF, cities, mortgage companies
- Timeline: 3 to 5 years; on-going
- Plan Goals Addressed: Education & Outreach; Partnerships; Protection.

Long Term Action Item #2: Protect existing development in landslide-prone areas.

Ideas for Implementation:

- Provide information to residents on landslide prevention. Publications such as FEMA's *Homeowners Landslide Guide for Hillside Flooding, Debris Flows, Erosion, and Landslide Control* and FEMA's *Hillside Drainage* flier have some ideas about reducing landslide susceptibility.
- Encourage easements to restrict certain activities on landslide-prone properties. Easements foregoing the right to develop a property can be either acquired or granted to the County or other organizations by property owners.
- Identify appropriate areas for the construction of debris flow diversions to protect existing properties.
- Ensure that ditches, stormwater facilities, and culverts are inspected and cleared prior to the wet season each year.
- Encourage the placement of culverts built for 50 to 100-year flood events.
- Coordinating Organization: Emergency Services, Public Works
- Internal Partner: Planning, GIS
- External Partner: DLCD, OEM, FEMA, ODF, Cities

- Timeline: On-going
- Plan Goals Addressed: Partnerships; Education & Outreach; Protection; Natural Resources.

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[1] USGS. March, 16, 2007. Johnson Creek Landslide. http://landslides.usgs.gov/monitoring/johnson_creek/

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.[1]

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 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.[2]

History of the Hazard in Lincoln County

The Pacific Northwest experienced a subduction zone earthquake estimated at magnitude 9 on January 26, 1700. The earthquake generated a tsunami that caused damage as far away as Japan. Subduction zone earthquakes and associated tsunamis have occurred on average every 500 years over the last 3500 years in the Pacific Northwest. The time between events has been as short as 100 to 200 years and as long as 1000 years.

In March 1964, a tsunami struck southeastern Alaska following an earthquake beneath Prince William Sound and arrived along the Alaska coastline between 20 and 30 minutes after the quake, devastating villages. Damages were estimated to be over $100 million. Approximately 120 people drowned. The tsunami spread across the Pacific Ocean and caused damage and fatalities in other coastal areas. Four children drowned at Beverly Beach and significant property damaged was incurred, including $5,000 in Depoe Bay. Along the entire Oregon Coast damage was estimated to be between $750,000 and $1 million. Tsunamis of lesser magnitude occurred along the Oregon Coast in 1946, 1960, and 1968.

Risk Assessment

In the event of an 8.8 magnitude earthquake, 60-200 miles off the coast, and during high tide, the inundation elevations would be: Siletz Bay, 40 feet; Depoe Bay, 31 feet; Newport, 31 feet; Yaquina Joe Point (Waldport), 26 feet; and Yachats, 27 feet.[3]

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.[4]

DOGAMI has conducted analysis resulting in extensive mapping along the Oregon Coast. 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 they have taken into account topography, bathymetry data, and information about potential regional tsunami sources.

It should be noted that these maps were produced in 1995. Since then DOGAMI and other agencies have conducted a large number of tsunami inundation studies. An update of these maps seems in order.

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. Thus, the average recurrence interval for tsunamis on the Oregon coast from distant sources would be about 15 years. However, the time interval between events has been as little as one year and as much as 73 years. Since only a few tsunamis caused measurable damage, a recurrence interval for distant tsunamis does not have much meaning for this region.

A tsunami originating from a Cascadia Subduction Zone earthquake 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. The last CSZ even occurred approximately 300 years ago.

The Region 1 Oregon Coast Profile and Risk Assessment describes Lincoln County as having a high level of probability for experiencing a tsunami, meaning one incident is likely within a 10-35 year period. This score is based on an analysis of risk conducted by county emergency managers, usually with the assistance of a team of local public safety officials.[5] The high ranking is additionally supported by members of the Lincoln County Natural Hazard Mitigation Steering Committee.

Vulnerability Assessment

The Oregon coast is at risk from tsunamis that originate from local and distant sources. Lincoln County has six communities in the tsunami inundation zone: Lincoln City, Depoe Bay, Newport, Toledo, Waldport, and Yachats. As shown in Figure 1 below, however, Depoe Bay, Toledo, and

Yachats have very little developed land that's within the tsunami inundation zone. Additionally, there are numerous residents living in the tsunami inundation zone within many of those communities as shown in Figure 2. Newport's South Beach district is an example of a highly vulnerable populated area. This includes South Beach State Park which during the summer time, can become teeming with visitors and tourists. Some other examples are Waldport, which is at an elevation of 12 feet, and the motels at the D River in Lincoln City which are at an elevation of only 10 feet. Although many communities have evacuation maps and evacuation plans, many casualties are expected from a local tsunami event. The built environment in the inundation zone will be especially hard hit. It is estimated that if a CSZ tsunami were to hit Lincoln County, 40% of the population and 40% of real property would be affected. [6]

The Region 1 Oregon Coast Profile and Risk Assessment describes Lincoln County as having a moderate level of vulnerability to tsunamis, meaning 1-10% of the population would be affected by a major tsunami event. This score is based on an analysis of risk conducted by county emergency managers, usually with the assistance of a team of local public safety officials. The moderate ranking is additionally supported by members of the Lincoln County Natural Hazards Mitigation Steering Committee.[7]

Figure 1 Developed Land in Tsunami-Inundation Zone

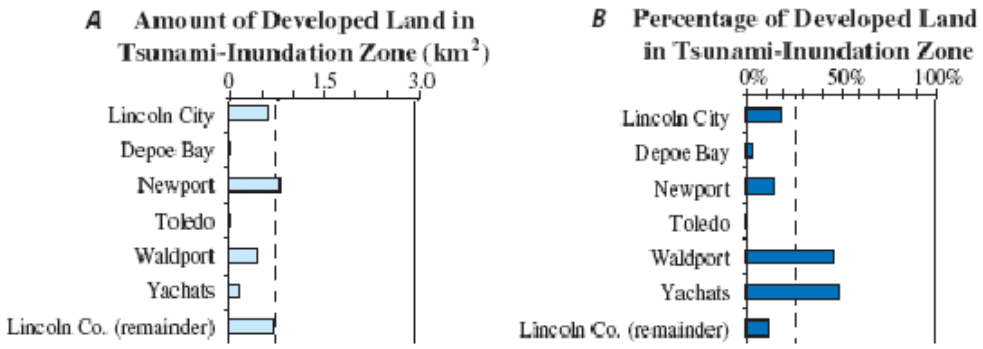
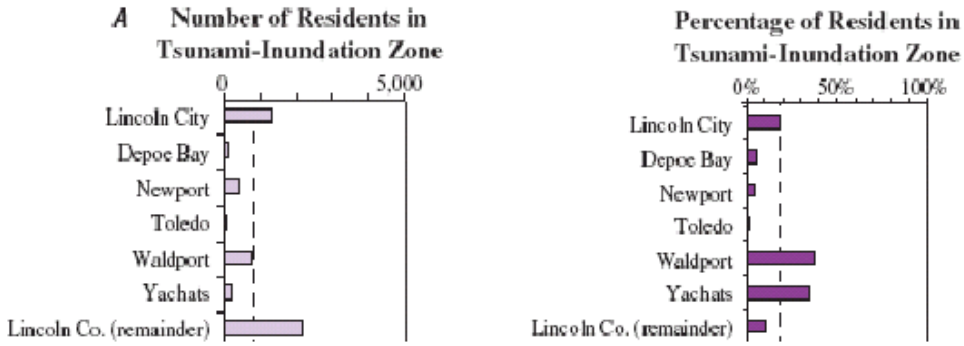


Figure 2 Residents in Tsunami-Inundation Zone



Source: USGS, Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon: http://pubs.usgs.gov/sir/2007/5283/sir2007-5283.pdf

Community Hazard Issues

Issues associated with the risk of a tsunami event in Lincoln County include population and property distribution in the hazard area, adequate tsunami warnings, and sufficient information on utilities, and infrastructure that may be impacted by a tsunami. People and properties located in low-lying areas near the ocean are at greatest risk from tsunami inundation. Tsunamis generated by a CSZ event just off the Oregon coast can strike the coast within five to thirty minutes, possibly disrupting power lines and communications and leaving little time for an official warning. The actual ground shaking of the earthquake may be the only warning received. Tsunamis generated by earthquakes occurring thousands of miles away will take several hours to reach the coast. There would be time for an official warning, although no earthquake would be felt, and the only warning may be a sudden unexpected change in sea level.

A significant tsunami event can be expected to cause disruption of power, contamination of water supplies, loss of essential communication systems, a large amount of debris, and traffic congestion. Dealing with evacuees would be a major challenge in the first days after the event. The tourist industry would be non-existent for a considerable period of time and damaged public facilities would have to be restored or replaced at considerable cost.

Boats and ships in harbor are also at great risk from the sudden changes in sea level. The water level can change so fast that lines holding ships to the pier have the potential to break. Navigating in these conditions would be treacherous as well as unpredictable; dangerous currents can continue for hours while the water in the harbor shifts back and forth.

The rapidly increasing sea level caused by the tsunami picks up debris, rocks, logs and other materials that act as projectiles causing additional damage and dangers.

Existing Hazard Mitigation Activities

Lincoln County Comprehensive Plan and Land Use Code

Lincoln County has enacted a Comprehensive Land Use Plan and is implementing land use regulations in compliance with ORS 197 and the Statewide Planning Goals. The County has enacted and enforces a coastal flood hazard area overlay zone, identified on FIRM maps as V zones, which is applied to all areas mapped as subject to high velocity ocean waters, including but not limited to storm surge or tsunami inundation. The regulations are designed to reduce the risk of tsunami damage to new and substantially improved structures within known tsunami hazard areas.

After planning approval, or prior to issuance of a development permit for construction of, conversion to, or replacement of any development on the following list, the owner or developer shall consult with the local building official to determine whether ORS 455 applies, specifically the "prohibition of construction for certain facilities and structures" and, the "regulation of certain vulnerable structures", identified in the 2001 Edition of the statutes as ORS 455.446 and ORS 455.447

Tsunami Inundation Maps

DOGAMI was instrumental in the passage of SB 379 (1995) resulting in changes to Oregon Revised Statute 445.446 and 445.447. The agency, using a combination of regional tsunami simulations and professional judgment, created tsunami hazard maps for the entire coast to implement ORS 455.446 and 455.447. The statute limits the construction of new essential facilities and special occupancy structures in the mapped tsunami inundation zone. Examples of essential structures are fire and police stations and hospitals. These have been used to create evacuation maps of all of the coastal incorporated cities of Lincoln County: Lincoln City, Depoe Bay, Newport, Waldport, and Yachats.

Lincoln County Public Works

Once an earthquake or tsunami occurs, an evaluation of roadways and bridges will occur for damages. Initial damage assessment will be logged and a plan of action developed. Life-line routes (arterial routes) have been identified and will receive priority. It is expected that inter-agency support will be highly needed. Lincoln County Road Dept. participates in inter-agency drills.

Lincoln County bridges are inspected every two years. Bridges are inspected in accordance with National Bridge Inspection Standards (NBIS). The County uses the NBIS inspections to guide bridge maintenance work. In the event of a critical finding, emergency repair work may be initiated. Bridges found to be incapable of carrying legal loads are posted.

Hazard Mitigation Action Items

Short-term Tsunami Action Items

Short-term tsunami action items include general mitigation activities that agencies are capable of implementing during the next two years, given their existing resources and authorities.

Short Term Action Item #1: Determine ways of mitigating the vulnerability of assets (fire stations, equipment, utilities) likely to be impacted by tsunami.

Ideas for Implementation:

- Coordinate emergency response to disaster, enhance local mapping capabilities and forecasting, encourage tsunami evacuation training for emergency responders;
- Investigate relocation for critical facilities in the tsunami inundation zone.
- Coordinating Organization: Emergency Services
- Internal Partners: Planning
- External Partners: DOGAMI
- Timeline: 1-2 years
- Plan Goals Addressed: Protection, Education and Outreach, Emergency Operations

Short Term Action Item #2: **Work with coastal communities, citizen groups, property owners, recreation areas, emergency responders, schools and businesses in promoting tsunami awareness and evacuation.**

Ideas for Implementation:

- Distribution of Tsunami information describing dangers and evacuation routes for visitors at the coast and continued educational outreach for residents and business owners.
- Coordinating Organization: Planning
- Internal Partners: Emergency Services
- External Partners: City Planning Departments
- Timeline: 1-2 years
- Plan Goals Addressed: Protection, Education and Outreach, Emergency Operations

Long-term Tsunami Action Items

Long-term tsunami action items include general mitigation activities that are likely to take more than two years to implement and may require new or additional resources and/or authorities.

Long Term Action Item #1: **Improve technology capacity of communities, agencies and responders needed to adequately map hazard areas, broadcast warnings, inform, and educate residents and visitors of tsunami dangers.**

Ideas for Implementation:

- Improve and utilize tsunami information, utilize technology to assist in determining evacuation needs and concerns.
- Coordinating Organization: Emergency Services
- Internal Partners: GIS
- External Partners: Local Cities, Radio, DOGAMI
- Timeline: Ongoing

- Plan Goals Addressed: Protection, Education and Outreach, Emergency Operations, Partnerships

Long Term Action Item #2: **Develop, coordinate with state and surrounding counties, the development and installation of a coastal tsunami warning system.**

Ideas for Implementation:

- Develop a system to track and warn the Lincoln County Coastline in coordination with the State, Federal and other Oregon County Emergency Planners.
- Coordinating Organization: Emergency Services
- Internal Partners: Public Works
- External Partners: Cities, Coastal Fire Agencies, ODOT
- Timeline: Ongoing
- Plan Goals Addressed: Protection, Education and Outreach, Emergency Operations, Partnerships.

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

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

[3] Lincoln County Emergency Services, June 2007. Lincoln County Hazard Analysis

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

[5] University of Oregon Community Service Center. (2007) *Region 1: Oregon Coast: Profile and Risk Assessment*.

[6] Lincoln County Emergency Services, June 2007. Lincoln County Hazard Analysis.

[7] University of Oregon Community Service Center. (2007) Region 1: Oregon Coast: Profile and Risk Assessment

Volume II: Hazard Annex
Volcanic Eruption

Causes and Characteristics of the Hazard

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

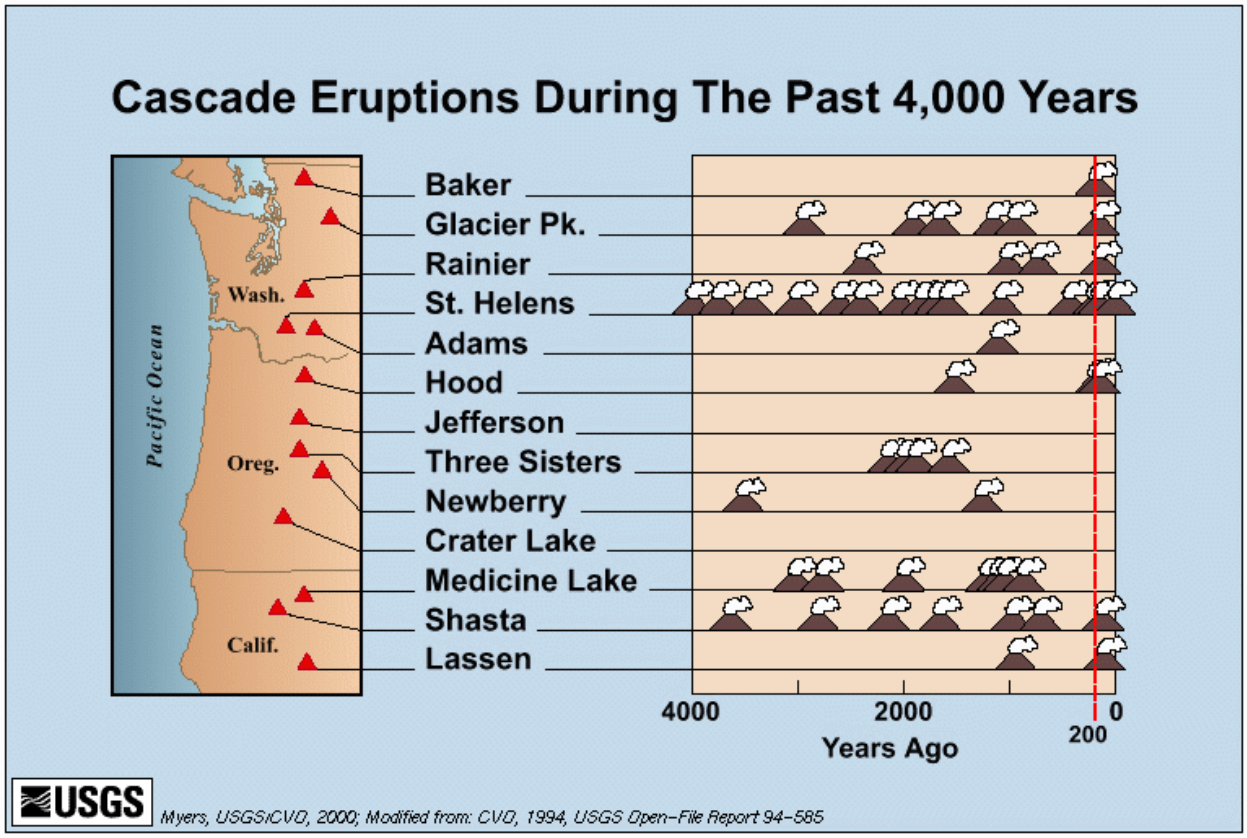
The effects of a major volcanic event can be widespread and devastating. The Cascade Range in Washington, Oregon and northern California is one of the most volcanically active regions in the United States. Volcanoes produce a wide variety of hazards that can destroy property and kill people. Large explosive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

Although there are no active volcanoes in Lincoln County, it is important for counties to know the potential impacts of nearby volcanoes. While the immediate danger area around a volcano is approximately 20 miles, ash fall problems may occur as much as 100 miles or more from a volcano's location.

History of the Hazard in Lincoln County

The closest volcanoes to Newport are in the Three Sisters area approximately 125 miles to the east. Given the right wind conditions, ash fall in Lincoln County could be a concern.

Figure 1 Cascade Range Eruptions in the past 4,000 Years



Source: *W.E. Scott et al., 1997*, http://vulcan.wr.usgs.gov/Volcanoes/Cascades/EruptiveHistory/cascades_eruptions_4000yrs.html

Mt. St. Helens, a volcano in Washington State, is the most active volcano in the Cascade Range. Its last major eruption occurred on May 18th, 1980 when a large landslide and powerful explosive eruption created a large crater, and ended 6 years later after more than a dozen extrusions of lava built a dome in the crater. [1]Larger, longer lasting eruptions have occurred in the volcano's past and are likely to occur in the future. There were some reports of minor ash fall in Lincoln County after the 1980 eruption, but no significant damage or impacts were reported.

Risk Assessment

How are Hazard Areas Identified?

The volcanic Cascade Mountain Range is not within Region 1 counties (see locations of potentially active volcanoes in Figure 1 below).

Figure 2 Potentially Active Volcanoes in Oregon and Washington

Source: USGS, 1999
http://vulcan.wr.usgs.gov/Volcanoes/WesternUSA/Maps/map_potentially_active.html

In Figure 1 above, Red triangles indicate volcanoes that have been active during the past 2,000 years. Other potentially active volcanoes are represented with white (red-outline) triangles.

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

Scientists also use wind direction to predict areas that might be affected by volcanic ash; during an eruption that emits ash, the ash fall deposition is controlled by the prevailing wind direction. The predominant wind pattern over the Cascades is from the west, and previous eruptions seen in the geologic record have resulted in most ash fall drifting to the east of the volcanoes. As a result of likely wind patterns, the extent of ash fall associated with a volcanic event would be widespread. Because Lincoln County is far west of the Cascade Range, however, it is not likely to be significantly affected by volcanic ash. The potential and geographical extent of volcanic ash fall from Mt. Hood and Mt. St. Helens are depicted in Figures 3 and 4, respectively.

Figure 3 Map showing annual probability of 10 cm (~4 inches) or more tephra accumulation in Oregon and Washington from eruptions throughout the Cascade Range (Lincoln County is circled in red).

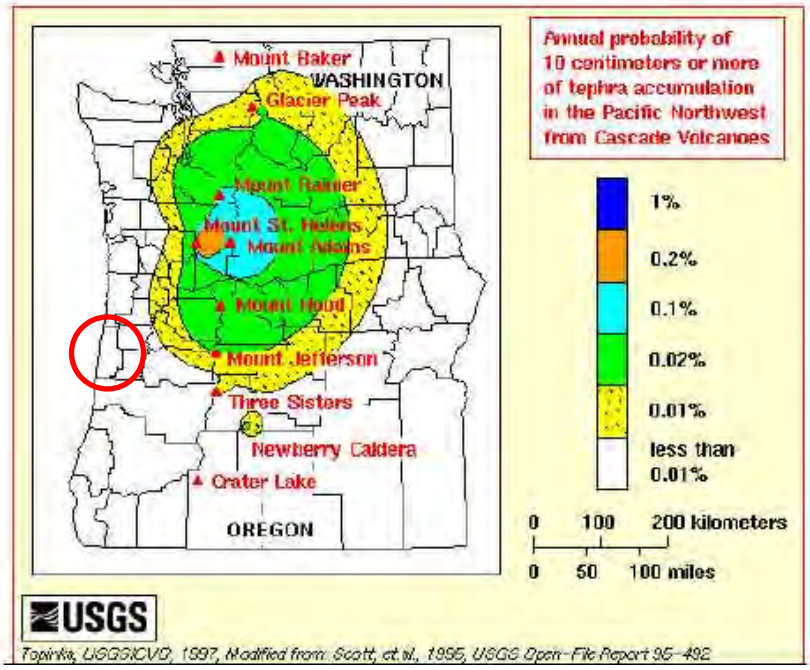
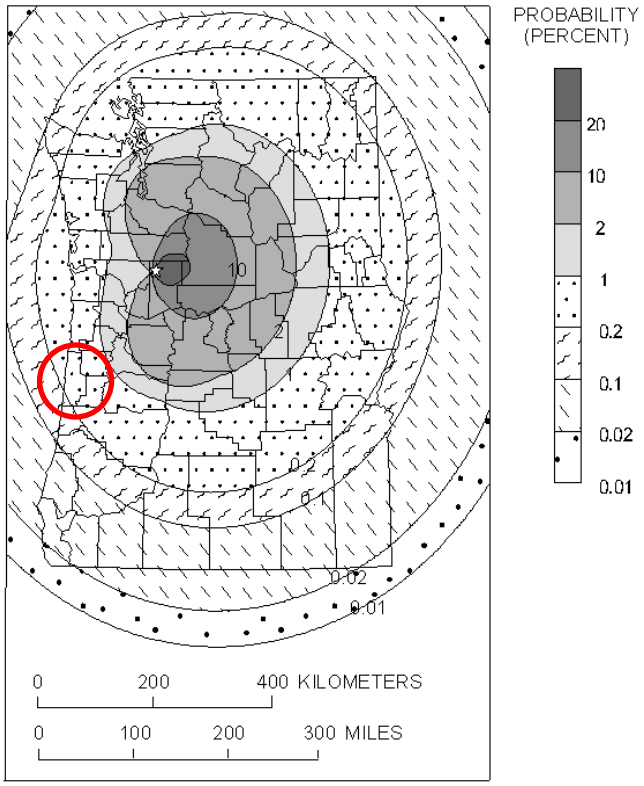


Figure 4 Map of Washington and Oregon showing the percentage probability of accumulation of ten or more centimeters (four or more inches) of tephra from a large eruption of Mount St. Helens



Probability of Future Occurrence

The probability of coastal counties receiving air borne tephra is about 1 in 10,000. [2] The Region 1 Oregon Coast Profile and Risk Assessment describes Lincoln County as having a low level of probability for volcanoes, meaning one incident is likely within a 75 – 100 year period. This score is based on an analysis of risk conducted by county emergency managers, usually with the assistance of a team of local public safety officials.[3] The low ranking is supported by members of the Lincoln County Natural Hazards Mitigation Steering Committee.

Vulnerability Assessment

The Region 1 Oregon Coast Profile and Risk Assessment describes Lincoln County as having a low level of vulnerability to volcanoes, meaning less than 1% of the population would be affected by a major emergency or disaster. This rating is based on an analysis of risk conducted by county emergency managers, usually with the assistance of a team of local public safety officials.[4] The low ranking is supported by members of the Lincoln County Natural Hazards Mitigation Steering Committee.

Risk Analysis

Because of Lincoln County's distance from volcanoes, there is not significant volcanic risk.

Community Hazard Issues

What is susceptible to damage during a hazard event?

Structural damage can result from the weight of ash, especially if it is wet. Four inches of wet ash may cause buildings to collapse. A half-inch of ash can impede the movement of most vehicles and disrupt transportation, communication, and utility systems, and cause problems for human and animal respiratory systems. It is extremely dangerous for aircraft, particularly jet planes, as the volcanic ash accelerates wear to critical engine components, can coat exposed electrical components, and erodes exposed structure. Ash fall may severely decrease visibility; even cause darkness, which can further disrupt transportation and other systems.

Ash fall can severely degrade air quality, triggering health problems. In areas with considerable ash fall, people with breathing problems might need additional services from doctors or emergency rooms. In severe events, an air quality warning, similar to those given on summer problem air quality days, could be issued. This would, for example, warn people with breathing problems not to go outside. On roads and streets, ash fall can create serious traffic problems as well as road damage. Vehicles moving over even a thin coating of ash can cause great clouds of ash to swell. This results in severe visibility problems for other drivers, calling for speed restrictions, and often forcing road closures. It also adds to the potential for health problems for residents of the area.

Extremely wet ash creates very slippery and hazardous road conditions. Ash filling roadside ditches and culverts can prevent proper drainage and cause shoulder erosion and road damage. Blocked drainages can also trigger debris flows or lahars if they cause water to pool on or above susceptible slopes. Conventional snow removal methods do not work on dry ash, as they only stir it up and cause it to resettle on the roadway. When ash is pushed to the side of travel lanes, wind and vehicle movement continue to cause it to billow.

Existing Hazard Mitigation Activities

None

Hazard Mitigation Action Items

None. There is no significant risk of volcano in Lincoln County.

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[17] United States Geological Society. *Mt. St. Helens Volcano*. Retrieved from http://volcan.wr.usgs.gov/Volcanoes/MSH/framework.html

[2] State of Oregon Natural Hazard Mitigation Plan. *Regional Risk Assessment, Region 1: Oregon Coast, "Volcano-Related Hazards." 2006*. 34-35

[3] Oregon Emergency Management, July 2003, County Hazard Analysis Scores.

[4] Oregon Emergency Management, July 2003, County Hazard Analysis Scores.

Volume II: Hazard Annex
Wildfire

Causes and Characteristics of the Hazard

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

The impact on communities from wildfire can be huge. In 1990, Bend's Awbrey Hall Fire destroyed 21 homes, caused $9 million in damage and cost more than $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 burned, 600 homes were 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 are the most likely to happen in Lincoln County

Interface Fires

Essentially an interface fire occurs where wildland and developed areas meet. In these locations, both vegetation and structural development combine to provide fuel. The wildland/urban interface (sometimes called rural interface in small communities or outlying areas) can be divided into three categories.

- The classic wildland/urban interface exists where well-defined urban and suburban development presses up against open expanses of wildland areas.
- The mixed wildland/urban interface is more typical of the problems in areas of exurban or rural development: isolated homes, subdivisions, resorts and small communities situated in predominantly wildland settings.
- The occluded wildland/urban interface where islands of wildland vegetation exist within a largely urbanized area.

Wildland Fires

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

Firestorms

Firestorms are events of such extreme intensity that effective suppression is virtually impossible. Firestorms often occur during dry, windy weather and generally burn until conditions change or the available fuel is consumed. The disastrous 1991 East Bay Fire in Oakland, California is an example of an interface fire that developed into a firestorm.

Conditions Contributing to Wildfires

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

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

Topography influences the movement of air and directs a fire's course. Slope is a key factor 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 Lincoln County

The two most significant fires in Lincoln County occurred more than one hundred years ago. In 1849, the Siletz Fire claimed more than 800,000 acres between Lincoln and Polk County. The 1853 Yaquina Fire burned more than 450,000 acres of Douglas fir, Sitka spruce, and western cedar within Lincoln County. In 1936, a series of fires hit communities in Oregon. In Lincoln County, buildings and a schoolhouse burned near a logging camp. Flames destroyed an "auto camp" near Yachats, and then continued toward the town. Some residences were lost, but the town was saved. Depoe Bay also lost homes to the flames, but firefighters kept the town from burning.

Oregon Department of Forestry's Western District includes Benton, Lincoln, Polk, and southwest Yamhill counties. Figure 1 displays a 10 year history of fire in the Western Oregon District.

Table 1 Western Oregon District 10 Year Fire Summary

12/04/2006

YEAR	FIRE SEASON BEGIN	FIRE SEASON END	FIRE SEASON LENGTH-DAYS	STATISTICAL FIRES # FIRES	ACRES	SUPPRESSION
1996	7/8	10/14	98	51	76	$45,890
1997	7/21	9/16	57	31	66	$12,713
1998	7/13	10/5	84	37	190	$42,736
1999	7/8	10/27	111	33	68	$43,880
2000	6/28	10/12	106	43	17	$11,873
2001	7/2	10/22	112	43	112	$35,939
2002	7/1	11/6	128	76	279	$88,400
2003	6/26	10/7	103	49	431	$28,069
2004	6/28	10/6	100	18	46	$69,549
2005	7/13	10/4	83	36	158	$40,069
2006	**6/26**	**10/19**	**115**	**48**	**50**	**$86,406**
10 YR AVERAGE			100	41	142	$45,963
5 YR AVERAGE			106	45	193	$62,499

http://egov.oregon.gov/ODF/FIELD/PHIL/docs/West_Oregon_District_Annual_Report_06.pdf

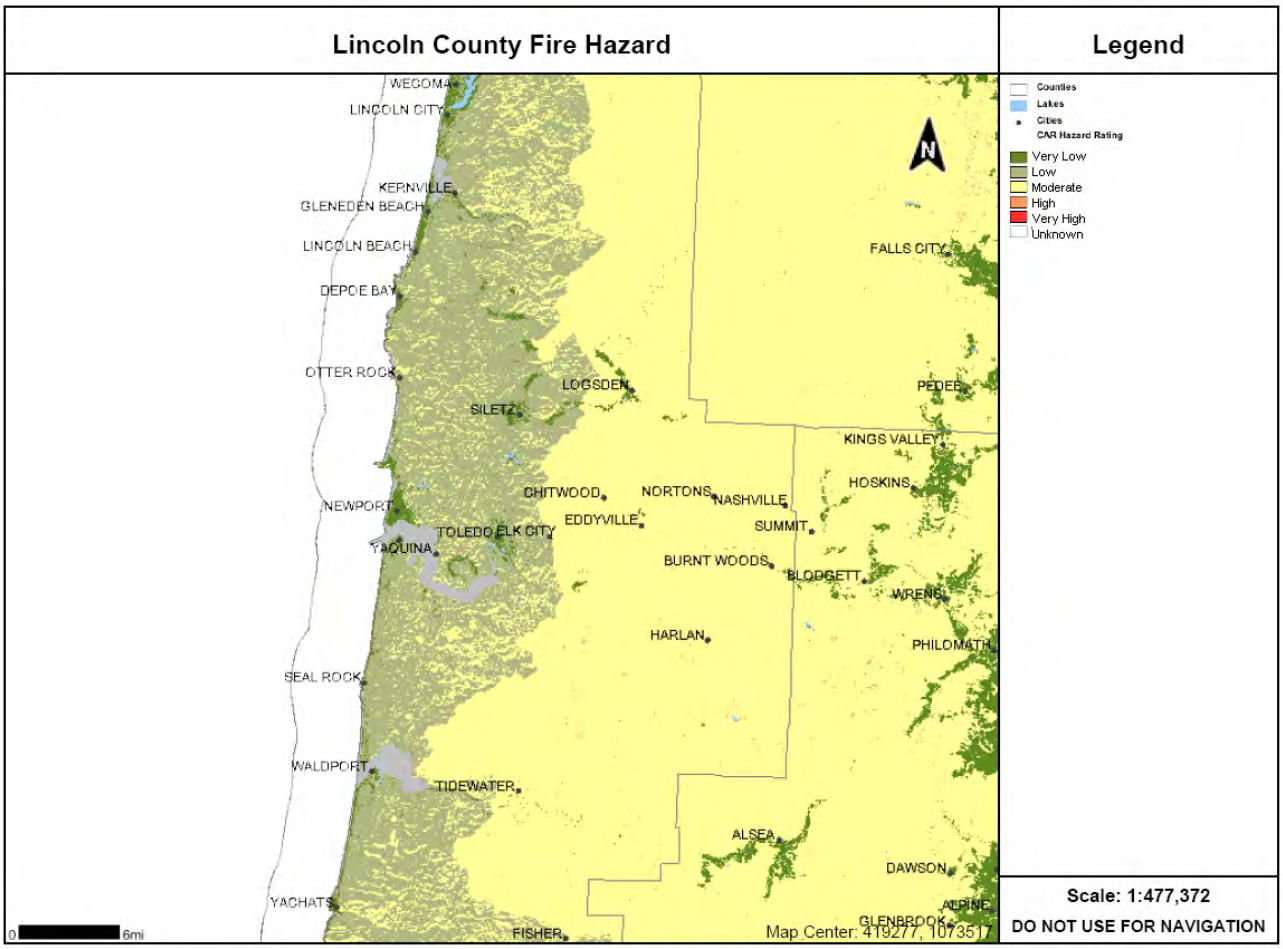
Risk Assessment

How are Hazard Areas Identified?

The development of a wildfire risk assessment will help prioritize areas for uses of available financial and human resources. Lincoln County is currently beginning the development a Community Wildfire Protection Plan (CWPP). The Plan is expected to be completed by December, 2009, and will then serve as the wildfire chapter of Lincoln County's Natural Hazard Mitigation Plan. A CWPP seeks to protect the community from wildfire hazards by: 1) identifying and prioritizing hazardous fuel treatments; and 2) recommending measures for reducing structural ignitability. In order to achieve these goals, the community will identify the location and extent of wildfire hazard areas. As seen in the figure below, Oregon State University has begun to map Lincoln County's fire hazard. Developing an assessment takes into account a variety of factors including: fuel hazards, risk of wildfire occurrence, homes, businesses, and essential infrastructure at risk, other community values at risk, and local preparedness and firefighting capability. Figure 1 depicts the mapped fire hazard in Lincoln County. According to this model Lincoln County ranges from a "very low" to "moderate" fire hazard. Most wildfires in Lincoln County occur in the wildland/urban interface zone. Therefore, the County has a number of communities that are at risk to wildfire as shown in Table 2. Ranges of the wildfire hazard are further determined by the likelihood of fire ignition due to natural or human conditions and the difficulty of fire suppression.

The use of Geographic Information System (GIS) technology in recent years has been a great asset to fire hazard assessment, allowing further integration of fuels, weather, and topography data to be used for fire behavior prediction, watershed evaluation, mitigation strategies, and hazard mapping.

Figure 1 Lincoln County Fire Hazard



http://www.oregonexplorer.info/Wildfire/publications/publications.aspx?Res=16148

Probability of Future Occurrence

Wildfire results from natural causes (e.g., lightening strikes), a mechanical failure (Oxbow Fire), or human-caused (unattended campfire, debris burning, or arson). Most wildfires can be linked to human carelessness; 70% of Oregon's wildland fires result from human activity. The remaining 30% result from lightning, occurring most frequently in eastern and southern Oregon. In Lincoln County, the probability of future occurrence is assessed as "moderate," which means that one incident is likely within a 35 to 75 year period.

Vulnerability Assessment

Lincoln County is ranked "moderate" in wildfire vulnerability which indicates that 1-10% of the population or region assets are likely to be affected by a major wildfire emergency or disaster

Each year a significant number of people build homes within or on the edge of the forest (urban/wildland interface), thereby increasing wildfire hazards. Wildfire incidents are most likely to occur in wildland urban interface communities. Lincoln County is comprised of nearly 90% forest land; meaning most communities are bordered by forest land and are

therefore vulnerable to wildfire. The following are defined as "Interface Communities/Jurisdictions" within Lincoln County and have been given a risk/vulnerability rating by ODF.

Table 2 Lincoln County Communities at Risk

Community/Jurisdiction	Risk	Hazard	Protection	Value	Overall
Central Oregon Coast RFPD	M	M	M	H	M
Depoe Bay	M	L	M	H	M
Depoe Bay RFPD	H	L	M	H	M
Lincoln County	M	M	M	H	M
Lincoln City	H	L	L	H	M
Newport	M	L	H	H	M
Newport RFPD	M	L	H	H	M
North Lincoln RFPD	L	L	M	H	M
Seal Rock RFPD	M	L	H	H	M
Siletz (City)	H	L	M	H	M
Siletz (Reservation)	H	L	M	H	M
Siletz RFPD	M	M	M	H	M
Toledo (City)	M	L	L	H	M
Toledo RFPD	M	L	M	H	M
Waldport (City)	M	L	H	H	M
Yachats (City)	L	L	M	L	M
Yachats RFPD	M	M	M	H	M

http://www.oregon.gov/ODF/FIRE/docs/PREV/06CAR.pdf

Column headings in the above table are described below:

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

Protection Capability= risks associated with inadequate wildfire protection capabilities, including capacity and resources to undertake fire prevention measures.

Values= human and economic values associated with communities or landscapes.

Note: Ratings were developed statewide, so the ratings of Low, Medium, and High are relative to other communities. A Local Community Wildfire Protection Plan may assess risks differently.

Risk Analysis

Should several wildfires start in Lincoln County's forests, it is estimated that up to fifty percent of the population would be impacted, primarily by smoke. An estimated five percent of the population would suffer some property damage.

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 forest and wild lands 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 because of its effects on timber harvest, loss of scenic and recreational values and the obvious threat to property and human life.

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 increase 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

More information on wildfire hazard can be found in the Wildfire chapter of the State of Oregon's Natural Hazards Mitigation Plan or in the Oregon Technical Resource Guide. Lincoln County is planning the development of a Community Wildfire Protection Plan in the coming year (2008-2009.) More information and studies will result from this process.

Existing Hazard Mitigation Activities

Oregon Department of Forestry (ODF)

The Oregon Department of Forestry is involved with local fire chiefs and fire departments as well as rural fire protection districts to provide training. Firefighters get a broad range of experience from exposure to wildland

firefighting. Local firefighters can also obtain their red card (wildland fire training documentation), 3.1. 22 and attend extensive workshops combining elements of structural and wildland firefighting, defending homes, and operations experience. ODF has been involved with emergency managers to provide support during non-fire events as well as working with industrial partners such as timber companies to share equipment in extremely large events.

Lincoln County Comprehensive Plan and Land Use Code

Lincoln County has enacted a Comprehensive Land Use Plan and implementing land use regulations in compliance with ORS 197 and the Statewide Planning Goals. As a part of the comprehensive plan, the county has placed large portions of the county in farm and forest use zones, which serves to limit most forms of development in rural portions of the county, development that would likely increase wildfire hazard.

In addition, the county has enacted land use regulations which address fire protection for new development in both urban and rural settings, and include provisions for access, water supply, fuel breaks and similar fire safety issues.

Hazard Mitigation Action Items

Short Term Action Item #1: **Develop a Community Wildfire Protection Plan for Lincoln County.**

- Coordinating Organization: Lincoln County Emergency Services
- Internal Partners: GIS, Planning
- External Partners: ODF, North and South Lincoln Fire Districts, City Fire Districts
- Plan Goals Addressed: Protection, Education and Outreach, Partnerships

Volume II: Hazard Annex
Wind Storm

Causes and Characteristics of the Hazard

High wind events are a regular occurrence Lincoln County, particularly in exposed coastal areas. 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 storms can be very destructive as documented in the now infamous Columbus Day Storm of October, 1962. Less destructive storms can still topple trees, power lines, and cause building damage. Because coastal wind storms typically occur during winter months, they are sometimes accompanied by heavy precipitation.

A windstorm is generally a short duration event involving straight-line winds and/or gusts in excess of 50 mph. Although windstorms can affect the entirety of Lincoln 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.

Though tornadoes are not common in Oregon, these events do occasionally occur and sometime produce significant property damage and even injury. Tornadoes are the most concentrated and violent storms produced by earth's atmosphere, and can produce winds in excess of 300 mph. They have been reported in most of the counties throughout the state since 1887. Most of them are caused by intense local thunderstorms common between April and October.

History of the Hazard in Lincoln County

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, where 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; in Lincoln County gusts exceeded 120 miles per hour.

See Table 1 on the following page for a listing of additional events that have occurred in Lincoln County.

Table 1. Lincoln County Windstorm History

Date	Location	Type	Comments
October 1962	Nearly Statewide	Wind	Wind speeds of 131 mph on the Oregon coast (Columbus Day Windstorm Event.) Considered most destructive windstorm in Oregon's history. Damage estimated at $170 million statewide.
March 1963	Coast and Northwest Oregon	Wind	100 mph gusts. Widespread damage.
Oct. 1967	Western and Northern Oregon	Wind	Wind speeds of 100 to 115 mph. Significant damage to buildings, agriculture and timber.
March 1971	Nearly Statewide	Wind	Notable damage in Newport. Falling trees took out power lines. Building damage.
December 1973	Newport	Tornado	Tore off roof of a real estate building, blew out several windows, damaged two other roofs, and moved a garage off of its foundation
November 1984	Waldport	Tornado	Damage category 5. $250K in property damage.
January 1986	North and Central Oregon Coast	Wind	Winds of 75mph left approximately five thousand residents without power
January 1987	Oregon Coast	Wind	Wind gusts to 96 mph at Cape Blanco. Significant erosion (highways and beaches.) Several injuries.
December 1987	Oregon Coast/ N.W. Oregon	Wind	Wind speeds up to 60 mph on the coast. Saturated ground enabled winds to uproot trees.
March 1988	North and Central Oregon Coast	Wind	Winds along the Oregon coast reached 55 to 75 mph. One fatality near Ecola State Park. Uprooted trees.
January 1990	Lincoln County, South Cascades, Pendleton	Wind/Rain	High winds and heavy snow. Most of the damage occurred in Lincoln City
February 1990	Oregon Coast	Wind	Wind gusts of 53 mph at Netarts. Damage to docks, piers, and boats.
January 1991	Most of Oregon	Wind	Winds of 63 mph at Netarts. 57 at Seaside.
November 1991	Oregon Coast	Wind	Slow-moving storm. 25-foot waves offshore. Buildings, boats, damaged. Transmission lines down.
January 1993	Oregon Coast, Northern Oregon	Wind	Winds of up to 98 mph in Tillamook. Widespread damage, esp. Nehalem Valley.
December 1995	Statewide	Wind	Gusts over 100 mph recorded in Newport. Sea Lion Caves: 119 mph. Followed path of Columbus Day Storm. Four fatalities, many injuries. Widespread damage (FEMA-110-DR-OR)
November 1997	Western Oregon	Wind	80 mph winds in Newport. Severe beach erosion. Trees toppled.
November 2006	Statewide	Wind/Rain	Winds of up to 100mph
December 2007	Oregon Coast	Wind	Winds of over 100 mph

Taylor, G.H. and Hatton, R.R., 1999, The Oregon Weather Book, A State of Extremes: Corvallis, Oregon, Oregon State University Press

Risk Assessment

How are Hazard Areas Identified?

A windstorm is generally a short duration event involving straight-line winds and/or gusts in excess of 50 mph. Windstorms can affect developed areas of the county with significant tree stands and major infrastructure, especially above ground utility lines. The lower wind speeds typical of eastern Lincoln County can still be high enough to knock down trees and power lines, and cause other property damage.

According to the 2005 Oregon Residential Specialty Code, Lincoln County is listed as a 110 mph area under their designation: Oregon Basic Wind Speeds for 50 Year Mean Recurrence Interval. This is their highest wind speed rating. Lincoln County is further divided up into varying exposure levels: Exposure B, C, and D.

- Exposure B: Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single family dwellings or larger.
- Exposure C: Open terrain with scattered obstructions, including surface undulations or other irregularities, having heights generally less than 30 feet extending more than 1,500 feet from the building site in any quadrant.
- Exposure D: Flat, unobstructed areas exposed to wind flowing over open water for a distance of at least 1 mile. Shorelines in exposure D include inland waterways and coastal areas. This exposure shall apply only to those buildings and other structures exposed to the wind coming from over the water. Exposure D extends inland from the shoreline a distance of 1,500 feet or 10 times the height of the building or structure, whichever is greater.

For winter weather events (including high winds,) the National Weather Service monitors gauging stations and provides public warnings for storms and high winds.

Probability of Future Occurrence

High windstorms occur yearly; storms with significant destructive potential typically occur once or twice per decade. Extreme high wind events on the order of the 1962 Columbus Day storm are thought to have a 100-year recurrence interval. The Region 1 Oregon Coast Profile and Risk Assessment describes Lincoln County as having a high probability for wind storms, meaning one incident is likely within a 10-35 year period. This score is based on an analysis of risk conducted by county emergency managers, usually with the assistance of a team of local public safety officials.[1] The high ranking is supported by members of the Lincoln County Natural Hazards Mitigation Steering Committee.

Vulnerability Assessment

Windstorms can cause power outages, transportation, and economic disruptions. Structures most vulnerable to high winds in Lincoln 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 Yaquina Bay Bridge are often closed during these high wind events.

The Region 1 Oregon Coast Profile and Risk Assessment describes Lincoln County as having a high level of vulnerability to wind storms, meaning 10% or more of the population would be affected by a major windstorm event. This score is based on an analysis of risk conducted by county emergency managers, usually with the assistance of a team of local public safety officials. The high ranking is supported by members of the Lincoln County Natural Hazards Mitigation Steering Committee.

Risk Analysis

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.

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.

Historically, falling trees have been the major cause of power outages in Lincoln County. 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.

Wind storms can be particularly damaging to manufactured homes and other non-permanent housing structures, which, in 2000, accounted for 16.3% of the housing units in Lincoln County. Special attention should be given to securing these types of structures.

Existing Hazard Mitigation Activities

Oregon Building Code

The Oregon Building Code prescribes standards for structures which require specific design for identified wind load, with additional requirements addressing high exposure areas.

Lincoln County Public Works

Lincoln County crews actively work to locate and remove hazardous trees located along county roads. This often involves working with abutting property owners. This work is scheduled throughout the year in an attempt to reduce storm related damage. However, in Lincoln County there are a great many trees and the problem can never be eliminated.

When a wind storm is forecasted, as one was in 2007, the road crew is placed on alert and assigned to different locations through out the county for quick response. Each crew is in radio contact and notified when a hazard has occurred. Each crew carries a power saw for removal of trees that have blown over. The vehicle (pickup) is equipped with a snow plow that allows the crew to quickly push the tree off of the road. This reduces the amount of time exposed to additional trees blowing over and opens the road quickly and efficiently. Crews must evaluate each occurrence as to the possibility of down power lines and the potential for additional blow down.

Hazard Mitigation Action Items

Short-term Windstorm Action Items

Short-term windstorm action items include general mitigation activities that agencies are capable of implementing during the next two years, given their existing resources and authorities.

Short Term Action Item #1: Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during windstorm events.

Ideas for Implementation:

- Partner with responsible agencies and organizations to design and disseminate education information to property owners to reduce risk to life, property, commerce and utility systems from tree failure;
- Develop partnerships between utility providers and county and local public works agencies to document known hazard areas and minimize risks; and
- Identify and find solutions to potentially hazardous trees in urban areas, near utility corridors, and near vital infrastructure; and partner with responsible agencies and organizations to develop landscaping and tree programs that have less impact on aboveground utility lines and roads.
- Coordinating Organization: Emergency Services
- Internal Partners: GIS, Public Works, Planning and Development
- External Partner: Cities, USFS, BLM, State Parks, utility providers
- Timeline: 2 years
- Plan Goals Addressed: Emergency Operations; Education & Outreach; Partnerships; Protection; Natural Resources

Short Term Action Item #2: Develop and implement, or enhance strategies for debris management and/or removal after windstorm events

Ideas for Implementation:

- Develop coordinated management strategies for clearing roads of fallen trees, and clearing debris from public and private property; Coordinate with those local agencies responsible for debris removal and provide residents locations for debris disposal; and Notify area residents, business owners, and employees of alternative routes in case of road blockage
- Coordinating Organization: Emergency Services, Solid Waste District
- Internal Partner: Public Works
- External Partner: ODOT, cities, regional recycling facilities
- Timeline: 2 years
- Plan Goals Addressed: Emergency Operations; Partnerships; Protection; Natural Resources; Implementation

Long-term Windstorm Action Items

Long-term windstorm action items include general mitigation activities that are likely to take more than two years to implement and may require new or additional resources and/or authorities.

Long Term Action Item #1: Map and publicize locations around the county that have the highest incidence of extreme windstorms.

Ideas for Implementation:

- Identify a responsible agency for central collection and reporting of storm data. Data collected should include:
- Windstorm data (sustained speeds, gusts, storm durations) for localities throughout the county.
- Maps of the locations within the county most vulnerable to high winds.
- Injury and property damage estimates, including locations.
- Identify a responsible agency to collect and transfer data to the National Climate Data Center (NCDC), Oregon Climate Service (OCS), FEMA, or other agencies concerned with the incidence of storms, to help establish and maintain baseline and historic records of storm events; and
- Identify public infrastructure and facilities subject to damage or closure during windstorm events.
- Coordinating Organization: Emergency Services
- Internal Partner: Planning, GIS
- External Partner: FEMA, NCDC, OCS, NWS
- Timeline: 5 years
- Plan Goals Addressed: Protection; Natural Resources

Long Term Action Item #2: Increase public awareness of windstorm mitigation activities.

Ideas for Implementation:

- Collect existing information on public education materials for protecting life, property, and the environment from windstorm events;
- Identify and collect additional information and programs as necessary; and
- Distribute educational materials to County residents and public and private sector organizations regarding preparedness for no-power situations.
- Coordinating Organization: Emergency Services
- Internal Partner: Planning
- External Partner: Utilities, cities, FEMA
- Timeline: On-going
- Plan Goals Addressed: Emergency Operations; Education & Outreach; Protection; Natural Resources.

Long Term Action Item #3: Continue and enhance windstorm resistant construction methods where possible to reduce damage and power outages from windstorms.

Ideas for Implementation:

- Seek grants for increasing the use of underground utilities where possible;
- Provide guidance on wind-resistant construction methods; and
- Coordinating Organization: Planning and Development
- Internal Partner: Planning and Development, Emergency Services
- External Partner: Cities, utilities
- Timeline: 5 years
- Plan Goals Addressed: Education and Outreach; Protection

Long Term Action Item #4: Encourage critical facilities to secure emergency power.

Ideas for Implementation:

- Seek funding and capital improvements for emergency power supplies for all identified critical facilities.
- Coordinating Organization: Emergency Services
- Internal Partner: Planning and Development
- External Partner: Cities, neighboring counties, Lincoln Fire, police stations, water systems
- Timeline: On-going
- Plan Goals Addressed: Emergency Operations; Partnerships; Natural Resources

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[1] Oregon Emergency Management, July 2003, County Hazard Analysis Scores.

Volume III:
City Addenda

Volume III: City Addenda
City of Depoe Bay

Overview

The city of Depoe Bay developed this addendum to the Lincoln County multi-jurisdictional Natural Hazards Mitigation Plan in an effort to increase the community's resilience to natural hazards. The addendum focuses on the natural hazards that could affect Depoe Bay, Oregon, which include coastal erosion, droughts, earthquakes, floods, landslides, tsunamis, volcanoes, wildfires and windstorms. It is impossible to predict exactly when disasters may occur, or the extent to which they will affect the city. 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 addendum provides a set of actions that aim to reduce the risks posed by natural hazards through education and outreach programs, the development of partnerships, and the implementation of preventative activities such as land use or storm water management plans. The actions described in the addendum are intended to be implemented through existing plans and programs within the city.

The addendum is comprised of the following sections: 1) Addendum Development Process; 2) Community Profile; 3) Risk Assessment; 4) Action Items; and 5) Plan Implementation and Maintenance.

Addendum Development Process

In the fall of 2006, the Oregon Partnership for Disaster Resilience (the Partnership/OPDR) at the University of Oregon's Community Service Center partnered with the Oregon Emergency Management (OEM) and Clatsop and Lincoln Counties to develop a Pre-Disaster Mitigation Grant proposal. Both Counties joined the Partnership by signing (through their county commissioners) a Memorandum of Understanding for this planning project. FEMA awarded the Oregon Coast Region a grant to support the development of the natural hazard mitigation plans for the two counties and cities therein. The Partnership, OEM, and the participating communities were awarded the grant in the fall of 2006 and local planning efforts began in the fall of 2007.

With guidance from the Partnership and assistance from the Lincoln County Department of Planning and Development, the city of Depoe Bay formed a local steering committee to participate in the addendum's development. The Depoe Bay Steering Committee was comprised of representatives from the following departments:

Depoe Bay City Recorder

Depoe Bay Planning Department

Depoe Bay Public Works Department

Depoe Bay Rural Fire Protection District

The committee first met on January 21, 2009; thereafter, the committee remained engaged and provided subsequent feedback and review of plan drafts. Staff from the Lincoln County Department of Planning and Development developed and facilitated the January 21, 2009 meeting at Depoe Bay's City Hall. During the meeting, the city's steering committee reviewed the county's risk assessment and discussed how the city's risks (i.e. hazards characteristics, probabilities of occurrence, local vulnerabilities, and community-specific impacts) differed from the county's. Additionally, the committee identified city-specific mitigation actions and expressed interest in building greater partnerships with the county via mitigation and/or emergency management-related activities.

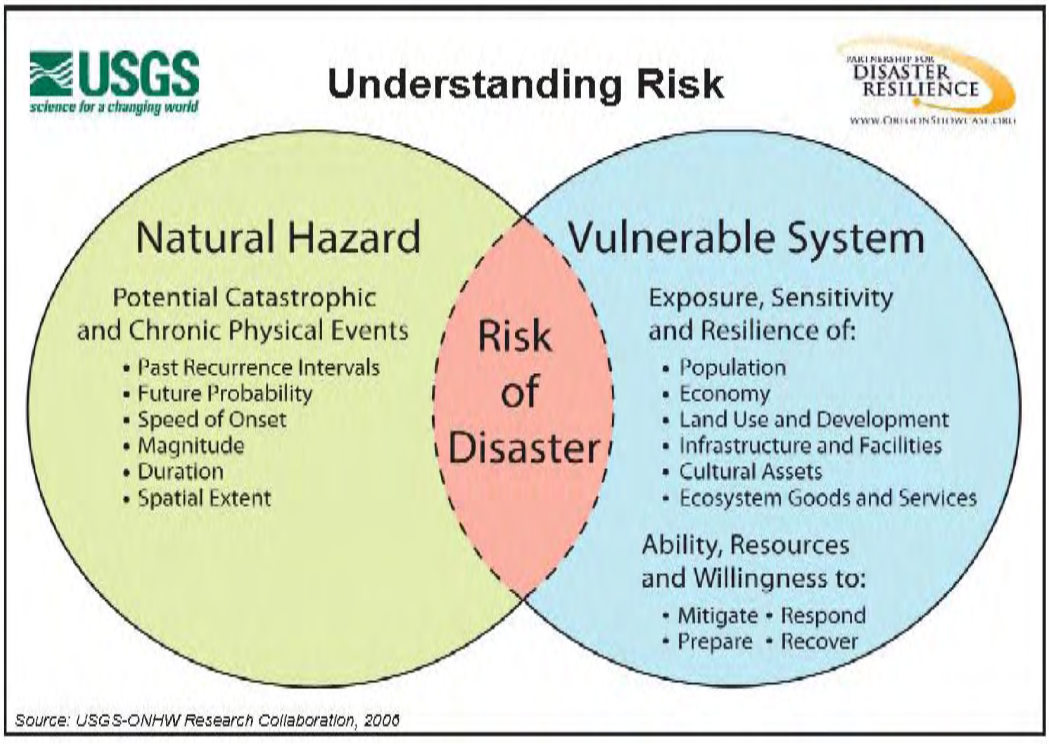
In _____ 2009, the Depoe Bay Steering Committee presented the draft addendum to the Depoe Bay City Council. The city will be responsible for maintaining and updating this addendum in coordination with the county's semi-annual plan update meetings.

The city of Depoe Bay adopted its addendum to the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan via resolution on _____.

Community Profile

The following section describes the city of Depoe Bay from a number of perspectives in order to help define and understand the city's sensitivity and resilience 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 Depoe Bay when the plan was developed. The information documented below, along with the risk assessments, should be used as the local level rationales for the city's risk reduction actions. The identification of actions that reduce the city's sensitivity and increase its resilience assist in reducing overall risk, or the area of the overlap in Figure 1 below.

Figure 1 Understanding Risk



Source: USGS - Partnership for Disaster Resilience Research Collaborative, 2006.

Geography & Climate

The city of Depoe Bay is located on the central Oregon Coast in Lincoln County Oregon, approximately 12 miles south of the city of Lincoln City and 93 miles from the metropolitan area of the city of Portland.[i] Depoe Bay sits at an average elevation of approximately 58 feet above sea level.[ii] Depoe Bay city limits covers a land area of approximately 1.80 square miles and has a small natural navigable harbor consisting of six square miles. The city is known as the "Whale Watching Capital of the World" and a resident pod of grey whales makes its home off Depoe Bay from March through December.[iii] The climate in Depoe Bay is moderate. Average monthly temperatures range from a low of 37 degrees to a high of 66 degrees. The hottest month is September and the coldest month is January. The driest month is July and the wettest month is December. Depoe Bay has an average annual precipitation of approximately 71.7 inches.[iv] The city is bound to the north by Boiler Bay State Park and to the south by Big Whale Cove.

Population & Demographics

The city of Depoe Bay was incorporated in 1973. The population was 1,174 in 2000 and 1,310 in 2006.[v] These population estimates do not take into account the large influx of tourists travelling to Depoe Bay each year.

Disaster impacts (in terms of loss and the ability to recover) vary among population groups following a disaster. Historically, 80% of the disaster burden falls on the public. Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities and low income persons. In 2000, 5.5% of families and 8% of individuals were living below the poverty line. Additionally, 32.5% of the population is over 60. Of those over 65, 26.8% are disabled.[vi] Table 1 below displays population by age in Depoe Bay, and Table 2 shows the percentage of Depoe Bay's disabled population by age.

Table 1: Population by Age: Depoe Bay, 2000

Age	Percent
Under 5 years	3.1
5 to 9 years	3.6
10 to 14 years	4.9
15 to 19 years	4.2
20 to 24 years	2.6
25 to 34 years	7.2
35 to 44 years	14.9
45 to 54 years	19.3
55 to 59 years	7.8
60 to 64 years	8.6
65 to 74 years	14.4
75 to 84 years	8.1
85 years and over	1.4

Source: U.S. Census 2000

Table 2: Disabled Population, Depoe Bay, 2000

Age	Percent
5-20 years	14.9
21-64 years	20.9
65-over	26.8

Source: U.S. Census 2000

Employment & Economics

According to the 2000 Census, the largest "employment industry" in Depoe Bay is comprised of arts, entertainment, recreation, accommodation and food services. Statistics suggest that tourism is a primary source of economic activity in Depoe Bay. "Retail trade" and "education, health and social services" compete equally as the second major employment industry (see Table 3 below).

Table 3: Employment by Industry, Depoe Bay, 2000

Industry	Number of Employees	Percent of Workforce
Arts, entertainment, recreation, accommodation and food services	137	26.4
Retail trade	70	13.5
Educational, health and social services	70	13.5
Construction	49	9.5
Transportation and warehousing, and utilities	40	7.7
Finance, insurance, real estate, and rental and leasing	33	6.4
Professional, scientific, management, administrative, and waste management services	27	5.2
Agriculture, forestry, fishing and hunting, and mining	26	5.0
Manufacturing	25	4.8
Other services (except public administration)	16	3.1
Public administration	14	2.7
Information	6	1.2
Wholesale trade	5	1.0

Source: Economic Census 2000

The five largest employers include the city of Depoe Bay-city services (12 employees); Ainslee's Salt Water Taffy-candy (7 employees); Sea Hag Restaurant (9 employees); Spouting Horn Restaurant (9 employees); and Tidal Raves Restaurant (9 employees).[vii]

Median income can be used as an indicator of the strength of the region's economic stability. In 2007, the estimated median household income was $42,193. This is approximately $6,500 less than the state's median household income of $48, 730. [viii]

Local and regional economic development organizations include the city of Depoe Bay and Harbor, the Depoe Bay Chamber of Commerce, Central Coast Economic Development Alliance, and the Economic and Community Development Department Regional Development Officer.

Housing

Housing type and year built are important factors in mitigation planning. Certain housing types tend to be less disaster resilient and warrant special attention; mobile homes, for example, are generally more prone to wind and water damage than standard stick-frame homes. Generally the older the home is, the greater the risk of damage from natural disasters. This is because stricter building codes have been developed following improved scientific understanding of plate tectonics and earthquake risk. For example, structures built after the late 1960's in the Northwest and California use earthquake resistant designs and construction techniques. In addition, FEMA began assisting communities with floodplain mapping during the 1970's and communities developed ordinances that required homes in the floodplain to be elevated to one foot above the Base Flood Elevation.

In 2000, Depoe Bay had 911 housing units. Of those, 66.1% (386) were owner occupied, 33.9% (196) were renter occupied, and 30.5 (327) were vacant. Of the vacant housing units, 23.5% (214) were for seasonal, recreational, or occasional use.[ix] Just under half (43%) of the city's housing stock was built prior to 1980, before stronger seismic building codes were put into place. Table 4 shows housing units by year built and Table 5 displays the type of housing available in Depoe Bay.

Table 4: Housing Structure Age, Depoe Bay, 2000

Year Built	Percent of Structures
1980-2000	47%
1960-1980	31.5%
Before 1960	21.6%

Source: U.S. Census 2000

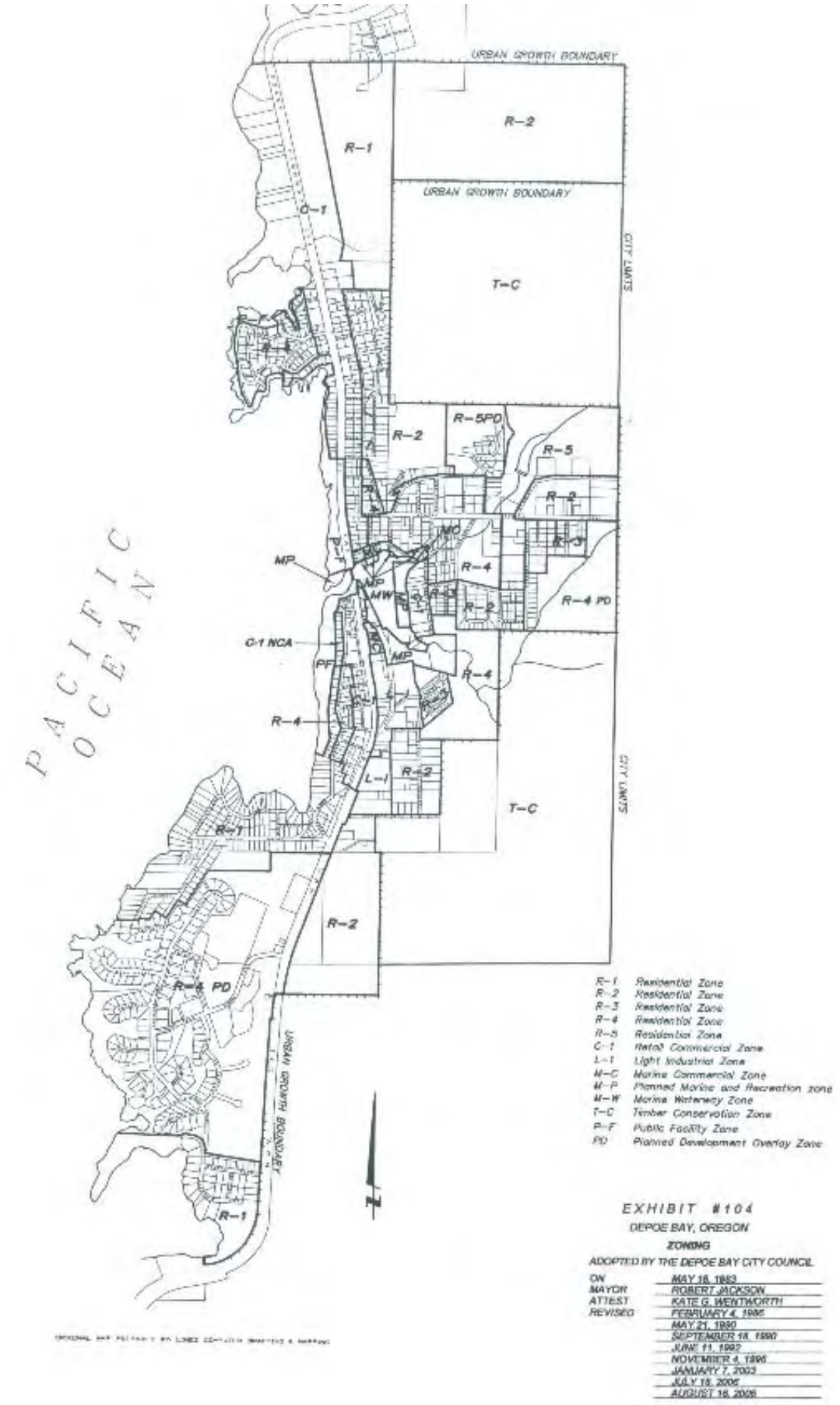
Table 5: Housing Type, Depoe Bay, 2000

Housing Type	Percent
Single-family	61.4%
Mobile Homes	13.1%
Multi-family	3.8%
Boat, R.V., Van, etc.	1.6%

Source: U.S. Census 2000

Lane Use & Development

Development in Depoe Bay spreads mostly north to south along US-Highway 101. Dense commercial areas in Depoe Bay exist along US-Highway 101 and are centrally located in the downtown area and around the harbor. Residential development is located north, south, and east of downtown along US-Highway 101, and west along the Pacific Ocean. The city's Comprehensive Plan identifies land use needs within the city and its urban growth boundary. The map below displays the city of Depoe Bay's zoning map.


URBAN GROWTH BOUNDARY
R-1
R-2
C-1
T-C
CITY LIMITS
R-5PD
R-5
R-3
R-4
R-4 PD
MP
MW
C-1 NCA
PF
L-1
PACIFIC OCEAN
R-1
R-2
R-4 PD
R-1
R-1 Residential Zone
R-2 Residential Zone
R-3 Residential Zone
R-4 Residential Zone
R-5 Residential Zone
C-1 Retail Commercial Zone
L-1 Light Industrial Zone
M-C Marine Commercial Zone
M-P Planned Marine and Recreation zone
M-W Marine Waterway Zone
T-C Timber Conservation Zone
P-F Public Facility Zone
PD Planned Development Overlay Zone
EXHIBIT #104
DEPOE BAY, OREGON
ZONING
ADOPTED BY THE DEPOE BAY CITY COUNCIL
ON MAY 18, 1983
MAYOR ROBERT JACKSON
ATTEST KATE G. WENTWORTH
REVISED FEBRUARY 4, 1986
MAY 21, 1990
SEPTEMBER 18, 1990
JUNE 11, 1992
NOVEMBER 4, 1996
JANUARY 7, 2003
JULY 18, 2006
AUGUST 18, 2006

Transportation

The city of Depoe Bay lies adjacent to US-Highway 101. US-Highway 101 is the principle state access route along the Oregon Coast. Major routes from U.S. Interstate 5 in the Willamette Valley to Lincoln County include Highways 18, 20, and 34. Transportation is an important consideration when planning for emergency service provisions.

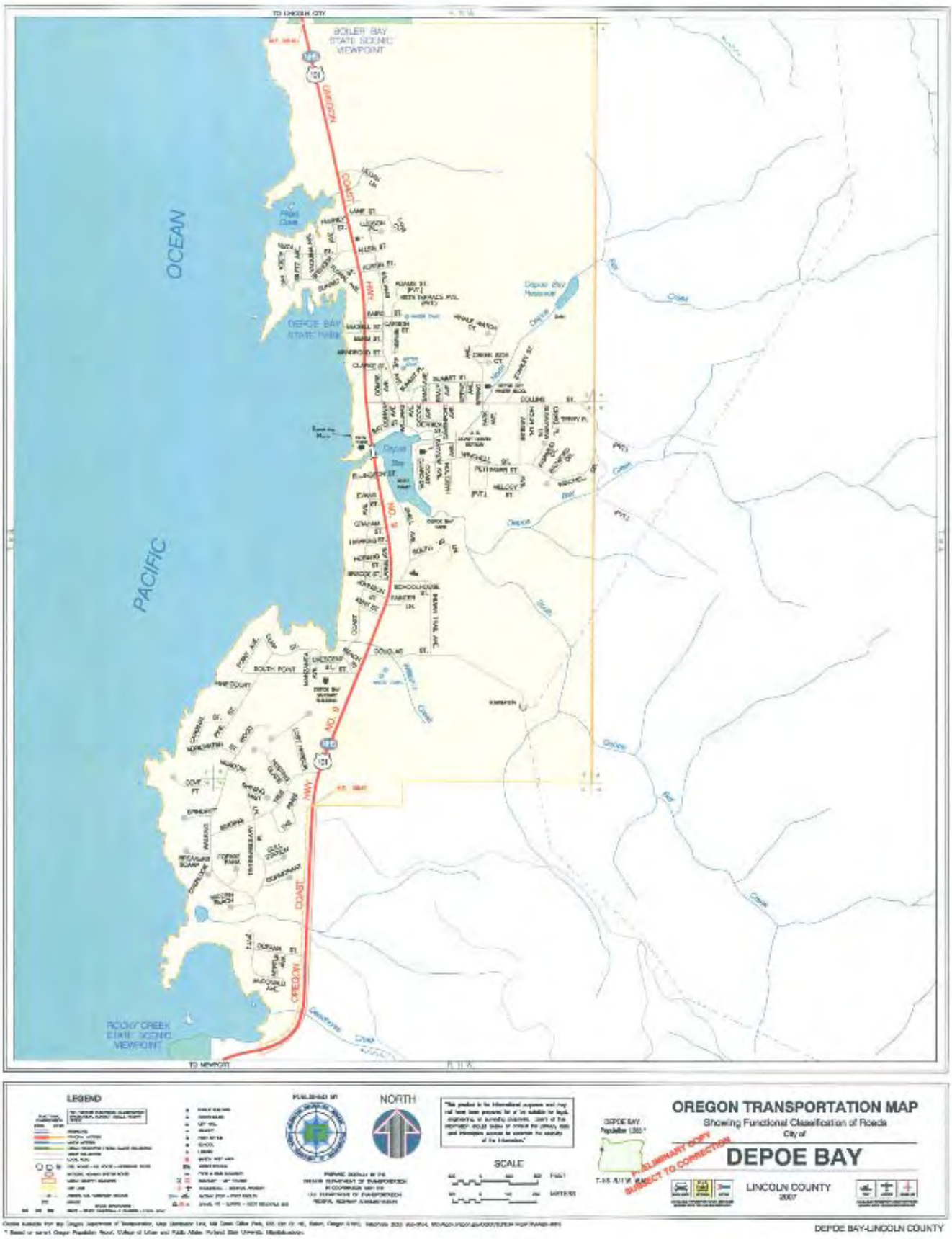
Growth within the city will put pressure on both major and minor roads, especially if the main mode of travel is by single occupancy vehicles. How people travel to work is indicative of the prevalence of single occupancy vehicle travel, and can help predict the amount of traffic congestion and the potential for accidents. Table 6 represents the different methods city residents use to travel to work.

Table 6: Means of Transportation and Carpooling, Depoe Bay 2000

Type of Transportation	Percent
Car, Truck or Van-drove alone	66.7%
Car, Truck, or Van-carpooling	15.2%
Worked at Home	9.4%
Walked	7.3%
Other means	1.3%
Public Transportation(including taxicab)	0%

Source: U.S. Census 2000

The following map is from the Oregon Department of Transportation and shows the major road systems in the city of Depoe Bay.



DEPOE BAY-LINCOLN COUNTY

Critical Facilities & Infrastructure

Critical facilities are those that support government and first responders' ability to take action in an emergency. They are the top priority in any comprehensive hazard mitigation plan. The city of Depoe Bay has the Depoe Bay City Hall, the wastewater treatment plant, and the water treatment plant.

Historical & Cultural Resources

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

Completion of the Roosevelt Highway and Depoe Bay Bridge in 1927 made Depoe Bay more accessible to tourists, new residents and those seeking to invest in the area. The natural beauty of the rugged coastline, rich marine life and abundant natural resources made Depoe Bay a popular destination early on. In 1927, the Depoe Bay Aquarium was built and remained one of the only privately owned aquariums in the United States until its closure in 1998. Given its proximity to the Pacific Ocean, Depoe Bay is a coastal fishing community where whale watching is also a popular activity.[x]

Depoe Bay has many festivals and community events through the year, including the Waterdog Trivia contest, Recognition Dinner for the Fire Department and Coast Guard, Easter Egg Hunt, Wooden Boat Show, Crab Feed and Ducky Derby, Fish and Chips Fundraiser for the Fleet of Flowers, Fleet of Flowers Memorial Day Ceremony, Annual Fireworks Display, Cruise into Drive Out Hunger, Chamber of Commerce Picnic, Annual Salmon Bake, and the Annual Sunday in the Park. Other local attractions include clamming, crabbing, deep sea fishing, watching spouting horns, whale watching, beachcombing and exploring tide pools. Recreational amenities include the Depoe Bay Whale Watch Center, the Depoe Bay City Park, Rocky Creek Scenic Area, Boiler Bay Scenic Area, and a wide range of restaurants, galleries and shops.

Government Structure

The City Council is the policy making body for the city of Depoe Bay. As the elected legislative body in Depoe Bay, the City Council has the overall responsibility for the scope, direction and financing of city services. Council members serve four or two years. Additional departments within the city include the following:

City Recorder: The city recorder assures the timely presentation of formal communications from the public, other agencies and city staff to the City Council. The recorder prepares City Council meeting agendas; maintains official city records which reflect the action of the governing body; maintains depository of contracts, agreements and official Council actions

and ensures the timely availability of these records to the Council, public, other agencies and staff.

Public Works Department: The public works department provides responsive community services related to planning, design, construction, operation, maintenance and management of public infrastructure, including streets, sewer, water treatment, waste water treatment, public buildings, and other facilities. Services provided by the department contribute to the public health, safety, economic diversity, environmental quality and citizen convenience.

Land Use Planning: The city provides services and information to the general public regarding all phases of community development and land use planning. Staff implements city ordinances, administers the local comprehensive plan and land use code, and advises the City Council and Planning Commission on all land use and special project matters.

Although not a city department, the Depoe Bay Rural Fire Protection District, serves the incorporated city of Depoe Bay.

Other commissions exist in Depoe Bay and assist in facilitating public services in the following areas: Harbor Commission, Traffic Safety Commission, Parks Commission, Salmon Enhancement Commission, and the Near Shore Action Team.

Existing Plan & Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances, and technical reports or studies. Plans and policies already in existence have support from local residents, businesses and policy makers.

Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs. Depoe Bay's addendum includes a range of recommended action items that, when implemented, will reduce the city's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the city's existing plans and policies. Linking existing plans and policies to the Natural Hazards Mitigation Plan addendum helps identify what resources already exist that can be used to implement the action items identified in the addendum. Implementing the city's mitigation actions through existing plans and policies increases their likelihood of being supported and getting updated, and maximizes the city's resources.

The following table documents the plans and policies currently in place in Depoe Bay.

Name	Date of Last Revision	Description	Relations to Natural Hazard Mitigation
Comprehensive Plan	1991	A document stating the general, long-range policies that will govern a local community's future development.	Contains city-specific information regarding natural hazards within the city's jurisdictional boundaries.
Zoning Ordinance	2007	An ordinance establishing land use zones to regulate the use of land, location of buildings and structures; and prescribing regulations governing the division of land within the city of Depoe Bay.	Contains city-specific hazard related requirements for the placement and construction of buildings, development in the floodplain, development of coastal shorelands, construction on steep slopes, and division of land.

Community Organizations and Programs

Social systems can be defined as community organizations and programs that provide social and community-based services, such as health care or housing assistance, to the public. In planning for natural hazard mitigation, it is important to know what social systems exist within the community because of their existing connections to the public. Often, actions identified by the plan involve communicating with the public or specific subgroups within the population (e.g. elderly, children, low income). The county and cities can use existing social systems as resources for implementing such communication-related activities because these service providers already work directly with the public on a number of issues, one of which could be natural hazard preparedness and mitigation. The countywide community organizations and programs table can be found in Section 2: Community Overview of the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan. The table highlights organizations that are active within the county and may be potential partners for implementing mitigation actions.

Existing Mitigation Activities

Existing mitigation activities include current mitigation programs and activities that are being implemented by the community in an effort to reduce the community's overall risk to natural hazards. Documenting these efforts can assist participating jurisdictions in better understanding risk and can assist in documenting successes. The following efforts have occurred or are on-going within the city of Depoe Bay:

- The Depoe Bay City Council adopted an Emergency Operations Plan in June 2008. The purpose of the plan is:

    - To provide, in cooperation with the Lincoln County Department of Emergency Services, effective city operations to minimize the results of emergency situations or a natural or man-made disaster.
    - To define the structure and function of the Emergency Operations Team who provides a coordinated response in emergency situations.
    - To organize an Emergency Operations Center from which city government can function efficiently during an emergency.
    - To specify the duties and responsibilities of personnel in the emergency Operations Center during an emergency.
    - To establish the framework for local plans to provide:
        - Adequate warning in event of a natural or man-made disaster.
        - Emergency operations of public services.
        - Coordination between the Emergency Operations Center and response teams in the field.
        - Evacuation and shelter facilities for the citizenry.
- The city has an Emergency Preparedness Locations Map that identifies evacuation routes and short-term assembly areas for neighborhoods throughout Depoe Bay. The map also identifies long-term assembly areas.
- The city enforces a building setback requirement for all development located along the oceanfront and harbor frontage. A primary purpose of the setback is to reduce property damages related to coastal erosion, wind storms, and flooding. The setback requirements also serve to meet the city's natural hazard goals, as defined in the Depoe Bay Comprehensive Plan:
    - To protect life and property from natural disasters and hazards.
    - To provide for adequate safeguards for land uses in areas of natural hazards.
- The City Comprehensive Plan and Zoning Ordinance state legislation: SB 378, implemented as Oregon Revised Statutes (ORS) 455.446 and 455.447, limits construction of new essential facilities and special occupancy structures in tsunami flooding zones.

Risk Assessment

The following hazards have been addressed in the Lincoln County Natural Hazard Mitigation Plan. The city of Depoe Bay reviewed the county's plan on January 21, 2009 and assessed how the city of Depoe Bay's risks vary from the risks facing the entire planning area.

Coastal Erosion

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of coastal erosion hazards. Erosion is a natural process that continually affects coastal areas. In the city of Depoe Bay and elsewhere along the Pacific, erosion becomes a hazard when lives and personal properties are at risk of damage. Erosion is typically a gradual process, which can be greatly accelerated in the event of a storm. Records of damages are not available at this time; however, events may have occurred in tandem with previous storms.

Depoe Bay has many high cliffs, as well as developments that are very close to the ocean. The city rests on a combination of basalt and sandstone. Aside from oceanfront properties, one area identified as particularly vulnerable to coastal erosion is the north side of the Depoe Bay harbor. The north side of the harbor consists of very high, steep, vertical sandstone cliffs where a condominium complex and several homes are located. The city also has a main sewer line located in Bay Street at the top of the cliff. Some erosion has occurred in these areas. The county identified areas along Highway 101 that have sustained erosion-induced damages. Within the city of Depoe Bay, however, the highway is safe. Potential community-related impacts, including shoreline reduction, economic (tourism-related) impacts, and property/infrastructural damage, are adequately described within the county's coastal erosion annex.

In an effort to mitigate the effects of coastal erosion, the city requires new development to comply with setback restrictions. Because coastal erosion is a continual process, the county has described the hazard's **probability** as **"high,"** meaning one incident is likely to occur within a 10-35 year period. The city of Depoe Bay agrees with the county's probably assessment, due to the city's location along the coast. The county additionally estimates a "moderate" vulnerability to coastal erosion hazards, meaning 1-10% of the population or regional assets are likely to be affected by this hazard. Depoe Bay believes that, due to their property setback requirements for new developments, they've reduced their otherwise "high" vulnerability to this hazard. As such, the city also rates its **vulnerability** as **"moderate,"** meaning 1-10% of the population or regional assets are likely to be affected by coastal erosion hazards.

The city of Depoe Bay uses the RNKR Environmental Hazards Inventory of coastal Lincoln County, Oregon as a mapping and reporting tool for coastal erosion. Although not included in this addendum, the coastal erosion map can be obtained at the Depoe Bay City Hall.

Drought

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of drought hazards. Due to a cool and wet climate, past and present weather conditions have generally spared coastal communities from the effects of severe drought. Depoe Bay, however, has experienced droughts in the past due to a lack of potable surface water. There are three creeks that supply the city's water- North Depoe Bay Creek, South Depoe Bay Creek, and Rocky Creek. In the event that climate patterns change and drought becomes a probable hazard, Depoe Bay would be vulnerable to drought conditions. These creeks are a direct-flow water source where contamination is a potential threat to water supply.

Lincoln County estimates that the **probability** of a drought is **"low,"** meaning no more than one event is likely to occur within a 75-100 year period. Depoe Bay agrees with the county's estimate, but also acknowledges uncertainty in predicting weather patterns. The city will review this estimate every five years, in concurrence with the county's plan update process.

Lincoln County additionally estimates a "low" vulnerability to drought hazards, meaning less than 1% of the population or regional assets would be affected by a major emergency or disaster. Due to the city's lack of back-up water sources and/or intergovernmental mutual assistance agreements, Depoe Bay estimates a **"moderate" vulnerability** to drought hazards, meaning 1-10% of the population could be affected by a major drought event. Potential drought-related impacts are adequately described within the county's drought hazard annex.

Earthquake

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics, location, and extent of earthquake hazards for the region. The county's plan additionally identifies all previous earthquakes that have affected the city. It is difficult to estimate recurrence intervals, but the state has experienced seven Cascadia Subduction Zone (CSZ) events in the last 3500 years- some of which were probably as large as a magnitude (M)9. These events are estimated to have an average recurrence interval between 500 and 600 years, although the time interval between individual events ranges from 150 to 1000 years. The last CSZ event occurred approximately 300 years ago. Scientists estimate there is a **10-20% probability** that a subduction zone earthquake will occur within the next 50 years.[xi] Based on this information, Lincoln County estimates a "high" probability that an earthquake will occur in the future. The city of Depoe Bay agrees with this estimate.

Lincoln County additionally estimates a "moderate" vulnerability to earthquake hazards, meaning 1-10% of the population or regional assets would be affected by a major emergency or disaster. Due to the city's concentrated population and resources, however, the city believes that its **vulnerability** to a high magnitude earthquake would be **"high"** meaning

more than 10% of the population or regional assets would be affected by an event. As shown in Table 4 above, about 53% of Depoe Bay's housing structures were built prior to enforcement of earthquake resistant building codes. Also, there is considerable development on steep slopes. The Highway 101 Bridge crossing the Bay was built in 1927, and is extremely vulnerable to damage from a high magnitude earthquake. In the event of bridge failure, north Depoe Bay would be isolated from south Depoe Bay. Likewise, transportation throughout the region and along the coast would be impacted if the Depoe Bay Bridge closed.

In addition, the city's infrastructure is highly vulnerable to a severe earthquake event. Sewer lines, water lines, power lines, water tanks, the Fire Hall and City Hall were identified by the steering committee as vulnerable assets. The city would also expect damage to roads following a CSZ event, as well as deaths and severe injuries region-wide. Education and outreach regarding the CSZ is an on-going endeavor in Depoe Bay.

Flood

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of flooding hazards within the region, as well as previous flooding occurrences. Ocean flooding and North and South Depoe Creeks are the primary sources of flooding. Ocean-related flood events happen because of storms and tides. River-related flood events are also caused by storms, as well as rain on snow / snowmelt. Lincoln County estimates a **"high" probability** that flooding will occur, meaning one event is likely within a 10-35 year period. The county estimates a **"moderate" vulnerability** to flood hazards, meaning 1-10% of the population or regional assets are likely to be affected by a major flooding event. Both ratings are true for the city as well.

The city of Depoe Bay has no records of sustained damage or serious impacts associated with major flood events. The city of Depoe Bay participates in the National Flood Insurance Program, and their most recent effective map date is October 15, 1980. The city has 141 National Flood Insurance Policy holders, with a total coverage of $31, 302,300. Two claims have been paid since 1978, at a total of $5,222. The number of buildings and/or properties within the floodplain is not available at this time. Additionally, there have been no repetitive loss properties in the city of Depoe Bay.[xii]

Landslide

Lincoln County's Natural Hazard Mitigation Plan adequately describes the causes and characteristics of landslides, and appropriately identifies previous landslide occurrences within the region, as well as the location and extent of previous and potential slides. No records for city-specific landslides have been kept, but the steering committee identified that the Army Corps of Engineers installed 72 pilings, 40-60 feet deep to prevent landslides from occurring east of the harbor.

In general, the east/northeastern portion of the city consists of steep slopes where development pressure exists. Road cracking has occurred in some areas, but no significant losses are documented. The city's water reservoir and a water tank are located in the eastern part of the city. Depoe Bay rebuilt the water tank in accordance with modern seismic and building code requirements to prevent damages from occurring in both earthquake and landslide events. Potential community-related impacts are adequately described within the county's plan, and include infrastructural damages, economic impacts (due to isolation and /or arterial road closures), property damage, and obstruction to evacuation routes.

In 2007, the Oregon 74th Legislative Assembly directed the Department of Geology and Mineral Industries (DOGAMI) to extend LIDAR collection efforts throughout the state. LIDAR (light detection and ranging) is a tool that can provide high-resolution images of the surface of the earth, and it's excellent for mapping natural hazards and landslides. When the statewide LIDAR studies are completed, the city of Depoe Bay will have a much greater understanding of its landslide risks. [xiii]

The county currently estimates a "moderate" probability that landslides will occur in the future, meaning one event is likely within a 35-75 year period. Due to the concentration of residential, commercial, infrastructure on steep slopes, however, the steering committee estimates a **"high" probability** that landslides will occur in the future, meaning one event is likely within a 10-35 year period. The county estimates a **"high" vulnerability** to landslide hazards, meaning more than 10% of the population or regional assets are likely to be affected by a major emergency or event. The city agrees with this rating.

Tsunami

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of tsunami hazards, as well as the previous occurrences of tsunami events within the region. The Department of Geology and Mineral Industries (DOGAMI) conducted an analysis resulting in extensive mapping along the Oregon Coast. The maps depict the expected inundation for tsunamis produced by a magnitude 8.8 to 8.9 undersea earthquake. The tsunami maps were produced to help implement Senate Bill 379 (SB 379), which was passed during 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, limit construction of new essential facilities and special occupancy structures in tsunami flooding zones. The 2004 Indian Ocean earthquake and tsunami led DOGAMI to re-evaluate the state's tsunami mapping program. Currently, DOGAMI is using the latest advances in mapping technology (LIDAR), computer technology and computer modeling to run a pilot mapping project for the coastal city of Cannon Beach. The new map will be scenario based, meaning that variations in inundation levels (given local or distant tsunamis) will be

shown. Below is the tsunami inundation zone map produced by DOGAMI.

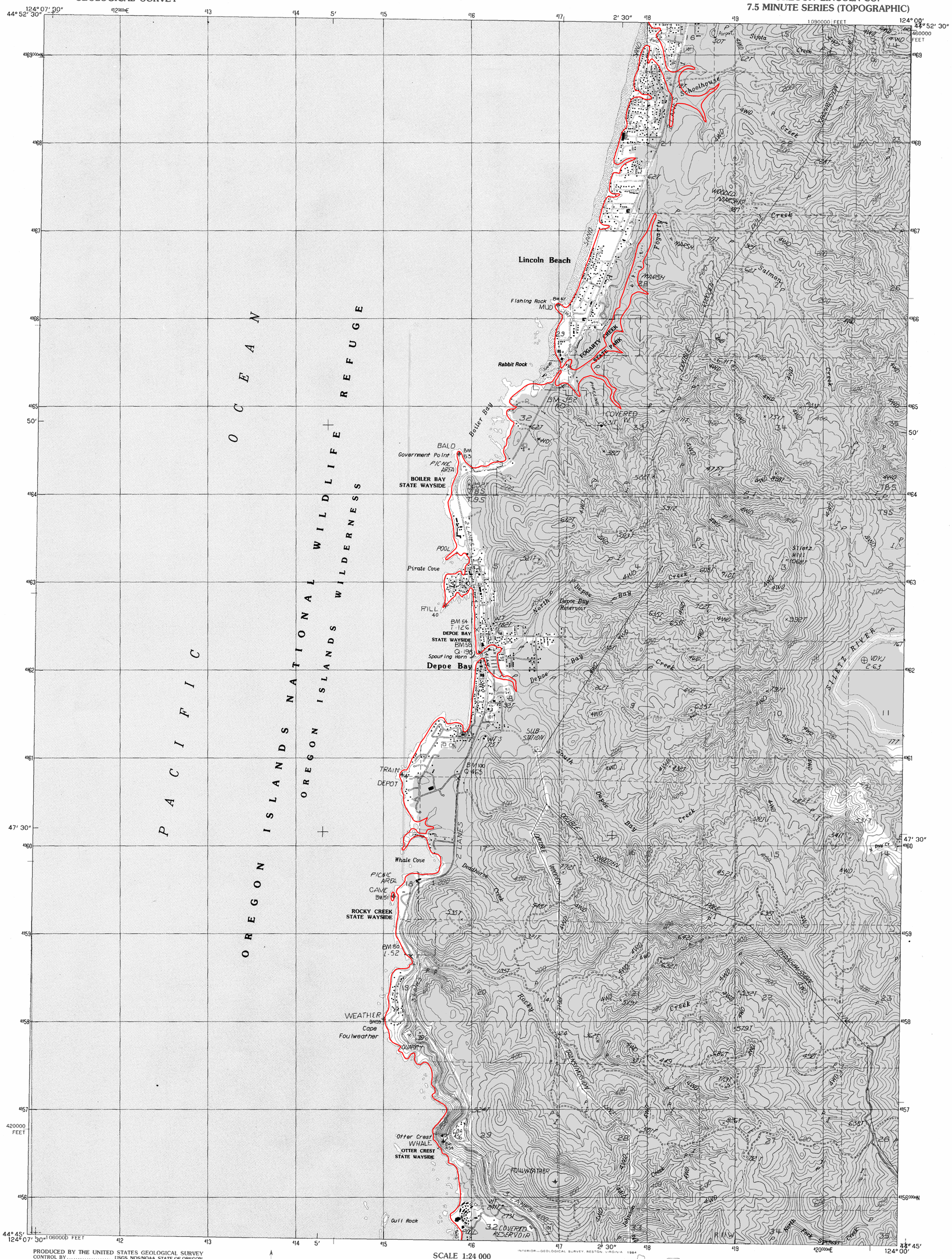
The extent of a tsunami event in Depoe Bay will depend on where the tsunami originated, and the size of the earthquake that produced the tsunami. Lincoln County appropriately describes the probability of a tsunami event for Depoe Bay. Geologists predict a **10-14% chance** that a Cascadia tsunami will be triggered by a shallow, undersea earthquake offshore Oregon in the next 50 years. The forecast comes from evidence for large but infrequent earthquakes and tsunamis that have occurred on the Oregon Coast every 500 years, on average.

The county estimates a **"moderate" vulnerability** to tsunami hazards, meaning 1-10% of the population or regional assets would be affected by a major event. Severe damage could occur on various properties, roads, bridges, communication systems, and infrastructure within Depoe Bay, among other assets described in the county's plan. As such, Depoe Bay agrees with the county's vulnerability estimate. Depoe Bay recognizes the importance of continuing education and outreach, especially to the transient populations (i.e., tourists), and plans to implement greater outreach in the future.

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
DONALD A. HULL, STATE GEOLOGIST

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DEPOE BAY QUADRANGLE
OREGON–LINCOLN CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY
CONTROL BY ..... USGS, NOS/NOAA, STATE OF OREGON
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN 1975-76
FIELD CHECKED ..... 1980. MAP EDITED 1984
PROJECTION ..... LAMBERT CONFORMAL CONIC
GRID: 1000-METER UNIVERSAL TRANSVERSE MERCATOR ...ZONE 10
10,000-FOOT STATE GRID TICKS .... OREGON, NORTH ZONE
UTM GRID DECLINATION ..... 0°45' WEST
1980 MAGNETIC NORTH DECLINATION ..... 19°30' EAST
VERTICAL DATUM ..NATIONAL GEODETIC VERTICAL DATUM OF 1929
HORIZONTAL DATUM .....1927 NORTH AMERICAN DATUM

To place on the predicted North American Datum of 1983, move the projection lines as shown by dashed corner ticks (24 meters north / 98 meters east)

There may be private inholdings within the boundaries of any Federal and State Reservations shown on this map

PROVISIONAL MAP
Produced from original manuscript drawings. Information shown as of date of field check.

SCALE 1:24 000

KILOMETERS 0 1 2
METERS 0 1000 2000
MILES 0 .5 1
FEET 1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10 000

NORTH

OREGON
QUADRANGLE LOCATION

CONTOUR INTERVAL 40 FEET
SUPPLEMENTARY CONTOUR INTERVAL 20 FEET
To convert meters to feet multiply by 3.2808
To convert feet to meters multiply by 0.3048
SHORELINE SHOWN REPRESENTS APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 5 FEET

1	2	3	1 Lincoln City 2 Devils Lake 3
4		5	4 5 Mowrey Landing 6
6	7	8	7 Newport North 8 Toledo North

ADJOINING 7.5' QUADRANGLE NAMES

ROAD LEGEND
Improved Road
Unimproved Road
Trail
Interstate Route U.S. Route State Route

DEPOE BAY, OREG.
PROVISIONAL EDITION 1984

44124-G1-TF-024

FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092

Open File Report O-95-27
Tsunami Hazard Map of the Depoe Bay Quadrangle, Lincoln County, Oregon

Tsunami inundation boundary
upper limit of area expected to be covered by flood water from a tsunami caused by a magnitude 8.8 undersea earthquake

See accompanying text for use of this map, mapping methodology, and acknowledgments.

Mapping by:

George R. Priest, Oregon Department of Geology and Mineral Industries, October-November, 1995.

Volcano

The Lincoln County Natural Hazard Mitigation Plan adequately describes the city's risk to volcanic events. Generally, an event that affects the county is likely to affect the city of Depoe Bay as well. The causes and characteristics of a volcanic event are appropriately described within the county's plan, as well as the location and extent of potential hazards. Previous occurrences are well documented within the county's plan, and the community impacts described by the county would generally be the same for Depoe Bay as well. The city of Depoe Bay is very unlikely to experience anything more than volcanic ash during a volcanic event. When Mt. Saint Helens erupted in 1980, the city received small amounts of ashfall, but not enough to cause significant health and/or economic damages. The county estimates a **"low" probability** of future volcanic events and a **"low" vulnerability** to future eruptions. The county's probability and vulnerability estimates accurately describe Depoe Bay's risks as well.

Wildfire

The Lincoln County Natural Hazard Mitigation Plan adequately describes the causes and characteristics of wildfires. 1849 and 1936 were particularly devastating years for wildfires in Lincoln County, but since then, there have been very few events. T he location and extent of a wildfire will vary depending on fuel, topography, and weather conditions. In Depoe Bay, areas of concern include the eastern side of the city (where forestland borders development), and some of the open spaces within the city's limits.

The county estimates a **"moderate" probability** that local wildfires will occur in the future, meaning no more than one event is likely to occur within a 35-75 year period. Likewise, the county estimates a "**moderate" vulnerability** to wildfires, meaning 1-10% of the population or regional assets are likely to be affected by a major event. Both estimates are true for the city as well.

The potential community impacts and vulnerabilities described in the county's plan are generally accurate for the city as well. Due to the prevailing wind patterns (i.e., from the north or south), the city's steering committee felt that the northern and southern ends of the city might be the most vulnerable spots to wildfire. Power, natural gas, and phone lines run through the forest to the east of the city, and would be affected in the event of a wildfire. Likewise, active commercial logging occurs just outside the city, and slash burns are a potential wildfire concern. The county is currently engaged in an effort to develop a Community Wildfire Protection Plan (CWPP) which will map vulnerable areas, among other things.

Windstorm

The Lincoln County Natural Hazard Mitigation Plan adequately describes the causes and characteristics of windstorms, as well as the location and extent of windstorm hazards. The region's (and city's) history of events are

adequately described within the county's plan as well. Because coastal wind storms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow. More than likely, however, the coast's winter will just be windy, cold, and wet.

In Depoe Bay, power outages are the greatest concern during windstorms. Building codes now require new developments to place power lines below ground. Without power, communication is lost, and fuel and food stores shut down. In the December 2007 wind storm, the water treatment plant nearly used up its diesel supply, and the city lost its primary communications route (provided through Telecommunication Utility-owned Fiber Optic routes). Depoe Bay city patrons were additionally unable to access 911. Also of concern are downed trees and damage to buildings. The county's plan adequately identifies the remaining impacts and damages that can occur with windstorm events.

The county estimates a **"high" probability** that windstorms will occur in the future, meaning one event is likely to occur within a 1-10 year period. Windstorms occur yearly, and the more destructive storms occur once or twice per decade. The county additionally estimates a **"high" vulnerability** to windstorms, meaning more than 10% of the population or regional assets would be affected by a major windstorm event. Both estimates are true for the city as well.

Action Items

The following action items are detailed recommendations for activities that local departments, citizens, and others could engage in to reduce risk. Action item worksheets are located at the end of the addendum.

- Identify high risk coastal erosion areas and find means to mitigate the hazard.
- Identify over-water transportation alternatives in the event that the U.S. Highway 101 bridge collapses in an earthquake or tsunami.
- Continue to educate citizens about earthquake and tsunami preparedness.
- Participate in the development of the county's Community Wildfire Protection Plan.
- Obtain LIDAR collection data from DOGAMI.

Additionally, the city of Depoe Bay has chosen to partner with the county on the following actions. Please see Appendix A in Lincoln County's Natural Hazard Mitigation Plan for more detail regarding each of the actions listed below.

- Coastal Erosion #1: Improve knowledge of coastal erosion hazard areas and understanding of vulnerability and risk to life and property in hazard prone areas.
- Coastal Erosion #2: Consider revising existing county coastal hazard area regulations based on the DOGAMI risk zone mapping.
- Earthquake #1: Integrate new earthquake hazard mapping data for Lincoln County and improve technical analysis of earthquake hazards.
- Earthquake #2: Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices.
- Earthquake #3: Encourage purchase of earthquake hazard insurance by forming partnerships with the insurance and real estate industries.
- Earthquake #4: Promote and enforce building code standards.
- Earthquake #5: Encourage seismic strength evaluations of critical facilities to identify vulnerabilities and to meet current seismic standards.
- Earthquake #6: Identify funding sources for and implement high priority structural and nonstructural retrofits of structures that are identified as seismically vulnerable.
- Flood #2: Formalize process for providing warnings of flood events to property owners in flood hazard areas.
- Flood #4: Work with affected property owners to elevate or relocate non-conforming, pre-FIRM structures in flood hazard areas.
- Landslide #1: Encourage construction, site location and design that can be applied to steep slopes to reduce the potential threat of landslides.
- Landslide #2: Increase public education related to landslide hazards by distributing DOGAMI landslide informational brochure.
- Landslide #3: Protect existing development in landslide-prone areas.
- Tsunami #1: Determine ways of mitigating the vulnerability of assets (fire stations, equipment, utilities) likely to be impacted by tsunami.
- Tsunami #2: Work with coastal communities, citizen groups, property owners, recreation areas, emergency responders, schools and businesses in promoting tsunami awareness and evacuation.
- Tsunami #3: Improve technology capacity of communities, agencies and responders needed to adequately map hazard areas, broadcast

warnings, inform, and educate residents and visitors of tsunami dangers.

- Wildfire #1: Develop a Lincoln County Community Wildfire Protection Plan.
- Windstorm #1: Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during windstorm events.
- Windstorm #2: Enhance strategies for debris management and/or removal after windstorm events.
- Windstorm #3: Map and publicize locations around the county that have the highest incidence of extreme windstorms.
- Windstorm #4: Increase public awareness of windstorm mitigation activities.
- Windstorm #5: Continue and enhance windstorm resistant construction methods where possible to reduce damage and power outages from windstorms.
- Windstorm #6: Encourage critical facilities to secure emergency power.

Plan Implementation and Maintenance

The city will utilize the same prioritization process as the county [See Section 4: Plan Implementation and Maintenance of the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan and Appendix D: Economic Analysis of Natural Hazard Mitigation Projects].

The city of Depoe Bay Planning Department will serve as the convener for the city of Depoe Bay Natural Hazard Mitigation Plan Addendum. The Planning Department will be responsible for convening the plan committee on a yearly basis to identify new risk assessment data, review status of mitigation actions, identify new actions, and seek funding to implement mitigation actions. The city of Depoe Bay Natural Hazard Mitigation Plan Addendum will be updated every five years in coordination with the county's plan update schedule.

[i] Oregon Economic and Community Development Department. City of Depoe Bay Community Profile.

[ii] Oregon Economic and Community Development Department. City of Depoe Bay Community Profile.

[iii] Oregon Coast Visitors Association, Depoe Bay. http://visittheoregoncoast.com/cities/depoe-bay/

[iv] Oregon Economic and Community Development Department. City of Depoe Bay Community Profile

[v] US Census Bureau, "Profile of Selected Social Characteristics, 2000, Depoe Bay, OR," American Factfinder Quick Tables, www.census.gov

[vi] US Census Bureau, "Profile of Selected Social Characteristics, 2000, Depoe Bay, OR," American Factfinder Quick Tables, www.census.gov

[vii] Oregon Economic and Community Development Department. City of Depoe Bay Community Profile.

[viii] Oregon Economic and Community Development Department. City of Depoe Bay Community Profile.

[ix] US Census Bureau, "Profile of Selected Social Characteristics, 2000, Depoe Bay, OR," American Factfinder Quick Tables, www.census.gov

[x] Central Coast Journal. www.centralcoastjournal.com

[xi] NOAA, 1993. Tsunamis affecting the West Coast of the United States: 1806-1992.

[xii] Oregon Department of Land Conservation and Development. Repetitive Flood Losses.

[xiii] Oregon LIDOR Consortium (OLC) Department of Geology and Mineral Industries, www.oregongeology.org.

Oregon Natural Hazards Workgroup
University of Oregon Community Service Center
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SIGN-IN SHEET

Name of Event/Meeting: Depoe Bay Steering Committee

Date of Event/Meeting: Jan. 21, 2009 Scheduled Time of Event/Meeting: 2 p.m.

Name	Representing	Email	Roundtrip mileage (if applicable)	Hourly Rate
Jessica Bondy	Lincoln County			
Terry Owings	City of Depoe Bay	owings@ci.depoe-bay.or.us		
LARRY LEWIS	" " " "	lewis@ci.depoe-bay.or.us		
Perry Murray	✓	murray@ci.depoe-bay.or.us		
Hank Walling	Depoe Bay Fire Dist.	HWalling@depoebayfire.com		

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Identify high risk coastal erosion areas and find means to mitigate the hazard.	1. Protect life and property. 2. Preserve natural areas and features.

Rationale for Proposed Action Item:

- In a self hazard analysis, the city of Depoe Bay rated itself as having a high coastal erosion risk and vulnerability. Throughout the city there are areas of ongoing coastal erosion. More notably there areas along the Depoe Bay Harbor susceptible to erosion. It is important to identify these areas and mitigate the hazard to ensure the protection of infrastructure, structures, and human life.
- The Disaster Mitigation Act of 2000 requires communities to identify comprehensive mitigation actions to protect critical infrastructure [201.6(c)(3)(ii)]. Making Depoe Bay Public Works aware of coastal erosion issues along roads can help protect these roads by making them a higher priority for Public Works to conduct stabilization work.

Ideas for Implementation:

- Work with local residents to raise awareness of coastal erosion issues in Depoe Bay.
- Coordinate efforts with Depoe Bay Public Works department responsible for maintaining roads and utilities.
- Identify structures and other assets at risk from erosion.
- Construct seawalls; install rip-rap or other means of shoreline stabilization where appropriate.
- Encourage property owners to retrofit buildings or stabilize landforms.

Coordinating Organization:	City of Depoe Bay

Internal Partners:	**External Partners:**
Depoe Bay Planning, Public Works	DLCD, DSL, DOGAMI, ODFW, utility companies

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	**Depoe Bay Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Identify over-water transportation alternatives in the event of bridge collapse in an earthquake and/or tsunami.	1. Protect life and property. 2. Coordinate and enhance emergency services.

Rationale for Proposed Action Item:

- In the event of a Cascadia Subduction Zone (CSZ) earthquake and/or tsunami, it is possible the U.S. Highway 101 Bridge in Depoe Bay would fail. Essential transportation services would need to be restored.
- 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 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.
- 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. The last CSZ event occurred approximately 300 years ago.
- Restoration of key infrastructure is essential after a natural disaster "to support the industry and the jobs it provided." To sustain the economy, communities should "provide for temporary infrastructure while long-term rebuilding efforts are underway."

Source: Governor's Commission Report on Recovery, Rebuilding, and Renewal. After Katrina: Building Back Better than Ever. December 31, 2005 p.112

Ideas for Implementation:

- Coordinate with local fishing and charter fleet to provide emergency services after a CSZ event.
- Obtain emergency equipment in preparation for an earthquake/tsunami event. Assist fleet with materials and costs associated with emergency service.

Coordinating Organization:	Depoe Bay Public Works

Internal Partners:	**External Partners:**
Depoe Bay Planning, Public Works	Lincoln County Emergency Services, ODOT, NOAA

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	**Depoe Bay Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Continue to educate citizens about earthquake and tsunami preparedness	1. Protect life and property. 2. Enhance and promote public awareness

Rationale for Proposed Action Item:

- Depoe Bay has engaged in numerous education & outreach activities related to earthquake and tsunami preparedness. The city recognizes the importance of an ongoing education & outreach program that's specifically related to these two hazards.
- The Cascadia Subduction Zone can potentially cause a magnitude 9 earthquake that will be felt in Lincoln City. Scientists estimate that there is a 10-20% probability that a subduction zone earthquake will occur within the next 50 years.
- The extent of a tsunami event in Depoe Bay will depend on where the tsunami originated, and the size of the earthquake that produced the tsunami. Geologists predict a 10-14% chance that a Cascadia tsunami will be triggered by a shallow, undersea earthquake offshore Oregon in the next 50 years. Depoe Bay Harbor is susceptible to an earthquake/tsunami event.
- Public education and outreach can be inexpensive and provide information that results in safer households, work places and other public areas. Some outreach materials include: informational brochures about community seismic risks and mitigation techniques, public forums, newspaper articles, training classes and television advertisements.

  Source: Oregon Technical Resource Guide. July 2000. Community Planning Workshop. Eugene, Or. University of Oregon p.8-20.

Ideas for Implementation:

- Encourage hotels, restaurants, and other tourist related facilities and accommodations to post tsunami evacuation maps.
- Work with the Chamber of Commerce on disseminating information on earthquake/tsunami preparedness.
- Work with local citizens on resources and networking available in case of an event.
- Update the city website with new information and link's to improve to improve the city's emergency preparedness.

Coordinating Organization:	City of Depoe Bay

Internal Partners:	**External Partners:**
Depoe Bay Public Works, Planning, City Recorder	Chamber of Commerce, DOGAMI, DLCD

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	**Depoe Bay Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	Alignment with Plan Goals:
Participate in the development of the County's Community Wildfire Protection Plan.	1. Protect life and Property; 2. Preserve natural areas and features; 3. Coordinate partnerships and coordination to improve implementation.

Rationale for Proposed Action Item:

- The County is currently engaged in an effort to develop a Community Wildfire Protection Plan (CWPP) which will map vulnerable areas, among other things. The city hopes to participate in the CWPP's development process as well. The CWPP has the potential to benefit both jurisdictions; the city's participation is essential in ensuring that the CWPP provides adequate city-level information.
- 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 (taken from Linn County's plan).

  Source: FEMA. October 30, 2000. Disaster Mitigation Act of 2000.http://www.fema.gov/library/viewRecord.do?id=1935. October 12, 2006.

Ideas for Implementation:

- Coordinate with the Lincoln County Steering Committee to identify persons/groups responsible for the CWPP planning effort. Coordinate and establish relationships with fire districts involved in the effort.

Coordinating Organization:	City of Depoe Bay

Internal Partners:	External Partners:
Depoe Bay Public Works, Planning, City Recorder	Lincoln County, Fire Districts, US Forest Service, BLM

Timeline:		If available, estimated cost:
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	Depoe Bay Steering Committee

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Obtain LIDAR collection data from DOGAMI	1. Protect life and Property; 2. Preserve natural areas and features; 3. Coordinate partnerships and coordination to improve implementation.

Rationale for Proposed Action Item:

- LIDAR (light detection and ranging) is a mapping tool that can provide very precise, accurate, and high-resolution images of the surface of the earth, vegetation, and the built environment. It can be used to study landforms and identify areas, especially landslide areas that may be susceptible to future occurrences. The Oregon Department of Geology and Mineral Industries (DOGAMI) has been working with communities to develop large-scale LIDAR maps of entire regions. In 2006- 2007, various local, state, and federal agencies formed the Portland Consortium to gather 2200 square miles of LIDAR data in the Portland Metropolitan region. DOGAMI has formed the Oregon LIDAR Consortium (OLC) to gather data in other Oregon regions, including Lincoln County. Entering into an agreement with the OLC, or obtaining LIDAR collection data from DOGAMI will assist in mapping areas of Western Lane County and landforms around Toledo.
- With LIDAR, you can quickly, cheaply, and accurately: find landslides, old cuts and grades; measure and estimate fills and cuts; find stream channels and measure gradients; measure the size and height of buildings, bridges; locate and measure every tree in the forest; characterize land cover; model floods, fire behavior; locate power lines and power poles; find archeological sites; map wetlands and impervious surfaces; define watersheds and viewsheds; model insolation and shaking; map road center and sidelines; find law enforcement targets; map landforms and soils; assess property remotely; inventory carbon; monitor quarries, find abandoned mines; enhance any project that requires a detailed and accurate 2-D or 3-D map.
- The east side of the city of Depoe Bay has relatively steep topography. Despite the city's topographical characteristics and vulnerabilities to landslides, Depoe Bay does not have accurate information regarding the location and extent of potential landslides. With improved data via participation in the OLC, (or purchase of the OLC's data), Depoe Bay would have a much greater understanding of its landslide risks.

  The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of a natural hazard on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Obtaining LIDAR collection data from DOGAMI will help in understanding areas and landforms susceptible to landslide events to protect new and existing buildings, and infrastructure.

Ideas for Implementation:

- DOGAMI's LIDAR website provides information about the OLC and LIDAR and is a starting point for entering into an agreement with DOGAMI.
  http://www.oregongeology.com/sub/projects/olc/default.htm
- Contact DOGAMI about obtaining the data. DOGAMI staff is additionally available to talk to groups of potential users to show them the data and explain its uses. The LIDAR will be available without license restrictions in standard USGS quadrangles, with a nominal charge for each quadrangle. DOGAMI is happy to work with small communities to develop map products

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that they can use if they do not have GIS.

- DOGAMI's LIDAR website provides information about the OLC and LIDAR and is a starting point for entering into an agreement with DOGAMI.
  http://www.oregongeology.com/sub/projects/olc/default.htm
- Contact DOGAMI about obtaining the data. DOGAMI staff is additionally available to talk to groups of potential users to show them the data and explain its uses. The LIDAR will be available without license restrictions in standard USGS quadrangles, with a nominal charge for each quadrangle. DOGAMI is happy to work with small communities to develop map products that they can use if they do not have GIS.

Coordinating Organization:	City of Depoe Bay

Internal Partners:	**External Partners:**
Depoe Bay Public Works, Planning, City Recorder	DOGAMI

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	**Depoe Bay Steering Committee**

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Volume III: City Addenda
Lincoln City

Overview

Lincoln City developed this addendum to the Lincoln County multi-jurisdictional Natural Hazards Mitigation Plan in an effort to increase the community's resilience to natural hazards. The addendum focuses on natural hazards that could affect Lincoln City, Oregon, which include coastal erosion, droughts, earthquakes, floods, landslides, tsunamis, volcanoes, wildfires, and windstorms. It is impossible to predict exactly when disasters may occur, or the extent to which they will affect the city. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize losses that result from natural hazards.

The addendum provides a set of actions that aim to reduce the risks posed by natural hazards through education and outreach programs, the development of partnerships, and the implementation of preventative activities such as land use or storm water management plans. The actions described in the addendum are intended to be implemented through existing plans and programs within the city.

The addendum is comprised of the following sections: 1) Addendum Development Process 2) Community Profile; 3) Risk Assessment; 4) Action Items.

Addendum Development Process

In the fall of 2006, the Oregon Partnership for Disaster Resilience (The Partnership / OPDR) at the University of Oregon's Community Service Center partnered with Oregon Emergency Management (OEM) and Clatsop and Lincoln Counties to develop a Pre-Disaster Mitigation Planning Grant proposal. Both Counties joined The Partnership by signing (through their County Commissions) a Memorandum of Understanding for this planning project. FEMA awarded the Oregon Coast Region a grant to support the development of the natural hazard mitigation plans for the two counties and the cities therein. The Partnership, OEM, and the participating communities were awarded the grant in the fall of 2006 and local planning efforts began in the fall of 2007.

With guidance from The Partnership and assistance from City County Insurance Services (CIS), Lincoln City formed a local Steering Committee to participate in the addendum's development. The Lincoln City Steering

Committee was comprised of representatives from the following departments:

- City Manager, Lincoln City
- Lincoln City GIS Department
- Lincoln City Police Department
- Lincoln City Department of Planning and Community Development
- Lincoln County Public Works Department

The Committee first met on August 5, 2008; thereafter, the Committee remained engaged and provided subsequent feedback and review of plan drafts. With assistance from the county's 'Resource Assistance for Rural Environments' (RARE) Participant and City County Insurance (CIS), OPDR developed and facilitated the August 5th meeting at City Hall in Lincoln City. During the meeting, the Committee reviewed the county's risk assessment and discussed how the city's risks (i.e., hazards' characteristics, probabilities of occurrence, local vulnerabilities, and community-specific impacts) differed from the county's. Additionally, the Committee identified city-specific mitigation actions, and expressed interest in building greater partnerships with the county via mitigation and/or emergency management-related activities.

In September 2008, the city manager presented the draft addendum to the city's Emergency Planning Team for input. The Emergency Planning Team will be responsible for maintaining and updating the addendum in coordination with the county's semi-annual plan update meetings.

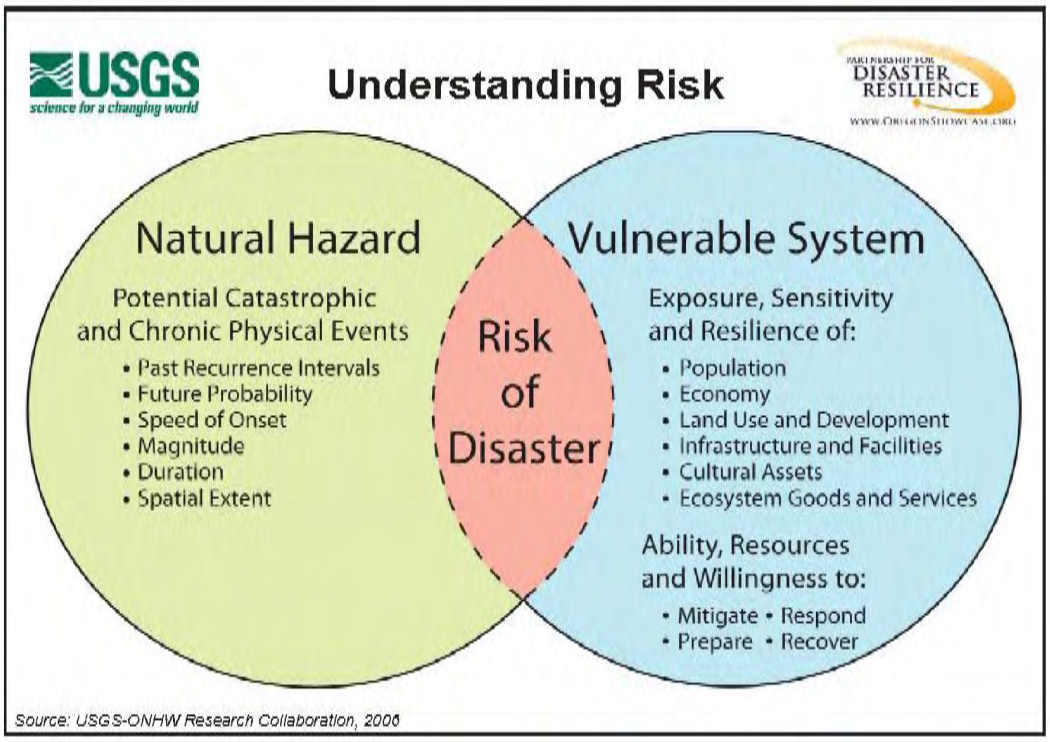
In _____, 2009, the Siletz Steering Committee presented the draft addendum to the City Council. Lincoln City adopted the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan via resolution on _____.

Community Profile

The following section describes Lincoln City from a number of perspectives in order to help define and understand the city's sensitivity and resilience 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 Lincoln City when the plan was developed. The information documented below, along with the hazard assessments located in the Hazard Summary, should

be used as local level rationale for the city's risk reduction actions. The identification of actions that reduce the city's sensitivity and increase its resilience assist in reducing overall risk, or the area of overlap in Figure 1 below.

Figure 1 Understanding Risk



Source: USGS - Partnership for Disaster Resilience Research Collaborative, 2006.

Geography and Climate

Located on the Coast of Oregon, Lincoln City resides in the western border of Lincoln County. Lincoln City lies at an elevation of 11 feet above sea level. Devils Lake (680-acres) borders the northeast portion of the city. The Siletz Bay and Siletz River are south of the city, and the Salmon River is to the north. Lincoln City is home to one of the world's shortest river, the D River, which connects Devils Lake to the Pacific Ocean. The climate in Lincoln City is moderate. Average temperatures are about 50 degrees during the day, and in the mid 30's at night. Average summer temperatures range from 60-70 degrees on the beach to 80-90 degrees inland.[i] Lincoln City has an annual rainfall of approximately 113 inches.[ii]

Population and Demographics

Lincoln City was incorporated on March 3, 1965. This incorporation united the Cities of Delake, Oceanlake and Taft as well as two unincorporated communities: Cutler City and Nelscott.[iii] The population was 7,480 in 2000, and was estimated to be 7,615 in 2007.[iv]

Table 1 displays population trends since 1990, but does not take into account the high influx of tourists that travel to Lincoln City each year.

Table 1 Population Trends, Lincoln City

	1990	2000	2006
Population	5892	7431	7944
Percent Change	0	26.2%	6.9%

US Census: Fact Finder

Disaster impacts (in terms of loss and the ability to recover) vary among population groups following a disaster. Historically, 80% of the disaster burden falls on the public. Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities, and low income persons. In 2000, 12.5% of families and 16.1% of individuals were living below the poverty line. In addition, 24.7% of the population is over 60 and of those over 65, 45% are disabled. Table 2 indicates population by age in Lincoln City as of the 2000 Census, and Table 3 displays the percent and age of the disabled population in 2000.

Table 2 Population by Age, Lincoln City 2000

Age	Percent
Under 5 years	5.9%
5-9 years	6.4%
10-14 years	6.1%
15-19 years	6.4%
20-24 years	5.8%
25-44 years	24.0%
45-59 years	20.0%
60-74 years	14.6%
Over 75 years	10.1%

Source: US Census 2000

Table 3 Disabled Population, Lincoln City 2000

Age	Percent
5-15 years	7.2%
16-64 years	24.0%
65-over	45.2%

Source: 2000 Census

Employment and Economics

According to the 2000 Census, the largest employment 'industry' in Lincoln City is comprised of arts, entertainment, recreation, accommodation and food services. Statistics suggest that tourism is a primary source of economic activity in Lincoln City. 'Education, health and social services' is the second largest employment industry (see Table 4 below).

Table 4 Employment by Industry, Lincoln City, 2000

Industry	Number of Employees	Percent of Workforce
Arts, entertainment, recreation, accommodation and food services	1,195	38.8
Educational, health and social services	446	14.5
Retail trade	381	12.4
Construction	235	7.6
Finance, insurance, real estate, and rental and leasing	162	5.3
Professional, scientific, management, administrative, and waste management services	158	5.1
Public administration	115	3.7
Manufacturing	106	3.4
Other services (except public administration)	105	3.4
Information	75	2.4
Transportation and warehousing, and utilities	42	1.4
Wholesale trade	37	1.2
Agriculture, forestry, fishing and hunting, and mining	20	0.6

Source: Economic Census 2000

The five largest employers include Chinook Winds Casino (650 employees); Starkor Manufacturing Co. - protective cases and covers (18 employees); The News Guard, Inc. – Newspaper (17 employees); Groth Gates Sheetmetal, Inc. (16 employees); and Quality Printing Service – commercial printing (5 employees).[v]

Median income can be used as an indicator of the strength of the region's economic stability. In 1999, the estimated median household income was $24,959.[vi] This is approximately $19,000 less than the state's median household income of $42,944.

Local and regional economic development organizations include the city of Lincoln City, Lincoln City Visitors & Convention Bureau, Lincoln City Chamber of Commerce, Central Coast Economic Development Alliance, and the Economic & Community Development Department Regional Development Officer.

Housing

Housing type and year built are important factors in mitigation planning. Certain housing types tend to be less disaster resistant and warrant special attention; mobile homes, for example, are generally more prone to wind and water damage than standard stick-built homes. Generally the older the home is, the greater the risk of damage from natural disasters. This is because stricter building codes have been developed following improved

scientific understanding of plate tectonics and earthquake risk. For example, structures built after the late 1960s in the Northwest and California use earthquake resistant designs and construction techniques. In addition, FEMA began assisting communities with floodplain mapping during the 1970s, and communities developed ordinances that required homes in the floodplain to be elevated to one foot above Base Flood Elevation.

In 2000, Lincoln City had 4,990 housing units. Of those, 31% (1,537) were owner occupied, 37% (1,834) were renter occupied, and 32% (1,619) were vacant. Of the vacant housing units, 82% (1,135) were for seasonal, recreational, or occasional use.[vii] Slightly over one-third of the city's housing stock was built prior to 1980, before stronger seismic building codes were put into place. Table 5 shows housing units by year built and Table 6 displays the type of housing available in Lincoln City.

Table 5 Housing Structure Age, Lincoln City 2000

Year Built	Percent of Structures
1980-2000	37%
1960-1980	33%
Before 1960	30%

Source: 2000 Census

Table 6 Housing Type, Lincoln City 2000

Housing Type	Percent
Single	54.0%
Multi-Family	37.0%
Mobile Home	8.0%
Boat, RV, Van, etc.	0.7%

Source: 2000 Census

Land Use and Development

Development in Lincoln City spreads mostly north to south along US-Highway 101. Dense commercial areas in Lincoln City exist along US-Highway 101. Residential development is located west of downtown and US-highway 101 along the Pacific Ocean as well as east near Devils Lake. The city's Comprehensive Plan identifies land use needs within the city and the Urban Growth Boundary. The map below displays Lincoln City's zoning and Urban Growth Boundary.

Lincoln City Zoning

May 2008

Legend

ZONE

R-1-10	Residential	Single Family 10,000 S.F. Min Lot Size
R-1-7.5	Residential	Single Family 7,500 S.F. Min Lot Size
R-1-5	Residential	Single Family 5,000 S.F. Min Lot Size
R-M	Residential, Multi-Family	
R-R	Recreation, Residential	
R-C	Recreation, Commercial	
I-M	Interior Mixed Use	
TVC	Taft VIllage Core	
G-C	General Commercial	
MSH	Main Street Highway	
P-C	Professional Campus	
P-I	Planned Industrial	
M-W	Marine Water	
OF	Ocean Front	
OS	Open Space	
P	Park	
R-1	County	
Pearl		
City Limits		
Urban Growth Boundary		

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Feet: 0, 500, 1,000, 2,000

Transportation

Lincoln City lies adjacent to US-Highway 101. US-Highway 101 is the principle state access route to the Oregon coast. Transportation is an important consideration when planning for emergency service provisions.

Growth within the city will put pressure on both major and minor roads, especially if the main mode of travel is by single occupancy vehicles. How people travel to work is indicative of the prevalence of single occupancy vehicle travel, and can help predict the amount of traffic congestion and the potential for accidents. Table 7 represents the different methods city residents use to travel to work.

Table 7 Means of Transportation and Carpooling, Lincoln City 2000

Type of Transportation	Percent
Car, Truck, or Van	85%
Drove Alone	67%
Carpooled	16%
2 people	13%
3 people	2%
Public Transportation	2%
Bus	1%
Walked	9%
Worked at Home	4%

Source: 2000 Census

The following map is from the Oregon Department of Transportation and shows the major road systems in Lincoln City.

LEGEND

FUNCTIONAL CLASSIFICATION STATE OTHER

FOR FURTHER FUNCTIONAL CLASSIFICATION INFORMATION, CONTACT O.D.O.T. REGION OFFICE.

- INTERSTATE
- PRINCIPAL ARTERIAL
- MINOR ARTERIAL
- URBAN COLLECTOR / RURAL MAJOR COLLECTOR
- MINOR COLLECTOR
- LOCAL ROAD

ORE. ROUTE – US. ROUTE – INTERSTATE ROUTE

NATIONAL HIGHWAY SYSTEM ROUTE

URBAN GROWTH BOUNDARY

CITY LIMIT

AMTRAK RAIL PASSENGER STATION

BRIDGE

GRADE SEPARATIONS :
STATE – OTHER FUNCTIONALLY CLASSED – LOCAL ROAD

- PUBLIC BUILDING
- COURTHOUSE
- CITY HALL
- ARMORY
- POST OFFICE
- SCHOOL
- LIBRARY
- SAFETY REST AREA
- WEIGH STATION
- PARK & RIDE LOCATION
- INTERCITY – CITY TRANSIT
- COMMERCIAL – GENERAL AVIATION
- AMTRAK STOP – PORT FACILITY
- GRAVEL PIT – QUARRY – ODOT STOCKPILE SITE

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OREGON DEPARTMENT OF TRANSPORTATION
GEOGRAPHIC INFORMATION SERVICES

NORTH

PREPARED DIGITALLY BY THE
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IN COOPERATION WITH THE
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

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SCALE

750 0 750 1500 FEET

225 0 225 450 METERS

LINCOLN CITY
Population 7,615 *

T. 6-8 S. R. 10-11 W. W.M.

OREGON TRANSPORTATION MAP

Showing Functional Classification of Roads
City of

PRELIMINARY COPY
SUBJECT TO CORRECTION

LINCOLN CITY

LINCOLN COUNTY
2007

PARK & RIDE | INTERCITY | AMTRAK
AVAILABLE TRANSPORTATION SERVICES SHOWN WITH YELLOW BACKGROUND

PORT | AIRPORT | COMM. AIR
AVAILABLE TRANSPORTATION SERVICES SHOWN WITH YELLOW BACKGROUND

Copies available from the Oregon Department of Transportation, Map Distribution Unit, Mill Creek Office Park, 555 13th St. NE, Suite 2, Salem, Oregon 97301–4178, Telephone (503) 986–3154, http://egov.oregon.gov/ODOT/TD/TDATA/gisCityMaps.shtml

* Based on current Oregon Population Report, College of Urban and Public Affairs, Portland State University, http://pdx.edu/prc

Historical and Cultural Resources

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

The first recorded tourists came in August of 1837, establishing the beginning of the tourist industry that still exists today. In the 1930s the towns of Cutler City, Taft, Nelscott, Delake, and Oceanlake joined together to become Lincoln City, which helped attract tourists and increase business. Annual events like Taft's Redhead Roundup and Oceanlake's Regatta draw visitors from all over the state.[viii]

Lincoln City has many festivals through out the year, including the Summer Kite Festival, Iris Pride Festival, Glass Float Gala and the Chowder Cook-off. Other local attractions include clamming, crabbing, whale-watching, beachcombing, kite flying, and exploring tide pools. Recreational amenities include Devils Lake, Otter Crest viewpoint, 65 factory stores, Chinook Winds Casino, The Connie Hansen Garden, Salmon River Estuary, Siletz Bay (Natural Scenic Wildlife Reserve), Lakeside Golf Course, 14 city parks, 12 beach access points, North Lincoln County Museum, and the Alder House glassblower.

Government Structure

The City Council is the policy making body for Lincoln City. As the elected legislative body in Lincoln City, the City Council has overall responsibility for the scope, direction and financing of city services. Council members serve four-year terms. Additional departments within the city include the following:

- **City Manager's Office**: The city manager is appointed by City Council and serves as the administrative head of the city government. As chief executive officer, the city manager provides the leadership and direction for the operation and management of all city departments.

- **City Recorder**: The city recorder assures the timely presentation of formal communications from the public, other agencies and city staff to the City Council. The recorder prepares City Council meeting agendas in coordination with the city manager; maintains official city records which reflect the actions of the governing body; maintains a depository of contracts, agreements and official Council actions and ensures the timely availability of these records to the Council, public, other agencies and staff.

- **Planning and Community Development Department:** The Planning and Community Development Department provides service and information to the general public regarding all phases of community development. Planning staff implements ordinance

and plan requirements through the Site Review Process, Land Use Action Process and Special Projects. Specifically, the Planning and Community Development Department reviews potential development opportunities to ensure compliance with zoning, setback, parking, landscaping, access and other city requirements.

In addition to oversight of the development process, the Planning and Community Development Department advises the City Council and Planning Commission on all land use and special project matters.

- **Public Works Department:** The Lincoln City Public Works Department provides responsive community services related to planning, design, construction, operation, maintenance and management of public infrastructure, including streets, sewer, water treatment, waste water treatment, public buildings and other facilities. Services provided by the department contribute to the public health, safety, economic diversity, environmental quality and citizen convenience.

- **Finance Department:** The Finance Department serves the community by managing utility billing, business licenses, collecting taxes and fees, dealing with city expenditures, preparing the city's budget and managing investments. The goal of the Finance Department staff is to provide all services with an emphasis on timeliness, accuracy and courteous customer service.

- **Police Department**: The mission of the Lincoln City Police Department is to maintain human rights while enforcing state and local laws, protecting persons, property and providing the highest quality professional service to all.

- **Parks and Recreation Department**: The Parks and recreation Department oversees parks and recreation activities for the city. There are several activities/areas the Parks and Recreation department oversee, such as: the swimming pool, rock climbing wall, youth activities, senior activities, adult fitness, after school program and camps.

- **Public Library**: The Lincoln City Public Library collects, preserves, and administers organized collections of books and related materials. The library can also be used for public meetings and other organized activities for the community.

Existing Plans and Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances, and technical reports or studies. Plans and policies already in place 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.

Lincoln City's Addendum to the Lincoln County Natural Hazards Mitigation Plan includes a range of recommended action items that, when implemented, will reduce the city's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the city'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 hazard mitigation plan's action items through existing plans and policies increases their likelihood of being supported and getting updated, and maximizes the city's resources.

The following table documents the plans and policies already in place in Lincoln City.

Name	Description	Relations to Natural Hazard Mitigation
Comprehensive Plan, 1998	A document stating the general, long-range policies that will govern a local community's future development.	Contains city specific information regarding natural hazards within the city's jurisdictional boundaries
Municipal Code, 2008	A codification of the general ordinances of Lincoln City. The code consists of all regulatory, penal, and administrative ordinances.	Contains city specific hazard related requirements for the placement and construction of the buildings. Issues such as floodplain development, fire resistant materials, etc.
Transportation Master Plan, 1995	Addresses the county's anticipated transportation needs over a period of 20 years.	The Transportation Plan may be a resource to identify which roads and transportation systems are most vulnerable to natural disasters. Likewise, the Transportation Plan can be utilized to implement mitigation measures aimed at protecting "transportation disadvantaged" populations in emergency situations. When updated, the Transportation Plan can also include mitigation elements in its implementation considerations.

Community Organizations and Programs

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

The countywide community organizations and programs list can be found in Section 2: Community Overview of the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan. The list highlights organizations that are active within the county and may be potential partners for implementing mitigation actions.

Existing Mitigation Activities

Existing mitigation activities include current mitigation programs and activities that are being implemented by the community in an effort to reduce the community's overall risk to natural hazards. Documenting these efforts can assist participating jurisdictions better understand risk and can assist in documenting successes. The following efforts have occurred or are on-going within Lincoln City:

- The city maintains an emergency preparedness website that's devoted to earthquakes, tsunamis, storms/flooding, and pandemic flu. FEMA's "Are you Prepared?" document is posted for reference, as well as a link to the Community Emergency Response Team's (CERT) website. The Earthquake and Tsunami hazards have their own web pages for additional information.
    - Tsunami webpage: includes information about tsunamis' causes and characteristics, recommendations for how to prepare and survive a tsunami, and information about how to plan an evacuation route. Additionally, there is tsunami information for kids, post-tsunami information, and a listing of preparedness events in Lincoln City. Tsunami evacuation maps are posted as well.
    - Earthquake webpage: includes information about the latest earthquakes in Washington, Oregon, and Northern California. Additionally, the city provides earthquake preparedness recommendations, as well as some tips about what to do during and after an earthquake. Links to the American Red Cross and US Geological Survey (i.e., for

more information about vulnerabilities and preparedness strategies) are posted as well.

- A Community Emergency Response Team (CERT) is active in Lincoln City. The CERT Program educates people about disaster preparedness for hazards that may impact their area, and trains them in basic disaster response skills such as fire safety, light search and rescue, team organization, and disaster medical operations. Lincoln City's CERT group has begun a 'Map Your Neighborhood' effort, which seeks to help neighborhoods prepare for disasters.
- The city enforces a setback requirement for all developments located along the coast. The purpose of the setback is to reduce property damages related to coastal erosion, wind storms, and flooding. The setback requirement also serves to meet the city's natural hazard goal, as defined within the Lincoln City Comprehensive Plan: "The city shall control development in hazardous areas to protect life and property from natural disasters and hazards."
- The city's Comprehensive Plan addresses natural hazards. Specific hazardous areas have been identified by RNKR Associates in their work *Environmental Hazards, Coastal Lincoln County Oregon, 1979.* The city has defined 'hazardous areas' on the RNKR map, and will allow development in these areas if adequate protective measures can be employed to prevent or minimize damage.[ix] This portion of the Comprehensive Plan also lists policies related to development in hazardous areas.
- Lincoln City issues practice tsunami warnings every Wednesday morning. Additionally, the city distributes evacuation maps, and pamphlets that address preparedness strategies. A Tsunami Preparedness Coordinator conducted a public awareness survey, as well as an evacuation drill in the Nelscott and Delake areas; she initiated the "Neighbor Helping Neighbor" tsunami buddy system, and created door signs for hotels to show evacuation information (among several other education and outreach projects for the city).
- The city moved a fire station and school out of the tsunami inundation zone two years ago. Additionally, the city obtained a reverse 911 system.
- State legislation:
    - SB 378 requires schools in potential inundation zones to teach students in K-8 grades about tsunamis and evacuation
    - SB 379, implemented as Oregon Revised Statutes (ORS) 455.446 and 455.447, limits construction of new essential facilities and special occupancy structures in tsunami flooding zones.

Risk Assessment

The following hazards have been addressed in the Lincoln County Natural Hazard Mitigation Plan. Lincoln City reviewed the county's plan on August 5, 2008 and assessed how Lincoln City's risks vary from the risks facing the entire planning area.

Coastal Erosion

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of coastal erosion hazards. Erosion is a natural process that continually affects coastal areas; in Lincoln City and elsewhere along the Pacific, erosion becomes a hazard when lives and personal properties are at risk of damage. Erosion is typically a gradual process, which can be greatly accelerated in the event of a storm. Private sea walls in Lincoln City require constant maintenance, and some property damage has occurred in areas within the city. Records of damages are not available at this time; however, events may have occurred in tandem with previous storms. Properties along Anchor Court, for example, have experienced partial and/or total damages due to storm-induced erosion. Future damages here are likely. The county identified areas along Highway 101 that have sustained erosion-induced damages. Within Lincoln City, however, the Highway is safe. Potential community-related impacts, including shoreline reduction, economic (tourism-related) impacts, and property/infrastructural damage, are adequately described within the county's Coastal Erosion Hazard Annex.

In an effort to mitigate the effects of coastal erosion, the city requires new development to comply with setback restrictions. Permits, additionally, are required for the development of sea walls. Because coastal erosion is a continual process, the county has described the hazard's **probability** of occurrence as **'high.'** Lincoln City agrees with the county's description, due to the city's location along the coast. The county additionally estimates a 'moderate' vulnerability to coastal erosion hazards, meaning 1-10% of the population or regional assets are likely to be affected by this hazard. Lincoln City believes that, due to their property setback requirements for new developments, they've reduced their vulnerability to this hazard. As such, the city also rates its **vulnerability** as **'moderate,'** meaning 1-10% of the population or regional assets are likely to be affected by coastal erosion hazards.

The Department of Geology and Mineral Industries (DOGAMI) assists communities by producing maps and reports on coastal erosion; Lincoln City uses this map to enforce development setback requirements. Although not included within this addendum, the coastal erosion hazards map can be obtained through the Planning and Community Development Department at City Hall.

Drought

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of drought hazards, as well as the location and extent of a potential event. Due to a cool, wet climate, past and present weather conditions have generally spared coastal communities from the effects of a drought. As such, there is no record of a severe drought event within Lincoln County. The same holds true for Lincoln City; the impacts of a potential event, however, are much greater for the city than for the county as a whole. Schooner Creek is the city's only water source, and the city's reservoirs store enough water for only one day of use. In the event that climate patterns change and drought becomes a probable hazard, Lincoln City would be extremely vulnerable to drought conditions. Furthermore, Schooner Creek is a direct-flow water source and contamination is a potential threat to the water supply.

Lincoln County estimates that the **probability** of a drought is **'low,'** meaning no more than one event is likely to occur within a 75-100 year period. Lincoln City agrees with the county's estimate, but also acknowledges great uncertainty in predicting weather patterns. The city will review this estimate every five years, in concurrence with the county's plan update process.

Lincoln County additionally estimates a **'low' vulnerability** to drought hazards, meaning less than 1% of the population or regional assets would be affected by a major emergency or disaster. Due to the lack of backup supplies and/or intergovernmental mutual assistance agreements, the city estimates a **'high' vulnerability.** In addition to reduced water supplies, a drought will increase the chances of wildfire and significantly reduce tourism activities. If hotels, for example, are unable to accommodate guests, the city's economy would greatly suffer.

Currently, the city has a water curtailment plan that will go into effect in the event of a drought. Further actions are identified below.

Earthquake

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes, characteristics, location, and extent of earthquake hazards for the region. The county's plan additionally identifies all previous occurrences that have affected the city. It is difficult to estimate recurrence intervals, but the state has experienced seven Cascadia Subduction Zone (CSZ) events in the last 3500 years – some of which were probably as large as magnitude (M) 9. These events are estimated to have an average recurrence interval between 500 and 600 years, although the time interval between individual events ranges from 150 to 1000 years. The last CSZ event occurred approximately 300 years ago. Scientists estimate that there is a **10-20% probability** that a subduction zone earthquake will occur within the next 50 years.[x] Based on this information, Lincoln County

estimates a **'high' probability** than an earthquake will occur in the future. Lincoln City agrees.

Lincoln County additionally estimates a 'moderate' vulnerability to earthquake hazards, meaning 1-10% of the population or regional assets would be affected by a major emergency or disaster. Due to the city's concentrated population and resources, however, the city believes that its **vulnerability** to a high magnitude earthquake would be **'high,'** meaning more than 10% of the population or regional assets would be affected by an event. As shown in Table 5 above on page 6, about 63% of Lincoln City's housing structures were built prior to the enforcement of earthquake resistant building codes. DOGAMI conducted a seismic needs assessment for public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs' offices and other law enforcement agency buildings. Buildings were ranked for the "probability of collapse" due to the maximum possible earthquake for any given area. Within Lincoln City, the following buildings were rated as 'moderate,' 'high,' or 'very high.'

- North Lincoln Fire & Rescue (2325 NW Hwy 101): *moderate*
- Samaritan North Lincoln Hospital: *moderate*
- Oceanlake Elementary School: *moderate*
- Taft Elementary School: *high*
- Taft Middle School: *moderate*
- Lincoln City Career Technical High School: *high*

In addition to the structures listed above, the city's infrastructure is highly vulnerable to a severe earthquake event. Sewer lines, water lines, power lines, water tanks, reservoirs, cell towers, the Samaritan North Lincoln Hospital, and City Hall were identified by the Steering Committee as vulnerable assets. The city would expect significant damage to roads and bridges following a Cascadia Subduction Zone event, as well as deaths and severe injuries region-wide. Education and outreach regarding earthquakes (and resultant tsunami) is an ongoing endeavor in Lincoln City.

Flood

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of flooding hazards within the region, as well as previous flooding occurrences. Schooner Creek and Devils Lake are the city's primarily sources of flooding– typically due to rain and snow-melt. The extent of flooding varies depending on rainfall, and/or precipitation levels throughout the year. Lincoln City's most significant flood event occurred in November, 1999; every road out of town was under water, including East Devils Lake Rd just south of Devils Lake. Lincoln County estimates a **'high' probability** that flooding will occur, meaning one event is likely within a 10-35 year period. The county

estimates a **'moderate' vulnerability** to flood hazards, meaning 1-10% of the population or regional assets are likely to be affected by a major emergency or event. Both ratings are true for the city as well.

Road closures are the most common flood-related impacts within the community. East Devils Lake Road floods frequently, and despite efforts to mitigate flood related damages by widening culverts along this road, flooding continues. Almost all of Lincoln City's 31 pump stations are in the floodplain, and the city's Flood Insurance Rate Maps (dated September, 1980) are in need of update. Lincoln City has 725 National Flood Insurance Policy (NFIP) holders, with a total coverage of $108,712,600. 32 claims have been paid since 1978, at a total of $646,123. Numbers of buildings and/or properties within the floodplain are not available at this time.

Additionally, 6 properties in Lincoln City have experienced a total of 17 losses. This means that there have been at least 6 repetitive losses in Lincoln City; some properties have had damages from more than two events. Total payments related to repetitive loss properties amount to $501,288.37.[xi]

Lincoln City is currently updating its Stormwater Master Plan. Mitigation actions are identified within that plan as well.

Landslide

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of landslides, and appropriately identifies previous landslide occurrences within the region, as well as the location and extent of previous and potential slides. No records for city-specific landslides have been kept, but the Steering Committee agrees that the city has enough steep slopes to warrant future study. Development pressure on steep slopes, for example, is an issue that Lincoln City is beginning to deal with. Likewise, the road to the city's wastewater treatment plant has occasional slides. No significant losses have occurred, but the potential for future damages are believed to exist along this road. Potential community impacts are adequately described within the county's plan, and include infrastructural damages, economic impacts (due to isolation and/or arterial road closures), property damages, and obstruction to evacuation routes.

The location and extent of landslides in Lincoln City are not available at this time. In 2007, the Oregon 74th Legislative Assembly directed the Department of Geology and Mineral Industries (DOGAMI) to extend LIDAR collection efforts throughout the state. LIDAR (light detection and ranging) is a tool that can provide high-resolution images of the surface of the earth, and it's excellent for mapping natural hazards like landslides. When the statewide LIDAR studies are completed, Lincoln City will have a much greater understanding of its landslide risks.

The county currently estimates a **'moderate' probability** that landslides will occur, meaning one event is likely within a 35-75 year period. The county estimates a **'high' vulnerability** to landslide hazards, meaning more than 10% of the population or regional assets are likely to be affected by a major emergency or event. Both ratings are true for the city as well.

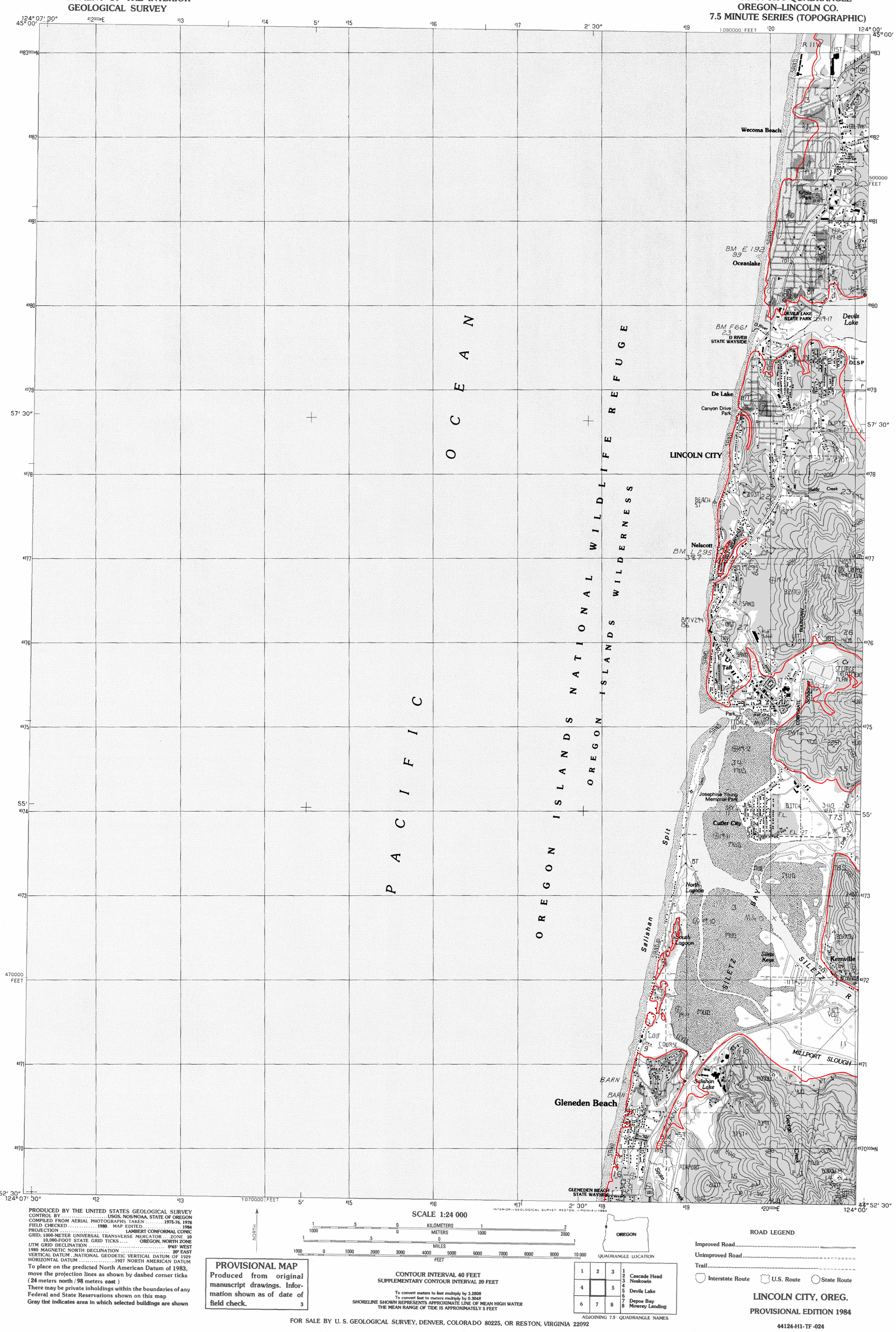
Tsunami

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of tsunami hazards, as well as the previous occurrences of tsunami events within the region. The Department of Geology and Mineral Industries (DOGAMI) conducted an analysis resulting in extensive mapping along the Oregon Coast. The maps depict the expected inundation for tsunamis produced by a magnitude 8.8 to 8.9 undersea earthquake. The tsunami maps were produced to help implement Senate Bill 379 (SB 379), which was passed during 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, limit construction of new essential facilities and special occupancy structures in tsunami flooding zones. The following tsunami-inundation zone map was produced for Lincoln City. Following the inundation map is the Lincoln City Tsunami Evacuation Zone Map. Evacuation zones are highlighted in yellow.

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
DONALD A. HULL, STATE GEOLOGIST

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LINCOLN CITY QUADRANGLE
OREGON–LINCOLN CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY
CONTROL BY ..... USGS, NOS/NOAA, STATE OF OREGON
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN 1975-76, 1978
FIELD CHECKED ..... 1980. MAP EDITED 1984
PROJECTION ..... LAMBERT CONFORMAL CONIC
GRID: 1000-METER UNIVERSAL TRANSVERSE MERCATOR ... ZONE 10
10,000-FOOT STATE GRID TICKS .... OREGON, NORTH ZONE
UTM GRID DECLINATION ..... 0°45′ WEST
1980 MAGNETIC NORTH DECLINATION ..... 20° EAST
VERTICAL DATUM ..NATIONAL GEODETIC VERTICAL DATUM OF 1929
HORIZONTAL DATUM ..... 1927 NORTH AMERICAN DATUM

To place on the predicted North American Datum of 1983, move the projection lines as shown by dashed corner ticks (24 meters north / 98 meters east)

There may be private inholdings within the boundaries of any Federal and State Reservations shown on this map

Gray tint indicates area in which selected buildings are shown

PROVISIONAL MAP
Produced from original manuscript drawings. Information shown as of date of field check. 3

CONTOUR INTERVAL 40 FEET
SUPPLEMENTARY CONTOUR INTERVAL 20 FEET

To convert meters to feet multiply by 3.2808
To convert feet to meters multiply by 0.3048
SHORELINE SHOWN REPRESENTS APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 5 FEET

1	2	3	1 Cascade Head 2 Neskowin 3
4		5	4 5 Devils Lake 6
6	7	8	7 Depoe Bay 8 Mowrey Landing

ADJOINING 7.5' QUADRANGLE NAMES

ROAD LEGEND
Improved Road
Unimproved Road
Trail
Interstate Route · U.S. Route · State Route

LINCOLN CITY, OREG.
PROVISIONAL EDITION 1984

44124-H1-TF-024

FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092

Open File Report O-95-25
Tsunami Hazard Map of the Lincoln City Quadrangle, Lincoln County, Oregon

Tsunami inundation boundary
upper limit of area expected to be covered by flood water from a tsunami caused by a magnitude 8.8 undersea earthquake

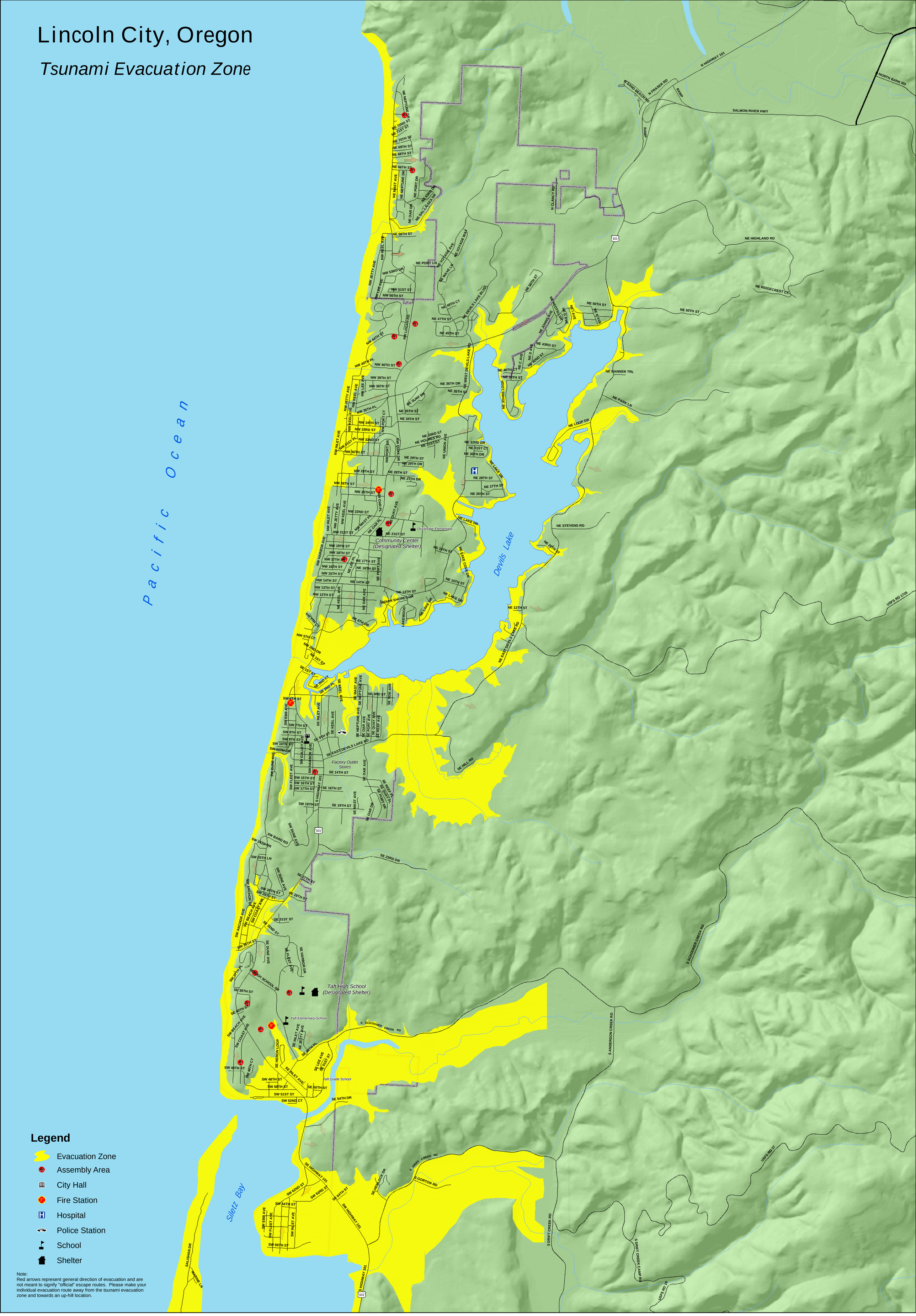
See accompanying text for use of this map, mapping methodology, and acknowledgments.

Mapping by:

George R. Priest, Oregon Department of Geology and Mineral Industries, October-November, 1995.

Lincoln City, Oregon

Tsunami Evacuation Zone



Legend

- Evacuation Zone
- Assembly Area
- City Hall
- Fire Station
- Hospital
- Police Station
- School
- Shelter

Note:
Red arrows represent general direction of evacuation and are not meant to signify "official" escape routes. Please make your individual evacuation route away from the tsunami evacuation zone and towards an up-hill location.

City of Lincoln City

Tsunami Evacuation

City of Lincoln City government use only. Use for any other purpose is entirely at the risk of the user. This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

N
W E
S

0 0.25 0.5 1 Miles

September 2007

mdb \\Lincoln-city\GISvol\GIS_Requested_Maps\PublicWorks\Tsunami\Evacuation.mxd

The location of Lincoln City's tsunami hazard is best described by the inundation map above, but improvements to this map may be possible in coming years. The 2004 Indian Ocean earthquake and tsunami led DOGAMI to re-evaluate the state's tsunami mapping program. Currently, DOGAMI is using the latest advances in mapping technology (LIDAR), computer technology and computer modeling to run a pilot mapping project for the coastal city of Cannon Beach. The new map will be scenario based, meaning that variations in inundation levels (given local or distant tsunamis) will be shown. If Lincoln City is presented with an opportunity to improve its current maps, the city's risk assessment information may change.

The extent of a tsunami event in Lincoln City will depend on where the tsunami originated, and the size of the earthquake that produced the tsunami. Lincoln County appropriately describes the probability of a tsunami event for Lincoln City. Geologists predict a **10-14% chance** that a Cascadia tsunami will be triggered by a shallow, undersea earthquake offshore Oregon in the next 50 years. The forecast comes from evidence for large but infrequent earthquakes and tsunamis that have occurred on the Oregon coast every 500 years, on average.[xii]

The county estimates a 'moderate' vulnerability to tsunami hazards, but Lincoln City feels that its vulnerability is greater. Proportionally, the city has much greater exposure to a tsunami than the county as a whole. Close to 20% of the city's developed lands are within the inundation zone. This includes more than 1,500 residents, and close to 2,000 employees. Additionally, more than 25 overnight-tourist facilities are within the inundation zone.[xiii] As such, the city estimates that its **vulnerability** to a tsunami event is **'high,'** meaning more than 10% of the population and regional assets are likely to be affected by a major event.

Lincoln City has put forth much effort to educate and inform citizens of tsunami hazards found within the city. Every Wednesday morning, the tsunami siren is tested; the city obtained a reverse 911 system; hotels are encouraged to post evacuation signs in private rooms; evacuation signs are posted throughout the city; evacuation maps are posted on the city's website; and a fire station and school were moved away from the inundation zone two years ago. In the event of a tsunami, the hospital may be at risk; currently it's just outside the tsunami inundation zone. Severe damage is expected to occur on various properties, roads, bridges, communication systems, and critical infrastructure within Lincoln City, among other assets described in the county's plan. Lincoln City recognizes the importance of continuing education and outreach, especially to the transient populations (i.e., tourists), and plans to implement greater outreach in the future.

Volcano

The Lincoln County Natural Hazard Mitigation Plan adequately describes the city's risk to volcanic events. Generally, an event that affects the

county is likely to affect Lincoln City as well. The causes and characteristics of a volcanic event are appropriately described within the county's plan, as well as the location and extent of potential hazards. Previous occurrences are well-documented within the county's plan, and the community impacts described by the county would generally be the same for Lincoln City as well. Lincoln City is very unlikely to experience anything more than volcanic ash during a volcanic event. When Mt. Saint Helens erupted in 1980, the city received small amounts of ashfall, but not enough to cause significant health and/or economic damages. The county estimates a **'low' probability** of future volcanic events and a **'low' vulnerability** to future eruptions. The county's probability and vulnerability estimates are accurate of Lincoln City's risk as well.

Wildfire

The Lincoln County Natural Hazard Mitigation Plan adequately describes the causes and characteristics of wildfires, as well as the county and city's history of wildfire events. 1849 and 1936 were particularly devastating years for wildfires in Lincoln County, but since then, there have been very few events. The location and extent of a wildfire vary depending on fuel, topography, and weather conditions. In Lincoln City, areas of concern include the eastern side of the city (where forestland borders development), and some of the open spaces within the city's limits.

The county estimates a **'moderate' probability** that local wildfires will occur in the future, meaning no more than one event is likely to occur within a 35-75 year period. Likewise, the county estimates a **'moderate' vulnerability** to wildfires, meaning 1-10% of the population or regional assets are likely to be affected by a major event. Both estimates are true for the city as well.

The potential community impacts and vulnerabilities described in the county's plan are generally accurate for the city as well. Due to the prevailing wind patterns (i.e., from the north or south), the city's steering committee felt that the northern and southern ends of the city might be the most vulnerable spots to wildfire. Power, natural gas, and phone lines run through the forest to the east of the city, and would be affected in the event of a wildfire. Likewise, active commercial logging occurs just outside the city, and slash burns are a potential wildfire concern. The county is currently engaged in an effort to develop a Community Wildfire Protection Plan (CWPP) which will map vulnerable areas, among other things. The city hopes to participate in the CWPP's development process as well.

Windstorm

The Lincoln County Natural Hazard Mitigation Plan adequately describes the causes and characteristics of windstorms, as well as the location and extent of windstorm hazards. The region's (and city's) history of events are adequately described within the county's plan as well. Because coastal

wind storms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow. More than likely, however, the coast's winter will just be windy, cold, and wet.

In Lincoln City, power outages are the greatest concern during windstorms. Building codes require new developments to place power lines below ground; currently, however, new construction only accounts for about 5% of the city's total development. Without power, communication is lost, and fuel and food stores shut down. In the December, 2007 wind storm, the water treatment plant nearly used up its diesel supply, and the city lost its primary communications route (provided through Telecommunication Utility-owned Fiber Optic routes). Lincoln City patrons were additionally unable to access 911. The county's plan adequately identifies the remaining impacts and damages that can occur with windstorm events.

The county estimates a **'high' probability** that windstorms will occur in the future. Windstorms occur yearly, and the more destructive storms occur once or twice per decade. The county additionally estimates a **'high' vulnerability** to windstorms, meaning more than 10% of the population or regional assets would be affected by a major windstorm event. Both estimates are true for the city as well.

Action Items

The following action items are detailed recommendations for activities that local departments, citizens, and others could engage in to reduce risk. Action item worksheets are located at the end of the addendum.

- Enter into a contract or intergovernmental agreement to provide potable water in the event of a drought.
- Seek funding to obtain raw water storage capacities.
- Identify over-water transportation alternatives in the event that bridges collapse in an earthquake and/or tsunami.
- Continue to educate citizens about earthquake and tsunami preparedness.
- Encourage new hospital-related developments to be seismically resilient, and safe from floods and tsunami waves.
- Seismically retrofit vulnerable structures and critical facilities.
- Explore steps needed to qualify Lincoln City for participation in the National Flood Insurance Program's (NFIP) Community Rating System (CRS).
- Implement actions identified in the Devils Lake Water Improvement District's Lake Management Plan.

- Construct a bridge on East Devils Lake Road where flooding typically occurs.
- Implement actions identified in the Lincoln City Stormwater Management Plan.
- Continue compliance with the National Flood Insurance Program (NFIP).
- Replace undersized culverts.
- Research steep slope ordinances; consider drafting a steep slope development ordinance for Lincoln City.
- Educate residents about how to prepare for and mitigate damage caused by natural hazards.
- Acquire generators for service stations.
- As it becomes available, integrate new risk assessment information into Lincoln City's Addendum.
- Encourage emergency-related intergovernmental planning.
- Seek funding to obtain additional tsunami sirens.
- Participate in the development of the county's Community Wildfire Protection Plan (CWPP).
- Improve emergency-vehicle access to beachfront properties and shoreline.
- Assess the city's wildland interface areas.
- Explore opportunities to limit and/or restrict slash-burning near city limits.
- Add debris removal and emergency response strategies to the Lincoln City Stormwater Management Plan.

Additionally, Lincoln City has chosen to partner with the county on the following actions. Please see Appendix A in Lincoln County's Natural Hazard Mitigation Plan for more detail regarding each of the actions listed below.

- Earthquake #1: Integrate new earthquake hazard mapping data for Lincoln County and improve technical analysis of earthquake hazards.
- Tsunami #2: Work with coastal communities, citizen groups, property owners, recreation areas, emergency responders, schools and businesses in promoting tsunami awareness and evacuation.
- Tsunami #3: Improve technology capacity of communities, agencies and responders needed to adequately map hazard areas, broadcast warnings, inform, and educate residents and visitors of tsunami dangers.

- Wildfire #1: Develop a Lincoln County Community Wildfire Protection Plan.

Plan Implementation & Maintenance

The city will utilize the same prioritization process as the county [See Section 4: Plan Implementation and Maintenance of the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan and Appendix D: Economic Analysis of Natural Hazard Mitigation Projects].

The Lincoln City Emergency Planning Team will serve as the convener for the Lincoln City Natural Hazard Mitigation Plan Addendum. The Emergency Planning Team will be responsible for convening the plan committee on a yearly basis to identify new risk assessment data, review status of mitigation actions, identify new actions, and seek funding to implement mitigation actions. The Lincoln City Natural Hazard Mitigation Plan Addendum will be updated every five years in coordination with the county's plan update schedule.

[i] City of Lincoln City. http://www.lincolncity.org.

[ii] CityTownInfo.com. "Lincoln City, OR." http://www.citytowninfo.com/places/oregon/lincoln-city.

[iii] Lincoln City Comprehensive Plan, p. 4.

[iv] 2007 Oregon Population Report, Portland State University Population Research Center.

[v] Oregon Economic and Community Development Department, Lincoln City Community Profile. http://info.econ.state.or.us:591/FMPro?-db=Community.fp4&-Format=forms.htm&-lay=webpage&-op=eq&sort%20name=Lincoln%20City&-script=hit%20count&-Find

[vi] City-Data.com. http://www.city-data.com/city/Lincoln-City-Oregon.html

[vii] U.S. Census, 2000. American Fact Finder, Lincoln City, Oregon. General Characteristics. www.census.gov.

[viii] Lincoln City, on the Central Oregon Coast. "Things to Do – Heritage & History." http://www.oregoncoast.org/pages/things-pages/heritage.php

[ix] Lincoln City Comprehensive Plan, *Natural Hazard*, p. 32.

[x] Geologic Hazards on the Oregon Coast. Oregon Department of Geology and Mineral Industries. http://www.oregongeology.com/sub/earthquakes/Coastal/OrGeoEqNTsu.htm

[xi] Department of Land Conservation and Development, Oregon Repetitive Flood Losses as of 3/31/2008.

[xii] Oregon Geology Fact Sheet, Tsunami Hazards in Oregon. Department of Geology and Mineral Industries. http://www.oregongeology.com/sub/publications/tsunami-factsheet_onscreen.pdf

[xiii] Wood, Nathan. "Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon." USGS Scientific Investigations Report 2007-5283 (2007): 13-19.

Lincoln City Steering Committee Meeting

City Risk Assessment / Action Item Identification

August 5, 2008, 10:30am

City Hall, Lincoln City

801 SW Highway 101, Lincoln City, Oregon

Name	Title	Organization Representing	Email	Phone #	Location coming from (City)	Signature certifying this information is correct
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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Enter into a contract or intergovernmental agreement to provide potable water in the event of a drought.	1. Protect life and property 3. Coordinate and enhance emergency services. 6. Promote partnerships and coordination to improve implementation

Rationale for Proposed Action Item:

- Schooner Creek is the City's only water source, and the City's reservoirs store enough water for only one day of use. In the event that climate patterns change and drought becomes a probable hazard, Lincoln City would be extremely vulnerable to drought conditions. Furthermore, Schooner Creek is a direct-flow water source and contamination is a potential threat to the water supply.
- Due to the lack of backup supplies and/or intergovernmental mutual assistance agreements, the City estimates a 'high' vulnerability to drought conditions.
- The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. Entering into an intergovernmental agreement to provide potable water in the event of a drought (or water contamination) will ensure a continued water source for Lincoln City.

Ideas for Implementation:

- Enter into a joint-service or mutual-aid agreement with a neighboring community to ensure water-availability in the event of a drought declaration and/or water-source contamination.

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
City Manager, Finance, Police	

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	Lincoln City Steering Committee

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Seek funding to obtain raw water storage capacities.	1. Protect life and property 3. Coordinate and enhance emergency services

Rationale for Proposed Action Item:

- Schooner Creek is the City's only water source, and the City's reservoirs store enough water for only one day of use. In the event that climate patterns change and drought becomes a probable hazard, Lincoln City would be extremely vulnerable to drought conditions. Furthermore, Schooner Creek is a direct-flow water source and contamination is a potential threat to the water supply.
- The water system serves 4300 residential and 650 commercial customers. As a tourist community, the population swells from a normal daily average of 13,500 to 23,000 on any given Friday evening. Only the amount of water necessary to satisfy the demand of the users is processed.
- The City has 3 reservoirs, which store a total of 5 million gallons. The water is mostly stored for emergency fire protection, but extra capacity additionally helps to ease peak demands and maintain constant pressure within the system.
- In addition to meeting customer demand, Schooner Creek must additionally maintain a sufficient flow for fisheries and recreational uses.

Ideas for Implementation:

- Obtain funding to construct additional reservoirs for emergency drought-related storage.
- Research ways to reduce drought risk within the City. (This may potentially result in non-storage projects)

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
City Manager, Finance	USDA, USGS, Western States Water Council

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	Lincoln City Steering Committee

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Identify over-water transportation alternatives in the event that bridges collapse in an earthquake and/or tsunami.	1. Protect life and property. 2. Coordinate and enhance emergency services.

Rationale for Proposed Action Item:

- In the event of a Cascadia Subduction Zone (CSZ) earthquake and/or tsunami, the City expects to lose the bridges over D River, and by 22nd St. The southern portion of the City will be separated from the hospital. Region-wide, portions of the coast may be isolated due to bridge failure.
- 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 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.
- 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. The last CSZ event occurred approximately 300 years ago.
- Restoration of key… infrastructure is essential after a natural disaster "to support the industry and the jobs it provided." To sustain the economy, communities should "provide for temporary infrastructure while long-term rebuilding efforts are underway."
  Source: Governor's Commission Report on Recovery, Rebuilding, and Renewal. After Katrina: Building Back Better than Ever. December 31, 2005. p. 112.

Ideas for Implementation:

- Build boat launches in strategic locations to serve as bridge replacements after an earthquake and tsunami.
- Obtain emergency equipment in preparation for an earthquake and/or tsunami event. Purchase flatcars to use as temporary bridges.

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
Finance, Community Development and Planning	ODOT, Department of Homeland Security, NOAA

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	Lincoln City Steering Committee

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Continue to educate citizens about earthquake and tsunami preparedness.	1. Protect life and property 2. Enhance and promote public education

Rationale for Proposed Action Item:

- Lincoln City has engaged in numerous education & outreach activities related to earthquake and tsunami preparedness. The City recognizes the importance of an ongoing education & outreach program that's specifically related to these two hazards.
- The Cascadia Subduction Zone can potentially cause a magnitude 9 earthquake that will be felt in Lincoln City. Scientists estimate that there is a 10-20% probability that a subduction zone earthquake will occur within the next 50 years.
- The extent of a tsunami event in Lincoln City will depend on where the tsunami originated, and the size of the earthquake that produced the tsunami. Geologists predict a 10-14% chance that a Cascadia tsunami will be triggered by a shallow, undersea earthquake offshore Oregon in the next 50 years. Close to 20% of the City's developed lands are within the tsunami inundation zone. This includes more than 1,500 residents, and close to 2,000 employees. Additionally, more than 25 overnight-tourist facilities are within the inundation zone.
- Public education and outreach can be inexpensive and provide information that results in safer households, work places and other public areas. Some outreach materials include: informational brochures about community seismic risks and mitigation techniques, public forums, newspaper articles, training classes and television advertisements.

  Source: Oregon Technical Resource Guide. July 2000. Community Planning Workshop. Eugene, OR: University of Oregon. p. 8-20.

Ideas for Implementation:

- Continue to encourage hotels to post tsunami evacuation maps within individual rooms. Explore the possibility of requiring hotels to post evacuation maps.
- Acquire funding to support a permanent tsunami preparedness coordinator position within the City.
- Continue to update and improve the City's emergency preparedness website.

Coordinating Organization:	CERT

Internal Partners:	**External Partners:**
Emergency Management, GIS	Tsunami Advisory Committee (TAC), DOGAMI

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT (ongoing)	

Form Submitted by:	Lincoln City Steering Committee

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage new hospital-related developments to be seismically resilient, and safe from floods and tsunami waves.	1. Protect life and property 4. Improve structural integrity of public buildings

Rationale for Proposed Action Item:

- The Cascadia Subduction Zone can potentially cause a magnitude (M) 9 earthquake. Scientists estimate that there is a 10-20% probability that a subduction zone earthquake will occur within the next 50 years. The Lincoln City Steering Committee identified the Samaritan North Lincoln Hospital as a structure that's potentially vulnerable to seismic events.
- The City would expect significant damage to roads and bridges following a Cascadia Subduction Zone event, as well as deaths and severe injuries region-wide. For the health and welfare of people region-wide, it's important that the hospital remain open and functioning in the aftermath of an earthquake / tsunami event.
- Seismic performance can be greatly enhanced through proper initial design or subsequent modifications. The hospital has plans to rebuild on-site. If new construction incorporates the strongest building techniques possible, the hospital's chances of withstanding earthquake damage may be increased.

Ideas for Implementation:

- Create a local rehabilitation and retrofit program for existing buildings.
- Evaluate the hospital's potential for collapse. Apply for Pre-Disaster Mitigation (PDM) funding to rehabilitate identified vulnerable buildings.
- For all new on-site development, apply for PDM funding to off-set costs related to seismic upgrades.

Coordinating Organization:	Samaritan North Lincoln Hospital

Internal Partners:	**External Partners:**
City Manager, Finance	CERT, DOGAMI

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	Lincoln City Steering Committee

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Seismically retrofit vulnerable structures and critical facilities.	1. Protect life and property 4. Improve structural integrity of public buildings

Rationale for Proposed Action Item:

- "For governments, less damage to government structures will mean continued services and normal processes or at least minimal interruptions. If government structures come through an earthquake with little or no damage, agencies will not have to relocate services, and public officials can respond to the immediate and long-term demands placed on them by the event. In short, seismic rehabilitation as a pre-event mitigation strategy actually will improve post-event response by lessening life loss, injury, damage, and disruption."
  Source: FEMA. Chapter 1: Why Seismic Rehabilitation?. http://www.fema.gov/plan/prevent/earthquake/pdf/fema-275-06-ch-1.pdf. October 12, 2006.
- DOGAMI conducted a seismic needs assessment for public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs' offices and other law enforcement agency buildings. Buildings were ranked for the "probability of collapse" due to the maximum possible earthquake for any given area. Within Lincoln City, the following buildings were rated as 'moderate,' 'high,' or 'very high.'
  - North Lincoln Fire & Rescue (2325 NW Hwy 101): *moderate*
  - Samaritan North Lincoln Hospital: *moderate*
  - Oceanlake Elementary School: *moderate*
  - Taft Elementary School: *high*
  - Taft Middle School: *moderate*
  - Lincoln City Career Technical High School: *high*
- In addition to the structures listed above, the City's infrastructure is highly vulnerable to a severe earthquake event. Sewer lines, water lines, power lines, water tanks, reservoirs, cell towers, the Samaritan North Lincoln Hospital, and City Hall were identified by the Steering Committee as vulnerable assets. The City would expect significant damage to roads and bridges following a Cascadia Subduction Zone event, as well as deaths and severe injuries region-wide.

Ideas for Implementation:

- Inventory of community buildings and infrastructure: determine which structures may be particularly vulnerable to earthquake damage. Seek funding to retrofit and/or re-build structures.
- Create a local rehabilitation and retrofit program for existing buildings.
- Rehabilitate identified vulnerable schools, emergency facilities, and public buildings/lifelines.

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
Finance, City Manager, Planning and Community Development	Oregon Emergency Management, DOGAMI

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	Lincoln City Steering Committee

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Explore steps needed to qualify Lincoln City for participation in the National Flood Insurance Program's Community Rating System (CRS).	1. Protect life and property

Rationale for Proposed Action Item:

- The City estimates a high probability that flooding will occur in the future.
- Lincoln City has 725 National Flood Insurance Policy (NFIP) holders, with a total coverage of $108,712,600. 32 claims have been paid since 1978, at a total of $646,123.
- 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.
  Source: Oregon Technical Resource Guide. July 2000. Community Planning Workshop. Eugene, OR: University of Oregon. p. 4-34.
- For communities with a high risk and high vulnerability to a flood, participating in the CRS can help a community reduce flood risk and save money by earning reduced insurance premiums.

Ideas for Implementation:

- Review CRS participation requirements, and take steps toward reaching the first ranking.

Coordinating Organization:	Community Development and Planning

Internal Partners:	**External Partners:**
City Manager, Finance	FEMA, Department of Land Conservation and Development, Oregon Emergency Management

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	Lincoln City Steering Committee

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Implement actions identified in the Devils Lake Water Improvement District's Lake Management Plan.	1. Protect life and property 2. Preserve natural areas and features 3. Promote partnerships and coordination to improve implementation.

Rationale for Proposed Action Item:

- The Devils Lake Water Improvement District is currently developing a Lake Management Plan for Devils Lake. The Lake Management Plan may include actions that mitigate flooding hazards.
- The Disaster Mitigation Act of 2000 requires communities to describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information (§201.6(b) 3). Reviewing, and incorporating mitigation into the Lake Management Plan (or implementing mitigation already identified in the Lake Management Plan) will assist the City in reducing its vulnerability to flood-related hazards.
- Lincoln City estimates a 'high' probability that flooding will occur, meaning one event is likely within a 10-35 year period. The City additionally estimates a 'moderate' vulnerability to flood hazards, meaning 1-10% of the population or regional assets are likely to be affected by a major emergency or event.

Ideas for Implementation:

- Review the Devils Lake Management Plan, when complete. If possible, participate in the planning process and incorporate mitigation principles & techniques into the Plan.

Coordinating Organization:	Planning & Community Development

Internal Partners:	**External Partners:**
Public Works	Devils Lake Water Improvement District

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	Lincoln City Steering Committee

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Construct a bridge on East Devils Lake Road where flooding typically occurs.	1. Protect life and property

Rationale for Proposed Action Item:

- Road closures are the most common flood-related impacts within the community. East Devils Lake Road floods frequently, and despite efforts to mitigate flood related damages by widening culverts along this road, flooding continues.
- Lincoln City estimates a 'high' probability that flooding will occur, meaning one event is likely within a 10-35 year period. The City additionally estimates a 'moderate' vulnerability to flood hazards, meaning 1-10% of the population or regional assets are likely to be affected by a major emergency or event.

Ideas for Implementation:

- Seek funding for bridge construction.
- Create development plans and assess alternatives to the project.

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
City Council, City Manager	ODOT, OEM

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	Lincoln City Steering Committee

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Implement actions identified in the Lincoln City Stormwater Management Plan.	1. Protect life and property 6. Promote partnerships and coordination to improve implementation

Rationale for Proposed Action Item:

- Lincoln City is currently updating its Stormwater Master Plan. Mitigation actions are identified within that plan as well.
- The Disaster Mitigation Act of 2000 requires communities to describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information (201.6(b)). Implementing actions identified within the Lincoln City Stormwater Management Plan will assist the City in meeting this requirement.
- Stormwater management is a key element in maintaining and enhancing a community's livability. There is a direct link between stormwater and a community's surface and ground waters. As a community develops, the impervious surfaces that are created increase the amount of runoff during rainfall events, disrupting the natural hydrologic cycle. Without control, these conditions erode stream channels and prevent groundwater recharge. Parking lots, roadways, and rooftops increase the pollution levels and temperature of stormwater runoff that is transported to streams, rivers, and groundwater resources. Protecting these waters is vital for a great number of uses, including fish and wildlife habitat, recreation, and drinking water. Source: Eugene Stormwater Management Manual. Section 1.1

Ideas for Implementation:

- Monitor the Stormwater Plan's update process. Review the Plan's mitigation actions at one of the County's future semi-annual natural hazard mitigation meetings. Identify and assist with actions that reduce the City's vulnerability to flood-related hazards.

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
Planning and Community Development	

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	Lincoln City Steering Committee

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Continue compliance with the National Flood Insurance Program.	1. Protect life and property

Rationale for Proposed Action Item:

- The City estimates a high probability that flooding will occur in the future.
- Lincoln City has 725 National Flood Insurance Policy (NFIP) holders, with a total coverage of $108,712,600. 32 claims have been paid since 1978, at a total of $646,123.
- 6 properties in Lincoln City have experienced a total of 17 losses. This means that there have been at least 6 repetitive losses in Lincoln City; some properties have had damages from more than two events. Total payments related to repetitive loss properties amount to $501,288.37.[i]
- Everyone in a participating community of the National Flood Insurance Program (NFIP) can buy flood insurance.

Ideas for Implementation:

- Continue to participate in the NFIP.
- Explore participation in the National Flood Insurance Program's Community Rating System (CRS).

Coordinating Organization:	Planning and Community Development

Internal Partners:	**External Partners:**
Finance	FEMA

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	ongoing	

Form Submitted by:	Lincoln City Steering Committee

[i] Department of Land Conservation and Development, Oregon Repetitive Flood Losses as of 3/31/2008.

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Replace undersized culverts.	1. Protect life and property

Rationale for Proposed Action Item:

- Road closures are the most common flood-related impacts within Lincoln City. East Devils Lake Road floods frequently, and despite efforts to mitigate flood related damages by widening culverts along this road, flooding continues.
- The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. Replacing undersized culverts will lessen the effect of flooding within Lincoln City.

Ideas for Implementation:

- Inventory culverts; identify culverts in need of replacement

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
Water districts	ODFW

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	Lincoln City Steering Committee

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Research steep slope ordinances; consider drafting a steep slope development ordinance for Lincoln City.	1. Protect life and property 2. Preserve natural areas and features

Rationale for Proposed Action Item:

- Development pressure on steep slopes is an issue that Lincoln City is beginning to deal with. Likewise, the road to the City's wastewater treatment plant has occasional slides. No significant losses have occurred, but the potential for future damages are believed to exist along this road. Potential impacts from landslides include infrastructural damages, economic impacts (due to isolation and/or arterial road closures), property damages, and obstruction to evacuation routes.
- Landslides and mudflows typically accompany rainstorms on the coast. Increasing development, and logging activities may increase the likelihood that landslides will occur.
- Oregon Land Use Goal 7 states that local governments shall adopt or amend plan policies that avoid "development in hazard areas where the risk to people and property cannot be mitigated" and prohibit "the siting of essestial facilities and special occupancy structures...in identified hazard zones.

Ideas for Implementation:

- The location and extent of landslides in Lincoln City are not available at this time. In 2007, the Oregon 74th Legislative Assembly directed the Department of Geology and Mineral Industries (DOGAMI) to extend LIDAR collection efforts throughout the state. LIDAR (light detection and ranging) is a tool that can provide high-resolution images of the surface of the earth, and it's excellent for mapping natural hazards like landslides. When the statewide LIDAR studies are completed, Lincoln City should evaluate the landslide risks within the City.
- Look at existing landslide ordinances within the State and determine how ordinances should be drafted for the City: http://www.oregon.gov/LCD/HAZ/landslideslocalgov.shtml#Existing_Ordinances

Coordinating Organization:	Planning and Community Development

Internal Partners:	**External Partners:**
Public Works	DLCD, ODF, DOGAMI

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	Lincoln City Steering Committee

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Educate residents about how to prepare for and mitigate damage caused by natural hazards.	1. Protect life and property. 2. Enhance and promote public education.

Rationale for Proposed Action Item:

- "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."
  Source: 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:

- Create public service advertisements.
- Distribute seasonal education & outreach materials with residents' water bills.
- Continue to teach children about emergency safety & preparedness.
- Host public meetings to discuss the earthquake and tsunami hazards in Lincoln City.
- Place educational materials on display at the library.

Coordinating Organization:	Police Department

Internal Partners:	**External Partners:**
City Council, City Manager, Planning and Community Development	American Red Cross, Fire Departments, Public Library

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	

Form Submitted by:	Lincoln City Steering Committee

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Acquire generators for service stations.	1. Protect life and property 3. Coordinate and enhance emergency services

Rationale for Proposed Action Item:

- In Lincoln City, power outages are the greatest concern during windstorms. In the December 2007 wind storm, gas stations closed.
- Ensuring continuous service will assist residents in recovering from a natural disaster as well as make the process easier.

Ideas for Implementation:

- Seek funding to purchase generators on behalf of service stations in Lincoln City.

Coordinating Organization:	Emergency Services

Internal Partners:	**External Partners:**
City Manager, Finance	DHS, OEM, local service stations

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	Lincoln City Steering Committee

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
As it becomes available, integrate new risk assessment information into Lincoln City's Addendum.	1. Protect life and property

Rationale for Proposed Action Item:

- In 2007, the Oregon 74th Legislative Assembly directed the Department of Geology and Mineral Industries (DOGAMI) to extend LIDAR collection efforts throughout the state. LIDAR (light detection and ranging) is a tool that can provide high-resolution images of the surface of the earth, and it's excellent for mapping natural hazards like landslides. When the statewide LIDAR studies are completed, Lincoln City will have a much greater understanding of its landslide risks.
- Better data provides for better decisions to minimize losses resulting from natural hazards.
- The 2004 Indian Ocean earthquake and tsunami led DOGAMI to re-evaluate the State's tsunami mapping program. Currently, DOGAMI is using the latest advances in mapping technology (LIDAR), computer technology and computer modeling to run a pilot mapping project for the coastal city of Cannon Beach. The new map will be scenario based, meaning that variations in inundation levels (given local or distant tsunamis) will be shown. If Lincoln City is presented with an opportunity to improve its current maps, the City's risk assessment information may change.
- The County is currently engaged in an effort to develop a Community Wildfire Protection Plan (CWPP) which will map vulnerable areas, among other things.

Ideas for Implementation:

- Integrate new risk assessment information into Lincoln City's Addendum, as it becomes available. During the County's semi-annual natural hazard mitigation meetings, the City should review new research, and 1) determine whether the City's hazard-specific information should change; and 2) develop new action items based on the updated risk assessment information (if necessary).

Coordinating Organization:	Convener of the Lincoln City Addendum

Internal Partners:	**External Partners:**
Lincoln City Steering Committee	Lincoln County Steering Committee, DOGAMI

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	Lincoln City Steering Committee

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage emergency-related intergovernmental planning.	1. Protect life and property 3. Coordinate and enhance emergency services 6. Promote partnerships and coordination to improve implementation

Rationale for Proposed Action Item:

- Communities along the Oregon coast share similar vulnerabilities to earthquake, tsunami, and windstorm hazards. Earthquakes and tsunamis, in particular, present common concerns. Specifically, coastal communities feel unprepared for dealing with the aftermath of a high magnitude Cascadia Subduction Zone earthquake (and tsunami following). In the event that an M9 earthquake occurs off the coast, Oregon's highly populated areas (i.e., Portland, Salem, Eugene) will additionally suffer large amounts of damage. Due to large amount of people who live in the Willamette Valley, relief efforts will likely focus on these inland cities first. (Or, at least, this is the fear of coastal residents). In an effort to become better prepared for the aftermath of such an event, Lincoln City would like to see broad emergency-related intergovernmental planning along the coast.

Ideas for Implementation:

- Find coastal groups that are already working together on common concerns and/or issues. Coordinate an informational / interest meeting to discuss coastal hazard issues and possibilities for intergovernmental emergency-related planning. Planning efforts could focus on all phases of a disaster, and benefit each participating jurisdiction in terms of preparedness, mitigation, response, and recovery.

Coordinating Organization:	City Manager

Internal Partners:	**External Partners:**
Emergency Services, Police, Fire, Public Works, Planning and Community Development, GIS	Tsunami Advisory Committee (DOGAMI), OEM, coastal counties / tsunami preparedness coordinators

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	Lincoln City Steering Committee

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Seek funding to obtain additional tsunami sirens.	1. Protect life and property. 2. Coordinate and enhance emergency services.

Rationale for Proposed Action Item:

- 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.
- The average recurrence interval for a Cascadia Subduction Zone (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. The last CSZ event occurred approximately 300 years ago.
- Close to 20% of the City's developed lands are within the inundation zone. This includes more than 1,500 residents, and close to 2,000 employees. Additionally, more than 25 overnight-tourist facilities are within the inundation zone.
- At this time Oregon does not have a uniform tsunami warning system with complete coverage of the coastline. In the spectrum of Oregon's tsunami warning capacity, there are some communities, Cannon Beach is the best example, that have taken their own initiative to employ sophisticated siren and voice delivery systems for alert notification. While Cannon Beach is a shining star for tsunami readiness, they do not reflect the majority of communities, which have limited sirens that are often cobbled together from civil defense alert systems. Many of these are failing from age or exposure to sand and salts. And even when working properly, these older electro-mechanical sirens produce a tone of limited delivery range. With that said, some emergency managers on the coast feel that siren systems, in general, are problematic warning systems due to:
  - Chronic exposure problems and high maintenance costs;
  - Poor audibility during high winds and storms and along rugged coastal terrain;
  - Confusion by public about intent of warning
  - Misuse of limited resources

Ideas for Implementation: Fire Department

- Work with OEM to identify funding sources to help pay for additional / new tsunami sirens in Lincoln City

Coordinating Organization:	Police / Fire Departments

Internal Partners:	**External Partners:**
Emergency Services, City Manager, Finance	National Tsunami Hazard Mitigation Program, OEM

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Participate in the development of the County's Community Wildfire Protection Plan.	1. Protect life and property; 2. Preserve natural areas and features; 3. Coordinate and enhance emergency services; 6. Promote partnerships and coordination to improve implementation.

Rationale for Proposed Action Item:

- The County is currently engaged in an effort to develop a Community Wildfire Protection Plan (CWPP) which will map vulnerable areas, among other things. The City hopes to participate in the CWPP's development process as well. The CWPP has the potential to benefit both jurisdictions; the City's participation is essential in ensuring that the CWPP provides adequate City-level information.
- 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 (taken from Linn County's plan). Source: FEMA. October 30, 2000. Disaster Mitigation Act of 2000. http://www.fema.gov/library/viewRecord.do?id=1935. October 12, 2006.

Ideas for Implementation:

- Coordinate with the Lincoln County Steering Committee to identify persons/groups responsible for the CWPP planning effort. Coordinate and establish relationships with fire districts involved in the effort.

Coordinating Organization:	Community Development and Planning

Internal Partners:	**External Partners:**
City Manager, City Recorder, Police	Lincoln County, Fire Districts, BLM

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Improve emergency-vehicle access to beachfront properties and shoreline.	1. Protect life and property 3. Coordinate and enhance emergency services

Rationale for Proposed Action Item:

- Due to the accumulation of driftwood, the beachfront area is susceptible to wildfire (in the event of continued dry weather). Emergency access to beachfront properties is inconsistent along the coast of Lincoln City.
- The City estimates a 'moderate' probability that local wildfires will occur in the future.

Ideas for Implementation:

- Map and prioritize areas in need of improved emergency-vehicle access.
- Seek funding to assist in the widening and/or construction of access routes.

Coordinating Organization:	GIS

Internal Partners:	**External Partners:**
Fire Departments, Public Works	NOAA

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Assess the City's wildfire interface areas.	1. Protect life and property 2. Preserve natural areas and features 5. Enhance and promote public education

Rationale for Proposed Action Item:

- The location and extent of a wildfire vary depending on fuel, topography, and weather conditions. In Lincoln City, areas of concern include the eastern side of the City (where forestland borders development), and some of the open spaces within the City's limits. Due to the prevailing wind patterns, however (i.e., from the north or south), the City's Steering Committee felt that the northern and southern ends of the City might be the most vulnerable spots to wildfire. In an effort to eventually mitigate areas of concern, the City needs to better understand where vulnerable areas are located.
- Power, natural gas, and phone lines run through the forest to the east of the City, and would be affected in the event of a wildfire.
- The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. Mapping wildfire interface areas will help the City to identify actions that can reduce the effects of wildfire on the community.

Ideas for Implementation:

- Coordinate with DOGAMI to better understand wildfire interface areas through improved LIDAR maps.
- Participate in the development of Lincoln County's Community Wildfire Protection Plan.

Coordinating Organization:	GIS

Internal Partners:	**External Partners:**
Parks and Recreation	BLM, Oregon Department of Forestry, Lincoln County

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Explore opportunities to limit and/or restrict slash-burning near city limits.	1. Protect life and property

Rationale for Proposed Action Item:

- Active commercial logging occurs just outside the City, and slash burns are a potential wildfire concern.
- Slash and burn techniques can result in uncontrolled wildfire.
- Commercial logging also opens up the forest to rapid growth of shrubs, bushes and small trees. Those fuels dry out quickly and burn readily, making them a prime ignition source for larger logs and trees.

Ideas for Implementation:

- Work with the County to limit slash-burning on County lands near City limits.

Coordinating Organization:	Planning and Community Development

Internal Partners:	**External Partners:**
Police, Emergency Management	ODF, BLM, Lincoln County

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Add debris removal and emergency response strategies to the Lincoln City Stormwater Management Plan.	1. Protect life and property

Rationale for Proposed Action Item:

- Lincoln City is currently updating its storm water master plan.
- The City estimates a 'high' probability that flooding will occur, meaning one event is likely within a 10-35 year period.
- Road closures are the most common flood-related impacts within the community.
- Wind storms often result in flooding, and debris removal (following a windstorm/flooding event) is a big task.
- The stormwater management plan currently does not describe emergency response strategies during (or following) a severe flooding event.

Ideas for Implementation:

- Coordinate with groups involved in updating the stormwater management plan. Suggest adding debris removal and emergency response strategies to the plan.

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
Community Development and Planning, Parks and Recreation	

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	Lincoln City Steering Committee

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Volume III: City Addenda
City of Newport

Overview

The city of Newport developed this addendum to the Lincoln County multi-jurisdictional Natural Hazards Mitigation Plan in an effort to increase the community's resilience to natural hazards. The addendum focuses on natural hazards that could affect Newport, Oregon, which include coastal erosion, droughts, earthquakes, floods, landslides, tsunamis, volcanoes, wildfires, and windstorms. It is impossible to predict exactly when disasters may occur, or the extent to which they will affect the city. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize losses that result from natural hazards.

The addendum provides a set of actions that aim to reduce the risks posed by natural hazards through education and outreach programs, the development of partnerships, and the implementation of preventative activities such as land use or storm water management plans. The actions described in the addendum are intended to be implemented through existing plans and programs within the city.

The addendum is comprised of the following sections: 1) Addendum Development Process 2) Community Profile; 3) Risk Assessment; 4) Action Items; and 5) Plan Implementation and Maintenance.

Addendum Development Process

In the fall of 2006, the Oregon Partnership for Disaster Resilience (The Partnership / OPDR) at the University of Oregon's Community Service Center partnered with Oregon Emergency Management (OEM) and Clatsop and Lincoln Counties to develop a Pre-Disaster Mitigation Planning Grant proposal. Both Counties joined The Partnership by signing (through their County Commissions) a Memorandum of Understanding for this planning project. FEMA awarded the Oregon Coast Region a grant to support the development of the natural hazard mitigation plans for the two counties and the cities therein. The Partnership, OEM, and the participating communities were awarded the grant in the fall of 2006 and local planning efforts began in the fall of 2007.

With guidance from The Partnership and the Lincoln County Planning Department, the city of Newport formed a local steering committee to participate in the addendum's development. The Newport Steering Committee was comprised of representatives from the following departments:

- Newport Fire Department
- Newport Department of Public Works
- Newport Police Department
- Newport Community Development Department
- Lincoln County Planning Department

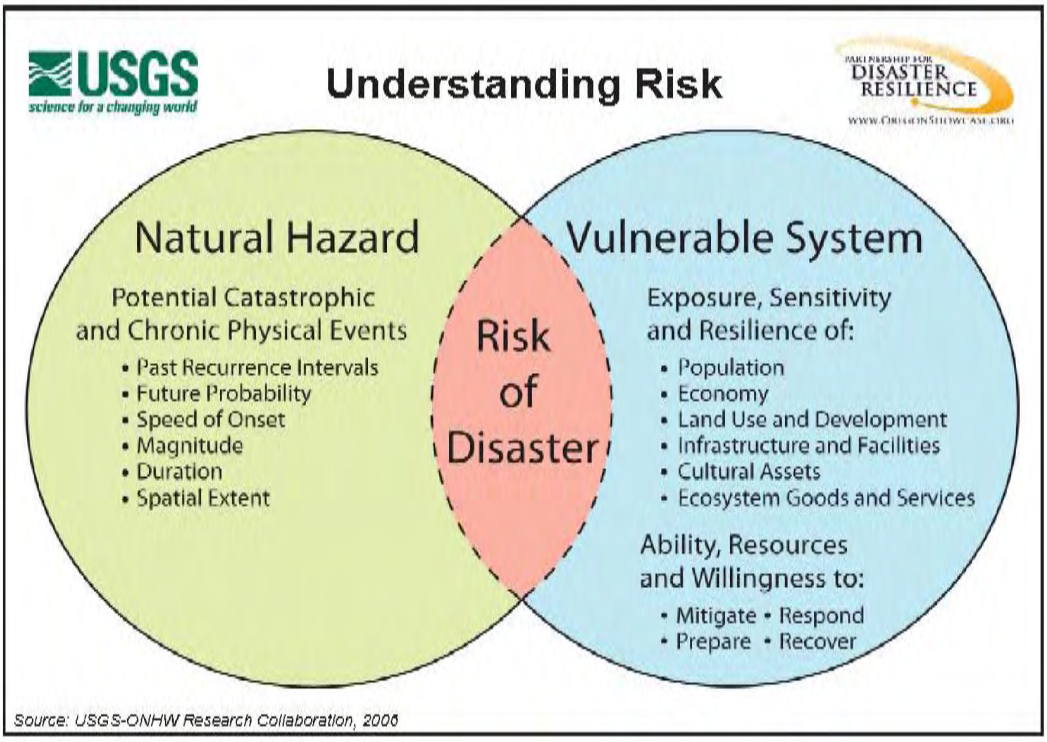
The committee first met on September 8, 2008; thereafter, the committee remained engaged and provided subsequent feedback and review of plan drafts. With assistance from Lincoln County, OPDR developed and facilitated the September 8th meeting at City Hall in Newport. During the meeting, the committee reviewed the county's risk assessment and discussed how the city's risks (i.e., hazards' characteristics, probabilities of occurrence, local vulnerabilities, and community-specific impacts) differed from the county's. Additionally, the committee adopted the county's goals (see Section 3 of the county's plan), and identified city-specific mitigation actions.

The city of Newport adopted the Lincoln County Multi-Jurisdictional Natural Hazards Mitigation Plan via resolution on Insert Date, Year.

Community Profile

The following section describes the city of Newport from a number of perspectives in order to help define and understand the city's sensitivity and resilience 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 city when the plan was developed. The information documented below, along with the hazard assessments located in the Hazard Summary, should be used as the local level rationale for the city's risk reduction actions. The identification of actions that reduce the city's sensitivity and increase its resilience assist in reducing overall risk, or the area of overlap in Figure 1 below.

Figure 1 Understanding Risk



Source: USGS - Partnership for Disaster Resilience Research Collaborative, 2006.

Geography & Climate

The city of Newport is located on the Oregon Coast in the western portion of Lincoln County. Newport's climate is relatively moderate; the average monthly temperatures range from 50 – 66 degrees in July and August, and 36-51 degrees in December and January, and the city receives approximately 72 inches of rain each year. Monthly precipitation is about 11 inches during the wetter months of November – January, and about 1 inch during the drier months of June - August.[i] The city's topography is both a mix of relatively flat areas and steeper sloped areas such as those near Yaquina Bay and along the Ocean, and the Coast Range is east of the city. Nearby bodies of water include the Pacific Ocean, Yaquina Bay, and Big Creek Reservoir.

Population & Demographics

Newport was first incorporated on October 23, 1882, and since then, the population has been steadily growing. In 2007 the city of Newport's population was estimated to be 10,455, an increase of 9.7 % from the 2000 US Census estimate of 9,532.[ii] Un-monitored growth within the city of Newport can potentially result in the development of lands in hazardous areas, including steep slopes.

Table 1 City of Newport Population Change, 2000-2007

Population Estimates	Newport Population	% Change
2000	9,532	X
2007	10,455	9.7%

Source: Portland State Population Research Center

Disaster impacts (in terms of loss and the ability to recover) vary among population groups following a disaster. Historically, 80% of the disaster burden falls on the public. Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities, and low income persons. In 2000, 12.2% of families and 14.4% of individuals were living below the federal poverty level (see Table 2 below).[iii] Additionally, 17.3% of the population is over the age of 65 (see Table 3 below). Of persons over 65, 35.4% are disabled.[iv]

Table 2 City of Newport Poverty Status, 2000

Type	Total Persons	% of Population
Families	305	12.2%
Individuals	1,330	14.4%

Source: US Census 2000, Newport City, OR, "Profile of General Demographic Characteristics: 2000"

Table 3 City of Newport Population by Age, 2000

Age Range	Total Persons	%
Under 5	533	5.6%
5 to 9	562	5.9%
10 to 14	598	6.3%
15 to 19	663	7.0%
20 to 24	537	5.6%
25 to 34	1,113	11.7%
35 to 44	1,339	14.0%
45 to 54	1,535	16.1%
55 to 59	556	5.8%
60 to 64	457	4.8%
65 to 74	855	9.0%
75 to 84	615	6.5%
85 and over	169	1.8%
Total	**9532**	**100%**

Source: US Census 2000, Newport City, OR, "Profile of General Demographic Characteristics: 2000"

Employment & Economics

Historically, the economy of Newport has been largely based on tourism, fishing, and timber. Though the seafood and the timber industries have declined, tourism is still a primary economic driver in Newport. The city's economy has been greatly influenced by the management, sales, and service industries.

Table 4 City of Newport Employment by Major Industry, 2000

Occupation	Total Persons	% of Population
Management, professional, and related occupations	1,417	32.5%
Sales and office occupations	1,227	28.2%
Service occupations	931	21.4%
Production, transportation, and material moving occupations	390	9.0%
Construction, extraction, and maintenance occupations	258	5.9%
Farming, fishing, and forestry occupations	134	3.1%

Source: US Census 2000, Newport City, OR, "Profile of Selected Economic Characteristics: 2000"

Median income can be used as an indicator of the strength of the region's economic stability. In 1999, the median household income in Newport was $31,996.[v] This is almost $10,000 below the 1999 national median household income of $41,994, and around $800 below the $32,769 median household income for Lincoln County.[vi] Although it can be used to compare areas as a whole, this number does not reflect how income is divided among area residents.

Housing

Housing type and year-built dates are important factors in mitigation planning. Certain housing types tend to be less disaster resistant and warrant special attention: mobile homes, for example, are generally more prone to wind and water damage than standard wood-structure homes. Generally the older the home is, the greater the risk of damage from natural disasters. This is because stricter building codes have been developed following improved scientific understanding of plate tectonics and earthquake risk. For example, structures built after the late 1960s in the Northwest and California use earthquake resistant designs and construction techniques. In addition, FEMA began assisting communities with floodplain mapping during the 1970s, and communities developed ordinances that required homes in the floodplain to be elevated to one foot above Base Flood Elevation.

In 2000, Newport had 5,119 housing units.[vii] Of those, 81.7% were occupied (4,112), and 18.3% (922) were vacant. Of the occupied housing units 51.9% (2,136) were owner occupied, and 48.1% (1,976) were renter occupied.[viii] Nearly 62.0% of the city's housing stock was built prior to 1980, before stronger seismic building codes were put into place (see Table 5 below). Additionally, Table 6 describes Newport's housing types in 2000.

Table 5 City of Newport Housing Structure Age, 2000

Year Built	Total Structures	% of Structures
1980-2000	1,922	38.3%
1960-1979	1,665	33.1%
Before 1960	2,000	28.5%

Source: US Census 2000, Newport City, OR, "Profile of Selected Housing Characteristics: 2000"

Table 6 City of Newport Housing Type, 2000

Housing Type	Total Structures	% of Structures
Single Unit	2,723	54.2%
Multi Unit	1,605	31.9%
Mobile Home	601	12.0%
Boat, RV, Van	90	1.8%

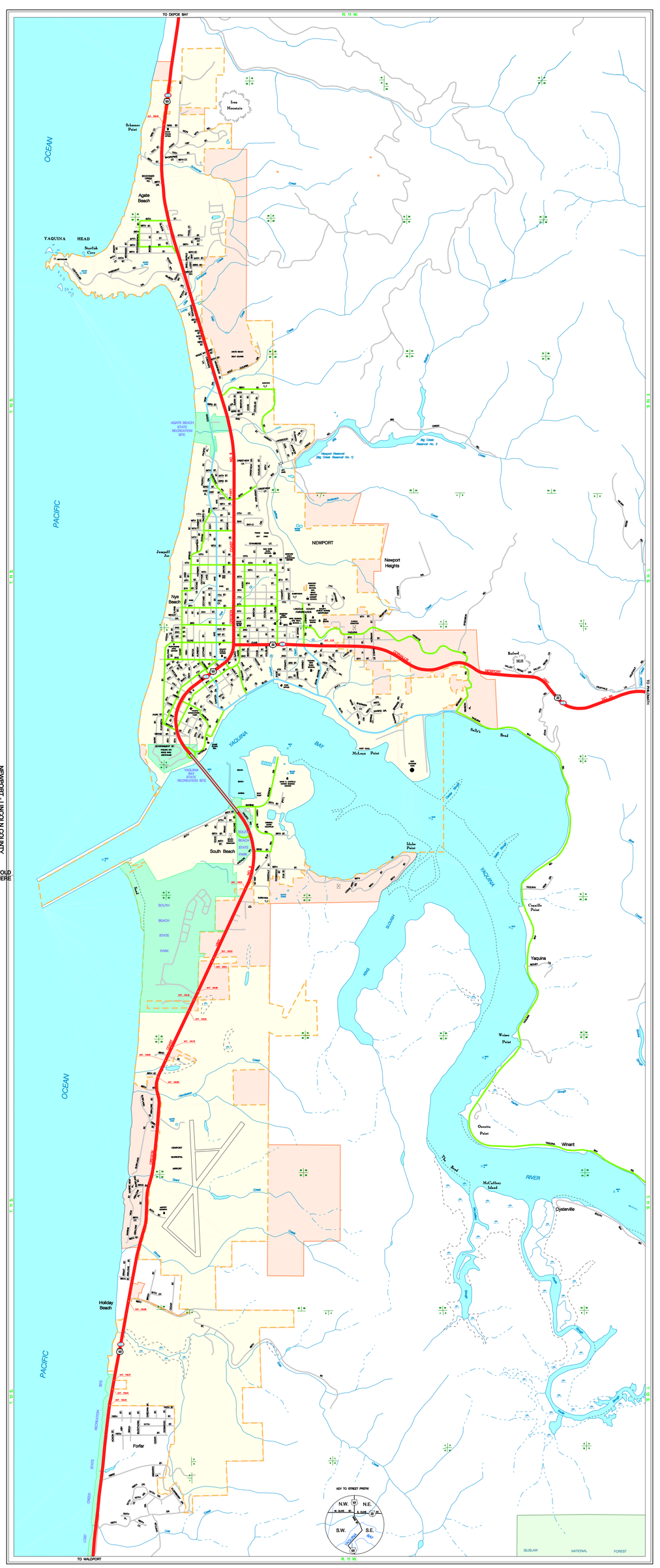
Source: US Census 2000, Newport City, OR, "Profile of Selected Housing Characteristics: 2000"

Land Use & Development

Development in Newport spans a total of 8.9 square miles. Newport sits along the coast of Central Oregon, making the city vulnerable to tsunamis. Newport spreads mostly to the north and south along Highway 101. Commercial development begins at NE 25th Street and continues until the Yaquina Bay Bridge. The downtown core includes government offices and additional retail use, and is concentrated between Olive and Fall Street.[ix] The downtown grid of streets in Newport is the basic footprint of the original town's extent. Newport's high school, middle school, and two elementary schools are located in the city's center. The fairgrounds and several ball fields are also in this same vicinity. There is a heavy concentration of established residential development on both sides of the highway between NE 25th Street and the Yaquina Bay Bridge.[x]

Transportation & Commuting Patterns

Two major transportation routes run through Newport: Highways 20 and 101. Highway 20 runs east to west and Highway 101 runs north and south. The city of Newport views Highway 101 and Highway 20 as the most important arterials in their multi-modal transportation.[xi] Transportation is an important consideration when planning for emergency service provisions. Growth within the city will put pressure on both major and minor roads, especially if the main mode of travel is by single occupancy vehicles.



LEGEND

FUNCTIONAL CLASSIFICATION (STATE ONLY)

FOR FURTHER FUNCTIONAL CLASSIFICATION INFORMATION, CONTACT ODOT, REGION 1 OFFICE.

- INTERSTATE
- PRINCIPAL ARTERIAL
- MINOR ARTERIAL
- URBAN COLLECTOR / RURAL MAJOR COLLECTOR
- MINOR COLLECTOR
- LOCAL ROAD

OR6 - ROUTE = US, ROUTE = INTERSTATE ROUTE
NATIONAL HIGHWAY SYSTEM ROUTE
URBAN GROWTH BOUNDARY
CITY LIMIT
AMTRAK RAIL PASSENGER STATION
BRIDGE
GRADE SEPARATIONS:
STATE – OTHER FUNCTIONALLY CLASSED – LOCAL ROAD

- PUBLIC BUILDING
- COURTHOUSE
- CITY HALL
- AIRPORT
- POST OFFICE
- SCHOOL
- LIBRARY
- SAFETY REST AREA
- WEIGH STATION
- PARK & RIDE LOCATION
- INTERCITY – CITY TRANSIT
- COMMERCIAL – GENERAL AVIATION
- AMTRAK STOP – PORT FACILITY
- GRAVEL PIT – QUARRY – ODOT STOCKPILE SITE

PUBLISHED BY

NORTH

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PREPARED DIGITALLY BY THE OREGON DEPARTMENT OF TRANSPORTATION IN COOPERATION WITH THE U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

SCALE

750 0 750 1500 FEET

225 0 225 450 METERS

NEWPORT
Population 10,405 *

T. 10-12 S. R. 11 W. W.M.

OREGON TRANSPORTATION MAP

Showing Functional Classification of Roads
City of

NEWPORT

PRELIMINARY COPY
SUBJECT TO CORRECTION

LINCOLN COUNTY
2007

AVAILABLE TRANSPORTATION SERVICES
BOXED WITH YELLOW BACKGROUND

AVAILABLE TRANSPORTATION SERVICES
BOXED WITH YELLOW BACKGROUND

Copies available from the Oregon Department of Transportation, Map Distribution Unit, Mill Creek Office Park, 555 13th St. NE, Suite 2, Salem, Oregon 97301-4178, Telephone (503) 986-3154, http://egov.oregon.gov/ODOT/TD/TDATA/gis/CityMaps.shtml
* Based on current Oregon Population Report, College of Urban and Public Affairs, Portland State University, http://pdx.edu/prc

Critical Facilities & Infrastructure

Critical facilities are those that support government and first responders' ability to take action in an emergency. They are a top priority in any comprehensive hazard mitigation plan. Individual communities should inventory their critical facilities to include locally designated shelters and other essential assets, such as fire stations, and water and wastewater treatment facilities. Newport has two fire stations (one main station on the north side of the Bay and one substation south of the Bay at the Airport), one hospital, two clinics, two public elementary schools, one middle school building, and one high school.[xii] Additionally, the city has two water storage reservoirs, one water treatment plant, and seven holding tanks with about nine million gallons of treated water storage capacity. Newport also has a municipal airport three miles south of the Yaquina Bay in the South Beach portion of the city. The airport has supported occasional commercial passenger service in the past, mostly with connections to Portland International (PDX).

Historic & Cultural Resources

Historic and cultural resources such as historic structures and landmarks can help to define a community and may also be sources of tourism dollars. Because of their role in defining and supporting the community, protecting these resources from the impact of disasters is important. The National Register of Historic Places lists 4 historic sites within the city of Newport. These historic resources include the Yaquina Head Lighthouse, Charles and Theresa Roper House, Old Yaquina Bay Lighthouse, and the New Cliff House.[xiii] Additional recreational amenities and attractions (among many) include Newport's Bayfront, Agate Beach Golf Course, Mariner's Square, the Newport Performing Arts Center, the Newport Visual Arts Center, Hatfield Marine Science Center, Oregon Coast Aquarium, and fishing and sightseeing charters.

Government Structure

The City Council is the policy making body for the city of Newport. Members of the Council serve as Council representatives on many boards and commissions of the city, other local governments, agencies, and the state. The mayor appoints all city boards and commissions. The Mayor and Councilors appoint the city administrator, city attorney, and municipal judge. The city manager supervises department directors, implements policies, goals and objectives of the City Council and oversees the protection of organization assets. The city manager is often required to be the final administrative arbitrator of the rules and ordinances that govern the city.

The city of Newport City Hall currently houses the following departments:[xiv]

City Manager's Office: The city manager supervises department directors, implements policies, goals and objectives of the City Council and oversees

the protection of organization assets. The city manager is often required to be the final administrative arbitrator of the rules and ordinances that govern the city. In this roll, the city manager must maintain a careful balance between being an ombudsman for a constituent, protecting the broader public interest, risk management for the organization and ensuring consistency and fairness in the application of city policy.

Community Development: The Community Development Department is responsible for land use planning, zoning administration, building inspection, development code enforcement, building and electrical code compliance, and historic preservation. Currently the Community Development Department houses four staff members, a Community Development Director, a Building Official, a Planner/Code Administrator, and an Administrative Secretary.

Public Works Department: Major areas of responsibility for the city of Newport's Public Works Department include: planning, designing, constructing, operating, maintaining and improving the city's utility and transportation systems. Currently the Public Works Department has six employees: a public works director/city engineer, assistant city engineer, administrative secretary, streets division superintendent, wastewater division superintendent, and a water division superintendent.

Finance Department: The Finance Department is the hub of all financial activities for the city. Billings and receipts for utilities and assessments, lien searches and customer service are all included in this department. This department provides central accounting services for all city departments within the city of Newport. The Finance Department is responsible for accounts receivable, accounts payable, risk management, purchasing, and human resources including payroll. The Finance Department is also responsible for coordination of the city's annual budget and audit processes, grant administration, fixed assets, financial reporting and investment of city funds. Currently the Finance Department has four employees including the finance director.

Police Department: The Newport Police Department provides law enforcement services for the city's residents and visitors 24 hours every day and places particular emphasis on responding to the community's calls for service, investigating crimes and traffic enforcement.

Existing Plan and Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances, and technical reports or studies. Plans and policies already in existence have support from local residents, businesses and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.

Newport's Addendum includes a range of recommended action items that, when implemented, will reduce the city's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the city's existing plans and policies. Linking existing plans and policies to the addendum helps identify what resources already exist that can be used to implement the action items identified in Newport's Addendum. Implementing the city's mitigation actions through existing plans and policies increases their likelihood of being supported and getting updated, and maximizes the city's resources.

The following are Newport's existing plans and policies:

- **Comprehensive Plan, 2007:** A document stating the general, long-range policies that will govern a local community's future development.

  Relation to Natural Hazard Mitigation: Contains city-specific information regarding natural hazards within the city's jurisdictional boundaries

- **Zoning Ordinance, 2008:** An ordinance establishing land use zones to regulate the location of building structure and the use of land within the city of Newport.

  Relation to Natural Hazard Mitigation: Contains city-specific hazard related requirements for the placement and construction of the buildings. Issues such as floodplain development, fire resistant materials, etc.

- **Subdivision Ordinance, 1998:** An ordinance prescribing regulations governing the subdivision of land.

  Relation to Natural Hazard Mitigation: Contains city-specific hazard related requirements for the subdivision of parcels. Issues such as floodplain development, protection from fire, etc.

- **Newport Transportation System Plan, 2008:** Guides the management of existing transportation facilities and the design and implementation of future facilities.

  Relation to Natural Hazard Mitigation: Mitigation principles and strategies can be incorporated into Transportation Systems Plans to protect key transportation infrastructure from natural hazards.

- **Newport Access Management Plan, 1997:** The purpose of this document is to define an effective access management program that will enhance mobility and improve the safety of roadways in the city of Newport

  Relation to Natural Hazard Mitigation: Mitigation principles and strategies can be incorporated into access management plans to protect key transportation infrastructure from natural hazards.

Community Organizations and Programs

Social systems can be defined as community organizations and programs that provide social and community-based services, such as health care or housing assistance, to the public. In planning for natural hazard

mitigation, it is important to know what social systems exist within the community because of their existing connections to the public. Often, actions identified by the plan involve communicating with the public or specific subgroups within the population (e.g. elderly, children, low income). The county and cities can use existing social systems as resources for implementing such communication-related activities because these service providers already work directly with the public on a number of issues, one of which could be natural hazard preparedness and mitigation.

The countywide Community Organizations and Programs table can be found in Section 2: Community Overview of the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan. The table highlights organizations that are active within the county and may be potential partners for implementing mitigation actions.

Risk Assessment

The following hazards have been addressed in the Lincoln County Natural Hazard Mitigation Plan. The city of Newport reviewed the county's plan on September 8, 2008 and assessed how Newport's risks vary from the risks facing the entire planning area.

Coastal Erosion

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of coastal erosion hazards. Erosion is a natural process that continually affects coastal areas, including the western border of the city of Newport. Typically, the damage caused by coastal erosion is 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 in a matter of hours. The regional, oceanic and climatic environments that result in intense winter storms determine the severity of chronic erosion hazards along the Oregon coast.

Previous occurrences of disasters incurred by coastal erosion are adequately described within the county's Coastal Erosion Hazard Annex. The county's plan mentions one catastrophic (as opposed to chronic) event that specifically occurred within the city of Newport: Jump off Joe. In this event, a landslide that began moving in the 1920's was accelerated by ocean wave attack in the mid 1940's. Roadways, drain pipes, and 15 houses were moved seaward.[xv]

Because coastal erosion is a continual process, the county has described the hazard's **probability** of occurrence as '**high.**' Newport agrees with the county's description, due to the city's location along the coast. Additionally, Lincoln County estimates a **'moderate' vulnerability** to coastal erosion hazards, meaning 1-10% of the population or regional assets are likely to be affected by a major erosion event. The Newport Steering Committee also believes that the 'moderate' vulnerability ranking accurately describes the city's vulnerability.

Potential community-related impacts, including shoreline reduction, economic (tourism-related) impacts, and property/infrastructural damage, are adequately described within the county's Coastal Erosion Hazard Annex. Additionally, the Newport Steering Committee identified the areas near Yaquina Head Lighthouse and Moolack Beach as particularly vulnerable spots.

Drought

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of drought hazards, as well as the location and extent of a potential event. Due to a cool, wet climate, past and present weather conditions have generally spared coastal communities from the effects of a drought. As such, there is no record of a severe

drought event within Lincoln County. The same holds true for Newport; the city has no record of imposing mandatory water restrictions.

Newport's primary water supply comes from the Big Creek Reservoir, and additional supply is available through water rights to the Siletz River.[xvi] The city has two storage reservoirs, and seven tanks with about 9 million gallons of treated water storage capacity. The city is currently proposing the construction of a new water reservoir to meet current standards for water protection,[xvii] but the city's steering committee does not believe that the tanks are adequate to store a large amount drinking water in the event of a drought. Currently, the city of Newport does not have an official water management plan that specifically addresses drought. The Oregon Water Resources Department, however, coordinates with municipalities to implement water conservation or curtailment plans when drought emergencies are declared.[xviii] The city's Water Master Plan is currently being updated, and part of the plan is expected to address conservation and rationing protocols.

Lincoln County estimates that the **probability** of a drought is **'low,'** meaning no more than one event is likely to occur within a 75-100 year period. The city of Newport agrees with the county's estimate, but also acknowledges great uncertainty in predicting weather patterns. The city will review this estimate every five years in concurrence with the county's plan update process. Lincoln County additionally estimates a 'low' vulnerability to drought hazards, meaning less than 1% of the population or regional assets would be affected by a major emergency or disaster. Due to potential storage concerns, however, the city of Newport estimates a **'moderate' vulnerability** to drought, meaning 1-10% of the population would be affected by a major event.

Potential drought-related community impacts are adequately described within the county's Drought Hazard Annex.

Earthquake

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes, characteristics, and location of earthquake hazards for the region. The county's plan additionally identifies all previous occurrences that have affected the city of Newport. It is difficult to estimate recurrence intervals, but the state has experienced seven Cascadia Subduction Zone (CSZ) events in the last 3500 years – some of which were probably as large as magnitude (M) 9. These events are estimated to have an average recurrence interval between 500 and 600 years, although the time interval between individual events ranges from 150 to 1000 years. The last CSZ event occurred approximately 300 years ago. Scientists estimate that there is a 10-20% **probability** that a subduction zone earthquake will occur within the next 50 years. [xix] Based on this information, Lincoln County estimates a 'high' probability than an earthquake will occur in the future. The city of Newport agrees.

Earthquake-induced damages are difficult to predict, and depend on the size, type, and location of the earthquake, as well as site-specific building and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any particular site. In many major earthquakes, damages have primarily been caused by the behavior of the soil.[xx] The Department of Geology and Mineral Industries (DOGAMI) developed the following maps for the city of Newport that show areas of higher risk (relative to other areas) during a damaging earthquake. Specifically, Figures 3 – 6 display relative amplification hazards, relative liquefaction hazards, and areas subject to earthquake-induced landslides. The fourth map displays hazard zones based on the combined effects of ground shaking, amplification, liquefaction, and earthquake-induced landsliding (and is titled "Relative Earthquake Hazard Map"). As shown in each of the maps, the area of greatest concern within the city of Newport is along the Yaquina Bay. The Bayfront area of Newport and the highly populated tourist spots are located in this area.

Figure 3 Relative Amplification Hazard Map

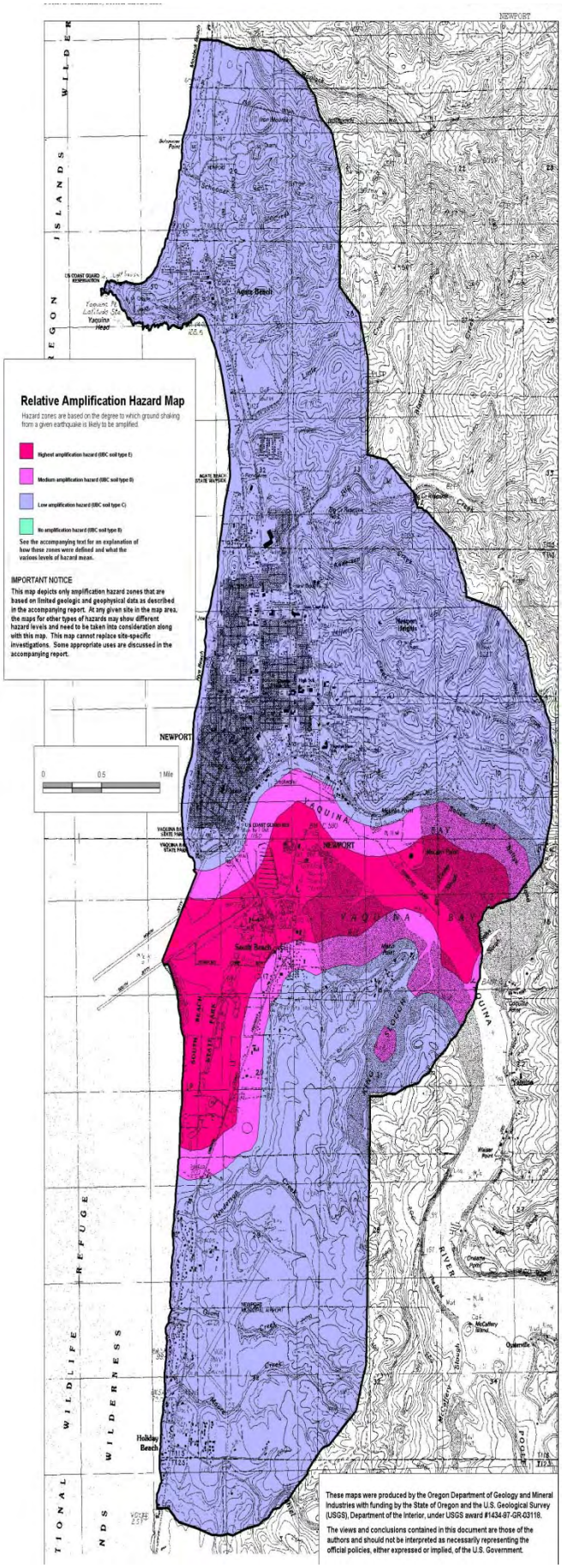
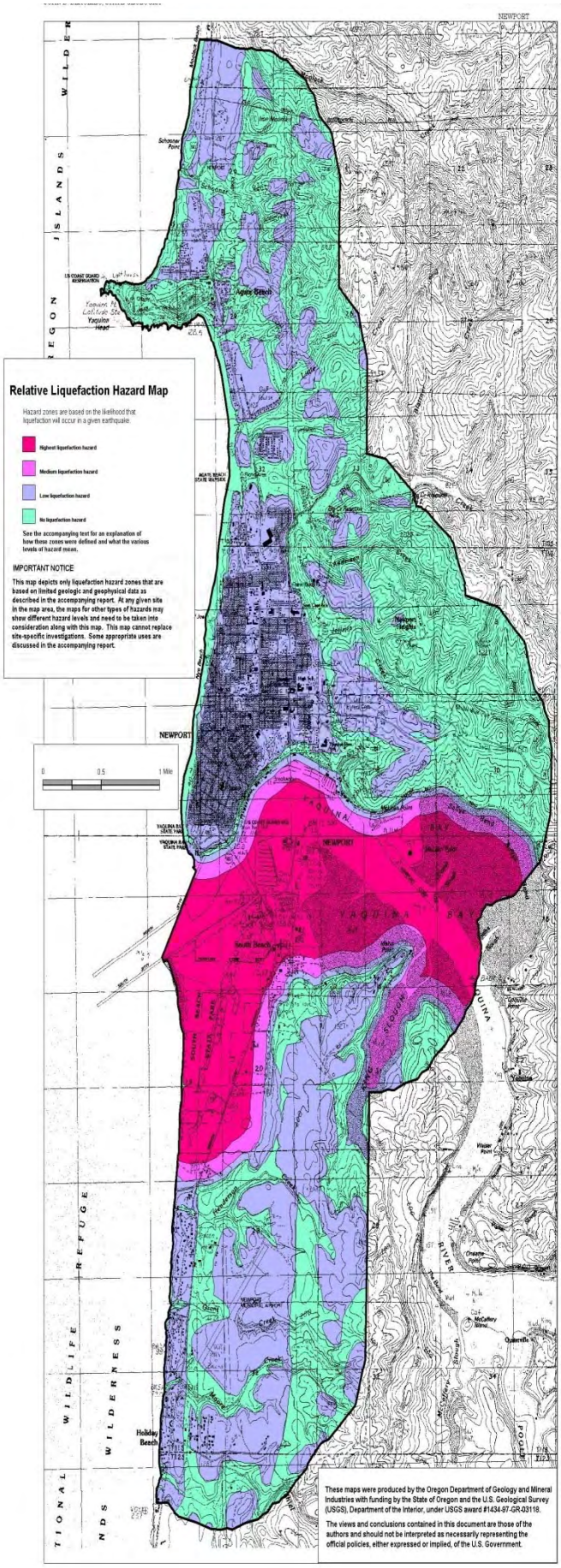


Figure 4 Relative Liquefaction Hazard Map



Relative Liquefaction Hazard Map

Hazard zones are based on the likelihood that liquefaction will occur in a given earthquake.

Highest liquefaction hazard

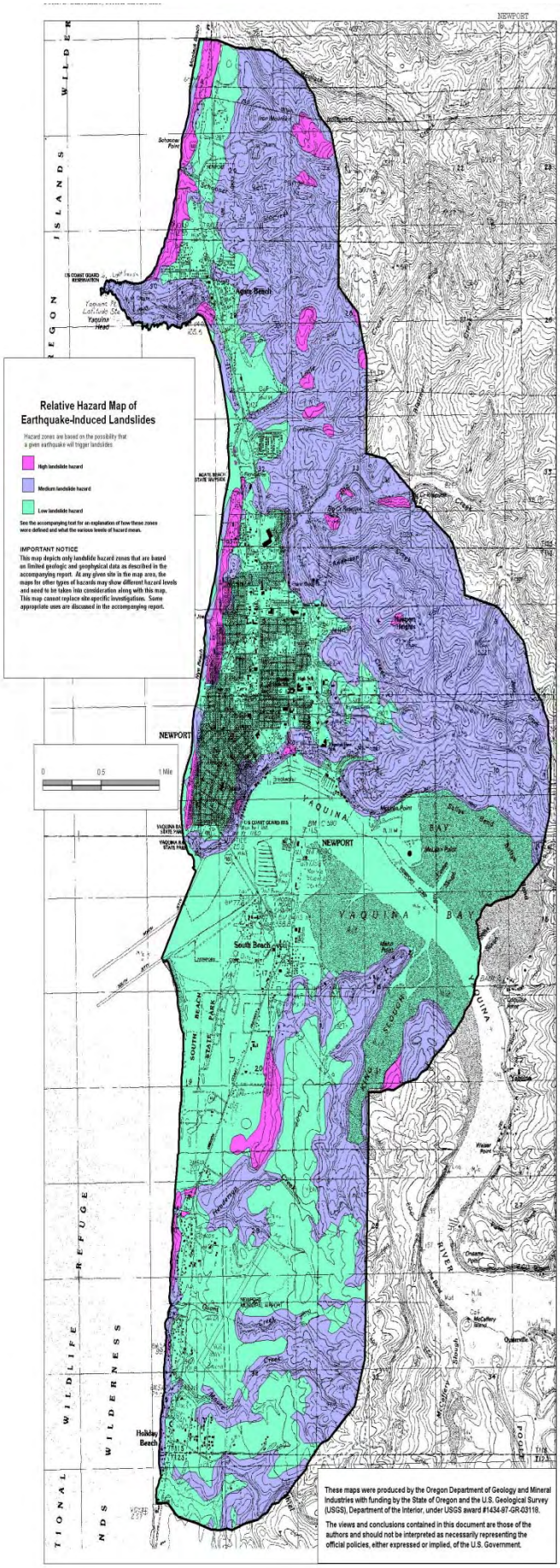
Medium liquefaction hazard

Low liquefaction hazard

No liquefaction hazard

See the accompanying text for an explanation of how these zones were defined and what the various levels of hazard mean.

Figure 5 Earthquake Induced Landslides



Relative Hazard Map of Earthquake-Induced Landslides

Hazard zones are based on the possibility that a given earthquake will trigger landslides.

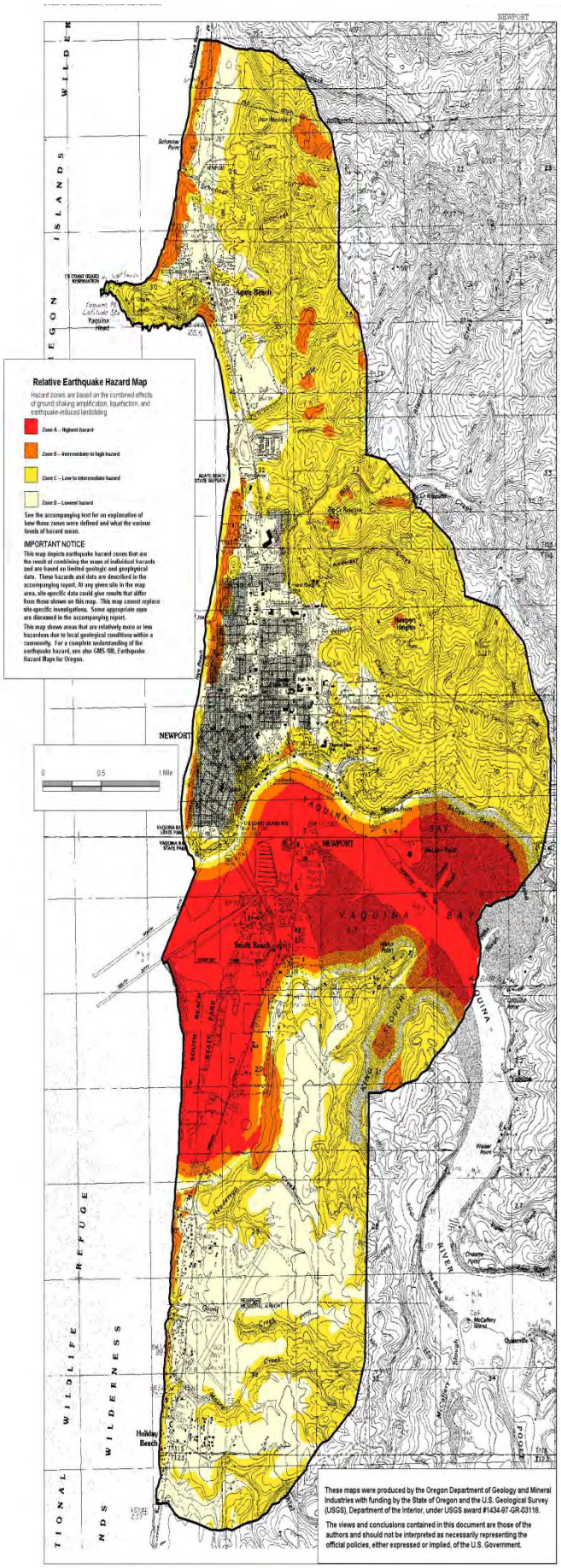
High landslide hazard

Medium landslide hazard

Low landslide hazard

See the accompanying text for an explanation of how these zones were defined and what the various levels of hazard mean.

Figure 6 Relative Earthquake Hazard Map



Relative Earthquake Hazard Map

Hazard zones are based on the combined effects of ground shaking amplification, liquefaction, and earthquake-induced landsliding.

Zone A – Highest hazard

Zone B – Intermediate to high hazard

Zone C – Low to intermediate hazard

Zone D – Lowest hazard

See the accompanying text for an explanation of how these zones were defined and what the various levels of hazard mean.

Lincoln County estimates a 'moderate' vulnerability to earthquake hazards, meaning 1-10% of the population or regional assets are likely to be affected by a major emergency or disaster. The city of Newport believes, however, that its **vulnerability** to a high magnitude earthquake would be **'high,'** meaning more than 10% of the population or regional assets would be affected by an event. The city's concentrated population and resources, as well as the soil characteristics and relative earthquake hazards described above are cause for further study and significant effort toward mitigating the earthquake hazard. As shown in Table 5 above on page 6, about 61.6% of Newport's housing structures were built prior to the enforcement of earthquake-resistant building codes. Additionally, DOGAMI conducted a rapid visual assessment for public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs' offices and other law enforcement agency buildings. Buildings were ranked for the "probability of collapse" due to the maximum possible earthquake for any given area. Within the city of Newport, the following buildings were rated:

- Newport FD – Station 1 (245 NW 10th St): *low*
- Newport Police Department (169 SW Coast Hwy): *high*

The city of Newport Steering Committee identified concerns related to the city's Fire Department (ranked 'low' in DOGAMI's rapid visual assessment). The committee believes that the fire department is built on fill, and would thus be subject to liquefaction in the event of an earthquake. City Hall was also identified as a concern, as was the Yaquina Bay Bridge. Additional study is needed for these particular structures, and others identified in DOGAMI's study.

Lincoln County's Earthquake Hazard Annex adequately describes the types of regional damages and impacts that can be caused by a high magnitude earthquake.

Flood

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of flooding hazards within the region, as well as previous flooding occurrences. The location and extent of Newport's flood hazard is best described by the city's Flood Insurance Rate Maps (FIRM), available at City Hall. The city's current effective FIRM is dated June 15, 1982. Newport is a participant in the National Flood Insurance Program, and the city has 223 policies in effect. Despite the number of policies, zero claims have been paid since 1978. Likewise, there have been zero repetitive loss structures within the city of Newport. Most flood insurance property owners can be found along the Yaquina River. Due to the River's width, flooding rarely occurs. The River is affected more-so by tides than fluctuations in rainfall. Numbers of buildings and/or properties within the floodplain are not available at this time.

The city's steering committee estimates a **'low' probability** that flooding will occur, meaning one event is likely to occur within a 75-100 year period.

The city also estimates a **'low' vulnerability** to floods, meaning less than 1% of the city's properties or assets are likely to be affected by a flooding event. Both of the city's probability and vulnerability ratings are lower than the county's ratings.

General flood-related community impacts are adequately described within the Flood Hazard Annex of Lincoln County's Natural Hazards Mitigation Plan. Within the city, undersized culverts occasionally present problems. Newport is currently updating its stormwater master plan, and culvert inadequacies will be addressed via mitigation in that plan.

Landslide

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of landslides, and appropriately identifies previous landslide occurrences within the region. The city of Newport occasionally sees minor landslides behind buildings along the bay front (i.e., steep slopes). Small slides tend to occur during the rainy season, and the city has seen damage to homes and streets at the west end of NW 57th Street. South of the Bay, the topography is relatively flat, and landslides are generally of less concern.

The location and extent of potential landslides in Newport are not available at this time. In 2007, the Oregon 74th Legislative Assembly directed the Department of Geology and Mineral Industries (DOGAMI) to extend lidar collection efforts throughout the state. Lidar (light detection and ranging) is a tool that can provide high-resolution images of the surface of the earth, and it's excellent for mapping natural hazards like landslides. To achieve the goal of collecting lidar data statewide, DOGAMI has formed the Oregon Lidar Consortium (OLC). The OLC will develop cooperative agreements for the collection of high-quality lidar that benefits the public at large, the business community, and agencies at all levels of government.[xxi] With improved data via participation in the OLC, Newport would have a much greater understanding of its landslide risks.

Potential landslide-related impacts are adequately described within the county's plan, and include infrastructural damages, economic impacts (due to isolation and/or arterial road closures), property damages, and obstruction to evacuation routes. Rain-induced landslides and debris flows can potentially occur during any winter in Lincoln County, and thoroughfares beyond city limits are susceptible to obstruction as well. As such, Newport is vulnerable to isolation for an extended period of time.

The county currently estimates a **'moderate' probability** that landslides will occur, meaning one event is likely within a 35-75 year period. Additionally, the county estimates a **'high' vulnerability** to landslide hazards, meaning more than 10% of the population or regional assets are likely to be affected by a major emergency or event. Both ratings are accurate of Newport's level of risk as well.

Tsunami

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of tsunami hazards, as well as the previous occurrences of tsunami events within the region. The Department of Geology and Mineral Industries (DOGAMI) conducted an analysis resulting in extensive mapping along the Oregon Coast. The maps depict the expected inundation for tsunamis produced by a magnitude 8.8 to 8.9 undersea earthquake. The tsunami maps were produced to help implement Senate Bill 379 (SB 379), which was passed during 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, limit construction of new essential facilities and special occupancy structures in tsunami flooding zones. The following tsunami-inundation zone maps (Figures 7 and 8) were produced for the city of Newport. Following the inundation map is the Newport Tsunami Evacuation Zone Map (Figure 9). Evacuation zones are highlighted in yellow.

Figure 7 Tsunami Hazard Map (Newport North Quadrangle)

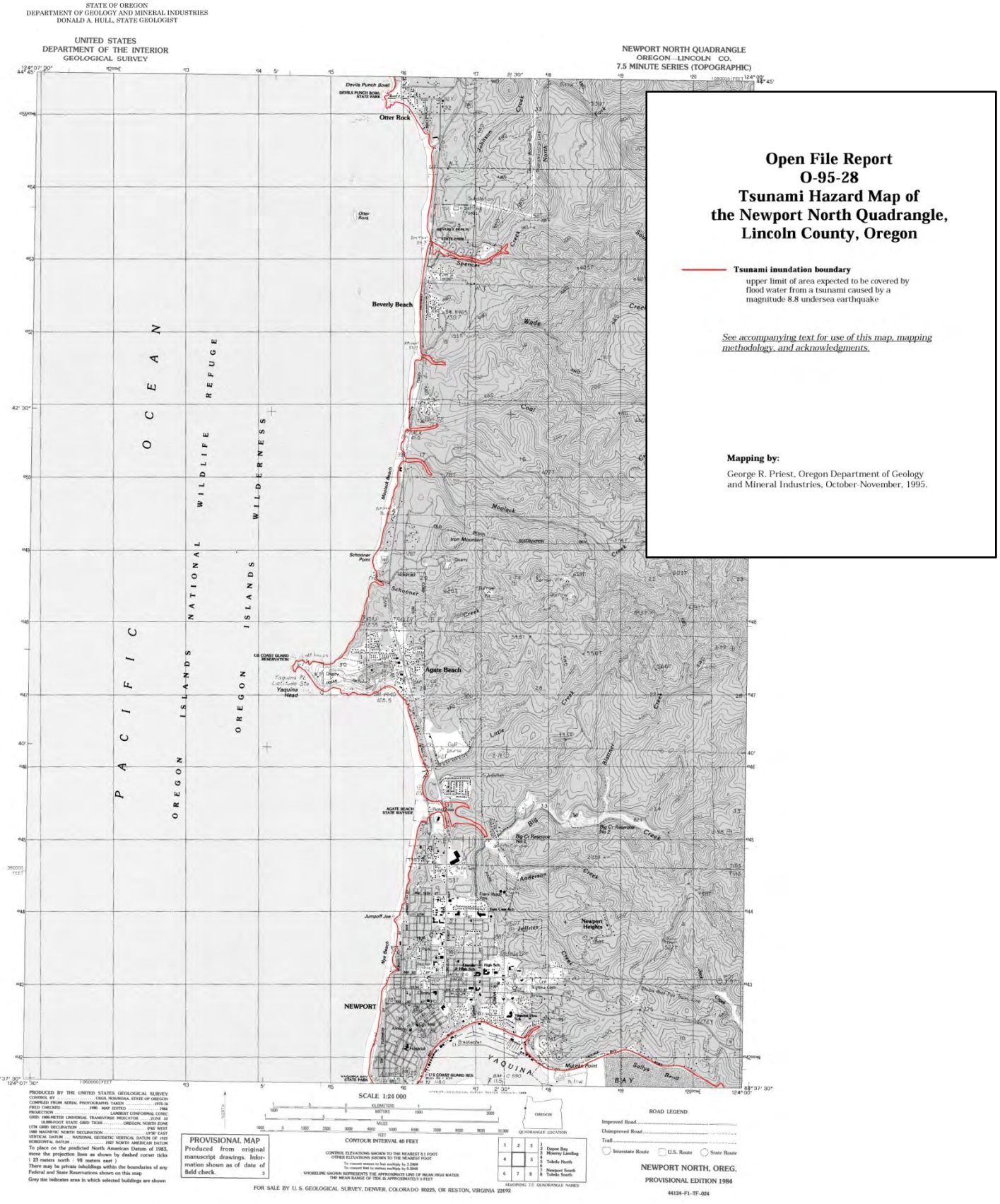


Figure 8 Tsunami Hazard Map (Newport South Quadrangle)

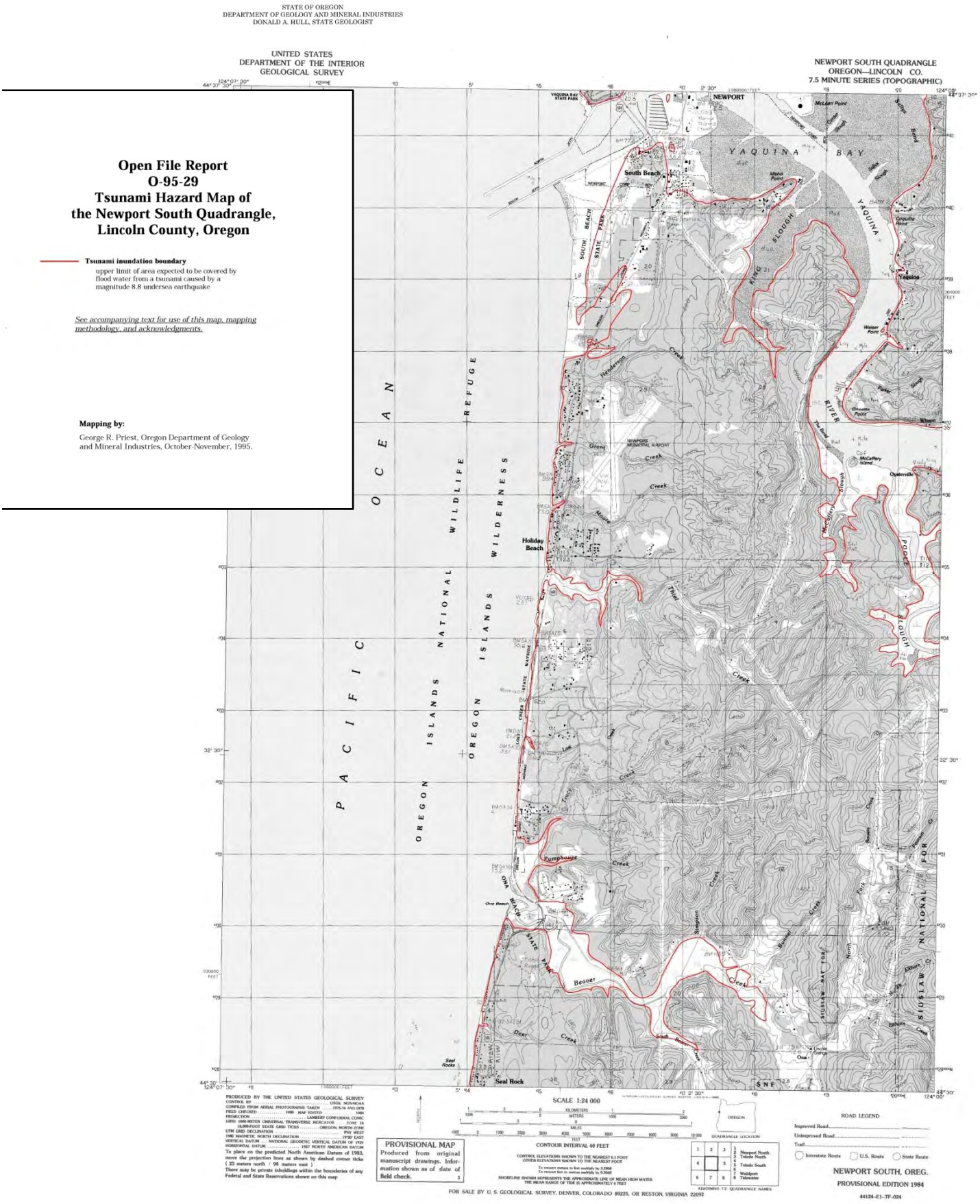


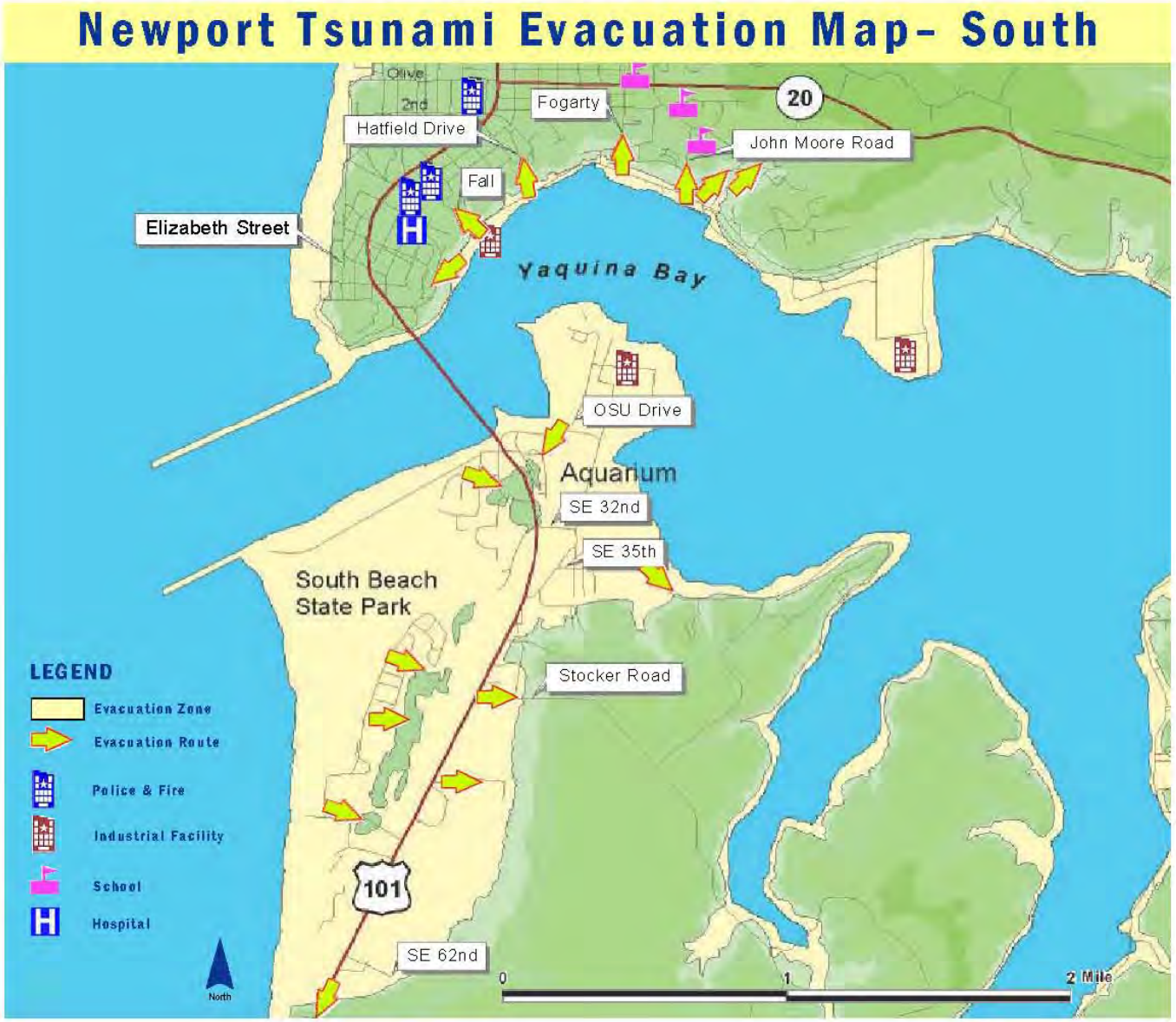
Figure 9 Newport Tsunami Evacuation Map

IF YOU FEEL THE GROUND SHAKE,
MOVE QUICKLY TO HIGHER GROUND
AND SAFETY!
DO NOT WAIT FOR AN OFFICIAL WARNING!

NOTICE

The evacuation zone on this map was developed by the Oregon Department of Geology and Mineral Industries in consultation with local officials. It is intended to represent a worst-case scenario for a tsunami caused by an undersea earthquake near the Oregon coast. Evacuation routes were developed by local officials and reviewed by the Oregon Department of Emergency Management.

The Oregon Department of Geology and Mineral Industries is publishing this brochure because the information furthers the mission of the Department. The map is intended for emergency response and should not be used for site-specific planning.



The location of Newport's tsunami hazard is best described by the inundation maps above, but improvements to this map may be possible in coming years. The 2004 Indian Ocean earthquake and tsunami led DOGAMI to re-evaluate the state's tsunami mapping program. Currently, DOGAMI is using the latest advances in mapping technology (LIDAR), computer technology and computer modeling to run a pilot mapping project for the coastal city of Cannon Beach. The new map will be scenario based, meaning that variations in inundation levels (given local or distant tsunamis) will be shown. If the city of Newport is presented with a similar opportunity to improve its current map, the city's risk assessment information may change.

The extent of a tsunami event in Newport will depend on where the tsunami originated, and the size of the earthquake that produced the tsunami. Lincoln County appropriately describes the **probability** of a tsunami event for the city of Newport. Geologists predict a 10-14% chance that a Cascadia tsunami will be triggered by a shallow, undersea earthquake offshore Oregon in the next 50 years. The forecast comes from evidence for large but infrequent earthquakes and tsunamis that have occurred on the Oregon coast every 500 years, on average.[xxii]

Close to 20% of the city's developed lands are within the inundation zone. This includes about 500 residents, and close to 1,200 employees. Additionally, about 9 overnight-tourist facilities are within the inundation zone.[xxiii] As such, the city estimates that its **vulnerability** to a tsunami event is **'high,'** meaning more than 10% of the population and regional assets are likely to be affected by a major event.

The city of Newport has put forth much effort to educate and inform citizens of tsunami hazards found within the city. Street signs below 50ft have red bands, and those above 50 ft have blue bands. Evacuation signs are posted throughout the city, and can also be found on the city's website. Severe damage is expected to occur on various properties, roads, bridges, communication systems, and critical infrastructure within Newport, among other assets described in the county's plan. The city is particularly concerned with the continued operability of the Yaquina Bay Bridge. The city of Newport recognizes the importance of continuing education and outreach, especially to the transient populations (i.e., tourists), and plans to implement greater outreach in the future.

Volcano

The Lincoln County Natural Hazard Mitigation Plan adequately describes Newport's risk to volcanic events. Generally, an event that affects the county is likely to affect Newport as well. The causes and characteristics of a volcanic event are appropriately described within the county's plan, as well as the location and extent of potential hazards. Previous occurrences are well-documented within the county's plan, and the community impacts described by the county would generally be the same for Newport as well.

Newport is very unlikely to experience anything more than volcanic ash during a volcanic event. When Mt. Saint Helens erupted in 1980, the city received small amounts of ashfall, but not enough to cause significant health and/or economic damages. The county estimates a **'low' probability** of future volcanic events and a **'low' vulnerability** to future eruptions. The county's probability and vulnerability estimates are accurate of Newport's risk as well.

Wildfire

The Lincoln County Natural Hazard Mitigation Plan adequately describes the causes and characteristics of wildfires, as well as the county and city's history of wildfire events. Wildfires in 1849 and 1936 were particularly devastating in Lincoln County, but since then, there have been very few events. The location and extent of a wildfire vary depending on fuel, topography, and weather conditions. As shown in Figure 1 within Lincoln County's Wildfire Hazard Annex, Newport has a very low fire hazard. Weather conditions are primarily at cause for the low hazard level.

The county estimates a 'moderate' probability that local wildfires will occur in the future, meaning no more than one event is likely to occur within a 35-75 year period. Due to the city's wet climate and location along the Pacific Coast, Newport's Steering Committee estimates a very **'low' probability** that wildfires will occur. The city recognizes, however, that climate patterns change, and the steering committee will re-evaluate their probability estimate when the city updates this addendum. Lincoln County additionally estimates a **'moderate' vulnerability** to wildfires, meaning 1-10% of the population or regional assets are likely to be affected by a major event. Due to a number of homes within the wildland-urban interface, the city agrees with the county's 'moderate' vulnerability rating.

The potential community impacts and vulnerabilities described in the county's plan are generally accurate for the city as well. Lincoln County is currently engaged in an effort to develop a Community Wildfire Protection Plan (CWPP) which will map vulnerable areas, among other things. The city is a participant in the CWPP's development process, and will update the city's wildfire risk assessment if the CWPP presents better data.

Windstorm

The Lincoln County Natural Hazard Mitigation Plan adequately describes the causes and characteristics of windstorms, as well as the location and extent of windstorm hazards. The region's (and city's) history of events are adequately described within the county's plan as well. Because coastal wind storms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow. More than likely, however, the coast's winter will just be windy, cold, and wet.

The county estimates a **'high' probability** that windstorms will occur in the future. Windstorms occur yearly, and the more destructive storms

occur once or twice per decade. The county additionally estimates a **'high' vulnerability** to windstorms, meaning more than 10% of the population or regional assets would be affected by a major windstorm event. Both estimates are true for the city as well.

Lincoln County's plan adequately describes the impacts caused by windstorms, including power outages, downed trees, heavy precipitation, building damages, and storm-related debris. Additionally, transportation and economic disruptions result as well.

Action Items

The following action items are detailed recommendations for activities that local departments, citizens, and others could engage in to reduce risk. Actions Action item worksheets are located at the end of the addendum.

- Enter into a contract or intergovernmental agreement to provide potable water in the event of a drought.
- Seismically retrofit vulnerable structures and critical facilities.
- Implement actions identified in the city's Stormwater Master Plan.
- Continue compliance with the National Flood Insurance Program.
- Enter into an agreement with DOGAMI's Oregon LIDAR Consortium to map the geomorphology (the study of landforms and the processes that shape them) of Lincoln County.
- Encourage residents and/or business owners within the tsunami inundation zone to purchase flood insurance.
- Encourage existing developments to move power lines underground.
- Continue to post 'high-wind' warning signs on Yaquina Bay Bridge.
- Develop education programs aimed at mitigating risk posed by hazards.

Additionally, Newport has chosen to partner with the county on the following actions. Please see Appendix A in Lincoln County's Natural Hazard Mitigation Plan for more detail regarding each of the actions listed below.

- Coastal Erosion #1: Improve knowledge of coastal erosion hazard areas and understanding of vulnerability and risk to life and property in hazard prone areas.
- Coastal Erosion #3: Evaluate existing county coastal hazard area regulations based on DOGAMI risk zone mapping.

- Earthquake #1: Integrate new earthquake hazard mapping data for Lincoln County and improve technical analysis of earthquake hazards.
- Earthquake #2: Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices.
- Earthquake #3: Encourage purchase of earthquake hazard insurance by forming partnerships with the insurance and real estate industries.
- Earthquake #4: Promote and enforce building code standards.
- Earthquake #5: Encourage seismic strength evaluations of critical facilities to identify vulnerabilities and to meet current seismic standards.
- Earthquake #6: Identify funding sources for and implement high priority structural and nonstructural retrofits of structures that are identified as seismically vulnerable.
- Landslide #1: Encourage construction, site location and design that can be applied to steep slopes to reduce the potential threat of landslides.
- Landslide #2: Increase public education related to landslide hazards by distributing DOGAMI landslide informational brochure.
- Landslide #4: Protect existing development in landslide-prone areas.
- Tsunami #1: Determine ways of mitigating the vulnerability of assets (fire stations, equipment, utilities) likely to be impacted by tsunami.
- Tsunami#2: Work with coastal communities, citizen groups, property owners, recreation areas, emergency responders, schools and businesses in promoting tsunami awareness and evacuation.
- Tsunami #3: Improve technology capacity of communities, agencies and responders needed to adequately map hazard areas, broadcast warnings, inform, and educate residents and visitors of tsunami dangers.
- Wildfire #1: Develop a Community Wildfire Protection Plan for Lincoln County.
- Windstorm #1: Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during windstorm events.
- Windstorm #2: Develop and implement, or enhance strategies for debris management and/or removal after windstorm events.

- Windstorm #3: Map and publicize locations around the county that have the highest incidence of extreme windstorms.
- Windstorm #4: Increase public awareness of windstorm mitigation activities.
- Windstorm #5: Continue and enhance windstorm resistant construction methods where possible to reduce damage and power outages from windstorms.
- Windstorm #6: Encourage critical facilities to secure emergency power.

Plan Implementation & Maintenance

The city will utilize the same action item prioritization process as the county [See Section 4: Plan Implementation and Maintenance of the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan and Appendix D: Economic Analysis of Natural Hazard Mitigation Projects].

The city of Newport Community Development Department will serve as the convener for the city of Newport Natural Hazard Mitigation Plan Addendum. The Community Development Department will be responsible for convening the plan committee on a yearly basis to identify new risk assessment data, review status of mitigation actions, identify new actions, and seek funding to implement mitigation actions. The city of Newport Natural Hazard Mitigation Plan Addendum will be updated every five years in coordination with the county's plan update schedule.

[i] Newport, Oregon City Profile: City-Data. http://www.city-data.com/city/Newport-Oregon.html.

[ii] Portland State Population Research Center, 2007 population estimates. http://www.pdx.edu/media/p/r/PRC_2007_Population_Report2_rev.pdf

[iii] US Census 2000, Newport City, Oregon, "Profile of Selected Economic Characteristics: 2000"

[iv] US Census 2000.

[v] US Census 2000, Newport City, Oregon, "Profile of Selected Economic Characteristics: 2000."

[vi] US Census 2000, Lincoln County, Oregon, "Profile of Selected Economic Characteristics: 2000."

[vii] US Census 2000, Newport City, Oregon, "Profile of Selected Housing Characteristics: 2000."

[viii] US Census 2000, Newport City, Oregon, "Profile of General Demographic Characteristics: 2000."

[ix] Parsons Brickerhoff Quade & Douglas, Inc. Newport Access Management Plan. 1997.

[x] Ibid

[xi] Ibid

[xii] Newport, Oregon City Profile: City-Data. http://www.city-data.com/city/Newport-Oregon.html.

[xiii] National Register of Historic Places, Oregon, Lincoln County. http://www.nationalregisterofhistoricplaces.com/or/Lincoln/state.html.

[xiv] City of Newport website. www.thecityofnewport.net

[xv] DOGAMI. Geologic Hazards on the Oregon Coast: Coastal Landslides. http://www.oregongeology.com/sub/earthquakes/Coastal/CoastalLandslides.htm

[xvi] United States Environmental Protection Agency. *Newport Water Management Plan.* August 2004.

[xvii] City of Newport, Public Works Department. Information Regarding Ballot Measure 21-124. www.thecityofnewport.net

[xviii] United States Environmental Protection Agency. *Newport Water Management Plan.* August 2004.

[xix] Geologic Hazards on the Oregon Coast. Oregon Department of Geology and Mineral Industries. http://www.oregongeology.com/sub/earthquakes/Coastal/OrGeoEqNTsu.htm

[xx] Madin, Ian P. and Wang, Zhenming. Oregon Department of Geology and Mineral Industries. Relative Earthquake Hazard Maps for Selected Urban Areas in Western Oregon. 1999.

[xxi] Department of Geology and Mineral Industries. Oregon Lidar Consortium (OLC). www.oregongeology.org.

[xxii] Oregon Geology Fact Sheet, Tsunami Hazards in Oregon. Department of Geology and Mineral Industries. http://www.oregongeology.com/sub/publications/tsunami-factsheet_onscreen.pdf

[xxiii] Wood, Nathan. "Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon." USGS Scientific Investigations Report 2007-5283 (2007): 13-19.

City of Newport Steering Committee Meeting

City Risk Assessment / Action Item Identification

September 8, 2008, 3pm

Newport City Hall

169 SW Coast Hwy, Newport, Oregon

Name	Title & Organization Representing	E-Mail & Phone	Location coming from (City)	Signature certifying this information is correct
Rick Crook	Newport Fire	rcrook@newportfire.net	Newport	
LEE RITZMAN	NEWPORT PUBLIC WORKS	lritzman@thecityofnewport.net	Newport	
MARK MIRANDA	NEWPORT POLICE	M.MIRANDA@NEWPORTPOLICE.NET	NEWPORT	
JAMES BASSENGTHWAITE	COMMUNITY DEVELOPMENT DIRECTOR - CITY OF NEWPORT	j.bassingthwaite@thecityofnewport.net	NEWPORT	
Jessica Bondy	Senior Planner Lincoln County Planning Dept.	jbondy@co.lincoln.or.us	Newport	

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Enter into a contract or intergovernmental agreement to provide potable water in the event of a drought.	Protect life and property; Coordinate and enhance emergency services; Promote partnerships and coordination to improve implementation.

Rationale for Proposed Action Item:

Newport's primary water supply comes from the Big Creek Reservoir, and additional supply is available through water rights to the Siletz River. The City has two storage reservoirs, and seven tanks with about 9 million gallons of treated water storage capacity. The City is currently proposing the construction of a new water reservoir to meet current standards for water protection, but the City's Steering Committee does not believe that the tanks are adequate to store a large amount drinking water in the event of a drought.

Due to potential storage concerns, the City of Newport estimates a 'moderate' vulnerability to drought, meaning 1-10% of the population would be affected by a major event.

The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. Entering into an intergovernmental agreement to provide potable water in the event of a drought (or water contamination) will ensure a continued water source for the City of Newport.

Ideas for Implementation:

Enter into a joint-service or mutual-aid agreement with a neighboring community to ensure water-availability in the event of a drought declaration and/or water-source contamination.

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
City Manager, Community Development	

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	Newport Steering Committee

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Seismically retrofit vulnerable structures and critical facilities.	Protect life and property

Rationale for Proposed Action Item:

The City of Newport believes that its vulnerability to a high magnitude earthquake would be 'high,' meaning more than 10% of the population or regional assets would be affected by an event. The City's concentrated population and resources, as well as the soil characteristics and relative earthquake hazards are cause for further study and significant effort toward mitigating the earthquake hazard.

"For governments, less damage to government structures will mean continued services and normal processes or at least minimal interruptions. If government structures come through an earthquake with little or no damage, agencies will not have to relocate services, and public officials can respond to the immediate and long-term demands placed on them by the event. In short, seismic rehabilitation as a pre-event mitigation strategy actually will improve post-event response by lessening life loss, injury, damage, and disruption." Source: FEMA. Chapter 1: Why Seismic Rehabilitation? http://www.fema.gov/plan/prevent/earthquake/pdf/fema-275-06-ch-1.pdf. October 12, 2006.

DOGAMI conducted a rapid visual assessment for public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs' offices and other law enforcement agency buildings. Buildings were ranked for the "probability of collapse" due to the maximum possible earthquake for any given area. Within the City of Newport, the following buildings were rated:

- Newport FD – Station 1 (245 NW 10th St): *low*
- Newport Police Department: *high*

Additionally, the following County buildings within the City of Newport were rated:

- Lincoln County Communications Agency: *moderate*
- Lincoln County Sheriff's Office: *moderate*
- Sam Case Elementary School: *moderate*
- Yaquina View Elementary School: *moderate*
- Newport High School – East: *moderate*
- Newport High School – West: *moderate*

The City of Newport Steering Committee identified concerns related to the City's Fire Department (ranked 'low' in DOGAMI's rapid visual assessment). The Committee believes that the fire department is built on fill, and would thus be subject to liquefaction in the event of an earthquake. City Hall was also identified as a concern, as is the Yaquina Bay Bridge. Additional study is needed for these particular structures, and others identified in DOGAMI's study.

Ideas for Implementation:		
Seek funding to further study the vulnerability of buildings identified in DOGAMI's rapid visual assessment, as well as those identified by the Newport Steering Committee. Additionally, facilitate partnerships to study the structural vulnerability of Yaquina Bay Bridge. Develop a comprehensive outreach program to educate businesses and residents about Newport's vulnerability to earthquakes and non-structural and structural retrofits they can implement to reduce the impact of a future earthquake event. Develop an inventory of public (i.e., city hall) and large commercial buildings/employers that may be particularly vulnerable to earthquake damage. Retrofit public buildings and critical facilities to meet or exceed current standards for earthquake resistance. Improve local capabilities to perform earthquake building safety evaluations. Create a local rehabilitation and retrofit program for existing buildings.		
Coordinating Organization:	Community Development & Public Works	
Internal Partners:		**External Partners:**
Finance		ODOT, Oregon Emergency Management, DOGAMI
Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	
Form Submitted by:	Newport Steering Committee	

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Implement actions identified in the City's Stormwater Master Plan.	Protect life and property; Promote partnerships and coordination to improve implementation

Rationale for Proposed Action Item:

Within the City, undersized culverts occasionally present problems (i.e., road closures, localized flooding). Newport has developed an updated stormwater master plan for a portion of the South Beach area of Newport and is currently planning on updating its stormwater master plan for other areas of the City, and culvert inadequacies will be addressed via mitigation in that plan.

The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. Replacing undersized culverts will lessen the effect of flooding within Newport.

Ideas for Implementation:

Inventory culverts; identify culverts in need of replacement. Implement actions identified in the City's updated Stormwater Master Plan.

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
Water districts	ODFW, ODF

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	Newport Steering Committee

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Continue compliance with the National Flood Insurance Program.	Protect life and property

Rationale for Proposed Action Item:

The National Flood Insurance Program (NFIP) provides communities with federally backed flood insurance, provided that communities develop and enforce adequate floodplain management measures. According to the NFIP, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance.

Newport is a participant in the National Flood Insurance Program, and the City has 223 policies in effect. Newport's most recent Flood Insurance Rate Map is dated June 15, 1982.

Everyone in a participating community of the National Flood Insurance Program (NFIP) can buy flood insurance.

The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of a natural hazard on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Continued participation in the NFIP will diminish flood damage to new and existing buildings in communities while providing homeowners, renters, and business owners additional flood insurance protection.

Ideas for Implementation:

Actively participate with DLCD and FEMA during Community Assistance Visits. The Community Assisted Visit (CAV) is a scheduled visit to a community participating in the NFIP for the purpose of: 1) conducting a comprehensive assessment of the community's floodplain management program; 2) assisting the community and its staff in understanding the NFIP and its requirements; and 3) assisting the community in implementing effective flood loss reduction measures when program deficiencies or violations are discovered.
Conduct an assessment of Newport floodplain ordinances to ensure they reflect current flood hazards.

Explore the possibility of updating the County's FEMA Flood Insurance Rate Map.

Continue to participate in the NFIP. Explore participation in the National Flood Insurance Program's Community Rating System (CRS).

Educate residents in Newport about flood issues and actions they can implement to mitigate the flood risk.

Coordinating Organization:	Community Development

Internal Partners:		**External Partners:**
Public Works		FEMA, DLCD
Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT (ongoing)	

Form Submitted by:	Newport Steering Committee

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Enter into an agreement with DOGAMI's Oregon LIDAR Consortium to map the geomorphology (the study of landforms and the processes that shape them) of Lincoln County.	Coordinate and enhance emergency services; Promote partnerships and coordination to improve implementation

Rationale for Proposed Action Item:

LIDAR (light detection and ranging) is a mapping tool that can provide very precise, accurate, and high-resolution images of the surface of the earth, vegetation, and the built environment. It can be used to study landforms and identify areas, especially landslide areas that may be susceptible to future occurrences. The Oregon Department of Geology and Mineral Industries (DOGAMI) has been working with communities to develop large-scale LIDAR maps of entire regions. In 2006-2007, various local, state, and federal agencies formed the Portland Consortium to gather 2200 square miles of LIDAR data in the Portland Metropolitan region. DOGAMI has formed the Oregon LIDAR Consortium (OLC) to gather data in other Oregon regions, including Lincoln County. Entering into an agreement with the OLC will assist in mapping areas of Lincoln County and landforms around Newport, especially those susceptible to landslide events.

The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of a natural hazard on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Entering into an agreement with DOGAMI's OLC will help in understanding areas and landforms susceptible to landslide events to protect new and existing buildings, and infrastructure.

Ideas for Implementation:

DOGAMI's LIDAR website provides information about the OLC and LIDAR and is a starting point for entering into an agreement with DOGAMI. http://www.oregongeology.com/sub/projects/olc/default.htm

Collaborate with other Lincoln County communities to develop a partnership to map the geomorphology of western Lincoln County.

Seek funding opportunities through FEMA, OEM, and DOGAMI

Coordinating Organization:	Community Development

Internal Partners:	**External Partners:**
	DOGAMI, FEMA, OEM, Lincoln County, Lincoln County communities

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	Newport Steering Committee

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage residents and/or business owners within the tsunami inundation zone to purchase flood insurance.	Protect life and property; Coordinate and enhance emergency services; Promote partnerships and coordination to improve implementation

Rationale for Proposed Action Item:

With an Oregon Flood Insurance Policy, "direct physical losses by flood are covered. Losses that result from flood-related erosion caused by excessive waters accompanied by a severe storm, flash flood, abnormal tidal surge or the like, which result in flooding. Damages due to mudflows, if caused by flooding, are also covered."
"If you are a resident living on the Oregon coast you need to be aware of the danger of Tsunami's. Tsunami is the Asian word for tidal wave, which by definition is a great sea wave produced by a submarine earthquake, volcanic eruption or landslide. A Tsunami would be a covered peril under a flood policy; damage by a tsunami would not be covered under a normal homeowner's policy." - www.oregoninsuranceadvisor.com

The Newport Steering Committee expressed concern that the majority of residents within the tsunami inundation zone were unaware of the fact that they could [and should] purchase flood insurance.

Ideas for Implementation:

Educate residents and businesses located in tsunami inundation zones and the option for purchasing flood insurance. Create pamphlets to distribute via the Chamber of Commerce and neighborhood associations.

Coordinating Organization:	Community Development

Internal Partners:	**External Partners:**
	Chamber of Commerce, local utility providers

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	Newport Steering Committee

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage existing developments to move power lines underground.	Protect life and property

Rationale for Proposed Action Item:

A windstorm is generally a short duration event involving straight-line winds and/or gusts in excess of 50 mph. Although windstorms can affect the entirety of Lincoln 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 wind and winter storm hazard risk assessment rates Newport as having a high vulnerability to wind and winter storm and a high probability of a future storm recurring. Supporting and encouraging the Central Lincoln People's Utility District to use underground construction methods to reduce power outages from storms will reduce the impact of future wind and winter storms.

The Disaster Mitigation Act of 2000 requires communities to develop comprehensive actions to reduce the impacts of natural hazards.[201.6(c)(3)(ii)]. Supporting and encouraging the Central Lincoln People's Utility District to underground existing utility lines to reduce power outages from storms will reduce the impact of future wind and winter storms.

Ideas for Implementation:

Work with the community and Newport Public Works Department to identify high wind areas from previous outages and apply for grants to underground utilities in those areas.

Identify areas particularly vulnerable to downed trees (i.e., where are power outages likely to occur?) Prioritize these areas for undergrounding power lines.

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
	Central Lincoln People's Utility District

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	Newport Steering Committee

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Continue to post 'high-wind' warning signs on Yaquina Bay Bridge.	Protect life and property; Enhance and promote public education

Rationale for Proposed Action Item:

High wind conditions are a common experience on the Oregon Coast. High winds at the Yaquina Bay Bridge make crossings difficult for large moving vehicles.

High wind events are a regular occurrence Lincoln County, particularly in exposed coastal areas. 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.

According to the 2005 Oregon Residential Specialty Code, Lincoln County is listed as a 110 mph area under their designation: Oregon Basic Wind Speeds for 50 Year Mean Recurrence Interval. This is their highest wind speed rating.

Ideas for Implementation:

When gusts or sustained high winds are reported, post warnings at a safe distance before the bridge.

Include warnings in public broadcasts and on CB radio stations.

Coordinating Organization:	Police Department

Internal Partners:	**External Partners:**
Public Works	NOAA, NWS, ODOT

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	Newport Steering Committee

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Develop education programs aimed at mitigating risk posed by hazards.	Protect life and property; Enhance and promote public education

Rationale for Proposed Action Item:

The City of Newport is vulnerable to coastal erosion hazards, drought, earthquakes, flood, landslides, tsunamis, volcanic eruptions, wildfires, and wind and winter storms. Hazards of particular concern include earthquakes, tsunamis, and windstorms.

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.
Source: Oregon Technical Resource Guide. July 2000. Community Planning Workshop. Eugene, OR: University of Oregon. p. 6-26.

"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 informed of, and involved in, the City's actions to mitigate hazards." Source: 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." Source: 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:

Partner with CERT to implement a variety of education and outreach programs along the coast.

Partner with DOGAMI's Tsunami Advisory Committee to support grassroots education and outreach programs within the community.

Conduct door-to-door outreach within the tsunami inundation zone.

Conduct tsunami evacuation drills with effective media coverage.

Coordinating Organization:	Community Development

Internal Partners:	**External Partners:**
	Lincoln County Community Emergency Response Team (CERT), Central Oregon Coast Association, Lincoln County Public Schools

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	

Form Submitted by:	Newport Steering Committee

Volume III: City Addenda
City of Siletz

Overview

The city of Siletz developed this addendum to the Lincoln County multi-jurisdictional Natural Hazards Mitigation Plan in an effort to increase the community's resilience to natural hazards. The addendum focuses on the natural hazards that could affect Siletz, Oregon, which include coastal erosion, drought, earthquake, flood, landslide, tsunami, volcano, wildfire, and windstorms. It is impossible to predict exactly when disasters may occur, or the extent to which they will affect the city. 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 addendum provides a set of actions that aim to reduce the risks posed by natural hazards through education and outreach programs, the development of partnerships, and the implementation of preventative activities such as land use or storm water management plans. The actions described in the addendum are intended to be implemented through existing plans and programs within the city.

The addendum is comprised of the following sections: 1) Addendum Development Process 2) Community Profile; 3) Risk Assessment; 4) Action Items; and 5) Plan Implementation and Maintenance.

Addendum Development Process

In the fall of 2006, the Oregon Partnership for Disaster Resilience (the Partnership/OPDR) at the University of Oregon's Community Service Center partnered with the Oregon Emergency Management (OEM) and Clatsop and Lincoln Counties to develop a Pre-Disaster Mitigation Grant proposal. Both counties joined the Partnership by signing (through their county commissioners) a Memorandum of Understanding for this planning project. FEMA awarded the Oregon Coast Region a grant to support the development of the natural hazard mitigation plans for the two counties and cities therein. The Partnership, OEM, and the participating communities were awarded the grant in the fall of 2006 and local planning efforts began in the fall of 2007.

With guidance from the Partnership and assistance from the Lincoln County Department of Planning and Development, the city of Siletz formed a local steering committee to participate in the addendum's development. The Siletz Steering Committee was comprised of representatives from the following departments and organizations:

Sheryl Simmons, Siletz City Recorder

Allen Middaugh, Superintendant, Siletz Public Works Department

David Edwards, Fire Chief, Siletz Rural Fire Protection District

The committee first met on January 10, 2009; thereafter the committee remained engaged and provided subsequent feedback and review of plan drafts. Staff from the Lincoln County Department of Planning and Development developed and facilitated a meeting at Siletz's City Hall on January 10, 2009. During the meeting, the city's steering committee reviewed the county's risk assessment and discussed how the city's risks (i.e. hazard characteristics, probabilities of occurrence, local vulnerabilities, and community-specific impacts) differed from the county's. Additionally, the steering committee identified city-specific mitigation actions and expressed interest in building greater partnerships with the county via mitigation and/or emergency management-related activities.

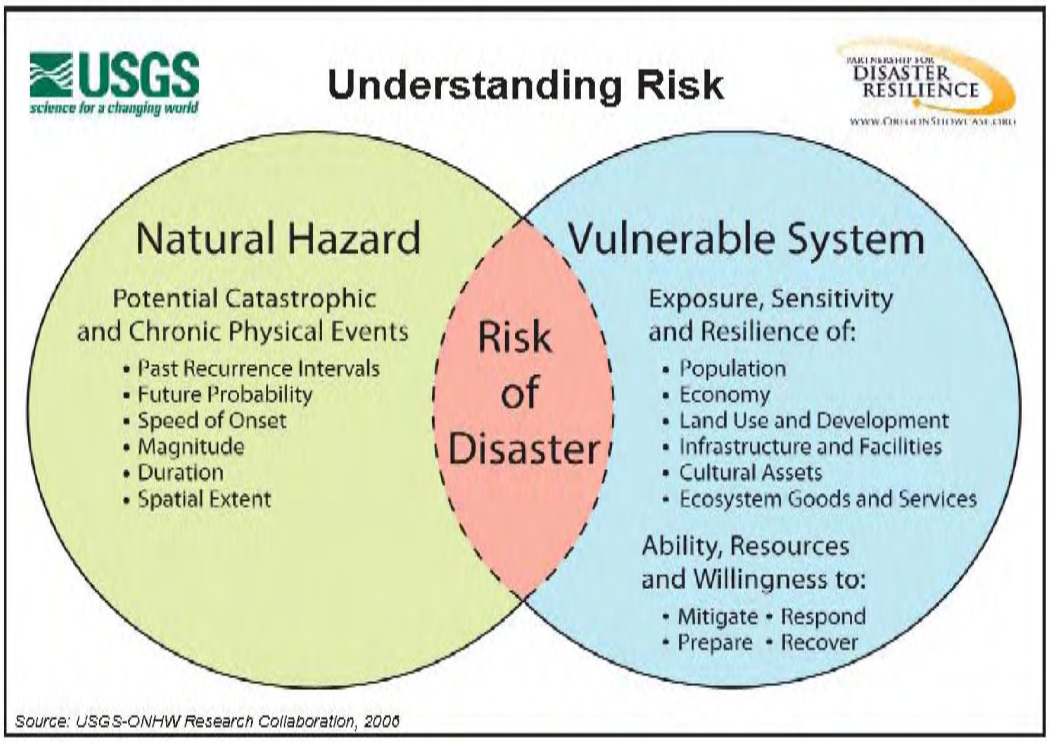
In _____, 2009, the Siletz Steering Committee presented the draft addendum to the City Council. The city will be responsible for maintaining and updating this addendum in coordination with the county's semi-annual plan update meetings.

The city of Siletz adopted the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan via resolution on _____.

Community Profile

The following section describes the city of Siletz from a number of perspectives in order to help define and understand the city's sensitivity and resilience 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 Siletz when the plan was developed. The information documented below, along with the risk assessments, should be used as the local level rationales for the city's risk reduction actions. The identification of actions that reduce the city's sensitivity and increase its resilience assist in reducing overall risk, or the area of the overlap in Figure 1 below.

Figure 1.1 Understanding Risk



Source: USGS – The Partnership for Disaster Resilience Research Collaborative, 2006

Geography & Climate

The city of Siletz is located on the Siletz River and lies approximately 8 miles inland from the Pacific Ocean, 13 miles from the county seat of Newport and approximately 7 miles north of the city of Toledo.[i] The city is approximately 130 feet above sea level, and city limits cover a land area of approximately 400 acres. The climate in Siletz is moderate. Average monthly temperatures range from a low of 37 degrees to a high of 66 degrees. The hottest month is September and the coldest month is January. The driest month is July and the wettest month is December. Siletz has an average annual precipitation of approximately 71.7 inches.[ii] The city is situated in the Siletz River Valley, bounded by the Siletz River and coastal mountains.

Population & Demographics

The city of Siletz was incorporated in 1946. The population was 1133 in 2000 and 1150 in 2006.[iii] Disaster impacts (in terms of loss and the ability to recover) vary among population groups following a disaster. Historically, 80% of the disaster burden falls on the public. Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities and low income persons. In 2000, 11% of families and 15% of individuals were living below the poverty line. In addition, 14.9% of the population is over 60. Of those over 65, 48.6% are disabled.[iv] Table 1 below displays population by age in Siletz, and Table 2 indicates the percent and age of the disabled population in 2000.

Table 1: Population by Age: Siletz, 2000

Age	Percent
Under 5 years	7.7
5 to 9 years	8.6
10 to 14 years	7.1
15 to 19 years	8.2
20 to 24 years	4.8
25 to 34 years	11.5
35 to 44 years	17.4
45 to 54 years	14.7
55 to 59 years	5.1
60 to 64 years	2.8
65 to 74 years	7.6
75 to 84 years	3.4
85 years and over	1.1

Source: US Census 2000

Table 2: Disabled Population, Siletz, 2000

Age	Percent
5-20 years	15.1
21-64 years	32.4
65-over	48.6

Source: U.S. Census

Employment & Economics

According to the 2000 Census, the largest "employment industry" in Siletz is comprised of education, health and social services. 'Arts, entertainment, recreation, accommodation and food services' is the second major employment industry, and 'Retail trade' is the third largest (see Table 3 below).

Table 3: Employment by Industry, Siletz, 2000

Industry	Number of Employees	Percent of Workforce
Educational, health and social services	85	17.0
Arts, entertainment, recreation, accommodation and food services	78	15.6
Retail trade	57	11.4
Manufacturing	54	10.8
Public administration	48	9.6
Transportation and warehousing, and utilities	40	8.0
Construction	30	6.0
Agriculture, forestry, fishing and hunting, and mining	24	4.8
Other services (except public administration)	19	3.8
Professional, scientific, management, administrative, and waste management services	18	3.6
Wholesale trade	17	3.4
Finance, insurance, real estate, and rental and leasing	17	3.4
Information	13	2.6

Source: Economic Census 2000

Median income can be used as an indicator of the strength of the region's economic stability. In 1999, the estimated median household income was $38,542. This is approximately $10,188 less than the state's median household income of $48,730.[v] Although it can be used to compare areas as a whole, this number does not reflect how income is divided among area residents.

Local and regional economic development organizations include the city of Siletz, Central Coast Economic Development Alliance, and the Economic and Community Development Department Regional Development Officer.

Housing

Housing type and year built are important factors in mitigation planning. Certain housing types tend to be less disaster resilient and warrant special attention; mobile homes, for example, are generally more prone to wind and water damage than standard stick-frame homes. Generally the older the home is, the greater the risk of damage from natural disasters. This is because stricter building codes have been developed following improved scientific understanding of plate tectonics and earthquake risk. For example, structures built after the late 1960's in the Northwest and California use earthquake resistant designs and construction techniques. In addition, FEMA began assisting communities with floodplain mapping during the 1970's and communities developed ordinances that required homes in the floodplain to be elevated to one foot above the Base Flood Elevation.

In 2000, Siletz had 468 housing units. Of those, 89.7% (420) were occupied, and 10.3% (48) were vacant. Seasonal, recreational, or occasional-use housing comprised 2.4% of the housing stock (or 11 units). Of the occupied housing units, 70.2% (295) were owner occupied, and 29.8% (125) were renter occupied.[vi] More than 50% of the city's housing stock was built prior to 1980, before stronger seismic building codes were put into place.

Table 4 shows housing units by year built and Table 5 displays the type of housing available in Siletz.

Table 4: Housing Structure Age, Siletz, 2000

Year Built	Percent of Structures
1980-2000	42%
1960-1980	42%
Before 1960	16%

Source: U.S. Census 2000

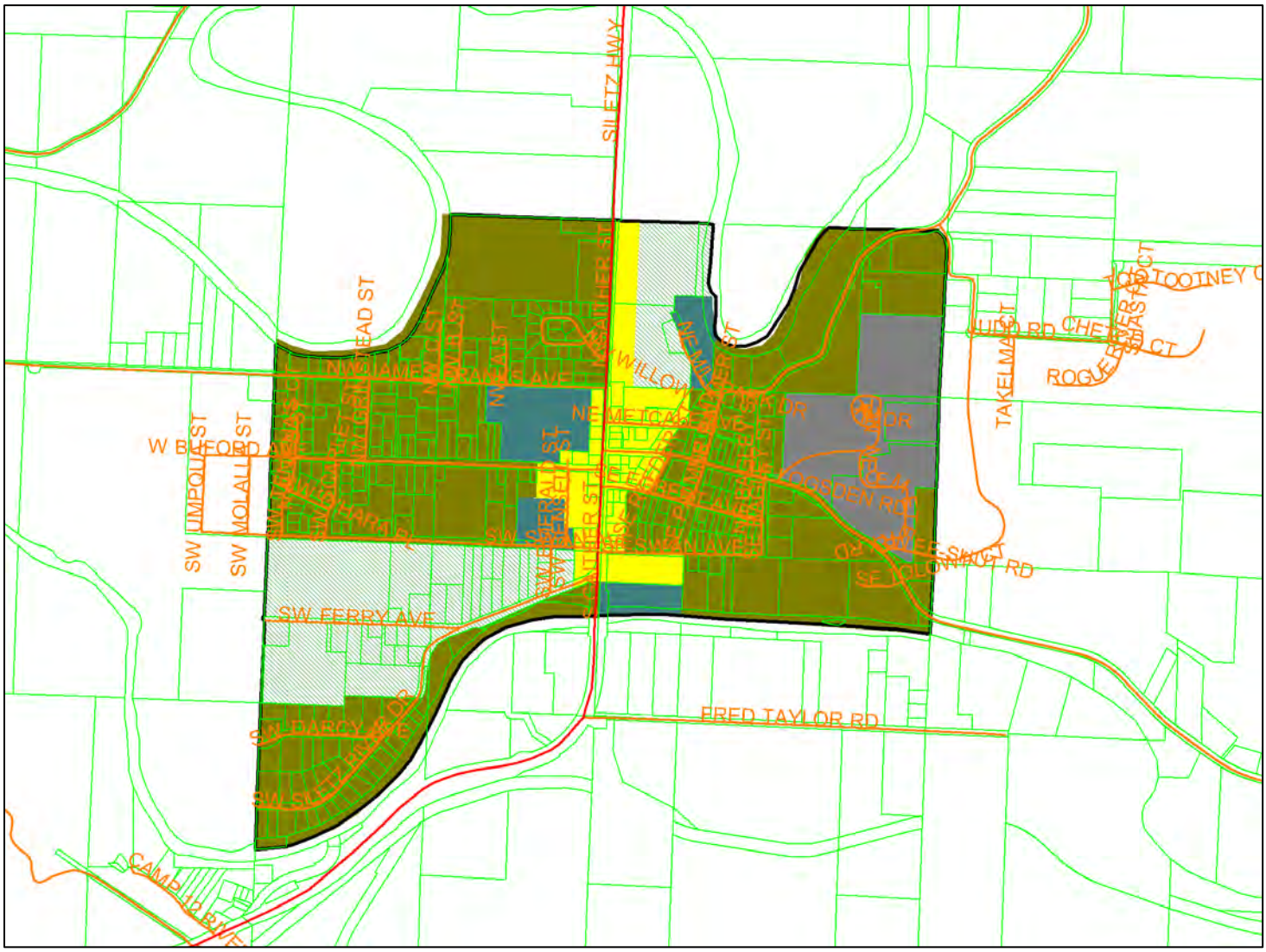
Table 5: Housing Type, Siletz, 2000

Housing Type	Percent
Single-family	48%
Multi-family	10%
Mobile Homes	42%
Boat, R.V., Van, etc.	0%

Source: US Census 2000

Land Use & Development

Development in Siletz spreads mostly north to south along US-Highway 229, and east along Logsden Road and local access roads surrounding the town. The main commercial area is concentrated near the intersection of Highway 229 and Logsden Road, and surrounding areas consist of residential and commercial development. The Confederated Tribes of Siletz Indians tribal lands are located on the eastern side of town. The city's Comprehensive Plan identifies land use needs within the city and its urban growth boundary. City zoning designations primarily include residential, commercial, and public lands. The map below displays the city of Siletz's zoning map.


SILETZ HWY
SW FERRY AVE
FRED TAYLOR RD
SW LOGSDEN RD
SE LOGSDEN RD
TAKELMA CT
ROGUE RIVER CT
SW UMPQUA ST
SW MOLALLA ST
W BELFORD AVE

Transportation

The city of Siletz lies adjacent to US-Highway 229. US-Highway 101 is the principle state access route along the Oregon Coast. Major routes from U.S. Interstate 5 in the Willamette Valley to Lincoln County include Highways 18, 20 and 34. Transportation is an important consideration when planning for emergency service provisions.

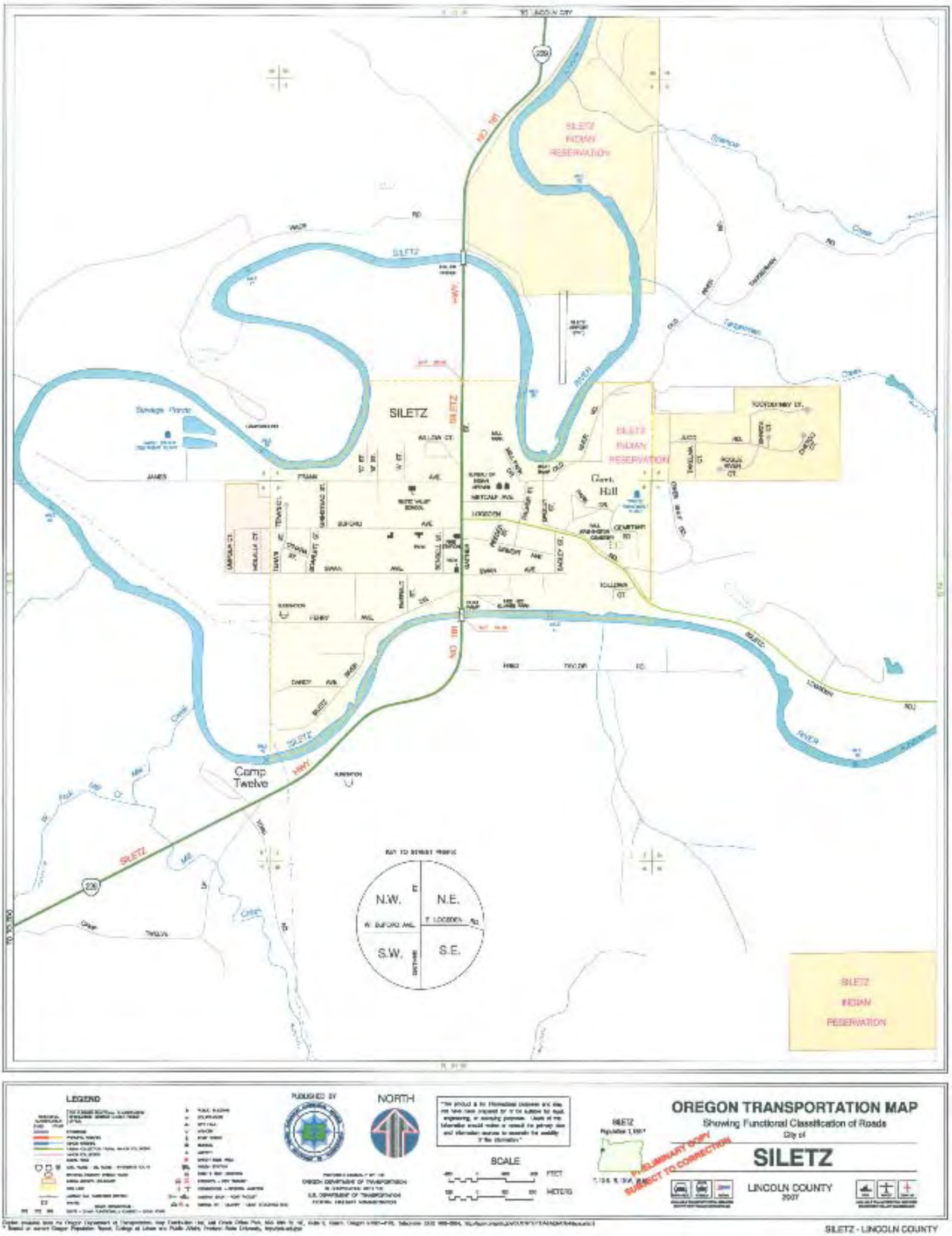
Growth within the city will put pressure on both major and minor roads, especially if the main mode of travel is by single occupancy vehicles. How people travel to work is indicative of the prevalence of single occupancy vehicle travel, and can help predict the amount of traffic congestion and the potential for accidents. Table 6 shows the different methods that city residents use when traveling to work.

Table 6: Means of Transportation and Carpooling, Siletz 2000

Type of Transportation	Percent
Car, Truck or Van-drove alone	76.4%
Car, Truck, or Van-carpooling	16.8%
Walked	2.5%
Public Transportation (including taxicab)	1.8%
Worked at Home	1.8%
Other means	0.6%

Source: U.S. Census 2000

The following map is from the Oregon Department of Transportation, and shows the major road systems in the city of Siletz.


SILETZ
INDIAN
RESERVATION
SILETZ
Camp
Twelve
N.W.
N.E.
S.W.
S.E.
LEGEND
NORTH
SCALE
OREGON TRANSPORTATION MAP
Showing Functional Classification of Roads
City of
SILETZ
LINCOLN COUNTY
2007
PRELIMINARY COPY
SUBJECT TO CORRECTION
SILETZ - LINCOLN COUNTY

Critical Facilities & Infrastructure

Critical facilities are those that support government and first responders' ability to take action in an emergency. They are a top priority in any comprehensive hazard mitigation plan. The city of Siletz operates and manages the water treatment plant, wastewater treatment plant, the public library and Siletz Valley School. The city also has the Siletz Valley Fire Department. The Confederated Tribes of Siletz Indians contracts with the city of Toledo for police service and Siletz has an agreement with the Tribe for police service inside city limits.

Historical & Cultural Resources

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

The city of Siletz has a long and rich history. As reviewed on the city's website, "The Siletz Reservation is contiguous with Siletz on its east side and lies to the north and southeast of the town as well. The roots of the Siletz peoples lie in some 27 tribes that once populated the coastal areas of Lincoln, Tillamook, and Lane Counties. In 1851 the U.S. Federal Government forced the Indians of Western Oregon onto reservations as a way of reducing conflicts between the Indians and the flood of Euro-American settlers who came for the area's newly found gold.

Over the years the size of the Siletz reservation has been reduced. A railroad to the coast split the reservation in two in the late 1860s and large sections of the reservation were opened to White settlement by the federal government. In the next couple of decades parts of the reservation were closed and the Dawes Act of 1887 placed tribal lands into allotments. Those lands that were not eventually allocated to Indians went into the public domain and were sold to settlers. In 1956 the Western Oregon Termination Act declared that the people of the Siletz Tribe were no longer Indians. As a result more of their land was sold to settlers, and also given to the town of Siletz. In 1977 the Siletz Tribe, with the enactment of the Siletz Restoration Act, was again recognized as an Indian tribe. The reservation now includes approximately 39 acres near town and 3,630 acres of timberland throughout Lincoln County. In 1991 the Tribe built a 13,500 square foot Tribal Health Clinic just outside of the town. The clinic is a valuable asset to the community as it serves tribal members and non-members. Today the Confederated Tribes of Siletz plays an important role in the area.

Native Americans relied on the area's natural resources long before the arrival of Euro-American settlers. At the beginning of the colonial era, native peoples subsisted by fishing, hunting, and gathering. In the more recent past the Siletz Tribe relied on the area's natural resources for their sustenance. They gathered a variety of plants, hooked and trapped lamprey, caught salmon, collected freshwater mussels, and hunted deer. However, recent declines in lamprey and salmon populations have

reduced access to these two important traditional food sources. Although the state does not recognize the Tribes coastal fishing rights today, the tribe believes that they are legitimized via treaty rights.

Euro-American settlers continued to enter the Siletz area throughout the latter 1800s. They established general stores in the community. For homesteaders who settled in rural areas outside of town, pack trains brought supplies to them. Siletz was similar to the rest of Lincoln County as its major industries were logging, lumbering, farming (agricultural and pastoral), rock crushing, reforestation, gathering of native flora, and cascara bark peeling. The town site of Siletz was established in 1910. The city was eventually incorporated in 1946. In the early days travel in the Siletz area was difficult, as most was done by foot or horse. A ferry aided those who crossed the Siletz River. The June 29th 1939 Lincoln County Leader describes Siletz as a center of trade and logging, as much of the timber headed for California and many eastern ports at that time came from the area."

The city of Siletz is surrounded by a rich diversity of natural resources, which attract local residents and tourists to the area. Fishing, boating and kayaking are popular activities as are hiking, birding and wildlife watching. Local public parks allow residents to enjoy the surrounding natural beauty and they also provide areas for sports, swimming, and skateboarding. The Confederated Tribes of Siletz hosts the annual Nesika Illahee Pow Wow held the second weekend of August. The event celebrates with native crafts, food, dancing competitions and the sale of a wide variety of native crafts and products.

Government Structure

The City Council is the policy making body for the city of Siletz. As the elected legislative body in Siletz, the City Council has the overall responsibility for the scope, direction and financing of city services. Council members serve four or two year terms. Additional departments within the city include the following:

City Recorder: The city recorder assures the timely presentation of formal communications from the public, other agencies and city staff to the City Council. The recorder prepares City Council meeting agendas; maintains official city records which reflect the action of the governing body; maintains depository of contracts, agreements and official Council actions and ensures the timely availability of these records to the Council, public, other agencies and staff.

Public Works Department: The Public Works Department provides responsive community services related to planning, design, construction, operation, maintenance and management of public infrastructure, including streets, sewer, water treatment, waste water treatment, public buildings, and other facilities. Services provided by the department contribute to the public health, safety, economic diversity, environmental quality and citizen convenience.

Land Use Planning: The city provides services and information to the general public regarding all phases of community development and land use planning. Staff implements city ordinances, administers the local comprehensive plan and land use code, and advises the City Council and Planning Commission on all land use and special project matters.

Fire Department: The Siletz Valley Fire Department is responsible for responding to fires, providing emergency medical service, and managing the aftermath of disasters for the city of Siletz and the surrounding community.

Library: The public library has access to books and items through membership in the Coastal Resource Sharing Network, a cooperative of libraries in Lincoln and Tillamook Counties.

Existing Plans and Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances, and technical reports or studies. Plans and policies already in existence have support from local residents, businesses and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs.

The city of Siletz's Addendum to the Lincoln County Natural Hazards Mitigation Plan includes a range of recommended action items that, when implemented, will reduce the city's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the city's existing plans and policies. Linking existing plans and policies to the addendum helps identify what resources already exist that can be used to implement the addendum's action items. Implementing the natural hazard mitigation plan's action items through existing plans and policies increases their likelihood of being supported and getting updated, and maximizes the city's resources.

The following table documents the plans and policies already in place in Siletz.

Name	Date of Last Revision	Description	Relations to Natural Hazard Mitigation
Comprehensive Plan	1987 (update in progress)	A document stating the general, long-range policies that will govern a local community's future development.	Contains city-specific information regarding natural hazards within the city's jurisdictional boundaries.
Zoning Ordinance	1987 (update in progress)	An ordinance establishing land use zones to regulate the use of land, location of buildings and structures; and prescribing regulations governing the division of land within the city of Siletz.	Contains city-specific hazard related requirements for the placement and construction of buildings, development in the floodplain, and division of land.

Community Organizations & Programs

Social systems can be defined as community organizations and programs that provide social and community-based services, such as health care or assistance, to the public. In planning for natural hazard mitigation, it is important to know what social systems exist within the community because of their existing connections to the public. Often, actions identified by the plan involve communicating with the public or specific subgroups within the population (e.g. elderly, children, low income). The county and cities can use existing social systems as resources for implementing such communication-related activities because these service providers already work directly with the public on a number of issues, one of which could be natural hazard preparedness and mitigation. The countywide community organizations and programs table can be found in Section 2: Community Overview of the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan. The table highlights organizations that are active within the county and may be potential partners for implementing mitigation actions.

Existing Mitigation Activities

Existing mitigation activities include current mitigation programs and activities that are being implemented by the community in an effort to reduce the community's overall risk to natural hazards. Documenting these efforts can assist participating jurisdictions in better understanding risk and can assist in documenting successes. The following efforts have occurred or are on-going within the city of Siletz:

- The city of Siletz adopted in 2005: Vulnerability Assessment Siletz Water Treatment Plant.

- The city of Siletz adopted in 2007: Emergency Response Planning Template for Public Wastewater System.
- The city of Siletz adopted in 1995: city of Siletz Emergency Operations Plan.
- The Siletz Valley Fire Department participates in practice drills locally and county-wide.
- The city of Siletz maintains emergency preparedness information on its website.

Risk Assessment

The following hazards have been addressed in the Lincoln County Natural Hazard Mitigation Plan. The city of Siletz reviewed the county's plan on January 10, 2009 and assessed how Siletz's risks vary from the risks facing the entire planning area.

Coastal Erosion

The city of Siletz does not border the Pacific Ocean. Coastal erosion is not considered to be a hazard within the community.

Drought

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of drought hazards, as well as the location and extent of potential events. Due to a cool, wet climate, past and present weather conditions have generally spared coastal communities from the effects of severe drought. The city of Siletz has experienced drought conditions in the past, but records of events are not available at this time.

Lincoln County estimates that the probability of a drought is "low," meaning no more than one event is likely to occur within a 75-100 year period. The city of Siletz is concerned about water supply on an annual basis. The Siletz River is a direct-flow water source where contamination is a potential threat to water supply. Additionally, the city believes that landslides could potentially occur above the water-intake, and inadvertently threaten the city's water supply. Because the city's water source is vulnerable to contamination (and not just weather-related conditions), the city believes that the **probability** of drought occurring in the future is **"moderate,"** meaning one incident is likely to occur within a 35-75 year period.

Lincoln County estimates a "low" vulnerability to drought hazards, meaning less than 1% of the population or regional assets would be affected by a major emergency or disaster. Conversely, the city's steering committee estimates a **"high" vulnerability** to drought, meaning more than 10% of the population or regional assets are likely to be affected by a major hazard event. The city has three water storage tanks with a total capacity of 1 million gallons; however, the available amount is estimated to be 650,000 thousand gallons. This difference results from draw-down and pressure needs throughout the city. Additionally, in the event of a fire or turbidity problems, the water supply could be significantly reduced.

Potential drought-related impacts are adequately described within the county's drought hazard annex. The city will review their probability and vulnerability estimates every five years, in concurrence with the county's plan update process.

Earthquake

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics, location, and extent of earthquake hazards for the region. The county's plan additionally identifies all previous

occurrences that have affected the city. It is difficult to estimate recurrence intervals, but the state has experienced seven Cascadia Subduction Zone (CSZ) events in the last 3500 years- some of which were probably as large as a magnitude (M) 9. These events are estimated to have an average recurrence interval between 500 and 600 years, although the time interval between individual events ranges from 150 to 1000 years. The last CSZ event occurred approximately 300 years ago. Scientists estimate there is **10-20% probability** that a subduction zone earthquake will occur within the next 50 years. Based on this information, Lincoln County estimates a "high" probability that an earthquake will occur in the future. The city of Siletz agrees.

Lincoln County additionally estimates a "moderate" vulnerability to earthquake hazards, meaning 1-10% of the population or regional assets would be affected by a major emergency or disaster. Due to the city's concentration of vulnerable infrastructure, resources, and population, however, the city believes that its **vulnerability** to a high magnitude earthquake would be **"high"** meaning more than 10% of the population or regional assets would be affected by a high magnitude event. As shown in Table 4 above, almost 58% of Siletz's housing structures were built prior to enforcement of earthquake resistant building codes.

In addition, the city's infrastructure is highly vulnerable to a severe earthquake event. Sewer lines, water lines, power lines, and water tanks were identified by the steering committee as vulnerable assets. The city's steering committee additionally identified the following earthquake-related vulnerabilities: steeper topography around the outskirts of town would [likely] be vulnerable to earthquake-induced landslides; in the event of a magnitude (M) 9 event, the city will likely be isolated from larger cities in the Willamette Valley, as well as coastal communities. As such, post-disaster-self reliance will be essential, and post-disaster communication may be hindered. The city would also expect damage to roads following a CSZ event, as well as deaths and severe injuries region-wide. Education and outreach regarding the CSZ is an on-going endeavor in Siletz.

Flood

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of flooding hazards within the region, as well as previous flooding occurrences. Flooding typically occurs within the city when storm drains back up and/or pumps fail to work. The city also experiences riverine flooding from the Siletz River. The extent of riverine flooding varies depending on rainfall and/or precipitation levels throughout the year. Siletz's most significant flood events occurred in 1964, 1996 and 1999. Lincoln County estimates a **"high" probability** that flooding will occur, meaning one event is likely within a 10-35 year period. Likewise, the county estimates a **"moderate" vulnerability** to flood hazards, meaning 1-10% of the population or regional assets are likely to be affected by a major emergency or event. Both ratings are true for the city of Siletz as well.

The city of Siletz participates in the National Flood Insurance Program, and its most recent effective map date is March 1st, 1979. The city of Siletz has 19 National Flood Insurance Policy holders, with a total coverage of $2,998,500. Since 1978, 1 claim has been paid at a total of $48,157. The number of buildings and/or properties within the floodplain is not available at this time. There are no repetitive loss properties in the city of Siletz.[vii]

Landslide

Lincoln County's Natural Hazard Mitigation Plan adequately describes the causes and characteristics of landslides, and appropriately identifies previous landslide occurrences within the region, as well as the location and extent of previous and potential slides. The topography of the city is relatively level, except for steeper hillsides in the northeast section of town by Old River Road and Judd Road. These areas would be more susceptible to landslides events. Road cracking has occurred in some areas, but no significant losses are documented. Potential community impacts are adequately described within the county's plan, and include infrastructural damages, economic impacts (due to isolation and /or arterial road closures), property damage, and obstruction to evacuation routes. Rain-induced landslides and debris flows can potentially occur during any winter in Lincoln County, and thoroughfares beyond city limits are additionally vulnerable to obstruction. As such, Siletz is vulnerable to isolation for an extended period of time.

In 2007, the Oregon 74th Legislative Assembly directed the Department of Geology and Mineral Industries (DOGAMI) to extend LIDAR collection efforts throughout the state. LIDAR (light detection and ranging) is a tool that can provide high-resolution images of the surface of the earth, and it's excellent for mapping natural hazards and landslides. When the statewide LIDAR studies are completed, the city of Siletz will have a much greater understanding of its landslide risks.

The county currently estimates a **"moderate" probability** that landslides will occur, meaning one event is likely within a 35-75 year period. The county estimates a **"high" vulnerability** to landslide hazards, meaning more than 10% of the population or regional assets are likely to be affected by a major emergency or event. The city of Siletz agrees with both ratings.

Tsunami

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of tsunami hazards, as well as the previous occurrences of tsunami events within the region. The Department of Geology and Mineral Industries (DOGAMI) conducted an analysis resulting in extensive mapping along the Oregon Coast. The maps depict the expected inundation for tsunamis produced by a magnitude 8.8 to 8.9 undersea earthquake. The tsunami maps were produced to help implement Senate Bill 379 (SB 379), which was passed during 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, limit construction of new essential facilities and special occupancy structures in tsunami flooding zones. Due to Siletz's inland location, there are no tsunami inundation zone maps for the city.

Geologists predict a **10-14% chance** that a tsunami will be triggered by a shallow, undersea earthquake offshore Oregon in the next 50 years. The forecast comes from evidence for large but infrequent earthquakes and tsunamis that have occurred on the Oregon coast every 500 years, on average.[viii] Siletz does not expect to experience the direct impacts of tsunami hazards, but acknowledges DOGAMI's probability estimates in planning for regional impacts.

The county estimates a **"moderate" vulnerability** to tsunami hazards, meaning 1-10% of the population or regional assets would be affected by a major event. Severe damage could occur in especially low-lying areas along the coast. Although the city of Siletz is located outside of the tsunami inundation zone, the county as a whole is vulnerable to a severe tsunami event. As such, Siletz would be affected by the regional impacts associated with a tsunami event, and believes that the county's "moderate" vulnerability rating appropriately describes the city's vulnerability as well. Regional impacts are appropriately described within the county's tsunami hazard annex.

Volcano

The Lincoln County Natural Hazard Mitigation Plan adequately describes the city's risk to volcanic events. Generally, an event that affects the county is likely to affect the city of Siletz as well. The causes and characteristics of a volcanic event are appropriately described within the county's plan, as well as the location and extent of potential hazards. Previous occurrences are well documented within the county's plan, and the community impacts described by the county would generally be the same for Siletz as well. The city of Siletz is very unlikely to experience anything more than volcanic ash during a volcanic event. When Mt. Saint Helens erupted in 1980, the city received small amounts of ashfall, but not enough to cause significant health and/or economic damages. The county estimates a **"low" probability** of future volcanic events and a **"low" vulnerability** to future eruptions. The county's probability and vulnerability estimates accurately describe Siletz's risks as well.

Wildfire

The Lincoln County Natural Hazard Mitigation Plan adequately describes the causes and characteristics of wildfires. 1849 and 1936 were particularly devastating years for wildfires in Lincoln County, but since then, there have been very few events. The location and extent of a wildfire will vary depending on fuel, topography, and weather conditions. The city of Siletz sits along the Siletz River and is surrounded by industrial and public forest lands. These forest lands are believed to be vulnerable to wildfires.

The county estimates a **"moderate" probability** that local wildfires will occur in the future, meaning no more than one event is likely to occur within a 35-75 year period. Likewise, the county estimates a **"moderate"**

vulnerability to wildfires, meaning 1-10% of the population or regional assets are likely to be affected by a major event. Both estimates are true for the city as well.

The potential community impacts and vulnerabilities described in the county's plan are generally accurate for the city as well. Due to prevailing wind patterns (i.e., from the north or south), the city's steering committee felt that the east and south ends of the city might be the most vulnerable spots to wildfire. Power, natural gas, and phone lines run through the forest to the east of the city, and would be affected in the event of a wildfire. Likewise, active commercial logging occurs just outside the city, and slash burns are a potential wildfire concern. The county is currently engaged in an effort to develop a Community Wildfire Protection Plan (CWPP) which will map vulnerable areas, among other things.

Windstorm

The Lincoln County Natural Hazard Mitigation Plan adequately describes the causes and characteristics of windstorms, as well as the location and extent of windstorm hazards. The region's (and city's) history of events are adequately described within the county's plan as well. Because coastal wind storms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow. More than likely, however, the coast's winter will just be windy, cold, and wet.

In Siletz, power outages are the greatest concern during windstorms. Without power, communication is lost, and fuel and food stores shut down. In the December, 2007 wind storm, the city lost power and some residents were unable to access 911. Also of concern are downed trees and damage to buildings. The city, in conjunction with some private utility companies, works to remove hazardous trees where possible. The county's plan adequately identifies additional impacts and damages that can occur with windstorm events.

The county estimates a **"high" probability** that windstorms will occur in the future. Windstorms occur yearly, and the more destructive storms occur once or twice per decade. The county additionally estimates a **"high" vulnerability** to windstorms, meaning more than 10% of the population or regional assets would be affected by a major windstorm event. Both estimates are true for the city as well.

Action Items

The following action items are detailed recommendations for activities that local departments, citizens, and others could engage in to reduce risk. Action item worksheets are located at the end of the addendum.

- Seek funding to obtain raw water storage capabilities.
- Continue to educate citizens about earthquake preparedness.
- Seismically retrofit vulnerable structures and critical facilities.

- Identify over-water transportation alternatives in the event that bridges collapse in an earthquake.
- Participate in the development of the county's community wildfire protection plan.

Additionally, the city of Siletz has chosen to partner with the county on the following actions. Please see Appendix A in Lincoln County's Natural Hazard Mitigation Plan for more detail regarding each of the actions listed below.

- Earthquake #1: Integrate new earthquake hazard mapping data for Lincoln County and improve technical analysis of earthquake hazards.
- Earthquake #2: Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices.
- Earthquake #3: Encourage purchase of earthquake hazard insurance by forming partnerships with the insurance and real estate industries.
- Earthquake #4: Promote and enforce building code standards.
- Earthquake #5: Encourage seismic strength evaluations of critical facilities to identify vulnerabilities and to meet current seismic standards.
- Earthquake #6: Identify funding sources for and implement high priority structural and nonstructural retrofits of structures that are identified as seismically vulnerable.
- Flood #1: Formalize process for providing warnings of flood events to property owners in flood hazard areas.
- Flood #2: Work with affected property owners to elevate or relocate non-conforming, pre-FIRM structures in flood hazard areas.
- Landslide #1: Encourage construction, site location and design that can be applied to steep slopes to reduce the potential threat of landslides.
- Landslide #2: Increase public education related to landslide hazards by distributing DOGAMI landslide informational brochure.
- Landslide #3: Protect existing development in landslide-prone areas.

- Tsunami #1: Work with coastal communities, citizen groups, property owners, recreation areas, emergency responders, schools and businesses in promoting tsunami awareness and evacuation.
- Wildfire #1: Develop a Lincoln County Community Wildfire Protection Plan.
- Windstorm #1: Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during windstorm events.
- Windstorm #2: Enhance strategies for debris management and/or removal after windstorm events.
- Windstorm #3: Map and publicize locations around the county that have the highest incidence of extreme windstorms.
- Windstorm #4: Increase public awareness of windstorm mitigation activities.
- Windstorm #5: Continue and enhance windstorm resistant construction methods where possible to reduce damage and power outages from windstorms.
- Windstorm #6: Encourage critical facilities to secure emergency power.

Plan Implementation & Maintenance

The city will utilize the same prioritization process as the county [See Section 4: Plan Implementation and Maintenance of the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan and Appendix D: Economic Analysis of Natural Hazard Mitigation Projects].

The city of Siletz Planning Department will serve as the convener for the city of Siletz Natural Hazard Mitigation Plan Addendum. The Planning Department will be responsible for convening the plan committee on a yearly basis to identify new risk assessment data, review status of mitigation actions, identify new actions, and seek funding to implement mitigation actions. The city of Siletz Natural Hazard Mitigation Plan Addendum will be updated every five years in coordination with the county's plan update schedule.

[i] Oregon Economic and Community Development Department. City of Siletz Community Profile.

[ii] Oregon Economic and Community Development Department. City of Siletz Community Profile.

[iii] Oregon Economic and Community Development Department. City of Siletz Community Profile.

[iv] US Census Bureau, "Profile of Selected Social Characteristics, 2000, Siletz, OR," American Factfinder Quick Tables, www.census.gov.

[v] US Census Bureau, "Profile of Selected Social Characteristics, 2000, Siletz, OR," American Factfinder Quick Tables, www.census.gov.

[vi] US Census Bureau, "Profile of Selected Social Characteristics, 2000, Siletz, OR," American Factfinder Quick Tables, www.census.gov.

[vii] Oregon Department of Land Conservation and Development. Repetitive Flood Losses.

[viii] Oregon LIDOR Consortium (OLC) Department of Geology and Mineral Industries; www.oregongeology.org

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Seek funding to obtain raw water storage capacities.	1. Protect life and property. 2. Coordinate and enhance emergency services.

Rationale for Proposed Action Item:

- The Siletz River is the city's only water source, and the city's reservoirs store enough water for limited duration. The Siletz River is a direct-flow water source and contamination or landslide induced turbidity are potential threats to the water supply. In addition, in the event that climate patterns change and drought becomes a probable hazard, the city of Siletz would be vulnerable to such conditions.
- The water system serves approximately 510 residential and 15 commercial connections. Only the amount of water necessary to serve the demand of the users is processed.
- The city has 3 reservoirs, which store a total of 1 million gallons. Only 650,000 can be used because of pressure and draw-down. Water is also used for fire protection.
- In addition to meeting customer demands, the Siletz River must additionally maintain a sufficient flow for fisheries and recreational uses.

Ideas for Implementation:

- Obtain funding to construct additional reservoirs for emergency drought-related storage.
- Research ways to reduce drought within the city. (This may potentially result in non-storage projects).

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
City Council	USDA, USGS, Western States Water Council

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	**Siletz Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Continue to educate citizens about earthquake preparedness.	1. Protect life and property. 2. Enhance and promote public awareness

Rationale for Proposed Action Item:

- The city of Siletz has engaged in numerous education & outreach activities related to earthquake preparedness. The city recognizes the importance of an ongoing education & outreach program that's specifically related to this hazard.
- The Cascadia Subduction Zone can potentially cause a magnitude 9 earthquake that will be felt in Siletz. Scientists estimate that there is a 10-20% probability that a subduction zone earthquake will occur within the next 50 years.
- Public education and outreach can be inexpensive and provide information that results in safer households, work places and other public areas. Some outreach materials include: informational brochures about community seismic risks and mitigation techniques, public forums, newspaper articles, training classes and television advertisements. Source: Oregon Technical Resource Guide. July 2000. Community Planning Workshop. Eugene, Or. University of Oregon p.8-20.

Ideas for Implementation:

- Work with local citizens and agencies on resources and networking available in case of an event.
- Update the city website with new information and link's to improve to improve the city's emergency preparedness.
- Disseminate informational hand-outs.

Coordinating Organization:	City of Siletz

Internal Partners:	**External Partners:**
Siletz Public Works, City Recorder	DOGAMI, DLCD

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	**Siletz Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Seismically retrofit vulnerable structures and critical facilities.	1. Protect life and property. 2. Improve structural integrity of public buildings.

Rationale for Proposed Action Item:

- "For governments, less damage to government structures will mean continued services and normal processes or at least minimal interruptions. If government structures come through an earthquake with little or no damage, agencies will not have to relocate services, and public officials can respond to the immediate and long-term demands placed on them by the event. In short, seismic rehabilitation as a pre-event mitigation strategy actually will improve post-event response by lessening life loss, injury, damage, and disruption."
  Source: FEMA. Chapter 1: Why Seismic Rehabilitation? http://www.fema.gov/plan/prevent/earthquake/pdf/fema-275-06-ch-1.pdf. October 12, 2006.

- The city's infrastructure is highly vulnerable to a severe earthquake event. Sewer lines, water lines, power lines, water tanks, reservoirs, that were identified by the Steering Committee as vulnerable assets. The city would expect significant damage to roads and bridges following a Cascadia Subduction Zone event, as well as deaths and severe injuries region-wide.

Ideas for Implementation:

- Inventory of community buildings and infrastructure: determine which structures may be particularly vulnerable to earthquake damage. Seek funding to retrofit and/or re-build structures.
- Create a local rehabilitation and retrofit program for existing buildings.
- Rehabilitate identified vulnerable schools, emergency facilities, and public buildings/lifelines.

Coordinating Organization:	City of Siletz

Internal Partners:	**External Partners:**
Siletz Public Works, City Recorder	Oregon Emergency Management, DOGAMI, DLCD

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	**Siletz Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Identify over-water transportation alternatives in the event of bridge collapse in an earthquake and/or tsunami.	1. Protect life and property. 2. Coordinate and enhance emergency services.

Rationale for Proposed Action Item:

- In the event of a Cascadia Subduction Zone (CSZ) earthquake, it is possible the Highway 229 bridges on either side of Siletz would fail. Essential transportation services would need to be restored.
- 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 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.
- 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. The last CSZ event occurred approximately 300 years ago.
- Restoration of key infrastructure is essential after a natural disaster "to support the industry and the jobs it provided." To sustain the economy, communities should "provide for temporary infrastructure while long-term rebuilding efforts are underway."
  Source: Governor's Commission Report on Recovery, Rebuilding, and Renewal. After Katrina: Building Back Better than Ever. December 31, 2005 p.112

Ideas for Implementation:

- Obtain emergency equipment in preparation for an earthquake event.

Coordinating Organization:	Siletz Public Works

Internal Partners:	**External Partners:**
	Lincoln County Emergency Services, ODOT, NOAA

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	**Siletz Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Participate in the development of the County's Community Wildfire Protection Plan.	1. Protect life and Property; 2. Preserve natural areas and features; 3. Coordinate partnerships and coordination to improve implementation.

Rationale for Proposed Action Item:

- The County is currently engaged in an effort to develop a Community Wildfire Protection Plan (CWPP) which will map vulnerable areas, among other things. The city hopes to participate in the CWPP's development process as well. The CWPP has the potential to benefit both jurisdictions; the city's participation is essential in ensuring that the CWPP provides adequate city-level information.
- 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 (taken from Lincoln County's plan).
  Source: FEMA. October 30, 2000. Disaster Mitigation Act of 2000.http://www.fema.gov/library/viewRecord.do?id=1935. October 12, 2006.

Ideas for Implementation:

- Coordinate with the Lincoln County Steering Committee to identify persons/groups responsible for the CWPP planning effort. Coordinate and establish relationships with fire districts involved in the effort.

Coordinating Organization:	City of Siletz

Internal Partners:	**External Partners:**
Siletz Public Works, City Recorder	Lincoln County, Fire Districts, US Forest Service, BLM

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	**Siletz Steering Committee**

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Volume III: City Addenda
City of Toledo

Overview

The city of Toledo developed this addendum to the Lincoln County multi-jurisdictional Natural Hazards Mitigation Plan in an effort to increase the community's resilience to natural hazards. The addendum focuses on natural hazards that could affect Toledo, Oregon, which include coastal erosion, droughts, earthquakes, floods, landslides, tsunamis, volcanoes, wildfires, and windstorms. It is impossible to predict exactly when disasters may occur, or the extent to which they will affect the city. However, with careful planning and collaboration among public agencies, private sector organizations, and citizens within the community, it is possible to minimize losses that result from natural hazards.

The addendum provides a set of actions that aim to reduce the risks posed by natural hazards through education and outreach programs, the development of partnerships, and the implementation of preventative activities such as land use or storm water management plans. The actions described in the addendum are intended to be implemented through existing plans and programs within the city.

The addendum is comprised of the following sections: 1) Addendum Development Process 2) Community Profile; 3) Risk Assessment; 4) Action Items; and 5) Plan Implementation and Maintenance

Addendum Development Process

In the fall of 2006, the Oregon Partnership for Disaster Resilience (The Partnership / OPDR) at the University of Oregon's Community Service Center partnered with Oregon Emergency Management (OEM) and Clatsop and Lincoln Counties to develop a Pre-Disaster Mitigation Planning Grant proposal. Both Counties joined The Partnership by signing (through their County Commissions) a Memorandum of Understanding for this planning project. FEMA awarded the Oregon Coast Region a grant to support the development of the natural hazard mitigation plans for the two counties and the cities therein. The Partnership, OEM, and the participating communities were awarded the grant in the fall of 2006 and local planning efforts began in the fall of 2007.

With guidance from The Partnership and the Lincoln County Planning Department, the city of Toledo formed a local steering committee to participate in the addendum's development. The Toledo Steering Committee was comprised of representatives from the following departments:

- Toledo Planning Department (2 Representatives)
- Toledo Fire Department
- Toledo City Council
- Toledo City Manager
- Oregon Partnership for Disaster Resilience

The committee first met on August 14, 2008; thereafter, the committee remained engaged and provided subsequent feedback and review of plan drafts. Lincoln County's 'Resource Assistance for Rural Environments' (RARE) Participant developed and facilitated the August 14th meeting at City Hall in Toledo. During the meeting, the committee reviewed the county's risk assessment and discussed how the city's risks (i.e., hazards' characteristics, probabilities of occurrence, local vulnerabilities, and community-specific impacts) differed from the county's. Additionally, the committee adopted the county's goals (see Section 3 of the county's plan), and identified city-specific mitigation actions. OPDR developed a final draft of Toledo's Addendum based on notes from the August 14th meeting.

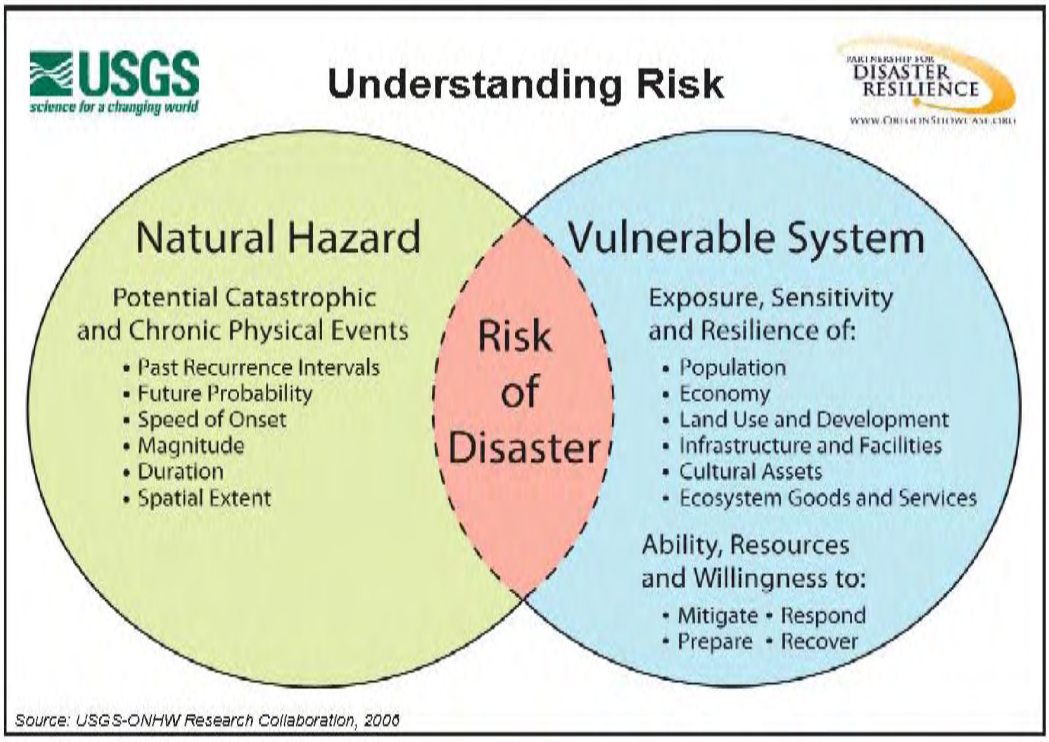
In _____, 2009, the Toledo Steering Committee presented the draft addendum to the City Council. The city will be responsible for maintaining and updating this addendum in coordination with the county's semi-annual plan update meetings.

The city of Toledo adopted the Lincoln County Multi-Jurisdictional Natural Hazards Mitigation Plan via resolution on Insert Date, Year.

Community Profile

The following section describes the city of Toledo from a number of perspectives in order to help define and understand the city's sensitivity and resilience 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 city when the plan was developed. The information documented below, along with the hazard assessments located in the Hazard Summary, should be used as the local level rationale for the city's risk reduction actions. The identification of actions that reduce the city's sensitivity and increase its resilience assist in reducing overall risk, or the area of overlap in Figure 1 below.

Figure 1. Understanding Risk

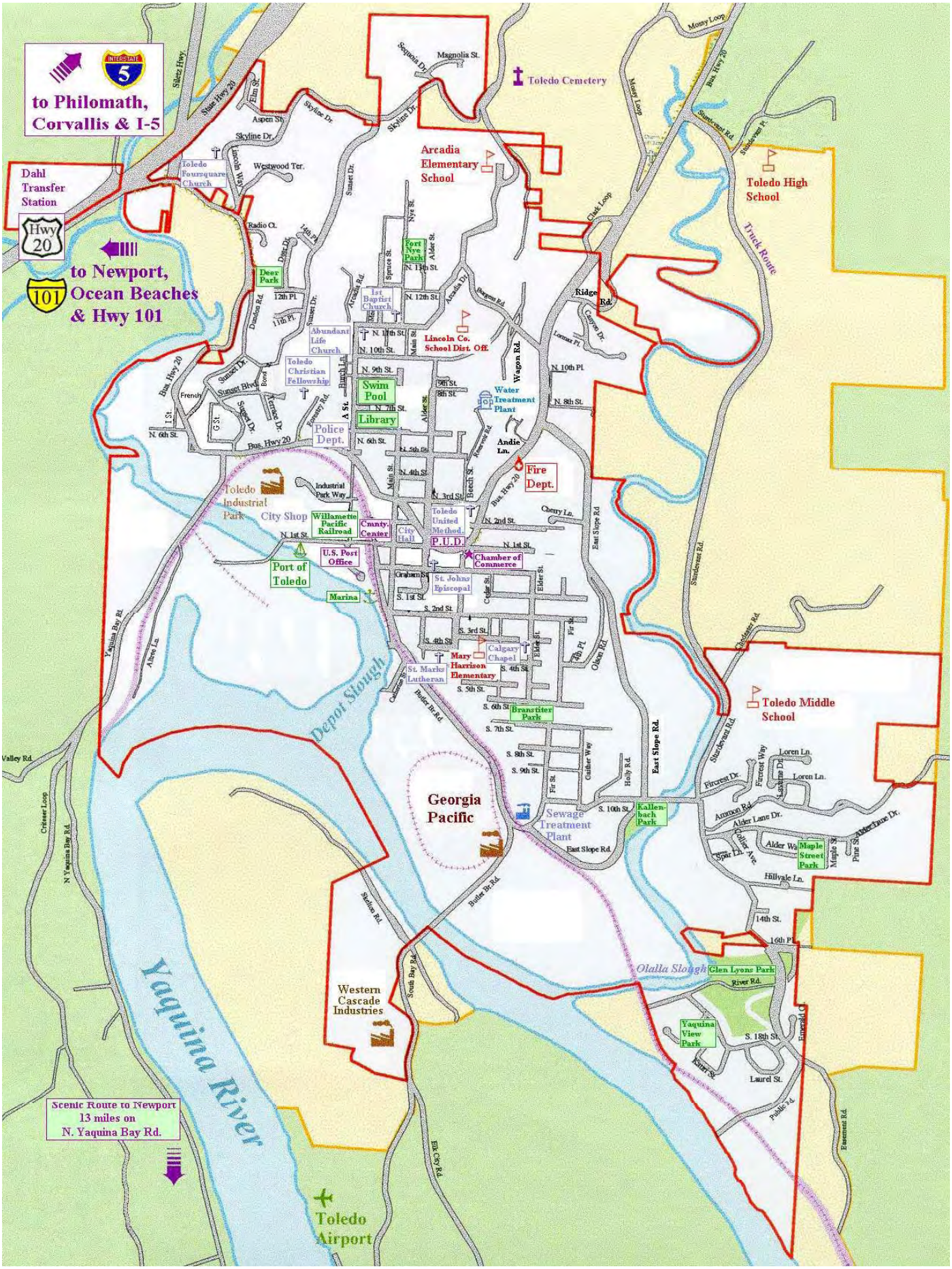


Source: USGS - Partnership for Disaster Resilience Research Collaborative, 2006.

Geography & Climate

Toledo is situated on a bend of the Yaquina River and is surrounded by wooded hills seven miles inland from the Central Oregon Coast. Toledo is the only inland coastal community with a deep water channel.[i] The climate in the city of Toledo is relatively moderate; the average monthly temperatures range from 50-66 degrees in July and August, and 38-51 degrees in December and January. The city annually receives approximately 72 inches of rain. Monthly precipitation is about 12 inches during the wetter months of November - January, and about 1 inch during the drier summer months of June - August.[ii] The city's topography is very hilly. Nearby bodies of water include the Pacific Ocean and Yaquina Reservoir. The following map of the city is provided by the Toledo Chamber of Commerce. The surrounding yellow area is the Urban Growth Boundary (UGB), and the surrounding green areas are outside of the UGB.

Figure 2 Toledo, Oregon



Population & Demographics

Since the city of Toledo was incorporated in 1905, the population has been slowly growing. In 2007 the city of Toledo's population was estimated to be 3,585, an increase of 3.3% from the 2000 US Census count of 3,472.[iii] Un-monitored growth within the city of Toledo can potentially result in the development of lands in hazardous areas, including steep slopes.

Table 1. City of Toledo Population Change, 2000-2007

Population Estimates	Toledo Population	% Change
2000	3,472	X
2007	3,585	3.3%

Source: Portland State Population Research Center

Disaster impacts (in terms of loss and the ability to recover) vary among population groups following a disaster. Historically, 80% of the disaster burden falls on the public. Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities, and low income persons. Portions of the city of Toledo's residents fall into these special needs populations. Over 5% of the city's population speaks English less than "very well," and in 2000, 19.3% of all individuals and 18.6% of families in the city of Toledo were living below the federal poverty level.[iv] Additionally, 10.6% of the population is 65 years or older (see Table 3 below).

Table 2. City of Toledo Poverty Status, 2000

Type	Total Persons	% of Population
Families	168	18.6%
Individuals	655	19.3%
Total	**823**	**37.9%**

Source: US Census 2000, Toledo City, OR, "Profile of General Demographic Characteristics: 2000"

Table 3. City of Toledo Population by Age, 2000

Age Range	Total Persons	%
Under 5	261	7.5%
5 to 9	249	7.2%
10 to 14	341	9.8%
15 to 19	254	7.3%
20 to 24	163	4.7%
25 to 34	514	14.8%
35 to 44	597	17.2%
45 to 54	460	13.2%
55 to 59	141	4.1%
60 to 64	123	3.5%
65 to 74	185	5.3%
75 to 84	148	4.3%
85 and over	36	1.0%
Total	**3,472**	**100%**

Source: US Census 2000, Toledo City, OR, "Profile of General Demographic Characteristics: 2000"

Employment & Economics

Historically, the economy of Toledo has been largely based on the processing of paper products. Toledo retains an industrial base with the largest industrial employer in Lincoln County.[v] Though the paper industry is still the primary employer in Toledo, the city's economy has been influenced by the management, sales and service industries. Today, Toledo is also known for its antiques and local artists' community. The following table displays employment by major industry sectors within Toledo.

Table 4. City of Toledo Employment by Major Industry, 2000

Occupation	Total Persons	% of Population
Management, professional, and related occupations	383	26.4%
Sales and office occupations	321	22.1%
Service occupations	318	21.9%
Production, transportation, and material moving occupations	243	16.7%
Construction, extraction, and maintenance occupations	172	11.8%
Farming, fishing, and forestry occupations	16	1.1%

Source: US Census 2000, Toledo City, OR, "Profile of Selected Economic Characteristics: 2000"

Median income can be used as an indicator of the strength of the region's economic stability. In 1999, the median household income in Toledo was $34,503.[vi] This is almost $7,500 below the 1999 national median household income of $41,994, and around $2000 above the $32,769 median household income for Lincoln County.[vii] Although it can be used to compare areas as a whole, this number does not reflect how income is divided among area residents.

Housing

Housing type and year-built dates are important factors in mitigation planning. Certain housing types tend to be less disaster resistant and warrant special attention: mobile homes, for example, are generally more prone to wind and water damage than standard stick-built homes. Generally the older the home is, the greater the risk of damage from natural disasters. This is because stricter building codes have been developed following improved scientific understanding of plate tectonics and earthquake risk. For example, structures built after the late 1960s in the Northwest and California use earthquake resistant designs and construction techniques. In addition, FEMA began assisting communities with floodplain mapping during the 1970s, and communities developed ordinances that required homes in the floodplain to be elevated to one foot above Base Flood Elevation.

In 2000, Toledo had 1,445 housing units.[viii] Of those, 89% were occupied (1,312), and 11% (922) were vacant. Of the occupied housing units 51.9% (2,136) were owner occupied, and 48.1% (1,976) were renter occupied.[ix] Nearly 84% of the city's housing stock was built prior to 1980, before stronger seismic building codes were put into place (see Table 5 below). Additionally, see Table 6 for a listing of housing types within the city of Toledo.

Table 5. City of Toledo Housing Structure Age, 2000

Year Built	Total Structures	% of Structures
1980-2000	255	17.7%
1960-1979	485	33.5%
Before 1960	705	48.8%

Source: US Census 2000, Toledo City, OR, "Profile of Selected Housing Characteristics: 2000"

Table 6. City of Toledo Housing Type, 2000

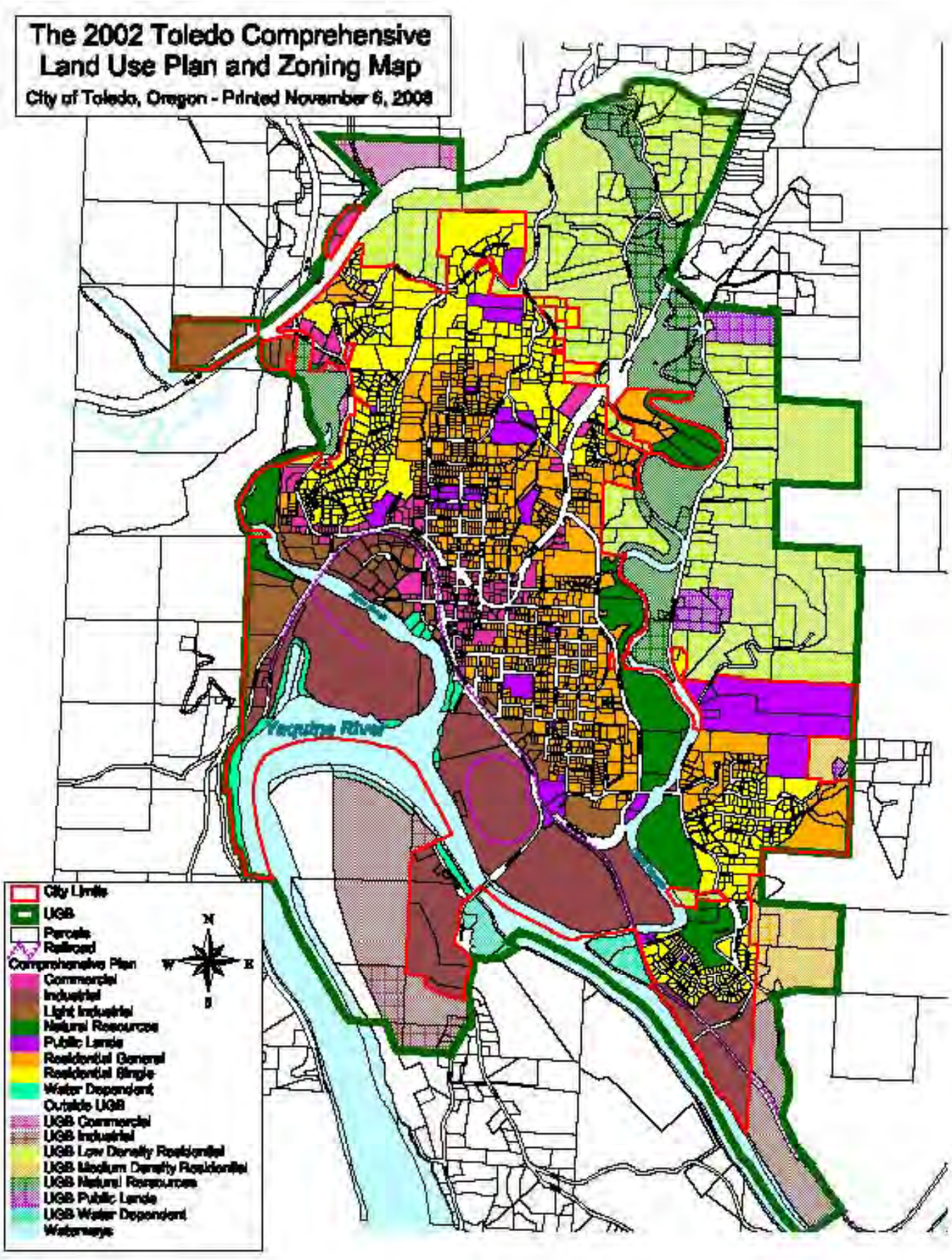
Housing Type	Total Structures	% of Structures
Single Unit	1,041	72.0%
Multi Unit	265	21.3%
Mobile Home	132	9.1%
Boat, RV, Van	7	0.5%

Source: US Census 2000, Toledo City, OR, "Profile of Selected Housing Characteristics: 2000"

Land Use & Development

Toledo sits seven miles inland from the coast line of Central Oregon, and development spans a total of 2.3 square miles. By the year 2020, the city estimates that 5,000 to 5,600 people will live in Toledo. Where and how the city decides to grow may influence the city's level of vulnerability to natural hazards. Toledo's Comprehensive Plan addresses land use needs within the city and the Urban Growth Boundary. In response to Statewide Planning Goal 7, the city additionally addresses development in relation to floods, tsunamis, earthquakes, landslides, weak foundation soils, high groundwater, wind/winter storms, and wildfires. Please see "Existing Mitigation Activities" below on page # for details regarding Goal 7 within Toledo's Comprehensive Plan, Article 7. Figure 3 below displays Toledo's zoning and Urban Growth Boundary.

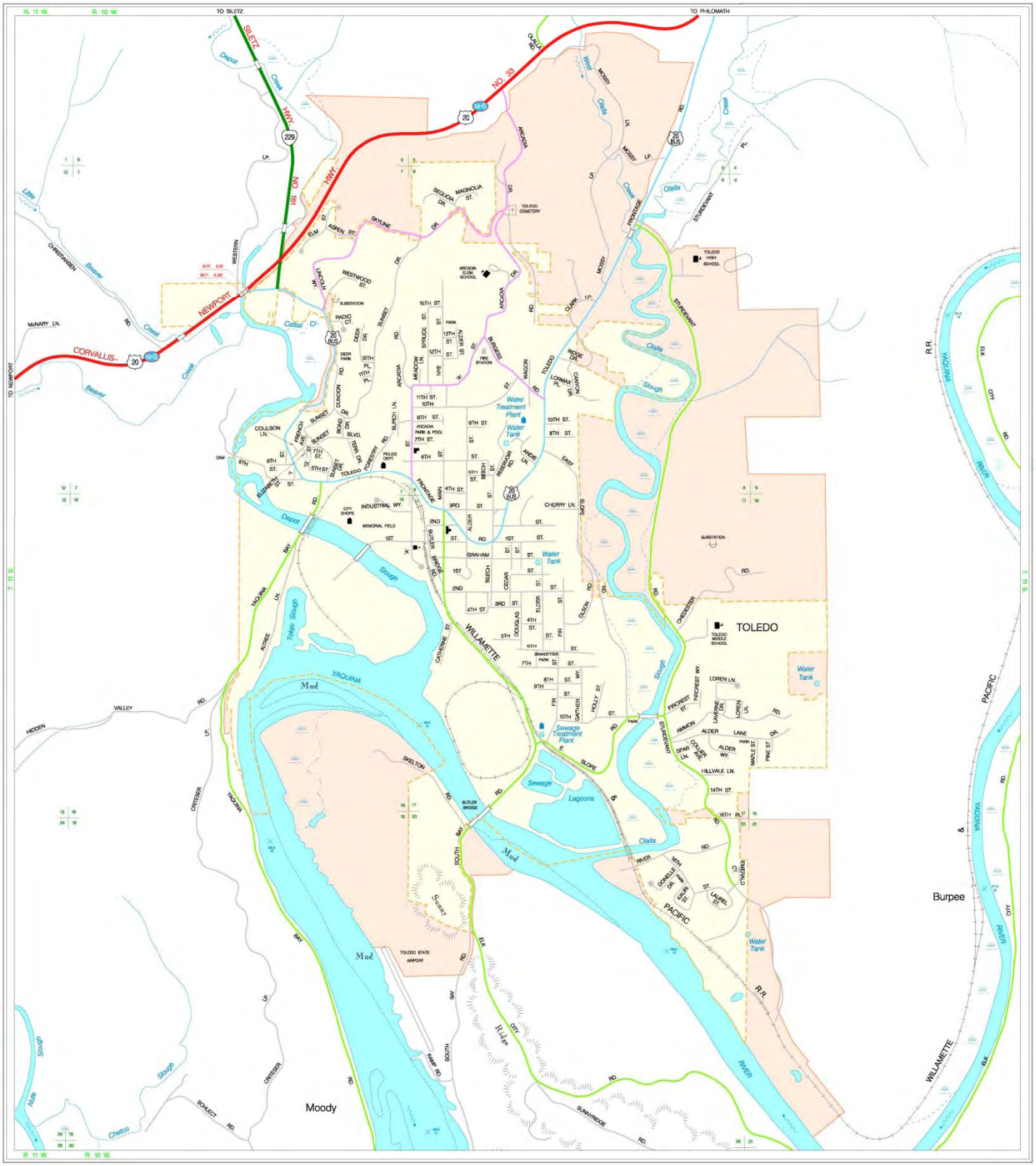
Figure 3 Zoning Map



Transportation & Commuting Patterns

Transportation routes in the city of Toledo include rail, air, marine, and U.S. Highway 20.[x] Highway 20 and Business 20 are important arterials in the city of Toledo's multi-modal transportation network. Transportation is an important consideration when planning for emergency service provisions. Growth within the city will put pressure on both major and minor roads, especially if the main mode of travel is by single occupancy vehicles.

Figure 4 Transportation Map



LEGEND

FOR FURTHER FUNCTIONAL CLASSIFICATION INFORMATION, CONTACT O.D.O.T. REGION OFFICE.

FUNCTIONAL CLASSIFICATION: STATE / OTHER

- INTERSTATE
- PRINCIPAL ARTERIAL
- MINOR ARTERIAL
- URBAN COLLECTOR / RURAL MAJOR COLLECTOR
- MINOR COLLECTOR
- LOCAL ROAD
- ORE. ROUTE – US. ROUTE – INTERSTATE ROUTE
- NATIONAL HIGHWAY SYSTEM ROUTE
- URBAN GROWTH BOUNDARY
- CITY LIMIT
- AMTRAK RAIL PASSENGER STATION
- BRIDGE
- GRADE SEPARATIONS
- STATE – OTHER FUNCTIONALLY CLASSED – LOCAL ROAD

- PUBLIC BUILDING
- COURTHOUSE
- CITY HALL
- AIRPORT
- POST OFFICE
- SCHOOL
- LIBRARY
- SAFETY REST AREA
- WEIGH STATION
- PARK & RIDE LOCATION
- INTERCITY – CITY TRANSIT
- COMMERCIAL – GENERAL AVIATION
- AMTRAK STOP – PORT FACILITY
- GRAVEL PIT – QUARRY – ODOT STOCKPILE SITE

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SCALE

500 0 500 1000 FEET

150 0 150 300 METERS

PREPARED DIGITALLY BY THE OREGON DEPARTMENT OF TRANSPORTATION IN COOPERATION WITH THE U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

TOLEDO Population 3,585 *

T. 11 S. R.10-11 W. W.M.

PRELIMINARY COPY SUBJECT TO CORRECTION

OREGON TRANSPORTATION MAP

Showing Functional Classification of Roads

City of

TOLEDO

LINCOLN COUNTY 2007

PARK & RIDE · INTERBUS · AMTRAK — AVAILABLE TRANSPORTATION SERVICES SHOWN WITH YELLOW BACKGROUND

PORT · AIRPORT · COMM. AIR — AVAILABLE TRANSPORTATION SERVICES SHOWN WITH YELLOW BACKGROUND

Copies available from the Oregon Department of Transportation, Map Distribution Unit, Mill Creek Office Park, 555 13th St. NE, Suite 2, Salem, Oregon 97301-4178, Telephone (503) 986-3154. http://egov.oregon.gov/ODOT/TD/TDATA/gis/CityMaps.shtml

* Based on current Oregon Population Report, College of Urban and Public Affairs, Portland State University, http://pdx.edu/prc

TOLEDO - LINCOLN COUNTY

Critical Facilities & Infrastructure

Critical facilities are those that support government and first responders' ability to take action in an emergency. They are a top priority in any comprehensive hazard mitigation plan. Toledo has a police department, fire department, water treatment plant, wastewater treatment plant, one elementary school, and a junior/senior high school.

Historic & Cultural Resources

Historic and cultural resources such as historic structures and landmarks can help to define a community and may also be sources of tourism dollars. Because of their role in defining and supporting the community, protecting these resources from the impact of disasters is important. The National Register of Historic Places lists three historic sites within the city of Toledo. These historic resources include the Ahnkuti House, Pacific Spruce Sawmill Tenant Houses, and St. John's Episcopal Church.[xi] Additional recreational amenities include Toledo's Municipal Pool, the Olalla Valley Golf Course, kayaking, fishing, bowling, and bird-watching. Seasonal attractions include the Summer Festival and Fireworks in July, the Antique Street Fair and Wooden Boat Festival in August, the Art Walk in September and Hometown Holiday in December.

Government Structure

City Council is the policy making body for the city of Toledo. Members of the Council serve as Council representatives on many boards and commissions of the city, other local governments, agencies, and the state. The city of Toledo currently houses the following departments:

Administration Department: The Administration Department is located at City Hall and is responsible for the day-to-day general administration and financial management of the city. The city manager, appointed by the mayor and City Council, is the administrative head of the city of Toledo. The department also includes the city attorney, city recorder and treasurer.[xii]

Community Planning and Development: The Community Planning and Development Department is responsible for the city's comprehensive plan, implementing ordinances, building permits, grant administration and special projects. In addition, the Planning Department oversees the Toledo Hometown Project which provides a forum for the Toledo Merchants and community citizens to work together to promote Toledo.[xiii] Currently the Community Planning and Development Department has three employees: a contracted planner, a planning secretary, and a community volunteer coordinator.

Public Works Department: The city of Toledo Public Works Department is responsible for maintaining the potable water distribution system, the wastewater collection system, the stormwater system, road side signage, fleet and equipment, park and grounds maintenance, and streets.[xiv]

Currently Public Works has the following employees: a Public Works Director, Administrative Secretary, nine Maintenance Workers, two Water Plant Operators, and two Wastewater Treatment Plant Operators.

Police Department: The Toledo Police Department is responsible for the overall law enforcement, code enforcement, and crime prevention programs for the city of Toledo. Through contract, the city also provides police services to the city of Siletz. The department provides dispatch services to the Police Department, Fire Department, and Rural Fire District and provides dispatch services to the Siletz Tribal Police Department.[xv] Currently the Police Department has fifteen employees: a Police Chief, a Police Sergeant, eight officers, a dispatch supervisor, and four dispatchers.

Fire Department: The Toledo Fire and Rescue Department is responsible for emergency response to fires, medical services and disaster management for the city of Toledo and surrounding community. The department consists of three city employees and approximately 40 volunteers.[xvi]

Library: The Public Library is located at 173 NW 7th Street and has about 35,000 items available for borrowing. It has access to 250,000 items through its membership in the Coastal Resource Sharing Network, a cooperative of Libraries in Lincoln and Tillamook Counties.

Recreation: The city of Toledo offers resources for recreation activities of all kinds. The city has a Municipal Pool, a park, and tennis courts among others resources.

Existing Plans and Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances, and technical reports or studies. Plans and policies already in place 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.

The city of Toledo's Addendum to the Lincoln County Natural Hazards Mitigation Plan includes a range of recommended action items that, when implemented, will reduce the city's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the city'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 hazard mitigation plan's action items through existing plans and policies increases their likelihood of being supported and getting updated, and maximizes the city's resources.

The following table documents the plans and policies already in place in Toledo.

Name	Date of Last Revision	Description	Relations to Natural Hazard Mitigation
Comprehensive Plan	2001	A document stating the general, long-range policies that will govern a local community's future development.	Contains city specific information regarding natural hazards within the city's jurisdictional boundaries
Zoning Ordinance	2006	An ordinance establishing land use zones to regulate the location of building structure and the use of land within the city of Toledo	Contains city specific hazard related requirements for the placement and construction of the buildings. Issues such as floodplain development, fire resistant materials, etc.
Subdivision Ordinance	2004	An ordinance prescribing regulations governing the subdivision of land.	Contains city specific hazard related requirements for the subdivision of parcels. Issues such as floodplain development, construction on steep slopes, etc.

Community Organizations and Programs

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

The countywide community organizations and programs list can be found in Section 2: Community Overview of the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan. The list highlights organizations that are active within the county and may be potential partners for implementing mitigation actions.

Existing Mitigation Activities

Existing mitigation activities include current mitigation programs and activities that are being implemented by the community in an effort to reduce the community's overall risk to natural hazards. Documenting these efforts can assist participating jurisdictions better understand risk and can assist in documenting successes. Within the city of Toledo, specific hazard objectives are listed within the city's Comprehensive Plan (dated 2000):

Overall Objectives:

1. Identify potential natural hazard areas where development may occur when appropriate safeguards can minimize the impact of hazards upon development and impacts of new development upon adjoining properties.

2. Identify and preserve known natural hazard areas best retained for open space, yards, natural resource areas, wildlife habitats, recreation, or other non-structural uses.

3. Maintain an inventory of areas subject to natural disasters and hazards. The inventory shall be used to determine the suitability of a location for development and, if necessary, be used to limit the development to a level consistent with the degree of a hazard, the disaster potential and the environmental protection policies in the Comprehensive Plan.

    a. The city shall utilize the Soil Survey of Lincoln County Area, Oregon July, 1997 (and later editions), the Environmental Geology of Lincoln County Oregon - Bulletin 81 (Department of Geology and Mineral Industries, 1973), the Environmental Hazard Inventory Coastal Lincoln County (RNKR Associates, 1977), the All Hazard Mitigation Plan: Lane, Lincoln, and Linn Counties, Oregon (G & E Engineering Systems, Inc. 1998) and other appropriate materials as guides for developing policies and regulations to minimize damages from developing in hazardous areas.

4. Develop comprehensive and effective safeguards for developments within known natural hazard areas by requiring the use of special design and construction features to reduce potential risks/damages in accordance with state building codes, other state codes, federal regulations, and local codes.

Specific hazard objectives are also listed. The Comprehensive Plan can be viewed online at the city's website, or within the Community Development Department at City Hall.

Risk Assessment

The following hazards have been addressed in the Lincoln County Natural Hazard Mitigation Plan. The city of Toledo reviewed the county's plan on August 14, 2008 and assessed how Toledo's risks vary from the risks facing the entire planning area.

Coastal Erosion

The city of Toledo does not border the Pacific Ocean; at this time, coastal erosion is not considered to be a hazard within the community.

Drought

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of drought hazards, as well as the location and extent of a potential event. Due to a cool, wet climate, past and present weather conditions have generally spared coastal communities from the effects of a drought. As such, there is no record of a severe drought event within Lincoln County. The same holds true for Toledo.

The Siletz River is Toledo's primary water supply during the summer months, and Mill Creek Reservoir is the primary water source during the winter months. Storage capacity is limited, and the city's steering committee believes that increased storage capacity may assist in mitigating the impact of a severe drought event. The Toledo Steering Committee additionally noted that emergency shut-off valves may increase the amount of water that the city's able to supply in the aftermath of a high magnitude earthquake event.

Lincoln County estimates that the **probability** of a drought is **'low,'** meaning no more than one event is likely to occur within a 75-100 year period. The city of Toledo agrees with the county's estimate, but also acknowledges great uncertainty in predicting weather patterns. The city will review this estimate every five years in concurrence with the county's plan update process. Lincoln County additionally estimates a 'low' vulnerability to drought hazards, meaning less than 1% of the population or regional assets would be affected by a major emergency or disaster. Due to potential storage concerns, however, the city of Toledo estimates a **'moderate' vulnerability** to drought.

Potential drought-related community impacts are adequately described within the county's Drought Hazard Annex.

Earthquake

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes, characteristics, location, and extent of earthquake hazards for the region. The county's plan additionally identifies all previous occurrences that have affected the city of Toledo. It is difficult to estimate recurrence intervals, but the state has experienced seven Cascadia

Subduction Zone (CSZ) events in the last 3500 years – some of which were probably as large as magnitude (M) 9. These events are estimated to have an average recurrence interval between 500 and 600 years, although the time interval between individual events ranges from 150 to 1000 years. The last CSZ event occurred approximately 300 years ago. Scientists estimate that there is a **10-20% probability** that a subduction zone earthquake will occur within the next 50 years.[xvii] Based on this information, Lincoln County estimates a 'high' probability than an earthquake will occur in the future. The city of Toledo agrees.

Lincoln County additionally estimates a 'moderate' vulnerability to earthquake hazards, meaning 1-10% of the population or regional assets would be affected by a major emergency or disaster. Due to the city's concentrated population, resources and geologic features, however, the city believes that its **vulnerability** to a high magnitude earthquake would be **'high,'** meaning more than 10% of the population or regional assets would be affected by an event. As shown in Table 5 above on page 7, about 82% of Toledo's housing structures were built prior to the enforcement of earthquake resistant building codes. DOGAMI conducted a seismic needs assessment for public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs' offices and other law enforcement agency buildings. Buildings were ranked for the "probability of collapse" due to the maximum possible earthquake for any given area. Within the city of Toledo, the following buildings were rated:

- Toledo Fire Department (496 E Hwy 20): *high*
  Note: This is the former Public Safety Building (currently vacant and for sale)
- Toledo Fire Department (285 NE Burgess Rd): *low*
- Toledo Police Department (250 W Hwy 20): *low*

The city's steering committee additionally identified the following earthquake-related vulnerabilities:

- The city's topography is [likely] prone to earthquake-induced landslides;
- In the event of a magnitude (M) 9 event, the city will likely be isolated from larger cities in the Willamette Valley, as well as coastal communities. Post-disaster self-reliance is essential;
- Post-disaster communication may be hindered; the acquisition of satellite phones may be a beneficial emergency-response related investment;
- Access to hospitals will be difficult;
- The city will likely need to accommodate a large section of Newport's population post-earthquake and/or tsunami. Currently, the city is not equipped to house and/or provide services for an influx of residents;
- The Olalla Reservoir Dam may breach and cause severe flooding;

- The Mill Creek Reservoir Dam may breach and cause severe flooding;
- Toledo City Hall is comprised of unreinforced masonry and may collapse in the event of a high magnitude earthquake; and
- The city's Georgia Pacific Paper Mill may be hazardous in the event of an earthquake. Further study is needed.

Additional general community impacts are adequately described within the Earthquake Hazard Annex of Lincoln County's Natural Hazards Mitigation Plan.

Flood

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of flooding hazards within the region, as well as previous flooding occurrences. Flooding typically occurs within the city when storm drains back up and/or pumps fail to work. The Yaquina River borders the city of Toledo, but riverine flooding is typically not an issue. The extent of flooding varies depending on rainfall, and/or precipitation levels throughout the year. Toledo's most significant flood events occurred in 1964 and 1996, and heavy rain in 1999 caused flooding along A Street. Three landslides additionally affected city residents during that same event.

Lincoln County estimates a **'high' probability** that flooding will occur, meaning one event is likely within a 10-35 year period. The county estimates a **'moderate' vulnerability** to flood hazards, meaning 1-10% of the population or regional assets are likely to be affected by a major emergency or event. Both ratings are true for the city of Toledo as well.

Toledo is a participant in the National Flood Insurance Program, and the city's most current effect map date is March 1, 1979. Toledo has 8 NFIP policies in effect, and 1 claim has been paid since 1978. The city has zero repetitive loss structures. Numbers of buildings and/or properties within the floodplain are not available at this time.

Landslides are the most common flood-related impacts within the community. Additional community impacts are adequately described within the Flood Hazard Annex of Lincoln County's Natural Hazards Mitigation Plan.

Landslide

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of landslides, and appropriately identifies previous landslide occurrences within the region. The city of Toledo has very steep slopes, and a long history of logging practices increase the probability that landslides will occur. Homes on Nye Street suffered landslide-related damages following Oregon's 1996 storms, and slides accompanied storms in 1966 and 1999.

Currently, the city of Toledo does not have accurate information regarding the location and extent of potential landslides. New developments on steep slopes are required to submit geotechnical reports, but improved data collection would greatly benefit the city's landslide mitigation efforts. In 2007, the Oregon 74th Legislative Assembly directed the Department of Geology and Mineral Industries (DOGAMI) to extend lidar collection efforts throughout the state. Lidar (light detection and ranging) is a tool that can provide high-resolution images of the surface of the earth, and it's excellent for mapping natural hazards like landslides. To achieve the goal of collecting lidar data statewide, DOGAMI has formed the Oregon Lidar Consortium (OLC). The OLC will develop cooperative agreements for the collection of high-quality lidar that benefits the public at large, the business community, and agencies at all levels of government.[xviii] With improved data via participation in the OLC, Toledo would have a much greater understanding of its landslide risks.

Potential landslide-related impacts are adequately described within the county's plan, and include infrastructural damages, economic impacts (due to isolation and/or arterial road closures), property damages, and obstruction to evacuation routes. Rain-induced landslides and debris flows can potentially occur during any winter in Lincoln County, and thoroughfares beyond city limits are additionally susceptible to obstruction. As such, Toledo is vulnerable to isolation for an extended period of time.

The county currently estimates a 'moderate' probability that landslides will occur, meaning one event is likely within a 35-75 year period. Due to the city's steep slopes, Toledo estimates a **'high' probability** that landslides will occur, meaning one event is likely within a 10-35 year period. The county estimates a **'high' vulnerability** to landslide hazards, meaning more than 10% of the population or regional assets are likely to be affected by a major emergency or event. The vulnerability rating is true for the city of Toledo as well.

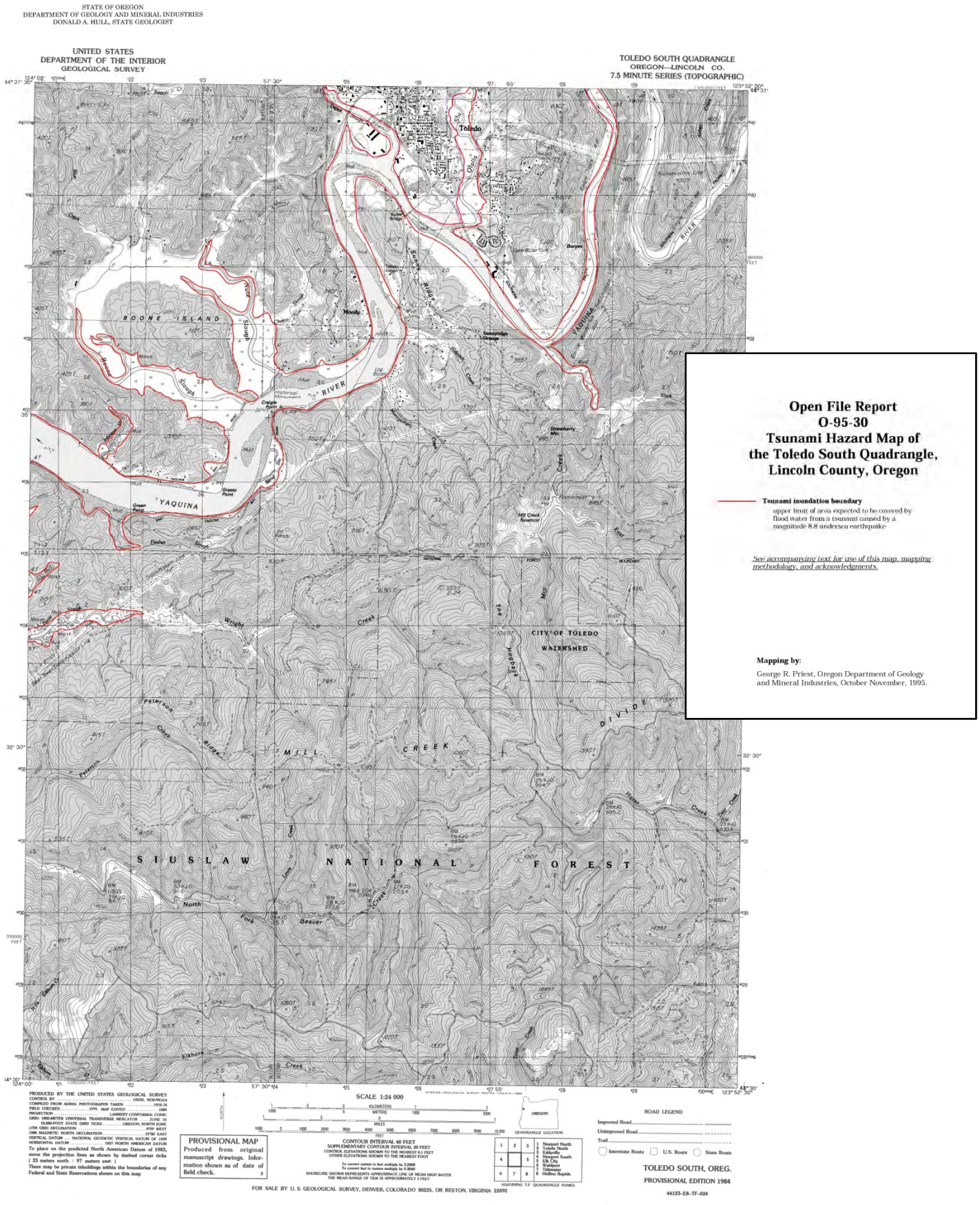
Tsunami

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of tsunami hazards, as well as the previous occurrences of tsunami events within the region. The city of Toledo is located seven miles inland from the Pacific Ocean, and as such, is not directly susceptible to tsunami waves. The Yaquina River is, however, expected to rise in the event of a tsunami, which may affect the city of Toledo.

The Department of Geology and Mineral Industries (DOGAMI) conducted an analysis resulting in extensive mapping along the Oregon Coast. The maps depict the expected inundation for tsunamis produced by a magnitude 8.8 to 8.9 undersea earthquake. The tsunami maps were produced to help implement Senate Bill 379 (SB 379), which was passed during 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, limit construction of new essential facilities and special occupancy structures in tsunami flooding zones. The following tsunami-inundation zone map, Figure 5, was produced for the city of Toledo, and shows where the Yaquina River is expected to rise.

Figure 5 Tsunami Hazard Map (Toledo South Quadrangle)



The location of Toledo's tsunami hazard is best described by the inundation map in Figure 5 above, but improvements to this map may be possible in coming years. The 2004 Indian Ocean earthquake and tsunami led DOGAMI to re-evaluate the state's tsunami mapping program. Currently, DOGAMI is using the latest advances in mapping technology (LIDAR), computer technology and computer modeling to run a pilot mapping project for the coastal city of Cannon Beach. The new map will be scenario based, meaning that variations in inundation levels (given local or distant tsunamis) will be shown. If the city of Toledo is presented with a similar opportunity to improve its current map, the city's risk assessment information may change.

The extent of a tsunami event in Toledo will depend on where the tsunami originated, and the size of the earthquake that produced the tsunami. Lincoln County appropriately describes the **probability** of a tsunami event for the city of Toledo. Geologists predict a **10-14%** chance that a Cascadia tsunami will be triggered by a shallow, undersea earthquake offshore Oregon in the next 50 years. The forecast comes from evidence for large but infrequent earthquakes and tsunamis that have occurred on the Oregon coast every 500 years, on average.[xix]

The county estimates a **'moderate' vulnerability** to tsunami hazards, and the city of Toledo agrees with this estimate. Although Toledo has very few developed lands are within the inundation zone,[xx] the city expects to see an influx of Newport residents following a large tsunami event. Likely, this will be the city's greatest tsunami-related impact. Toledo is currently unprepared for such an increase, and will be unable to house, feed, and care for a much larger population. The city's steering committee noted that the city may want to increase its capacity to handle such a population surge, and that the Emergency Response Plan should account for such a scenario.

Volcano

The Lincoln County Natural Hazard Mitigation Plan adequately describes Toledo's risk to volcanic events. Generally, an event that affects the county is likely to affect Toledo as well. The causes and characteristics of a volcanic event are appropriately described within the county's plan, as well as the location and extent of potential hazards. Previous occurrences are well-documented within the county's plan, and the community impacts described by the county would generally be the same for Toledo as well. Toledo is very unlikely to experience anything more than volcanic ash during a volcanic event. When Mt. Saint Helens erupted in 1980, the city received small amounts of ashfall, but not enough to cause significant health and/or economic damages. The county estimates a **'low' probability** of future volcanic events and a **'low' vulnerability** to future eruptions. The county's probability and vulnerability estimates are accurate of Toledo's risk as well.

Wildfire

The Lincoln County Natural Hazard Mitigation Plan adequately describes the causes and characteristics of wildfires, as well as the county and city's history of wildfire events. 1849 and 1936 were particularly devastating years for wildfires in Lincoln County, but since then, there have been very few events. The location and extent of a wildfire vary depending on fuel, topography, and weather conditions. As shown in Figure 1 within Lincoln County's Wildfire Hazard Annex, Toledo has a very low fire hazard. Weather conditions are primarily at cause for the low hazard level.

The county estimates a 'moderate' probability that local wildfires will occur in the future, meaning no more than one event is likely to occur within a 35-75 year period. Due to the city's wet climate and location along the Pacific Coast, Toledo's Steering Committee estimates a very **'low' probability** that wildfires will occur. The city recognizes, however, that climate patterns change, and the steering committee will re-evaluate their probability estimate when the city updates this addendum. Lincoln County additionally estimates a 'moderate' vulnerability to wildfires, meaning 1-10% of the population or regional assets are likely to be affected by a major event. The city of Toledo, however, estimates a **'high' vulnerability** to wildfires, meaning more than 10% of the population would be affected by a major event. The city has adequate response capabilities, but because of the climate, wildfires very rarely occur. As such, the amount of fuel and undergrowth would cause massive fires if it ever became dry enough for such an event.

The potential community impacts and vulnerabilities described in the county's plan are generally accurate for the city as well. Lincoln County is currently engaged in an effort to develop a Community Wildfire Protection Plan (CWPP) which will map vulnerable areas, among other things. Toledo hopes to participate in the CWPP's development process, and will update the city's wildfire risk assessment if the CWPP presents better data.

Windstorm

The Lincoln County Natural Hazard Mitigation Plan adequately describes the causes and characteristics of windstorms, as well as the location and extent of windstorm hazards. The region's (and city's) history of events are adequately described within the county's plan as well. Because coastal wind storms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow. More than likely, however, the coast's winter will just be windy, cold, and wet.

The county estimates a **'high' probability** that windstorms will occur in the future. Windstorms occur yearly, and the more destructive storms occur once or twice per decade. The county additionally estimates a **'high' vulnerability** to windstorms, meaning more than 10% of the population or

regional assets would be affected by a major windstorm event. Both estimates are true for the city of Toledo as well.

Lincoln County's Plan adequately describes the impacts caused by windstorms, including downed trees, heavy precipitation, building damages, and storm-related debris. Toledo experiences sporadic power failures all winter long, and trees frequently block roads. Typically, however, residents are prepared for power outages. The city's steering committee discussed the need for assisting residents with medical vulnerabilities during power-outages; Toledo's fastest growing age group is the elderly population, and medical isolation will continue to be an issue unless mitigated.

Action Items

The following action items are detailed recommendations for activities that local departments, citizens, and others could engage in to reduce risk. Action item worksheets are located at the end of the addendum.

- Obtain emergency shut off valves for the city's water lines.
- Educate citizens about natural hazards preparedness.
- Evaluate the structural integrity of the Olalla Reservoir Dam and the Mill Creek Reservoir Dam.
- Seismically retrofit vulnerable structures and critical facilities.
- Evaluate the structural integrity of the Georgia Pacific Paper Mill.
- Implement specific hazard objectives identified in the city's Comprehensive Plan.
- Create an emergency response plan that accounts for an influx of persons after a Cascadia Subduction Zone earthquake and/or tsunami.
- Participate in the development of the county's Community Wildfire Protection Plan.
- Continue compliance with the National Flood Insurance Program.
- Obtain lidar collection data from DOGAMI.

Additionally, Toledo has chosen to partner with the county on the following actions. Please see Appendix A in Lincoln County's Natural Hazard Mitigation Plan for more detail regarding each of the actions listed below.

- Earthquake #1: Integrate new earthquake hazard mapping data for Lincoln County and improve technical analysis of earthquake hazards.

- Earthquake #5: Encourage seismic strength evaluations of critical facilities to identify vulnerabilities and to meet current seismic standards.
- Earthquake #6: Identify funding sources for and implement high priority structural and nonstructural retrofits of structures that are identified as seismically vulnerable.
- Flood #1: Explore steps needed to qualify Lincoln County for participation in the NFIP Community Rating System (CRS)
- Flood #3: Update the Lower Siletz Flood Mitigation Action Plan; develop flood mitigation action plan(s) for the lower Alsea and Salmon River, and Drift Creek and other areas.
- Flood #4: Work with affected property owners to elevate or relocate non-conforming, pre-FIRM structures in flood hazard areas.
- Landslide #1: Encourage construction, site location and design that can be applied to steep slopes to reduce the potential threat of landslides.
- Landslide #2: Increase public education related to landslide hazards by distributing DOGAMI landslide informational brochure.
- Landslide #3: Mitigate activities in identified potential and historical landslide areas through public outreach.
- Windstorm #1: Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during windstorm events.
- Windstorm #2: Develop and implement, or enhance strategies for debris management and/or removal after windstorm events.
- Windstorm #4: Increase public awareness of windstorm mitigation activities.
- Windstorm #5: Continue and enhance windstorm resistant construction methods where possible to reduce damage and power outages from windstorms.
- Windstorm #6: Encourage critical facilities to secure emergency power.

Plan Implementation & Maintenance

The city will utilize the same prioritization process as the county [See Section 4: Plan Implementation and Maintenance of the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan and Appendix D: Economic Analysis of Natural Hazard Mitigation Projects].

The city of Toledo Planning Department will serve as the convener for the city of Toledo Natural Hazard Mitigation Plan Addendum. The Planning Department will be responsible for convening the plan committee on a

yearly basis to identify new risk assessment data, review status of mitigation actions, identify new actions, and seek funding to implement mitigation actions. The city of Toledo Natural Hazard Mitigation Plan Addendum will be updated every five years in coordination with the county's plan update schedule.

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[i] Toledo Chamber of Commerce. http://www.visittoledooregon.com.

[ii] Toledo, Oregon City Profile: City-Data. http://www.city-data.com/city/Toledo-Oregon.html.

[iii] Portland State Population Research Center, 2007 population estimates. http://www.pdx.edu/media/p/r/PRC_2007_Population_Report2_rev.pdf

[iv] US Census 2000, Toledo City, Oregon, "Profile of Selected Economic Characteristics: 2000"

[v] Toledo Planning Commission and the Toledo Community Development Department. 2020 Vision for Toledo, Oregon. 2000 Toledo Comprehensive Land Use Plan.

[vi] US Census 2000, Toledo City, Oregon, "Profile of Selected Economic Characteristics: 2000."

[vii] US Census 2000, Lincoln County, Oregon, "Profile of Selected Economic Characteristics: 2000."

[viii] US Census 2000, Toledo City, Oregon, "Profile of Selected Housing Characteristics: 2000."

[ix] US Census 2000, Toledo City, Oregon, "Profile of General Demographic Characteristics: 2000."

[x] Toledo Planning Commission and the Toledo Community Development Department. 2020 Vision for Toledo, Oregon. 2000 Toledo Comprehensive Land Use Plan.

[xi] National Register of Historic Places, Oregon, Lincoln County. http://www.nationalregisterofhistoricplaces.com/or/Lincoln/state.html

[xii] City of Toledo Website, Administrative Department http://www.cityoftoledo.org/administration.html.

[xiii] City of Toledo Website, Community Planning and Development Department. http://www.cityoftoledo.org/planning.html.

[xiv] City of Toledo Website, Public Works Department. http://www.cityoftoledo.org/publicworks.html.

[xv] City of Toledo Website, Police Department. http://www.cityoftoledo.org/police.html.

[xvi] City of Toledo Website, Fire and Rescue Department. http://www.cityoftoledo.org/fire3.htm.

[xvii] Geologic Hazards on the Oregon Coast. Oregon Department of Geology and Mineral Industries. http://www.oregongeology.com/sub/earthquakes/Coastal/OrGeoEqNTsu.htm

[xviii] Oregon Lidar Consortium (OLC). Department of Geology and Mineral Industries. www.oregongeology.org.

[xix] Oregon Geology Fact Sheet, Tsunami Hazards in Oregon. Department of Geology and Mineral Industries. http://www.oregongeology.com/sub/publications/tsunami-factsheet_onscreen.pdf

[xx] Wood, Nathan. "Variations in City Exposure and Sensitivity to Tsunami Hazards in Oregon." USGS Scientific Investigations Report 2007-5283 (2007): 13-19.

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Obtain emergency shut off valves for the city's water lines.	Protect life and property Coordinate and enhance emergency services

Rationale for Proposed Action Item:

- The Toledo Steering Committee noted that emergency shut-off valves may increase the amount of water that the city's able to supply in the aftermath of a high magnitude earthquake event. Emergency shut-off valves automatically close in the event of an emergency to prevent the loss of handled media. Valves are frequently installed on residential water and gas lines, and may be installed on city water lines as well.

- 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 [201.6(c)(3)(ii)]. Installing emergency shut-off valves on city infrastructure can help to lessen an earthquake's effects on the city's water supply.

Ideas for Implementation:

- Obtain funding for emergency shut-off valves. Determine need, costs, and estimated benefits.

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	Toledo Steering Committee

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Educate citizens about natural hazards preparedness.	Enhance and promote public education

Rationale for Proposed Action Item:

- In the event of a magnitude (M) 9 event, the city will likely be isolated from larger cities in the Willamette Valley, as well as coastal communities. Post-disaster self-reliance is essential.
- "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." *Source: Oregon Natural Hazards Workgroup. Lane County Natural Hazard Mitigation Plan (Draft). October 2005. Community Service Center, University of Oregon, Eugene, OR. p. 46.*
- The Toledo Steering Committee expressed interest in developing strategies to assist residents that are in need of medical equipment during power outages.

Ideas for Implementation:

- Create public service advertisements.
- Distribute seasonal education & outreach materials with residents' water bills.
- Teach children about emergency safety & preparedness.
- Encourage residents to understand how to behave during windstorms. Educate residents about the hazards associated with high winds, and how to prevent harm during power outages.
- Host public meetings to discuss the earthquake and landslide hazards in Toledo.
- Educate residents about how to prepare for and mitigate damage caused by earthquakes.
- Place educational materials on display at the library.
- Create a neighbor assistance program to help residents in need of medical equipment during power outages. Provide information to residents about generator sharing programs and/or purchasing opportunities.

Coordinating Organization:	Fire Department (volunteers)

Internal Partners:	**External Partners:**
	FEMA, DOGAMI, Ready.gov, Oregon Emergency Management

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT (ongoing)	

Form Submitted by:	Toledo Steering Committee

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Evaluate the structural integrity of the Olalla Reservoir Dam and the Mill Creek Reservoir Dam.	Protect life and property Coordinate and enhance emergency services

Rationale for Proposed Action Item:

- Toledo is located in a high hazard area for earthquakes. The city's steering committee expressed concern that the Olalla Reservoir Dam and/or the Mill Creek Reservoir Dam may breach in the event of a high magnitude earthquake and cause severe flooding within the city.
- If we can understand the risk from dam failure closer to reality, we can plan and use resources more appropriately to prepare against this hazard. *Source: DOGAMI*

Ideas for Implementation:

- Create an Emergency Action Plan for dam failure. An EAP is a formal document that identifies potential emergency conditions at a dam and specifies preplanned actions to be followed to reduce property damage and loss of life. An EAP specifies actions the dam owner should take to take care of problems at the dam. It also includes steps to assist the dam owner in issuing early warning and notification messages to responsible downstream emergency management authorities of the emergency.
- Evaluate the community's risk of flooding from dam failure. Determine whether recreational facilities, campgrounds, or residences are located below the dam.
- Contact the state or county emergency management agency to determine whether the Olalla Dam is a high-hazard or significant-hazard potential dam.
- Educate residents about what to do during a flood event. For example, if residents are instructed to evacuate, they should do the following:
    - Secure your homes. If you have time, bring in outdoor furniture. Move essential items to an upper floor.
    - Turn off utilities at the main switches or valves if instructed to do so. Disconnect electrical appliances. Do not touch electrical equipment if you're wet or standing in water.

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
	FEMA, Oregon Emergency Management, Lincoln County

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	Toledo Steering Committee

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Seismically retrofit vulnerable structures and critical facilities.	Protect life and property Improve structural integrity of public buildings

Rationale for Proposed Action Item:

- "For governments, less damage to government structures will mean continued services and normal processes or at least minimal interruptions. If government structures come through an earthquake with little or no damage, agencies will not have to relocate services, and public officials can respond to the immediate and long-term demands placed on them by the event. In short, seismic rehabilitation as a pre-event mitigation strategy actually will improve post-event response by lessening life loss, injury, damage, and disruption." *Source: FEMA. Chapter 1: Why Seismic Rehabilitation? http://www.fema.gov/plan/prevent/earthquake/pdf/fema-275-06-ch-1.pdf. October 12, 2006.*
- DOGAMI conducted a seismic needs assessment for public school buildings, acute inpatient care facilities, fire stations, police stations, sheriffs' offices and other law enforcement agency buildings. Buildings were ranked for the "probability of collapse" due to the maximum possible earthquake for any given area. Within Toledo, the following buildings were rated:
  - Toledo Fire Department (496 E Hwy 20): *high*
    Note: this building has been vacant for some time and it does not house emergency services.
  - Toledo Fire Department (285 NE Burgess Rd): *low*
  - Toledo Police Department (250 W Hwy 20): *low*

  Additionally, the following county buildings within the city of Toledo were rated:
  - Olalla Center for Children & Families: *moderate*
  - Toledo High School: *high*
  - Toledo Middle School: *high*
- In addition to the structures listed above, the city's infrastructure is highly vulnerable to a severe earthquake event. Sewer lines, water lines, power lines, water tanks, reservoirs, cell towers, and City Hall were identified by the steering committee as vulnerable assets. The city would expect significant damage to roads and bridges following a Cascadia Subduction Zone event, as well as deaths and severe injuries region-wide.

Ideas for Implementation:

- Inventory community buildings and infrastructure: determine which structures may be particularly vulnerable to earthquake damage. Seek funding to retrofit and/or re-build structures.
- Create a local rehabilitation and retrofit program for existing buildings.
- Rehabilitate identified vulnerable schools, emergency facilities, and public buildings/lifelines.
- Teach homeowners, schools, and businesses how to perform non-structural retrofits within their living and work environments.

Coordinating Organization:	Public Works

Internal Partners:	**External Partners:**
Finance, City Manager, Community Development	Oregon Emergency Management, DOGAMI

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	

Form Submitted by:	Toledo Steering Committee

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Evaluate the structural integrity of the Georgia Pacific Paper Mill.	Protect life and property

Rationale for Proposed Action Item:

- Toledo's Paper Mill was constructed in 1957 when Georgia-Pacific purchased the C.D. Johnson Lumber Company. The Mill employs 500 people, and purchases approximately $200 million of local goods and services. As such, the Mill is integral to the success of Toledo's economy. The Toledo Steering Committee had concerns that the Mill may not be capable (structurally) of withstanding a high magnitude earthquake event. Potential structural inadequacies compromise employees' safety, as well as the health and well-being of residents nearby (i.e., potential chemical releases). As such, the city would like to evaluate the Mill's structural integrity, and resultantly provide recommendations for improvement.

- 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 [201.6(c)(3)(ii)].

Ideas for Implementation:

- Coordinate with Georgia Pacific to hire a team of engineers to evaluate the Mill's structural integrity. Request a list of recommendations for improvement based on findings.

Coordinating Organization:	City of Toledo (Council); Georgia Pacific

Internal Partners:	**External Partners:**
Community Development, Public Works	DOGAMI

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	Toledo Steering Committee

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Implement specific hazard objectives identified in the city's Comprehensive Plan.	Promote partnerships and coordination to improve implementation

Rationale for Proposed Action Item:

Article 7 of Toledo's Comprehensive Plan lists the following primary goal:

> Prevent loss of life and property damage by requiring appropriate safeguards for all development of properties within known natural hazard areas. Natural hazards include: floods, tsunamis, earthquakes, landslide and slope hazards, weak foundation soils, high groundwater, wind/windthrow/winter storms, and wildfires.

Overall objectives are as follows:

1. Identify potential natural hazard areas where development may occur when appropriate safeguards can minimize the impact of hazards upon development and impacts of new development upon adjoining properties.
2. Identify and preserve known natural hazard areas best retained for open space, yards, natural resource areas, wildlife habitats, recreation, or other non-structural uses.
3. Maintain an inventory of areas subject to natural disasters and hazards. The inventory shall be used to determine the suitability of a location for development and, if necessary, be used to limit the development to a level consistent with the degree of hazard, the disaster potential and the environmental protection policies in the Comprehensive Plan.
    a. The city shall utilize the Soil Survey of Lincoln County Area, Oregon July, 1997 (and later editions), the Environmental Geology of Lincoln County Oregon - Bulletin 81 (Department of Geology and Mineral Industries, 1973), the Environmental Hazard Inventory Coastal Lincoln County (RNKR Associates, 1977), the All Hazard Mitigation Plan: Lane, Lincoln, and Linn Counties, Oregon (G & E Engineering Systems, Inc.1998) and other appropriate materials as guides for developing policies and regulations to minimize damages from developing in hazardous areas.
4. Develop comprehensive and effective safeguards for developments within known natural hazard areas by requiring the use of special design and construction features to reduce potential risks/damages in accordance with state building codes, other state codes, federal regulations, and local codes.

Specific hazard objectives are listed for floods, tsunamis, earthquakes, landslide and slope hazards, weak foundation soils, high groundwater, wind/windthrow/winter storms, and wildfires.

The Disaster Mitigation Act of 2000 requires that plans include a process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate. [*§201.6(c)(4)(ii)*]

Ideas for Implementation:

Continue to implement & develop actions based on the objectives listed within the Comprehensive Plan.

Coordinating Organization:	Community Planning and Development

Internal Partners:		**External Partners:**
		Lincoln County, DLCD
Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT (ongoing)	

Form Submitted by:	Toledo Steering Committee

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Create an emergency response plan that accounts for an influx of persons after a Cascadia Subduction Zone earthquake and/or tsunami.	Coordinate and enhance emergency services

Rationale for Proposed Action Item:

- An Emergency Response Plan is a comprehensive plan to protect the public, including criteria for assessing an emergency situation and procedures for mobilizing response personnel and agencies and establishing communications and coordination. The city of Toledo's Natural Hazards Mitigation Steering Committee identified a need for: 1) creating an emergency response plan; and 2) including a strategy within the ERP that accounts for an influx of persons (i.e., a quick increase in population) following a high magnitude Cascadia Subduction Zone earthquake and/or tsunami.

- The Toledo Steering Committee recognizes that the creation of an emergency response plan is not mitigation; however, planning for a situation in which the city expects to be unprepared is an important component of all-hazards preparedness, mitigation, response, and recovery.

Ideas for Implementation:

- Model development of the emergency response plan after neighboring Lincoln County cities' plans. Include the public in discussions about post-earthquake and/or tsunami scenarios. With city-wide assistance, develop a strategy that prepares the city for responding to the needs of its citizens, and potentially the needs of nearby cities' residents.

- Work with neighboring cities, especially Newport, in developing the emergency response plan.

Coordinating Organization:	Community Planning and Development

Internal Partners:	**External Partners:**
Public Works, Police, Fire	City of Newport, Lincoln County, Oregon Emergency Management

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	Toledo Steering Committee

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Participate in the development of the county's Community Wildfire Protection Plan	Protect life and property; Preserve natural areas and features; Coordinate and enhance emergency services; Promote partnerships and coordination to improve implementation.

Rationale for Proposed Action Item:

- The county is currently engaged in an effort to develop a Community Wildfire Protection Plan (CWPP) which will map vulnerable areas, among other things. The city hopes to participate in the CWPP's development process as well. The CWPP has the potential to benefit both jurisdictions; the city's participation is essential in ensuring that the CWPP provides adequate city-level information.
- 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. *Source: FEMA. October 30, 2000. Disaster Mitigation Act of 2000. http://www.fema.gov/library/viewRecord.do?id=1935. October 12, 2006.*

Ideas for Implementation:

- Coordinate with the Lincoln County Steering Committee to identify persons/groups responsible for the CWPP planning effort. Coordinate and establish relationships with fire districts involved in the effort.

Coordinating Organization:	Fire Department

Internal Partners:	**External Partners:**
Community Development and Planning	Lincoln County, Fire Districts, BLM

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	Toledo Steering Committee

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Continue compliance with the National Flood Insurance Program.	Protect life and property

Rationale for Proposed Action Item:

- The National Flood Insurance Program (NFIP) provides communities with federally backed flood insurance, provided that communities develop and enforce adequate floodplain management measures. According to the NFIP, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance.
- The city estimates a high probability that flooding will occur in the future.
- Toledo has 8 National Flood Insurance Police holders, and 1 claim has been paid since 1978. The city has zero repetitive loss structures.
- Everyone in a participating community of the National Flood Insurance Program (NFIP) can buy flood insurance.
- Continue to participate in the NFIP.
- Explore participation in the National Flood Insurance Program's Community Rating System (CRS).
- The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of a natural hazard on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Continued participation in the NFIP will diminish flood damage to new and existing buildings in communities while providing homeowners, renters, and business owners additional flood insurance protection.

Ideas for Implementation:

- Actively participate with DLCD and FEMA during Community Assistance Visits. The Community Assisted Visit (CAV) is a scheduled visit to a community participating in the NFIP for the purpose of: 1) conducting a comprehensive assessment of the community's floodplain management program; 2) assisting the community and its staff in understanding the NFIP and its requirements; and 3) assisting the community in implementing effective flood loss reduction measures when program deficiencies or violations are discovered.
- Conduct an assessment of Toledo floodplain ordinances to ensure they reflect current flood hazards.
- Explore the possibility of updating the city's FEMA Flood Insurance Rate Map.
- Continue to participate in the NFIP. Explore participation in the National Flood Insurance Program's Community Rating System (CRS).
- Educate residents in Toledo about flood issues and actions they can implement to mitigate the flood risk.

Coordinating Organization:	Community Planning and Development

Internal Partners:	**External Partners:**
Public Works	FEMA, DLCD

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT (ongoing)	

Form Submitted by:	Toledo Steering Committee

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Obtain lidar collection data from DOGAMI	Protect life and property Preserve natural areas and features; Promote partnerships and coordination to improve implementation.

Rationale for Proposed Action Item:

- LIDAR (light detection and ranging) is a mapping tool that can provide very precise, accurate, and high-resolution images of the surface of the earth, vegetation, and the built environment. It can be used to study landforms and identify areas, especially landslide areas that may be susceptible to future occurrences. The Oregon Department of Geology and Mineral Industries (DOGAMI) has been working with communities to develop large-scale LIDAR maps of entire regions. In 2006-2007, various local, state, and federal agencies formed the Portland Consortium to gather 2200 square miles of LIDAR data in the Portland Metropolitan region. DOGAMI has formed the Oregon LIDAR Consortium (OLC) to gather data in other Oregon regions, including Lincoln County. Entering into an agreement with the OLC, or obtaining lidar collection data from DOGAMI will assist in mapping areas of Western Lane County and landforms around Toledo.
- With lidar, you can quickly, cheaply, and accurately: find landslides, old cuts and grades; measure and estimate fills and cuts; find stream channels and measure gradients; measure the size and height of buildings, bridges; locate and measure every tree in the forest; characterize land cover; model floods, fire behavior; locate power lines and power poles; find archeological sites; map wetlands and impervious surfaces; define watersheds and viewsheds; model insolation and shaking; map road center and sidelines; find law enforcement targets; map landforms and soils; assess property remotely; inventory carbon; monitor quarries, find abandoned mines; enhance any project that requires a detailed and accurate 2-D or 3-D map.
- The city of Toledo has relatively steep topography, and landslides have frequently accompanied heavy rainstorms. Additionally, severe landslides are expected to occur in the event of a high-magnitude earthquake. Despite the city's topographical characteristics and vulnerabilities to landslides, Toledo does not have accurate information regarding the location and extent of potential landslides. With improved data via participation in the OLC, (or purchase of the OLC's data), Toledo would have a much greater understanding of its landslide risks.
- The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of a natural hazard on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Obtaining lidar collection data from DOGAMI will help in understanding areas and landforms susceptible to landslide events to protect new and existing buildings, and infrastructure.

Ideas for Implementation:

- DOGAMI's LIDAR website provides information about the OLC and LIDAR and is a starting point for entering into an agreement with DOGAMI. http://www.oregongeology.com/sub/projects/olc/default.htm
- Contact Ian Madin at DOGAMI about obtaining the data. Ian is additionally available to talk to groups of potential users to show them the data and explain its uses. The lidar will be available without license restrictions in standard USGS quadrangles, with a nominal charge for each quadrangle. DOGAMI is happy to work with small communities to develop map products that they can use if they do not have GIS.

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**

Public Works, City Council		DOGAMI
Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		
Form Submitted by:	Toledo Steering Committee	

SAMPLE: USE THIS AS A SIGN-IN SHEET AT THE MEETING

Name of Event/Meeting: Toledo

Date of Event/Meeting: 6/14/08 Scheduled Time of Event/Meeting: 11:00

Name	Representing	Email	Roundtrip mileage (if applicable)	Hourly Rate
Rusty Klem	Toledo Planning			
William Ewing	Toledo Fire Department	Tfd@cityoftoledo.org		
Roo Cross	Toledo City Council			
Arlene Inukai	Toledo Planning Dept.	planning@cityoftoledo.org		
Michelle Amberg	Toledo -	manager@cityoftoledo.org		

Volume III: City Addenda
City of Waldport

Overview

The city of Waldport developed this addendum to the Lincoln County multi-jurisdictional Natural Hazards Mitigation Plan in an effort to increase the community's resilience to natural hazards. The addendum focuses on the natural hazards that could affect Waldport, Oregon, which include coastal erosion, droughts, earthquakes, floods, landslides, tsunamis, volcanoes, wildfires and windstorms. It is impossible to predict exactly when disasters may occur, or the extent to which they will affect the city. 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 addendum provides a set of actions that aim to reduce the risks posed by natural hazards through education and outreach programs, the development of partnerships, and the implementation of preventative activities such as land use or storm water management plans. The actions described in the addendum are intended to be implemented through existing plans and programs within the city.

The addendum is comprised of the following sections: 1) Addendum Development Process; 2) Community Profile; 3) Risk Assessment; 4) Action Items; and 5) Plan Implementation and Maintenance.

Addendum Development Process

In the fall of 2006, the Oregon Partnership for Disaster Resilience (the Partnership/OPDR) at the University of Oregon's Community Service Center partnered with the Oregon Emergency Management (OEM) and Clatsop and Lincoln Counties to develop a Pre-Disaster Mitigation Grant proposal. Both Counties joined the Partnership by signing (through their county commissioners) a Memorandum of Understanding for this planning project. FEMA awarded the Oregon Coast Region a grant to support the development of the natural hazard mitigation plans for the two counties and cities therein. The Partnership, OEM, and the participating communities were awarded the grant in the fall of 2006 and local planning efforts began in the fall of 2007.

With guidance from the Partnership and assistance from the Lincoln County Department of Planning and Development, the city of Waldport formed a local steering committee to participate in the addendum's development. The Waldport Steering Committee was comprised of representatives from the following departments:

Waldport City Manager

Waldport Planning Department

Waldport Public Works Department

Central Oregon Coast Fire and Rescue

The committee first met on January 27, 2009; thereafter, the committee remained engaged and provided subsequent feedback and review of plan drafts. Staff from the Lincoln County Department of Planning and Development developed and facilitated the January 27, 2009 meeting at Waldport's City Hall. During the meeting, the city's steering committee reviewed the county's risk assessment and discussed how the city's risks (i.e. hazards characteristics, probabilities of occurrence, local vulnerabilities, and community-specific impacts) differed from the county's. Additionally, the committee identified city-specific mitigation actions and expressed interest in building greater partnerships with the county via mitigation and/or emergency management-related activities.

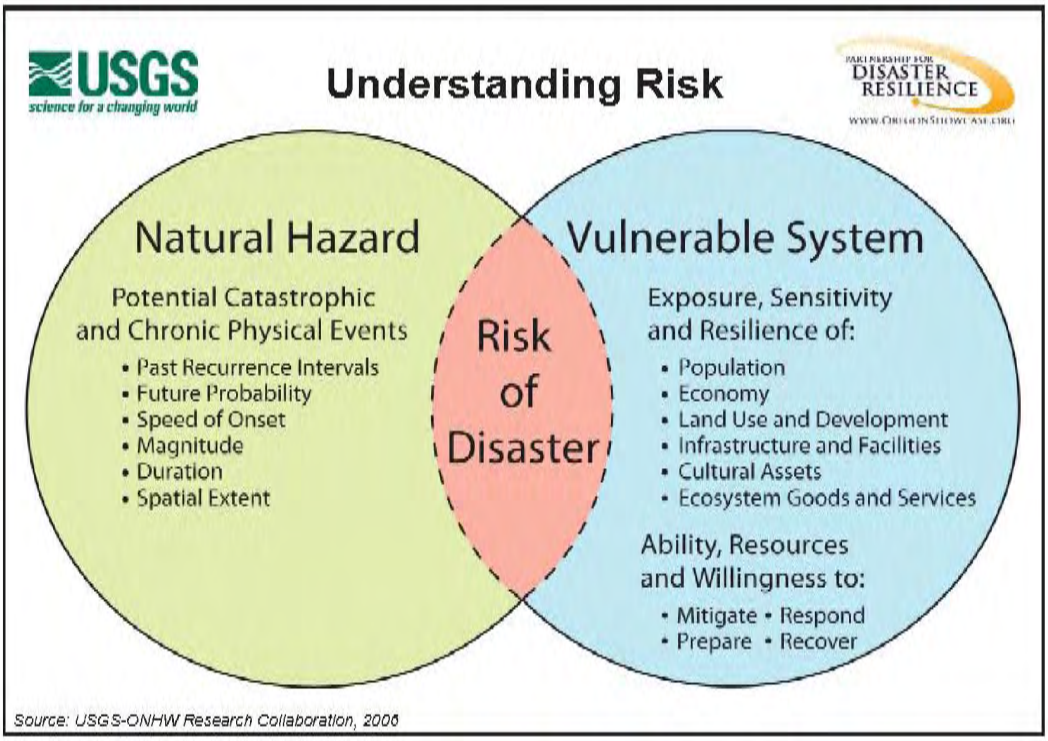
In _____ 2009, the Waldport Steering Committee presented the draft addendum to the Waldport City Council. The city will be responsible for maintaining and updating this addendum in coordination with the county's semi-annual plan update meetings.

The city of Waldport adopted the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan via resolution on _____.

Community Profile

The following section describes the city of Waldport from a number of perspectives in order to help define and understand the city's sensitivity and resilience 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 Waldport when the plan was developed. The information documented below, along with the risk assessments, should be used as the local level rationales for the city's risk reduction actions. The identification of actions that reduce the city's sensitivity and increase its resilience assist in reducing overall risk, or the area of the overlap in Figure 1 below.

Figure 1 Understanding Risk



Source: USGS – The Partnership for Disaster Resilience Research Collaborative, 2006

Geography & Climate

The city of Waldport is located on the central Oregon Coast, in Lincoln County Oregon, approximately 15 miles south of the city of Newport and 129 miles from the metropolitan area of the city of Portland. The city of Waldport sits at an average elevation of approximately 12 feet above sea level. Waldport city limits cover a land area of approximately 2.14 square miles and features the Alsea Bay, a popular crabbing area. Average monthly temperatures range from a low of 37 degrees to a high of 66 degrees. The hottest month is September and the coldest month is January. The driest month is July and the wettest month is December. Waldport has an average annual precipitation of approximately 71.7 inches.[i]

Population & Demographics

The city of Waldport was incorporated in 1911. The population was 2,050 in 2000 and 2,110 in 2006.[ii] These population figures do not take into account the large influx of tourists travelling to Waldport each year.

Disaster impacts (in terms of loss and the ability to recover) vary among population groups following a disaster. Historically, 80% of the disaster burden falls on the public. Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities and low income persons. In 2000, 9.4% of families and 17.3% of individuals were living below the poverty line. Additionally, 29.2% of the population is over 60. Of those over 65, 45% are disabled.[iii]

Table 1 below displays population by age in Waldport, and Table 2 shows the percentage of Waldport's disabled population by age.

Table 1: Population by Age: Waldport, 2000

Age	Percent
Under 5 years	5.3
5 to 9 years	6.4
10 to 14 years	8.0
15 to 19 years	5.5
20 to 24 years	2.9
25 to 34 years	8.9
35 to 44 years	13.9
45 to 54 years	14.1
55 to 59 years	5.8
60 to 64 years	5.8
65 to 74 years	12.5
75 to 84 years	8.7
85 years and over	2.2

Source: US Census 2000

Table 2: Disabled Population, Waldport, 2000

Age	Percent
5-20 years	13.4
21-64 years	20
65-over	45

Source: U.S. Census

Employment & Economics

According to the 2000 Census, the largest employment industry in Waldport is comprised of retail trade. Statistics suggest that tourism is a primary source of economic activity in Waldport. 'Arts, entertainment, recreation, accommodation and food services' is the second largest employment industry, and 'education, health and social services' is the third largest (see Table 3 below).

Table 3: Employment by Industry, Waldport, 2000

Industry	Number of Employees	Percent of Workforce
Retail trade	160	21.0
Arts, entertainment, recreation, accommodation and food services	154	20.2
Educational, health and social services	115	15.1
Public administration	65	8.5
Finance, insurance, real estate, and rental and leasing	56	7.3
Manufacturing	43	5.6
Transportation and warehousing, and utilities	38	5.0
Construction	36	4.7
Other services (except public administration)	29	3.8
Professional, scientific, management, administrative, and waste management services	24	3.1
Agriculture, forestry, fishing and hunting, and mining	19	2.5
Wholesale trade	19	2.5
Information	4	0.5

Source: Economic Census 2000

The four largest employers in Waldport include Ray's Food Place - retail grocery (33 employees), Tri-Agg, Inc. Ready Mix Concrete (15 employees), Alsea Bay Dental Clinic Dentistry (12 employees), and Bill's Chevron and Tire Station (12 employees).[iv]

Median income can be used as an indicator of the strength of the region's economic stability. In 2007, the estimated median household income was $39,453. [ii] This is approximately $9,277 less than the state's median household income of $48, 730.[v]

Local and regional economic development organizations include the city of Waldport, Port of Alsea, Central Coast Economic Development Alliance, and the Economic and Community Development Department Regional Development Officer.

Housing

Housing type and year built are important factors in mitigation planning. Certain housing types tend to be less disaster resilient and warrant special attention; mobile homes, for example, are generally more prone to wind and water damage than standard stick-frame homes. Generally, the older the home is, the greater the risk of damage from natural disasters. This is because stricter building codes have been developed following improved scientific understanding of plate tectonics and earthquake risk. For example, structures built after the late 1960's in the Northwest and California use earthquake resistant designs and construction techniques. Additionally, FEMA began assisting communities with floodplain mapping during the 1970's and communities developed ordinances that required homes in the floodplain to be elevated to one foot above the Base Flood Elevation.

In 2000, Waldport had 1,099 housing units. Of those, 64.5% (586) were owner occupied, 35.5% (323) were renter occupied, and 17.3% (190) were vacant. Of the vacant housing units, 8% (88) were for seasonal, recreational, or occasional use. Over half (62%) of the city's housing stock was built prior to 1980, before stronger seismic building codes were put into place.[vi] Table 4 shows housing units by year built, and Table 5 displays the type of housing available in Waldport.

Table 4: Housing Structure Age, Waldport, 2000

Year Built	Percent of Structures
1980-2000	38.3%
1960-1980	44.3%
Before 1960	17.5%

Source: U.S. Census 2000

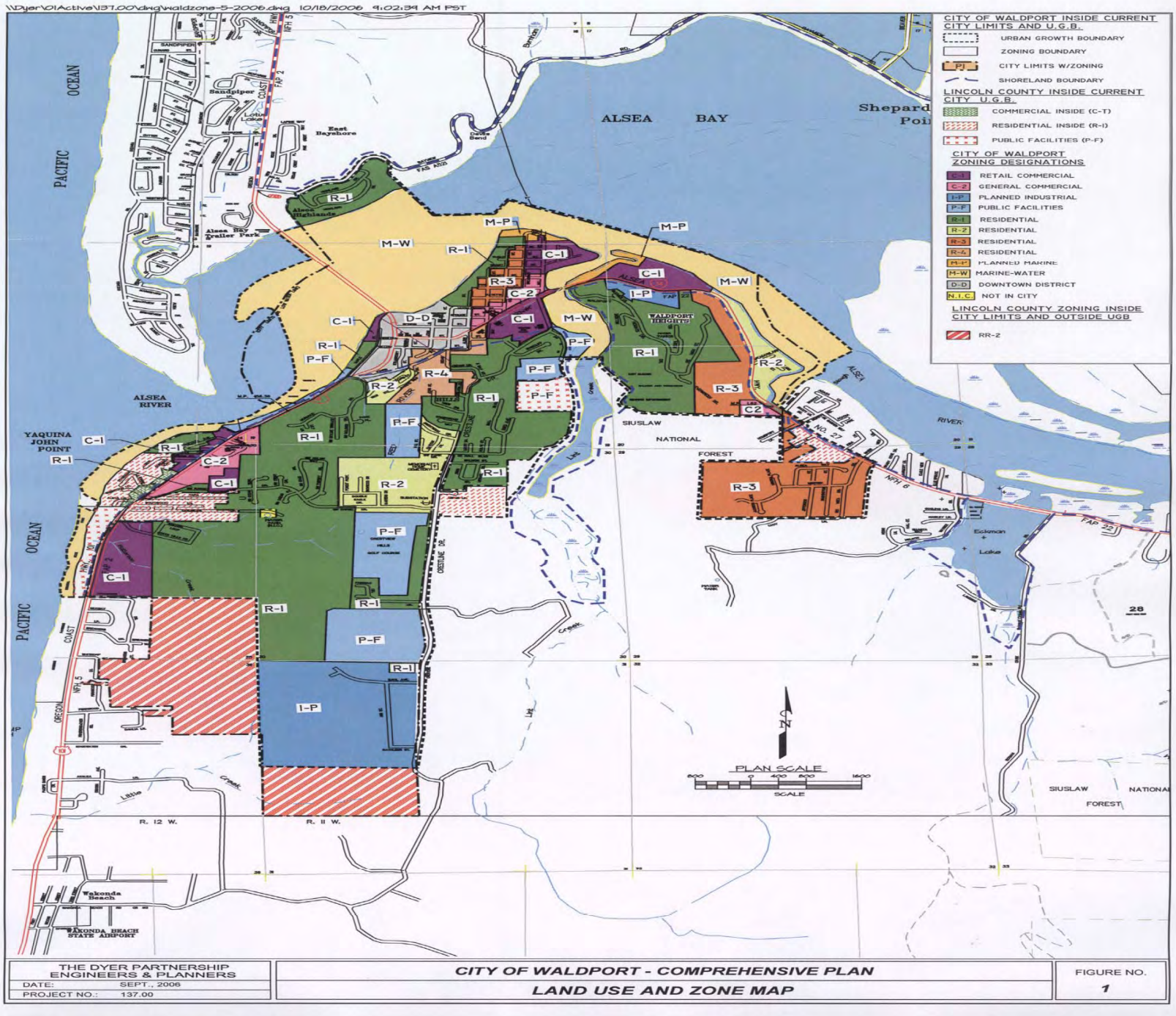
Table 5: Housing Type, Waldport, 2000

Housing Type	Percent
Single-family	69.8%
Multi-family	15.1%
Mobile Homes	15%
Boat, R.V., Van, etc.	0%

Source: US Census 2000

Land Use & Development

The city of Waldport sits at the mouth of the Alsea Estuary. Development in Waldport spreads mostly north to south along US-Highway 101 and east on Highway 34. Dense commercial areas in Waldport exist along US-Highway 101 centrally located in the downtown area and around the Alsea Bay. Residential development is located north, south, and east of downtown, along US-Highway 101 and 34, and west along the Pacific Ocean. The city's Comprehensive Plan identifies land use needs within the city and its urban growth boundary. The map below displays the city of Waldport's zoning map.


\\Dyer\01Active\137.00\dwg\waldzone-5-2006.dwg 10/18/2006 9:02:39 AM PST
CITY OF WALDPORT INSIDE CURRENT CITY LIMITS AND U.G.B.
URBAN GROWTH BOUNDARY
ZONING BOUNDARY
CITY LIMITS W/ZONING
SHORELAND BOUNDARY
LINCOLN COUNTY INSIDE CURRENT CITY U.G.B.
COMMERCIAL INSIDE (C-T)
RESIDENTIAL INSIDE (R-I)
PUBLIC FACILITIES (P-F)
CITY OF WALDPORT ZONING DESIGNATIONS
RETAIL COMMERCIAL
GENERAL COMMERCIAL
PLANNED INDUSTRIAL
PUBLIC FACILITIES
RESIDENTIAL
RESIDENTIAL
RESIDENTIAL
RESIDENTIAL
PLANNED MARINE
MARINE-WATER
DOWNTOWN DISTRICT
N.I.C. NOT IN CITY
LINCOLN COUNTY ZONING INSIDE CITY LIMITS AND OUTSIDE UGB
RR-2
PACIFIC OCEAN
ALSEA BAY
ALSEA RIVER
YAQUINA JOHN POINT
SIUSLAW NATIONAL FOREST
Sandpiper
East Bayshore
Alsea Highlands
Alsea Bay Trailer Park
Waldport Heights
Eckman Lake
PLAN SCALE
SCALE
R. 12 W.
R. 11 W.
Yakonda Beach
YAKONDA BEACH STATE AIRPORT
THE DYER PARTNERSHIP ENGINEERS & PLANNERS
DATE: SEPT., 2006
PROJECT NO.: 137.00
CITY OF WALDPORT - COMPREHENSIVE PLAN
LAND USE AND ZONE MAP
FIGURE NO. 1

Transportation

The city of Waldport lies adjacent to US-Highway 101. US-Highway 101 is the principle state access route along the Oregon coast. Major routes from U.S. Interstate 5 in the Willamette Valley to Lincoln County include Highways 18, 20, and 34. Transportation is an important consideration when planning for emergency service provisions.

Growth within the city will put pressure on both major and minor roads, especially if the main mode of travel is by single occupancy vehicles. How people travel to work is indicative of the prevalence of single occupancy vehicle travel, and can help predict the amount of traffic congestion and the potential for accidents. Table 6 shows the different methods city residents use to travel to work.

Table 6: Means of Transportation and Carpooling, Waldport 2000

Type of Transportation	Percent
Car, Truck or Van-drove alone	79.1%
Car, Truck, or Van-carpooling	11.7%
Worked at Home	6.3%
Walked	2.5%
Other means	0.4%
Public Transportation (including taxicab)	0%

Source: U.S. Census 2000

The following map is from the Oregon Department of Transportation and shows the major road systems in the city of Waldport.


OCEAN
PACIFIC
TO YACHATS
TO ALSEA
LEGEND
PUBLISHED BY
NORTH
SCALE
OREGON TRANSPORTATION MAP
Showing Functional Classification of Roads
City of
WALDPORT
LINCOLN COUNTY
2007
PRELIMINARY COPY
SUBJECT TO CORRECTION

Critical Facilities and Infrastructure

Critical facilities are those that support government and first responders' ability to take action in an emergency. They are the top priority in any comprehensive hazard mitigation plan. The city of Waldport has the wastewater treatment plant, the water treatment plant, the public works shop, the public library, and public schools. The city of Waldport is located within the service district boundaries of the Central Oregon Coast Fire and Rescue District.

Historical & Cultural Resources

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

The first settlers in the area floated down the Alsea River in the late 1870's, and the townsite is known to have an old Indian burial ground. Until the last two decades, Waldport's history was based on forest products, fishing and dairying industries. The original Alsea Bay Bridge was built in the 1930's, and was replaced in the early 1990's with a new bridge designed to resemble the old bridge. Tourism now plays a large role in the local economy.[vii] The Port of Alsea promotes business development of Port District assets, and serves to preserve, protect, and promote the ecological, aesthetic and economic resources of the Alsea Estuary and river. The Port has been working with a local oyster grower to develop a small oyster farm in the estuary.

The city of Waldport has many community events throughout the year, including, but not limited to: Beachcomber's Days, Christmas in Waldport, Candle Lighted Bridge Walk, and 4th of July Fireworks. Other local attractions include clamming, crabbing, fishing, beachcombing and exploring tide pools. Recreational amenities include the William Keady Wayside, ALSI Historical and Genealogical Society, the Alsea Bridge Visitor and Interpretive Center, and a wide range of restaurants, galleries and shops.

Government Structure

The City Council is the policy making body for Waldport. As the elected legislative body in Waldport, the City Council has overall responsibility for the scope, direction and financing of city services. Council members serve four-year terms. Departments within the city include the following:

- **City Manager's Office**: The city manager is appointed by the City Council and serves as the city administrative officer of the city government. The city manager provides the leadership and direction for the operation and management of all city departments, and serves as the city's budget officer.

- **City Recorder**: The city recorder assures the timely presentation of formal communications from the public, other agencies and city staff to the City Council. The recorder prepares city council meeting agendas in coordination with the city manager; maintains official city records which reflect the actions of the governing body; maintains a depository of contracts, agreements and official council actions and ensures the timely availability of these records to the council, public other agencies and staff.

- **City Planner**: The city planner provides service and information to the general public regarding phases of planning and community development. The city planner implements ordinance and plan requirements through a site and land use review process. Specifically, the city planner reviews potential development opportunities to ensure compliance with zoning, setback, parking, landscaping, access and other city requirements.

  In addition to oversight of the development process, the city planner advises the City Council, Planning Commission, and city manager on land use and special project matters.

- **Public Works Department**: The Waldport Public Works Department provides responsive community services related to planning, design, construction, operation, maintenance and management of public infrastructure, including streets, sewer, water treatment, waste water treatment, storm drainage, public buildings and other facilities. Services provided by the department contribute to the public health, safety, economic diversity, environmental quality and citizen convenience.

- **Finance Department:** The Finance Department serves the community by managing utility billing, business licenses, collecting taxes and fees, dealing with city expenditures, monitoring the city's budget, and managing investments. The goal of the finance department staff is to provide services with an emphasis on timelines, accuracy and courteous customer service

- **Public Library**: The Waldport Public Library collects, preserves, and administers organized collections of books, internet communication and related materials.

- **Community Center**: The Waldport Community Center provides a wide array of community services including a Senior Meals Program, a meeting facility for several community organizations, a crafts and farmers market, and other organized activities for the community.

Existing Plans and Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Such existing plans and policies can include comprehensive plans, zoning

ordinances, and technical reports or studies. Plans and policies already in place 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.

The city of Waldport's Addendum to the Lincoln County Natural Hazards Mitigation Plan includes a range of recommended action items that, when implemented, will reduce the city's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the city's existing plans and policies. Linking existing plans and policies to the Natural Hazards Mitigation Plan Addendum helps identify what resources already exist that can be used to implement the action items identified in the plan. Implementing the natural hazard mitigation plan's action items through existing plans and policies increases their likelihood of being supported and getting updated, and maximizes the city's resources.

The following table documents the plans and policies already in place in Waldport.

Name	Date of Last Revision	Description	Relations to Natural Hazard Mitigation
Comprehensive Plan	1991 (update in progress, scheduled to be completed in 2009)	A document stating the general, long-range policies that will govern a local community's future development.	Contains city-specific information regarding natural hazards within the city's jurisdictional boundaries.
Development Code	2008	An ordinance establishing land use zones to regulate the use of land, location of buildings and structures; and prescribing regulations governing the division of land within the city of Waldport.	Contains city-specific hazard related requirements for the placement and construction of buildings, development in the floodplain, development of coastal shorelands, construction on steep slopes, and division of land.

Community Organizations & Programs

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

service providers already work directly with the public on a number of issues, one of which could be natural hazard preparedness and mitigation. The countywide community organizations and programs table can be found in Section 2: Community Overview of the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan. The table highlights organizations that are active within the county and may be potential partners for implementing mitigation actions.

Existing Mitigation Activities

Existing mitigation activities include current mitigation programs and activities that are being implemented by the community in an effort to reduce the community's overall risk to natural hazards. Documenting these efforts can assist participating jurisdictions in better understanding risk and can assist in documenting successes. The following efforts have occurred or are on-going within Waldport.

- The city of Waldport adopted an emergency operations plan in September 2001. The stated purpose of the plan is:
  - To provide, in cooperation with the Lincoln County Department of Emergency Services, an effective operational capability in order to minimize the results of a natural or manmade disaster.
  - To assist in meeting the above capability, the following requirements should be satisfied:
    1. Provision of an adequate warning in event of a natural or man-made disaster.
    2. The development of a local plan to provide emergency operations in times of emergency.
    3. An Emergency Operations Center from which city government can function efficiently.
    4. The identification of facilities suitable for use as shelters for the citizenry as a means of maintaining self-sufficiency in the event of a disaster.
- The Mission of the Emergency Operations Plan is to safeguard life and property by making maximum use of available manpower, equipment, and other resources in order to minimize the effects of a disaster.
- The city of Waldport supports the Central Oregon Coast Fire & Rescue District (COCFRD). This includes supporting COCFRD in the implementation of the 2006 Emergency Disaster Plan prepared by COCFRD. The objectives of the Emergency Disaster Plan are to incorporate and coordinate all facilities and personnel of the District into an efficient organization capable of reacting adequately and promptly in the face of disaster, and to conduct such operations as the nature of the disaster requires, whether during a local emergency or to assist other jurisdictions should they need help.
- The city of Waldport enforces a setback requirement for all developments located along the coast. The purpose of the setback is to reduce property damages related to coastal erosion, wind storms, and

flooding. The setback requirement also serves to meet the city's natural hazard goal, as defined with the Waldport Comprehensive Plan: "To protect life and property from natural disasters and hazards."

- The city Comprehensive Plan and Development Code address natural hazards. Specific hazardous areas have been identified by RNKR Associates in their work *Environmental Hazards, Coastal Lincoln County, Oregon, 1979*. The city has defined 'hazardous areas' and will allow development in these areas if adequate protective measures can be employed to prevent or minimize damage in accordance with city development code standards.
- Waldport issues practice tsunami siren warnings every Monday at 12:00 p.m. Additionally, the city distributes a Waldport tsunami evacuation map and tsunami safety brochure.
- The Waldport Middle School was moved out of the tsunami zone in 2006. The Lincoln County School District has plans to build a new high school out of the tsunami zone.
- State legislation:
    - SB 378 requires schools in potential inundation zones to teach students in K-8 grades about tsunamis and evacuation. The Waldport elementary and middle schools are located outside potential inundation zones.
    - SB 379, implemented as Oregon Revised Statutes (ORS) 455.446 and 455.447, limits construction of new essential facilities and special occupancy structures in tsunami flooding zones.

Risk Assessment

The following hazards have been addressed in the Lincoln County Natural Hazard Mitigation Plan. The city of Waldport reviewed the county's plan on January 27, 2009 and assessed how Waldport's risks vary from the risks facing the entire planning area.

Coastal Erosion

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of coastal erosion hazards. Erosion is a natural process that continually affects coastal areas. In the city of Waldport and elsewhere along the Pacific, erosion becomes a hazard when lives and personal properties are at risk of damage. Erosion is typically a gradual process, which can be greatly accelerated in the event of a storm. The city can be characterized as consisting of uplifted marine terrace deposits particularly on high cliffs along the north side of the Alsea Bay and south of downtown along the oceanfront. There are also low-lying sand dunes along the bayfront, downtown and south of town, and east of Highway 101. Concentrations of development exist along the high cliffs on the north side of the bay, as well as along the oceanfront. Aside from oceanfront properties, one area that's particularly vulnerable to coastal erosion is inside the Alsea Bay, along the waterfront facing west. This area experienced rapid erosion in the early 1980's as a result of an "El Nino" event. Homes and commercial buildings were threatened when erosion at the distal tip of the Alsea Spit opened the Alsea Bay to increased wave action. Since then, accretion restored the distal tip and reduced the threat. Additionally, structural shoreline stabilization using "riprap" - large boulders imbedded in the sand - was installed to mitigate for future events.[viii] T he county identified areas along Highway 101 that have sustained erosion-induced damages. Within the city of Waldport, during this same El Nino event, a portion of Highway 101 along the waterfront was threatened. This event resulted in a seawall being constructed to protect the Highway. Records of other specific events are not available at this time; however, events may have occurred in tandem with previous storms. Potential community-related impacts, including shoreline reduction, economic (tourism-related) impacts, and property/infrastructure damage, are adequately described within the county's Coastal Erosion Annex.

In an effort to mitigate the effects of coastal erosion, the city requires new development to comply with setback restrictions. Because coastal erosion is a continual process, the county has described the hazard's **probability** as **"high,"** meaning one incident is likely to occur within a 10-35 year period. The county additionally estimates a **"high" vulnerability** to coastal erosion hazards, meaning a 1-10% of the population or regional assets are likely to be affected by this hazard. The city of Waldport agrees with both of these ratings due to the city's location along the coast.

The city of Waldport uses the RNKR Environmental Hazards Inventory of Coastal Lincoln County, Oregon as a mapping and reporting tool for coastal erosion. Although not included in this addendum, the coastal erosion map can be obtained at Waldport's City Hall.

Drought

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of drought hazards, as well as the location and extent of a potential event. Due to a cool, wet climate, past and present weather conditions have generally spared coastal communities from the effects of severe drought. As such, there is no record of a severe drought event within Lincoln County. The same holds true for the city of Waldport.

Lincoln County estimates that the **probability** of a drought is **"low,"** meaning no more than one event is likely to occur within a 75-100 year period. Likewise, the county estimates a **"low" vulnerability** to drought hazards, meaning less than 1% of the population or regional assets would be affected by a major emergency or disaster. Both estimates accurately describe the city's risk as well.

Potential drought-related impacts are adequately described within the county's drought hazard annex. The city will review these estimates every five years, in concurrence with the county's plan update process.

Earthquake

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics, location, and extent of earthquake hazards for the region. The county's plan additionally identifies all previous earthquakes that have affected the city. It is difficult to estimate recurrence intervals, but the state has experienced seven Cascadia Subduction Zone (CSZ) events in the last 3500 years - some of which were probably as large as a magnitude (M) 9. These events are estimated to have an average recurrence interval between 500 and 600 years, although the time interval between individual events ranges from 150 to 1000 years. The last CSZ event occurred approximately 300 years ago.

Scientists estimate there is a 10-20% probability that a subduction zone earthquake will occur within the next 50 years.[ix] Based on this information, Lincoln County estimates a **"high" probability** that an earthquake will occur in the future. The city of Waldport agrees. Lincoln County additionally estimates a "moderate" vulnerability to earthquake hazards, meaning a 1-10% of the population or regional assets would be affected by a major emergency or disaster. Due to the city's concentrated population in low-lying areas, infrastructure, and resources, however, the city believes that its **vulnerability** to a high magnitude earthquake would be **"high"** meaning more than 10% of the population or regional assets would be affected by an event. As shown in Table 4 above, almost 62% of Waldport's housing structures were built prior to enforcement of

earthquake resistant building codes. Also, there is considerable development on steep waterfront slopes and low-lying sand dunal areas, making these areas at risk for earthquake-related impacts like tsunamis and liquefaction.

The city's infrastructure is highly vulnerable to a severe earthquake event. Sewer lines, water lines, power lines, water tanks, the Fire Hall and City Hall were identified by the steering committee as vulnerable assets. The city would also expect damage to roads following a CSZ event, as well as deaths and severe injuries region-wide. Education and outreach regarding the CSZ is an on-going endeavor in Waldport.

Flood

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of flooding hazards within the region, as well as previous flooding occurrences. Ocean and riverine flooding are the primary sources of flooding. Ocean-related flood events happen because of storms and tides. River-related flood events are also caused by storms, as well as rain on snow / snowmelt. Lincoln County estimates a **"high" probability** that flooding will occur, meaning one event is likely within a 10-35 year period. The county estimates a **"moderate" vulnerability** to flood hazards, meaning 1-10% of the population or regional assets are likely to be affected by a major emergency or event. Both ratings are true for the city as well.

The Waldport Steering Committee notes that flooding occurred on city streets in the low-lying areas of Waldport in 1996. Otherwise, there are no records of sustained damage or serious impacts associated with major flood events. The city of Waldport participates in the National Flood Insurance Program, and their most recent effective map date is March 15, 1979. The city of Waldport has 114 National Flood Insurance Policy holders, with a total coverage of $23,943,000. Seventeen claims have been paid since 1978, at a total of $82,525. The number of buildings and/or properties within the floodplain is not available at this time. One property in Waldport has experienced a total of two losses. This means there has been one repetitive loss property in Waldport. Total payments on the repetitive loss property amount to $23,985.74.[x]

Potential flood-related impacts are adequately described within the county's flood hazard annex.

Landslide

Lincoln County's Natural Hazard Mitigation Plan adequately describes the causes and characteristics of landslides, and appropriately identifies previous landslide occurrences within the region, as well as the location and extent of previous and potential slides. The city's steering committee reports that in 2009, one house was damaged by landsliding which was possibly caused by subsurface drainage. In 1996, two houses were destroyed by landsliding which was possibly caused by poor drainage

caused by the construction of man-made ponds. In general, waterfront property along the north side of the Alsea Bay and areas east/ southeast along ridgelines may be vulnerable to landslides. Road cracking has occurred in some areas, but no significant losses are documented. Potential community impacts are adequately described within the county's plan, and include infrastructural damages, economic impacts (due to isolation and /or arterial road closures), property damage, and obstruction to evacuation routes.

In 2007, the Oregon 74th Legislative Assembly directed the Department of Geology and Mineral Industries (DOGAMI) to extend LIDAR collection efforts throughout the state. LIDAR (light detection and ranging) is a tool that can provide high-resolution images of the surface of the earth, and it's excellent for mapping natural hazards and landslides. When the statewide LIDAR studies are completed, the city of Waldport will have a much greater understanding of its landslide risks.

The county currently estimates a **"moderate" probability** that landslides will occur, meaning one event is likely within a 35-75 year period. The county estimates a **"high" vulnerability** to landslide hazards, meaning more than 10% of the population or regional assets are likely to be affected by a major emergency or event. Both estimates appropriately describe the city's risk as well.

Tsunami

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of tsunami hazards, as well as the previous occurrences of tsunami events within the region. The Department of Geology and Mineral Industries (DOGAMI) conducted an analysis resulting in extensive mapping along the Oregon Coast. The maps depict the expected inundation for tsunamis produced by a magnitude 8.8 to 8.9 undersea earthquake. The tsunami maps were produced to help implement Senate Bill 379 (SB 379), which was passed during 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. The 2004 Indian Ocean earthquake and tsunami led DOGAMI to re-evaluate the state's tsunami mapping program. Currently, DOGAMI is using the latest advances in mapping technology (LIDAR), computer technology and computer modeling to run a pilot mapping project for the coastal city of Cannon Beach. The new map will be scenario based, meaning that variations in inundation levels (given local or distant tsunamis) will be shown. Below is the 1995 tsunami inundation zone map produced by DOGAMI for the city of Waldport.

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
DONALD A. HULL, STATE GEOLOGIST

Open File Report
O-95-31
Tsunami Hazard Map of the Waldport Quadrangle, Lincoln County, Oregon

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

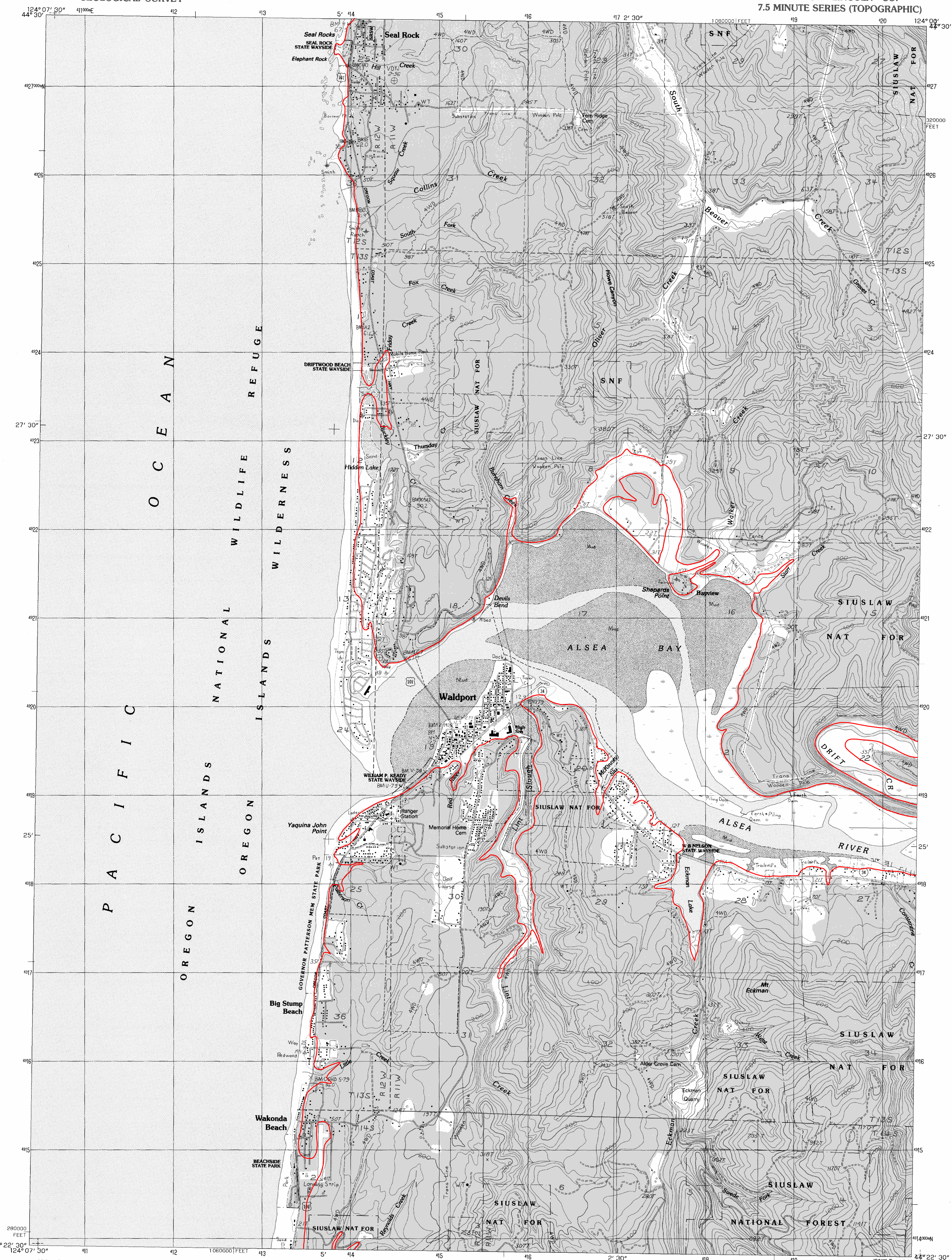
WALDPORT QUADRANGLE
OREGON—LINCOLN CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

Tsunami inundation boundary
upper limit of area expected to be covered by flood water from a tsunami caused by a magnitude 8.8 undersea earthquake

See accompanying text for use of this map, mapping methodology, and acknowledgments.

Mapping by:

George R. Priest, Oregon Department of Geology and Mineral Industries, October-November, 1995.



PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY
CONTROL BY .... USGS, NOS/NOAA, STATE OF OREGON
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN 1975-76
FIELD CHECKED .... 1980. MAP EDITED 1984
PROJECTION .... LAMBERT CONFORMAL CONIC
GRID: 1000-METER UNIVERSAL TRANSVERSE MERCATOR ..... ZONE 10
10,000-FOOT STATE GRID TICKS .... OREGON, NORTH ZONE
UTM GRID DECLINATION .... 0°45' WEST
1980 MAGNETIC NORTH DECLINATION .... 19°30' EAST
VERTICAL DATUM ... NATIONAL GEODETIC VERTICAL DATUM OF 1929
HORIZONTAL DATUM .... 1927 NORTH AMERICAN DATUM

To place on the predicted North American Datum of 1983, move the projection lines as shown by dashed corner ticks (23 meters north / 98 meters east)

There may be private inholdings within the boundaries of any Federal and State Reservations shown on this map

PROVISIONAL MAP
Produced from original manuscript drawings. Information shown as of date of field check. 3

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
SUPPLEMENTARY CONTOUR INTERVAL 20 FEET
CONTROL ELEVATIONS SHOWN TO THE NEAREST 0.1 FOOT
OTHER ELEVATIONS SHOWN TO THE NEAREST FOOT

To convert meters to feet multiply by 3.2808
To convert feet to meters multiply by 0.3048

SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 6 FEET

QUADRANGLE LOCATION

1	
2	Newport South
3	Toledo South
4	
5	Tidewater
6	
7	Yachats
8	Cannibal Mtn.

ADJOINING 7.5' QUADRANGLE NAMES

ROAD LEGEND
Improved Road
Unimproved Road
Trail
Interstate Route — U.S. Route — State Route

FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092

WALDPORT, OREG.
PROVISIONAL EDITION 1984
44124–D1–TF–024

The extent of a tsunami event in Waldport will depend on where the tsunami originated, and the size of the earthquake that produced the tsunami. Lincoln County appropriately describes the probability of a tsunami event for Waldport. Geologists predict a **10-14% chance** that a Cascadia tsunami will be triggered by a shallow, undersea earthquake offshore Oregon **in the next 50 years.** The forecast comes from evidence for large but infrequent earthquakes and tsunamis that have occurred on the Oregon coast every 500 years, on average.

The county estimates a **"moderate" vulnerability** to tsunami hazards, meaning 1-10% of the population or regional assets would be affected by a major event. Severe damage could occur on various properties, roads, bridges, communication systems, and infrastructure within Waldport, among other assets described in the county's plan. As such, Waldport agrees with the county's vulnerability estimate. Waldport recognizes the importance of continuing education and outreach, especially to the transient populations (i.e., tourists), and plans to implement greater outreach in the future.

Volcano

The Lincoln County Natural Hazard Mitigation Plan adequately describes the city's risk to volcanic events. Generally, an event that affects the county is likely to affect the city of Waldport as well. The causes and characteristics of a volcanic event are appropriately described within the county's plan, as well as the location and extent of potential hazards. Previous occurrences are well documented within the county's plan, and the community impacts described by the county would generally be the same for Waldport as well. The city of Waldport is very unlikely to experience anything more than volcanic ash during a volcanic event. When Mt. Saint Helens erupted in 1980, the city received small amounts of ashfall, but not enough to cause significant health and/or economic damages. The county estimates a **"low" probability** of future volcanic events and a **"low" vulnerability** to future eruptions. The county's probability and vulnerability estimates accurately describe Waldport's risks as well.

Wildfire

The Lincoln County Natural Hazard Mitigation Plan adequately describes the causes and characteristics of wildfires for the region. 1849 and 1936 were particularly devastating years for wildfires in Lincoln County, but since then, there have been very few events. The location and extent of a wildfire vary depending on fuel, topography, and weather conditions. The city of Waldport sits at the mouth of the Alsea Bay, and is bounded to the east/southeast by industrial forest lands. These are areas of concern which would be vulnerable to wildfires as well as some of the open spaces within the city's limits.

The county estimates a **"moderate" probability** that local wildfires will occur in the future, meaning no more than one event is likely to occur

within a 35-75 year period. Likewise, the county estimates a "**moderate" vulnerability** to wildfires, meaning 1-10% of the population or regional assets are likely to be affected by a major event. Both estimates are true for the city as well.

The potential community impacts and vulnerabilities described in the county's plan are generally accurate for the city as well. Due to the prevailing wind patterns (i.e., from the north or south), the city's steering committee felt that the east and south ends of the city might be the most vulnerable spots to wildfire. Power, natural gas, and phone lines run through the forest to the east of the city, and would be affected in the event of a wildfire. Likewise, active commercial logging occurs just outside the city, and slash burns are a potential wildfire concern. The county is currently engaged in an effort to develop a Community Wildfire Protection Plan (CWPP) which will map vulnerable areas, among other things.

Windstorm

The Lincoln County Natural Hazard Mitigation Plan adequately describes the causes and characteristics of windstorms, as well as the location and extent of windstorm hazards. The region's (and city's) history of events are adequately described within the county's plan as well. Because coastal wind storms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow. More than likely, however, the coast's winter will just be windy, cold, and wet.

In Waldport, power outages are the greatest concern during windstorms. Building codes now require new developments to place power lines below ground. Without power, communication is lost, and fuel and food stores shut down. The city underwent a project to install the overhead power lines in downtown underground. In the December 2007 wind storm, the city lost power and some residents were unable to access 911. Also of concern are downed trees and damage to buildings. The city, in conjunction with some private utility companies, works to remove hazardous trees where possible. The county's plan adequately identifies the remaining impacts and damages that can occur with windstorm events.

The county estimates a **"high" probability** that windstorms will occur in the future. Windstorms occur yearly, and the more destructive storms occur once or twice per decade. The county additionally estimates a **"high" vulnerability** to windstorms, meaning more than 10% of the population or regional assets would be affected by a major windstorm event. Both estimates are true for the city as well.

Action Items

The following action items are detailed recommendations for activities that local departments, citizens, and others could engage in to reduce risk. Action item worksheets are located at the end of the addendum.

- Continue to educate citizens about earthquake and tsunami preparedness.
- Prepare a Stormwater Master Plan for the city of Waldport.
- Prepare a coordinated city-wide Landslide Response Plan.
- Explore and seek funding for coordinated emergency services to install a consistent system of tsunami warning sirens countywide/multi-jurisdictional.
- Participate in the development of the county's Community Wildfire Protection Plan.
- Encourage emergency related intergovernmental planning.
- As it becomes available, integrate new risk assessment information into Waldport's Addendum.

Additionally, the city of Waldport has chosen to partner with the county on the following actions. Please see Appendix A in Lincoln County's Natural Hazard Mitigation Plan for more detail regarding each of the actions listed below.

- Coastal Erosion #1: Improve knowledge of coastal erosion hazard areas and understanding of vulnerability and risk to life and property in hazard prone areas.
- Coastal Erosion #2: Consider revising existing county coastal hazard area regulations based on the DOGAMI risk zone mapping.
- Earthquake #1: Integrate new earthquake hazard mapping data for Lincoln County and improve technical analysis of earthquake hazards.
- Earthquake #2: Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices.
- Earthquake #3: Encourage purchase of earthquake hazard insurance by forming partnerships with the insurance and real estate industries.
- Earthquake #4: Promote and enforce building code standards.

- Earthquake #5: Encourage seismic strength evaluations of critical facilities to identify vulnerabilities and to meet current seismic standards.
- Earthquake #6: Identify funding sources for and implement high priority structural and nonstructural retrofits of structures that are identified as seismically vulnerable.
- Flood #1: Explore steps needed to qualify Lincoln County for participation in the NFIP Community Rating System (CRS).
- Flood #2: Formalize process for providing warnings of flood events to property owners in flood hazard areas.
- Flood #3: Develop mitigation action plan for the Lower Alsea
- Flood #4: Work with affected property owners to elevate or relocate non-conforming, pre-FIRM structures in flood hazard areas.
- Landslide #1: Encourage construction, site location and design that can be applied to steep slopes to reduce the potential threat of landslides.
- Landslide #2: Increase public education related to landslide hazards by distributing DOGAMI landslide informational brochure.
- Landslide #3: Protect existing development in landslide-prone areas.
- Tsunami #1: Determine ways of mitigating the vulnerability of assets (fire stations, equipment, utilities) likely to be impacted by tsunami.
- Tsunami #2: Work with coastal communities, citizen groups, property owners, recreation areas, emergency responders, schools and businesses in promoting tsunami awareness and evacuation.
- Tsunami #3: Improve technology capacity of communities, agencies and responders needed to adequately map hazard areas, broadcast warnings, inform, and educate residents and visitors of tsunami dangers.
- Wildfire #1: Develop a Lincoln County Community Wildfire Protection Plan.
- Windstorm #1: Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during windstorm events.

- Windstorm #2: Enhance strategies for debris management and/or removal after windstorm events.
- Windstorm #3: Map and publicize locations around the county that have the highest incidence of extreme windstorms.
- Windstorm #4: Increase public awareness of windstorm mitigation activities.
- Windstorm #5: Continue and enhance windstorm resistant construction methods where possible to reduce damage and power outages from windstorms.
- Windstorm #6: Encourage critical facilities to secure emergency power.

Plan Implementation & Maintenance

The city will utilize the same prioritization process as the county [See Section 4: Plan Implementation and Maintenance of the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan and Appendix D: Economic Analysis of Natural Hazard Mitigation Projects].

The city of Waldport Planning Department will serve as the convener for the city of Waldport Natural Hazard Mitigation Plan Addendum. The Planning Department will be responsible for convening the plan committee on a yearly basis to identify new risk assessment data, review status of mitigation actions, identify new actions, and seek funding to implement mitigation actions. The city of Waldport Natural Hazard Mitigation Plan Addendum will be updated every five years in coordination with the county's plan update schedule.

SIGN-IN SHEET

Name of Event/Meeting: City of Waldport Steering Committee

Date of Event/Meeting: 1-26-09 Scheduled Time of Event/Meeting: 10 a.m.

Name	Representing	Email	Roundtrip mileage (if applicable)	Hourly Rate
DEREK CRAWSON	CENTRAL OREGON COAST RFPD	walfire1@peak.org	~~0~~	
LARRY LEWIS	CITY OF WALDPORT	larry.lewis@waldport.org	~~0~~	
Nancy Leonard	" " "	nancy.leonard@ " .org.	~~0~~	
John Alfano	" " "	john.alfano@ " .org.	~~0~~	
Jessica Bondy	Lincoln County Planning	jbondy@co.lincoln.or.us		

[i] Oregon Economic and Community Development Department. City of Waldport Community Profile.

[ii] US Census Bureau, "Profile of Selected Social Characteristics, 2000, Waldport, OR," American Factfinder Quick Tables, www.census.gov.

[iii] US Census Bureau, "Profile of Selected Social Characteristics, 2000, Waldport, OR," American Factfinder Quick Tables, www.census.gov.

[iv] Oregon Economic and Community Development Department. City of Waldport Community Profile.

[v] US Census Bureau, "Profile of Selected Social Characteristics, 2000, Waldport, OR," American Factfinder Quick Tables, www.census.gov.

[vi] US Census Bureau, "Profile of Selected Social Characteristics, 2000, Waldport, OR," American Factfinder Quick Tables, www.census.gov.

[vii] City of Waldport Comprehensive Plan. http://www.waldport.org/pdfforms/Comp%20plan.pdf

[viii] Oregon Geology, published by the Department of Geology and Mineral Industries Vol. 49 Number 5 May 1987 "Erosional Changes at Alsea Spit, Waldport Oregon."

[ix] NOAA, 1993. Tsunamis affecting the West Coast of the United States: 1806-1992.

[x] Oregon Department of Land Conservation and Development. Repetitive Flood Losses.

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Continue to educate citizens about earthquake and tsunami preparedness	1. Protect life and property. 2. Enhance and promote public awareness.

Rationale for Proposed Action Item:

- Waldport has engaged in numerous education & outreach activities related to earthquake and tsunami preparedness. The city recognizes the importance of an ongoing education & outreach program that's specifically related to these two hazards.
- The Cascadia Subduction Zone can potentially cause a magnitude 9 earthquake that will be felt in Waldport. Scientists estimate that there is a 10-20% probability that a subduction zone earthquake will occur within the next 50 years.
- The extent of a tsunami event in Waldport will depend on where the tsunami originated, and the size of the earthquake that produced the tsunami. Geologists predict a 10-14% chance that a Cascadia tsunami will be triggered by a shallow, undersea earthquake offshore Oregon in the next 50 years. Waldport is susceptible to an earthquake/tsunami event.
- Public education and outreach can be inexpensive and provide information that results in safer households, work places and other public areas. Some outreach materials include: informational brochures about community seismic risks and mitigation techniques, public forums, newspaper articles, training classes and television advertisements. Source: Oregon Technical Resource Guide. July 2000. Community Planning Workshop. Eugene, Or. University of Oregon p.8-20.

Ideas for Implementation:

- Encourage hotels, restaurants, and other tourist related facilities and accommodations to post tsunami evacuation maps.
- Work with Chamber of Commerce on disseminating information on earthquake/tsunami preparedness.
- Work with local citizens on resources and networking available in case of an event.
- Update the city website with new information and link's to improve to improve the city's emergency preparedness.

Coordinating Organization:	City of Waldport

Internal Partners:	**External Partners:**
Waldport Public Works, Planning, City Manager	Chamber of Commerce, DOGAMI, DLCD

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	**Waldport Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Prepare a Stormwater Master Plan for the city of Waldport.	1. Protect life and property. 2. Preserve natural areas and features.

Rationale for Proposed Action Item:

- Waldport does not currently have a comprehensive Stormwater Management Plan. Mitigation actions would be identified within the plan which would have beneficial results for the city.
- Stormwater management is a key element in maintaining and enhancing a community's livability. There is a direct link between stormwater and a community's surface and ground waters. As a community develops, the impervious surfaces that are created increase the amount of runoff during rainfall events, disrupting the natural hydrologic cycle. Without control, these conditions erode stream channels and prevent groundwater recharge. Parking lots, roadways, and rooftops increase the pollution levels and temperature of stormwater runoff that is transported to streams, rivers, and groundwater resources. Protecting these waters is vital for a great number of uses, including fish and wildlife habitat, recreation, and drinking water. Source: Eugene Stormwater Management Manual. Section 1.1

Ideas for Implementation:

- Develop a city-wide Stormwater Master Plan.
- Coordinate with local community.
- Identify mitigation action items that reduce the city's vulnerability to flood and landslide related hazards.

Coordinating Organization:	City of Waldport

Internal Partners:	**External Partners:**
Waldport Planning, Public Works, City Council	ODOT, County Public Works, DOGAMI

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	**Waldport Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Prepare a Landslide Response Plan for the city of Waldport	1. Coordinate and enhance emergency services. 2. Enhance and promote public education.

Rationale for Proposed Action Item:

- A Landslide Response Plan will be a comprehensive plan established to protect the public, identify actions to be taken before (if known), during, and after an event.
- Landslides may be chronic or catastrophic events which may endanger lives, property, infrastructure, and emergency services. A Landslide Response Plan will establish protocol and criteria for responding to and assessing each situation on a case by case basis.
- Establish a strategy to improve preparedness for landslide events and prepares the city for responding to the needs its citizens.

Ideas for Implementation:

- Provide an outline of activities that would be implemented in response to a landslide event.
- Establish communications protocol in case of an event.
- Coordinate appropriate personnel and responders- assignment of responsibilities.
- Alert citizens and appropriate agencies.
- Establish mitigation actions.
- Monitor effectiveness of the Plan and update accordingly.

Coordinating Organization:	City of Waldport

Internal Partners:	**External Partners:**
Waldport Planning, Public Works	Lincoln County Emergency Services, DOGAMI

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	**Waldport Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Explore and seek funding for coordinated emergency services to install a consistent system of tsunami warning sirens countywide/multi-jurisdictional.	1. Protect life and property. 2. Coordinate and enhance emergency services. 3. Enhance and promote public education. 4. Promote partnerships and coordination to improve implementation.

Rationale for Proposed Action Item:

- 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.
- The average recurrence interval for a Cascadia Subduction Zone (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. The last CSZ event occurred approximately 300 years ago.
- Low-lying areas of the city are located within the Tsunami Inundation Zone.
- At this time Oregon does not have a uniform tsunami warning system with complete coverage of the coastline. In the spectrum of Oregon's tsunami warning capacity, there are some communities, Cannon Beach is the best example, that have taken their own initiative to employ sophisticated siren and voice delivery systems for alert notification. While Cannon Beach is a shining star for tsunami readiness, they do not reflect the majority of communities, which have limited sirens that are often cobbled together from civil defense alert systems. Many of these are failing from age or exposure to sand and salts. And even when working properly, these older electro-mechanical sirens produce a tone of limited delivery range. With that said, some emergency managers on the coast feel that siren systems, in general, are problematic warning systems due to:
    - Chronic exposure problems and high maintenance costs;
    - Poor audibility during high winds and storms and along rugged coastal terrain;
    - Confusion by public about intent of warning Misuse of limited resources

Ideas for Implementation:

- Coordinate with County Emergency Service providers and law enforcement to identify an appropriate countywide warning system.
- Work with OEM to identify funding sources to help pay for additional/new tsunami sirens in Waldport.

Coordinating Organization:	City of Waldport

Internal Partners:	**External Partners:**
City Public Works, City Manager, Finance	Lincoln County Emergency Services, Central Coast Fire and Rescue District, OEM

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	**Waldport Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Participate in the development of the County's Community Wildfire Protection Plan.	1. Protect life and Property; 2. Preserve natural areas and features; 3. Coordinate partnerships and coordination to improve implementation.

Rationale for Proposed Action Item:

- The County is currently engaged in an effort to develop a Community Wildfire Protection Plan (CWPP) which will map vulnerable areas, among other things. The city hopes to participate in the CWPP's development process as well. The CWPP has the potential to benefit both jurisdictions; the city's participation is essential in ensuring that the CWPP provides adequate city-level information.
- 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 (taken from Linn County's plan). Source: FEMA. October 30, 2000. Disaster Mitigation Act of 2000. http://www.fema.gov/library/viewRecord.do?id=1935. October 12, 2006.

Ideas for Implementation:

- Coordinate with the Lincoln County Steering Committee to identify persons/groups responsible for the CWPP planning effort.
- Coordinate and establish relationships with fire districts involved in the effort.

Coordinating Organization:	City of Waldport

Internal Partners:	**External Partners:**
Waldport Public Works, Planning, City Manager	Lincoln County, Fire Districts, US Forest Service, BLM

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	**Waldport Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage emergency related intergovernmental planning.	1. Protect life and property. 2. Coordinate and enhance emergency services. 3. Promote partnerships and coordination to improve implementation.

Rationale for Proposed Action Item:

- Communities along the Oregon coast share similar vulnerabilities to earthquake, tsunami, and windstorm hazards. Earthquakes and tsunamis, in particular, present common concerns.
- Specifically, coastal communities feel unprepared for dealing with the aftermath of a high magnitude Cascadia Subduction Zone earthquake (and tsunami following). In the event that an M9 earthquake occurs off the coast, Oregon's highly populated areas (i.e., Portland, Salem, Eugene) will additionally suffer large amounts of damage. Due to large amount of people who live in the Willamette Valley, relief efforts will likely focus on these inland cities first. (Or, at least, this is the fear of coastal residents). In an effort to become better prepared for the aftermath of such an event, Waldport would like to see broad emergency-related intergovernmental planning along the coast.

Ideas for Implementation:

- Find coastal groups that are already working together on common concerns and/or issues.
- Coordinate an informational / interest meeting to discuss coastal hazard issues and possibilities for intergovernmental emergency-related planning. Planning efforts could focus on all phases of a disaster, and benefit each participating jurisdiction in terms of preparedness, mitigation, response and recovery.

Coordinating Organization:	City of Waldport

Internal Partners:	**External Partners:**
Planning, Public Works	OEM, coastal counties, Lincoln County Emergency Services

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	**Waldport Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
As it becomes available, integrate new risk assessment information into Waldport's Addendum.	1. Protect life and property.

Rationale for Proposed Action Item:

- In 2007, the Oregon 74th Legislative Assembly directed the Department of Geology and Mineral Industries (DOGAMI) to extend LIDAR collection efforts throughout the state. LIDAR (light detection and ranging) is a tool that can provide high-resolution images of the surface of the earth, and it's excellent for mapping natural hazards like landslides. When the statewide LIDAR studies are completed, Waldport will have a much greater understanding of its landslide risks.
- Better data provides for better decisions to minimize losses resulting from natural hazards.
- The 2004 Indian Ocean earthquake and tsunami led DOGAMI to re-evaluate the state's tsunami mapping program. Currently, DOGAMI is using the latest advances in mapping technology (LIDAR), computer technology and computer modeling to run a pilot mapping project for the coastal city of Cannon Beach. The new map will be scenario based, meaning that variations in inundation levels (given local or distant tsunamis) will be shown. If Waldport is presented with an opportunity to improve its current maps, the city's risk assessment information may change.
- The County is currently engaged in an effort to develop a Community Wildfire Protection Plan protecting vulnerable areas, among other things.

Ideas for Implementation:

- Integrate new risk assessment information into Waldport's Addendum, as it becomes available.
- During the County's semi-annual natural hazard mitigation meetings, the city should review new research, and 1) determine whether the city's hazard-specific information should change; and 2) develop new action items based on the updated risk assessment information (if necessary).

Coordinating Organization:	City of Waldport

Internal Partners:	**External Partners:**
Waldport Steering Committee	Lincoln County Steering Committee, DOGAMI

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	**Waldport Steering Committee**

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Volume III: City Addenda
City of Yachats

Overview

The city of Yachats developed this addendum to the Lincoln County multi-jurisdictional Natural Hazards Mitigation Plan in an effort to increase the community's resilience to natural hazards. The addendum focuses on the natural hazards that could affect Yachats, Oregon, which include coastal erosion, droughts, earthquakes, floods, landslides, tsunamis, volcanoes, wildfires and windstorms. It is impossible to predict exactly when disasters may occur, or the extent to which they will affect the city. 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 addendum provides a set of actions that aim to reduce the risks posed by natural hazards through education and outreach programs, the development of partnerships, and the implementation of preventative activities such as land use or storm water management plans. The actions described in the addendum are intended to be implemented through existing plans and programs within the city.

The addendum is comprised of the following sections: 1) Addendum Development Process; 2) Community Profile; 3) Risk Assessment; 4) Action Items; and 5) Plan Implementation and Maintenance.

Addendum Development Process

In the fall of 2006, the Oregon Partnership for Disaster Resilience (the Partnership/OPDR) at the University of Oregon's Community Service Center partnered with the Oregon Emergency Management (OEM) and Clatsop and Lincoln Counties to develop a Pre-Disaster Mitigation Grant proposal. Both Counties joined the Partnership by signing (through their county commissioners) a Memorandum of Understanding for this planning project. FEMA awarded the Oregon Coast Region a grant to support the development of the natural hazard mitigation plans for the two counties and cities therein. The Partnership, OEM, and the participating communities were awarded the grant in the fall of 2006 and local planning efforts began in the fall of 2007.

With guidance from the Partnership and assistance from the Lincoln County Department of Planning and Development, the city of Yachats formed a local steering committee to participate in the addendum's development. The Yachats Steering Committee was comprised of the following representatives:

Nancy Batchelder, Yachats City Recorder

Larry Lewis, Yachats City Planner

John McClintock, Yachats Public Works Director

Frankie Petrick, Fire Chief, Yachats Rural Fire Protection District

The committee first met on January 26, 2009; thereafter, the committee remained engaged and provided subsequent feedback and review of plan drafts. Staff from the Lincoln County Department of Planning and Development developed and facilitated the January 26, 2009 meeting at Yachats's City Hall. During the meeting, the city's steering committee reviewed the county's risk assessment and discussed how the city's risks (i.e. hazards characteristics, probabilities of occurrence, local vulnerabilities, and community-specific impacts) differed from the county's. Additionally, the committee identified city-specific mitigation actions and expressed interest in building greater partnerships with the county via mitigation and/or emergency management-related activities.

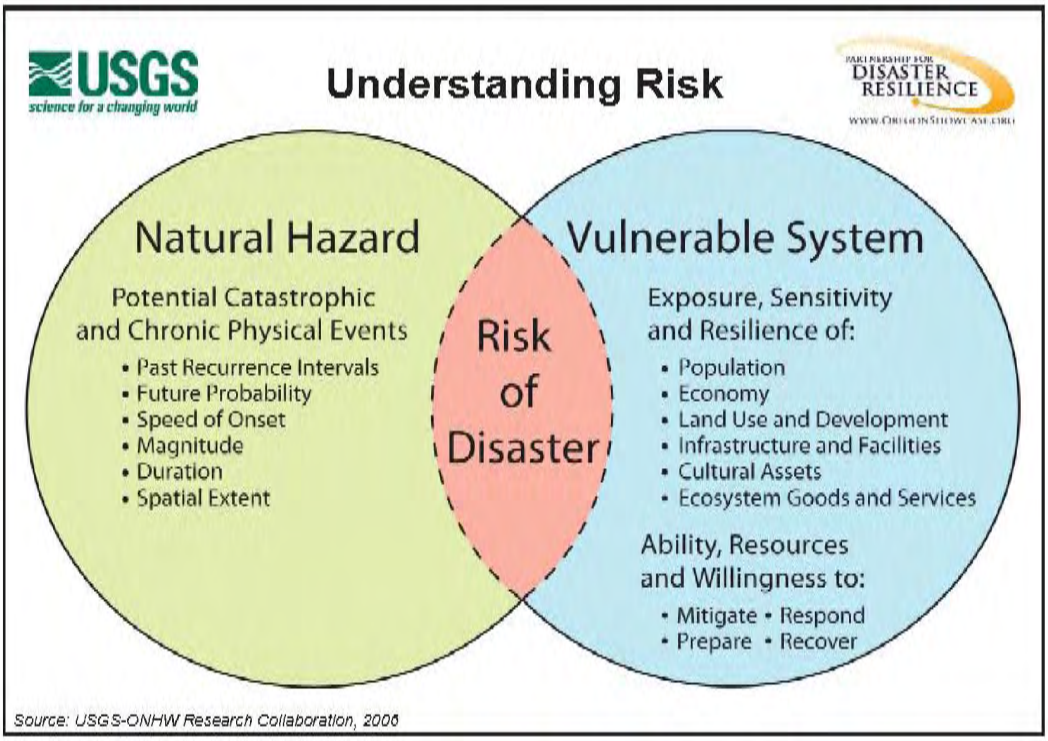
In _____ 2009, the Yachats Steering Committee presented the draft addendum to the City Council. The city will be responsible for maintaining and updating this addendum in coordination with the county's semi-annual plan update meetings.

The city of Yachats adopted the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan via resolution on _____.

Community Profile

The following section describes the city of Yachats from a number of perspectives in order to help define and understand the city's sensitivity and resilience 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 Yachats when the plan was developed. The information documented below, along with the risk assessments, should be used as the local level rationales for the city's risk reduction actions. The identification of actions that reduce the city's sensitivity and increase its resilience assist in reducing overall risk, or the area of the overlap in Figure 1 below.

Figure 1 Understanding Risk



Source: USGS – The Partnership for Disaster Resilience Research Collaborative, 2006

Geography & Climate

The city of Yachats is located on the Central Oregon Coast, in Lincoln County Oregon, approximately 26 miles south of the city of Newport and 155 miles from the metropolitan area of the city of Portland. Yachats is located at the mouth of the Yachats River overlooking the Pacific Ocean. The city of Yachats has an average elevation of approximately 23 feet above sea level. The climate in Yachats is moderate. Average monthly temperatures range from a low of 37 degrees to a high of 66 degrees. The hottest month is September and the coldest month is January. The driest month is July and the wettest month is December. Yachats has an average annual precipitation of approximately 71.7 inches.[v] The city consists of varying topography ranging from ridgetops, steep hillsides, basalt cliffs, uplifted marine terrace deposits, river frontage and relatively level areas along US Highway 101.[i]

Population & Demographics

The city of Yachats was incorporated in 1966. The population was 617 in 2000 and 745 in 2006.[ii] These populations do not take into account the large influx of tourists travelling to Yachats Bay each year.

Disaster impacts (in terms of loss and the ability to recover) vary among population groups following a disaster. Historically, 80% of the disaster burden falls on the public. Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities and low income persons. In 2000, 12.8% of families and

14.1% of individuals were living below the poverty line. In addition, 40.5% of the population is over 60. Of those over 65, 46.7% are disabled.[iii] Table 1 below displays population by age in Yachats as of the 2000 Census and, and Table 2 indicates the percent and age of the disabled population in 2000.

Table 1: Population by Age: Yachats, 2000

Age	Percent
Under 5 years	1.6
5 to 9 years	3.2
10 to 14 years	4.2
15 to 19 years	3.9
20 to 24 years	2.6
25 to 34 years	4.2
35 to 44 years	8.8
45 to 54 years	19.9
55 to 59 years	11.0
60 to 64 years	8.4
65 to 74 years	17.8
75 to 84 years	12.0
85 years and over	2.3

Source: US Census 2000

Table 2: Disabled Population, Yachats, 2000

Age	Percent
5-20 years	5.3
21-64 years	17.5
65-over	46.7

Source: U.S. Census 2000

Employment & Economics

According to the 2000 Census, the largest employment industry in Yachats is comprised of retail trade. Statistics suggest that tourism is a primary source of economic activity in Yachats. 'Arts, entertainment, recreation, accommodation and food services' is the second largest employment industry, and 'education, health and social services' is the third largest.[iv] (see Table 3 below).

Table 3: Employment by Industry, Yachats, 2000

Industry	Number of Employees	Number of Workforce
Retail trade	49	19.8
Arts, entertainment, recreation, accommodation and food services	47	19.0
Educational, health and social services	41	16.5
Public administration	25	10.1
Construction	20	8.1
Finance, insurance, real estate, and rental and leasing	14	5.6
Manufacturing	13	5.2
Other services (except public administration)	13	5.2
Professional, scientific, management, administrative, and waste management services	13	5.2
Information	8	3.2
Agriculture, forestry, fishing and hunting, and mining	4	1.6
Wholesale trade	1	0.4
Transportation and warehousing, and utilities	0	0

Source: Economic Census 2000

The five largest employers include The Adobe Resort (restaurant and motel) - 60 employees, La Roca Restaurant - 22 employees, Landmark Restaurant and Lounge - 20 employees, Yachats Crab and Chowder house - 18 employees, and Yachats Village Market - 17 employees.[v]

Median income can be used as an indicator of the strength of the region's economic stability. In 1999, the estimated median household income was $32,308. This is approximately $16,422 less than the state's median household income of $48, 730.[vi]

Local and regional economic development organizations include the city of Yachats, Port of Alsea, Yachats Chamber of Commerce, Central Coast Economic Development Alliance, and the Economic and Community Development Department Regional Development Officer.[vii]

Housing

Housing type and year built are important factors in mitigation planning. Certain housing types tend to be less disaster resilient and warrant special attention; mobile homes, for example, are generally more prone to wind and water damage than standard stick-frame homes. Generally, the older the home is, the greater the risk of damage from natural disasters. This is because stricter building codes have been developed following improved scientific understanding of plate tectonics and earthquake risk. For example, structures built after the late 1960's in the Northwest and California use earthquake resistant designs and construction techniques. In addition, FEMA began assisting communities with floodplain mapping during the 1970's and communities developed ordinances that required homes in the floodplain to be elevated to one foot above the Base Flood Elevation.

In 2000, Yachats had 619 housing units. Of those, 72.7% (242) were owner occupied, and 27.3% (91) were renter occupied. There were 286 vacant housing units of which 235 were for seasonal, recreational or occasional use. Over half (54.9%) of the city's housing stock was built prior to 1980, before stronger seismic building codes were put into place.[viii] Table 4 shows housing units by year built, and Table 5 displays the type of housing available in Yachats.

Table 4: Housing Structure Age, Yachats, 2000

Year Built	Percent of Structures
1980-2000	45%
1960-1980	24.9%
Before 1960	30%

Source: U.S. Census 2000

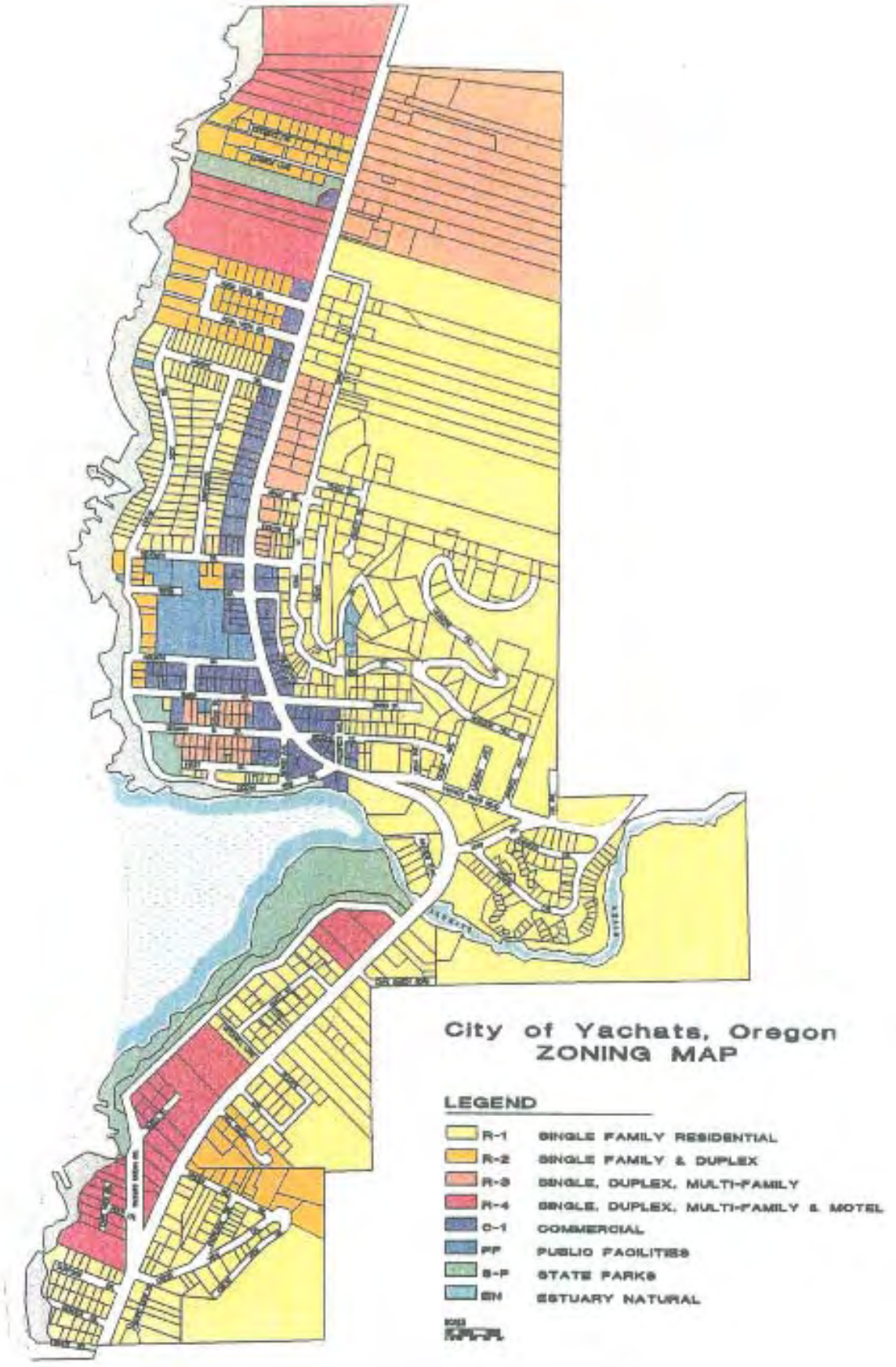
Table 5: Housing Type, Yachats, 2000

Housing Type	Percent
Single-family	86.5%
Multi-family	8%
Mobile Homes	5.2%
Boat, R.V., Van, etc.	0.4%

Source: US Census 2000

Land Use & Development

The city of Yachats sits at the mouth of the Yachats River overlooking the Pacific Ocean. Development in Yachats spreads mostly north to south along US-Highway 101 and slightly east along Yachats River Road. Dense commercial areas in Yachats exist along US-Highway 101 and are centrally located in the downtown area and around the Yachats River. Residential development surrounds the downtown commercial core. The city's Comprehensive Plan identifies land use needs within the city and its urban growth boundary. The map below displays the city of Yachats's zoning map.


City of Yachats, Oregon
ZONING MAP
LEGEND
R-1 SINGLE FAMILY RESIDENTIAL
R-2 SINGLE FAMILY & DUPLEX
R-3 SINGLE, DUPLEX, MULTI-FAMILY
R-4 SINGLE, DUPLEX, MULTI-FAMILY & MOTEL
C-1 COMMERCIAL
PF PUBLIC FACILITIES
S-P STATE PARKS
EN ESTUARY NATURAL

Transportation

The city of Yachats lies adjacent to US-Highway 101. US-Highway 101 is the principle state access route along the Oregon Coast. Major routes from U.S. Interstate 5 in the Willamette Valley to Lincoln County include Highways 18, 20, and 34. Transportation is an important consideration when planning for emergency service provisions.

Growth within the city will put pressure on both major and minor roads, especially if the main mode of travel is by single occupancy vehicles. How people travel to work is indicative of the prevalence of single occupancy vehicle travel, and can help predict the amount of traffic congestion and the potential for accidents. Table 6 represents the different methods city residents use to travel to work.

Table 6: Means of Transportation and Carpooling, Yachats 2000

Type of Transportation	Percent
Car, Truck or Van-drove alone	63.1%
Car, Truck, or Van-carpooling	13.1%
Walked	10.7%
Worked at Home	10.7%
Other means	2.5%
Public Transportation (including taxicab)	0%

Source: U.S. Census 2000

The following map is from the Oregon Department of Transportation and shows the major road systems in the city of Yachats.

YACHATS - LINCOLN COUNTY

Critical Facilities & Infrastructure

Critical facilities are those that support government and first responders' ability to take action in an emergency. They are the top priority in any comprehensive hazard mitigation plan. The city of Yachats has the wastewater treatment plant, the water treatment plant, the public library and public schools, and the Yachats Commons. The city is within the District boundaries of the Yachats Rural Fire Protection District.

Historical & Cultural Resources

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

The city of Yachats's website offers noteworthy time periods in the community's history. Before white settlers came to the Yachats area, the coast was inhabited by Native Americans, known as the Alsi and Yahuts tribes. In 1787, Captain Cook, one of the first white people sailing along the Oregon Coast, named Cape Perpetua, an 800-foot cape overlooking the ocean. In 1855, the Coast Range Reservation and Alsea Sub-Agency established a community to be the home to different tribes of Native Americans. In 1871, it noted that the first white child was born in Yachats. In 1875, the Coast Range Reservation and Alsea Sub-Agency was closed when the area was opened to settlement. In 1892, the Oceanview, Benton County Post Office was established in what later became known as the town of Yachats. Vacationers began visiting the Yachats area in the early 1900's. In 1914, the US Forest Service built a narrow road around Cape Perpetua. In 1917, the community was renamed from "Oceanview" to the present name of Yachats. In 1918, soldiers of the Signal Corps were organized at camps in the area to log for spruce used to build airplanes for war efforts. In 1926, the Little Log Church was built to serve the community. The church later became the property of the Lincoln County Historical Society, who eventually turned the church over to the city of Yachats. It is now maintained as the Little Log Church and Museum. In the 1930's, the Roosevelt Memorial Highway, now known as US Highway 101, was completed, opening the coastal area to a greater influx of people. In the 1930's and 40's, the Great Depression and World War II affected the area. Today, Yachats is a lively community home to permanent and seasonal residents, with a vigorous tourist population.[ix]

The city of Yachats is rich with beauty and abundant natural resources. The coastal community offers recreational amenities, activities and attractions including, but not limited to fishing, beachcombing, clam digging, hiking, camping, whale watching, crabbing, windsurfing, scenic flights, golfing, kite-flying and more. In and around the community are the Cape Perpetua Federal Recreational Area and Museum, Smelt Sands State Park, Yachats State Park, and the Commons Community Center. The city of Yachats holds many community events throughout the year,

including, but not limited to, the Yachats Guitar Festival, the Yachats Music Festival, Yachats Big Band, the Yachats Farmers Market, various arts and craft shows, the Yachats la de da Parade, Festivities and Fireworks Show, the Yachats Village Mushroom Festival, the Annual Smelt Fry, the Yachats Celtic Music Festival, and the Yachats Youth and Families Activities Program, as well as a wide range of restaurants, galleries and shops.[x]

Government Structure

The City Council is the policy making body for Yachats. As the elected legislative body in Yachats, the City Council has overall responsibility for the scope, direction and financing of city services. Council members serve four-year terms. Departments within the city include the following:

- **City Recorder**: The city recorder assures the timely presentation of formal communications from the public, other agencies and city staff to the City Council. The recorder prepares city council meeting agendas in coordination with the mayor; maintains official city records which reflect the actions of the governing body; maintains a depository of contracts, agreements and official council actions and ensures the timely availability of these records to the council, public other agencies and staff.

- **City Planner**: The city planner provides service and information to the general public regarding phases of planning and community development. The city planner implements ordinance and plan requirements through a site and land use review process. Specifically, the city planner reviews potential development opportunities to ensure compliance with zoning, setback, parking, landscaping, access and other city requirements.

  In addition to oversight of the development process, the city planner advises the City Council and Planning Commission on land use and special project matters.

- **Public Works Department**: The Yachats Public Works Department provides responsive community services related to planning, design, construction, operation, maintenance and management of public infrastructure, including streets, sewer, water treatment, waste water treatment, storm drainage, public buildings and other facilities. Services provided by the department contribute to the public health, safety, economic diversity, environmental quality and citizen convenience.

- **Finance Department:** The Finance Department serves the community by managing utility billing, business licenses, collecting taxes and fees, dealing with city expenditures, preparing the city's budget and managing investments. The goal of the Finance Department staff is to

provide services with an emphasis on timelines, accuracy and courteous customer service.

- **Public Library**: The Yachats Public Library collects, preserves, and administers organized collections of books and related materials.

Existing Plans and Policies

Communities often have existing plans and policies that guide and influence land use, land development, and population growth. Such existing plans and policies can include comprehensive plans, zoning ordinances, and technical reports or studies. Plans and policies already in existence have support from local residents, businesses and policy makers.

Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs. Yachats's Addendum includes a range of recommended action items that, when implemented, will reduce the city's vulnerability to natural hazards. Many of these recommendations are consistent with the goals and objectives of the city's existing plans and policies. Linking existing plans and policies to the Addendum helps identify what resources already exist that can be used to implement the action items identified in Yachat's Addendum. Implementing the city's mitigation actions through existing plans and policies increases their likelihood of being supported and getting updated, and maximizes the city's resources.

The following are Yachats's existing plans and policies:

- **Comprehensive Plan, 2008**: A document stating the general, long-range policies that will govern a local community's future development.
    - Relation to natural hazard mitigation: Contains city-specific information regarding natural hazards within the city's jurisdictional boundaries

- **Zoning Ordinance, 2008**: An ordinance establishing land use zones to regulate the location of building structure and the use of land within the city of Yachats.
    - Relation to natural hazard mitigation: Contains city-specific hazard related requirements for the placement and construction of the buildings. Issues such as floodplain development, fire resistant materials, etc. Contains city-specific hazard related requirements for the subdivision of parcels. Issues such as floodplain development, protection from fire, etc.

- **Yachats Village Circulation Plan, 1997:** Guides the management of existing transportation facilities and the design and implementation of future facilities.
    - Relation to Natural Hazard Mitigation: Mitigation principles and strategies can be incorporated into Transportation Systems Plans to protect key transportation infrastructure from natural hazards.

Community Organizations & Programs

Social systems can be defined as community organizations and programs that provide social and community-based services, such as health care or housing assistance, to the public. In planning for natural hazard mitigation, it is important to know what social systems exist within the community because of their existing connections to the public. Often, actions identified by the plan involve communicating with the public or specific subgroups within the population (e.g. elderly, children, low income). The county and cities can use existing social systems as resources for implementing such communication-related activities because these service providers already work directly with the public on a number of issues, one of which could be natural hazard preparedness and mitigation. The countywide community organizations and programs table can be found in Section 2: Community Overview of the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan. The table highlights organizations that are active within the county and may be potential partners for implementing mitigation actions.

Existing Mitigation Activities

Existing mitigation activities include current mitigation programs and activities that are being implemented by the community in an effort to reduce the community's overall risk to natural hazards. Documenting these efforts can assist participating jurisdictions in better understanding risk and can assist in documenting successes. The following efforts have occurred or are on-going within the city of Yachats:

- The city of Yachats has an emergency planning steering committee that meets monthly. The committee is in the process of preparing an emergency preparedness plan.
- The city of Yachats maintains a website that includes an emergency planning section. The website includes a variety of emergency planning related topics, i.e. Family Assessment Survey; what to do if there is an earthquake/tsunami; what to do after a flood; what can you do before an emergency; do you have flood insurance; and prevent house fires and wildfires.
- A Community Emergency Response Team (CERT) is active in Yachats. The CERT Program educates people about disaster preparedness and trains citizens to assist with the community's immediate needs in the aftermath of a disaster (when emergency services are not immediately available). CERT can assist in saving lives and protecting property.
- The city of Yachats coordinates emergency planning activities with the Yachats Rural Fire Protection District.
- The city of Yachats enforces a setback requirement for all developments located along the coast. The purpose of the setback is to reduce property damages related to coastal erosion, wind storms, and

flooding. The setback requirement also serves to satisfy a portion of the city's natural hazard goal, as defined in the Yachats Comprehensive Plan: "Through regulation of the location and type of development, the city shall work to protect life and property from natural disasters and hazards, such as landslides, fire, tsunamis and flooding."

- The city's Comprehensive Plan and Zoning and Land Use Code address natural hazards. Specific hazardous areas have been identified by RNKR Associates in their work *Environmental Hazards, Coastal Lincoln County, Oregon, 1979*. The city has defined 'hazardous areas' and will allow development in these areas if adequate protective measures can be employed to prevent or minimize damage in accordance with city development code standards.
- State legislation: SB 379, implemented as Oregon Revised Statutes (ORS) 455.446 and 455.447, limits construction of new essential facilities and special occupancy structures in tsunami flooding zones.

Risk Assessment

The following hazards have been addressed in the Lincoln County Natural Hazard Mitigation Plan. The city of Yachats reviewed the county's plan on January 26, 2009 and assessed how Yachats's risks vary from the risks facing the entire planning area.

Coastal Erosion

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of coastal erosion hazards. Erosion is a natural process that continually affects coastal areas. In the city of Yachats and elsewhere along the Pacific, erosion becomes a hazard when lives and personal properties are at risk of damage. Erosion is typically a gradual process, which can be greatly accelerated in the event of a storm. The county identified areas along Highway 101 that have sustained erosion induced damages. The city can be characterized as consisting of low rock beaches, basalt cliffs and benches overlain by sedimentary uplifted marine terrace deposits along US Highway 101. Additionally, the city has steep hillsides east of Highway 101 and southeast of the Yachats River. The most susceptible area for coastal erosion is along the oceanfront where concentrations of homes, businesses, roads and infrastructure are located. The steering committee identified the area along Ocean View Road from 6th Street down to the Yachats Recreation Area as experiencing on-going erosion. The city of Yachats has engaged in projects to mitigate coastal erosion by installing hardened shoreline stabilization in the form of rip-rip, relocating pump stations away from vulnerable locations, and stabilizing banks. The city recently received authorization for a rip-rap project that will protect utilities and streets along the bluffline. Records of other specific events are not available at this time; however, events may have occurred in tandem with previous storms.

Potential community-related impacts, including shoreline reduction, economic (tourism-related) impacts, and property/infrastructure damage, are adequately described within the county's Coastal Erosion Annex.

In an effort to mitigate the effects of coastal erosion, the city requires new development to comply with setback restrictions. Because coastal erosion is a continual process, the county has described the hazard's **probability** as **"high,"** meaning one incident is likely to occur within a 10-35 year period. The county additionally estimates a **"high" vulnerability** to coastal erosion hazards, meaning 1-10% of the population or regional assets are likely to be affected by this hazard. The city of Yachats agrees with both of these ratings due to the city's location along the coast.

The city of Yachats uses the RNKR Environmental Hazards Inventory of Coastal Lincoln County, Oregon as a mapping and reporting tool for coastal erosion. Although not included in this addendum, the coastal erosion map can be obtained at Yachats's City Hall.

Drought

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of drought hazards, as well as the location and extent of potential events. Due to a cool, wet climate, past and present weather conditions have generally spared coastal communities from the effects of severe drought. The city of Yachats has experienced drought conditions in the past, but records of events are not available at this time.

Lincoln County estimates that the probability of a drought is "low," meaning no more than one event is likely to occur within a 75-100 year period. The city of Yachats is concerned about water supply on an annual basis, due to potential surface water contamination. The city is working to perfect their water rights on the Yachats River to secure future access and supply. Likewise, Yachats has an intergovernmental agreement with the South Lincoln County Water District and the city of Waldport for delivery services in the event of a water-shortage. Because Yachats's water supply is not reliable, however, the city estimates a **"high" probably** that drought will be a concern, meaning more than one event is likely to occur within a 75-100 year period.

Lincoln County additionally estimates a "low" vulnerability to drought hazards, meaning less than 1% of the population or regional assets would be affected by a major emergency or disaster. Due to lack of a predictable water supply, the Yachats Steering Committee believes that the impacts of a potential event are much greater for the city than for the county as a whole. As such, the city estimates a **"high" vulnerability** to drought hazards, meaning more than 10% of the population would be affected by a major emergency or disaster. Although the city has IGA's to ensure deliverable water in the event of a water shortage, the South Lincoln County Water District and the city of Waldport have similar contamination concerns as Yachats. Funding has been secured to purchase emergency

treatment machines capable of treating 9000 gallons per day for drinking water. In addition, the city Public Works Department has an ongoing water main inspection program to prevent the loss of water due to leaks. The city also has long range plans to construct a series of reservoirs with water storage capacity of up to 500,000 gallons. Moreover, the city has an active water conservation program in place.

Potential drought-related impacts are adequately described within the county's drought hazard annex. The city will review these estimates every five years, in concurrence with the county's plan update process.

Earthquake

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics, location, and extent of earthquake hazards for the region. The county's plan additionally identifies all previous earthquakes that have affected the city. It is difficult to estimate recurrence intervals, but the state has experienced seven Cascadia Subduction Zone (CSZ) events in the last 3500 years -- some of which were probably as large as a magnitude (M)9. These events are estimated to have an average recurrence interval between 500 and 600 years, although the time interval between individual events ranges from 150 to 1000 years. The last CSZ event occurred approximately 300 years ago. Scientists estimate there is **10-20% probability** that a subduction zone earthquake will occur within the next 50 years.[xi] Based on this information, Lincoln County estimates a **"high" probability** that an earthquake will occur in the future. The city of Yachats agrees.

Lincoln County additionally estimates a "moderate" vulnerability to earthquake hazards, meaning a 1-10% of the population or regional assets would be affected by a major emergency or disaster. Due to the city's concentrated population in low-lying areas, steep hillsides infrastructure, and resources, however, the city believes that its **vulnerability** to a high magnitude earthquake would be **"high,"** meaning more than 10% of the population or regional assets would be affected by an event. As shown in Table 4 above, almost 55% of Yachats housing structures were built prior to enforcement of earthquake resistant building codes. Also, there is considerable development on steep hillsides with grades as much as approximately 23%.

In addition, the city's infrastructure is highly vulnerable to a severe earthquake event. Sewer lines, water lines, power lines, water and sewer treatment systems, City Hall and the Lions Thrift Store were identified by the steering committee as vulnerable assets. The city would also expect damage to roads following a CSZ event, as well as deaths and severe injuries region-wide. Education and outreach regarding the CSZ is an on-going endeavor in Yachats.

Flood

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of flooding hazards within the region, as well as previous flooding occurrences. Ocean and riverine flooding are the primary sources of flooding. Ocean-related flood events happen because of storms and tides. River-related flood events are also caused by storms, as well as rain on snow / snowmelt. Lincoln County estimates a **"high" probability** that flooding will occur, meaning one event is likely within a 10-35 year period. The county estimates a **"moderate" vulnerability** to flood hazards, meaning 1-10% of the population or regional assets are likely to be affected by a major emergency or event. Both ratings are true for the city as well.

The city of Yachats's Steering Committee notes that a couple of homes along Gender Creek located south of the Yachats River were recently flooded, most likely from debris that clogs storm drains. The city is currently taking steps to address infrastructural vulnerabilities associated with seasonal flooding and flooding associated with storm drain systems. The city's water intake system was recently upgraded in such a way that improved maintenance capabilities and will reduce potential flood impacts. The city is reviewing its Storm Water Master Plan to identify a list of projects intended to mitigate localized flooding that's associated with clogged or overloaded drains. The city's steering committee also found that with the exception of some pump stations, there are no critical city facilities located in flood hazard areas. The steering committee acknowledges there may be seasonal underground streams of which they may not be aware.

The city of Yachats participates in the National Flood Insurance Program, and their most recent effective map date is 3/1/79. The city has 122 National Flood Insurance Policy holders, with a total coverage of $33,743,000. Five claims have been paid since 1978, at a total of $21,833. Otherwise, there are no records of sustained damage or serious impacts associated with major flood events. The number of buildings and/or properties within the floodplain is not available at this time.

One property in Yachats has experienced a total of two losses. This means there has been one repetitive loss property in Yachats. Total payments related to this repetitive loss property amount to $5,976.27.[xii]

Landslide

Lincoln County's Natural Hazard Mitigation Plan adequately describes the causes and characteristics of landslides, and appropriately identifies previous landslide occurrences within the region. Areas most susceptible to landslide activity are on steep hillsides east of Highway 101 and southeast of the Yachats River. The city's steering committee notes that site-specific geotechnical reports are required for development on steep hillsides, and city approval is also required for road construction and utility installation serving development on steep hillsides. Road cracking

has occurred in some areas, but no significant losses are documented. Potential community-related impacts from landslide events are adequately described within the county's plan. Potential impacts include infrastructural damages, economic impacts (due to isolation and /or arterial road closures), property damage, and obstruction to evacuation routes.

In 2007, the Oregon 74th Legislative Assembly directed the Department of Geology and Mineral Industries (DOGAMI) to extend LIDAR collection efforts throughout the state. LIDAR (light detection and ranging) is a tool that can provide high-resolution images of the surface of the earth, and it's excellent for mapping natural hazards and landslides. When the statewide LIDAR studies are completed, the city of Yachats will have a much greater understanding of its landslide risks.[xiii]

The county currently estimates a **"moderate" probability** that landslides will occur, meaning one event is likely within a 35-75 year period. The county estimates a **"high" vulnerability** to landslide hazards, meaning more than 10% of the population or regional assets are likely to be affected by a major emergency or event. The city agrees with both ratings.

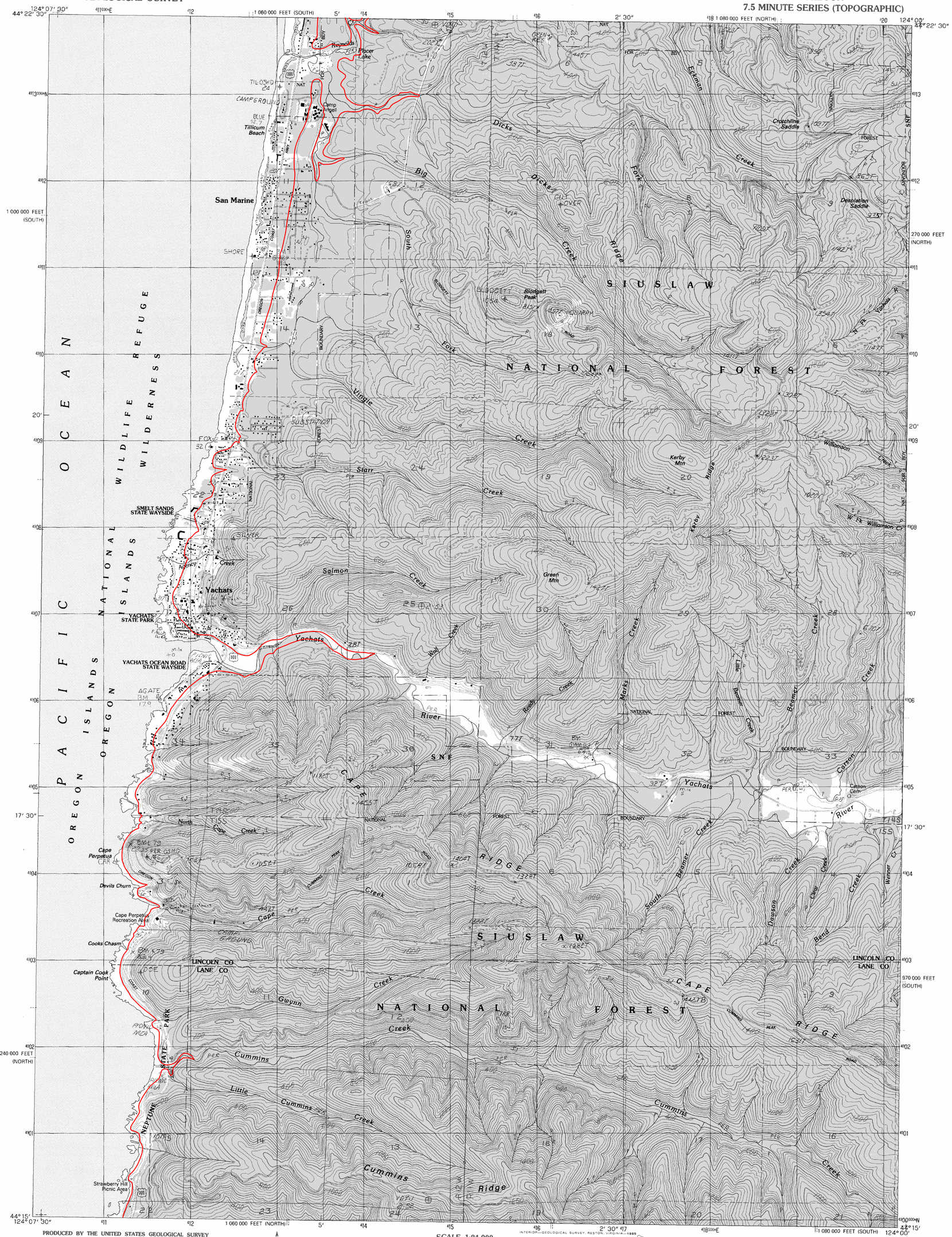
Tsunami

Lincoln County's Natural Hazards Mitigation Plan adequately describes the causes and characteristics of tsunami hazards, as well as the previous occurrences of tsunami events within the region. The Department of Geology and Mineral Industries (DOGAMI) conducted an analysis resulting in extensive mapping along the Oregon Coast. The maps depict the expected inundation for tsunamis produced by a magnitude 8.8 to 8.9 undersea earthquake. The tsunami maps were produced to help implement Senate Bill 379 (SB 379), which was passed during 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, limit construction of new essential facilities and special occupancy structures in tsunami flooding zones. The 2004 Indian Ocean earthquake and tsunami led DOGAMI to re-evaluate the state's tsunami mapping program. Currently, DOGAMI is using the latest advances in mapping technology (LIDAR), computer technology and computer modeling to run a pilot mapping project for the coastal city of Cannon Beach. The new map will be scenario based, meaning that variations in inundation levels (given local or distant tsunamis) will be shown. Below is the 1995 tsunami inundation zone map produced by DOGAMI for the city of Yachats.

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
DONALD A. HULL, STATE GEOLOGIST

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

YACHATS QUADRANGLE
OREGON
7.5 MINUTE SERIES (TOPOGRAPHIC)



PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY
CONTROL BY ..... USGS, NOS/NOAA
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN 1975-76
FIELD CHECKED ..... 1980. MAP EDITED 1984
PROJECTION ..... LAMBERT CONFORMAL CONIC
GRID: 1000-METER UNIVERSAL TRANSVERSE MERCATOR ..... ZONE 10
10,000-FOOT STATE GRID TICKS..OREGON, NORTH AND SOUTH ZONES
UTM GRID DECLINATION ..... 0°45' WEST
1980 MAGNETIC NORTH DECLINATION ..... 19°30' EAST
VERTICAL DATUM ... NATIONAL GEODETIC VERTICAL DATUM OF 1929
HORIZONTAL DATUM ..... 1927 NORTH AMERICAN DATUM

To place on the predicted North American Datum of 1983, move the projection lines as shown by dashed corner ticks (23 meters north / 98 meters east)

There may be private inholdings within the boundaries of any Federal and State Reservations shown on this map

PROVISIONAL MAP
Produced from original manuscript drawings. Information shown as of date of field check.

SCALE 1:24 000

KILOMETERS 0 1 2
METERS 0 1000 2000
MILES 0 1
FEET 1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10 000

CONTOUR INTERVAL 40 FEET

CONTROL ELEVATIONS SHOWN TO THE NEAREST 0.1 FOOT
OTHER ELEVATIONS SHOWN TO THE NEAREST FOOT

To convert meters to feet multiply by 3.2808
To convert feet to meters multiply by 0.3048

SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 6 FEET

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 Waldport
2 Tidewater
4 Cannibal Mtn
5
6 Heceta Head
7 Cummins Peak
8

ADJOINING 7.5' QUADRANGLE NAMES

ROAD LEGEND
Improved Road
Unimproved Road
Trail
Interstate Route U.S. Route State Route

YACHATS, OREG.
PROVISIONAL EDITION 1984

44124–C1–TF–024

FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1985

Open File Report O-95-33
Tsunami Hazard Map of the Yachats Quadrangle, Lincoln and Lane Counties, Oregon

Tsunami inundation boundary
upper limit of area expected to be covered by flood water from a tsunami caused by a magnitude 8.8 undersea earthquake

See accompanying text for use of this map, mapping methodology, and acknowledgments.

Mapping by:

George R. Priest, Oregon Department of Geology and Mineral Industries, October-November, 1995.

The extent of a tsunami event in Yachats will depend on where the tsunami originated, and the size of the earthquake that produced the tsunami. Lincoln County appropriately describes the probability of a tsunami event for Yachats. Geologists predict a **10-14% chance** that a tsunami will be triggered by a shallow, undersea earthquake offshore Oregon in the next 50 years. The forecast comes from evidence for large but infrequent earthquakes and tsunamis that have occurred on the Oregon coast every 500 years, on average.

The county estimates a "moderate" vulnerability rating to tsunami hazards, meaning 1-10% of the population or regional assets would be affected by a major event. The Yachats Steering Committee estimates a **"high" vulnerability** to tsunami hazards, meaning more than 10% of the population or regional assets are likely to be affected by a major emergency or event. The basis for this determination results from a review of the tsunami inundation zone map. The map shows a substantial portion of the developed community located within the risk zone. In addition, when the tourist population swells, many are spending time at accommodations, facilities, or along the beach/bluff-line in these vulnerable locations. An existing assisted living facility is located on the eastern fringe of the tsunami inundation zone. Severe damage could occur to low-lying areas of the city, including roads, bridges, communication systems, and infrastructure within Yachats, among other assets described in the county's plan. The city of Yachats recognizes the importance of continuing education and outreach, especially to the transient populations (i.e., tourists), and plans to implement greater outreach in the future.

Volcano

The Lincoln County Natural Hazard Mitigation Plan adequately describes the city's risk to volcanic events. Generally, an event that affects the county is likely to affect the city of Yachats as well. The causes and characteristics of a volcanic event are appropriately described within the county's plan, as well as the location and extent of potential hazards. Previous occurrences are well documented within the county's plan, and the community impacts described by the county would generally be the same for Yachats as well. The city of Yachats is very unlikely to experience anything more than volcanic ash during a volcanic event. When Mt. Saint Helens erupted in 1980, the city received small amounts of ashfall, but not enough to cause significant health and/or economic damages. The county estimates a **"low" probability** of future volcanic events and a **"low" vulnerability** to future eruptions. The county's probability and vulnerability estimates accurately describe Yachats's risks as well.

Wildfire

The Lincoln County Natural Hazard Mitigation Plan adequately describes the causes and characteristics of wildfires for the region. 1849 and 1936 were particularly devastating years for wildfires in Lincoln County, but since then, there have been very few events. The location and extent of a

wildfire will vary depending on fuel, topography, and weather conditions. The city of Yachats is surrounded by resource lands that are actively managed for forest uses. The Yachats Steering Committee notes that commercial forestry and harvesting activities increase the potential for wildfires. In addition, development on the ridgeline along the eastern boundary of the city has increased over the last few years, making this urban/rural interface more vulnerable to wildfires. These are areas of concern, which would be vulnerable to wildfires as well as some of the open spaces within the city's limits. The city takes steps to notify landowners about measures, which can be taken to reduce risks associated with wildfires. Such measures include maintaining a firebreak free of dead fuels around the home.

The county estimates a **"moderate" probability** that local wildfires will occur in the future, meaning no more than one event is likely to occur within a 35-75 year period. Likewise, the county estimates a **"moderate" vulnerability** to wildfires, meaning 1-10% of the population or regional assets are likely to be affected by a major event. Both estimates are true for the city as well.

The potential community impacts and vulnerabilities described in the county's plan are generally accurate for the city as well. Due to the prevailing wind patterns (i.e., from the north or south), the city's steering committee felt that the east and south ends of the city might be the most vulnerable spots to wildfire. Power, natural gas, and phone lines run through the forest to the east of the city, and would be affected in the event of a wildfire. Likewise, active commercial logging occurs just outside the city, and slash burns are a potential wildfire concern. The county is currently engaged in an effort to develop a Community Wildfire Protection Plan (CWPP) which will map vulnerable areas, among other things.

Windstorm

The Lincoln County Natural Hazard Mitigation Plan adequately describes the causes and characteristics of windstorms, as well as the location and extent of windstorm hazards. The region's (and city's) history of events are adequately described within the county's plan as well. Because coastal wind storms typically occur during winter months, they are sometimes accompanied by ice, freezing rain, flooding, and very rarely, snow. More than likely, however, the coast's winter will just be windy, cold, and wet.

In Yachats, power outages are the greatest concern during windstorms. Without power, communication is lost, and fuel and food stores shut down. In the December, 2007 wind storm, the city lost power and some residents were unable to access 911. Also of concern are downed trees, heavy precipitation and damage to buildings. The city, in conjunction with some private utility companies, works to remove hazardous trees where possible. In the event of a large windstorm with sustained power outages, the city of Yachats opens up an emergency soup kitchen. The county's

plan adequately identifies the remaining impacts and damages that can occur with windstorm events.

The county estimates a **"high" probability** that windstorms will occur in the future. Windstorms occur yearly, and the more destructive storms occur once or twice per decade. The county additionally estimates a **"high" vulnerability** to windstorms, meaning more than 10% of the population or regional assets would be affected by a major windstorm event. Both estimates are true for the city as well.

Action Items

The following action items are detailed recommendations for activities that local departments, citizens, and others could engage in to reduce risk. Action item worksheets are located at the end of the addendum.

- Identify over-water transportation alternatives in the event of bridge collapse in an earthquake and or/tsunami.
- Continue to educate citizens about earthquake and tsunami preparedness.
- Seek funding to obtain tsunami sirens.
- Continue to maintain and keep stocked two mobile storage containers with emergency supplies and equipment.
- Implement actions identified in the Yachats Storm Drainage Master Plan.
- Encourage purchase of flood insurance, even for those outside of the NFIP mapped hazard areas.
- Provide supplemental water supply tanks in key locations to ensure availability of water throughout the city.
- Participate in the development of the county's Community Wildfire Protection Plan.
- Obtain LIDAR collection data from DOGAMI.

Additionally, Yachats has chosen to partner with the county on the following actions. Please see Appendix A in Lincoln County's Natural Hazard Mitigation Plan for more detail regarding each of the actions listed below.

- Coastal Erosion #1: Improve knowledge of coastal erosion hazard areas and understanding of vulnerability and risk to life and property in hazard prone areas.

- Coastal Erosion #2: Consider revising existing county coastal hazard area regulations based on the DOGAMI risk zone mapping.
- Earthquake #1: Integrate new earthquake hazard mapping data for Lincoln County and improve technical analysis of earthquake hazards.
- Earthquake #2: Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices.
- Earthquake #3: Encourage purchase of earthquake hazard insurance by forming partnerships with the insurance and real estate industries.
- Earthquake #4: Promote and enforce building code standards.
- Earthquake #5: Encourage seismic strength evaluations of critical facilities to identify vulnerabilities and to meet current seismic standards.
- Earthquake #6: Identify funding sources for and implement high priority structural and nonstructural retrofits of structures that are identified as seismically vulnerable.
- Flood #1: Explore steps needed to qualify Lincoln County for participation in the NFIP Community Rating System (CRS).
- Flood #2: Formalize process for providing warnings of flood events to property owners in flood hazard areas.
- Flood #3: Work with affected property owners to elevate or relocate non-conforming, pre-FIRM structures in flood hazard areas.
- Landslide #1: Encourage construction, site location and design that can be applied to steep slopes to reduce the potential threat of landslides.
- Landslide #2: Increase public education related to landslide hazards by distributing DOGAMI landslide informational brochure.
- Landslide #3: Protect existing development in landslide-prone areas.
- Tsunami #1: Determine ways of mitigating the vulnerability of assets (fire stations, equipment, utilities) likely to be impacted by tsunami.

- Tsunami #2: Work with coastal communities, citizen groups, property owners, recreation areas, emergency responders, schools and businesses in promoting tsunami awareness and evacuation.
- Tsunami #3: Improve technology capacity of communities, agencies and responders needed to adequately map hazard areas, broadcast warnings, inform, and educate residents and visitors of tsunami dangers.
- Wildfire #1: Develop a Lincoln County Community Wildfire Protection Plan.
- Windstorm #1: Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during windstorm events.
- Windstorm #2: Enhance strategies for debris management and/or removal after windstorm events.
- Windstorm #3: Map and publicize locations around the county that have the highest incidence of extreme windstorms.
- Windstorm #4: Increase public awareness of windstorm mitigation activities.
- Windstorm #5: Continue and enhance windstorm resistant construction methods where possible to reduce damage and power outages from windstorms.
- Windstorm #6: Encourage critical facilities to secure emergency power.

Plan Implementation & Maintenance

The city will utilize the same prioritization process as the county [See Section 4: Plan Implementation and Maintenance of the Lincoln County Multi-Jurisdictional Natural Hazard Mitigation Plan and Appendix D: Economic Analysis of Natural Hazard Mitigation Projects].

The city of Yachats Planning Department will serve as the convener for the city of Yachats Natural Hazard Mitigation Plan Addendum. The Planning Department will be responsible for convening the plan committee on a yearly basis to identify new risk assessment data, review status of mitigation actions, identify new actions, and seek funding to implement mitigation actions. The city of Yachats Natural Hazard Mitigation Plan Addendum will be updated every five years in coordination with the county's plan update schedule.

[i] Oregon Economic and Community Development Department. City of Yachats Community Profile.

[ii] US Census Bureau, "Profile of Selected Social Characteristics, 2000, Yachats, OR," American Factfinder Quick Tables, www.census.gov.

[iii] US Census Bureau, "Profile of Selected Social Characteristics, 2000, Yachats, OR," American Factfinder Quick Tables, www.census.gov.

[iv] US Census Bureau, "Profile of Selected Social Characteristics, 2000, Yachats, OR," American Factfinder Quick Tables, www.census.gov.

[v] Oregon Economic and Community Development Department. City of Yachats Community Profile.

[vi] US Census Bureau, "Profile of Selected Social Characteristics, 2000, Yachats, OR," American Factfinder Quick Tables, www.census.gov.

[vii] Oregon Economic and Community Development Department. City of Yachats Community Profile.

[viii] US Census Bureau, "Profile of Selected Social Characteristics, 2000, Yachats, OR," American Factfinder Quick Tables, www.census.gov.

[ix] City of Yachats History. www. http://www.ci.yachats.or.us/Yachats%20History.htm

[x] City of Yachats Events. http://www.ci.yachats.or.us/calendar/commons/events.htm

[xi] NOAA, 1993. Tsunamis affecting the West Coast of the United States: 1806-1992.

[xii] Oregon Department of Land Conservation and Development. Repetitive Flood Losses.

[xiii] Oregon LIDOR Consortium (OLC) Department of Geology and Mineral Industries, www.oregongeology.org.

Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Identify over-water transportation alternatives in the event of bridge collapse in an earthquake and/or tsunami.	1. Protect life and property. 2. Coordinate and enhance emergency services.

Rationale for Proposed Action Item:

- In the event of a Cascadia Subduction Zone (CSZ) earthquake and/or tsunami, it is possible the U.S. Highway 101 bridge in Yachats would fail. Essential transportation services would need to be restored.
- 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 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.
- 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. The last CSZ event occurred approximately 300 years ago.
- Restoration of key infrastructure is essential after a natural disaster "to support the industry and the jobs it provided." To sustain the economy, communities should "provide for temporary infrastructure while long-term rebuilding efforts are underway."
  Source: Governor's Commission Report on Recovery, Rebuilding, and Renewal. After Katrina: Building Back Better than Ever. December 31, 2005 p.112

Ideas for Implementation:

- Build boat launches in strategic locations to serve as bridge replacements after an earthquake and tsunami.
- Obtain emergency equipment in preparation for an earthquake/tsunami event. Purchase flatcars to use as temporary bridges.

Coordinating Organization:	Yachats Public Works

Internal Partners:	**External Partners:**
Yachats Planning, Public Works	Lincoln County Emergency Services, ODOT, NOAA, CERT

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	**Yachats Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Continue to educate citizens about earthquake and tsunami preparedness	1. Protect life and property. 2. Enhance and promote public awareness.

Rationale for Proposed Action Item:

- Yachats has engaged in numerous education & outreach activities related to earthquake and tsunami preparedness. The city recognizes the importance of an ongoing education & outreach program that's specifically related to these two hazards.
- The Cascadia Subduction Zone can potentially cause a magnitude 9 earthquake that will be felt in Yachats. Scientists estimate that there is a 10-20% probability that a subduction zone earthquake will occur within the next 50 years.
- The extent of a tsunami event in Yachats will depend on where the tsunami originated, and the size of the earthquake that produced the tsunami. Geologists predict a 10-14% chance that a Cascadia tsunami will be triggered by a shallow, undersea earthquake offshore Oregon in the next 50 years. The city of Yachats is susceptible to an earthquake/tsunami event.
- Public education and outreach can be inexpensive and provide information that results in safer households, work places and other public areas. Some outreach materials include: informational brochures about community seismic risks and mitigation techniques, public forums, newspaper articles, training classes and television advertisements.

Source: Oregon Technical Resource Guide. July 2000. Community Planning Workshop. Eugene, Or. University of Oregon p.8-20.

Ideas for Implementation:

- Encourage hotels, restaurants, and other tourist related facilities and accommodations to post tsunami evacuation maps.
- Work with local citizens and CERT on resources and networking available in case of an event.
- Update the city website with new information and link's to improve to improve the city's emergency preparedness.

Coordinating Organization:	City of Yachats

Internal Partners:	**External Partners:**
Yachats Public Works, Planning, City Recorder	CERT, DOGAMI, DLCD

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	**Yachats Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Seek funding to obtain tsunami sirens.	1. Protect life and Property. 2. Coordinate and enhance emergency services.

Rationale for Proposed Action Item:

- 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.
- The average recurrence interval for a Cascadia Subduction Zone (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. The last CSZ event occurred approximately 300 years ago.
- Low-lying areas of the city are located within the tsunami inundation zone.
- At this time Oregon does not have a uniform tsunami warning system with complete coverage of the coastline. In the spectrum of Oregon's tsunami warning capacity, there are some communities, Cannon Beach is the best example, that have taken their own initiative to employ sophisticated siren and voice delivery systems for alert notification. While Cannon Beach is a shining star for tsunami readiness, they do not reflect the majority of communities, which have limited sirens that are often cobbled together from civil defense alert systems. Many of these are failing from age or exposure to sand and salts. And even when working properly, these older electro-mechanical sirens produce a tone of limited delivery range. With that said, some emergency managers on the coast feel that siren systems, in general, are problematic warning systems due to:
    - Chronic exposure problems and high maintenance costs;
    - Poor audibility during high winds and storms and along rugged coastal terrain;
    - Confusion by public about intent of warning; and
    - Misuse of limited resources.

Ideas for Implementation:

- Work with OEM to identify funding sources to help pay for new tsunami sirens in the city of Yachats.

Coordinating Organization:	City of Yachats

Internal Partners:	**External Partners:**
Yachats Public Works, Planning, City Recorder	Lincoln County, Fire Districts, US Forest Service, BLM

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	**Yachats Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Continue to maintain and keep stocked two mobile storage containers with emergency supplies and equipment.	1. Coordinate and enhance emergency services. 2. Enhance and promote public education.

Rationale for Proposed Action Item:

- The city of Yachats is vulnerable to a Cascadia Subduction Zone earthquake/tsunami event.
- Other natural hazards such as flood, landslide and windstorm can leave populations without basic resources during emergencies.
- The city chooses to be proactive in being prepared to provide basic services when disrupted by natural hazard events.

Ideas for Implementation:

- Two portable storage containers will be stocked with emergency supplies and equipment and be strategically placed in key locations.
- Seek funding to maintain and keep each unit stocked.
- Continue community education and outreach regarding the purpose and function of the Emergency Planning Steering Committee.
- Seek funding for additional containers.

Coordinating Organization:	City of Yachats

Internal Partners:	**External Partners:**
Yachats Public Works, Emergency Planning Steering Committee	Yachats Rural Fire Protection District

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	**Yachats Steering Committee**

Oregon Natural Hazards Workgroup
University of Oregon Community Service Center
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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Implement actions identified in the Yachats Storm Drainage Master Plan.	1. Protect life and property. 2. Promote partnerships and coordination to improve implementation.

Rationale for Proposed Action Item:

- The city of Yachats is currently updating its Storm Drainage Master Plan. Mitigation actions are identified within that plan as well.
- The Disaster Mitigation Act of 2000 requires communities to describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information (201.6(b)). Implementing actions identified within the city of Yachats Storm Drainage Master Plan will assist the city in meeting this requirement.
- Stormwater management is a key element in maintaining and enhancing a community's livability. There is a direct link between stormwater and a community's surface and ground waters. As a community develops, the impervious surfaces that are created increase the amount of runoff during rainfall events, disrupting the natural hydrologic cycle. Without control, these conditions erode stream channels and prevent groundwater recharge. Parking lots, roadways, and rooftops increase the pollution levels and temperature of stormwater runoff that is transported to streams, rivers, and groundwater resources. Protecting these waters is vital for a great number of uses, including fish and wildlife habitat, recreation, and drinking water.

Source: Eugene Stormwater Management Manual. Section 1.1

Ideas for Implementation:

- Monitor the Storm Drainage Plan's update process.
- Identify and assist with actions that reduce the city's vulnerability to flood-related hazards.
- Seek funding for actions items.

Coordinating Organization:	City of Yachats

Internal Partners:	**External Partners:**
Yachats Public Works, Planning	DOGAMI

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	**Yachats Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage purchase of flood insurance, even for those outside of NFIP mapped hazard areas.	1. Protect life and property. 2. Enhance and promote public education.

Rationale for Proposed Action Item:

- Increasing knowledge about the extent of flood risk in order to educate residents about elevating homes and structures can help mitigate the city's vulnerability to future floods.
- There are streams affected by seasonal flooding.
- 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 informed of, and involved in, the city's actions to mitigate hazards.

Ideas for Implementation:

- Continue to participate in the National Flood Insurance Program.
- Make contacts with insurance industry representatives to keep current about their requirements, rates, and plans.
- Provide educational information to property owners.

Coordinating Organization:	City of Yachats

Internal Partners:	**External Partners:**
Planning	Lincoln County, insurance companies

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	**Yachats Steering Committee**

Oregon Natural Hazards Workgroup
University of Oregon Community Service Center
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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Provide supplemental water supply tanks in key locations to ensure availability of water throughout the city.	1. Protect life and property. 2. Coordinate and enhance emergency services.

Rationale for Proposed Action Item:

- In a self hazard analysis, the city of Yachats rated itself as having a high drought risk and vulnerability. It is important water remains available during and after a drought event.
- The Disaster Mitigation Act of 2000 requires communities to create actions that will reduce the impact of natural hazards on the community [201.6(c)(3)(ii)]. Providing supplemental water supply tanks in key locations will enhance the City's resilience in a drought event.

Ideas for Implementation:

- Obtain funding to construct additional water reservoirs for emergency drought-related storage.
- Research ways to reduce drought risk within the city. This may potentially result in non-structural projects.

Coordinating Organization:	City of Yachats

Internal Partners:	**External Partners:**
Yachats Public Works	USDA, USGA, Western States Water Council

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	LT	

Form Submitted by:	**Yachats Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Participate in the development of the county's Community Wildfire Protection Plan.	1. Protect life and property. 2. Preserve natural areas and features. 3. Coordinate partnerships and coordination to improve implementation.

Rationale for Proposed Action Item:

- The county is currently engaged in an effort to develop a Community Wildfire Protection Plan (CWPP) which will map vulnerable areas, among other things. The city hopes to participate in the CWPP's development process as well. The CWPP has the potential to benefit both jurisdictions; the city's participation is essential in ensuring that the CWPP provides adequate city-level information.
- 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 (taken from Linn County's plan).
  Source: FEMA. October 30, 2000. Disaster Mitigation Act of 2000. http://www.fema.gov/library/viewRecord.do?id=1935. October 12, 2006.

Ideas for Implementation:

- Coordinate with the Lincoln County Steering Committee to identify persons/groups responsible for the CWPP planning effort. Coordinate and establish relationships with fire districts involved in the effort.

Coordinating Organization:	City of Yachats

Internal Partners:	**External Partners:**
Yachats Public Works, Planning, City Recorder	Lincoln County, Fire Districts, US Forest Service, BLM

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		

Form Submitted by:	**Yachats Steering Committee**

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Natural Hazard Action Item Proposal Form

Proposed Action Item:	**Alignment with Plan Goals:**
Obtain LIDAR collection data from DOGAMI	1. Protect life and property. 2. Preserve natural areas and features. 3. Coordinate partnerships and coordination to improve implementation.

Rationale for Proposed Action Item:

- LIDAR (light detection and ranging) is a mapping tool that can provide very precise, accurate, and high-resolution images of the surface of the earth, vegetation, and the built environment. It can be used to study landforms and identify areas, especially landslide areas that may be susceptible to future occurrences. The Oregon Department of Geology and Mineral Industries (DOGAMI) has been working with communities to develop large-scale LIDAR maps of entire regions. In 2006- 2007, various local, state, and federal agencies formed the Portland Consortium to gather 2200 square miles of LIDAR data in the Portland Metropolitan region. DOGAMI has formed the Oregon LIDAR Consortium (OLC) to gather data in other Oregon regions, including Lincoln County. Entering into an agreement with the OLC, or obtaining LIDAR collection data from DOGAMI will assist in mapping areas of Western Lane County and landforms around Yachats.
- With LIDAR, you can quickly, cheaply, and accurately: find landslides, old cuts and grades; measure and estimate fills and cuts; find stream channels and measure gradients; measure the size and height of buildings and bridges; locate and measure every tree in the forest; characterize land cover; model floods, fire behavior; locate power lines and power poles; find archeological sites; map wetlands and impervious surfaces; define watersheds and view-sheds; model insulation and shaking; map road center and sidelines; find law enforcement targets; map landforms and soils; assess property remotely; inventory carbon; monitor quarries, find abandoned mines; enhance any project that requires a detailed and accurate 2-D or 3-D map.
- The east side of the city of Yachats has relatively steep topography. Despite the city's topographical characteristics and vulnerabilities to landslides, Yachats does not have accurate information regarding the location and extent of potential landslides. With improved data via participation in the OLC, (or purchase of the OLC's data), Yachats would have a much greater understanding of its landslide risks.
- The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of a natural hazard on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Obtaining LIDAR collection data from DOGAMI will help in understanding areas and landforms susceptible to landslide events to protect new and existing buildings, and infrastructure.

Ideas for Implementation:

- DOGAMI's LIDAR website provides information about the OLC and LIDAR and is a starting point for entering into an agreement with DOGAMI. http://www.oregongeology.com/sub/projects/olc/default.htm
- Contact DOGAMI about obtaining the data. DOGAMI staff is additionally available to talk to groups of potential users to show them the data and explain its uses. The LIDAR will be available without license restrictions in standard USGS quadrangles, with a nominal charge for each quadrangle. DOGAMI is happy to work with small communities to develop map products that they can use if they do not have GIS.

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Coordinating Organization:	City of Yachats	
Internal Partners:		**External Partners:**
Yachats Public Works, Planning, City Recorder		DOGAMI
Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
ST		
Form Submitted by:	**Yachats Steering Committee**	

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Volume IV: Mitigation Resources

Appendix A: Action Item Forms

Coastal Erosion #1:

Proposed Action Item:	**Alignment with Plan Goals:**
Improve knowledge of coastal erosion hazard areas and understanding of vulnerability and risk to life and property in hazard prone areas.	• Education and Outreach • Partnerships • Protection

Rationale for Proposed Action Item:

- The coastal erosion chapter of Lincoln County's risk assessment identified the potential for coastal erosion to cause damage to buildings and infrastructure within Lincoln County: coastal erosion may cause road closures and interruptions to utility services. Increasing knowledge of coastal erosion hazards is important as it will assist the county in more accurately identifying vulnerability to damage and disruption from these hazards.
- The Disaster Mitigation Act of 2000 requires communities to identify the community's vulnerability to natural hazards, and recommends identifying the types and numbers of buildings and infrastructure that could be affected by hazards [201.6(c)(2)(*ii*)(A)]. Expanding the inventory of buildings that are vulnerable to coastal erosion helps the county assess its overall vulnerability to this hazard. A more accurate assessment of its coastal erosion vulnerability can assist the county in identifying and selecting appropriate methods for landslide risk mitigation.

Ideas for Implementation:

- Incorporate the results of the DOGAMI coastal erosion hazard zone mapping effort into the County Natural Hazards Mitigation Plan Risk Assessment, and the comprehensive plan inventory.
- Identify the location and extent of hazard areas and establish a factual base to support implementation of future measures;
- Analyze the risk of these areas to life, property, and infrastructure; and
- Develop public information to emphasize economic risk when building on lands subject to coastal erosion

Coordinating Organization:	Lincoln County Planning

Internal Partners:	**External Partners:**
Lincoln County Public Works/Emergency Services	DOGAMI, Cities

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
2 years		

Form Submitted by:	**Lincoln County Planning Department**

Coastal Erosion #2:

Proposed Action Item:	**Alignment with Plan Goals:**
Improve knowledge of effects of climate change and understanding of vulnerability and risk to life and property in hazard prone areas.	• Education and Outreach • Protection

Rationale for Proposed Action Item:

- Increasing global temperature is expected to cause an increase in the intensity of storm events, significant changes to the amount and pattern of precipitation, and an overall rise in sea level. These factors may increase Lincoln County's risk to coastal erosion. The Disaster Mitigation Act of 2000 requires communities to identify the community's vulnerability to natural hazards; incorporating best available information on the effects of climate change will allow a more accurate identification of vulnerability over time.

Ideas for Implementation:

- Incorporate new scientific studies into the Lincoln County Natural Hazard Mitigation Plan Risk Assessment, and the comprehensive plan inventory.

Coordinating Organization:	Lincoln County Planning

Internal Partners:	**External Partners:**
Lincoln County Public Works/Emergency Services	DOGAMI, Cities

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	

Form Submitted by:	**Lincoln County Planning Department**

Coastal Erosion #3:

Proposed Action Item:	**Alignment with Plan Goals:**
Evaluate revising existing county coastal hazard area regulations based on the DOGAMI risk zone mapping	• Protection • Natural Resources

Rationale for Proposed Action Item:

- In recent years, DOGAMI has evaluated coastal erosion hazard zones along dune and bluff backed shorelines in Lincoln County, Oregon. These have resulted in two publications: Coastal Erosion Hazard Zones along Dune and Bluff-Backed Shorelines, Lincoln County, Cascade Head to Seal Rock (2004), and Seal Rock to Cape Perpetua (2007.) Overall these maps identified high risk coastal erosion hazard areas.
- 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*)]. Adopting development ordinances that would regulate development activities based on relative risk from coastal erosion could help limit overall vulnerability of new development to coastal erosion.

Ideas for Implementation:

- Use DOGAMI hazard mapping (Open File Reports 0-04-09 and 0-07-01) as well as other sources as a potential basis for new code.
- Incorporate the use of financial incentives or disincentives to promote development outside the identified risk areas.

Coordinating Organization:	Lincoln County Planning

Internal Partners:		**External Partners:**
Lincoln County Emergency Services, Public Works, GIS		DOGAMI
Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	

Form Submitted by:	**Lincoln County Planning Department**

Earthquake #1:

Proposed Action Item:	**Alignment with Plan Goals:**
Integrate new earthquake hazard mapping data for Lincoln County and improve technical analysis of earthquake hazards.	• Education and Outreach • Partnerships • Protection • Natural Resources

Rationale for Proposed Action Item:

- In a self hazard analysis, Lincoln County rated itself as having a high earthquake rating. Increasing knowledge about the extent of earthquake and making this information available through published maps and other documents will increase public awareness regarding the county's vulnerability to future earthquakes.
  Lincoln County's probability for, and vulnerability to, earthquake is addressed by the NHMP as being moderate or high. A GIS data repository and clearinghouse would allow agencies responsible for hazard mitigation to access the most current information, improving their ability to mitigate for earthquake hazards. This will assist the county in reducing its overall risk to earthquake.

Ideas for Implementation:

- Update Lincoln County earthquake HAZUS data using more localized data; and
  Conduct risk analysis incorporating HAZUS data and the created hazard maps using GIS technology to identify risk sites and further assist in prioritizing mitigation activities and assessing the adequacy of current land use requirements.

Coordinating Organization:	GIS

Internal Partners:	**External Partners:**
Public Works, Planning, Emergency Services	OSU, USGS, BLM, MWVCOG, OEM, FEMA, DOGAMI

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
1-2 years		

Form Submitted by:	**Lincoln County Planning Department**

Earthquake #2:

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage reduction of nonstructural and structural earthquake hazards in homes, schools, businesses, and government offices.	• Emergency Services • Protection • Natural Resources • Partnerships

Rationale for Proposed Action Item:

- In a self hazard analysis, Lincoln County rated itself as having a high earthquake rating. Increasing knowledge about the extent of earthquake risk in order to educate residents about retrofitting homes and structures can help mitigate the county's vulnerability to future earthquakes.
- The Disaster Mitigation Act of 2000 requires communities to identify how the community will continue to involve the public in the plan maintenance process [201.6(c)(4)(*iii*)]. Educating the public helps keep the public informed of what is being done with the plan, how the County is working to mitigate its risk to hazards, and allows for feedback and suggestions from the public for improving, updating, and maintaining the plan.

Ideas for Implementation:

- Provide information to government building and school facility managers and teachers on securing bookcases, filing cabinets, light fixtures, and other objects that can cause injuries and block exits;
- Encourage facility managers, business owners, and teachers to refer to FEMA.s practical guidebook, *Reducing the Risks of Nonstructural Earthquake Damage*;
- Encourage homeowners and renters to use *Is Your Home Protected from Earthquake Disaster? A Homeowner's Guide to Earthquake Retrofit* (IBHS) for economic and efficient mitigation techniques;
- Work with local building supply outlets to feature checklists/retrofit kits for reducing nonstructural risk;
- Explore partnerships to provide retrofitting classes for homeowners, renters, building professionals, and contractors;
- Conduct periodic safety surveys (vs. inspections) of nonstructural seismic hazards;
- Use home shows to promote nonstructural strategies and mitigation information; and
- Target development located in potential fault zones or in unstable soils for intensive education and retrofitting resources.

Coordinating Organization:	Emergency Services

Internal Partners:	**External Partners:**
Building, Planning, Risk Management, Lincoln County Public Schools	City building officials, school districts, builders. associations, IBHS, Red Cross, DOGAMI, Lincoln Fire, FEMA, OEM

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
1-2 years		

Form Submitted by:	**Lincoln County Planning Department**

Earthquake #3:

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage purchase of earthquake hazard insurance by forming partnerships with the insurance and real estate industries.	• Education and Outreach • Protection • Natural Resources

Rationale for Proposed Action Item:

- In a self hazard analysis, Lincoln County rated itself as having a high earthquake rating. Increasing knowledge about the availability and coverage of earthquake insurance will assist in mitigating long term risk from earthquake damage.

Ideas for Implementation:

- Provide earthquake insurance information to Lincoln County residents;
- Make contacts with insurance industry representatives to keep current about their requirements, rates, and plans; and
- Work with real estate industry representatives to educate them about what types of structures are resistant to earthquakes.

Coordinating Organization:	Emergency Services

Internal Partners:	**External Partners:**
Planning	Local insurance agencies, mortgage companies, insurance and real estate industries, DOGAMI

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
1-2 years		

Form Submitted by:	**Lincoln County Planning Department**

Earthquake #4:

Proposed Action Item:	**Alignment with Plan Goals:**
Promote and enforce building code standards related to seismic safety.	• Education and Outreach • Protection • Natural Resources

Rationale for Proposed Action Item:

- In a self hazard analysis, Lincoln County rated itself as having a high earthquake rating. Promoting and enforcing appropriate building code standards will help reduce vulnerability of new buildings from future earthquake events.

Ideas for Implementation:

- Continue building code education, promotion, and utilization to ensure earthquake resistant new construction.

Coordinating Organization:	Planning and Building

Internal Partners:	**External Partners:**
	Builders, developers, property owners

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	

Form Submitted by:	**Lincoln County Planning Department**

Earthquake #5:

Proposed Action Item:	**Alignment with Plan Goals:**
Use seismic strength evaluations of critical facilities to identify vulnerabilities and to meet current seismic standards	• Emergency Operations • Education and Outreach • Partnerships • Protection

Rationale for Proposed Action Item:

- Oregon Senate Bill 3 (2005) enables the Oregon Office of Emergency Management to develop a grant program to seismically rehabilitate critical public facilities. While the grant program is still being developed, the existing DOGAMI inventory of critical facilities is available to assist communities in obtaining funding once the grant program is in place.
- The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that protect new and existing buildings [201.6(c)(3)(ii)]. Seismically retrofitting existing critical facilities will help communities in Lincoln County reduce their vulnerability to seismic events.

Ideas for Implementation:

- Develop an inventory of schools, universities, and critical facilities that do not meet current seismic standards;
- Retrofit older public buildings to bring them up to current earthquake standards.
- Encourage owners of non-retrofitted reservoirs to upgrade them to meet seismic standards; and
- Encourage all water providers to replace all old cast iron pipes with more ductile iron, and identify partnership opportunities with other agencies for pipe replacement.

Coordinating Organization:	Emergency Services

Internal Partners:	**External Partners:**
Planning and Building	City planning departments; water service providers; OAWU; school districts, hospitals, ODOT, colleges and universities; architects, Oregon Building Codes Division

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	

Form Submitted by:	**Lincoln County Planning Department**

Earthquake #6:

Proposed Action Item:	**Alignment with Plan Goals:**
Identify funding sources for and implement high priority structural and nonstructural retrofits of structures that are identified as seismically vulnerable.	• Education and Outreach • Partnerships • Implementation

Rationale for Proposed Action Item:

- Oregon Senate Bill 3 (2005) enables the Oregon Office of Emergency Management to develop a grant program to seismically rehabilitate critical public facilities. While the grant program is still being developed, the existing DOGAMI inventory of critical facilities is available to assist communities in obtaining funding once the grant program is in place.
- The Disaster Mitigation Act of 2000 requires communities to identify comprehensive actions that protect new and existing buildings [201.6(c)(3)(ii)]. Seismically retrofitting existing critical facilities will help communities in Lincoln County reduce their vulnerability to seismic events.
- Lack of capital to upgrade structures is a major reason why many public and privately owned buildings and bridges are not retrofitted to current seismic standards.

Ideas for Implementation:

- Evaluate grant and foundations that support earthquake mitigation activities;
- Provide information for property owners, small businesses, and organizations on sources of funds (loans, grants, etc.);
- Explore options for including seismic retrofitting in existing programs such as low-income housing, insurance reimbursements, and pre- and post-disaster repairs.

Coordinating Organization:	Emergency Services

Internal Partners:	**External Partners:**
Planning and Building, County Assessor	Local banks, credit unions, Rural Development (USDA), OECDD; FEMA, OEM

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	

Form Submitted by:	**Lincoln County Planning Department**

Flood #1:

Proposed Action Item:	**Alignment with Plan Goals:**
Explore steps needed to qualify Lincoln County for participation in the NFIP Community Rating System (CRS)	• Protection • Education and Outreach • Partnerships

Rationale for Proposed Action Item:

- The NFIP Community Rating System is a voluntary incentive program that recognizes and encourages community flood plain management activities that exceed minimum NFIP requirements. The goals of the CRS are to reduce flood losses; facilitate accurate insurance rating; promote awareness of flood insurance. Community actions meeting these goals result in discounted flood insurance premiums. County participation in the CRS would thus both reduce risk and save money.

Ideas for Implementation:

- Determine CRS eligibility requirements
- Document existing activities which are creditable under the CRS guidelines
- Complete and submit CRS application

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
Emergency Services, Public Works	DLCD, FEMA, Insurance Services Office (ISO)

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
1-2 years		

Form Submitted by:	**Lincoln County Planning Department**

Flood #2:

Proposed Action Item:	**Alignment with Plan Goals:**
Formalize process for providing warnings of flood events to property owners in flood hazard areas.	• Protection • Education and Outreach • Partnerships • Emergency Operations

Rationale for Proposed Action Item:

- In the flood chapter of the Lincoln County risk assessment, it identifies flood as being a risk to those living in the floodplain. The County's current practice of using resident and property owner phone contacts for providing notice of impending flooding has been effective and it should be expanded and systemized. This will provide improved early warning capability of flood events to at-risk property owners, thus reducing risks to life and property.

Ideas for Implementation:

- Use GIS to develop and maintain a comprehensive database of property owner names and addresses, and contact information for properties in flood hazard areas
- During periods of forecasted flood events, maintain active links on the County's web site to provide access to real time information on flooding conditions and forecasts, including first hand information from area residents

Coordinating Organization:	Emergency Services

Internal Partners:	**External Partners:**
GIS, Sheriff's Office	Fire and Rescue Service providers

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
1-2 years		

Form Submitted by:	**Lincoln County Planning Department**

Flood #3:

Proposed Action Item:	**Alignment with Plan Goals:**
Update the Lower Siletz Flood Mitigation Action Plan; develop flood mitigation action plan(s) for the lower Alsea and Salmon River, and Drift Creek and other areas.	• Protection • Education and Outreach • Partnerships

Rationale for Proposed Action Item:

- The Lower Siletz Flood Mitigation Action Plan provides a successful model for flood hazard mitigation in a targeted area with high vulnerability to loss from recurring flood events. This plan should be updated to document implementation actions completed, and identify additional activities to be addressed.
- Similar high vulnerability areas exist in the developed, flood prone areas along the lower Alsea River, Salmon River and Drift Creek. These areas could benefit from the development of similar mitigation plans.

Ideas for Implementation:

- Seek grant funding to update the existing Siletz plan and develop additional plans for identified areas on other rivers

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
Emergency Services	OEM; FEMA Region X

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	

Form Submitted by:	**Lincoln County Planning Department**

Flood #4:

Proposed Action Item:	**Alignment with Plan Goals:**
Work with affected property owners to elevate or relocate non-conforming, pre-FIRM structures in flood hazard areas	• Protection • Education and Outreach • Partnerships

Rationale for Proposed Action Item:

- Concentrations of pre-FIRM structures in areas subject to flooding are present in several areas along the County's major rivers. Experience with the floods of the late 1990s showed that properly elevated structures in the flood plain performed well during major flood events, most suffering minimal if any, damage. Especially in areas which may be subject to damage during relatively high frequency flood events, elevating structures in conformance with the County's flood hazard area codes (lowest floor at least one foot above the base flood level) is a cost effective way to reduce risk.

Ideas for Implementation:

- Seek grant funding for structure elevation and relocation
- Establish eligibility criteria, focusing on repetitive loss properties and structures located at the lowest elevations
- Implement public outreach and information campaigns to identify and inform property owners of the program

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
Emergency Services	OEM; FEMA Region X

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	

Form Submitted by:	**Lincoln County Planning Department**

Flood #5:

Proposed Action Item:	**Alignment with Plan Goals:**
Continue compliance with the National Flood Insurance Program	• Protection • Coordination

Rationale for Proposed Action Item:

- The National Flood Insurance Program (NFIP) provides communities with federally backed flood insurance, provided that communities develop and enforce adequate floodplain management measures. According to the NFIP, buildings constructed in compliance with NFIP building standards suffer approximately 80 percent less damage annually than those not built in compliance.
- The Disaster Mitigation Act of 2000 requires that communities identify actions and projects that reduce the impact of a natural hazard on the community, particularly to new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Continued participation in the NFIP will diminish flood damage to new and existing buildings in communities while providing homeowners, renters, and business owners with 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 Lincoln County floodplain ordinances to ensure they reflect current flood hazards.

Coordinating Organization:	Lincoln County Planning and Development

Internal Partners:	**External Partners:**
Lincoln County Emergency Services, Building and Public Works	DLCD, relevant cities

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	

Form Submitted by:	**Lincoln County Planning Department**

Landslide #1:

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage construction, site location and design that can be applied to steep slopes to reduce the potential threat of landslides.	• Education and Outreach • Partnerships • Protection • Natural Resources

Rationale for Proposed Action Item:

- The Landslide Annex of Lincoln County's risk assessment identified the potential for landslides to cause damage to buildings and infrastructure within Lincoln County: landslides may cause road closures and interruptions to utility services. The annex also identified previous incidents of landslides that affected Lincoln County, including landslides that accompanied the 1996 storm event. Road closures forced residents to find alternate transportation routes. Working with Lincoln County Public Works and Lincoln County Planning and Development to implement building and construction practices that recognize slope and other landslide risk factors can help mitigate the county's overall risk to landslides.
- 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*)]. Adopting development ordinances that would regulate grading, excavation, development, and cut and fill activities could help limit development that would increase a slope's vulnerability to landslides, or limit development that could increase the potential for loss of life or property due to landslides. Such actions would help the county mitigate its risk to landslides.

Ideas for Implementation:

- Encourage erosion control techniques, such as the temporary use of straw bales, diversion dams, or other physical changes to control storm water runoff during road and site construction;
- Suggest to property owners to reduce water input into slopes from building roof drains, storm drains, and surface runoff;
- Where appropriate, reduce the number of building sites and corresponding disruption of the natural contour and vegetation; and
- Increase communication and coordination between Lincoln County Public Works and Building Departments

Coordinating Organization:	Lincoln County Planning

Internal Partners:	**External Partners:**
Emergency Services, Building, and Public Works	DLCD, Cities

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
1-2 years		

Form Submitted by:	**Lincoln County Planning Department**

Landslide #2:

Proposed Action Item:	**Alignment with Plan Goals:**
Increase public education related to landslide hazards by distributing DOGAMI landslide informational brochure.	• Education and Outreach • Partnerships

Rationale for Proposed Action Item:

- The Landslide Annex of Lincoln County's risk assessment identified the potential for landslides to cause damage to buildings and infrastructure within Lincoln County: landslides may cause road closures and interruptions to utility services. The annex also identified previous incidents of landslides that affected Lincoln County, including landslides that accompanied the 1996 storm event. Road closures forced residents to find alternate transportation routes. Working with Lincoln County to educate landowners about mitigating the affects of landslides can assist landowners in preparing for and responding to potential landslide events. This can help mitigate the county's overall risk to landslides.
- The Disaster Mitigation Act of 2000 requires communities to identify how the community will continue to involve the public in the plan maintenance process [201.6(c)(4)(*iii*)]. Educating landowners on how to mitigate the affects of landslides helps keep the public informed of what is being done with the plan, how the County is working to mitigate its risk to landslides, and allows for feedback and suggestions from the public for improving, updating, and maintaining the plan.

Ideas for Implementation:

- Distribute the DOGAMI landslide informational brochure through Lincoln County Planning and Development, Lincoln County Emergency Services and Lincoln County Public Works.

Coordinating Organization:	Lincoln County Planning

Internal Partners:	**External Partners:**
Emergency Services and Public Works	DLCD, DOGAMI, OEM

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
1-2 years		

Form Submitted by:	**Lincoln County Planning Department**

Landslide #3:

Proposed Action Item:	**Alignment with Plan Goals:**
Mitigate activities in identified potential and historical landslide areas through public outreach.	• Education and Outreach • Partnerships • Protection

Rationale for Proposed Action Item:

- The Landslide Annex of Lincoln County's risk assessment identified the potential for landslides to cause damage to buildings and infrastructure within Lincoln County: landslides may cause road closures and interruptions to utility services. The annex also identified previous incidents of landslides that affected Lincoln County, including landslides that accompanied the 1996 storm event. Road closures forced residents to find alternate transportation routes. Working with Lincoln County to educate landowners about mitigating the affects of landslides can assist landowners in preparing for and responding to potential landslide events. This can help mitigate the county's overall risk to landslides.
- The Disaster Mitigation Act of 2000 requires communities to identify how the community will continue to involve the public in the plan maintenance process [201.6(c)(4)(*iii*)]. Educating landowners on how to mitigate the affects of landslides helps keep the public informed of what is being done with the plan, how the County is working to mitigate its risk to landslides, and allows for feedback and suggestions from the public for improving, updating, and maintaining the plan.

Ideas for Implementation:

- Distribute the DOGAMI landslide informational brochure.
- Coordinate with property owners to reduce risk in landslide hazard areas;
- Provide information on hazard location to future residents;
- Distribute landslide educational materials to the public; and
  Identify and use existing mechanisms for public outreach (e.g., SWCD, NRCS, watershed councils, OSU Extension, etc.).

Coordinating Organization:	Lincoln County Planning, Emergency Services

Internal Partners:	**External Partners:**
Public Works	ODF, cities, mortgage companies

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	3-5 years	

Form Submitted by:	**Lincoln County Planning Department**

Landslide #4:

Proposed Action Item:	**Alignment with Plan Goals:**
Protect existing development in landslide-prone areas.	• Partnerships • Education and Outreach • Protection • Natural Resources

Rationale for Proposed Action Item:

- The Landslide Annex of Lincoln County's risk assessment identified the potential for landslides to cause damage to buildings and infrastructure within Lincoln County: landslides may cause road closures and interruptions to utility services. The annex also identified previous incidents of landslides that affected Lincoln County, including landslides that accompanied the 1996 storm event. Road closures forced residents to find alternate transportation routes. Reviewing and monitoring existing public infrastructure to identify specific exposure to landslide risk.
- 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*)]. Identifying existing public infrastructure with exposure to landslide risk will allow the implementation of mitigation measures to reduce this risk.

Ideas for Implementation:

- Provide information to residents on landslide prevention. Publications such as FEMA's *Homeowners Landslide Guide for Hillside Flooding, Debris Flows, Erosion, and Landslide Control* and FEMA's *Hillside Drainage* flier have some ideas about reducing landslide susceptibility;
- Encourage easements to restrict certain activities on landslide-prone properties. Easements foregoing the right to develop a property can be either sold or granted to the county or other organizations by property owners;
- Construct debris flow diversions to protect existing properties
- Ensure that ditches, stormwater facilities, and culverts are inspected and cleared prior to the wet season each year; and
- Encourage the placement of culverts built for 50 to 100-year flood events.

Coordinating Organization:	Emergency Services, Public Works

Internal Partners:	**External Partners:**
Planning, GIS	DLCD, OEM, FEMA, ODF, Cities

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	

Form Submitted by:	**Lincoln County Planning Department**

Tsunami #1:

Proposed Action Item:	**Alignment with Plan Goals:**
Determine ways of mitigating the vulnerability of assets (such as fire stations, equipment, and utilities) likely to be impacted by tsunami.	• Protection • Education and Outreach • Emergency Operations

Rationale for Proposed Action Item:

- The tsunami chapter of Lincoln County's risk assessment identified a significant tsunami event as having the potential to cause disruption of power, contamination of water supplies, loss of essential communication systems, a large amount of debris, and traffic congestion. A tsunami has the potential to damage critical buildings and infrastructure in the tsunami inundation zone. Lincoln County GIS has already indentified all critical facilities in the tsunami inundation zone. Mitigating the effects that a tsunami has on County assets is a high priority.
- 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*)]. Assessing and evaluating needed mitigation for critical assts in the tsunami inundation zone, can assist the County in determining what further actions are needed to help mitigate Lincoln County's risk to tsunami.

Ideas for Implementation:

- Coordinate emergency response to disaster, enhance local mapping capabilities and forecasting, encourage tsunami evacuation training for emergency responders**.**
- Investigate relocation alternatives for critical facilities in the tsunami inundation zone.

Coordinating Organization:	Emergency Services

Internal Partners:		**External Partners:**
Planning		DOGAMI
Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
1-2 years		

Form Submitted by:	**Lincoln County Planning Department**

Tsunami #2:

Proposed Action Item:	**Alignment with Plan Goals:**
Work with coastal communities, citizen groups, property owners, recreation areas, emergency responders, schools and businesses in promoting tsunami awareness and evacuation.	• Protection • Education and Outreach • Emergency Operations

Rationale for Proposed Action Item:

- The tsunami chapter of Lincoln County's risk assessment identified people and properties located in low-lying areas near the ocean as being at risk from tsunami inundation. Increasing public outreach to educate residents about their risk to tsunami as well as what to do in the event of a tsunami will help decrease their vulnerability to tsunami.
- The Disaster Mitigation Act of 2000 requires communities to identify how the community will continue to involve the public in the plan maintenance process [201.6(c)(4)(*iii*)]. Educating landowners on how to mitigate the affects of tsunami helps keep the public informed of what is being done with the plan, how the County is working to mitigate its risk to tsunami, and allows for feedback and suggestions from the public for improving, updating, and maintaining the plan.

Ideas for Implementation:

- Distribution of Tsunami information describing dangers and evacuation routes for visitors at the coast and continued educational outreach for residents and business owners.

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
Emergency Services	City Planning Departments

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
1-2 years		

Form Submitted by:	**Lincoln County Planning Department**

Tsunami #3:

<table>
<tr><td colspan="2">Proposed Action Item:</td><td>Alignment with Plan Goals:</td></tr>
<tr><td colspan="2">Improve technology capacity of communities, agencies and responders needed to adequately map hazard areas, broadcast warnings, inform, and educate residents and visitors of tsunami dangers</td><td>• Protection
• Education and Outreach
• Emergency Operations
• Partnerships</td></tr>
<tr><td colspan="3">Rationale for Proposed Action Item:</td></tr>
<tr><td colspan="3">• The tsunami chapter of Lincoln County’s risk assessment identified people and properties located in low-lying areas near the ocean as being at risk from tsunami inundation. Dealing with evacuees would be a major challenge in the first days after the event. Improving technology, particularly GIS and communications, for the identification of response needs such as addressing the adequacy of evacuation routes in the event of a tsunami will help decrease their vulnerability to tsunami.
• The Disaster Mitigation Act of 2000 requires communities to identify how the community will continue to involve the public in the plan maintenance process [201.6(c)(4)(iii)]. Improving technology capacity will allow more widespread dissemination of information, thus assisting in keeping residents informed of what is being done with the plan, how the County is working to mitigate its risk to tsunami, and allowing for feedback and suggestions from the public for improving, updating, and maintaining the plan.</td></tr>
<tr><td colspan="3">Ideas for Implementation:</td></tr>
<tr><td colspan="3">• Improve and utilize tsunami information, utilize technology to assist in determining evacuation needs and concerns.</td></tr>
<tr><td>Coordinating Organization:</td><td colspan="2">Emergency Services</td></tr>
<tr><td colspan="2">Internal Partners:</td><td>External Partners:</td></tr>
<tr><td colspan="2">GIS</td><td>Cities, Radio, DOGAMI</td></tr>
<tr><td colspan="2">Timeline:</td><td>If available, estimated cost:</td></tr>
<tr><td>Short Term (0-2 years)</td><td>Long Term (2-4 or more years)</td><td rowspan="2"></td></tr>
<tr><td></td><td>Ongoing</td></tr>
<tr><td>Form Submitted by:</td><td colspan="2">Lincoln County Planning Department</td></tr>
</table>

Tsunami #4:

Proposed Action Item:	**Alignment with Plan Goals:**
Ensure coordination of the local coastal tsunami warning system with the current National Weather Service system.	• Protection • Education and Outreach • Emergency Operations • Partnerships

Rationale for Proposed Action Item:

- The tsunami chapter of Lincoln County's risk assessment identified people and properties located in low-lying areas near the ocean as being at risk from tsunami inundation. Providing warning to these assets before a tsunami hits is of significant concern to Lincoln County.
- The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(ii)]. Providing adequate warning to residents in the tsunami inundation zone in the event of a tsunami can help decrease the County's risk to tsunami events.

Ideas for Implementation:

- Develop a system to warn the Lincoln County Coastline in coordination with existing State and Federal systems.

Coordinating Organization:	Emergency Services

Internal Partners:	**External Partners:**
Public Works, Lincoln County Sheriff's Department	Cities, Coastal Fire Agencies, ODOT

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	

Form Submitted by:	**Lincoln County Planning Department**

Wildfire #1:

Proposed Action Item:	**Alignment with Plan Goals:**
Develop a Community Wildfire Protection Plan for Lincoln County in compliance with the standards of the Healthy Forests Restoration Act (HFRA).	• Protection • Education and Outreach • Partnerships

Rationale for Proposed Action Item:
Wildfire incidents are most likely to occur in wildland urban interface communities. 90% of Lincoln County is forest land; communities within these areas are therefore especially vulnerable to wildfire. In order to complete a more thorough risk assessment it is important that the County complete a Community Wildfire Protection Plan, so that it can then mitigate that risk

Ideas for Implementation:
Coordinate with local and regional fire departments, rural fire department districts and other fire protection agencies for preparation and completion of the CWPP.

Coordinating Organization:	Emergency Services

Internal Partners:	**External Partners:**
GIS, Planning	ODF, local fire protection districts, and state and federal land managers.

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
1-2 years		

Form Submitted by:	**Lincoln County Planning Department**

Windstorm #1:

Proposed Action Item:	**Alignment with Plan Goals:**
Develop and implement programs to keep trees from threatening lives, property, and public infrastructure during windstorm events.	• Education and Outreach • Partnerships • Implementation • Emergency Operations • Protection

Rationale for Proposed Action Item:

- Lincoln County's risk assessment identified tree falls during windstorm events as a risk to the county. During a windstorm, tree falls have the potential to damage buildings and infrastructure, block roadways, and down overhead power lines, causing electric power failures. Tree pruning helps reduce the vulnerability of trees to windstorms, mitigating the potential damage they could cause to buildings and infrastructure during a windstorm.
- 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*)]. Developing public/private partnerships to educate the public can help pool resources for mitigation. Tree pruning will help reduce the trees' vulnerability to windstorms. Reducing tree vulnerability reduces the risk that trees will be downed in a windstorm, damaging buildings and infrastructure. Having pruning standards before tree pruning begins assists work crews responsible for pruning: standards allow work crews to know they are sufficiently completing pruning jobs the first time out, maximizing time, money, and other resources.

Ideas for Implementation:

- Partner with responsible agencies and organizations to design and disseminate education information to property owners to reduce risk from tree failure to life, property, commerce and utility systems;
- Develop partnerships between utility providers and county and local public works agencies to document known hazard areas and minimize risks;
- Identify and find solutions to potentially hazardous trees in urban areas, near utility corridors, and near vital infrastructure; and
- Partner with responsible agencies and organizations to develop landscaping and tree programs that have less impact on aboveground utility lines and roads.

Coordinating Organization:	Public Works, Planning and Development

Internal Partners:	**External Partners:**
GIS	Cities, USFS, BLM, State Parks, utility providers

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
2 Years		

Form Submitted by:	**Lincoln County Planning Department**

Windstorm #2:

Proposed Action Item:	**Alignment with Plan Goals:**
Develop and implement, or enhance strategies for debris management and/or removal after windstorm events	• Natural Resources • Partnerships • Implementation • Emergency Operations • Protection

Rationale for Proposed Action Item:

- Lincoln County's risk assessment identified debris during windstorm events as a risk to the county. During a windstorm, debris has the potential to block roadways, leaving transportation routes impassable to emergency services. Having adequate resources after a windstorm will prevent this.
- The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(*ii*)]. Identifying a means of clearing roads after a windstorm can assist the County in decreasing its vulnerability to windstorm. A better identification of its windstorm vulnerability can assist the County in better identifying and prioritizing projects that can assist the County in mitigating its overall risk to windstorm.

Ideas for Implementation:

- Develop coordinated management strategies for clearing roads of fallen trees, and clearing debris from public and private property;
- Coordinate with those local agencies responsible for debris removal and provide residents locations for debris disposal; and
- Notify area residents, business owners, and employees of alternative routes in case of road blockage.

Coordinating Organization:	Emergency Services, Solid Waste District

Internal Partners:	**External Partners:**
Public Works	ODOT, cities, regional recycling facilities

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
2 Years		

Form Submitted by:	**Lincoln County Planning Department**

Windstorm #3:

Proposed Action Item:	**Alignment with Plan Goals:**
Map and publicize locations around the county that have the highest incidence of extreme windstorms.	• Natural Resources • Protection

Rationale for Proposed Action Item:

- The windstorm chapter of Lincoln County's risk assessment identified high winds as a risk to the county. During a windstorm, high winds can cause tree falls and have the potential to damage buildings and infrastructure, block roadways, and down overhead power lines, causing electric power failures. Developing a map of areas that have the highest incidence of windstorm can help the County in better identifying and prioritizing projects that can assist the County in mitigating its overall risk to windstorms.
- The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(*ii*)]. Developing an inventory of areas most subject to extreme wind conditions can help the County identify locations more vulnerable to damage caused by windstorms. Such information can help the County in better identifying and prioritizing projects that can assist the County in mitigating its overall risk to windstorms.

Ideas for Implementation:

- Identify a responsible agency for central collection and reporting of storm data. Data collected should include: Windstorm data (sustained speeds, gusts, storm durations) for localities throughout the county. Maps of the locations within the county most vulnerable to high winds. Injury and property damage estimates, including locations. Identify a responsible agency to collect and transfer data to the National Climate Data Center (NCDC), Oregon Climate Service (OCS), FEMA, or other agencies concerned with the incidence of storms, to help establish and maintain baseline and historic records of storm events; and Identify public infrastructure and facilities subject to damage or closure during windstorm events.

Coordinating Organization:	Emergency Services

Internal Partners:	**External Partners:**
Planning, GIS	FEMA, NCDC, OCS, NWS

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	5 years	

Form Submitted by:	**Lincoln County Planning Department**

Windstorm #4:

Proposed Action Item:	**Alignment with Plan Goals:**
Increase public awareness of windstorm mitigation activities.	• Natural Resources • Protection • Emergency Operations • Education and Outreach

Rationale for Proposed Action Item:

- The windstorm chapter of Lincoln County's risk assessment identified windstorm events as a risk to the county. Increasing public awareness of the hazards associated with windstorms, including building damage, tree falls, and down overhead power lines, can helping mitigate the county's risk to windstorms.
- 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*)]. Developing public/private partnerships to educate the public can help pool resources for mitigation. Outreach provided by such an effort could educate property owners, assisting them to reduce the vulnerability to windstorms of buildings, trees and overhead power lines on their property, helping reduce the county's overall risk to windstorms.

Ideas for Implementation:

- Collect existing information on public education materials for protecting life, property, and the environment from windstorm events;
- Identify and collect additional information and programs as necessary; and
- Distribute educational materials to County residents and public and private sector organizations regarding preparedness for no-power situations.

Coordinating Organization:	Emergency Services

Internal Partners:	**External Partners:**
Planning	Utilities, cities, FEMA

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	

Form Submitted by:	**Lincoln County Planning Department**

Windstorm #5:

Proposed Action Item:	**Alignment with Plan Goals:**
Continue and enhance windstorm resistant construction methods where possible to reduce damage to utilities and critical facilities from windstorms.	• Protection • Education and Outreach

Rationale for Proposed Action Item:

- The windstorm Chapter of Lincoln County's risk assessment identified tree falls during winter storm events as a risk to the county. During a windstorm, tree falls have the potential to damage buildings and infrastructure, and down overhead power lines, causing electric power failures. Having wind resistant utilities and critical facilities can help decrease disruptions in services, mitigating the county's risk to windstorms.
- The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(*ii*)]. Having wind resistant critical facilities and utilities in the event of a windstorm can help decrease disruptions in services, mitigating the County's risk to windstorms.

Ideas for Implementation:

- Seek grants for increasing the use of underground utilities where possible;
- Provide guidance on wind-resistant construction methods.

Coordinating Organization:	Planning

Internal Partners:	**External Partners:**
Emergency Services	Cities, utilities

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	5 years	

Form Submitted by:	**Lincoln County Planning Department**

Windstorm #6:

Proposed Action Item:	**Alignment with Plan Goals:**
Encourage critical facilities to secure emergency power.	• Protection • Education and Outreach • Emergency Operations • Partnerships • Natural Resources

Rationale for Proposed Action Item:

- The windstorm chapter of Lincoln County's risk assessment identified tree falls during windstorm events as a risk to the county. During a windstorm, tree falls have the potential to damage buildings and infrastructure, and down overhead power lines, causing electric power failures. Providing backup power to critical facilities in the event of a windstorm can help decrease disruptions in services, mitigating the County's risk to windstorms.
- The Disaster Mitigation Act of 2000 requires communities to identify actions and projects that reduce the effects of hazards on the community [201.6(c)(3)(*ii*)]. Providing backup power to critical facilities in the event of a windstorm can help decrease disruptions in services, mitigating the county's risk to windstorm events.

Ideas for Implementation:

- Seek funding and capital improvements for emergency power supplies for all identified critical facilities.

Coordinating Organization:	Emergency Services

Internal Partners:	**External Partners:**
Planning	Cities, neighboring counties, Lincoln Fire, police stations, water systems

Timeline:		**If available, estimated cost:**
Short Term (0-2 years)	Long Term (2-4 or more years)	
	Ongoing	

Form Submitted by:	**Lincoln County Planning Department**

Volume IV: Mitigation Resources

Appendix B: Planning and Public Process

Oregon Natural Hazards Workgroup
University of Oregon Community Service Center
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DEPARTMENT OF PLANNING AND DEVELOPMENT

210 S. W. 2nd ST
Newport, OR 97365
(541) 265-4192
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LINCOLN COUNTY PRE-DISASTER MITIGATION PLAN

Steering Committee First Quarterly Meeting
November 29, 2007

Time: 2:00 p.m.
Location: Public Service Building
210 SW 2nd St. Newport, Or. 97365

Agenda

i. Introductions
ii. Describe the Scope of Work and Timeline of the Natural Hazards Mitigation Plan
iii. Discuss Hazards to be Addressed
iv. Develop Plan Mission and Goals
v. Discuss a Public Involvement Strategy
vi. Schedule Next Steering Committee Meeting

Steering Committee Members

Jessica Bondy, Senior Planner- Lincoln County Department of Planning and Development

David Farr, Resource Assistance for Rural Environments (RARE) Intern- Lincoln County Department of Planning and Development

Jim Hawley, Emergency Services- Lincoln County

Jim Buisman, Director of Public Works- Lincoln County

Sheriff Dennis Dotson- Lincoln County Sheriffs Department

Chief Don Baker- Lincoln County Fire Marshall

Nancy Batchelder, City Recorder- City of Yachats

Larry Lewis, City Planner- Cities of Depoe Bay and Waldport

Steering Committee Roles and Responsibilities

The actual planning process and documentation development will be accomplished by the Lincoln County Department of Planning Development. The planning process as defined under the Scope of Work begins by working with a Steering Committee. The Steering Committee is made up of representatives of the community that have direct involvement in disaster mitigation activities. The committee will help guide the development of the Natural Hazards Mitigation plan by setting goals, identifying appropriate activities, and developing a process for public participation.

Specifically, the committee can work to:

- Establish working groups to address specific issues or needs;
- Ensure coordination of the plan with affected parties;
- Distribute the plan to stakeholders by various means;
- Present findings to the community;
- Develop clear, effective educational materials;
- Oversee implementation of mitigation activities; and
- Develop and implement a communication plan to better inform the public about the benefits of risk reduction and loss prevention.

To begin this process, we want to explore some basic questions:

- From your organizations perspective, what hazard(s) pose the greatest threat to the community and why?
- Does your organization maintain information or data on the impact of previous disasters?
- What role can your organization play in reducing risk in the community?
- Does your organization have any plans or policies that might be used to implement natural hazard risk reduction activities?
- What agencies or organizations in the community or region do you think should be involved in risk reduction activities in Lincoln County?

Also during this first meeting, we hope to define a **mission statement** for the overall plan. Staff will present a draft mission statement to the Steering Committee as a starting point. In general, we seek to answer questions such as: who does the plan serve, what does the plan do, and what can the plan accomplish. We also want to **identify goals** the community intends to work

toward mitigating risk from natural hazards. Again, staff will present draft goals to the Steering Committee at the first meeting. The following are goals that the committee may consider:

- Protect life and property;
- Coordinate and enhance emergency services;
- Improve structural integrity of public buildings;
- Enhance and promote public education; and
- Promote partnerships and coordination to improve implementation

The committee may choose to revise these goals and/or add or subtract from them.

Finally, we hope to put ideas together to formulate a **public involvement strategy**. The goal of the public involvement strategy is to ensure the plan includes diverse community perspectives, reflects community needs, and assists in gathering support and participation during plan implementation. Certain elements are expected to be considered in a public involvement strategy such as stakeholder interviews. Examples of strategies may include public meetings, posting information on the County website, disseminating information, among others.

We expect the Steering Committee to meet 4-6 times during the next 11 months or so. Meetings would last 1-2 hours as needed. The Steering Committee is intended to remain active once the plan is adopted, meeting occasionally to review the status of the plan.

Steering Committee Meeting: Nov. 29, 2007

Present: Jim Buisman, Lincoln County Public Works, Nancy Batchelder, City Recorder-City of Yachats, Jim Hawley, Lincoln County Emergency Services, Don Baker North Lincoln County Fire and Rescue, Dennis Dotson, Lincoln County Sherriff's Office, Larry Lewis, City Planner-Depoe Bay and Waldport

Mission Statement: The mission statement was approved by the Lincoln County Steering Committee:
The mission of the Lincoln County Mitigation Plan is to promote public policy and mitigation activities which will enhance the safety to life and property from natural hazards.

Goals Statement: The goals statement was approved by the Lincoln County Steering Committee:
-Protect life and property
-Preserve natural areas and features;
-Coordinate and enhance emergency services;
-Improve structural integrity of public buildings;
-Enhance and promote public education;
-Promote partnerships and coordination to improve implementation

List of Stakeholders:
-Siletz Indian Tribe
Pamela Barlow Lind
Phone: 541-444-8361, 800-922-1399 x1361
Email: pamelal@ctsi.nsn.us
-Hospital
Samaritan Pacific Communities Hospital
Lisa Ely
574-4898
lely@samhealth.org
-Ports
Newport
Don Mann
Phone (541) 265-7758
-Parks and Recreation
Tony Stein
Voice: (541) 265-9871
John Allen
-American Red Cross
Oregon Pacific Chapter
(541) 265-7182
-Chamber of Commerce
Central Coast Economic Development Alliance
541-765-4380
-City public works

-Lincoln County School District
-NOAA/Hatfield Marine Science Center
-Toledo Mill/Georgia Pacific
-Emergency Broadcasting/Radio
-ODOT
-Public Health Office
-Coast Guard
-Siuslaw National Forest

Public Involvement Strategy:
-Website
-Brochure
-Public Meeting
-Stakeholder interviews

Existing Mitigation:

Disaster Preparedness For You and Your Household- LC Health and Human Services Emergency Preparedness Program, LC Emergency Services, American Red Cross

Homeowner's Landslide Guide- Oregon Emergency Management, Federal Emergency Management Agency Region 10

Protect Your Home from Flood Damage: Mitigation Ideas for Reducing Flood Losses- FEMA

Planning for Survival: How to protect your home from wildfires- BLM, ODF, USFS,

An Action Plan for Protecting Rural/Forest Lands from Wildfire- Department of Forestry, Department of Land Conservation and Development, Emergency Management Division, Office of State Fire Marshal

Special Paper 31: Mitigating Geologic Hazards in Oregon: A Technical Reference Manual- DOGAMI

Tsunami Hazard Map of the Yaquina Bay Area, Lincoln County, Oregon- DOGAMI

Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities- Communities Committee, National Association of Counties, National Association of State Foresters, Society of American Foresters, Western Governors' Association

Natural Hazards:
Earthquake
Fire
Flood

Landslide/Coastal Erosion
Tsunami
Volcanic activity
Windstorm
Drought
Terrorism?

FEMA Review Sheet: Local Natural Hazards Mitigation Plan Determination
www.oregonshowcase.org/downloads/pdf/plans/FEMA_Review_Sheet.doc

Comments: Don Baker asked a question regarding if this plan would cover how many hospital beds would be available post-disaster. This was a good clarifying question as I explained that this was a pre-disaster mitigation plan concentrating on loss prevention and risk reduction.

SAMPLE: USE THIS AS A SIGN-IN SHEET AT THE MEETING

Name of Event/Meeting: Disaster Mitigation Steering Committee Meeting

Date of Event/Meeting: Nov. 29th, 2007 Scheduled Time of Event/Meeting: 2:00

Name	Representing	Email	Roundtrip mileage (if applicable)	Hourly Rate
JIM BUISMAN	LINCOLN CO PUBLIC WORKS	jbuisman@co.lincoln.or.us		
Jessica Bondy	Lincoln Co. Planning	jbondy@co.lincoln.or.us		
Nancy Batchelder	City of Yachats	nancy@ci.yachats.or.us		
Jim Hazlett	Lincoln Co. Emergency Serv	jhazlett@co.lincoln.or.us		
Don Baker	NORTH LINCOLN FIRE + RESCUE	DBAKER@NLFR.ORG		
DENNIS DOTSON	LINCOLN COUNTY SHERIFF'S OFFICE	ddotson@co.lincoln.or.us		
LARRY LEWIS	Depoe Bay & Waldport	lewis@ci.depoe-bay.or.us larry.lewis@waldport.org		

DEPARTMENT OF PLANNING AND DEVELOPMENT

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LINCOLN COUNTY PRE-DISASTER MITIGATION PLAN

Steering Committee Second Quarterly Meeting
April 7, 2008

Time: 2:00 p.m.
Location: Planning Conference Room
210 SW 2nd St. Newport, Or. 97365

Agenda

i. Introductions
ii. Project Update
iii. Community Assets and Vulnerabilities
iv. Hazard Annexes
v. Discuss Potential Action Items (Mitigation Projects)
vi. Schedule Next Steering Committee Meeting

Present: Jessica Bondy, Lincoln County Planning; Jim Buisman, Lincoln County Public Works; Matt Spangler, Lincoln County Planning; Megan Findley, Oregon Partnership for Disaster Resilience; Krista Dillon, Oregon Partnership for Disaster Resilience; Don Baker, North Lincoln Fire and Rescue; Dennis Dotson, Sherriff's Office; Jim Hawley, Emergency Services; Larry Lewis, Depoe Bay, Waldport, Yachats.

Project Update:
-Sec 2, sent to members of Steering Committee, told them to email feedback.
-12 Stakeholder interviews conducted
-Hazard Annexes in rough draft form.

-Community Assets and Vulnerabilities Exercise
Jessica Bondy explained exercise, gave pre-filled out exercise sheets to Steering Committee members as well as blank exercise sheets so members

could fill in missing information. Referred to GIS/hazard maps as a great tool to identify these community assets and vulnerabilities

Hazard Annexes: Summarized by David Farr
-Should Coastal Erosion and Landslide be divided up into separated annexes?: Yes
-Winterstorm and Windstorm could be combined into Severe Storm or divided up- up to RARE participant.
-Drought, Volcano, included? Not necessary- could add annex, but only needs to be 1 page per.
-Continued with summarization of hazard annexes followed by commentary from Steering Committee.
Hazards:
-Landslide/Coastal Erosion
    -Drainage needs to be maintained
    -weight issues associated with trees
    -Cape Foulweather in 1995- event
    -1996 slides at Cape Perpetua, N. of Tillamook, 18, and old 101 lost a bridge- meant that Lincoln County was totally isolated
-Flood
    -Salmon River- flooding highly unpredictable
    -Nov of 2006 event
    -AO = ocean zone flooding
    -Are lenders requiring NFIP coverage in Depoe Bay
    -Include success stories
    -Connect NFIP action item with NFIP table
-Wildfire
    -1939-7500 acres south of Yachats
    -Call Depoe Bay Fire District about wildfire in 1970s
    -Brian Ballou- history of fire in Oregon
    -Might consider just one mitigation action: Community Wildfire Plan
    -Link Mitigation Plan and Community Wildfire Plan
-Windstorm/Winterstorm
    -Add Central Lincoln PUD as stakeholder
-Earthquake
    -Scotts Mill- 1993
    -Richter vs. new scale?
    -add amplification maps
    -80 bridges on 350 miles of county road
    -Natural hazard mitigation plan may be used as basis for grant money from different source (Dept. of Homeland Security)
-Tsunami
    -Make a note that inundation maps and other info- from 1995, somewhat outdated
    -Siletz at 40 ft.? Doublecheck

-DOGAMI has constructed % figure for probability
-Look in # of critical facilities in inundation zone
-Vertical elevation structures- potential mitigation action item?
-Tsunami warning signage an issue- scares away visitors in Waldport
-Can use term "maintain and enhance for warning signs

Next Meeting: late May, early June
Meeting closed

HAZARD IDENTIFICATION

Please be as detailed as possible. If you are unable to provide accurate information, and know of someone who can, please list that contact or resource instead.

Hazard	Hazard Location in the Community	History of Hazard in Your Community	Hazard Impacts
Flood	- Ocean - Salmon, Siletz, Yaquina, Alsea, Yachats Rivers, & tributaries Drift, Anderson, Depoe, Olalla, Schooner Creeks	Prior to 64' 12/64 1996 1978 1998 1986 1999 1987 1989 Seasonal 1990 Winter flooding	Erosion, damage to buildings, infrastructure, commerce, other business & daily activities, habitat, public health, safety & welfare
Earthquake	- off-shore Cascadia Subduction Zone - shallow crustal faults	- 1400, 1050, 600, 400, 750, 900 - BCE - Before Common Era 8-9 Mag. 1700 - 9.0 Mag. 1873 - 7.3 1962 - 5.2-5.5 1993 - 5.6 1993 - 5.9-6 Other events } Statewide	fatalities, tsunami, damage to buildings, infrastructure, public, health, safety & welfare, commerce, etc. V - moderate Probability - high
Tsunami		1946 1960 1964 1968 1994	Impacts associated w/ CSZ significant vs. distant tsunami
Wind Storm	- Seasonal high winds throughout community. - Wind speeds higher at headlands and coastline, diminishing inland. - Tornado - Newport 12/73 Waldport 11/84	Table 21 - Significant Windstorms Oregon Coast, notably, 10/67, 1/62, 11/62, 3/63, 1/86, 1/87, 12/87, 3/88, 1/90, 2/90, 11/91, 1/93, 12/95, 11/97, 2/02, 12/07	- fatalities, beach erosion, flooding, trees toppled, transmission lines downed, road closures, buildings damaged, - high vulnerability - high probability

	HAZARD LOCATION	HAZARD HISTORY	HAZARD IMPACT
Landslide / Coastal Erosion	Along major highways - 101, 18, 229, 20, 34 and steep hillsides.	1996 - Statewide 2050 - Hwy 101 closed N. / Florence Annual/Seasonal debris flows/ slope failures	buildings, infrastructure, public health, safety, welfare,
	slope failures along ocean shore bluff and dune-backed erosion	Seasonal / catastrophic / chronic hazard	Buildings / infrastructure / highway closures, bridges
Volcano-Related Hazards	- No known specific location in Lincoln Co. - Cascade Range - off-shore	- No known hazard history in Lincoln Co. - Geologic time	Associated with volcanic Cascade Mountain Range Low vulnerability = (1) incident - 75-100 yrs Low probability = > 1% of pop. affected
Drought	- countywide - population areas - rivers, tributaries, groundwater	Table 1 - Statewide data 1904-1905 1917-1931 1939-1941 1976-1981 1985-1997 2000-2001	- water supply - if long-term, forest conditions / wildfires Low vulnerability >1% High probability - (1) 10-35 yrs
Winter Storm	Infrequent Countywide - less along coastline - slightly more at higher elevations in Coast Range Temp. Av. 44° Jan.	- Seasonal storms in Coast Range with limited duration. - No significant history along coastline (e.g. once / 10 yr.)	- school delays, dangerous roads, tree loss low vulnerability low probability
Wildfire	- Any forested area - Wildland/Urban Interface Communities: Depoe Bay, E. Lincoln Co., Elk City, Lincoln City, Newport, Otter Rock, Rose Lodge, Seal Rock, Tidewater, Toledo, Siletz, Waldport, Yachats	- 1846 - Yaquina roughly 450,000 acres in Lincoln / Lane Counties - incidental / small-scale lightning, slash-burns	- threaten forest environment - threaten population, resources, assets moderate probability = (1) incident w/in 35-75 yr. moderate probability = 1-10% pop. affected

Economic Assets

- What type of economy do you have in your community? Tourist-based? Manufacturing-based? Tourism, Fishing, Forest/Wood Products
- Who are the major employers? What businesses are significant contributors to the local economy? - See Back
- What businesses employ significant portions of your community?
- How is your economy unique? Based on Natural + Scenic Resources
- What are some common business types in your community? (i.e., are most businesses small businesses?) - See Back

Which businesses are dependent on their locations, and which are capable of moving?

List Assets / Characteristics:

Government - 15%

Health Care/ Social Services - 9%

Retail trade - 14%

Manufacturing - 5%

Accommodation/ Food Service - 17%

---

5 largest regional employment sectors

- How might the economy be at risk to **all** of the following hazards: flooding, earthquakes, tsunamis, wind storms, landslides, coastal erosion, volcano-related hazards, drought, winter storm, and wildfire?
- Which businesses will be significantly impacted by the temporary loss of utilities?
- Which businesses are dependent on their location, and which businesses are capable of re-locating?
- Are significant portions of your economy in harms way? (i.e., in the tsunami inundation zone?)

- The economy is most at risk to flooding, windstorms, + landslides, coastal erosion as chronic hazards. Catastrophic hazards (eg) earthquake/tsunami would be devastating. Other hazards less likely.

- Loss of utilities significantly impacts most, if not all, businesses. Assuming people are reacting to loss of utilities, even fishing/timber activities would be disrupted.

- Manufacturing sector highly dependent on transportation network,
- Retail trade dependent on wholesale trade, transportation network and discretionary spending by residents and tourists.
- Wholesale dependent on transportation network
- professional + business service sector sensitive to loss of utilities, but may be more resilient to transportations disruptions if work from home.
- Construction trade reliant on protecting infrastructure and transportation network.

- Along Highway 101, coastal estuaries + rivers in harms way of flooding, tsunami, wind, landslides, coastal erosion. Wildfire + winter storms inland.

Major Employers in Lincoln County: (Countywide, including Cities)

- Confederated Tribes of the Siletz
- Lincoln County School District
- Samaritan Health Services
- Georgia-Pacific
- Lincoln County
- Oregon State University / Hatfield Marine Science Center
- Salishan Lodge + Golf Resort
- Pacific Shrimp
- Central Lincoln P.U.D.
- Shilo Inns
- Fred Meyers
- Inn at Spanish Head
- Wal-Mart
- City of Lincoln City
- The Embarcadero Resort
- Safeway Stores
- Newport Shrimp
- Oregon Coast Aquarium

Common Business Types

Tourist Related
Service Related
Small scale retail
Marine related storage, rental, repair, marina
Lodgings
Restaurants / Markets
Galleries - arts - entertainment
Real Estate
Offices
RV Parks
Public Administration
Home based business
Construction

Cultural and Historic Resources

Which cultural or historic resources also represent significant economic assets? Examples: Landmarks, Archeological Sites, Historic Buildings, Tourism Spots, etc. See attached inventory of historical & cultural sites throughout Lincoln County

List Assets / Characteristics:

- North Lincoln County Historical Museum
- Oregon Coast History Center
- Toledo History Museum
- Waldport Heritage Museum
- Little Log Church
- Yaquina Pacific Railroad Society
- Oregon Coast Aquarium
- Hatfield Marine Science Center
- Numerous Bridges Over Highway 101
- Covered Bridges
- Siletz Indian Tribal Lands
- lighthouses
- Natural and Scenic Areas of coastline, rivers, estuaries & forest lands.

- How might cultural and historic resources in your community be at risk to **all** of the following hazards: flooding, earthquakes, tsunamis, wind storms, landslides, coastal erosion, volcano-related hazards, drought, winter storm, and wildfire?
- What sites, if lost or damaged, could have a significant effect on the community's identity? Could these losses lead to economic impacts?
- Do any cultural or historic resources house a significant portion of the population? What are they?

- Cultural and historic resources may be at risk to flooding, tsunami, windstorms, landslides, coastal erosion, winter-storm and wildfire.
- Most prehistoric/archaeological sites are in undisclosed locations for purposes of protecting the resource.
- Confederated Tribes of Siletz Indians
- Damage or interruption of access to cultural or historic resources would have an economic impact on the community.
- Significant economic impacts associated with loss/access to Natural & Scenic resources of Lincoln County.
- See attached list of specific annual events held throughout Lincoln County which would be affected by natural disasters.

Infrastructure and Critical Facilities

- What facilities are critical for your community to function?

Examples: Emergency Services, Schools/Shelters, Airports, Roads, Local Relief Agencies, Government Buildings, Utility Providers, etc.

List Assets / Characteristics:

See attached Inventory (All Lincoln County)

Hwy 101, 18, 20, 229, 34 County Roads, Culverts Bridges, Railroad, Airports - Newport, Wakonda, Toledo, Siletz Port of Alsea, Newport, Hospitals - 2, Police Stations - 4, Fire + Rescue - 8, 1 School District, 1 Community College, Central Lincoln PUD, Pacificorp. Consumers Power, NW Natural Gas, Red Cross, Radio Auxiliary Telecommunications Specialists (RATS), Citizen Emergency Response Team (CERT), Police, Fire, Sheriff, Coast Guard. National Guard,

- How might infrastructure and critical facilities be at risk to **all** of the following hazards: flooding, earthquakes, tsunamis, wind storms, landslides, coastal erosion, volcano-related hazards, drought, winter storm, and wildfire?
- Are people able to move or evacuate following an event? Will roads and bridges be usable after a disaster?
- Do earthquakes threaten the structural integrity or operational capacity of any buildings in your community?
- Are there any unreinforced masonry buildings in your jurisdiction?
- Is there redundancy in utility systems so that if one site fails during a disaster, the community can quickly adapt?

- Transportation networks, systems for power transmission and critical facilities such as hospitals and police stations are vital to the functioning of the region. Facilities most affected are those subject to flooding, tsunami, landslides + windstorms.

- Tsunami evacuation routes are noted, drills are conducted. County Emergency Services staff notify those in harms way when able. CERT + other emergency responders do their best to evacuate/rescue people. Roads and bridges may be inaccessible in the event of disasters.

- Earthquakes threaten buildings pre-dating building codes or updated seismic zone codes. Those newer buildings meeting Seismic Codes or remodeled better able to withstand disaster, but are untested in real-life event.
- Yes, although masonry is not as common a building material as wood-frame.
- Utility districts and systems will assist in response and recovery where necessary and able.

Environmental Assets

- What are the land uses in your area?
- Where are hazardous material sites?
- What are the environmental resources in your community?
- Why are these environmental resources significant? Quality of life? Economic reasons?

Examples: Watersheds, Recreation Areas, Parks, Reservoirs, Forests, Wildlife Populations, etc.

List Assets / Characteristics:

See major employers list
- Industrial - GP mill, forest related, fishing, + support services
- commercial, public facilities, residential, tourist related,
- LNG tank, gas stations, waste sites, GP mill
- Environmental Resources - coastline, Hwy 101, 30 state parks, county parks, federal lands, wilderness areas, recreational water activities, lighthouses, bridges, Hatfield Marine Science Center, Oregon Coast Aquarium, Casino, Museums, Cascade Head, Devils Lake, all estuaries, Yaquina Head, Cape Perpetua, coastal headlands

- How might environmental assets be at risk to **all** of the following hazards: flooding, earthquakes, tsunamis, wind storms, landslides, coastal erosion, volcano-related hazards, drought, winter storm, and wildfire?
- Are there natural processes associated with a disaster that could impact a sensitive area? (e.g. sedimentation, inundation)

- Environmental assets would be most at risk to flooding, seasonal windstorms, catastrophic landslides + coastal erosion. Predicted tsunami from Cascade Subduction Zone would cause widespread devastation.
- Sensitive areas along coastline + estuaries would be impacted by chronic and/or catastrophic disasters.
- Water quality related uses - fishing, habitat restoration efforts, Oregon Coast Aquarium, recreational uses, bridges + transportation, would be adversely impacted by natural disasters.
- Like Hurricane Katrina, Lincoln County environmental assets, populations, quality of life and economic stability would be adversely impacted by natural disasters.

Human Population

- Where are the special needs populations in your area? (e.g. retirement homes, child-care, assisted-care facilities, group homes, non-English speaking populations)
- Who are the social service providers in your community?
- Do population types vary greatly in your community? (e.g. tourists, students, residents, etc.) How so?
- Is the population growing? If so, where?
- What is unique about your population?

Special consideration areas: minority populations, households below poverty level, populations over age 65, single parent with child families, rental households, significant tourist populations, populations with varying needs.

List Assets / Characteristics:

Poverty - total pop = 15%
Youth (0-14) = 15%,
Senior (64-75) = 10%,
75+ = 9%
Non-English - 2-5%
Single-Family = 66%
Multi-Family = 16%
Mobile home = 16%
RV = 2%

See attached Lincoln County Resource Guide for Social Service providers and population / demographic information

- How might populations be at risk to **all** of the following hazards: flooding, earthquakes, tsunamis, wind storms, landslides, coastal erosion, volcano-related hazards, drought, winter storm, and wildfire?
- How might power outages cause harm to certain population groups?
- Are certain groups within flood zones?
- Are there concentrations of persons within buildings that will not survive an earthquake, windstorm, or tsunami?
- Are there people need to know more about hazards? Which hazards? Who?

- Special needs populations are at the same, if not more risk to the same hazards as others, and would likely suffer more or be less able to recover resulting from isolation, fewer resources.
- Power outages are an inconvenience to anyone. People on life-support or other similar devices should be prepared (e.g. generators).
- Flood zones in Lincoln County are located along coastal strip and rivers + estuaries. Diverse mix of populations located in these areas.
- Lincoln County as a whole, including local cities take a pro-active approach to natural hazard public outreach + education.

SAMPLE: USE THIS AS A SIGN-IN SHEET AT THE MEETING

Name of Event/Meeting: Steering Committee Meeting

Date of Event/Meeting: April 7th Scheduled Time of Event/Meeting: 2:00

Name	Representing	Email	Roundtrip mileage (if applicable)	Hourly Rate
Jessica Bordy	Lincoln County Planning			
JIM BUISMAN	LINCOLN CO PUBLIC WORKS			
Matt Spangler	Lincoln Co. Planning			
Megan Findley	Oregon Partnership for Disaster Resilience			
Krista Dillon	"			
Don Baker	North Lincoln Fire + Rescue			
DENNIS DOTTON	S. O.			
Jim Hawley	Emergency Services			
LARRY LEWIS	Depoe Bay, Waldport, Yachats			

Existing Mitigation

Disaster Preparedness For You and Your Household- LC Health and Human Services Emergency Preparedness Program, LC Emergency Services, American Red Cross

Homeowner's Landslide Guide- Oregon Emergency Management, Federal Emergency Management Agency Region 10

Protect Your Home from Flood Damage: Mitigation Ideas for Reducing Flood Losses- FEMA

Planning for Survival: How to protect your home from wildfires- BLM, ODF, USFS,

An Action Plan for Protecting Rural/Forest Lands from Wildfire- Department of Forestry, Department of Land Conservation and Development, Emergency Management Division, Office of State Fire Marshal

Special Paper 31: Mitigating Geologic Hazards in Oregon: A Technical Reference Manual- DOGAMI

Tsunami Hazard Map of the Yaquina Bay Area, Lincoln County, Oregon- DOGAMI

Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities- Communities Committee, National Association of Counties, National Association of State Foresters, Society of American Foresters, Western Governors' Association

Healthy Forests and Rangelands (Wildfire Prevention)
http://www.forestsandrangelands.gov/success/index.cfm

Statewide Seismic Needs Assessment
http://www.oregongeology.com/sub/projects/rvs/OFR-O-07-02-SNAA-onscreen.pdf

Cascadia (DOGAMI Publication): Various Coastal Hazard Mitigation Efforts
http://nanoos.org/news/CascadiaWinter2005.pdf

Landslide Loss Estimation Pilot Project In Oregon
http://www.oregon.gov/DOGAMI/Landslide/O0205.pdf

Forestry, Landslides, and Public Safety
http://www.oregon.gov/ODF/PRIVATE_FORESTS/docs/fp/LandslidesPublicSafety.pdf

Oregon Department of Forestry Storm Impacts and Landslides of 1996
http://www.oregon.gov/ODF/PRIVATE_FORESTS/docs/fp/StormExecSum.pdf

Steering Committee Members

Jessica Bondy, Senior Planner- Lincoln County Department of Planning and Development

David Farr, Resource Assistance for Rural Environments (RARE) Intern- Lincoln County Department of Planning and Development

Jim Hawley, Emergency Services- Lincoln County

Jim Buisman, Director of Public Works- Lincoln County

Sheriff Dennis Dotson- Lincoln County Sheriffs Department

Chief Don Baker- Lincoln County Fire Marshall

Nancy Batchelder, City Recorder- City of Yachats

Larry Lewis, City Planner- Cities of Depoe Bay and Waldport

DEPARTMENT OF PLANNING AND DEVELOPMENT

210 S. W. 2nd ST
Newport, OR 97365
(541) 265-4192
Fax (541) 265-6945

LINCOLN COUNTY PRE-DISASTER MITIGATION PLAN

Steering Committee Third Meeting
July 22, 2008

Time: 2:00 p.m.
Location: Planning Conference Room
210 SW 2nd St. Newport, Or. 97365

Agenda

i. Introductions
ii. Project Update
iii. Discuss Potential Action Items (Mitigation Projects)
iv. Schedule Next Steering Committee Meeting

Present: Jessica Bondy, Lincoln County Planning; Jim Buisman, Lincoln County Public Works; Matt Spangler, Lincoln County Planning; Dennis Dotson, Sherriff's Office; Jim Hawley, Emergency Services; Nancy Batchelder, City recorder, City of Yachats.

Project Update:
-Sec 1, 2, 3, in draft form. Hazard annexes completed and available on PDR website. Preliminary list of Action Items. To do: Action Item worksheets. Complete drafts.

Action Items:

Should there more detailed action items (each individual project/task hashed out?)
These Action Items are more of a broad guideline for future grants: for example instead of listing out each county road project, many would fit under the landslide action item: protect infrastructure from landslide hazards.

Landslide Action ST Item #2: culverts inspected on an annual basis by Public Works
Earthquake Action Item ST #1: Course offered by FEMA in Ellensburg on the use of HAZUS software.
Earthquake Action Item ST #2: Internal Partners: Deane Bristow, Risk management; Lincoln Co. Public Schools
Earthquake Action Item ST #3: Earthquake insurance brochure? Tip of the week on County website, local newspaper.
Earthquake Action Item LT #2: Cities/ Utilities responsible for replacing cast iron pipes
Earthquake Action Item LT #3: Evaluations on structures pre or post earthquake? Post earthquake. Pre evals reserved for licensed structural engineers.
Windstorm Action Items: Much responsibility shared with Lincoln County Solid Waste toward debris cleanup. Accessibility to hazardous trees is an issue. Public Works/Central Lincoln PUD work collaboratively.
Windstorm Action Item LT #1: Been done. Storms are mostly very localized in the north or south of the County.
Windstorm Action Item LT #2: Brochure on hazardous trees? Red cross should be added to partners. Encourage landowners to cut logs on county roads.
Windstorm Action Item LT #3: Seek grants for underground utilities.
Tsunami Action Item ST #1: Waldport highschool looking to move out of inundation zone
Tsunami Action Item LT #1 and 2: Emergency services has info on drills, maps, hazards etc. Warning system is the responsibility of the cities. Depoe Bay has warning system plan in place. Reverse 911 in process, example of success story.
Flood action items: Reverse 911 will help in mitigation efforts.

Next Meeting: mid to late August
Meeting closed

SAMPLE: USE THIS AS A SIGN-IN SHEET AT THE MEETING

Name of Event/Meeting: Steering Committee Meeting

Date of Event/Meeting: July 22, 2008 Scheduled Time of Event/Meeting: 2:00

Name	Representing	Email	Roundtrip mileage (if applicable)	Hourly Rate
Jim Bellsman	Lincoln Co Public Works	jbellsman@co.lincoln.or.us		
Jessica Bondy	Lincoln Co. Planning	jbondy@co.lincoln.or.us		
David Farr	Lincoln Co. Planning	dfarr@co.lincoln.or.us		
Dennis Dotson	Sheriff's Office	ddotsm@co.lincoln.or.us		
Jim Hawley	Emergency Services	jhawley@co.lincoln.or.us		
Nancy Batchelder	City of Yachats	nancy@ci.yachats.or.us		
Matt Spangler	Lincoln Co. Planning			

DEPARTMENT OF PLANNING AND DEVELOPMENT

210 S. W. 2nd ST
Newport, OR 97365
(541) 265-4192
Fax (541) 265-6945

LINCOLN COUNTY PRE-DISASTER MITIGATION PLAN

Steering Committee Third Meeting
August 27, 2008

Time: 3:30 p.m.
Location: Planning Conference Room
210 SW 2nd St. Newport, Or. 97365

Agenda

i. Introductions
ii. Project Update
iii. Discuss Plan Maintenance
iv. Discuss Plan Implementation

SAMPLE: USE THIS AS A SIGN-IN SHEET AT THE MEETING

Name of Event/Meeting: Steering Committee Meeting

Date of Event/Meeting: 8/27/08 Scheduled Time of Event/Meeting: 3:30

Name	Representing	Email	Roundtrip mileage (if applicable)	Hourly Rate
Jim Hazley	Lincoln Co. Emg. Services	jhazley@co.lincoln.or.us		
Jessica Bondy	Lincoln County Planning	jbondy@co.lincoln.or.us		
LARRY LEWIS	Depoe Bay, Waldport, Yachats	larry.lewis@waldport.org		
DENNIS DOTSON	SHERIFF'S OFFICE	ddotson@co.lincoln.or.us		
JAMES BUISMAN	LINCOLN CO. PUBLIC WORKS	jbuismon@co.lincoln.or.us		
David Farr	Lincln Co. Planning	dfarr@co.lincoln.or.us		

DEPARTMENT OF PLANNING AND DEVELOPMENT

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LINCOLN COUNTY PRE-DISASTER MITIGATION PLAN

Steering Committee Third Meeting
August 27, 2008

Time: 3:30 p.m.
Location: Planning Conference Room
210 SW 2nd St. Newport, Or. 97365

Agenda

i. Introductions
ii. Project Update
iii. Discuss Plan Maintenance
iv. Discuss Plan Implementation

Project Update:
Plan finished except for a few small edits, FEMA Crosswalk, City Addendums

Plan Maintenance:
Conveners: Emergency Services, Planning and Development
Semi-annual Steering Committee Meeting: role: come up with new mitigation projects as well as what projects the County wants to apply for grant money.

A large part of the maintenance of the plan is the continued involvement of the public. Good strategies? Tip of the week, post plan on Emergency Services site, incorporate Lincoln County Schools, Advertise website, open houses.

Send project/plan to all Steering Committee Members for review.

Meeting adjourned

Stakeholder Interview Transcript

Stakeholders:

1. Randy Walker, Facilities Manager, Hatfield Marine Science Center
2. Jenny Demaris Emergency Mgmt Coordinator, Samaritan Pacific Hospital
3. Doug Grafe + Kyle Williams, Foresters, Oregon Department of Forestry
4. Don Mann + Maureen Keeler, Managers, Port of Newport
5. Rebecah Morris, President, Central Oregon Coast Association
6. Rob Witter + George Priest, Geologists, Department of Geology and Mineral Industries
7. Onno Husing, Chairman, Oregon Coastal Zone Management Association
8. John Allen, North Coast Region Manager, Oregon Parks and Recreation Department
9. Mark Snyder, Superintendent, Gleneden-Kernville Water District
10. Tom Picciano, Communication Manager, Georgia Pacific West, Inc.
11. Don Andreasen, Safety Specialist, Siuslaw National Forest
12. Mike Mulligan, CERT

Hatfield Marine Science Center: December 12, 2007

-Constructed on unconsolidated fill
-Building slabs not connected- no earthquake clips. A magnitude 7.0 or higher- serious issue
-No historic problem with tsunamis- '64 tsunami referenced- 2 people killed at Beverly Beach, Crescent Beach- 11 killed
-Power issues- Center has numerous -80 degree coolers containing precious samples (ex: extinct whale tissue). Does not have sufficient power generators. Need for generators estimated at $200,000, additional $50,000 for engineering.
-Have tsunami hazard/evacuation plan in place. Includes maps.
-Once a year tsunami/earthquake drill is conducted. Meet at evacuation site.
-No sirens in place. Liability issues. Nursing home across bay might react to drill- creates problems, i.e. transporting disabled.

Samaritan Pacific Hospital: December 13, 2007

-So far they have received $206,000 in grants.
-Much collaboration with police + fire.
-'08 will expect $20,000 in grant money.
-Confident hospital has spent money wisely
-Larger utilities are earthquake retrofitted, for example: auto shutoff valves for natural gas (NW Natural.)
-Earthquake survey was done in recent years, engineering report.
-The original facility was built in '48. Constructed 18' thick concrete walls, because still wary of Japanese bombing U.S.

-County resource: extra generators available for other organizations, older generators still useful
- Available fresh water an issue. Backup water + filtration system
-power surge took out equipment when turned back on
-Ice storms- not enough sanding equipment

Oregon Dept. of Forestry: December 14, 2007

-400,000 acres of jurisdiction when it comes to wildfire prevention- everything other than large private timber owners (Forest Capitol, Plum Creek, Green Diamond
-Fall/Winter prescribed fires enforced by ODF
-Conduct thinning practices on state land. Fires driven by east winds on Coast. Fire season later- Late Jun to Sept.
-Prescribed fires- Burning slash after major trees have been removed.
- ODF- enforce on private lands (Forest Practices Act '92)
-ODF Hazard Team '98- historically focus has been fire but work on variety of hazards
-Fire risk- Backyard debris burning, urban interface, clear cuts around subdivisions, Measure 37 claims.
-On an annual basis: one lightning fire, fifteen man-made fires: (recreation fires, ATVs debris burning, equipment fires associated with logging, road construction.)
-Numerous landslides '98.
-Have attempted to retain trees in high risk areas.
-These high risk areas are based on geotech maps- done in event of logging.(typically 65-70% slope + winter time and heavy rains.
-Forestry, Landslides and Public Safety
-Oregon Dept of Forestry Storm Impacts and Landslides of 1996
-Debris disposal program at GP mill.

Port of Newport: January 14, 2008

-New project: upgrade of terminal dock - $18 million
-Two ships are currently foundation of dock
-Includes Sheet bulkhead upgrade at $4-5 million
-Jettys are controlled by the federal government
-Along with vulnerability of docks, includes boats
-Port of Newport currently consists of 4-5 thousand boats
-1% live on boats
-Dec. Storm- inhabitants on boats were given warning by nighttime security
-Fishing boats used to ferry across bay in even of Yaquina Bridge collapse
-Need for impromptu emergency constructed docks + crane.

Central Oregon Coast Association: January 17, 2008

-Tourist Industry dies during storm
-Media coverage often negative and even inaccurate regarding road closures etc.

-After Dec storm business dropped 26%
-Local Media- how can they and COCA provide info so that they can accurately report: road closures, business closures, power outages, etc.
-Bay city, Seaside, Cannon Beach- hit hard in Dec. storm. With negative/slow recovery
-Weather definitely a factor- bad weather sometimes positive- nasty/rainy in the valley and nice on the coast. Incentive for people to travel to the coast
-Roads incredibly important to tourism- slide at Cape Foulweather- 101
-Highway 20 a huge issue- current large scale project means it is impassible by all larger vehicles (busses, large trucks.)
-Tunnel at Heceta Creek closure.
-Existing Airports: Salishan, Newport, Florence, Bandon. Horizon and Jetblue considering flights to Newport airport. Would bring more tourism.
-During the storm, aesthetics not real issue, just road closures

DOGAMI: January 23, 2008

-Erosion Zones- High to low hazard.
-Marion, Lincoln, and Tillamook county-
-County-side GIS of historical hazard events
-Marion County have point system regarding slope steepness
-Regulatory map- constructed in '95 as part of SB 379 (Critical facilities, inundation modeling, development code) ORS 402.
-Debris flows- more rapidly moving.
-Lidar- ongoing project- getting airplane=large obstacle.
-Bare earth lidar, laser measures and is able to eliminate vegetation
-Current ongoing project: Johnson creek slide on 101
-Provide info on hazards, not site specific
-Broader subdivision review- very rare, require geotech report
-DOGAMI has no regulatory role, but provides policy recommendations
-They provide existing slide areas and also erosion rates
-created tsunami hazard maps and evacuation maps
-restrict so that critical factilites aren't constructed in tsunami zone
-Currently four erosion zones-active zones- historic, beach, dune, junction

OCZMA: January 22, 2008

-Geotech reports- responsible for providing adequate oversight.
-Are private sector geologists (who are responsible for conducting geotech reports) qualified
-Three entities who should be tightly bound: Insurance, Bank, Landowner
-New statute should require realtor to identify and disclose hazard to homeowner/homebuilder
-DOGAMI maps should be means
-100 flood map
-Updated tsunami maps- do realtors have duty to disclose?

-connection between DOGAMI and the private sector
-Whose duty should it be do disseminate/disclose hazard information, local, state, federal, private sector.
-Talk to realtor
-State has made it increasingly difficult to rip-rap existing structures

Oregon Parks and Recreation: January 23, 2008

-Offices in Newport, Astoria, Yachats
-FEMA funded cleanup on Saddle Mountain.
-Problems associated with fire and insect infestations – debris cleanup to adjacent neighbors.
-Standing trees also an issue.
-Oregon shore conservation
-Oregon Parks and Recreation responsible for rip-rap permitting
-Extensive rip-rap at Yachats
-Cape Lookout- experimenting with sand bags and cobble stones which creates an artificial dune.
-Nestucca Spit- drainfield where 60 ft. was taken out by wave action
-Oregon Beach Control Bill- 1977- disallowed rip rap on structures built afterwards.
-15 emergency permits for rip-rap in last 2 to 3 weeks
-Tillamook- erosion 30 ft from house, rip-rap allowed
-$500 per linear foot.
-Lincoln City- rip rap company/stone quarry
-County signs off on rip-rap permit
-In Rockaway Beach – emergency rip-rap was permitted because it was shown that the house was in eminent danger. Afterwards required to apply for permanent permit
-Negative side of rip-rap- destroys beaches
-Line vegetation-end of property
-Cape Lookout- lost two restrooms from coastal erosion

Gleneden-Kernville Water District: February 5, 2008

-Mark Snyder- manager of water district, contractor for sewer district
-Made up of 7 employees
-Facilities plan in place for next 20 years, required by DEQ
-Collection system- shares 60% of cost
-Most people retired in community (70%)
-Includes local restaurants small businesses
-located at the south end of Lincoln City
-Current families are mostly employed by casino
-A lot of second homes in district, especially Salishan, made up of many wealthy folks
-During the winter time population of district drops significantly as result
-Evacuation plan in place- meeting place is at Gleneden Community Club
-245 million gallons of water storage drift creek to north reservoir

-Emergency pumps in place
-Four district vehicles
-Three san filters-hits microbes-installed in 1992, chlorine also added
-Depoe Bay fire provides service

Toledo Mill: February 7, 2008

-Facility retrofitted for current earthquake standards
-Substantial flooding in 1999, have dikes in place
-inundation zone- 2 earthquakes
-turbine generator system in place in the event of power outages
-Last December power was out for a couple of hours
-Self-sufficient facilities- no needs for mitigation- own engineering staff
-critical spares warehouse- to keep mill up and running
-no active fault line
-50 ft tsunami- only a meter or less at mill

Siuslaw National Forest: February 13, 2008

-Thinning done through timber sales which are contracted out to logging companies
-Fire mitigation – agreements with local fire depts. on fire fighting jurisdictions
-Waldport evacuation point- schools, red cross
-Siuslaw jurisdiction- areas from Hebo all the way down to Coos Bay
-Large part is asking- are forest practices/roads etc. in compliance with OSHA regulations
-Joe Acosta- road engineer, landslides, erosion control
-firewood cutting permit in designated areas
-in charge of nation park campgrounds
-ATVs approved at certain sites

CERT: March 17, 2008

-Evacuation routes- wildfire, Lost Creek
-Broken down by tax lots- special needs? Distance/proximity to evac site?
-Map broken up into cells each cell isolated due to slide etc.
-Identifying individuals or neighborhood groups within each island to support
-Identifying rendez-vous points within islands with a distance of less than 3/8 mile throughout
-Identifying access points- beach, lake, river.
-Each identifiable by #, letter
-Accessible by: 4x4? All terrain? Footpath?
-Gates are open during certain times of year in private forests during wildfire season
-Water intakes- need to be added to public works inventory
-In near future will test map/system with a mock Cascadia Subduction event (July 1st)

MEDIA RELEASE

Lincoln County Board of Commissioners

Casey Miller
225 West Olive Street
Newport, OR 97365
Phone: (541) 265-4989
FAX: (541) 265-4176
clmiller@co.lincoln.or.us

NATURAL HAZARD MITIGATION PLAN DISCUSSED AT PLANNING AND DEVELOPMENT OPEN HOUSE 4 P.M. TO 6 P.M. THURSDAY, AUGUST 21ST

The Lincoln County Department of Planning and Development invites area residents to an open house from 4 p.m. to 6 p.m. Thursday August 21, 2008 to hear about work involving the development of a multi-jurisdictional Natural Hazards Mitigation Plan.

A Natural Hazard Mitigation Plan can assist the community in understanding what puts the com munity at risk. By identifying and understanding the relationship between natural hazards, vulnerable systems, and existing capabilities, communities in Lincoln County become better equipped to identify and implement actions aimed at reducing the overall risk of hazards.

The plan focuses on the primary natural hazards that could affect Lincoln County, which include flood, earthquake, landslide, coastal erosion, tsunami, wildfire, windstorm and winterstorm. The Plan is being developed in accordance with the Federal Disaster Mitigation Act of 2000. Communities that adopt local natural hazards mitigation plans become eligible for mitigation grant funding, including the Federal Emergency Management Agency Hazard Mitigation Grant Program and Pre-Disaster Mitigation Grant Program.

The open house will be held at the Lincoln County Courthouse, Board of Commissioner's Conference Room, East Entrance, 225 W. Olive Street, Newport, Oregon.

For more information please contact the Lincoln County Department of Planning and Development at 265-4192.

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Posted: Aug 15, 2008 - 10:08:08 PDT

Local News

Natural Hazard Mitigation Plan is open house topic

The Lincoln County Department of Planning and Development invites area residents to an open 4 p.m. to 6 p.m. Thursday, Aug. 21, to hear about work involving the development of a multi-ju Natural Hazards Mitigation Plan.

This plan can assist coastal residents in understanding what puts the community at risk. By ider understanding the relationship between natural hazards, vulnerable systems, and existing capal communities in Lincoln County become better equipped to identify and implement actions aime the overall risk of hazards.

The plan focuses on the primary natural hazards that could affect Lincoln County, which include earthquake, landslide, coastal erosion, tsunami, wildfire, windstorm and winter storms. The plar developed in accordance with the Federal Disaster Mitigation Act of 2000. Communities that ad natural hazards mitigation plans become eligible for mitigation grant funding, including the Fede Emergency Management Agency Hazard Mitigation Grant Program and Pre-Disaster Mitigation G Program.

The open house will be held in the Board of Commissioner's Conference Room in the Lincoln Co Courthouse, Newport.

For more information, contact the Lincoln County Department of Planning and Development at 7

Email this story **Print this story**

SAMPLE: USE THIS AS A SIGN-IN SHEET AT THE MEETING

Name of Event/Meeting: Natural Hazard Mitigation Plan Open House

Date of Event/Meeting: 8/21/08 Scheduled Time of Event/Meeting: 4:00-6:00

Name	Representing	Email	~~Roundtrip mileage (if applicable)~~	~~Hourly Rate~~
Janet Harrison	Private Citizen	dogamist@hotmail.com		
Wayne Belmore	County counsel & concerned citizen	wbelmore@charter.net		
John Waffanschmidt	Private Citizen			
Cyndi Karp	Myself	cyndikarp@peak.org		

Appendix C
Economic Analysis of Natural Hazard Mitigation Projects

This appendix was developed by the Community Service Center's Oregon Partnership for Disaster Resilience at the University of Oregon. It has been reviewed and accepted by the Federal Emergency Management Agency as a means of documenting how the prioritization of actions shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

The appendix outlines three approaches for conducting economic analyses of natural hazard mitigation projects. It describes the importance of implementing mitigation activities, different approaches to economic analysis of mitigation strategies, and methods to calculate costs and benefits associated with mitigation strategies. Information in this section is derived in part from: The Interagency Hazards Mitigation Team, *State Hazard Mitigation Plan,* (Oregon State Police – Office of Emergency Management, 2000), and Federal Emergency Management Agency Publication 331, *Report on Costs and Benefits of Natural Hazard Mitigatio*n. This section is not intended to provide a comprehensive description of benefit/cost analysis, nor is it intended to provide the details of economic analysis methods that can be used to evaluate local projects. It is intended to (1) raise benefit/cost analysis as an important issue, and (2) provide some background on how economic analysis can be used to evaluate mitigation projects.

Why Evaluate Mitigation Strategies?

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred. Evaluating possible natural hazard mitigation activities provides decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Evaluating mitigation projects is a complex and difficult undertaking, which is influenced by many variables. First, natural disasters affect all segments of the communities they strike, including individuals, businesses, and public services such as fire, police, utilities, and schools. Second, while some of the direct and indirect costs of disaster damages are measurable, some of the costs are non-financial and difficult to quantify in dollars. Third, many of the impacts of such events produce

"ripple-effects" throughout the community, greatly increasing the disaster's social and economic consequences.
While not easily accomplished, there is value, from a public policy perspective, in assessing the positive and negative impacts from mitigation activities, and obtaining an instructive benefit/cost comparison. Otherwise, the decision to pursue or not pursue various mitigation options would not be based on an objective understanding of the net benefit or loss associated with these actions.

What are Some Economic Analysis Approaches for Evaluating Mitigation Strategies?

The approaches used to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into three general categories: benefit/cost analysis, cost-effectiveness analysis and the STAPLE/E approach. The distinction between the there methods is outlined below:

Benefit/cost Analysis

Benefit/cost analysis is a key mechanism used by the state Office of Emergency Management (OEM), the Federal Emergency Management Agency, and other state and federal agencies in evaluating hazard mitigation projects, and is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

Benefit/cost analysis is used in natural hazards mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoided future damages, and risk. In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented. A project must have a benefit/cost ratio greater than 1 (i.e., the net benefits will exceed the net costs) to be eligible for FEMA funding.

Cost-Effectiveness Analysis

Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. Hence, economic analysis approaches are covered for both public and private sectors as follows.

Investing in public sector mitigation activities

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities. Some benefits cannot be evaluated

monetarily, but still affect the public in profound ways. Economists have developed methods to evaluate the economic feasibility of public decisions which involve a diverse set of beneficiaries and non-market benefits.

Investing in private sector mitigation activities

Private sector mitigation projects may occur on the basis of one of two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

1. Request cost sharing from public agencies;
2. Dispose of the building or land either by sale or demolition;
3. Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
4. Evaluate the most feasible alternatives and initiate the most cost effective hazard mitigation alternative.

The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchasers. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

STAPLE/E Approach

Conducting detailed benefit/cost or cost-effectiveness analysis for every possible mitigation activity could be very time consuming and may not be practicable. There are some alternate approaches for conducting a quick evaluation of the proposed mitigation activities which could be used to identify those mitigation activities that merit more detailed assessment. One of these methods is the STAPLE/E Approach.

Using STAPLE/E criteria, mitigation activities can be evaluated quickly by steering committees in a systematic fashion. This set of criteria requires the committee to assess the mitigation activities based on the Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLE/E) constraints and opportunities of implementing the particular mitigation item in your community. The second chapter in FEMA's How-To Guide "Developing the Mitigation Plan – Identifying Mitigation Actions and Implementation Strategies" as well as the "State of Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process" outline some specific considerations in analyzing each aspect. The following are suggestions for how to examine each aspect of the STAPLE/E Approach from the "State of

Oregon's Local Natural Hazard Mitigation Plan: An Evaluation Process".

Social: Community development staff, local non-profit organizations, or a local planning board can help answer these questions.

- Is the proposed action socially acceptable to the community?
- Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- Will the action cause social disruption?

Technical: The city or county public works staff, and building department staff can help answer these questions.

- Will the proposed action work?
- Will it create more problems than it solves?
- Does it solve a problem or only a symptom?
- Is it the most useful action in light of other community goals?

Administrative: Elected officials or the city or county administrator, can help answer these questions.

- Can the community implement the action?
- Is there someone to coordinate and lead the effort?
- Is there sufficient funding, staff, and technical support available?
- Are there ongoing administrative requirements that need to be met?

Political: Consult the mayor, city council or county planning commission, city or county administrator, and local planning commissions to help answer these questions.

- Is the action politically acceptable?
- Is there public support both to implement and to maintain the project?

Legal: Include legal counsel, land use planners, risk managers, and city council or county planning commission members, among others, in this discussion.

- Is the community authorized to implement the proposed action? Is there a clear legal basis or precedent for this activity?
- Are there legal side effects? Could the activity be construed as a taking?
- Is the proposed action allowed by the comprehensive plan, or must the comprehensive plan be amended to allow the proposed action?
- Will the community be liable for action or lack of action?

- Will the activity be challenged?

Economic: Community economic development staff, civil engineers, building department staff, and the assessor's office can help answer these questions.

- What are the costs and benefits of this action?
- Do the benefits exceed the costs?
- Are initial, maintenance, and administrative costs taken into account?
- Has funding been secured for the proposed action? If not, what are the potential funding sources (public, non-profit, and private)?
- How will this action affect the fiscal capability of the community?
- What burden will this action place on the tax base or local economy?
- What are the budget and revenue effects of this activity?
- Does the action contribute to other community goals, such as capital improvements or economic development?
- What benefits will the action provide? (This can include dollar amount of damages prevented, number of homes protected, credit under the CRS, potential for funding under the HMGP or the FMA program, etc.)

Environmental: Watershed councils, environmental groups, land use planners and natural resource managers can help answer these questions.

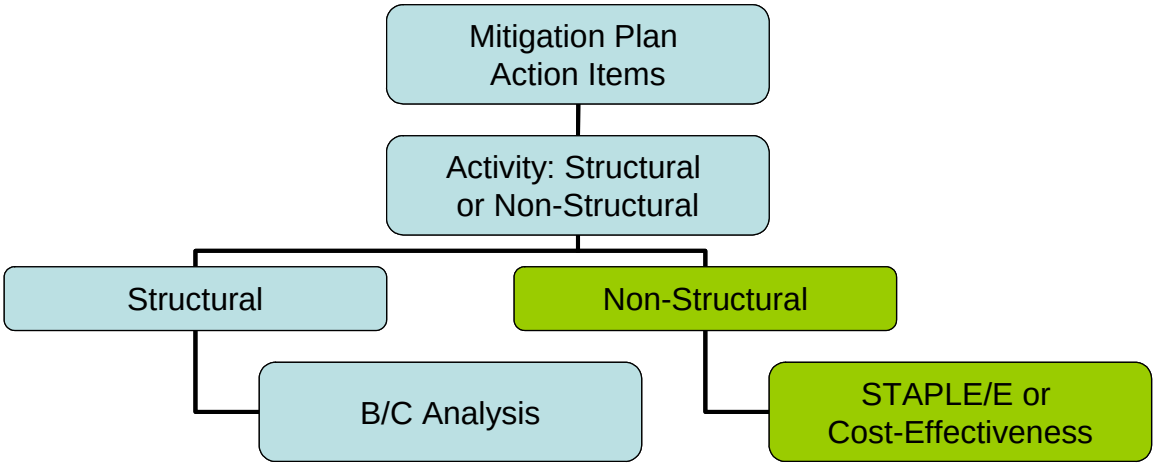
- How will the action impact the environment?
- Will the action need environmental regulatory approvals?
- Will it meet local and state regulatory requirements?
- Are endangered or threatened species likely to be affected?

The STAPLE/E approach is helpful for doing a quick analysis of mitigation projects. Most projects that seek federal funding and others often require more detailed Benefit/Cost Analyses.

When to use the Various Approaches

It is important to realize that various funding sources require different types of economic analyses. The following figure is to serve as a guideline for when to use the various approaches.

Figure A.1: Economic Analysis Flowchart



Source: Community Service Center's Oregon Partnership for Disaster Resilience at the University of Oregon, 2005

Implementing the Approaches

Benefit/cost analysis, cost-effectiveness analysis, and the STAPLE/E are important tools in evaluating whether or not to implement a mitigation activity. A framework for evaluating mitigation activities is outlined below. This framework should be used in further analyzing the feasibility of prioritized mitigation activities.

1. Identify the Activities

Activities for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation project can assist in minimizing risk to natural hazards, but do so at varying economic costs.

2. Calculate the Costs and Benefits

Choosing economic criteria is essential to systematically calculating costs and benefits of mitigation projects and selecting the most appropriate activities. Potential economic criteria to evaluate alternatives include:

- ***Determine the project cost.*** This may include initial project development costs, and repair and operating costs of maintaining projects over time.
- ***Estimate the benefits.*** Projecting the benefits, or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical

durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings, bond and stock issues, and commercial loans.

- ***Consider costs and benefits to society and the environment.*** These are not easily measured, but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.
- ***Determine the correct discount rate.*** Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision maker's time preference and also a risk premium. Including inflation should also be considered.

3. Analyze and Rank the Activities

Once costs and benefits have been quantified, economic analysis tools can rank the possible mitigation activities. Two methods for determining the best activities given varying costs and benefits include net present value and internal rate of return.

- ***Net present value***. Net present value is the value of the expected future returns of an investment minus the value of expected future cost expressed in today's dollars. If the net present value is greater than the project costs, the project may be determined feasible for implementation. Selecting the discount rate, and identifying the present and future costs and benefits of the project calculates the net present value of projects.
- ***Internal Rate of Return***. Using the *internal rate of return* method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project. Once the mitigation projects are ranked on the basis of economic criteria, decision-makers can consider other factors, such as risk, project effectiveness, and economic, environmental, and social returns in choosing the appropriate project for implementation.

Economic Returns of Natural Hazard Mitigation

The estimation of economic returns, which accrue to building or land owners as a result of natural hazard mitigation, is difficult. Owners evaluating the economic feasibility of mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided
- Relocation and disruption expenses avoided
- Proprietor's income losses avoided

These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period of time.

Additional Costs from Natural Hazards

Property owners should also assess changes in a broader set of factors that can change as a result of a large natural disaster. These are usually termed "indirect" effects, but they can have a very direct effect on the economic value of the owner's building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices
- Availability of resource supplies
- Commodity and resource demand changes
- Building and land values
- Capital availability and interest rates
- Availability of labor
- Economic structure
- Infrastructure
- Regional exports and imports
- Local, state, and national regulations and policies
- Insurance availability and rates

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to estimate total economic impacts of changes in an economy. Decision makers should understand the total economic impacts of natural disasters in order to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

Additional Considerations

Conducting an economic analysis for potential mitigation activities can assist decision-makers in choosing the most appropriate strategy for their community to reduce risk and prevent loss from natural hazards. Economic analysis can also save time and resources from being spent on inappropriate or unfeasible projects. Several resources and models are listed on the following page that can assist in conducting an economic analysis for natural hazard mitigation activities.

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. Many communities are looking towards developing multi-objective projects. With this in mind, opportunity rises to develop strategies that integrate natural hazard mitigation with projects related to watersheds, environmental planning, community economic development, and small business development, among others. Incorporating natural hazard mitigation with other community projects can increase the viability of project implementation.

Resources

CUREe Kajima Project, *Methodologies For Evaluating The Socio-Economic Consequences Of Large Earthquakes*, Task 7.2 Economic Impact Analysis, Prepared by University of California, Berkeley Team, Robert A. Olson, VSP Associates, Team Leader; John M. 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 Costs and Benefits of Natural Hazard Mitigation.* Publication 331, 1996.

Goettel & Horner Inc., *Earthquake Risk Analysis Volume III: The Economic Feasibility of Seismic Rehabilitation of Buildings in The City*

of Portland, Submitted to the Bureau of Buildings, City of Portland, August 30, 1995.

Goettel & Horner Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects* Volume V, Earthquakes, Prepared for FEMA's Hazard Mitigation Branch, October 25, 1995.

Horner, Gerald, *Benefit/Cost Methodologies for Use in Evaluating the Cost Effectiveness of Proposed Hazard Mitigation Measures*, Robert Olson Associates, Prepared for Oregon State Police, Office of Emergency Management, July 1999.

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Risk Management Solutions, Inc., *Development of a Standardized Earthquake Loss Estimation Methodology*, National Institute of Building Sciences, Volume I and II, 1994.

VSP Associates, Inc., *A Benefit/Cost Model for the Seismic Rehabilitation of Buildings*, Volumes 1 & 2, Federal Emergency Management Agency, FEMA Publication Numbers 227 and 228, 1991.

VSP Associates, Inc., *Benefit/Cost Analysis of Hazard Mitigation Projects: Section 404 Hazard Mitigation Program and Section 406 Public Assistance Program, Volume 3: Seismic Hazard Mitigation Projects*, 1993.

VSP Associates, Inc., *Seismic Rehabilitation of Federal Buildings: A Benefit/Cost Model*, Volume 1, Federal Emergency Management Agency, FEMA Publication Number 255, 1994.

Region 1: Oregon Coast Household Natural Hazards Preparedness Survey

Survey Report for:

Clatsop County, Oregon
Tillamook County, Oregon
Lincoln County, Oregon
Lane County, Oregon
Douglas County, Oregon
Coos County, Oregon
Curry County, Oregon

Prepared by:

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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

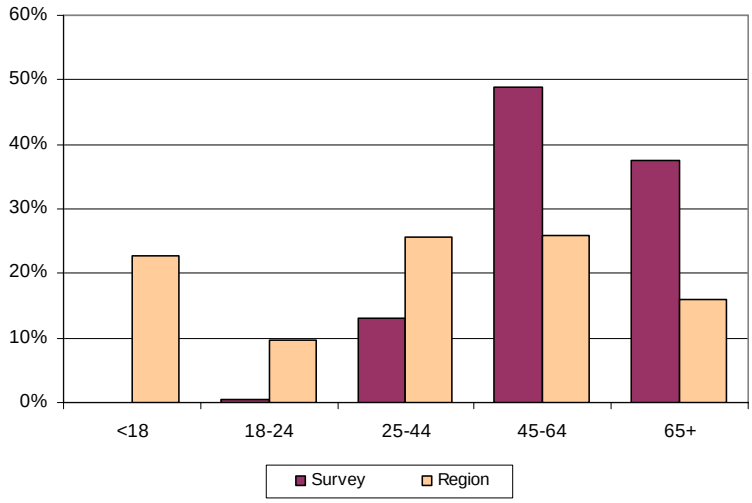
Zip Code	City	Percent
97103	Astoria	17.2
17420	Coos Bay	11.8
97439	Florence	8.3
97459	North Bend	6.9
97415	Brookings	6.4
97423	Coquille	5.4
97365	Newport	4.9
97141	Tillamook	4.4
Other		34.7

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)

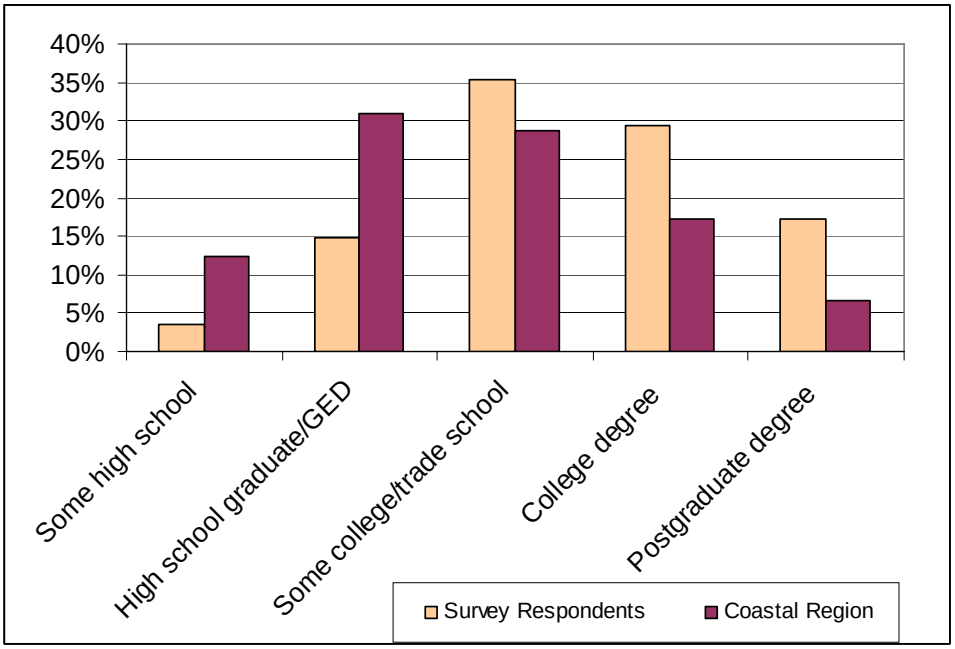


Source: U.S. Census Bureau: www.census.gov (2000) and Household Natural Hazards Preparedness Survey, Oregon Partnership for Disaster Resilience, (Nov. 2007).

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

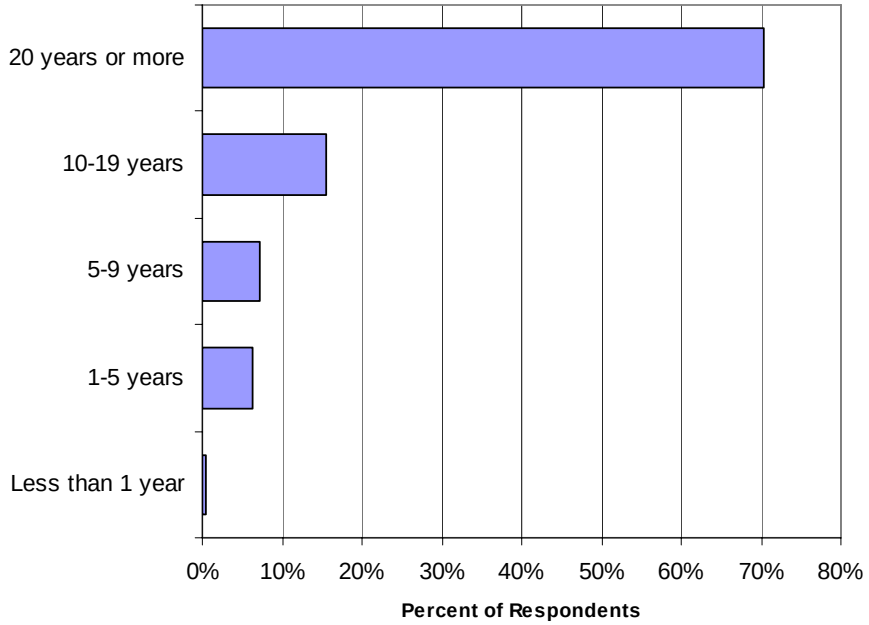


Source: U.S. Census Bureau: www.census.gov (2000) and Household Natural Hazards Preparedness Survey, Oregon Partnership for Disaster Preparedness, (Nov. 2007)

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.

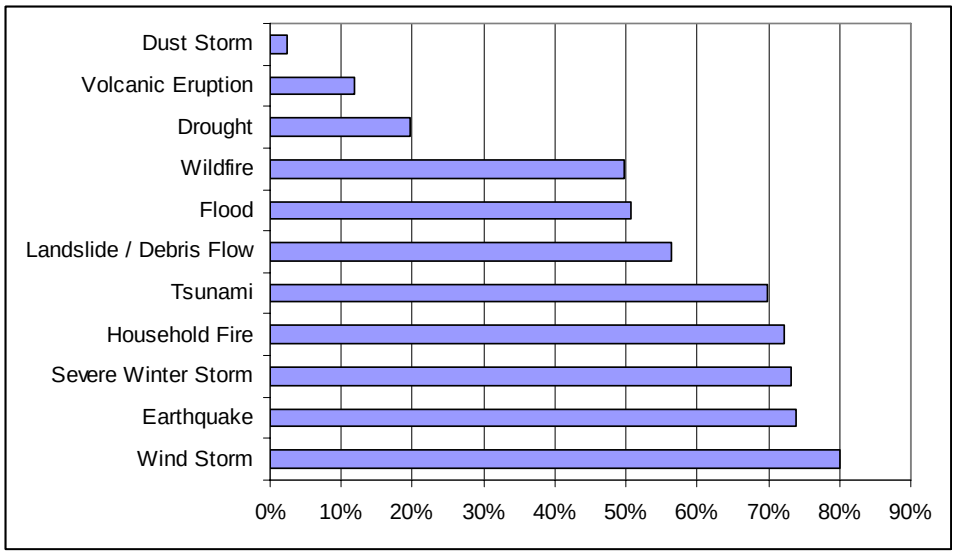
The survey asked respondents to rank their personal level of concern for specific natural disasters affecting their community (Table 3). The results show that respondents were most concerned about windstorm, earthquake, severe winter storm and household fire. The respondents are least concerned about 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

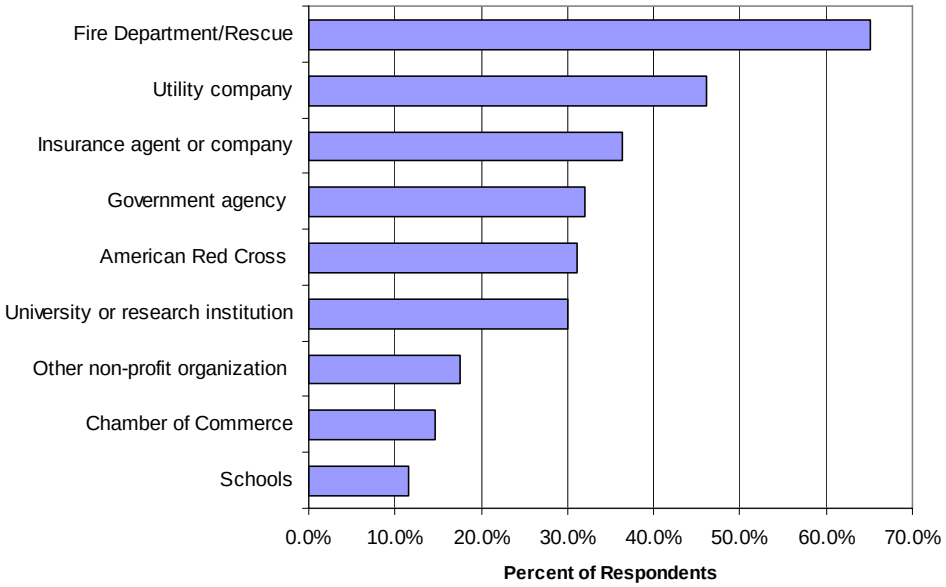
In your household, have you or someone in your household:	Have Done	Plan To Do	Not Done	Unable To Do	Does Not Apply
A. Attended meetings or received written information on natural disasters or emergency preparedness?	52.7%	5.4%	40.9%	1.0%	
B. Talked with members in your household about what to do in 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.

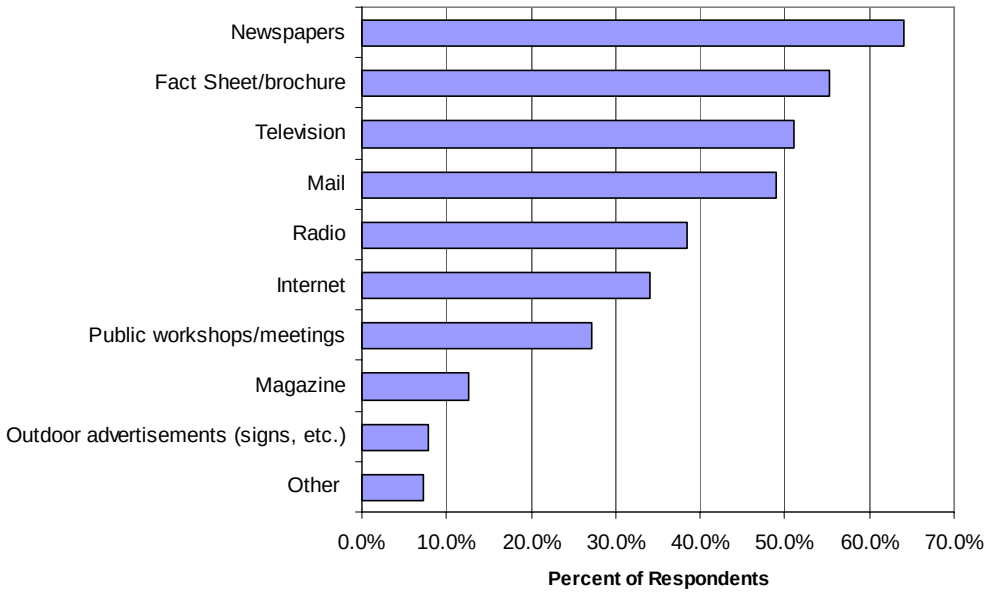
Figure 5. Survey Respondents' Preferred Sources of Information Regarding Household Preparedness



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!

Volume IV: Mitigation Resources
Appendix E: Resource Directory

1) Disaster Preparedness for You and Your Household
   June 2007, Lincoln County

2) Homeowner's Landslide Guide
   Oregon Emergency Management
   Federal Emergency management Agency Region 10

3) Protect Your Home Against Earthquake Damage
   Institute for Business & Home Safety

4) Planning for Survival – How to Protect Your Home from Wildfire
   March 1988, Central Oregon Coast Fire Prevention Cooperative

5) Answers to Questions About the NFIP
   FEMA

6) Development Standards Firm Zones A, A1-30, AO
   Lincoln County Department of Planning and Development

7) Lower Siletz Basin Flood Mitigation Action Plan
   September 2000, Community Planning Workshop

8) Protect Your Home from Flood Damage
   FEMA

9) Mitigating Geologic Hazards in Oregon: A Technical Reference Manual
   1999 Beaulieu, John D. and Dennis L. Olmstead
   Oregon Department of Geology and Mineral Industries

10) Hazard Analysis Matrix Worksheet
    June 27, 2007, Lincoln County Emergency Services

11) 2007 Lincoln County Land Use Codes
    Office of Lincoln County Legal Counsel

12) Environmental Hazard Inventory
    Coastal Lincoln County, Oregon

13) Lincoln County Planning Map

Note: the above documents can be found at the Lincoln County Department of Planning and Development, 210 SW Second Street, Newport, Oregon 97365.