

Curry County Natural Hazard Mitigation Plan

Curry County and the Cities of:
Port Orford, Gold Beach and Brookings



November 2015

Volume I: Basic Plan

Prepared for:
Curry County Emergency Management

Prepared by:
University of Oregon
Community Service Center
Oregon Partnership for Disaster Resilience



UNIVERSITY OF OREGON



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Special thanks to Don Kendal, Curry County Emergency Manger, for his leadership in convening the committee and to Beth Barker-Hidalgo, Curry Community Health, for her vision and support throughout.

Curry County NHMP Update Steering Committee

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- Beth Barker-Hidalgo, Curry Community Health
- Derwin Boggs, Coos Forest Patrol
- Don Kendall, Curry County Emergency Management
- Glenda Park, Coos-Curry Electric Cooperative
- Julie Schmelzer, Curry County Administrator/Economic Development
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City of Port Orford

- Jim Auburn, Mayor, City of Port Orford
- Terrie Richards, City of Port Orford

City of Gold Beach

- Jodi Fritts, City Administrator/Planning Director, City of Gold Beach

City of Brookings

- Gary Millman, City Administrator, City of Brookings
- LauraLee Snook, City of Brookings Public Works
- Donna Colby-Hanks, City of Brookings
- Donny Dotson, City of Brookings

Additional Listed Members (Invited)

- Susan Brown, Curry County Commissioner
- Tom Huxley, Curry County Commissioner
- David Brock Smith, Curry County Commissioner
- Renee Kolen, Curry County Clerk
- Jerry Herbage, Curry County Attorney
- Jim Kolen, Curry County Assessor
- John Ward, Curry County Sherriff
- Doug Robbins, Curry County Roadmaster
- Bruce Floyd, Gold Beach Fire Chief
- Jim Watson, Brookings Fire Chief
- Rosie Hoxeng, Gold Beach Chamber of Commerce/Coastal Home Health and Hospice
- Frank Corrales, Coos Curry Electric
- Ted Fitzgerald, Port of Brookings Harbor
- Monte Edwards, US Forest Service
- Mike Pope, US Bureau of Land Management
- Brett Weidemiller, Coos Forest Patrol
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Additional Thanks:

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About the Community Service Center

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

About the Oregon Partnership for Disaster Resilience

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

Plan Template Disclaimer

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

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PLAN SUMMARY

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

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

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

Why Develop this Mitigation Plan?

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

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

What is Mitigation?

“Any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event.”

- U.S. Federal Emergency Management Agency

Who Participated in Developing the Plan?

The Curry County NHMP is the result of a collaborative effort between the county, cities, special districts, citizens, public agencies, non-profit organizations, the private sector and regional organizations. County and City steering committees guided the Plan development process.

The County Steering Committee included representatives from the following jurisdictions and agencies:

- Curry County
- City of Port Orford
- City of Gold Beach
- City of Brookings
- American Red Cross
- Coos-Curry Electric Cooperative
- Coos Forrest Protective Association
- Oregon Department of Forestry
- Curry Community Health

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

The Curry County Emergency Manager convened the planning process and will take the lead in implementing, maintaining and updating the plan. Curry County is dedicated to directly involving the public in the continual review and update of the natural hazards mitigation plan. Although members of the Steering Committee represent the public to some extent, the public will also have the opportunity to continue to provide feedback about the Plan throughout the implementation and maintenance period. Notably, the county invited additional participation in the planning process.

How Does this Mitigation Plan Reduce Risk?

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

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

Figure PS-I Understanding Risk



Source: Oregon Partnership for Disaster Resilience.

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

What is Curry County’s Overall Risk to Hazards?

Curry County reviewed and updated their risk assessment to evaluate the probability of each hazard as well as the vulnerability of the community to that hazard. Scores are based on the Curry County Hazard Analysis submitted to the Oregon Office of Emergency Management. Table PS-1 below summarizes hazard probability and vulnerability as determined by the county steering committee (for more information see Section 2, Risk Assessment). Notably, the Hazard Analysis on file with OEM for Curry County (2007) does not include the coastal erosion hazard. Coastal erosion IS addressed elsewhere in this plan.

Table PS-1 Risk Assessment Summary

Hazard	History	Vulnerability	Maximum		Total Threat Score	Hazard Rank	Hazard Tiers
			Threat	Probability			
Flood	20	50	100	70	240	# 1	Top Tier
Windstorm	20	50	100	70	240	# 2	
Wildfire	20	50	100	70	240	# 3	
Tsunami	8	50	100	35	193	# 4	Middle Tier
Earthquake	2	50	100	35	187	# 5	
Landslide	20	5	80	70	175	# 6	Bottom Tier
Volcanic Ash	2	50	100	7	159	# 7	
Drought	8	15	70	56	149	# 8	

Source: Curry County Hazard Analysis, October 2007; Analysis and Ranking by OPDR

At the end of this executive summary, hazard briefs provide summary information for priority hazards in Curry County.

What is the Plan’s Mission?

The mission of the Curry County NHMP is to:

Mission: *Create a disaster resilient Curry County.*

This can be achieved by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to guide the county towards building a safer, more disaster resistant community.

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

What are the Plan Goals?

The Plan goals describe the overall direction that the participating jurisdiction’s agencies, organizations, and citizens can take toward mitigating risk from natural hazards. Below is a list of the plan goals (Note: although numbered the goals are not prioritized):

Goal 1: *Save lives and reduce injuries.*

Goal 2: *Minimize and prevent damage to public and private buildings and infrastructure.*

Goal 3: *Reduce economic losses.*

Goal 4: *Increase public and private sector involvement in natural hazard mitigation, education, and critical facilities planning.*

Goal 5: *Provide more opportunities for development outside of mapped hazardous areas.*

Goal 6: *Protect natural and cultural resources.*

Goal 7: *Increase cooperation and coordination among private entities, and local, state, and federal agencies.*

Goal 8: *Update natural hazard sections of the comprehensive plan and integrate local NHMPs with comprehensive plans and implementing measures.*

Goal 9: *Increase education, outreach, awareness, and collaboration.*

Goal 10: *Increase natural hazard outreach to vulnerable populations in Curry County.*

How are the Action Items Organized?

The action items are organized within an action matrix included within Section 3, Mitigation Strategy (full descriptions are provided in Appendix A, *Action Item Forms*).

Data collection, research and the public participation process resulted in the development of the action items. The Action Item Matrix portrays the overall Plan framework and identifies linkages between the plan goals and actions. The matrix documents the title of each action along with, the coordinating organization, timeline, and

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

the Plan goals addressed. Action items particular to each of the participating cities are included at the end of the action item matrix in Section 3, Mitigation Strategy and in the addenda.

Comprehensive Action Plan

The following table summarizes specific **priority** NHMP actions. Refer to the Mitigation Strategy section for a complete list of actions. Volume II, Appendix A contains detailed information for all action items, including potential partners, implementation ideas, proposed timeline and estimated budget.

Table PS-2: High Priority NHMP Actions

Priority Mitigation Actions
Curry County
Utilize the final multi-hazard risk report and assessment currently being developed by DOGAMI through FEMA's RiskMap program to update the Curry County Hazard Analysis.
Utilize the final multi-hazard risk report and assessment currently being developed by DOGAMI through FEMA's RiskMap program to update the Goal 7 Section of the Curry County Comprehensive Plan.
Conduct non-structural seismic retrofit workshops with government agencies, businesses, and residents to prevent damage from earthquakes.
City of Port Orford
Implement Port Orford Comprehensive Plan, Goal 7 Section, Policy 5
Implement Port Orford Comprehensive Plan, Goal 7 Section, Policy 7
Implement Port Orford Comprehensive Plan, Goal 7 Section, Policy 8
Implement Port Orford Comprehensive Plan, Goal 7 Section, Policy 9
Adopt a Tsunami Land Use Overlay Zone
City of Gold Beach
Update the Goal 7 Section of the Gold Beach Comprehensive Plan.
Adopt a Tsunami Land Use Overlay Zone
City of Brookings
Safe Drinking Water Resiliency Project [HUD Resilience Competition Project]
Critical Healthcare Resiliency Project [HUD Resilience Competition Project]
Sewer Storm Disaster Repairs Project [HUD Resilience Competition Project]
Multifamily LMI and Tsunami-Safe Housing Program [HUD Resilience Competition Project]
Electricity Reliability Project [HUD Resilience Competition Project]
Update the Goal 7 Section of the Brookings Comprehensive Plan.
Adopt a Tsunami Land Use Overlay Zone
Analyze the Port Jetty's and storm water system in Brookings for stability during floods and severe storms and identify mitigation options
Convert existing distribution facilities to underground at the Port of Brookings/Harbor

Source: NHMP Steering Committee; HUD Resilience Team; Oregon Partnership for Disaster Resilience

How will the plan be implemented?

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

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

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

Plan Adoption

Once the Plan is locally reviewed and deemed complete the Plan Convener submits it to the State Hazard Mitigation Officer at the Oregon Military Department – Office of Emergency Management (OEM). OEM reviews the Plan and submits it to the Federal Emergency Management Agency (FEMA – Region X) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR Part 201.6. Once the Plan is pre-approved by FEMA, the county and cities formally adopt the Plan via resolution. The Curry County Plan Convener will be responsible for ensuring local adoption of the Curry County NHMP and providing the support necessary to ensure plan implementation. Once the resolution is executed at the local level and documentation is provided to FEMA, the Plan is formally acknowledged by FEMA and the county (and participating cities) will re-establish eligibility for the Pre-Disaster Mitigation Grant Program, the Hazard Mitigation Grant Program funds, and the Flood Mitigation Assistance program funds.

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

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

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

The Steering Committees for Curry County and participating cities each met to review the Plan update process and their governing bodies adopted the NHMP as shown below:

Curry County adopted the plan on **[DATE], 2015**

The City of Port Orford adopted the plan on **[DATE], 2015**

The City of Gold Beach adopted the plan on **[DATE], 2015**

The City of Brookings adopted the plan on **[DATE], 2015**

FEMA Region X approved the Curry County NHMP on [DATE], 2015. With approval of this Plan, the entities listed above are now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through [DATE], 2015.

Hazard Briefs

The following provide brief summaries for each of the priority hazards in Curry County.



Coastal Erosion

History of Hazard in County

Recent Events:

No new coastal erosion events have been identified since the last update of the Curry County Natural Hazard Mitigation Plan (NHMP) in 2010.

Historically Significant Events:

1998 (Feb): Port Orford- Heavy surf damaged Port Orford's sewage treatment plant, causing approximately \$300,000 in damage and eroded the dune that separates the ocean from Garrison Lake, one of Port Orford's water sources.

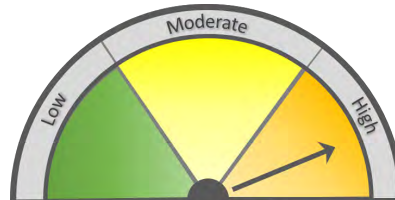
2004: Otter Point State Park- Coastal erosion destroyed a hiking trail.

-1.9 ft./yr.

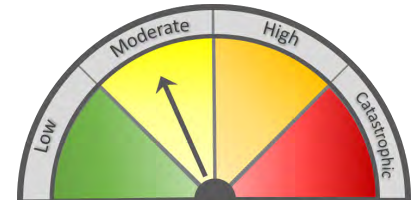
erosion rate at Nesika Beach bluffs

~20

homes are currently developed along the bluff



Hazard Probability



Community Vulnerability

Description of the Hazard

Coastal erosion is a natural process that continually affects the entire coast. Erosion becomes a hazard when development, life or community safety are threatened. Waves, currents, tides and storms resulting in episodic and recurrent erosion constantly affect beaches, sand spits, dunes and bluffs. 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. The 2015 Draft Oregon NHMP identifies coastal erosion within its coastal hazards annex that also includes coastal flooding, landslides, earthquake, and tsunami.

Findings and Implications for Curry County

- Changing climate and weather patterns may alter the frequency, intensity and duration of wind and winter storm events.
- Sea level rise may change the incidence and location of coastal erosion over time.
- Coastal erosion can effect utilities, transportation networks, and essential facilities with potential long-term impacts on residents and the local economy.
- Some of the highest erosion rates for bluff-backed shorelines in Oregon are found along a segment within the Nesika Beach area of Curry County, with bluff toe retreats measured at 1.9 feet per year (DOGAMI).

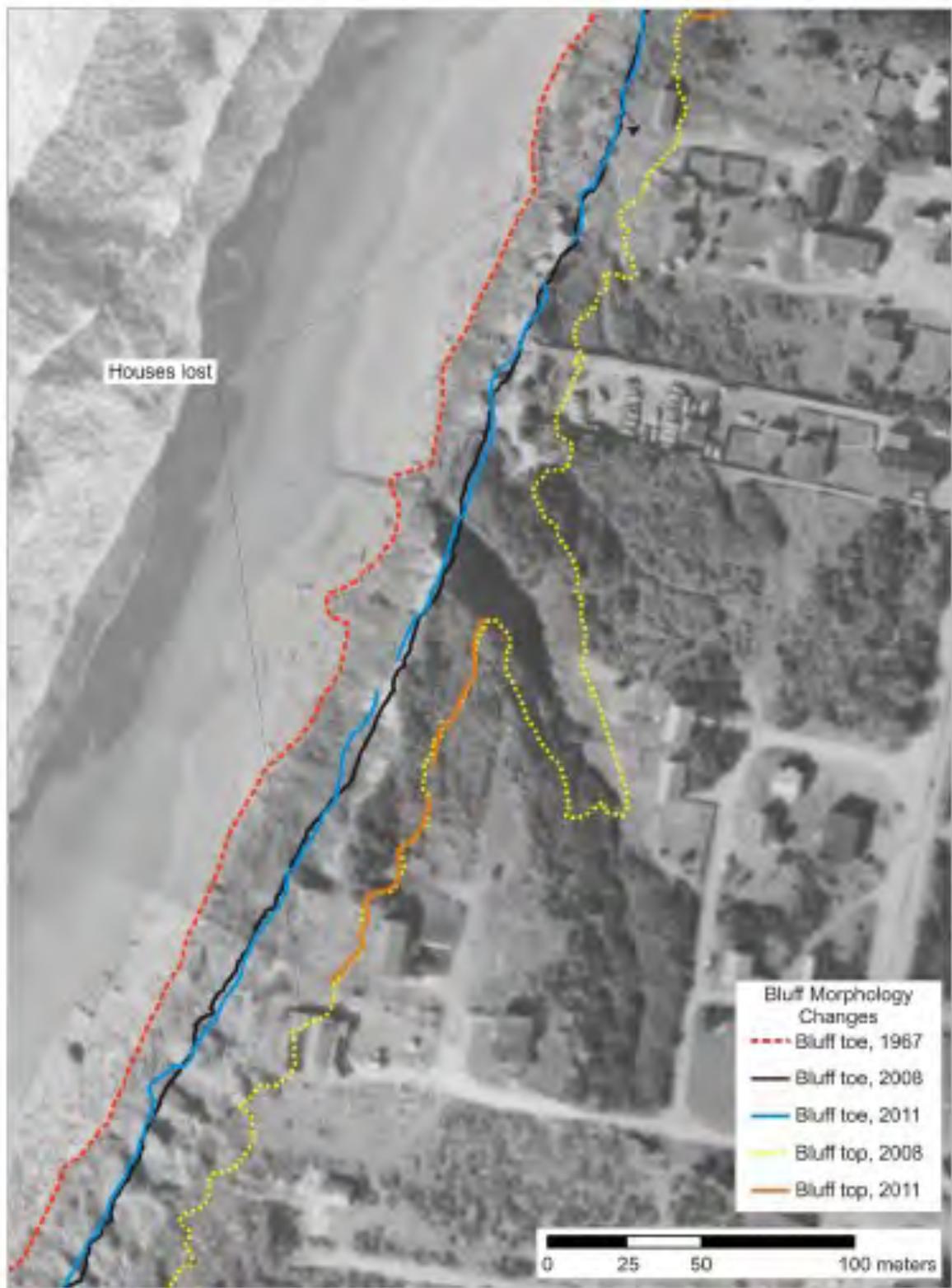
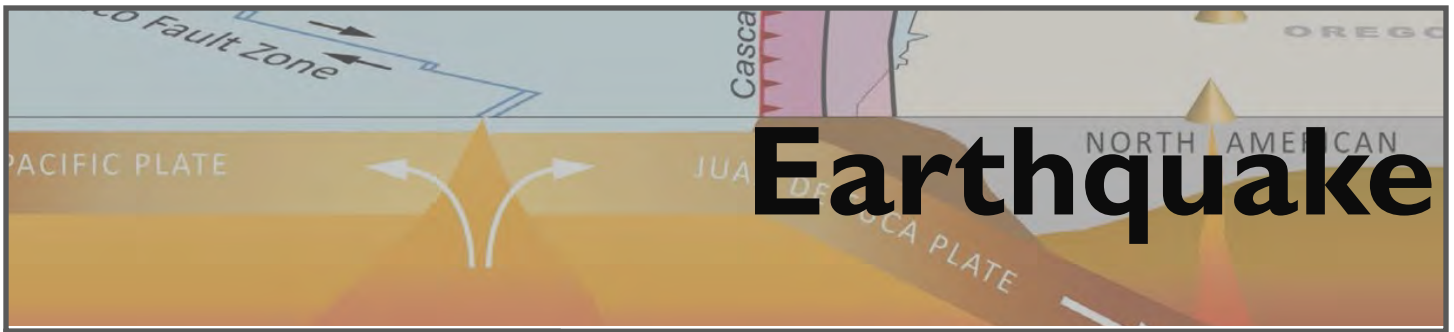


Figure 22. Close-up view of geomorphic changes (bluff toe and top) along a portion of the Nesika Beach shore depicted on a 1967 orthorectified image. Note the two homes identified in the 1967 aerial images that have been lost due to retreat of the bluffs.

Source: Department of Geology and Mineral Industries - Open-File Report o-13-07. Refer to this report for additional mapping and analysis of shoreline changes in the Gold Beach and Nesika Beach areas of Curry County. <http://www.oregongeology.org/pubs/ofr/O-13-07.pdf>



History of Hazard in County

Recent Events:

Curry County has not experienced any damaging earthquakes in the past 100 years.

Historically Significant Events:

November 1873: 7.3 Intraplate Earthquake off Oregon Coast resulted in minor damage throughout southwest Oregon.

January 1700: ~9.0 Earthquake on the Cascadia Subduction Zone (CSZ) generated a local tsunami.

88

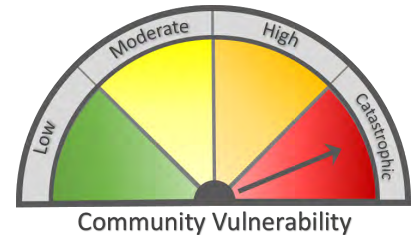
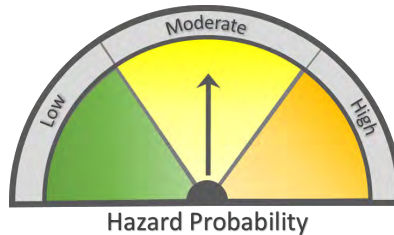
bridges exist in Curry County.

1975

Bridges built prior to this year have a significant structural collapse potential when subjected to earthquake forces.

77%

of the Curry County's bridges were built before 1975.



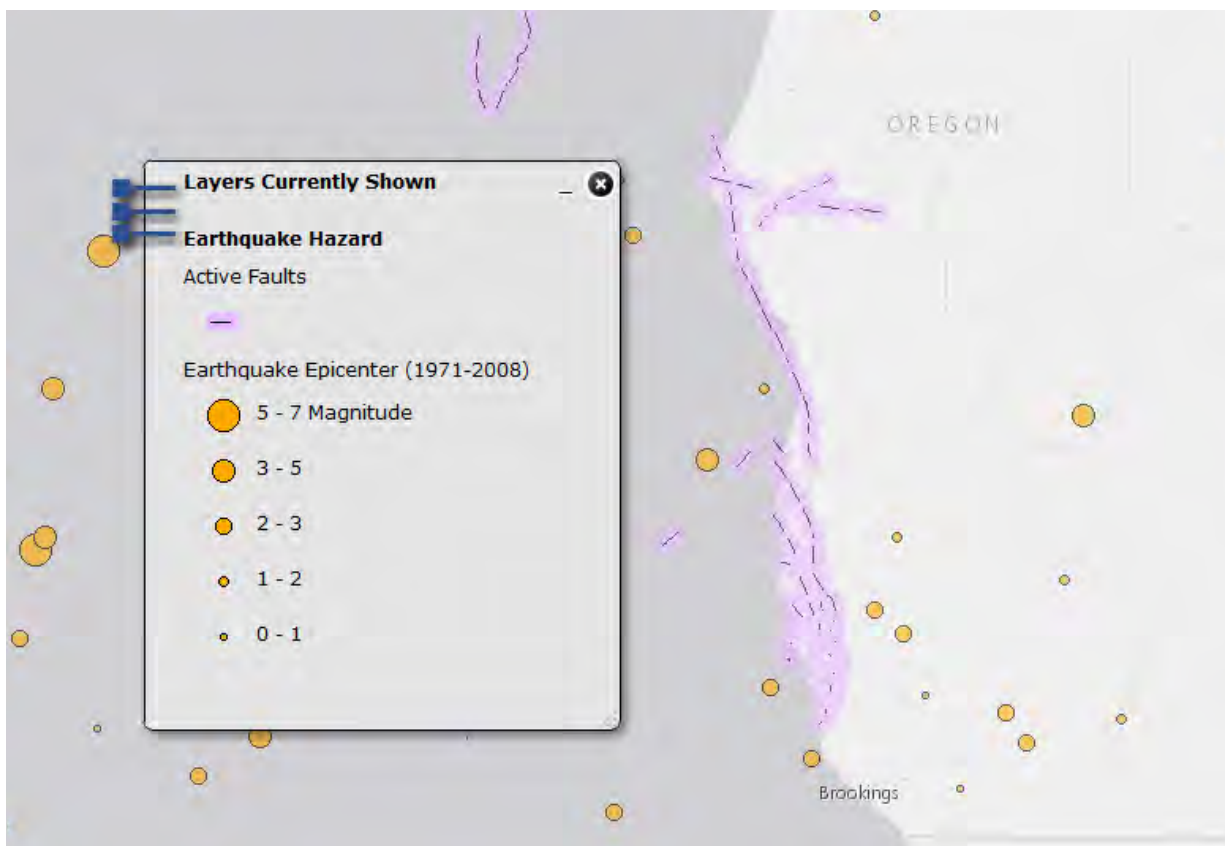
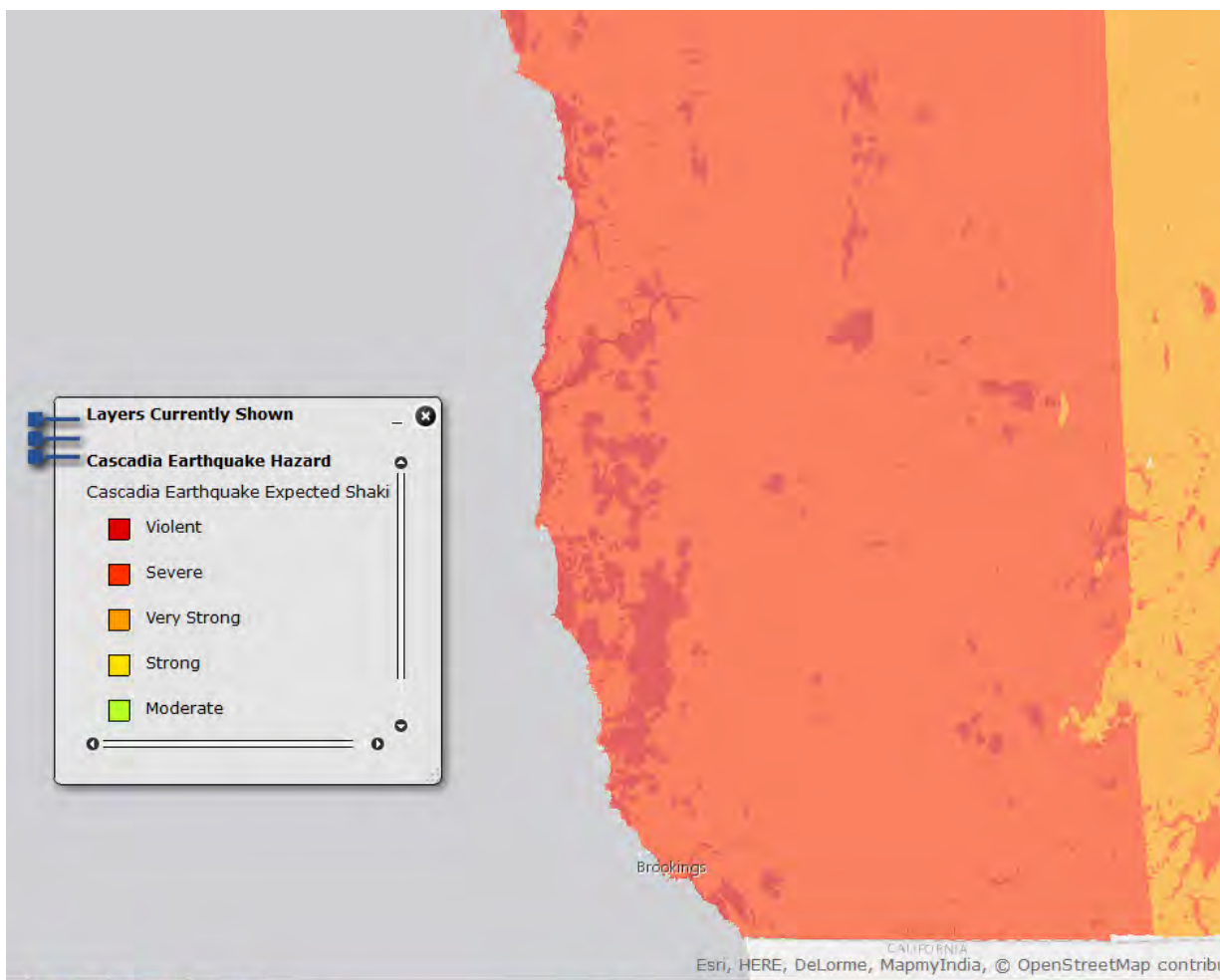
Description of the Hazard

Oregon and the Pacific Northwest in general are susceptible to earthquakes from four sources: 1) the off-shore Cascadia Subduction Zone (CSZ); 2) deep intra-plate events within the Juan de Fuca Plate; 3) shallow crustal events within the North American Plate; and 4) earthquakes associated with volcanic activity.

The areas most susceptible to ground amplification and liquefaction have young, soft alluvial sediments, found along river and stream channels. The extent of the damage to structures and injury and death to people will depend upon the type of earthquake, proximity to the epicenter and the magnitude and duration of the event.

Findings and Implications for Curry County

- The southern segment of the CSZ ruptures with a recurrence of roughly 240 years; the last CSZ event occurred 315 years ago (Goldfinger et. al. 2012).
- Seven out of 18 (38%) county schools have a high (>10%) or very high (100%) collapse potential (DOGAMI 2008).
- The county budget has declined from \$75.6 million in 2010/2011 to \$57.3 million in 2014/2015; nearly 70% of the 2014/2015 budget (~\$40 million) is restricted to the County Road Fund.
- New revenue sources or external funds will be needed to address Curry County's lifeline infrastructure vulnerabilities.





Flood

History of Hazard in County

Recent Events:

January 2012: Coos and Curry flooding along with landslides and mudslides.

March 2012: Coos and Curry Counties- Winds and heavy rain caused flooding, mudslides, and landslides in twelve counties. Damage to state highways estimated at \$5,856,881.

November 2012: Curry County- Rain flooded the Chetco River and Hunter Creek with 9.84 inches of rain recorded at Harbor in a 24-hour period.

November 2012: Curry and Josephine flooding caused \$4 million in damages to infrastructure.

Historically Significant Events:

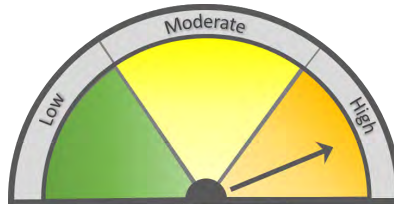
Curry County experiences chronic flooding on an almost annual basis. The County has been named in five major disaster declarations over the past half-century.

359

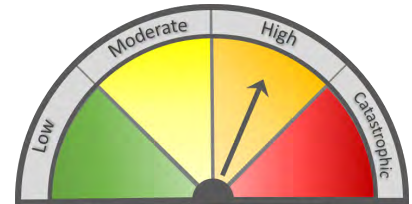
flood insurance policies exist in the county ...

33%

of those policies are pre-firm.



Hazard Probability



Community Vulnerability

Description of the Hazard

Flooding results when surface water flow exceeds the carrying capacity of rivers, streams, channels, ditches, and other drainage systems. In Oregon, flooding is most common from October through April when storms from the Pacific Ocean bring intense rainfall. Most of Oregon's destructive natural disasters have included flooding. Flooding can be aggravated when rain is accompanied by snow-melt and frozen ground; the spring cycle of melting snow is the most common source of flood in the region. The principal types of flood that occur in Curry County include: coastal flooding from high tides and ocean storms, and high river flows (within estuaries the two types combine to create flood hazards). Flooding may also occur in combination with a local or distant tsunami event.

Findings and Implications for Curry County

- Changing climate and weather patterns may alter the size, location and frequency of future floods in Curry County.
- None of the cities or county participate in the Community Rating System.
- Curry has no severe repetitive flood loss properties and only three repetitive flood loss buildings.

Coos Co

Curry County

FEMA Special Flood Hazard Area (SFHA)

Also known as the "100-year flood"

- Effective -
Sept. 25, 2009

Douglas Co

Port Orford

FLORAS CR

SIXES R

ELK R

ROGUE R

ROGUE R

ILLINOIS R

Gold Beach

PISTOL R

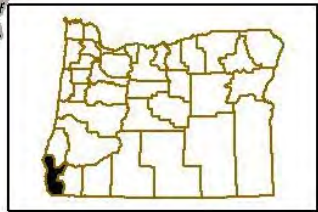
Josephine Co

0 2.5 5 10 Miles

Brookings

CHETCO R

California



Legend

County

Rivers

City Limits

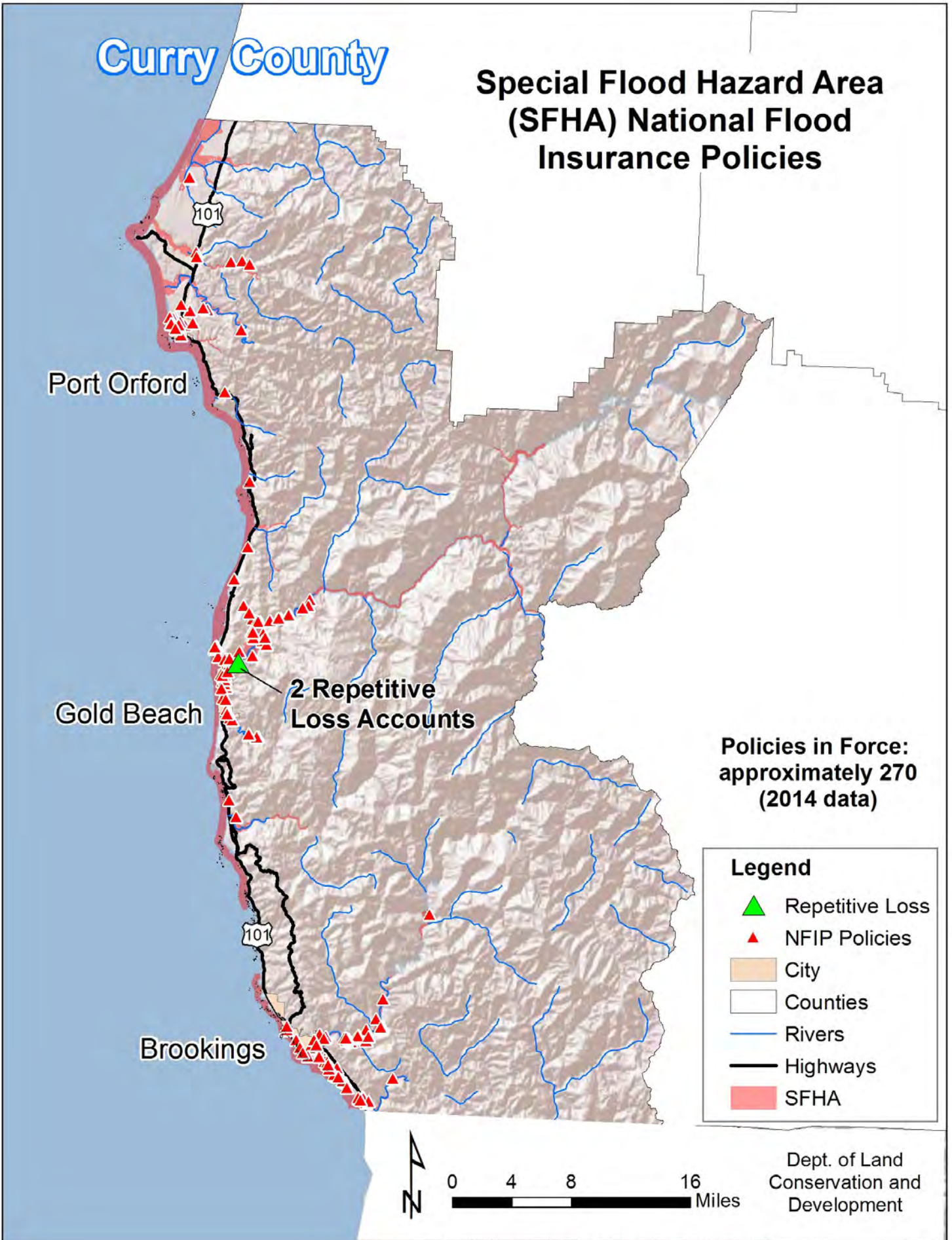
SFHA

Dept. of Land
Conservation and
Development



Curry County

Special Flood Hazard Area (SFHA) National Flood Insurance Policies





Landslide

History of Hazard in County

Recent Events:

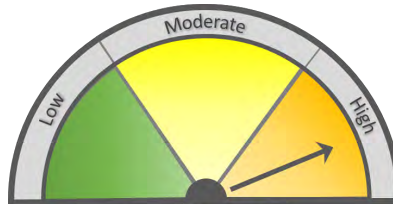
March 2011: Curry County and 12 other counties experienced winds and heavy rains that resulted in flooding, mudslides, and landslides in 13 counties (DR 4055). Damage to state highways alone was estimated at \$5,856,881.

Historically Significant Events:

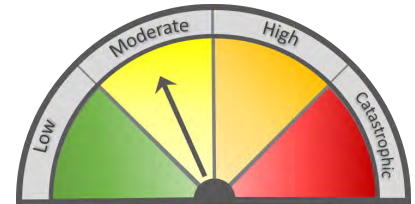
Numerous landslide events have impacted State Highway 101 over the past half-century closing the highway at times, isolating communities and causing hundreds of thousands of dollars in repairs.

Over **3,000**

landslides have been identified and mapped in the county.



Hazard Probability



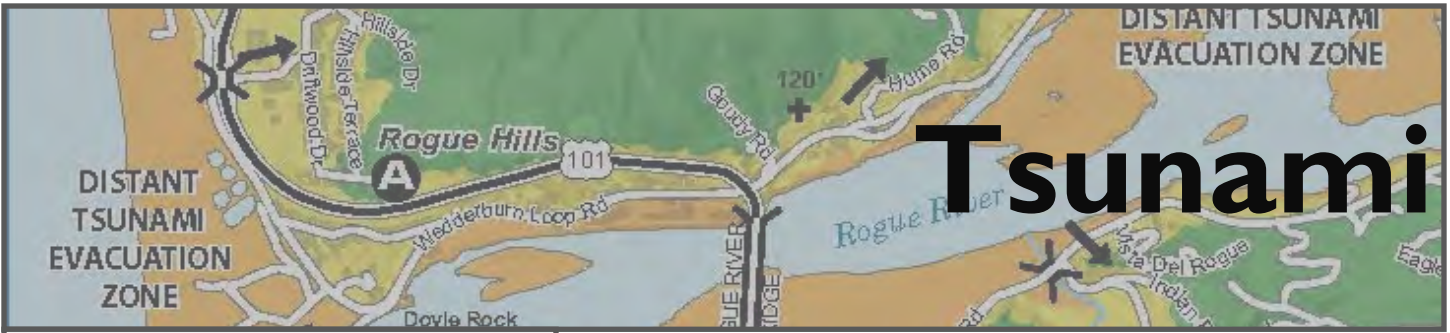
Community Vulnerability

Description of the Hazard

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 are a chronic, recurring hazard in Curry County.

Findings and Implications for Curry County

- Transportation infrastructure in Curry County is particularly vulnerable to landslide hazards.
- In 2013, the Oregon Department and Mineral Industries completed a detailed landslide study for Curry County; the County has not updated its Comprehensive Plan to reflect this new data.
- Local policy changes, particularly those related to land use and transportation, could significantly reduce community vulnerability if enacted immediately and implemented over time.
- Changing climate and weather patterns may alter the size, location and frequency of landslides in Curry County.



History of Hazard in County

Recent Events:

March 2011: Oregon Coast- A 9.0 magnitude earthquake originating from Japan caused \$6.7 million worth of damages along the Oregon coast. The event resulted in a Disaster Declaration in Curry County; the Port of Brookings experienced extensive damage.

Historically Significant Events:

March 1964: 9.2 Earthquake in Alaska generated a distant tsunami the impacted the entire Oregon coast.

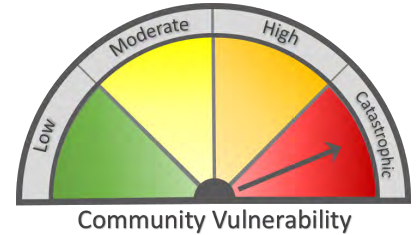
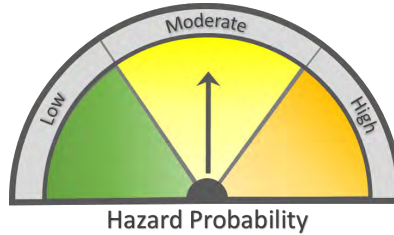
January 1700: ~9.0 Earthquake on the Cascadia Subduction Zone (CSZ) generated a local tsunami.

59%

of residents in Gold Beach live within the DOGAMI delineated "Large" tsunami inundation zone - Wood et. al., 2014

0

Number of locally adopted tsunami land-use overlay zones

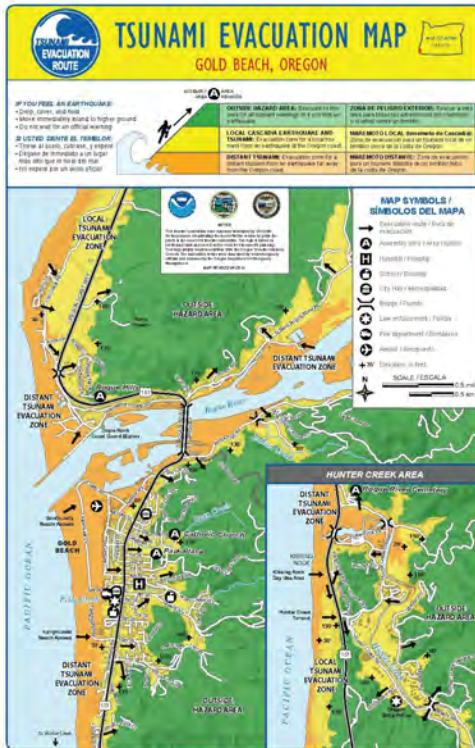
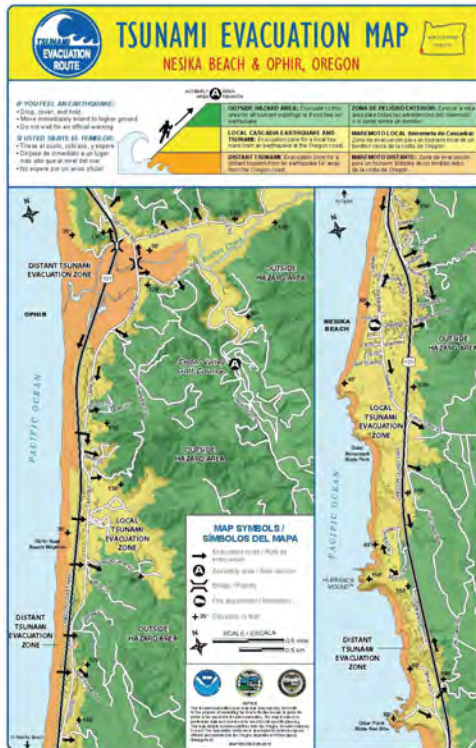
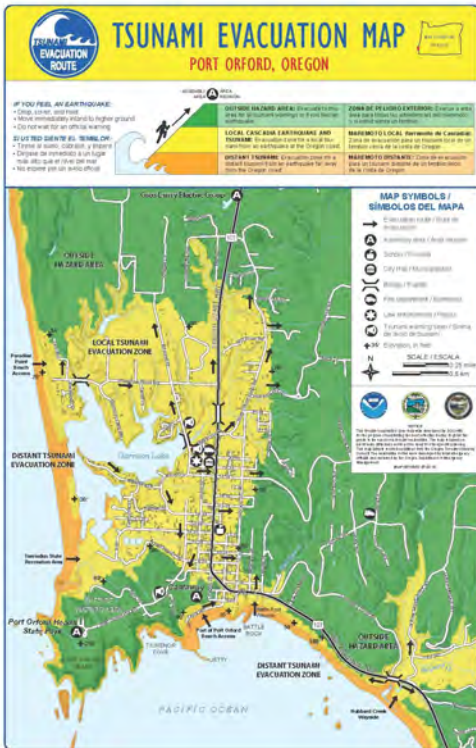


Description of the Hazard

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. The initial tsunami wave mimics the shape and size of the sea floor deformation that causes it. A tsunami from a local source will likely be stronger, higher and travel farther inland (overland and up river) than a distant tsunami (generated from a distant earthquake event such as in Alaska or Japan). The local tsunami wave may be traveling at 30 mph when it hits the coastline and have heights of 20 to more than 60 feet, depending on the coastal bathymetry (water depths) and geometry (shoreline features). Curry County is vulnerable to impacts from both local and distant tsunamis.

Findings and Implications for Curry County

- The southern segment of the CSZ ruptures with an average recurrence interval of roughly 240 years; the most recent CSZ event occurred 315 years ago (Goldfinger et. al. 2012).
- A local tsunami event generated by a CSZ earthquake will catastrophically impact key lifeline infrastructure systems.
- New tsunami inundation data is available; the County has not updated its Comprehensive Plan to reflect this new data.
- Local policy changes, particularly those related to land use and economic development, could reduce community vulnerability if enacted immediately and implemented over time.



Wildfire

History of Hazard in County

Recent Events:

June 2014: Curry County- the Euchre Creek Fire, 12 miles north of Gold Beach, burned 56 acres.

Historically Significant Events:

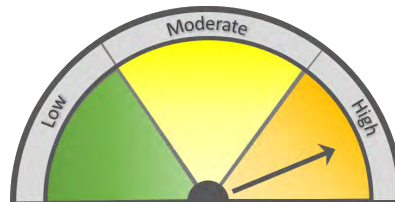
2002: The Biscuit Fire burned roughly 500,000 acres for a total cost of \$150 million in damages.

1936: Bandon Fire burns 225 acres and most of the City of Bandon just north of Curry County.

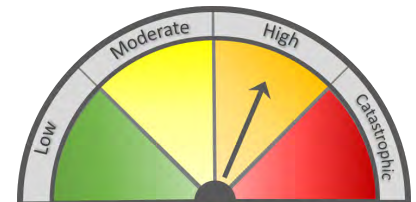
1868: Coos and Curry Counties- 90% of Elliott State Forest burns. Fire is stopped when it reaches the ocean after burning through 296,000 acres and \$150 Million in suppression costs.

\$2.68

is the amount in the Coos Forest Protection Association District FY '13-'14 Budget per acre of timber covered.



Hazard Probability



Community Vulnerability

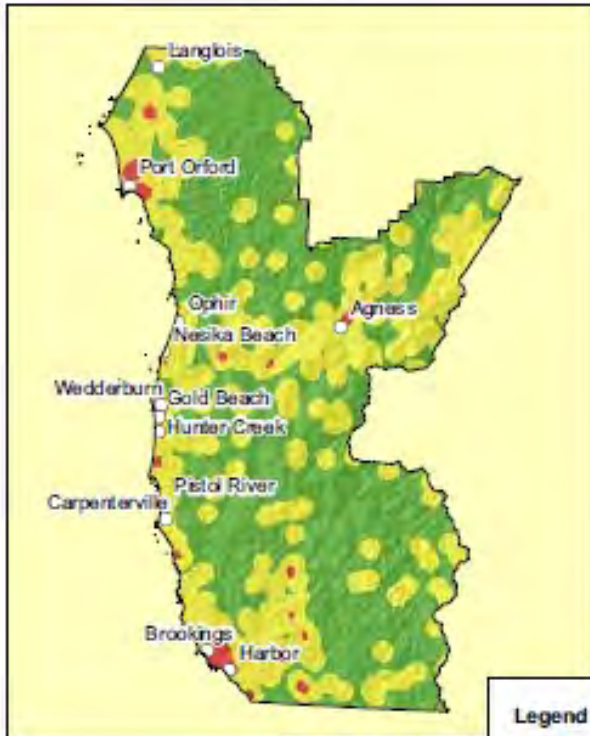
Description of the Hazard

Wildfires occur in areas with large amounts of flammable vegetation that require a suppression response due to uncontrolled burning. 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. Wildfire can be divided into three categories: interface, wildland, and firestorms. 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.

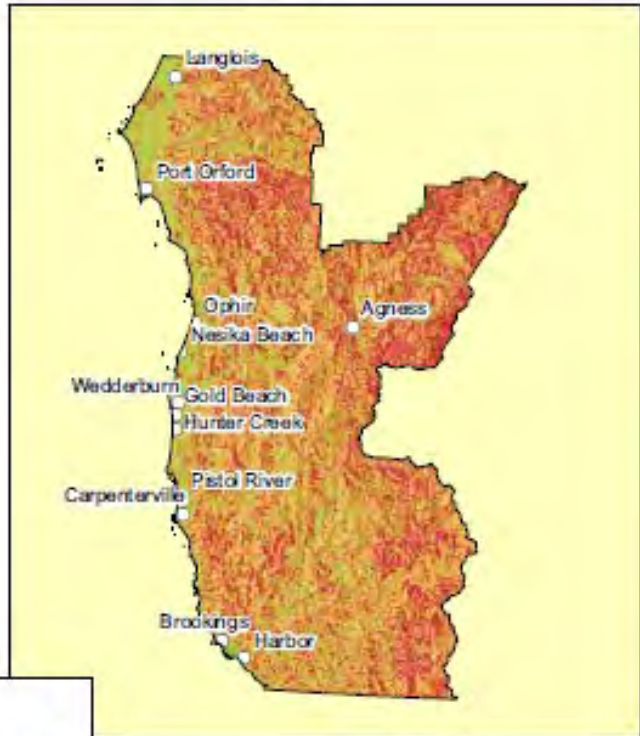
Findings and Implications for Curry County

- Changing climate and weather patterns may alter the size, location and frequency of future wildfires in Curry County.
- Gorse is a significant, highly flammable source of fuel for wildfires; it is an invasive shrub with large (average mapped polygon size is 34 acres in the region), dense patches common between Bandon and Port Orford.
- The Curry County Community Wildfire Protection Plan was developed in 2008 and has not been updated since.
- According to the 2008 CWPP, only a third of homes at risk to wildfire had the minimum recommended defensible space buffer of 30-feet.

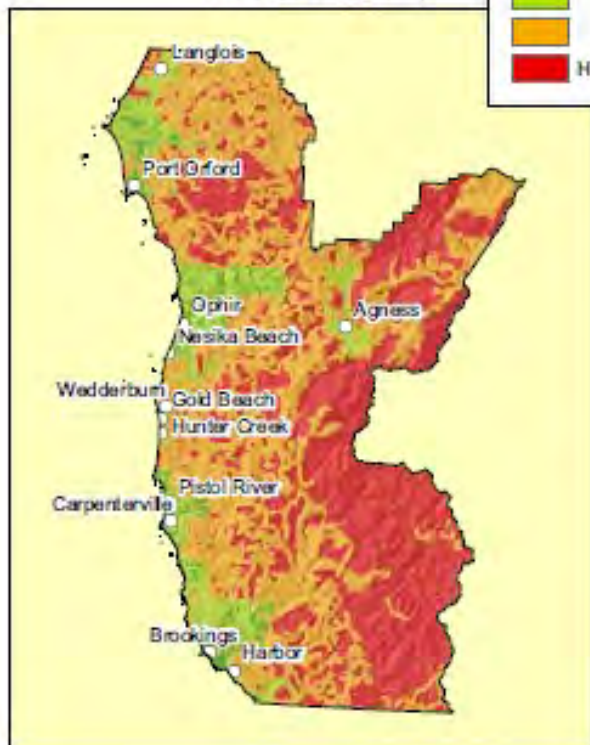
Ignition Risk



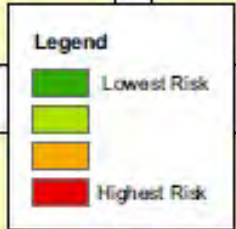
Hazard



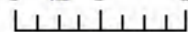
Protection Capability



Values At Risk



0 4.5 9 18 Miles



Wildfire Risk Assessment Map 2 Risk Assessment Factors

Created by: Jim Wolf, February 5, 2008



This map is a public resource of general information. Use this information at your own risk. Curry County makes no warranty of any kind, expressed or implied, including any warranty of merchantability, fitness for a particular purpose, or any other matter.

Wind/Winter Storm

History of Hazard in County

Recent Events:

March 2012: Curry and 11 other counties - Damaging winds, heavy rains, flooding, mudslides, landslides, and erosion result in \$6 million in damages and a Disaster Declaration (DR-4055).

Historically Significant Events:

2007 (Dec. 1-3): A relentless storm pummeled the Oregon and Washington Coasts for three-days bringing the strongest winds the area has seen since the Columbus Day storm.

2002 (Feb. 7): A strong low pressure system came onshore in Southwest Oregon. Maximum wind gusts reported included 84 mph in Gold Beach.

1962 (Oct. 12): Columbus Day Storm.

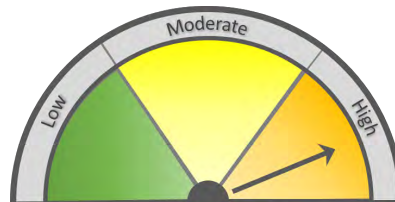
1950 (Jan): Heaviest snow statewide since record keeping started; six-inches in Brookings and three in Gold Beach.

17,592

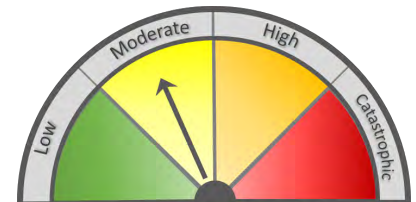
members in the Coos-Curry
Electric Cooperative.

100%

of the local power supply is
produced outside the region.



Hazard Probability



Community Vulnerability

Description of the Hazard

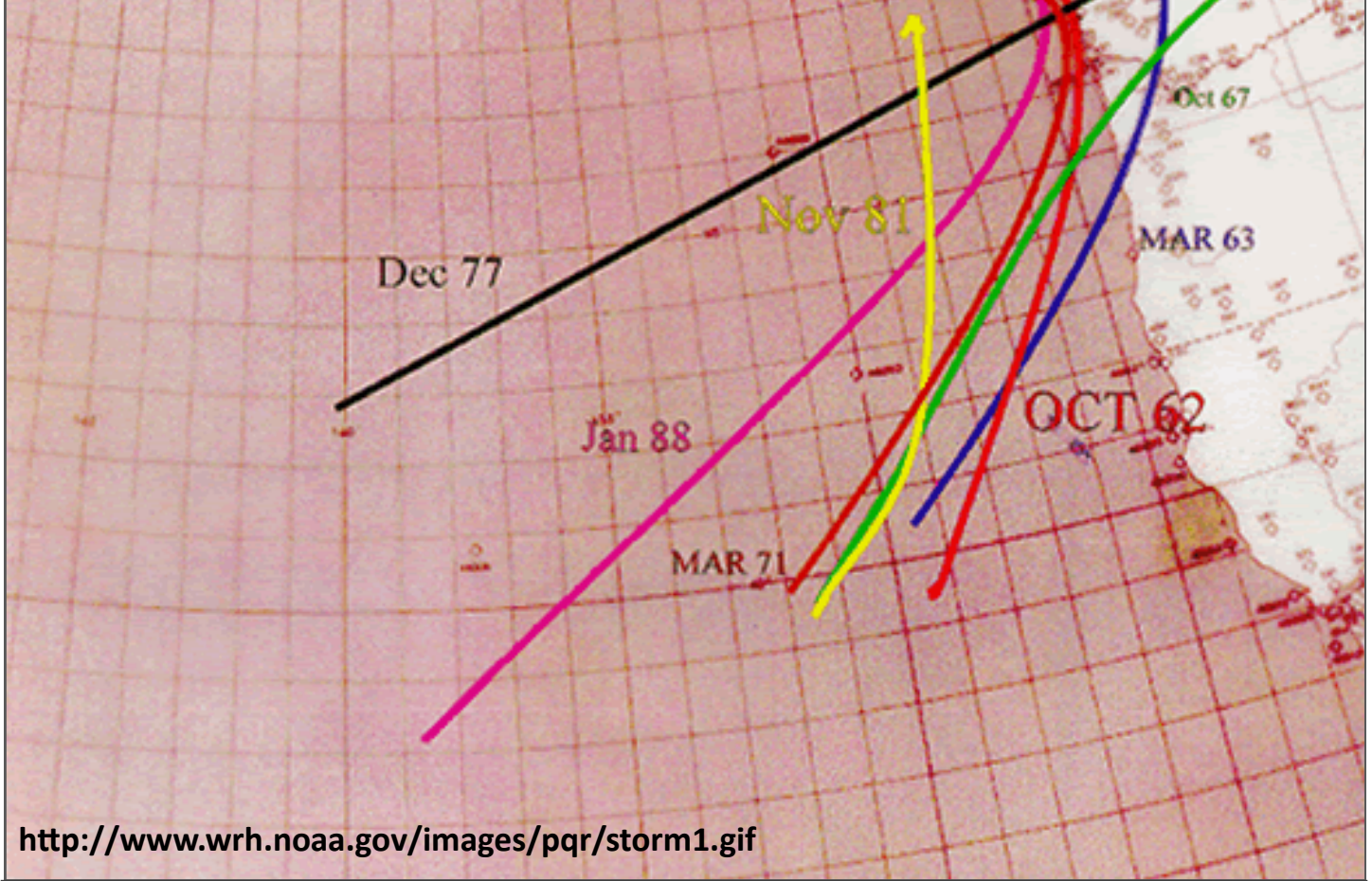
Windstorms are generally short duration events involving straight-line winds and/or gusts in excess of 50 mph. Although windstorms can affect all of Curry County, they are especially dangerous along the coastline and coastal headlands. A windstorm will frequently knock down trees and power lines, damage homes, businesses, public facilities, and create tons of storm related debris. In addition, windstorms contribute to wave action and coastal erosion. Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They generally originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Wind and rain are the primary concerns in Curry County; snow and ice events are rare on the south coast.

Findings and Implications for Curry County

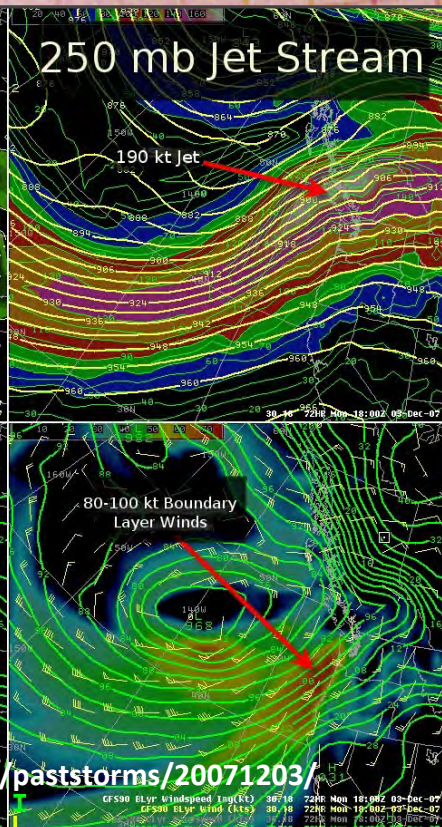
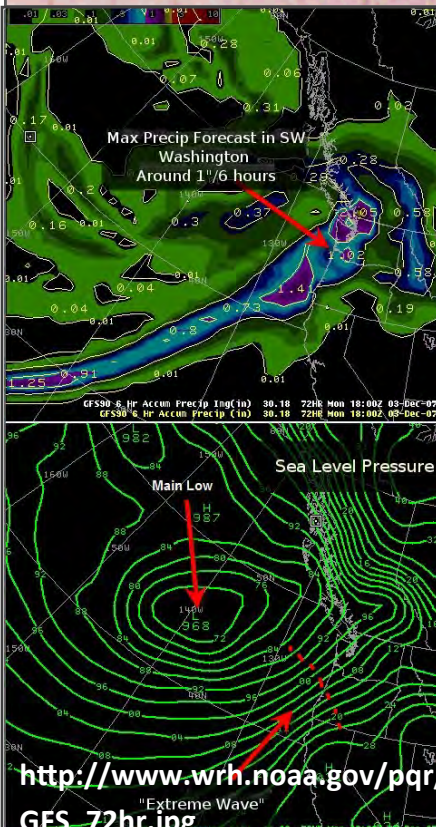
- Changing climate and weather patterns may alter the frequency, intensity and duration of wind and winter storm events.
- Damaging wind is the primary concern; snow and ice events are rare.
- Power outages are common and can last due to isolation and impacts to transportation from downed trees.
- Opportunities to mitigate power outages include undergrounding and adding diverse and redundant local power supplies to homes, businesses and the local electrical grid.
- Wind storms are a chronic hazard on the Oregon coast and coastal residents tend to be prepared to deal with them.

Sampling of High Wind Producing Storm Track

From a 1985 Paper by John Coparanis



<http://www.wrh.noaa.gov/images/pqr/storm1.gif>



December 1-3, 2007 Hurricane Force Windstorm

A windstorm packing hurricane force winds battered the coasts of Washington and Oregon during December 1-3, 2007. Winds with this storm were second only to that of the 1962 Columbus Day Storm with a recorded gust of 129 mph at Bay City, Oregon (reports of as much as 147 mph at unpopulated areas); however, the longevity of winds with this storm far exceeded the Columbus Day Storm with sustained winds in excess of 50 mph for over 2 days. This storm also delivered significant wave heights (top 1/3 of wave heights) of 48 feet before unmooring the buoys that were observing them and caused significant flooding on coastal rivers and some Willamette Tributaries. This led to the closure of all east-west roads through the Coast Range into the Willamette Valley and cut power to the area for at least 4 days. Image to the left shows the NWS 72-Hour Model Forecast for this storm.

<http://www.wrh.noaa.gov/pqr/paststorms/20071203/>

GFS 72hr. img

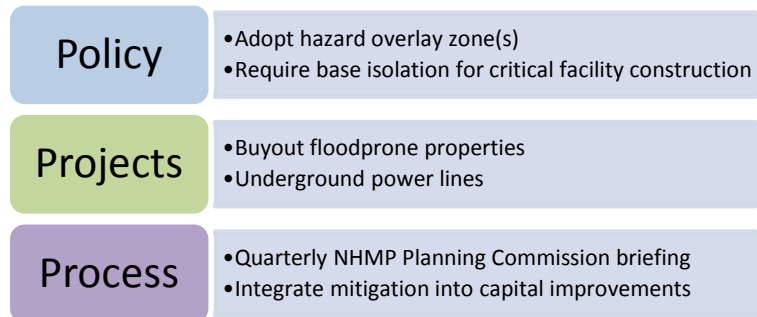
SECTION I: INTRODUCTION

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

What is Natural Hazard Mitigation?

The Federal Emergency Management Agency (FEMA) defines mitigation as “. . . the effort to reduce loss of life and property by lessening the impact of disasters . . . through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk.”¹ Said another way, natural hazard mitigation is a method of permanently reducing or alleviating the losses of life, property, and injuries resulting from natural hazards through long and short-term strategies. Example strategies (see Figure 1.1) include policy changes, such as updated land development ordinances; projects, such as seismic retrofits to critical facilities; and process tasks such as quarterly reporting to the Board of County Commissioners on mitigation activities.

Figure 1.1 – Mitigation Strategy Categories



Source: Oregon Partnership for Disaster Resilience

Natural hazard mitigation is the responsibility of the “Whole Community” - individuals, private businesses and industries, state and local governments, and the federal government. At the local level, 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.

¹ FEMA, *What is Mitigation?* <http://www.fema.gov/what-mitigation>

Why Develop a Mitigation Plan?

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

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

What Federal Requirements Does This Plan Address?

The Disaster Mitigation Act of 2000 (DMA2K) is the latest federal legislation addressing mitigation planning. The Act reinforces the importance of mitigation planning and emphasizes planning for natural hazards before they occur. Specifically, DMA2K 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 State and local jurisdictions' proposed mitigation measures are based on a sound planning process that accounts for the risk to the individual and State and local jurisdictions' capabilities.

Chapter 44 Code of Federal Regulations (CFR), section 201.6, also requires a local government to have an approved mitigation plan in order to receive HMGP project grants.² Pursuant of Chapter 44 CFR, the Natural Hazard Mitigation Plan planning processes shall include opportunity for the public to comment on the plan during review, and the updated Natural Hazard Mitigation Plan shall include documentation of the public planning process used to develop the plan.³ The Natural Hazard Mitigation Plan update must also contain a risk assessment, mitigation strategy and a plan maintenance process that has been formally adopted by the governing body of the jurisdiction.⁴ Lastly, the Natural Hazard Mitigation Plan must be submitted to Oregon Military Department – Office of Emergency Management (OEM) for initial plan review, and then federal approval.⁵ Additionally, a recent change in

² Code of Federal Regulations, Chapter 44. Section 201.6, subsection (a), 2015

³ *ibid*, subsection (b). 2015

⁴ *ibid*, subsection (c). 2015

⁵ *ibid*, subsection (d). 2015

the way OEM administers the Emergency Management Performance Grant (EMPG), which helps fund local emergency management programs, also requires a FEMA-approved NHMP.

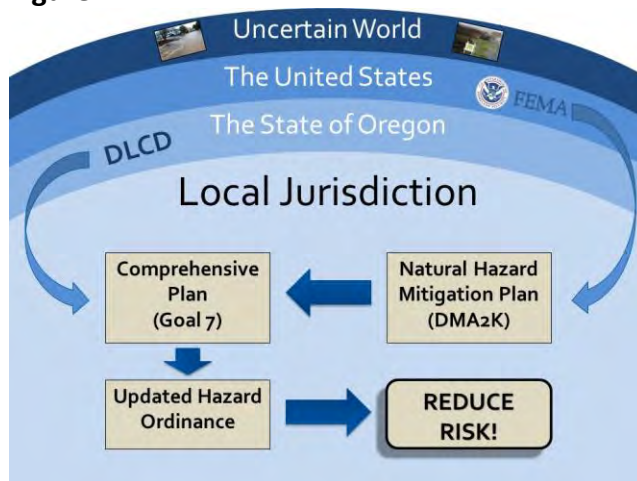
What is the Policy Framework for Natural Hazards Planning in Oregon?

Planning for natural hazards is an integral element of Oregon’s statewide land use planning program, which began in 1973. All Oregon cities and counties have comprehensive plans (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 requires that local governments, “. . . adopt comprehensive plans (inventories, policies and implementing measures) to reduce risk to people and property from natural hazards.”⁶ 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, additional resources exist at the state and federal levels. Some of the key agencies in this area include Oregon Military Department – Office of Emergency Management (OEM), Oregon Building Codes Division (BCD), Oregon Department of Forestry (ODF), Oregon Department of Geology and Mineral Industries (DOGAMI), and the Department of Land Conservation and Development (DLCD).

Figure 1.2



Source: Oregon Partnership for Disaster Resilience

⁶ <http://www.oregon.gov/LCD/docs/goals/goal7.pdf>

How was the Plan Developed and Updated?

The Plan was developed by the Curry County Natural Hazard Mitigation Plan Steering Committee, which includes members of the county and incorporated jurisdictions. The Curry County Steering Committee formally convened on three occasions to discuss and revise the plan. Steering Committee members contributed data and maps, and reviewed and updated the community profile, risk assessment, action items, and implementation and maintenance plan.

An open public involvement process is essential to the development of an effective plan. In order to develop a comprehensive approach to reducing the effects of natural disasters, the planning process shall include an opportunity for the public, neighboring communities, local and regional agencies, as well as, private and non-profit entities to comment on the Plan during review.⁷ OPDR provided a publicly accessible project website (<http://csc.uoregon.edu/opdr/currycounty>) for the general public to provide feedback on the draft NHMP via a web form. In addition, Curry County submitted a newspaper article describing the plan update process. Finally, County staff posted flyers and discussed the plan update process informally with local elected officials.

How is the Plan Organized?

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

Volume I: Basic Plan

Plan Summary

The plan summary provides an overview of the FEMA requirements plans process and highlights the key elements of the risk assessment, mitigation strategy, and implementation and maintenance strategy. In addition, the plan summary presents short briefing papers for top and middle tier hazards identified in the plan.

Section 1: Introduction

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

Section 2: Risk Assessment

Section 2 provides the factual basis for the mitigation strategies contained in Section 3. Additional information is included within Appendix D, which contains an overall description of Curry County and the Cities of Brookings, Gold Beach and Port Orford. This section

⁷ Code of Federal Regulations, Chapter 44. Section 201.6, subsection (b). 2015

includes a brief description of community sensitivities and vulnerabilities and an overview of natural hazards Curry County. The Risk Assessment allows readers to gain an understanding of the county's, and other jurisdictions', sensitivities – those community assets and characteristics that may be impacted by natural hazards, as well as the county's, and other jurisdictions', resilience – the ability to manage risk and adapt to hazard event impacts. Additionally, this section provides information on the jurisdictions' participation in the National Flood Insurance Program (NFIP). This NHMP addresses the following hazards:

- Coastal Erosion
- Drought
- Earthquake
- Flood
- Landslide
- Tsunami
- Wildfire, and
- Windstorm

Section 3: Mitigation Strategy

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

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 five-year review meetings.

Volume 2: Appendices

The resource appendices are designed to provide the users of the Curry County NHMP 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: Community Profile

The community profile describes the county and participating cities from a number of perspectives in order to help define and understand the regions sensitivity and resilience to

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

Appendix D: Economic Analysis of Natural Hazard Mitigation Projects

This appendix describes the Federal Emergency Management Agency's (FEMA) requirements for benefit cost analysis in natural hazards mitigation, as well as various approaches for conducting economic analysis of proposed mitigation activities. The Oregon Partnership for Disaster Resilience developed this appendix. 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 E: Grant Programs and Resources

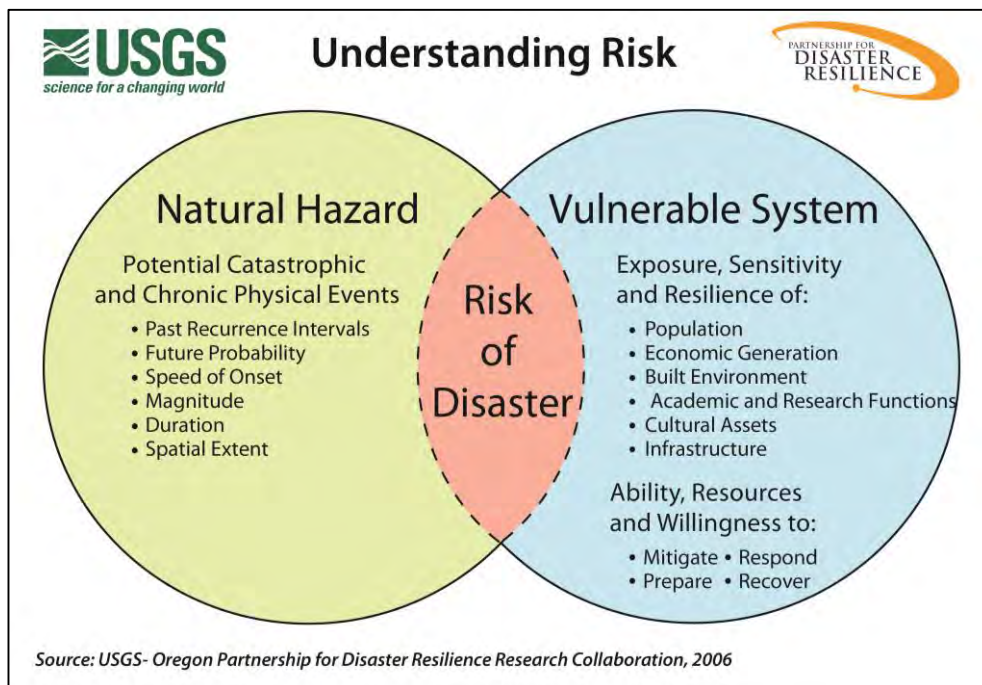
This appendix lists state and federal resources and programs by hazard.

SECTION 2: RISK ASSESSMENT

This section of the NHMP addresses 44 CFR 201.6(b)(2) - Risk Assessment. The Risk Assessment applies to Curry County and the Cities of Port Orford, Gold Beach and Brookings. City specific information is called out where relevant. In addition, this chapter can assist with addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards.

The information presented below, along with hazard specific information presented in the Hazard Annexes and community characteristics presented in the Community Profile Appendix, is used to inform the risk reduction actions identified in Section 3 – Mitigation Strategy. The risk assessment process is graphically depicted in Figure 2-1 below. Ultimately, the goal of hazard mitigation is to reduce the area where hazards and vulnerable systems overlap.

Figure 2-1 Understanding Risk



Source: Oregon Partnership for Disaster Resilience.

What is a Risk Assessment?

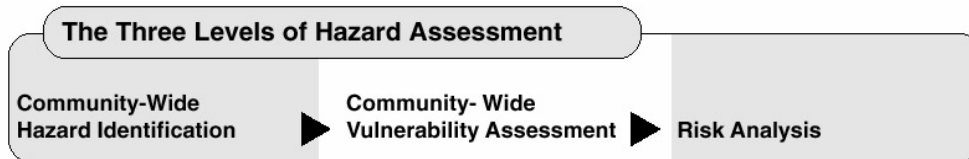
A risk assessment consists of three phases: hazard identification, vulnerability assessment, and risk analysis.

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.

- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with, or have an impact on, the important assets identified by the community.

The following figure illustrates the three-phase risk assessment process:

Figure 2-2 Three Phases of a Risk Assessment



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

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

Hazard Identification

Curry County identifies nine natural hazards that could have an impact on the county and each of the participating jurisdictions. Summary information for each hazard is presented below; additional information pertaining to the types and characteristics of each hazard is available in the State of Oregon Natural Hazard Mitigation Plan Region 1 Risk Assessment. Table 2-1 lists the hazards identified in the county in comparison to the hazards identified in the State of Oregon NHMP for Coastal Oregon (Region 1), which includes Curry County.

Table 2-1 Curry County Hazard Identification

Curry County	Oregon NHMP Region 1: Oregon Coast
Coastal Erosion	Coastal Hazards*
Drought	Drought
Earthquake	Earthquake (Cascadia/ Crustal)
Flood	Flood (Riverine/ Tidal)
Landslide	Landslide
Tsunami	Tsunami (Local/ Distant)
Volcanic Ash	Volcano
Wildfire	Wildfire
Windstorm	Windstorm
-	Winter Storm

*In the State NHMP, Coastal Hazards include: Coastal Erosion (short/ long term), Landslides, Earthquakes and Tsunamis

Source: Curry County NHMP Steering Committee (2015) and State of Oregon (Draft) NHMP, Region 1: Coastal Oregon (2015)

The following subsections briefly describe relevant information for each hazard. For additional background on the hazards, vulnerabilities and general risk assessment information for coastal hazards in Oregon, refer to the [State of Oregon NHMP, Region 1: Coastal Oregon Risk Assessment \(2015\)](#).

Coastal Erosion

Coastal erosion is a natural process that continually affects the entire coast. Erosion becomes a hazard when development, life or community safety are threatened. Waves, currents, tides and storms resulting in episodic and recurrent erosion constantly affect beaches, sand spits, dunes and bluffs. 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. The 2015 Draft Oregon NHMP identifies coastal erosion within its coastal hazards annex that also includes coastal flooding, landslides, earthquake, and tsunami.

Refer to the following DOGAMI report for additional information: [OPEN-FILE REPORT O-13-07 OREGON BEACH SHORELINE MAPPING AND ANALYSIS PROGRAM: QUANTIFYING SHORT- TO LONG-TERM BEACH AND SHORELINE CHANGES IN THE GOLD BEACH, NESIKA BEACH, AND NETARTS LITTORAL CELLS, CURRY AND TILLAMOOK COUNTIES, OREGON.](#)

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

Image 1 Coastal erosion Nesika Beach



Source: John Woodland, March 2010.

Image 2 Coastal erosion Nesika Beach



Source: Oregon Partnership for Disaster Resilience, March 2010.

No new coastal erosion events have been identified since the last update of the Curry County Natural Hazard Mitigation Plan (NHMP) in 2010.

- February 1998: Port Orford- Heavy surf damaged Port Orford's sewage treatment plan, causing approximately \$300,000 in damage and eroding the dune that separates the ocean from Garrison Lake, one of Port Orford's sources of water.
- 2004: Otter Point State Park- Coastal erosion destroyed a hiking trail.

Drought

A drought is a period of drier than normal conditions. Drought occurs in virtually every climatic zone, but its characteristics vary significantly from one region to another. Drought is a temporary condition; it differs from aridity, which is restricted to low rainfall regions and is a permanent feature of climate. The extent of drought events depends upon the degree of moisture deficiency, and the duration and size of the affected area. Typically, droughts occur as regional events and often affect more than one city and county.

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

Three recent drought events have been added to the hazard history list for drought since 2010.

- 1961: Coos and Curry Counties- Abnormally high temperatures in the two counties.
- 1976-1981: Western Oregon- Intense drought. 1976-77 was the single driest year of the century.
- 1985-1997: Curry County- A general dry period throughout the state; the Governor issued a Drought Declaration for Curry County in 1992.
- 2000-2001: Statewide- the second most intense drought in Oregon's history.
- December 2002: Coos, Curry and Douglas Counties - Governor Declared State of Drought Emergency declared "due to conditions caused by drought and low water."
- 2004-2005: Coos, Curry, and Douglas Counties- Counties declared primary natural disaster area due to drought.
- *August 2013: Curry County- Agricultural losses due to recent drought. Curry County designated as primary natural disaster area.*
- *December 2014: Lane, Douglas, and Coos Counties- Drought disaster declaration for the three counties due to below average snowpack.*
- *July 2015: Formal Governor Declared Determination of State of Drought Emergency due to drought, low snow pack levels, and low water conditions.*

Earthquake

Oregon and the Pacific Northwest in general are susceptible to earthquakes from four sources: 1) the off-shore Cascadian Fault Zone; 2) deep intra-plate events within the

subducting Juan de Fuca Plate; 3) shallow crustal events within the North American Plate; and 4) earthquakes associated with volcanic activity.¹

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

According to the Oregon NHMP, the return period for the largest of the CSZ earthquakes (Magnitude 9.0+) is 530 years with the last CSZ event occurring 314 years ago in January of 1700. The probability of a 9.0+ CSZ event occurring in the next 50 years ranges from 7 - 12%. Notably, 10 - 20 "smaller" Magnitude 8.3 - 8.5 earthquakes identified over the past 10,000 years affect only the southern half of Oregon and northern California. The average return period for these events is roughly 240 years. The combined probability of any CSZ earthquake occurring in the next 50 years is 37 - 43%.

While Curry County has not experienced any significant earthquakes in recent memory, earthquakes in Oregon that have affected the county are listed below. Three earthquake events have been added since the 2010 plan update.

- January 1700: Offshore, Cascadia Subduction Zone- Approximately 9.0 earthquake generated a tsunami that struck Oregon, Washington, and Japan; destroyed Native American villages along the coast.
- November 1873: Brookings Area- Chimneys fell at Port Orford, Grants Pass, and Jacksonville. There were no aftershocks to the 7.3 magnitude earthquake. The origin was probably the Gorda block off the Juan de Fuca plate. Intraplate event.
- November 1962: Portland- A 5.2-5.5 magnitude earthquake caused damage to many homes (chimneys, windows, etc). The earthquake was a crustal event.
- March 1993: Scotts Mills- A 5.6 magnitude earthquake caused \$27 million in damages to homes, schools, businesses, state buildings (Salem). Crustal Event (FEMA-985-DR-OR).
- September 1993: Klamath Falls- Two earthquakes (5.9-6.0) caused two deaths and extensive damage. \$7.5 million in damage to homes, commercial, and government buildings. Crustal event (FEMA-1004-DR-OR).
- July 2004: Newport, OR- A 4.9 magnitude earthquake recorded southwest of Newport. No damages.
- August 2004: Newport, OR- A 4.7 magnitude earthquake recorded northeast of Newport. No damages.
- April 2008: Newport, OR- A swarm of 5.0-5.4 earthquakes occurred off the Central Oregon coast.
- *October 2011: Oregon Coast- A 5.3 magnitude earthquake occurred off the Oregon coast. The earthquake was 172 miles northwest of Brookings.*
- *February 2012: Oregon Coast- A 6.0 magnitude earthquake occurred off the Oregon coast about 190 miles northwest of Brookings. There were no reported damages.*

- *April 2012: Oregon Coast- A 5.9 magnitude earthquake occurred off the Oregon coast. The earthquake was 196 miles away from Brookings. There were no reported damages.*

Flood

Flooding results when rain and snowmelt creates water flow that exceed the carrying capacity of rivers, streams, channels, ditches, and other watercourses. In Oregon, flooding is most common from October through April when storms from the Pacific Ocean bring intense rainfall. Most of Oregon's destructive natural disasters have been floods.² Flooding can be aggravated when rain is accompanied by snowmelt and frozen ground; the spring cycle of melting snow is the most common source of flood in the region. The principal types of flood that occur in Curry County include: spring/snow melt flooding, warm winter rain-on-snow flooding, ice jams, flash floods, and dam failure.

Floods frequently occur in Curry County during periods of heavy rainfall. The primary sources of riverine flooding include Chetco River, Elk River, Pistol River, Rogue River, Sixes River, Winchuck River, and Hunter Creek.

Refer to the following DOGAMI report for additional information: [OPEN-FILE REPORT O-15-07 COASTAL FLOOD HAZARD STUDY, CURRY COUNTY, OREGON](#)

Four flood events have been added since the 2010 plan update.

- October 1950: Curry County- Period of heavy rainfall with 10 to 12 inches recorded for the County.
- October 1953: Curry County- Period of heavy rain from a wet winter storm. Gold Beach had a storm total of 9.8 inches of rain, while Port Orford recorded 7.25 inches of rain.
- December-January 1964-65: Curry County- The December 1964 rainstorm was among the most severe in western Oregon since the late 1870s. Hundreds of miles of roads and highways were washed out or badly damaged, and thousands of people had to be evacuated due to ensuing floods. Rivers in Curry County were above the flood stage, and mudslides, bridge failures, and inundation closed several roads.
- February 1996: Curry County- Flooding occurred throughout Oregon and Curry County. Region-wide damage estimates exceeded \$1 billion.
- November-December 1996: Curry County- Oregon State of Emergency declared for Curry County due to flooding and landslides from heavy rains.
- January 1997: Statewide- Flooding widespread throughout Oregon, with many roads closed due to high water and landslides. The governor declared a State of Emergency in January due to heavy rains that began December 21, 1996 and caused flooding, landslides, and erosion in 18 counties, including Curry County.
- December 2005: Curry County- Heavy flooding in Curry County due to heavy rains. Damages occurred in Curry, Coos, Josephine, and Jackson Counties.

² Taylor, George H. and Chris Hannan. *The Oregon Weather Book*. Corvallis, OR: Oregon State University Press. 1999

- December 2007: Oregon Coast- Strong storms along the entire Oregon Coast. Curry County was included in a Presidential Disaster Declaration for the Coast.
- January 2012: Coos and Curry Counties- A severe winter storm caused flooding along with landslides and mudslides in southern Oregon.
- *March 2012: Coos and Curry Counties- Winds and heavy rain caused flooding, mudslides, and landslides in twelve counties. Damage to state highways estimated at \$5,856,881.*
- *November 2012: Curry County- Rain flooded the Chetco River and Hunter Creek, and 9.84 inches of rain were recorded at Harbor in a 24-hour period.*
- *November 2012: Curry and Josephine Counties- Heavy rain caused \$4 million in damages to infrastructure.*

Landslide

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.

Curry County is subject to landslide events. The severity or extent of landslides is typically a function of geology and the landslide triggering mechanism. Rainfall initiated landslides tend to be smaller, and earthquake induced landslides may be very large. Even small slides can cause property damage, result in injuries, or take lives.

Refer to the following DOGAMI reports for additional information: [Open-File Report O-14-10, Landslide Inventory of Coastal Curry County, Oregon](#); [Open-File Report O-13-02, Landslide Inventory Map of the Harbor Hills Area, Curry County, Oregon](#).

One landslide event has been added since 2010.

- 1953: Curry County- Landslide near the Harbor Hills area (southeast of Brookings) damaged a home and closed Highway 101.
- 1993: Highway 101- the "Arizona Inn Slide" shut down Highway 101 for two weeks. ODOT has since installed new drainage systems. Previous slides occurred in 1938, 1954, 1978, and 1981.
- 1994-1995: Gold Beach- Hooskaneden slide closed down Highway 101, 18 miles south of Gold Beach.
- Winter 1996-1997: Curry County- Significant landslide events occurred in Curry County as a result of intense rainfall from the February storms. The governor declared two State of Emergencies for Curry County during this period.
- 1999: Curry County- Landslide on Highway 101 at Reinhart Creek (MP 311.2-311.7) cost \$1,300,000 to repair. There was \$500,000 worth of repairs on Highway 101 and 80 Acres Road (MP 332.5-333).
- 2001: Curry County- Landslide on Highway 101 at Slide Creek (MP 310.6-310.8) cost \$1,100,000 to repair. A landslide at Humbug State Park near Bear Trap Creek (MP 307.06-307.16) cost \$175,000 to repair.

- January 2006: Curry County- Gregory Point landslide 2.2 miles south of Port Orford blocked Highway 101.
- 2008: Curry County- Heavy rains caused approximately 3,000 tons of mud and debris and covered Harbor Heights Road in the Harbor Hills area southeast of Brookings, blocking access to several homes.
- *March 2011: Curry County and 12 other counties- Winds and heavy rains caused flooding, mudslides, and landslides in 13 counties. Damage to state highways estimated at \$5,856,881.*

Tsunami

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. A tsunami from a local source will likely be stronger, higher and travel farther inland (overland and up river) than a distant tsunami (generated from a distant earthquake event such as in Alaska or Japan). The local 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). Significant portions of Gold Beach and Port Orford are susceptible to tsunamis, particularly those generated by CSZ events. Brookings is the least vulnerable city to tsunami impacts. However, much of the unincorporated city of Harbor (which is within the Brookings Urban Growth Boundary) is vulnerable to tsunami impacts. Brookings is one of two cities selected to compete in a national Housing and Urban Development sponsored Resilience competition as a result of the damage sustained during the 2011 Tohoku earthquake and tsunami event.



DOGAMI Tsunami Inundation Maps publications incorporate all the best tsunami science available today, including recent publications by colleagues studying the Cascadia Subduction Zone, updated computer simulation models using high-resolution lidar topographic data, and knowledge gained from the 2004 Sumatra, 2010 Chile, and 2011 Tōhoku earthquakes and tsunamis. Refer to the DOGAMI Tsunami Inundation Map Series (TIMS) for Curry County for specific information: [TIM map publication overview](#). Refer to the following DOGAMI report for additional information: [OPEN-FILE REPORT O-13-19 TSUNAMI INUNDATION SCENARIOS FOR OREGON](#).

One major tsunami event has been added to this hazard history section since the 2010 NHMP update.

- January 26, 1700: Oregon Coast- A magnitude 9 subduction zone earthquake generated a tsunami that caused damage along the entire Oregon Coast and as far away as Japan.
- November 1873: Port Orford- An earthquake in northern California generated a tsunami. Structures at the high tide line in Port Orford were damaged.
- April 1, 1946: Coos Bay and Bandon- A tsunami generated by a magnitude 7.8 earthquake in the Aleutian Islands of Alaska killed 165 people and cost over \$26 million. The highest inundation waves occurred in Hawaii, where a 12-meter run-up was recorded. The tsunami arrived at the island of Hilo 4.9 hours after the earthquake originated, and 96 people lost their lives. A 10-foot wave was recorded at Coos Bay and Bandon, but no damages were recorded.
- November 4, 1952: Bandon- An earthquake in Kamchatka, Russia caused a four-foot tsunami in Bandon where log decks broke loose from their foundation piers.
- March 1964: Oregon Coast: A tsunami struck southeastern Alaska following an earthquake beneath Prince William Sound. The tsunami arrived along the Alaskan coastline between 20 and 30 minutes after the quake, devastating coastal villages. The tsunami spread across the Pacific Ocean and caused damage and fatalities in other coastal areas, including Oregon. Coos Bay suffered \$20,000 in damages. Along the entire Oregon coast, damage was estimated to be between \$750,000 and \$1 million.
- *March 2011: Oregon Coast- A 9.0 magnitude earthquake originating from Japan caused \$6.7 million worth of damages along the Oregon coast. Particularly, there was extensive damage to the Port of Brookings, as well as the Port of Depoe Bay, and Charleston Harbor. A State of Emergency was declared in Curry County due to damage at the Port of Brookings.*

Wildfire

Wildfires occur in areas with large amounts of flammable vegetation that require a suppression response due to uncontrolled burning. 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. Wildfire can be divided into three categories: interface, wildland, and firestorms. 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. The 2008 [Curry County Community Wildfire Protection Plan](#) identified sixteen communities “at risk” to the effects of wildfire.

Three wildfire events have been added since the 2010 plan update.

- 1868: Coos and Curry Counties- 90% of Elliott State Forest burns. Fire is stopped when it reaches the ocean after burning through 296,000 acres.
- September 1936: Coos and Curry Counties: Temperatures reached 90 degrees and humidity dropped to 6% sparking wildfires throughout the two counties.
- 1987: Southern Coast Range- The Silver Fire occurred in the Southern Coast Range and burned 97,000 acres.
- 2002: Curry County- The Biscuit Fire burned roughly 500,000 acres for a total cost of \$150 million in damages.
- *June 2014: Curry County- the Euchre Creek Fire, 12 miles north of Gold Beach, burned 56 acres.*
- *June 2015: Buckskin Fire eight-miles north of Cave Junction 5,345 acres*
- *August 2015: Collier Butte Fire 10-miles east of Gold Beach 12,230 acres*

Windstorm

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 Curry County, they are especially dangerous along the beaches, headlands and coastal bluffs as well as in developed areas with large trees or tree stands. A windstorm will frequently knock down trees and power lines, damage homes, businesses, public facilities, and create tons of storm related debris. Windstorms are a common, chronic hazard in Curry County.

Two windstorm events were added to this hazard history section since the 2010 NHMP update.

- January 1921: Oregon Coast- Hurricane-force winds along the entire coast.
- January 1950: Curry County- Severe winter weather with snow, sleet, and freezing rain closed down highways and power lines.
- December 1951: Statewide- Large windstorm with coastal winds between 60 and 100 mph. Damage across the state.
- November 1958: Curry County- Wind Storm with gusts between 80 and 100 mph, over a billion board feet of timber fell, roads in Coos County largely blocked.
- February 1961: Curry County- Heavy gusts and significant rain caused widespread damage in Coos County.
- October 1962: Curry County- Columbus Day Storm. Most destructive wind storm in Oregon’s history, and caused widespread damage in Coos County.
- October 1967: Oregon Coast- Severe wind damage along the coast, winds 100 to 110 mph.
- March 1983: Brookings- Tornado touched down in Brookings, causing \$25,000 in damage.
- December 1995: Western Oregon- State of Emergency declared throughout western Oregon due to a major windstorm.
- November 1996: Curry County- Heavy rain in Curry County.

- February 2002: Curry County: Windstorm with 88 mph winds recorded in Bandon. Severe damage to utilities and roads caused by falling trees. State of Emergency declared for Coos, Curry, Douglas, Lane and Linn Counties.
- November 2002: Brookings: Tornado touched down in Brookings causing \$500,000 in damage.
- November 2006: Curry County- Storms with winds measured at 70 mph created a total of \$10,000 in damages.
- December 2006: Coos, Curry, and Douglas Counties: Windstorms with winds over 90 mph caused \$225,000 for Coos, Curry, and Douglas counties.
- December 2007: Oregon and Washington- A relentless storm pummeled the Oregon and Washington Coasts for 3 days, bringing the strongest winds the area has seen since the Columbus Day storm.
- *March 2012: Coos and 11 other counties- Damaging winds, heavy rains, flooding, mudslides, landslides, and erosion in Coos and 11 other counties cost nearly \$6 million in damages.*
- *October 2014: strong winds and ocean surge damaged Port Orford dock resulting in \$450,000.00 damage*

Winter Storm

Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms, while possible, do not normally affect Curry County.

No new winter storm events were identified.

- 1950 (Jan): Heaviest snow statewide since record keeping started; six-inches in Brookings and three in Gold Beach.

Volcanic Ash

Curry County is located on the Pacific Rim. Tectonic movement within the earth's crust can renew nearby dormant volcanoes resulting in ash fallout. Volcanic activity is possible from Mount Hood and Mount Saint Helens, Three Sisters, Mount Bachelor, and the Newberry Crater areas. Because the distance to these potentially active volcanic areas is so great, the only adverse effect that would impact areas of Curry County is ash fallout. The area affected by ash fallout depends upon the height attained by the eruption column and the atmospheric conditions at the time of the eruption. There is no recent geologic history of volcanic impacts in Curry County and the probability of future events is very low.

Federal Disaster and Emergency Declarations

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

President Dwight D. Eisenhower approved the first federal disaster declaration in May 1953 following a tornado in Georgia. Since then, federally declared disasters have been approved

within every state as a result of natural hazard related events. As of January 2015, FEMA has approved a total of 29 major disaster declarations, two emergency declarations, and 58 fire management assistance declarations in Oregon.³ When governors ask for presidential declarations of major disaster or emergency, they stipulate which counties in their state they want included in the declaration. Table 2-2 summarizes the major disasters declared in Oregon that affected Curry County, since 1955. The table shows that there have been seven major disaster declarations for the county. All but one of these were related to severe wind or storm events resulting primarily in flooding, landslides and wind related damage. The only other declaration in the county was related to a distant tsunami event triggered by the 2011 Tohoku Earthquake in Japan.

An Emergency Declaration is more limited in scope and without the long-term federal recovery programs of a Major Disaster Declaration. Generally, federal assistance and funding are provided to meet a specific emergency need or to help prevent a major disaster from occurring. Curry County has only one recorded Emergency Declaration related to the 2005 Hurricane Katrina evacuation.

Fire Management Assistance may be provided after a State submits a request for assistance to the FEMA Regional Director at the time a "threat of major disaster" exists. There is only one fire management assistance declaration on record for the county.

Table 2-2 FEMA Major Disaster (DR), Emergency (EM), and Fire Management Assistance (FMA) Declarations for Curry County

Declaration Number	Declaration Date	Incident Period		Incident	Individual Assistance	Public Assistance Categories
		From	To			
DR-184	12/24/1964	12/24/1964	12/24/1964	Heavy rains and flooding	Yes	A, B, C, D, E, F, G
DR-413	1/25/1974	1/25/1974	1/25/1974	Severe Storm, Flooding	Yes	A, B, C, D, E, F, G
DR-1405	3/12/2002	2/7/2002	2/8/2002	Severe Windstorm	None	A, B, C, D, E, F, G
DR-1632	3/20/2006	12/18/2005	1/21/2006	Severe Storm, Flooding, Landslides	None	A, B, C, D, E, F, G
DR-1733	12/8/2007	12/1/2007	12/17/2007	Sever Storm, Flooding, Landslides	None	A, B, C, D, E, F, G
DR-1964	3/25/2011	3/11/2011	3/11/2011	Tsunami Wave Surge	None	A, B, C, D, E, F, G
DR-4055	3/2/2012	1/17/2012	1/21/2012	Severe Storm, Flooding, Landslides	None	A, B, C, D, E, F, G
EM-3228	9/7/2005	8/29/2005	10/1/2005	Hurricane Katrina Evacuation	None	B
FMA-2453	7/28/2002	7/27/2002	-	Florence Fire	None	B

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

³FEMA, *Declared Disasters by Year or State*, http://www.fema.gov/news/disaster_totals_annual.fema#markS. Accessed January 9, 2015.

The table below presents the probability scores for each of the natural hazards present in Curry County and for the participating cities. As shown in the table with **bold text**, several hazards are rated with high probabilities.

Table 2-5 Natural Hazard Probability Assessment Summary

Hazard	Curry County	Port Orford	Gold Beach	Brookings
Coastal Erosion	High	High	High	High
Drought	Moderate	Moderate	Moderate	Moderate
Earthquake (Cascadia)	Moderate	Moderate	Moderate	Moderate
Flood	High	High	High	High
Landslide	High	High	High	High
Tsunami	Moderate	Moderate	Moderate	Moderate
Wildfire	High	Moderate	Moderate	Low
Windstorm	High	High	High	High
Winter Storm	Low	Low	Low	Low

Source: Curry County NHMP Steering Committee (including Port Orford, Gold Beach and Brookings) 2015.

Vulnerability Assessment

Community vulnerabilities are an important component of the NHMP risk assessment. For more in-depth information regarding specific community vulnerabilities, reference Volume II, Hazard Annexes and Appendix C: Community Profile.

Population

The socio-demographic qualities of the community population such as language, race and ethnicity, age, income, and educational attainment are significant factors that can influence the community’s ability to cope, adapt to and recover from natural disasters. Historically, 80 percent of the disaster burden falls on the public.⁴ Of this number, a disproportionate burden is placed upon special needs groups, particularly children, the elderly, the disabled, minorities, and low-income persons. Population vulnerabilities can be reduced or eliminated with proper outreach and community mitigation planning.

Population Vulnerabilities

- As of 2013, over one-quarter (28.6%) of Curry County’s population is over the age of 64; that number is projected to rise to more than 40% (or roughly 10,500 individuals) by 2030. Curry County’s elderly population is expected to grow at a rate two-times faster than Oregon. Roughly 14% of Oregon’s population is over the age of 64, with a projection of 21% by 2030.⁵

⁴ Hazards Workshop Session Summary #16, *Disasters, Diversity, and Equity*, University of Colorado, Boulder (2000).

⁵ Office of Economic Analysis, Department of Administrative Services. Long Term County Forecast. Long-term Oregon State’s County Population Forecast, 2010-2050. Accessed December 2013.

- The Curry County age dependency ratio⁶ is 71, which is higher than that of the State of Oregon (48.6); the age dependency figure for the county is expected to increase to 113 by the year 2030. The dramatic increase is due to the growth in population over age 64 (expected population under 15 years is expected to decrease by 2030. All three incorporated cities in Curry County have age dependency ratios over 50.
- Curry County median income was 78% (\$39,516) of the state median (\$50,229) in 2013. Port Orford had an even lower median (\$30,182), with Brookings and Gold Beach slightly higher at \$43,389 and \$47,069 respectively.
- Approximately 15% of the total Curry County population lived at or below the poverty line in 2013, with 20% of children in poverty.
- While over 90% of the population over 25 has graduated high school or higher, only 20% of the population has a bachelor's degree or higher.
- Approximately one-quarter of the Curry County population is estimated to have a disability. Of that, 2,693 individuals over 65 (42.4%) are disabled.
- Nearly 40% of Curry County renters spend more than 35% of their income on housing. For the cities, those percentages are: 36% in Gold Beach, 45% in Brookings and 61% in Port Orford.⁷

Economy

Economic diversification, employment and industry are measures of economic capacity. However, economic resilience to natural disasters is far more complex than merely restoring employment or income in the local community. Building a resilient economy requires an understanding of how the component parts of employment sectors, workforce, resources and infrastructure are interconnected in the existing economic picture. The current and anticipated financial conditions of a community are strong determinants of community resilience, as a strong and diverse economic base increases the ability of individuals, families and the community to absorb disaster impacts for a quick recovery.

Economic Vulnerabilities

- According to the Oregon Employment Department, Curry County unemployment has decreased from 13% in 2009 to 10.6% in 2013.
- The largest sectors of employment in Curry County are Government (19%) Trade, Transportation, and Utilities (19%), Leisure and Hospitality (17%), and Education and Health Services (11%).⁸
- The largest revenue sectors in Curry County are Retail Trade (\$227.7 million), Manufacturing (\$190.6 million) and Health Care and Social Assistance (\$61.8 million).

⁶ Dependency Ratio: the ratio of population typically not in the work force (less than 15, greater than 64)

⁷ U.S. Census Bureau, 2008-2012 American Community Survey, Tables B25070 & B25091.

⁸ Oregon Employment Department, "2013 Covered Employment and Wages Summary Reports," <http://www.qualityinfo.org/olmisj/labforce>. Accessed October 2014.

- The Education and Health Services sector is expected to have the most growth from 2012 to 2022 at 17%.⁹ Natural Resources and Mining and Leisure and Hospitality are the next closest growth sectors, with both projecting 9% growth from 2012 to 2022.
- Curry County has the second lowest property tax rate in the state at 0.5996 per \$1,000 of assessed value.
- The total county budget has fallen to \$57.3 million in 2014/2015 from \$75.4 million in 2010/2011.

Environment

The capacity of the natural environment is essential in sustaining all forms of life including human life, yet it often plays an underrepresented role in community resiliency to natural hazards. The natural environment includes land, air, water and other natural resources that support and provide space to live, work and recreate.¹⁰ Natural capital such as wetlands and forested hill slopes play significant roles in protecting communities and the environment from weather-related hazards, such as flooding and landslides. When natural systems are impacted or depleted by human activities, those activities can adversely affect community resilience to natural hazard events.

Environmental Vulnerabilities

- Environmental assets, particularly those along the coastal margin, are vulnerable to sea level rise, salt water intrusion and ocean acidification. Changes in these categories are largely being driven by changes in global temperature and climate regimes.
- Higher sea levels and more powerful storms will alter coastal shorelines, shorelands and estuaries. Increased wave heights and storm surges can also lead to loss of natural buffeting functions of beaches, tidal wetlands and dunes.¹¹
- Forest ecosystems are also vulnerable to drought, wildfire and severe storm impacts.

Built Environment, Critical Facilities, and Infrastructure

Critical facilities (i.e. police, fire, and government facilities), housing supply and physical infrastructure are vital during a disaster and are essential for proper functioning and response. The lack or poor condition of infrastructure can negatively affect a community's ability to cope, respond and recover from a natural disaster. Following a disaster, communities may experience isolation from surrounding cities and counties due to infrastructure failure. These conditions force communities to rely on local and immediately available resources.

⁹ Oregon Employment Department "Regional Employment Projections by Industry & Occupation 2012-2022". <http://www.qualityinfo.org>. Accessed October 2014.

¹⁰ Mayunga, J. "Understanding and Applying the Concept of Community Disaster Resilience: A capital-based approach. Summer Academy for Social Vulnerability and Resilience Building," (2007).

¹¹ Department of Land Conservation and Development Coastal Management Program.

Housing Vulnerabilities

- Mobile home and other non-permanent residential structures account for **25.6%** of the housing in Curry County. In Gold Beach and Port Orford, mobile homes account for 19.7% and 16.3% respectively.¹² These structures are particularly vulnerable to certain natural hazards, such as earthquake, tsunami, windstorms and heavy flooding events.
- Based on U.S. Census data, more than 55% of the residential housing in Curry County was built after the current seismic building standards of 1990.¹³
- Approximately one-quarter of residential structures were constructed prior to the local implementation of the flood elevation requirements of the 1970's (county Flood Insurance Rate Maps –FIRMs- were not completed until the late 1970s and early 1980s).¹⁴
- Curry County recorded over 1,100 new private residential building permits between 2002 and 2011. Of those, roughly 60% were in unincorporated portions of the county; Brookings accounted for another 36%. Virtually no new residential building permits were recorded in Gold Beach or Port Orford during that period.
- The housing vacancy rate in Curry County was estimated at just over 17% in 2013. Approximately one-quarter of the housing units in Gold Beach and Port Orford were estimated to be vacant; the number is marginally better at 15.7% in Brookings.¹⁵

Critical Facilities and Infrastructure Vulnerabilities

- Virtually all state and county roads and bridges in Curry County are vulnerable to multiple hazards including flood, landslide, earthquake, tsunami and coastal erosion. Curry County has over 70 bridge or culvert crossings on Highway 101 alone. Impacts to the transportation system can result in the isolation of vulnerable populations, limit access to critical facilities such as hospitals and adversely impact local commerce, employment and economic activity.
- There is one general hospital in the county with 24/7 emergency room and inpatient services; located in Gold Beach, the hospital is in the process of being rebuilt because it does not meet current fire code. The Curry Medical Center in Brookings provides urgent care services from 8 a.m. to 8 p.m. seven days a week; the medical center does not have an emergency room.
- All of Curry County's power is generated outside the region; there is no redundancy in power transmission and only limited redundancy in the power distribution network.
- There are no "high threat potential" dams located in Curry County; the county has eight dams categorized as "low threat potential: Ferry Creek, Big Creek and six additional structures on unnamed tributaries of Elk River and Floras Lake.

¹² U.S. Census Bureau, 2008-2012 American Community Survey, Table DP04.

¹³ Ibid.

¹⁴ Ibid.

¹⁵ Ibid, Table B25004.

National Flood Insurance Program (NFIP) Vulnerability

FEMA modernized the Curry County Flood Insurance Rate Maps (FIRMs) in September 2009. The table below shows that as of March 2015, Curry County (including the incorporated cities) has 359 National Flood Insurance Program (NFIP) policies in force. Of those, 117 were developed before development of the initial FIRM. Fifty paid claims have been made in the county totaling just under \$1 Million. The last Community Assistance Visit (CAV) for Curry County was on February 23, 2001 (the most recent CAV was in Brookings on August 25, 2001). Neither the county nor any of the incorporated cities are members of the Community Rating System (CRS). The table shows that the majority of flood insurance policies are for residential structures, primarily single-family homes.

Table 2-3 Flood Insurance Detail

Jurisdiction	Current FIRM Date	Initial FIRM Date	Total Policies	Pre-FIRM Policies	Policies by Building Type				Minus Rated A Zone	Minus Rated V Zone
					Single Family	2 to 4 Family	Other Residential	Non-Residential		
Curry	-	-	359	117	265	10	44	40	3	0
County*	9/25/2009	4/3/1978	265	80	187	1	43	34	3	0
Brookings	9/25/2009	9/18/1985	23	8	19	2	0	2	0	0
Gold Beach	9/25/2009	11/15/1985	49	21	38	7	0	4	0	0
Port Orford	9/25/2009	1/29/1980	22	8	21	0	1	0	0	0

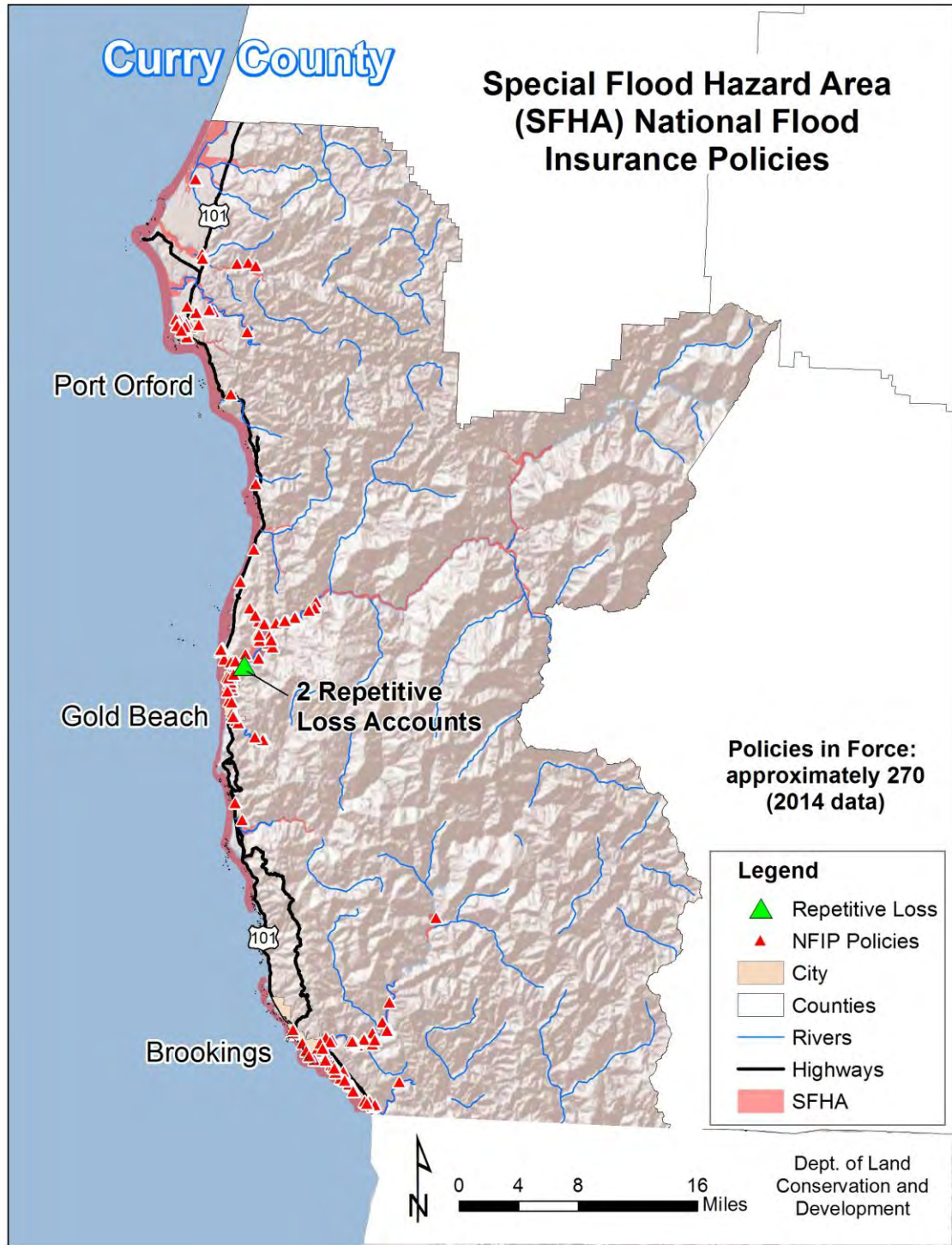
Jurisdiction	Insurance in Force	Total Paid Claims	Pre-FIRM Claims Paid	Total Paid Amount	Substantial Damage Claims	Repetitive Loss Buildings	Severe Repetitive Loss	CRS Class Rating	Last CAV
Curry	\$90,008,500	50	31	\$941,154	1	3	0	-	-
Curry County*	\$ 63,419,600	34	18	\$ 594,812	1	2	0	NA	2/23/2001
Brookings	\$ 7,242,000	4	3	\$ 26,452	0	0	0	NA	8/25/2001
Gold Beach	\$ 13,264,900	9	7	\$ 310,652	0	1	0	NA	9/27/1999
Port Orford	\$ 6,082,000	3	3	\$ 9,238	0	0	0	NA	NA

* Portion of entire county under county jurisdiction
 NP - Not Participating NA - Information not Available/ Not Applicable

Source: Information compiled by Department of Land Conservation and Development, March 2015.

One substantial damage claim has been paid in the county to date. Data provided by the State Floodplain Manager in March 2015 shows that there are a total of three Repetitive Loss Structures (one in Gold Beach and two in the unincorporated area) and no Severe Repetitive Loss Structures.

Figure 2-3 Repetitive Loss and Severe Repetitive Loss Properties



Source: Department of Land Conservation and Development, August 2015.

Cascadia Tsunami Specific Vulnerability (Catastrophic Hazard)

The Department of Geology and Mineral Industries updated the Tsunami Inundation Maps for Curry County in 2012. The table below shows the number and percentage of buildings at risk in each of five inundation scenario zones.¹⁶ Importantly, the data suggest that there has been **only one** “extra extra large” event and **only one** additional “extra large” event over the past 10,000 years. The data suggest three additional events in the “large” category. So, the majority (14) of Cascadia generated tsunami events that have occurred over the last 10,000 years appear to fall in either the small or medium categories. Even so, the table shows a significant percentage (over 25%) of existing buildings in Gold Beach at risk to even a small Cascadia tsunami event. Gold Beach, in particular, should strongly consider Tsunami mitigation actions, particularly changes in local land use policy and development regulations. There are 16 Tsunami Inundation Map panels for Curry County available for viewing or download at: <http://www.oregongeology.org/tsuclearinghouse/pubs-inumaps.htm>.¹⁷

Table 2.X – CSZ Tsunami Vulnerability by Jurisdiction

			Local Source (CSZ) Tsunami Inundation Event									
			Small		Medium		Large		Extra Large		Extra Extra large	
Total Buildings		#	%	#	%	#	%	#	%	#	%	
Entire County		19,204	1,080	5.6%	1,936	10.1%	3,239	16.9%	5,670	29.5%	6,483	33.8%
Port Orford	City Limit	867	17	2.0%	48	5.5%	286	33.0%	668	77.0%	693	79.9%
	UGB	1,361	11	0.8%	38	2.8%	261	19.2%	736	54.1%	786	57.8%
Gold Beach	City Limit	1,739	469	27.0%	764	43.9%	1,136	65.3%	1,433	82.4%	1,475	84.8%
	UGB	2,532	520	20.5%	866	34.2%	1,326	52.4%	1,808	71.4%	1,888	74.6%
Brookings	City Limit	3,631	25	0.7%	42	1.2%	51	1.4%	179	4.9%	398	11.0%
	UGB	8,268	171	2.1%	385	4.7%	609	7.4%	1,339	16.2%	1,781	21.5%

Source: Department of Geology and Mineral Industries; City Limit building count analysis by CSC.

DOGAMI also developed Tsunami Inundation Maps for two distant tsunami scenarios: Alaska M9.2 and Alaska Maximum. Only modest building impacts are expected under either scenario for the county. Gold Beach could see impacts to roughly 15% of its existing development under the Alaska Maximum scenario.

Table 2.X – Distant Tsunami Vulnerability (Alaska Scenarios) by Jurisdiction

Total Buildings			Distant Source (A-ASZ) Tsunami Inundation Event			
			Alaska M9.2		Alaska Medium	
		#	%	#	%	
Entire County		19,204	35	0.20%	529	2.80%
Port Orford	City Limit	867	1	0.1%	11	1.3%
	UGB	1,361	0	0.0%	6	0.4%
Gold Beach	City Limit	1,739	6	0.3%	268	15.4%
	UGB	2,532	3	0.1%	285	11.3%
Brookings	City Limit	3,631	1	0.0%	16	0.4%
	UGB	8,268	6	0.1%	126	1.5%

Source: Department of Geology and Mineral Industries; City Limit building count analysis by CSC.

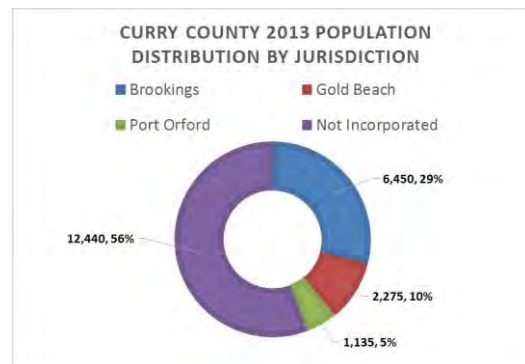
¹⁶ The five scenarios are labeled as “T-shirt sizes” ranging from Small, Medium, Large, Extra Large, to Extra Extra Large. The data reflect the cumulative number of buildings in each zone.

¹⁷ Note that the building vulnerability numbers listed in these tables may not match the numbers on the DOGAMI Tsunami Inundation Map panels. DOGAMI is currently working to address errors in building counts related to city limit and urban growth boundary extents.

Vulnerability Summary

Vulnerability assesses the extent to which people are susceptible to injury or other impacts resulting from a hazard as well as the exposure of the built environment or other community assets (social, environmental, economic, etc.) to hazards. The exposure of community assets to hazards is critical in the assessment of the degree of risk a community has to each hazard. Identifying the populations, facilities and infrastructure at risk from various hazards can assist the county in prioritizing resources for mitigation, and can assist in directing damage assessment efforts after a hazard event has occurred. The exposure of county and city assets to each hazard and potential implications are explained in each hazard section.

Vulnerability includes the percentage of population and property likely to be affected under an “average” occurrence of the hazard. Curry County evaluated the best available vulnerability data to develop the vulnerability scores presented below. For the purposes of this NHMP, the county and cities utilized the Oregon Military Department – Office of Emergency Management (OEM) Hazard Analysis methodology vulnerability definitions to determine hazard probability.



The table below presents the vulnerability scores for each of the natural hazards present in Curry County and for participating cities. As shown in the table with **bold text**, several hazards are rated with high vulnerabilities.

Table 2-4 Community Vulnerability Assessment Summary

Hazard	Curry County	Port Orford	Gold Beach	Brookings
Coastal Erosion	Moderate	Moderate	Moderate	Low
Drought	Moderate	Moderate	Moderate	Moderate
Earthquake (Cascadia)	High	High	High	High
Flood	High	Moderate	High	High
Landslide	High	Moderate	Moderate	High
Tsunami	High	High	High	High
Wildfire	High	High	High	High
Windstorm	Moderate	Moderate	Moderate	Moderate
Winter Storm	Moderate	Moderate	Moderate	Moderate

Source: Curry County NHMP Steering Committee (including Port Orford, Gold Beach and Brookings) 2015.

For local governments, conducting the hazard analysis is a useful step in planning for hazard mitigation, response, and recovery. The method provides the jurisdiction with sense of hazard priorities, but does not predict the occurrence of a particular hazard.

Risk Assessment

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

Port Orford, Gold Beach and Brookings participated in County Steering Committee meetings and/or worked with OPDR to complete a jurisdiction specific hazard analysis. City specific information is presented following general information for the county.

County Methodology

This NHMP includes a summary of the Curry County Hazards Analysis (2007). The hazard analysis methodology by counties in Oregon (primarily to inform Emergency Operations Planning) was first developed by FEMA circa 1983, and gradually refined by the Oregon Military Department's Office of Emergency Management over the years.

The methodology produces scores that range from 24 (lowest possible) to 240 (highest possible). Vulnerability and probability are the two key components of the methodology. Vulnerability examines both typical and maximum credible events, and probability endeavors to reflect how physical changes in the jurisdiction and scientific research modify the historical record for each hazard. Vulnerability accounts for approximately 60% of the total score, and probability approximately 40%. We include the hazard analysis summary here to ensure consistency between the EOP and NHMP. Because Curry County has not updated the Hazard Analysis in eight years, the NHMP includes an action to update and resubmit the analysis to OEM.

The Oregon method provides the jurisdiction with a sense of hazard priorities, or relative risk. It doesn't predict the occurrence of a particular hazard, but it does "quantify" the risk of one hazard compared with another. By doing this analysis, planning can first be focused where the risk is greatest.

In this analysis, severity ratings, and weight factors, are applied to the four categories of history, vulnerability, maximum threat (worst-case scenario), and probability as demonstrated below.

History (Weight Factor = 2)

History is the record of previous occurrences. Events to include in assessing history of a hazard in your jurisdiction are events for which the following types of activities were required:

- The Emergency Operations Center (EOC) or alternate EOC was activated;
- Three or more Emergency Operations Planning (EOP) functions were implemented, e.g., alert & warning, evacuation, shelter, etc.;
- An extraordinary multi-jurisdictional response was required; and/or
- A "Local Emergency" was declared.

LOW = 0 to 1 event in the past 100 years, scores between 1 and 3 points

MODERATE = 2 to 3 event in the past 100 years, scores between 4 and 7 points

HIGH = 4+ events in the past 100 years, scores between 8 and 10 points

Probability (Weight Factor = 7)

Probability is the likelihood of future occurrence within a specified period of time.

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

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

Vulnerability (Weight Factor = 5)

Vulnerability is the percentage of population and property likely to be affected under an “average” occurrence of the hazard.

LOW = < 1% affected, scores between 1 and 3 points

MODERATE = 1 - 10% affected, scores between 4 and 7 points

HIGH = > 10% affected, scores between 8 and 10 points

Maximum Threat (Weight Factor = 10)

Maximum threat is the highest percentage of population and property that could be impacted under a worst-case scenario.

LOW = < 5% affected, scores between 1 and 3 points

MODERATE = 5 - 25% affected, scores between 4 and 7 points

HIGH = > 25% affected, scores between 8 and 10 points

The 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 (assessed in the previous section), and (2) the likelihood or probability of the harm occurring. The table below presents the entire updated hazard analysis matrix for Curry County. The hazards are listed in rank order from high to low. The table shows that hazard scores are influenced by each of the four categories combined. Notably, the Hazard Analysis on file with OEM for Curry County (2007) does not include the coastal erosion hazard. With considerations for past historical events, the probability or likelihood of a particular hazard event occurring, the vulnerability to the community, and the maximum threat or worst-case scenario, flood, windstorm, and wildfire events rank as the top hazard threats to the county (top tier). Tsunami, earthquake, and landslide events rank in the middle (middle tier). Volcanic ash and droughts comprise the lowest ranked hazards in the county (bottom tier).

Table 2-6 Hazard Analysis Matrix – Curry County

Hazard	History	Vulnerability	Maximum		Total Threat	Hazard Rank	Hazard Tiers
			Threat	Probability			
Flood	20	50	100	70	240	# 1	Top Tier
Windstorm	20	50	100	70	240	# 2	
Wildfire	20	50	100	70	240	# 3	
Tsunami	8	50	100	35	193	# 4	Middle Tier
Earthquake	2	50	100	35	187	# 5	
Landslide	20	5	80	70	175	# 6	
Volcanic Ash	2	50	100	7	159	# 7	Bottom Tier
Drought	8	15	70	56	149	# 8	

Source: Curry County Hazard Analysis, October 2007; Analysis and Ranking by OPDR

For local governments, conducting the hazard analysis is a useful step in planning for hazard mitigation, response, and recovery. The method provides the jurisdiction with sense of hazard priorities, but does not predict the occurrence of a particular hazard.

The Department of Geology and Mineral Industries is currently conducting a multi-hazard risk assessment for Curry County utilizing HAZUS and other susceptibility and exposure assessment techniques. That analysis is expected to be complete in 2016. We present a PRELIMINARY DRAFT summary here for ILLUSTRATIVE PURPOSES ONLY. These numbers are preliminary and should not be used for policy decisions at this time.

Table 2-7 DRAFT Susceptibility and Exposure Analysis Curry County

Hazards	Susceptibility / Exposure	Curry County (TOTAL)				Curry County (Unincorporated)			
		Total Bldgs	%	Total Value	%	Total Bldgs	%	Total Value	%
		20,767	100%	\$1,636,259,000	100%	13,982	100%	\$911,511,000	100%
Coastal Erosion*	Very High Susceptibility	Incomplete Data				52	0%	\$9,636,000	1%
	High Susceptibility					106	1%	\$18,522,000	2%
	Moderate Susceptibility					139	1%	\$24,484,000	3%
Local Tsunami	XX Large Inundation	6,600	32%	\$542,538,000	33%	3,881	28%	\$267,661,000	29%
	Large Inundation	3,145	15%	\$306,566,000	19%	1,626	12%	\$137,874,000	15%
	Small Inundation	978	5%	\$99,449,000	6%	485	3%	\$53,184,000	6%
Riverine Flooding	.2% annual chance (500-yr flood)	839	4%	\$11,539,000	1%	693	5%	\$9,182,000	1%
	1% annual chance (100-yr flood)	520	3%	\$5,318,000	0%	447	3%	\$4,449,000	0%
	2% annual chance (50-yr flood)	310	1%	\$2,231,000	0%	268	2%	\$1,958,000	0%
	10% annual chance (10-yr flood)	119	1%	\$567,000	0%	99	1%	\$528,000	0%
Earthquake	Complete Damage	8,374	40%	\$825,314,000	50%	6,663	48%	\$478,204,000	52%
	Extensive Damage	4,783	23%			3,717	27%		
	Moderate Damage	7,938	38%			5,770	41%		
	Slight Damage	5,412	26%			3,838	27%		
Wildfire	High Exposure	30	0%	\$1,426,000	0%	30	0%	\$1,426,000	0%
	Moderate Exposure	87	0%	\$6,691,000	0%	86	1%	\$6,631,000	1%
Landslide	Very High Susceptibility	1,343	6%	\$105,523,000	6%	1,238	9%	\$93,087,000	10%
	High Susceptibility	3,970	19%	\$308,646,000	19%	3,227	23%	\$224,602,000	25%
	Moderate Susceptibility	12,634	61%	\$959,478,000	59%	9,257	66%	\$593,329,000	65%

Source: DOGAMI; Table summary by OPDR.

City Specific Risk Assessment

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

All three of the incorporated cities in Curry County - Port Orford, Gold Beach and Brookings, participated in this plan update. The Department of Geology and Mineral Industries is currently conducting a multi-hazard risk assessment for Curry County utilizing HAZUS and other susceptibility and exposure assessment techniques. That analysis is expected to be complete in 2016. We present a PRELIMINARY DRAFT summary here for ILLUSTRATIVE PURPOSES ONLY. These numbers are preliminary and should not be used for policy decisions at this time.

Table 2-8 DRAFT Susceptibility and Exposure Analysis Curry Jurisdictions

Hazards	Susceptibility / Exposure	Brookings				Gold Beach				Port Orford			
		Total Bldgs	%	Total Value	%	Total Bldgs	%	Total Value	%	Total Bldgs	%	Total Value	%
		3,949	100%	\$462,342,000	100%	1,912	100%	\$189,329,000	100%	924	100%	\$73,077,000	100%
Coastal Erosion*	Very High Susceptibility	No Data											
	High Susceptibility												
	Moderate Susceptibility												
Local	XX Large Inundation	427	11%	\$64,680,000	14%	1,560	82%	\$157,240,000	83%	732	79%	\$52,957,000	72%
Tsunami	Large Inundation	69	2%	\$14,691,000	3%	1,179	62%	\$130,542,000	69%	271	29%	\$23,459,000	32%
	Small Inundation	18	0%	\$4,754,000	1%	463	24%	\$38,576,000	20%	12	1%	\$2,935,000	4%
Riverine Flooding	2% annual chance (500-yr flood)	2	0%	\$7,000	0%	144	8%	\$2,350,000	1%	-	0%	\$0	0%
	1% annual chance (100-yr flood)	-	0%	\$0	0%	70	4%	\$790,000	0%	3	0%	\$79,000	0%
	2% annual chance (50-yr flood)	-	0%	\$0	0%	42	2%	\$273,000	0%	-	0%	\$0	0%
	10% annual chance (10-yr flood)	-	0%	\$0	0%	20	1%	\$39,000	0%	-	0%	\$0	0%
Earthquake	Complete Damage	540	14%	\$181,631,000	39%	836	44%	\$117,222,000	62%	335	36%	\$48,257,000	66%
	Extensive Damage	516	13%			336	18%			214	23%		
	Moderate Damage	1,435	36%			469	25%			264	29%		
	Slight Damage	1,249	32%			229	12%			96	10%		
Wildfire	High Exposure	-	0%	\$0	0%	-	0%	\$0	0%	-	0%	\$0	0%
	Moderate Exposure	-	0%	\$0	0%	1	0%	\$60,000	0%	-	0%	\$0	0%
Landslide	Very High Susceptibility	51	1%	\$7,848,000	2%	52	3%	\$4,461,000	2%	2	0%	\$127,000	0%
	High Susceptibility	307	8%	\$47,620,000	10%	336	18%	\$28,101,000	15%	100	11%	\$8,323,000	11%
	Moderate Susceptibility	1,780	45%	\$213,652,000	46%	1,151	60%	\$117,344,000	62%	446	48%	\$35,153,000	48%

Source: DOGAMI; Table summary by OPDR.

OPDR also worked with students in PPPM 407-507 - Hazard Mitigation Planning for Natural Hazards and Community Resilience to complete relative risk assessment summaries for each jurisdiction. Summary information for each city is presented below.

Table 2-7 Relative Risk Assessment for Port Orford

Enterprise-wide		SEVERITY = MAGNITUDE of IMPACTS										SEVERITY IMPACTS	RELATIVE RISK	
HAZARD RISK ASSESSMENT MODEL	Relative probability this event will occur	HEALTH AND SAFETY		FACILITIES IMPACT		COMMUNITY IMPACT								
		Potential deaths or injuries		Physical damage & costs		Economic interruption		Ecologic Interruption		Social interruption		Overall Impact (Average)	Probability x Impact Severity	
Threat Event / Hazard	1= Implausible 2= Very Rare 3= Rare 4= Likely 5= Almost Certain	Question 1	Question 2	Question 1	Question 2	Question 1	Question 2	Question 1	Question 2	Question 1	Question 2	1= Lowest 5= Highest	1= Lowest 25= Highest	
Natural Hazards	Coastal Erosion	5	1	2	3	2	3	1	1	1	1	1.60	8.00	
	Drought	4	1	1	1	2	4	5	4	4	2	2.60	9.10	
	Earthquake	3	1	5	5	5	5	5	3	3	5	4.20	12.60	
	Flood	4	3	4	4	2	3	1	1	3	1	2.40	9.60	
	Landslide/Debris Flow	5	3	4	4	2	3	4	1	2	2	2.80	14.00	
	Local Tsunami	3	1	5	5	5	5	5	3	5	4	4.30	12.90	
	Distant Tsunami	3	1	4	5	5	4	2	2	3	1	3.00	9.00	
	Volcano	1	1	1	1	1	2	1	2	1	1	1.20	0.60	
	Wildfire (WUI)	3	1	3	4	3	3	2	4	4	1	3	2.80	8.40
	Windstorm	5	3	4	3	2	2	2	2	3	3	2.70	13.50	
	Winter Storm	2	1	4	2	2	2	2	1	2	2	2.00	4.00	

Source: Analysis and Ranking by OPDR

Table 2-7 Relative Risk Assessment for Gold Beach

Enterprise-wide		SEVERITY = MAGNITUDE of IMPACTS										SEVERITY IMPACTS	RELATIVE RISK	
HAZARD RISK ASSESSMENT MODEL	Relative probability this event will occur	HEALTH AND SAFETY		FACILITIES IMPACT		COMMUNITY IMPACT								
		Potential deaths or injuries		Physical damage & costs		Economic interruption		Ecologic Interruption		Social interruption		Overall Impact (Average)	Probability x Impact Severity	
Threat Event / Hazard	1= Implausible 2= Very Rare 3= Rare 4= Likely 5= Almost Certain	Question 1	Question 2	Question 1	Question 2	Question 1	Question 2	Question 1	Question 2	Question 1	Question 2	1= Lowest 5= Highest	1= Lowest 25= Highest	
Natural Hazards	Coastal Erosion	5	1	3	3	2	2	1	1	1	1	1.60	8.00	
	Drought	4	1	1	1	2	4	5	4	4	2	2.60	10.40	
	Earthquake - Cascadia (3-5min)	3	1	5	5	4	5	5	3	3	4	4.00	12.00	
	Flood - Riverine	4	3	4	4	2	3	1	1	3	1	2.50	10.00	
	Landslide/Debris Flow	5	3	4	4	3	3	2	1	2	1	3	2.60	13.00
	Local Tsunami	3	1	5	5	4	5	4	3	5	5	4.20	12.60	
	Distant Tsunami	3	1	5	4	3	4	2	2	3	2	3	2.90	8.70
	Volcano	1	1	1	1	1	2	1	2	1	1	1	1.20	1.20
	Wildfire (WUI)	3	1	3	4	2	3	1	4	4	1	3	2.60	7.80
	Windstorm	5	3	4	5	2	2	2	1	3	1	3	2.60	13.00
	Winter Storm	2	1	3	5	1	2	2	1	2	1	2	2.00	4.00

Source: Analysis and Ranking by OPDR

Table 2-7 Relative Risk Assessment for Brookings

Enterprise-wide		SEVERITY = MAGNITUDE of IMPACTS										SEVERITY IMPACTS	RELATIVE RISK	
HAZARD RISK ASSESSMENT MODEL	Relative probability this event will occur	HEALTH AND SAFETY		FACILITIES IMPACT		COMMUNITY IMPACT								
		Potential deaths or injuries		Physical damage & costs		Economic interruption		Ecologic Interruption		Social interruption		Overall Impact (Average)	Probability x Impact Severity	
Threat Event / Hazard	1= Implausible 2= Very Rare 3= Rare 4= Likely 5= Almost Certain	Question 1	Question 2	Question 1	Question 2	Question 1	Question 2	Question 1	Question 2	Question 1	Question 2	1= Lowest 5= Highest	1= Lowest 25= Highest	
Natural Hazards	Coastal Erosion	4	1	3	3	2	2	1	1	1	1	1.60	6.40	
	Drought	4	1	1	1	2	4	5	4	4	2	2.60	10.40	
	Earthquake - Cascadia (3-5min)	3	1	5	5	4	5	5	3	3	4	4.00	12.00	
	Flood - Riverine	4	3	4	4	2	3	1	1	3	1	3	2.50	10.00
	Landslide/Debris Flow	5	3	3	4	3	3	2	1	2	1	3	2.50	12.50
	Local Tsunami	3	1	5	4	3	5	4	3	5	5	4.00	12.00	
	Distant Tsunami	3	1	5	4	2	4	2	2	3	2	3	2.80	8.40
	Volcano	1	1	1	1	1	2	1	2	1	1	1	1.20	1.20
	Wildfire (WUI)	3	1	3	4	2	3	1	4	4	1	3	2.60	7.80
	Windstorm	5	3	4	5	2	2	2	1	3	1	3	2.60	13.00
	Winter Storm	2	1	3	5	1	2	2	1	2	1	2	2.00	4.00

Source: Analysis and Ranking by OPDR

This relative risk assessment is useful in prioritizing hazards and potential mitigation interventions. The assessment is subjective. In some cases incomplete data or assumptions can significantly change the outcome. The information should be used as a starting point for

further discussion and should be refined as conditions change or as more objective data is obtained. OPDR utilized the following definitions to complete scoring.

Probability Definitions:

1. Implausible: No previous recorded events or indicative evidence of potential events. Miniscule potential or means to occur.
2. Very Rare: Few recorded events or little indicative evidence of potential events. Little potential or means to occur.
3. Rare: Several recorded events; some indicative evidence of potential events. Modest potential or means to occur.
4. Likely: A number of recorded events and ample indicative evidence of potential events. Considerable potential or means to occur.
5. Almost Certain: Numerous recorded events and unequivocal indicative evidence of potential events. Significant potential or means to occur.

Potential Deaths and Injuries

Question 1. If this event has occurred in the past in your (region, county, city), what were the extent of injuries and deaths that occurred?

1. None, or this event has never occurred
2. Few minor injuries
3. Multiple minor injuries or a major injury
4. Multiple major injuries or a death
5. Multiple deaths and major injuries

Question 2. Consider the potential for injuries or deaths from past events or from similar events in other communities, and any changes or trends that would affect future injuries and deaths from this type of event. Estimate the number of injuries and deaths that could result from this event:

1. None
2. Few minor injuries
3. Multiple minor injuries or possible major injury
4. Multiple major injuries or possible death
5. Multiple deaths and major injuries

Physical Damage and Costs

Question 1. Consider the vulnerability of your (region, county, city, facility) to this event. Estimate the extent of damage:

1. Little or no damage
2. Mild damage to several facilities
3. Moderate damage to multiple facilities
4. Severe damage to multiple facilities
5. Extensive damage to most facilities

Question 2. Considering the extent of damage, estimate the total cost to respond to the event and repair or replace all damaged facilities in your (region, county, city, facility):

1. Less than \$1 million
2. Between \$1 million and \$10 million
3. Between \$10 million and \$100 million
4. Between \$100 million and \$1 billion
5. More than \$1 billion

Economic Interruption

Question 1. If this event occurred in your (region, county, city, facility) estimate the duration of interruption to commercial business:

1. Hours
2. Days
3. Weeks
4. Months
5. Year or longer

Question 2. If this event occurred in your (region, county, city, facility) estimate the percentage of commercial business that would be interrupted:

1. Less than 10%
2. 10-30%
3. 30-50%
4. 50-75%
5. Greater than 75%

Ecologic Interruption

Question 1. If this event occurred in your (region, county, city, facility) estimate the percentage of ecologic systems that will be impacted by this event?

1. <10%
2. 10-25%
3. 25-50%
4. 50-75%
5. >75%

Question 2. Consider the value your community places on ecosystem services* (clean water, clean air, open space, hunting, fishing, recreation, resource extraction, etc.). If this event occurred, what impact will it have on the community's ability to benefit from and/or access ecosystem services?

1. Little or no impact
2. Mild impact
3. Moderate impact
4. Severe impact
5. Extensive impact

*Ecosystem Services are the processes by which the environment produces resources that we often take for granted such as clean water, timber, habitat for wildlife and fisheries, and pollination of native and agricultural plants. Whether we find ourselves in the city or a rural area, the ecosystems in which humans live provide goods and services that can be impacted by natural hazard events. ~ Definition adapted from 2000 Ecological Society of America document.

Social Interruption

Question 1. If this event occurred in your (region, county, city, facility) estimate the percentage of the population that would be displaced by this event?

1. <10%
2. 10-25%
3. 25-50%
4. 50-75%
5. >75%

Question 2. Consider the social networks in your community (cultural/sport events, education, religious activities, volunteer opportunities, civic engagement, etc.). If this event occurred, what impact would it have on the community's ability to engage in meaningful social interactions?

1. Little or no impact
2. Mild impact
3. Moderate impact
4. Severe impact
5. Extensive impact

SECTION 3: MITIGATION STRATEGY

Section 3 outlines Curry County's strategy to reduce or avoid long-term vulnerabilities to the identified hazards. Specifically, this section presents a mission and specific goals and actions thereby addressing the mitigation strategy requirements contained in 44 CFS 201.6(c). The NHMP Steering Committee reviewed and updated the mission, goals, and action items documents in this plan. Additional planning process documentation is in Appendix B.

Mitigation Plan Mission

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

The mission of the Curry County NHMP is:

Create a disaster resilient Curry County.

This can be achieved by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to guide the county towards building a safer, more disaster resilient community.

The 2015 NHMP Steering Committee reviewed the 2010 plan mission statement and agreed it accurately describes the overall purpose and intent of this Plan. This is the exact wording that was present in the 2010 plan. The Steering Committee believes the concise nature of the mission statement allows for a comprehensive approach to mitigation planning.

Mitigation Plan Goals

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

Stakeholder participation was a key aspect in developing the Plan goals. Meetings with the project Steering Committee, stakeholder interviews and public workshops all served as methods to obtain input and priorities in developing goals for reducing risk and preventing loss for natural hazards in Curry County.

The 2015 Curry County NHMP Steering Committee reviewed the 2010 plan goals in comparison to the Draft State Natural Hazard Mitigation Plan goals and determined they would modify their goals to better align with the State Natural Hazard Mitigation Plan goals, as well as current conditions in the County.

All the Plan goals are important are listed below in no particular order or priority. Establishing community priorities within action items neither negates nor eliminates any

goals but it establishes which action items to consider to implement first, should funding become available. Below is a list of the re-confirmed plan goals:

Goal 1: *Save lives and reduce injuries.*

Goal 2: *Minimize and prevent damage to public and private buildings and infrastructure.*

Goal 3: *Reduce economic losses.*

Goal 4: *Increase public and private sector involvement in natural hazard mitigation, education, and critical facilities planning.*

Goal 5: *Provide more opportunities for development outside of mapped hazardous areas.*

Goal 6: *Protect natural and cultural resources.*

Goal 7: *Increase cooperation and coordination among private entities, and local, state, and federal agencies.*

Goal 8: *Update natural hazard sections of the comprehensive plan and integrate local NHMPs with comprehensive plans and implementing measures.*

Goal 9: *Increase education, outreach, awareness, and collaboration.*

Goal 10: *Increase natural hazard outreach to vulnerable populations in Curry County.*

During the Steering Committee meetings on February 25, 2015 and April 9, 2015 the Curry County NHMP update committee (including city representatives) reviewed and revised the Curry County mission statement and goal statements. The cities of Port Orford, Gold Beach and Brookings all agreed to adopt the plan mission and goals as revised. Each city reviewed and revised city specific actions as needed.

Action Item Development Process

Development of action items was a multi-step, iterative process that involved brainstorming, discussion, review, and revisions. Action items can be developed through a number of sources. The figure below illustrates some of these sources.

Figure 3-1 Development of Action Items



Source: Oregon Partnership for Disaster Resilience, 2008.

The majority of the action items were first created during the 2005 and 2010 NHMP planning process. During these processes, steering committees developed maps of local vulnerable populations, facilities, and infrastructure in respect to each identified hazard. Review of these maps generated discussion around potential actions to mitigate impacts to the vulnerable areas. The Oregon Partnership for Disaster Resilience (OPDR) provided guidance in the development of action items by presenting and discussing actions that were used in other communities. OPDR also took note of ideas that came up in Steering Committee meetings and drafted specific actions that met the intent of the Steering Committee. Based on a review of potential exposure, susceptibility, severity, relative risk and existing mitigation activities that are underway or expected, OPDR suggested a set of priority actions for the next five-year cycle. In addition, OPDR included actions specific to the City of Brookings current HUD Resilience Phase II application.

Priority Mitigation Actions

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. Due to resource constraints, Curry County is listing a set of high priority actions in an effort to focus attention on an achievable set of high leverage activities over the next five-years. Detailed implementation information for each priority action is listed in Appendix A. This plan identifies priority actions based on an evaluation of high impact hazards, resource availability and FEMA identified best

practices. In the case of Brookings, priority actions include those proposed in the HUD Resilience Competition application prepared by the State of Oregon.

Table 1: High Priority NHMP Actions

Priority Mitigation Actions
Curry County
Utilize the final multi-hazard risk report and assessment currently being developed by DOGAMI through FEMA's RiskMap program to update the Curry County Hazard Analysis.
Utilize the final multi-hazard risk report and assessment currently being developed by DOGAMI through FEMA's RiskMap program to update the Goal 7 Section of the Curry County Comprehensive Plan.
Conduct non-structural seismic retrofit workshops with government agencies, businesses, and residents to prevent damage from earthquakes.
City of Port Orford
Implement Port Orford Comprehensive Plan, Goal 7 Section, Policy 5
Implement Port Orford Comprehensive Plan, Goal 7 Section, Policy 7
Implement Port Orford Comprehensive Plan, Goal 7 Section, Policy 8
Implement Port Orford Comprehensive Plan, Goal 7 Section, Policy 9
Adopt a Tsunami Land Use Overlay Zone
City of Gold Beach
Update the Goal 7 Section of the Gold Beach Comprehensive Plan.
Adopt a Tsunami Land Use Overlay Zone
City of Brookings
Safe Drinking Water Resiliency Project [HUD Resilience Competition Project]
Critical Healthcare Resiliency Project [HUD Resilience Competition Project]
Sewer Storm Disaster Repairs Project [HUD Resilience Competition Project]
Multifamily LMI and Tsunami-Safe Housing Program [HUD Resilience Competition Project]
Electricity Reliability Project [HUD Resilience Competition Project]
Update the Goal 7 Section of the Brookings Comprehensive Plan.
Adopt a Tsunami Land Use Overlay Zone
Analyze the Port Jetty's and storm water system in Brookings for stability during floods and severe storms and identify mitigation options
Convert existing distribution facilities to underground at the Port of Brookings/Harbor

Source: NHMP Steering Committee; HUD Resilience Team; Oregon Partnership for Disaster Resilience

Action Item Matrix

The action item matrix presents a pool of mitigation actions. The majority of these actions carry forward from prior versions of this plan. This expanded list of actions is available for local consideration as resources, capacity, technical expertise and/or political will become available. The matrix documents the related hazard, a brief description of the action, and proposed timeline. Appendix A, Action Item Forms provides detailed information about each of the priority action items. A blank action item form is included for use by the NHMP committee as additional action items are considered for implementation.

Note: Jurisdictional review and identification of additional priority action items will take place during the quarterly meeting immediately following finalization of the DOGAMI Multi-Hazard Risk Report (currently being funded through FEMA's Risk Map program).

Table 2: Curry County NHMP Actions

Action Item	Hazard	Proposed Action Title	Timeline
High Priority #1	Multi-Hazard	Utilize the final multi-hazard risk report and assessment currently being developed by DOGAMI through FEMA's RiskMap program to update the Curry County Hazard Analysis.	1-2 years
High Priority #2	Multi- Hazard	Utilize the final multi-hazard risk report and assessment currently being developed by DOGAMI through FEMA's RiskMap program to update the Goal 7 Section of the Curry County Comprehensive Plan.	1-3 years
High Priority #3	Earthquake	Conduct non-structural seismic retrofit workshops with government agencies, businesses, and residents to prevent damage from earthquakes.	Ongoing
#1	Coastal Erosion	Continue to monitor the progression of coastal erosion in conjunction with sea level rise.	LT
#2	Drought	Continue to enforce existing water requirement codes for rural residents	Ongoing
#3	Drought	Identify and evaluate alternative water sources.	LT
#4	Earthquake	Conduct non-structural seismic retrofit workshops with government agencies, businesses, and residents to prevent damage from earthquakes.	ST
#5	Flood	Continue to review and assess the county's floodplain ordinance to determine whether it meets current National Flood Insurance Program (NFIP) requirements	LT
#6	Flood	Take steps for the county to qualify for participation in the National Flood Insurance Program's (NFIP) Community Rating System.	LT
#7	Flood	Maintain the county's Flood Insurance Rate Maps (FIRM) when new data becomes available.	LT
#10	Landslide	Continue to track landslide events along major roadways and develop appropriate mitigation measures	Ongoing
#11	Tsunami	Seek funding to relocate critical services outside of the tsunami inundation zone	LT
#12	Wildfire	Review and update the 2008 Curry County Community Wildfire Protection Plan.	LT
#13	Wildfire	Encourage new development to incorporate wildfire mitigation measures and ensure adequate emergency access	Ongoing
#14	Windstorm	Educate the public about the role of proper tree pruning and care in preventing damage during windstorms	Ongoing
#15	Windstorm	Encourage utilities to underground construction methods where possible to reduce loss of service from windstorms.	LT
#16	Multi- Hazard	Ensure that all critical facilities have backup power and/or emergency operations plans in place to deal with power outages	LT
#17	Multi-Hazard	Identify and disseminate information regarding alternate transportation routes	ST
#18	Multi-Hazard	Further develop risk assessment maps to show areas at risk for all hazards.	Underway
#19	Multi-Hazard	Establish mutual aid agreements between government agencies and commercial businesses in the event of an emergency (e.g. fuel, heavy equipment, food, etc.)	Ongoing- Critical
#20	Multi-Hazard	Encourage citizens to prepare and maintain provisions for a minimum of one week without services.	LT
#21	Multi-Hazard	Adopt the 2012 post-disaster framework for Curry County	ST
#22	Multi- Hazard	Educate and encourage businesses, schools, and governmental organizations to develop continuity of operations plans.	ST
#23	Multi-Hazard	Develop backup systems for county records	LT
#25	Multi-Hazard	Encourage special districts (including ports) to develop addenda to the Curry County Natural Hazards Mitigation Plan.	Critical
#26	Multi-Hazard	Identify Red Cross shelters that are seismically sound, and retrofit existing shelters.	LT
#27	Multi-Hazard	Explore developing a redundant utility system to supply Curry County with continuous service.	LT
#28	Multi-Hazard	Develop a multi- hazard public education campaign targeted to residents and tourists about the natural hazards Curry County is vulnerable to and mitigation measures they can implement.	Ongoing
#29	Multi-Hazard	Complete a risk analysis for the hazards addressed in this plan when information is available, to estimate potential loss of life and damage to property.	Underway
#30	Multi- Hazard	Outsource an engineering analysis/study for each Coos-Curry Electric Substation in Curry County (8) to identify necessary work to harden and improve each facility's reliability and structural integrity.	Immediate 1-3 Years
#31	Multi-Hazard	Coos-Curry Electric needs to replace critical overhead distribution feeders with underground to facilitate power restoration work and lessen power outage duration after major weather events.	LT

Source: NHMP Steering Committee; Oregon Partnership for Disaster Resilience

Table 3: Port Orford NHMP Actions

Action Item	Hazard	Proposed Action Title	Timeline
High Priority #1	Multi Hazard	Utilize the final multi-hazard risk report and assessment currently being developed by DOGAMI through FEMA's RiskMap program to update the Goal 7 Section of the Port Orford Comprehensive Plan.	1-2 years
High Priority #2	Tsunami	Adopt a Tsunami Land Use Overlay Zone based on DOGAMI Tsunami Inundation Maps	1-2 years
#1	Flood	Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.	Long Term- Continuous
#2	Earthquake	Upgrade/Retrofit Critical facilities to reduce potential of earthquake collapse.	2-4 years
#3	Wildfire	Continue through multi agency coordination, to develop and initiate an abatement plan for noxious weeds – specifically gorse, scotch broom, and butterfly brush.	Long-Term Continuous
#4	Landslide	Continue to identify and map high risk slide areas for mitigation possibilities and funding sources.	Long Term- ongoing
#5	Earthquake/Tsunami	Continue to implement and enhance public education program regarding earthquakes and tsunamis.	Long term- continuous
#6	Multi-Hazard	Identify and map all roads, logging trails, and private drives to access during a catastrophic event.	1-2 Years
#7	Wildfire	Continue wildfire public education programs.	Long Term- Continuous
#8	Wildfire	Continue wildfire prevent through public education programs to target residents, tourist, and companies in the area.	Ongoing
#9	Multi-Hazard	Evaluate water and sewer lanes for limited extension to new areas.	Long-Term

Source: NHMP Steering Committee; Oregon Partnership for Disaster Resilience

Table 4: Gold Beach NHMP Actions

Action Item	Hazard	Proposed Action Title	Timeline
High Priority #1	Multi Hazard	Utilize the final multi-hazard risk report and assessment currently being developed by DOGAMI through FEMA's RiskMap program to update the Goal 7 Section of the Port Orford Comprehensive Plan.	1-2 years
High Priority #2	Tsunami	Adopt a Tsunami Land Use Overlay Zone based on DOGAMI Tsunami Inundation Maps	1-2 years
#1	Multi Hazard	Continue to implement public education programs regarding natural hazards.	Long term- ongoing
#2	Earthquake	Seek funding to retrofit buildings and/or infrastructure at risk of damage in a high magnitude earthquake.	3-5 years and ongoing
#3	Flood	Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.	Ongoing
#4	Flood	Analyze the Port Jetty in Gold Beach for stability and identify mitigation options. Analyze stability of community airport due to the inundation of floodwaters from creeks and sewer systems.	Short term (given funding); 2-3 years
#5	Landslide	Identify and map high-risk slide areas to create an accurate logistical assessment.	<1 year once initiated
#6	Landslide	Evaluate current and high hazard slides for prioritization and explore mitigation possibilities.	2-4 years
#7	Wildfire	Through multi-agency coordination, develop an abatement plan for control of noxious weeds, specifically Gorse, Scotch Broom and Butterfly Brush.	1-2 years for plan. Abatement, ongoing
#8	Wildfire	Identify and map all roads, private drives, logging trails to increase the ability of firefighters to locate and gain access to provide services and/or evacuations.	2 years, and ongoing

Source: NHMP Steering Committee; Oregon Partnership for Disaster Resilience

Table 5: Brookings NHMP Actions

Action Item	Hazard	Proposed Action Title	Timeline
High Priority #1	Multi Hazard	Utilize the final multi-hazard risk report and assessment currently being developed by DOGAMI through FEMA's RiskMap program to update the Goal 7 Section of the Port Orford Comprehensive Plan.	1-2 years
High Priority #2	Tsunami	Adopt a Tsunami Land Use Overlay Zone based on DOGAMI Tsunami Inundation Maps	1-2 years
High Priority #3	Multi-Hazard	Analyze the Port Jetty's and storm water system in Brookings for stability during floods and severe storms and identify mitigation options	1-2 years
#1	Multi-Hazard	Convert existing distribution facilities to underground at the Port of Brookings/Harbor.	1-2 years
#2	HUD Resilience	Safe Drinking Water Resiliency Project	1-2 years
#3	HUD Resilience	Critical Healthcare Resiliency Project	1-2 years
#4	HUD Resilience	Sewer Storm Disaster Repairs Project	1-2 years
#5	HUD Resilience	Multifamily LMI and Tsunami-Safe Housing Program	1-2 years
#6	HUD Resilience	Electricity Reliability Project	1-2 years
#7	Flood	Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.	Long Term- Continuous
#8	Flood	Develop Alternate Water Sources	Immediate (1-3 Years)
#9	Earthquake	Upgrade/retrofit critical facilities to reduce potential of earthquake collapse.	2-4 Years
#10	Earthquake	Seek funding to study the seismic vulnerability of buildings in the City of Brookings and retrofit those that are vulnerable to seismic hazards.	2-4 Years
#11	Earthquake	Seek funding to study the seismic vulnerability of infrastructure in the City of Brookings and retrofit those that are vulnerable to seismic hazards.	2-4 Years
#12	Wildfire	Continue to implement and enhance public education programs regarding wildfires, earthquakes, and tsunamis.	Long Term, Continuous
#13	Landslide	Continue to identify and map high risk slide areas to create an accurate logistical assessment.	Long-Term Ongoing
#14	Multi-Hazard	Review of county and community comprehensive plans for the need to update hazard specific sections to reflect the latest information on seismic hazards in each community.	Long Term- Continuous
#15	Multi-Hazard	Analyze the Port Jetty's and storm water system in Brookings for stability during floods and severe storms and identify mitigation options	Short Term 1-2 Years
#16	Multi-Hazard	Convert existing distribution facilities to underground at the Port of Brookings/Harbor.	1-3 Years
#17	Multi-Hazard	Coos-Curry Electric needs to install additional fuel storage at its Brookings and Port Orford offices to fuel existing generators in case of emergency.	Long-Term

Source: NHMP Steering Committee; Oregon Partnership for Disaster Resilience

Action Item Worksheets

Each priority 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 local elected official consideration, grant applications or other implementation opportunities. The worksheet components are described below. These action item worksheets are located in Appendix A, Action Item Forms.

Proposed Action Title

Each action item includes a brief description of the proposed action.

Alignment with Plan Goals

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.

Affected Jurisdiction

Many of the action items within this Plan apply to all of the participating cities and the county; however, some action items are specific to one city or to the County. The list of affected jurisdictions is provided on the right side of the matrix. Each city identified as an “affected jurisdiction” will contribute to accomplishing the specified action at a local level. The action item form in Appendix A provides more detailed information.

Alignment with Existing Plans/ Policies

Identify any existing community plans and policies where the action item can be incorporated. Incorporating the mitigation action into existing plans and policies, such as comprehensive plans, will increase the likelihood that it will be implemented.

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 II and the Hazard Annexes.

Implementation through Existing Programs

For each action item, the form is designed to solicit ideas for implementation, which serve as the starting point for taking action. Ideas for implementation could include: (1) collaboration with relevant organizations, (2) alignments with the community priority areas, and (3) applications to new grant programs.

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. When an action is implemented, more work will probably be needed to determine the exact course of action.

The Curry County NHMP includes a range of actions 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. Curry County and the participating cities currently address statewide planning goals and legislative requirements through their comprehensive land use plans, capital improvements plans, mandated standards, and building codes. To the extent possible, the jurisdictions will work

to incorporate the recommended mitigation action items into existing programs and procedures.

Many of the recommendations contained in the Curry County NHMP are consistent with the goals and objectives of the existing plans and policies. Where possible, Curry County and the participating cities will implement the recommendations and actions contained in the NHMP 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 action items contained in the NHMP through such plans and policies increases their likelihood of being supported and implemented.

Coordinating Organization:

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

Internal and External Partners:

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

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

Potential Funding Sources

When possible, identify potential funding sources for the action item. Example funding sources can include: the federal Pre-Disaster Mitigation and Flood Mitigation Grant Program; or local funding sources such as capital improvement or general funds. An action item may also have multiple funding sources.

Estimated Cost

Where possible, an estimate of the cost for implementing the action item is included.

¹ Ibid.

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. *Ongoing* action items signify that work has begun and will either exist over an indefinite timeline, or an extended timeline.

Status

As action items are implemented or new ones are created during the Plan maintenance process, it is important to indicate the status of the action item – whether it is new, ongoing, deferred, or complete. Documenting the status of the action will make reviewing and updating the mitigation Plan easier during the Plan’s five-year update, and can be used as a benchmark for progress. *Deferred* action items have yet to see any significant work begin on the particular action.

Priority

High priority action items are designated in order to clarify the importance of these mitigation actions for the affected jurisdictions.

SECTION 4:

PLAN IMPLEMENTATION AND MAINTENANCE

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

Implementing the Plan

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

Plan Adoption

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

Convener

The Curry County Emergency Manager will take responsibility for plan implementation and will facilitate the Curry County Hazard Mitigation Coordinating Body meetings and will assign tasks such as updating and presenting the Plan to the rest of the members of the Coordinating Body. Plan implementation and evaluation will be a shared responsibility among all of the assigned Hazard Mitigation Coordinating Body members. The Convener's responsibilities include:

- Forming a new ad hoc group in June and invite key stakeholders;
- Organizing Coordinating Body meeting dates, times, locations, agendas, and member notification;
- Documenting the discussions and outcomes of committee meetings;

- Serving as a communication conduit between the Coordinating Body and the public/stakeholders
- Identifying emergency management-related funding sources for natural hazard mitigation projects; and,
- Utilizing the Risk Assessment as a tool for prioritizing proposed natural hazard risk reduction projects.

Coordinating Body

The Curry County Convener will form a Natural Hazard Coordinating Body for updating and implementing the NHMP. The Coordinating Body responsibilities include:

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

Meetings

The following jurisdictions, agencies, and/or organizations were represented and served on the Steering Committee during the development of the Curry County NHMP (for a list of individuals, see the Acknowledgements section of this NHMP):

- Curry County
- City of Brookings
- City of Port Orford
- City of Gold Beach
- Coos Forest Patrol
- Coos Curry Electric Cooperative, Inc.
- American Red Cross
- Curry Community Health
- Brookings Fire Chief, as the elected County Fire Board Chief
- US Forest Service

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

Implementation through Existing Programs

The NHMP includes a range of actions 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. Curry County, and the participating cities, currently addresses statewide planning goals and legislative requirements through their comprehensive land use plans, capital improvement plans, mandated standards, and building codes. To the extent possible, Curry County, and participating cities will work to incorporate the recommended mitigation action items in existing programs and procedures.

Many of the recommendations contained in the NHMP are consistent with the goals and objectives of Curry County and participating cities' plans and policies. Where possible, Curry County, and participating cities, should implement the recommended actions contained in the NHMP through existing plans and policies. Plans and policies already in existence often have support from local residents, businesses, and policy makers. Many land-use, comprehensive, and strategic plans get updated regularly, and can adapt easily to changing conditions and needs. Implementing the action items contained in the NHMP through such plans and policies increases the likelihood of being supported and implemented.

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

- City and County Budgets
- Community Wildfire Protection Plans
- Comprehensive Land Use Plans
- Economic Development Action Plans
- Zoning Ordinances and Building Codes

For additional examples of plans, programs or agencies that may be used to implement mitigation activities, refer to Appendix C, *Community Profile*.

The County and participating cities have the following structures available to implement the plan:

Table 4.1: County and City Governance

	Brookings	Gold Beach	Port Orford
Government Form	Mayor/Council	Mayor/Council	Mayor/Council
City Manager/ Administrator	Yes	Yes	Yes
Mayor	Yes	Yes	Yes
City Council	4-Person	5-Person	6-Person
Building	Yes	No	No
Parks/ Recreation	No	Yes	No
Planning	No	Yes	Yes
Public Works	Yes	Yes	Yes
Police	Yes	Yes	Yes
Fire	Yes	Yes	Yes
Information Technology	No	No	Yes

Source: County and City Websites

Plan Maintenance

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

Meetings

The Coordinating Body will meet on a **quarterly basis** to complete the following tasks. During the first meeting, the Coordinating Body will:

- Update hazard histories after the winter season;
- Prioritize potential mitigation projects, and

- Review existing action items to determine appropriateness for funding before the budget is approved in May.

During the second meeting, the Coordinating Body will:

- Review existing action items to determine appropriateness for funding; and,
- Discuss methods for continued public involvement and education before the summer months begin.

During the third meeting, the Coordinating Body will:

- Update the risk assessment; and
- Review existing action items to determine appropriateness for funding.

During the final meeting, the Coordinating Body will:

- Update decision makers on progress of the plan; and
- Document successes and lessons learned during the year.

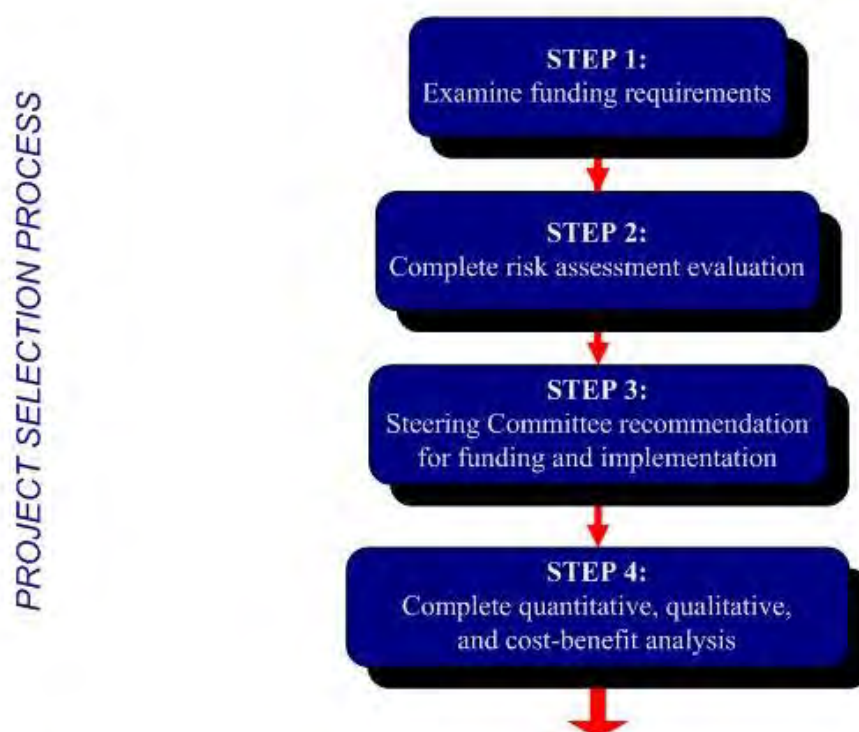
These meetings are an opportunity for the cities to report back to the county on progress that has been made towards their components of the NHMP. The ad hoc committee that will be formed may revise the schedule as resources and events shift.

The Convener will be responsible for documenting the outcome of the quarterly meetings. The process the Coordinating Body will use to prioritize mitigation projects is detailed in the section below. The Plan's format allows the County and participating jurisdictions to review and update sections when new data becomes available. New data can be easily incorporated, resulting in a NHMP that remains current and relevant to the participating jurisdictions.

Project Prioritization Process

Each of the participating jurisdictions has included a short list of prioritized actions. Because DOGAMI is in the process of completing updated multi-hazard risk assessment products, future mitigation plan maintenance meetings will revisit the prioritization process. The Disaster Mitigation Act of 2000 requires that jurisdictions identify a process for prioritizing potential actions. Potential mitigation activities often come from a variety of sources; therefore, the project prioritization process needs to be flexible. Committee members, local government staff, other planning documents, or the risk assessment may be the source to identify projects. Figure 4-1 illustrates the project development and prioritization process.

Figure 4-1 Action Item and Project Review Process



Source: Oregon Partnership for Disaster Resilience.

Step 1: Examine funding requirements

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

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

Step 2: Complete risk assessment evaluation

The second step in prioritizing the Plan's action items is to examine which hazards the selected actions are associated with and where these hazards rank in terms of community risk. The Coordinating Body will determine whether or not the Plan's risk assessment supports the implementation of eligible mitigation activities. This determination will be based on the location of the potential activities, their proximity to known hazard areas, and whether community assets are at risk. The Coordinating Body will additionally consider whether the selected actions mitigate hazards that are likely to occur in the future, or are likely to result in severe/ catastrophic damages.

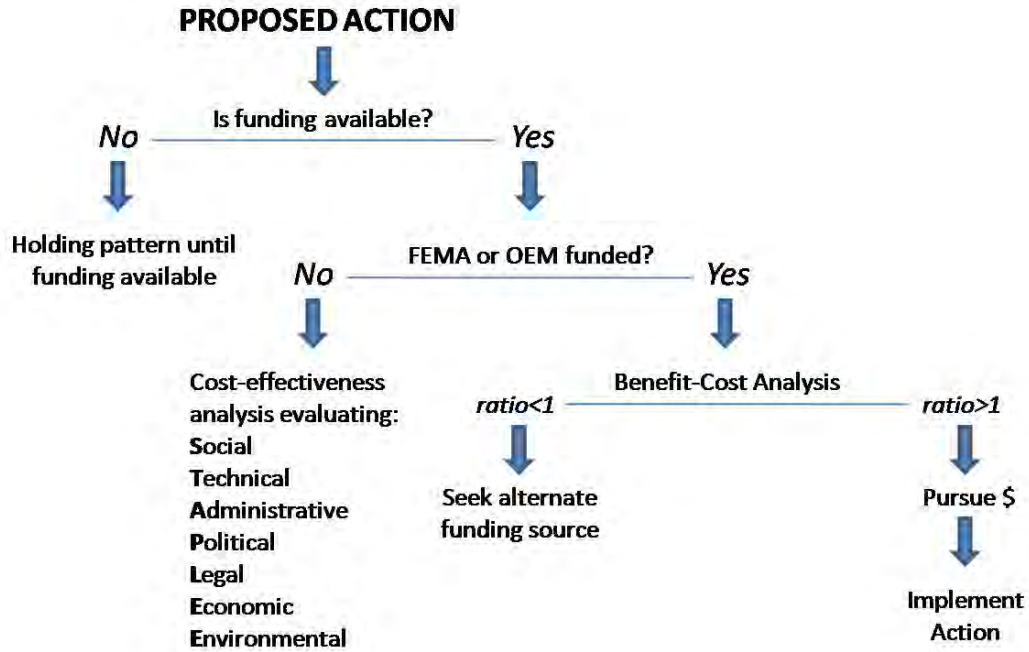
Step 3: Coordinating Body Recommendation

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

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

The fourth step is to identify the costs and benefits associated with the selected natural hazard mitigation strategies, measures, or projects. Two categories of analysis that are used in this step are: (1) benefit/cost analysis, and (2) cost-effectiveness analysis. Conducting benefit/cost analysis for a mitigation activity assists in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. Cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating natural hazards provides decision makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects. Figure 4-2 shows decision criteria for selecting the appropriate method of analysis.

Figure 4-2 Action Item and Project Review Process



Source: Oregon Partnership for Disaster Resilience.

If the activity requires federal funding for a structural project, the Coordinating Body will use a FEMA- 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 Coordinating Body 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. OPDR at the University of Oregon’s Community Service Center has tailored STAPLE/E technique for use in natural hazard action item prioritization.

Continued Public Involvement and Participation

The participating jurisdictions are dedicated to involving the public directly in the continual reshaping and updating of the Curry County NHMP. Although members of the Coordinating Body represent the public to some extent, the public will also have the opportunity to continue to provide feedback about the Plan.

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

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

- Use existing newsletters such as schools and utility bills to inform the public where to view and provide feedback; and,
- Present new and relevant information at community events such as the Home Show, the County Fair, The Azalea Festival, National Night Out, and the Country Music Festival.

In addition to the involvement activities listed above, Curry County will ensure continued public involvement by posting the Curry County NHMP on the County's website (<http://www.co.curry.or.us/>). The Plan will also be archived and posted on the University of Oregon Libraries' Scholar's Bank Digital Archive (<http://scholarsbank.uoregon.edu>).

Five-Year Review of Plan

This plan will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. **The Curry County NHMP is due to be updated by June XX, 2020.** The convener will be responsible for organizing the coordinating body to address plan update needs. The coordinating body will be responsible for updating any deficiencies found in the plan, and for ultimately meeting the Disaster Mitigation Act of 2000's plan update requirements.

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

Figure 4-3. Natural Hazards Mitigation Plan Update Toolkit

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

Source: Oregon Partnership for Disaster Resilience