Curry County - Oregon

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FEMA Approval Letter

Letter of Promulgation

Curry County Natural Hazards Mitigation Plan

Cities & Towns

Agness
Brookings
Carpenterville
Gold Beach
Harbor
Hunter Creek
Langlois
Nesika Beach
Ophir
Pistol River
Port Orford
Wedderburn

Newspapers

Coastal Pilot
Curry Reporter
Port Orford News
Port Orford Today

Radio Stations

KURY 95.3 FM
KGBR

Airports

Brookings
Gold Beach
Cape Blanco

Ports

Gold Beach
Brookings-Harbor
Port Orford

Curry Comprehensive Plan (Map 1)

Curry Coastal Shorelands (Map 2)

Curry Coastal Shorelands (Map 3)

Curry Coastal Shorelands (Map 4)

Curry Coastal Shorelands (Map 5)

Curry Coastal Shorelands (Map 6)

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Report for:

Curry County Emergency Management

&

The City of Brookings

The City of Gold Beach

The City of Port Orford

Port of Brookings Harbor

Port of Gold Beach

Port of Port Orford

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CURRY COUNTY STAKEHOLDERS

Curry County Emergency Management

Curry County Planning

Curry County Road Department

Curry County Public Health

City of Brookings

City of Gold Beach

City of Port Orford

Port of Brookings Harbor

Port of Gold Beach

Port of Port Orford

Curry County General Hospital

Citizens for Emergency Preparedness

Langlois Rural Fire District

Sixes Rural Fire Protection District

Port Orford Fire

Ophir Rural Fire Protection District

Squaw Valley – North Bank Rural Fire Protection District

Agness Fire

Harbor Fire

Gold Beach Fire

Pistol River Fire Cape

Ferrelo Fire

Upper Chetco Fire

Brookings Fire

Winchuck Fire

Coos Forest Protective Association

STEERING COMMITTEE

Michael Murphy	Curry County Emergency Services Coordinator
Wayne Green	Curry County Road Department
Grant Young	Curry County Planning Department
Erna Barnett	City of Port Orford, City Administrator
Ginny Hochberg	Curry General Hospital
Nita Rolfe	Port of Brookings Harbor
Earl Parks	Port of Brookings Harbor – Security
John Borton	USDA
Jim Wills	Oregon Department of Transportation
Robert Sechler	Oregon Department of Transportation
Frank Eckley	Oregon State Parks
Steve Mazur	Oregon Department of Fish and Wildlife
Jack Nottingham	Citizens for Emergency Preparedness
John Brazil	Harbor Rural Fire Protection District
Keith Anderson	Oregon Department of Environmental Quality
John Flannigan	Coos Forest Protective Association
Bill Sherbarth	Agness Fire
William Zimmerman	Sixes Rural Fire Protection District
Tom Taylor	Winchuck Rural Fire Protection District

Curry County Natural Hazards Mitigation Plan

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PROJECT MANAGER

The Curry County Office of Emergency Management administered this project. Project Manager:

Michael Murphy, Emergency Services Coordinator
94325 Moore Street (Courthouse Annex)
P.O. Box 746
Gold Beach, OR 97444

FUNDING

The strongest winter windstorm in several years came ashore in southwest Oregon on February 7, 2002, resulting in extensive property, vegetation, and electric utility damage as well as widespread loss of electrical service and associated economic losses. The storm's destructive forces extended through the Coast Range and into the, mid Willamette Valley.

On March 12, 2002, President Bush declared a five-county area of Oregon a federal disaster area. This disaster was designated FEMA-1405-DR-OR under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 93-288. Under the declaration, federal funds are provided for the state and affected local governments in the counties of Coos, Curry, Douglas, Lane and Linn to pay 75 percent of the eligible cost for debris removal, emergency services, and restoring damaged public facilities. The declaration also makes cost-shared funding, through the Hazard Mitigation Grant Program (HMGP), available to the state for approved projects that will reduce future disaster losses and resulting costs. Funding for this project was awarded to Curry County through the Hazard Mitigation Grant Program, DR-1405, HMGP#11-99011; Project: Curry County Natural Hazards Mitigation Planning.

***Executive Summary: Hazard Mitigation Survey Team Report for the Severe Windstorm in Western Oregon, February 7, 2002. Prepared by Oregon Emergency Management and the Federal Emergency Management Agency.**

ORGANIZATION

The Curry County Natural Hazard Mitigation Plan is the collaborative effort of the County, all incorporated cities and communities within the county, rural fire districts, and special districts, to address multi-hazard issues including flood, landslide, severe winter storm, windstorm, wildfire, earthquake, and tsunami.

Each participating city and the county have identified specific hazards that impact the community's residents and infrastructure keeping in mind that there is a considerable transient population in tourism.

MISSION

The mission of the Curry County Natural Hazards Mitigation Plan is to promote sound public policy and practices designed to protect citizens, critical facilities, infrastructure, private property, the environment and delicate ecosystems from natural hazards. By increasing public awareness, documenting the resources for risk analysis and reduction and identifying activities to guide the county and each community, build safer more resilient communities.

GOALS

The goal of the Curry County Natural Hazards Mitigation Plan is to protect life and property and reduce the effects of natural hazards, and establish a more resilient community.

Protect Life and Property

- Identify high impact areas affected by natural hazards through past events, to determine future projections.

- Explore and implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to natural hazards.
- Provide overall direction for the participating cities, special districts and residents in planning short and long term goals for mitigation measures.
- Define risk reduction plans.

Public Awareness

- Provide information on preparedness and increase public awareness of the risks associated with natural hazards.
- Develop public awareness through public education programs.

Natural Systems

- Balance hazard reduction measures with natural resource management.
- Determine rehabilitative measures to preserve natural systems and the environment.

Emergency Services

- Ensure mitigation projects and policies for critical facilities, services and infrastructure.
- Coordinate natural hazard mitigation activities with emergency operations plans and procedures.

Partnerships and Implementation

- Establish communication and coordination among public agencies, citizens, non-profit organizations, businesses, and industry.
- Coordinate partnerships within public and private sector organizations to identify, prioritize and implement action items between local and county governments, to implement mitigation activities.

ACTION ITEMS

Action items will be identified by hazard as well as by community. Specific activities are identified in which agencies and citizens are encouraged to take part in risk reduction planning, education, land use, and building programs.

Short term, goals are action items that can be implemented with existing resources and authorities, generally attainable within one or two years. *Long term* goals are action items that may require additional authorities, resources and funding to accomplish. These items may take two to five years to accomplish.

PLAN MAINTENANCE

Contained herein is the formal process that will ensure that the Curry County Natural Hazard Mitigation Plan remains a living document. The plan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing a plan revision every five years. If during the annual evaluation it is determined that additions or deletions are necessary to fulfill the mission of this plan and ensure public safety the Curry County Natural Hazard Mitigation Committee has the ability to make recommendations for such changes. Any changes shall be submitted to respective county or local governments for approval. An updated copy of the Plan will be sent to Oregon Emergency Management and FEMA, every five years for their review.

Plan Adoption

The Curry County Commissioners and City Councils of the cooperative cities will be responsible for adopting the Curry County Natural Hazard Mitigation Plan. These governing bodies have the authority to promote sound public policy regarding natural hazards. Once the plan has been adopted, by the County Commissioners and each participating City, the County Emergency Services Coordinator will be responsible for submitting it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management will then submit the plan to the Federal Emergency Management Agency (FEMA) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR, Part 201. Upon acceptance by FEMA, Curry County and participating cities will gain eligibility for Hazard Mitigation Grant Program Funds.

Coordinating Body

The Curry County Hazard Mitigation Committee will be responsible for coordinating implementation of plan action items and undertaking the formal review process. The Curry County Commissioners and cooperative City Councils will assign representatives from involved agencies, including but not limited to the current Hazard Mitigation Advisory Committee members. A Hazard Mitigation Committee was formed in Curry County consisting of members from local agencies, organizations and citizens and includes the following:

Michael Murphy	Curry County Emergency Services Coordinator
Wayne Green	Curry County Road Department
Grant Young	Curry County Planning Department
Erna Barnett	City of Port Orford, City Administrator (retired)
Ginny Hochberg	Curry General Hospital
Nita Rolfe	Port of Brookings Harbor
Earl Parks	Port of Brookings Harbor – Security
John Borton	U.S. Department of Agriculture
Jim Wills	Oregon Department of Transportation
Robert Sechler	Oregon Department of Transportation
Frank Eckley	Oregon State Parks
Steve Mazur	Oregon Department of Fish and Wildlife
Jack Nottingham	Citizens for Emergency Preparedness
John Brazil	Harbor Rural Fire Protection District
Keith Anderson	Oregon Department of Environmental Quality
John Flannigan	Coos Forest Protective Association
Bill Sherbarth	Agness Fire
William Zimmerman	Sixes Rural Fire Protection District
Tom Taylor	Winchuck Rural Fire Protection District

Convener

The Curry County Commissioners and collaborative City Councils will adopt the Curry County Natural Hazard Mitigation Plan. The Board of Commissioners will appoint the Hazard Mitigation Advisory Committee who will take responsibility for the plan implementation. The Curry County Emergency Services Coordinator will serve as a *convener* to facilitate the Committee meetings and ensure implementation of the Plan. The Natural Hazard Advisory Committee will have the shared responsibility of evaluating the Plan.

The Advisory committee will meet on a quarterly basis where committee members will report on the progress of their action items.

EVALUATING AND UPDATING THE PLAN

Formal Review

The convener will facilitate an annual review for effectiveness of implemented action items. All of the Mitigation Advisory committee members will be involved in the review process. This review will be to determine the necessity for program revision to accomplish the outlined action strategies. The evaluation process includes a schedule and timeline, and identifies the local agencies and organizations participating in the plan evaluation. The convener or designee will be responsible for contacting the Hazard Mitigation Advisory Committee members and organizing the annual meeting. Committee members will be responsible for monitoring and evaluating the progress of the plan and their participating agencies. The committee members will review the goals and action items to determine their relevance to changing situations in their jurisdiction as well as changes in any State or Federal policy.

The convener will assign the duty of updating the plan to one or more of the Committee members. The designated committee members will have three months to make appropriate changes to the Plan before submitting it to the Hazard Committee members, and presenting it to the Curry County Commissioners and cooperative City Councils. The Hazard Mitigation

Committee members will also notify all holders of the county plan when changes have been made. Every five years the updated plan will be submitted to the State Hazard Mitigation Officer and the Federal Emergency Management Agency for review.

Public Involvement

Curry County has been dedicated to involving the public directly in the planning process of this Plan. The public will also have the opportunity to provide feedback about the Plan. Copies of the plan will be available in the public libraries. Comments from citizens should be directed to the Advisory committee members from the collaborative. Committee members will present public comments and suggestions during regularly scheduled meetings.

A public meeting will also be held after each annual evaluation or when deemed necessary by the Advisory Committee. The meetings will provide the public forum for which they can express its concerns, opinions, or ideas about the Plan. The County Public Information Officer will be responsible for using county media resources to publicize the annual public meetings to maintain public involvement.

THE PLANNING PROCESS

The planning process began with a kick-off meeting involving all of the incorporated cities and special districts in the county. Government officials, decisions makers were asked to answer a variety of hazard – related questions. For example:

1. What are the natural hazards that repeatedly impact the infrastructure and populace of their jurisdiction?
2. Are there current planning projects to mitigate the effects of these identified hazards?
3. Is there a priority assigned to these projects?
4. Are there any projects that have not been addressed due to priorities.

Each of the involved jurisdictions has working projects specifically to deal with the natural hazard effect on critical infrastructure facilities.

Public input during the planning process and development of action items was solicited. Several public meetings assisted in creating the goals and projects identified.

These public meetings resulted in the ability to obtain documentation regarding damage and costs due to identified hazards, on private property, that could not have been obtained otherwise.

Coordination between public agencies, citizen's organizations, non-profit organizations, businesses and industry was developed. Monthly meetings of the steering committee and general public were held and facilitated by the Project Coordinator and the contractor, Debbie Simon, President, Diversified Safety Management. Meetings were scheduled on a monthly basis with the exception of April, 2004 due to scheduling difficulties among the committee members.

Schedule

July 29, 2003 – Kick off meeting with stakeholders. The meeting was held at the Curry County Annex in Gold Beach. The content was centered on the explanation of the Natural Hazard Mitigation Plan and the necessity of all the stakeholders to become active partners in hazard assessment and mitigation action item development for their jurisdictions. The suggestion was made to rotate the venue of the meetings between the stakeholders throughout the planning process to facilitate the committee members becoming more familiar with each other and their place of business.

August 28, 2003 – Hosted by Oregon Department of Transportation, Hunter Creek Office. Discussion centered on landslide hazards in the county including state highways as well as county maintained roadways.

September 25, 2003 – Hosted by Brookings Fire Department. Fire hazards were identified and discussed. Maps of county roadways and state highways with pinpointed landslide hazards, was made available for attendees to look over.

October 29, 2003 – Hosted by the City of Port Orford. Discussion regarding a dune breach causing a local lake and water source to be compromised. This issue has been a major community concern and is fast becoming critical due to storm surges and the inundation of sea water entering the lake and jeopardizing a waste treatment facility as well as many homes. The environmental hazard to fresh water trout and other species

has become an important topic with Oregon Department of Fish and Wildlife, Oregon State Parks as well as the City of Port Orford.

November 19, 2003 – Hosted by Curry County Office of Emergency Management in Gold Beach. Continued accumulation of information for development of community action items.

December 10, 2003 – Hosted by the Port of Brookings. Hazards discussed centered around winter storms and the deterioration of the jetty in Brookings. Additional information was received from Curry County Road Department regarding landslides.

February 18, 2004 – Hosted by the City of Port Orford. Community meeting involving the general public as well as Curry County Commissioner, ODFW, Oregon Parks, Confederated Tribes, Curry County Emergency Management, DEQ, ODFW, and approximately 100 citizens from the community attended the meeting. Presentations were given by 2 contractors on the resolution of the Garrison Lake issue with suggestions to rebuild the breached dune. The suggestions given were 1). To dredge the lake and use the material to rebuild the dune and, 2). To let the dune rebuild itself naturally which would continue to endanger the community immediately surrounding the lake, for the number of years it would take to recover naturally. No decision was made during this meeting. Its intent was to inform the community of the options.

March 31, 2004 – Hosted by Curry County Commissioners, at the Gold Beach Annex. The contractor, explaining the Natural Hazard Mitigation Plan and the issues it addressed, during a public meeting of the Commissioners made a public presentation.

March 31, 2004 – Personal interview of the Harbormaster of the Port of Gold Beach. Hazard identification of winter storms effect and deterioration of the jetty at Gold Beach.

May 26, 2004 – Hosted by Curry County Office of Emergency Management, Gold Beach, and County Annex. First drafts of the Plan were given to attendees for discussion, and refinement of community action items.

June 2004 – Implementation of recommendations from committee members and finalization of document.

PROBABILITY OF HAZARD OCCURRENCE

The natural hazards covered in Section 3 of this plan are those posing the highest likelihood of future events in Curry County, based both on previous occurrences (recorded history) and also on the latest science (for example, the earthquake hazard, for which recorded history of large events downplays the risk due to the relatively short period of record).

Probability of occurrence is derived from the *Curry County Hazard Analysis*, a separate document that is summarized in Appendix C of this plan. Natural hazards with the highest probability of occurrence in Curry County, listed in order are: windstorms (and related severe winter storm hazards), essentially an annual event in the county; landslides; tsunamis (from distant and near sources, both large and small); wildland/urban interface fires; floods; and earthquakes.

See Appendix C for additional information.

ECONOMIC ANALYSIS

Benefit /cost analysis is one of the key mechanisms used by the state Office of Emergency Management (OEM), the Federal Emergency Management Agency, and other state and federal agencies. In evaluating hazard mitigation projects, it is required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended.

This section is not intended to provide a comprehensive description of benefit / cost analysis, nor is it intended to provide the details of economic analysis methods that can be used to evaluate local projects. It is intended to raise benefit / cost analysis as an important issue, and provide some back- ground on how economic analysis can be used to evaluate mitigation projects.

Mitigation Strategies

Mitigation activities reduce the cost of disasters by minimizing property damage, injuries, and the potential for loss of life, and by reducing emergency response costs, which would otherwise be incurred. Evaluating natural hazard mitigation 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.

The approaches used to identify the costs and benefits associated with natural hazard mitigation strategies, measures, or projects fall into two general

categories: benefit/cost analysis and cost-effectiveness analysis. The distinction between the two methods is the way in which the relative costs and benefits are measured. Additionally, there are varying approaches to assessing the value of mitigation for public sector and private sector activities.

Benefit/Cost Analysis

Benefit/cost analysis is used in natural hazard mitigation to show if the benefits to life and property protected through mitigation efforts exceed the cost of the mitigation activity. Conducting benefit/cost analysis for a mitigation activity can assist communities in determining whether a project is worth undertaking now, in order to avoid disaster related, damages later. Benefit/cost analysis is based on calculating the frequency and severity of a hazard, avoided future damages, and risk.

In benefit/cost analysis, all costs and benefits are evaluated in terms of dollars, and a net benefit/cost ratio is computed to determine whether a project should be implemented (i.e., if net benefits exceed net costs, the project is worth pursuing). A project must have a benefit/cost ratio greater than 1 in order to be funded.

Cost Effective Analysis

Cost-effective analysis evaluates how best to spend a given amount of money to achieve a specific goal. This type of analysis, however, does not necessarily measure costs and benefits in terms of dollars. Determining the economic feasibility of mitigating natural hazards can also be organized according to the perspective of those with an economic interest in the outcome. The result being, economic analysis approaches are covered for both public and private sectors as follows.

Evaluating mitigation strategies in the public sector is complicated because it involves estimating all of the economic benefits and costs regardless of who realizes them, and potentially to a large number of people and economic entities.

Some benefits cannot be evaluated monetarily, but still affect the public in many ways. Economists have developed methods to evaluate the economic feasibility of public decisions that involve a diverse set of beneficiaries and non-market benefits.

Private sector mitigation projects may occur on the basis of one of two approaches: it may be mandated by a regulation or standard, or it may be economically justified on its own merits. A building or landowner, whether a private entity or a public agency, required to conform to a mandated standard may consider the following options:

- Request cost sharing from public agencies.
- Dispose of the building or land either by sale or demolition;
- Change the designated use of the building or land and change the hazard mitigation compliance requirement; or
- Evaluate the most feasible alternatives and initiate the most, cost effective hazard mitigation alternative.

  The sale of a building or land triggers another set of concerns. For example, real estate disclosure laws can be developed which require sellers of real property to disclose known defects and deficiencies in the property, including earthquake weaknesses and hazards to prospective purchasers. Correcting deficiencies can be expensive and time consuming, but their existence can prevent the sale of the building. Conditions of a sale regarding the deficiencies and the price of the building can be negotiated between a buyer and seller.

  Benefit/cost analysis and cost-effectiveness analysis, are important tools in evaluating whether or not to implement a mitigation activity. A framework for evaluating alternative mitigation activities is outlined below:

- **Identify the Alternatives** – Alternatives for reducing risk from natural hazards can include structural projects to enhance disaster resistance, education and outreach, and acquisition or demolition of exposed properties, among others. Different mitigation projects can assist in minimizing risk to natural hazards, but do so at varying economic costs.

- **Calculate the Cost and Benefits** – Choosing economic criteria is essential to systematically calculating cost and benefits of mitigation projects and selecting the most appropriate alternative. Potential economic criteria to evaluate alternatives include:
- ***Determine the project cost*.** This may include initial project development cost, and repair and operating costs of maintaining projects over time.
- ***Estimate the benefits.*** Projecting the benefits or cash flow resulting from a project can be difficult. Expected future returns from the mitigation effort depend on the correct specification of the risk and the effectiveness of the project, which may not be well known. Expected future costs depend on the physical durability and potential economic obsolescence of the investment. This is difficult to project. These considerations will also provide guidance in selecting an appropriate salvage value. Future tax structures and rates must be projected. Financing alternatives must be researched, and they may include retained earnings. Bond and stock issues, and commercial loans.
- ***Consider costs and benefits to society and the environment.*** These are not easily measured, but can be assessed through a variety of economic tools including existence value or contingent value theories. These theories provide quantitative data on the value people attribute to physical or social environments. Even without hard data, however, impacts of structural projects to the physical environment or to society should be considered when implementing mitigation projects.
- ***Determine the correct discount rate.*** Determination of the discount rate can just be the risk-free cost of capital, but it may include the decision-maker's time preference and also a risk premium. Including inflation should also be considered.
- ***Analyze and Rank the Alternatives*** – Once costs and benefits have been quantified, economic analysis tools can rank the alternatives. Two methods for determining the best alternative given varying costs and benefits include net present value and internal rate of return.

- ***Net present value***. Net present value is the value of the expected future returns of an investment minus the value of expected future cost expressed in today's dollars. If the net present value is greater than the project costs, the project may be determined feasible for implementation. Selecting the discount rate, and identifying the present and future costs and benefits of the project calculates the net present value of projects.
- ***Internal Rate of Return.*** Using the internal rate of return method to evaluate mitigation projects provides the interest rate equivalent to the dollar returns expected from the project. Once the rate has been calculated, it can be compared to rates earned by investing in alternative projects. Projects may be feasible to implement when the internal rate of return is greater than the total costs of the project.

Once the mitigation projects are ranked on the basis of economic criteria, decision-makers can consider other factors, such as risk, project effectiveness, and economic, environmental, and social returns in choosing the appropriate project for implementation.

Economic Returns of Natural Hazard Mitigation

The estimation of economic returns, which accrue, to building or landowner as a result of natural hazard mitigation is difficult. Owners evaluating the economic feasibility of mitigation should consider reductions in physical damages and financial losses. A partial list follows:

- Building damages avoided
- Content damages avoided
- Inventory damages avoided
- Rental income losses avoided
- Relocation and disruption expenses avoided
- Proprietor's income losses avoided

  These parameters can be estimated using observed prices, costs, and engineering data. The difficult part is to correctly determine the effectiveness

of the hazard mitigation project and the resulting reduction in damages and losses. Equally as difficult is assessing the probability that an event will occur. The damages and losses should only include those that will be borne by the owner. The salvage value of the investment can be important in determining economic feasibility. Salvage value becomes more important as the time horizon of the owner declines. This is important because most businesses depreciate assets over a period of time.

Additional Costs from Natural Hazards

Property owners should also assess changes in a broader set of factors that can change as a result of a large natural disaster. These are usually termed, “indirect” effects, but they can have a very direct effect on the economic value of the owner’s building or land. They can be positive or negative, and include changes in the following:

- Commodity and resource prices
- Availability of resource supplies
- Commodity and resource demand changes
- Building and land values
- Capital availability and interest rates
- Availability of labor
- Economic structure
- Infrastructure
- Regional exports and imports
- Local, state, and national regulations and policies
- Insurance availability and rates

Changes in the resources and industries listed above are more difficult to estimate and require models that are structured to estimate total economic impacts. Total economic impacts are the sum of direct and indirect economic impacts. Total economic impact models are usually not combined with economic feasibility models. Many models exist to eliminate total economic impacts of

changes in an economy. Decision-makers should understand the total economic impacts of natural disasters in order to calculate the benefits of a mitigation activity. This suggests that understanding the local economy is an important first step in being able to understand the potential impacts of a disaster, and the benefits of mitigation activities.

Benefit/cost analysis is complicated, and the numbers may divert attention from other important issues. It is important to consider the qualitative factors of a project associated with mitigation that cannot be evaluated economically. There are alternative approaches to implementing mitigation projects. Many communities are looking towards developing multi-objective projects. With this in mind, opportunity arises to develop strategies that integrate natural hazard mitigation with projects related to watersheds, environmental planning, community economic development, and small business development, among others. Incorporating natural hazard mitigation with other community projects can increase the viability of project implementation.

Priorities

Curry County and each stakeholder city have identified action items for problem areas that are of the most concern in mitigation. During the planning process each of the involved communities developed action items that were of a priority to mitigate for the safety of their communities. This plan represents each community's major concern and priority for mitigation. The continued community involvement in the Hazard Mitigation planning process will ensure that these priority projects are completed, as funding becomes available. As funding opportunities come from different programs with various focuses the utilization of the cost benefit analysis outlined above, when specific applicable project funding becomes available these priority projects will be completed over time.

SECTION 2 COMMUNITY PROFILE

COMMUNITY PROFILE

Natural hazards can endanger citizens, property, the environment, and the economy of Curry County. Flooding, coastal erosion, landslides, windstorms, severe winter storms, wildfires, and earthquakes have exposed Curry County residents and businesses to the financial and emotional costs of recovering after natural disasters. The risk associated with natural hazard increase as more people move to areas affected by these hazards. The inevitability of natural hazards, and the growing population and activity within the county create an urgent need to develop strategies, coordinate resources, and increase public awareness to reduce risk and prevent loss from future hazard events. Identifying risks posed by natural hazards and developing strategies to reduce the impact of a hazard event can assist in protecting life and property of citizens and communities. Local residents and businesses can work together with the county to create a Natural Hazards Mitigation Plan that addresses the potential impacts of natural hazard events.

GEOGRAPHY AND THE ENVIRONMENT

Curry County is located in the southwest portion of Oregon, in an area of justly deserved reputation for spectacular scenery. However, along with the natural beauty of the area come the ongoing forces that created it. This is an area of both chronic and catastrophic hazards that can put people and property at risk.

Chronic hazards are those hazards that constantly affect the coast: beach, dune, and bluff erosion; slides, slumps, and gradual weathering of sea cliffs; and flooding of low-lying areas during major storms. Chronic hazards come from winter storms, associated storm surges, and wave setup; strong nearshore currents; high winds, rain, runoff, and associated lowland flooding; and elevated sea levels caused by seasonal effects and periodic El Niño or La

Niña effects. Waves, currents, tides and storms are constantly affecting beaches and headlands, causing erosion, landslides, and flooding. Many coastal features such as beaches and sand spits are constantly changing. Attempts to stabilize such ephemeral features so they cannot change in most cases are ultimately futile, because the forces that have shaped this land for millions of years are not easily overruled. For example, cliffs with marvelous views are there because land in front of them has slid away. And areas that have had one landslide are likely to have others. The coast of Oregon is constantly under attack by the ocean.

Catastrophic hazards are associated with earthquakes and related tsunamis. The eastward-moving Juan de Fuca tectonic plate dives under the westward-moving North American Plate just off the Oregon Coast at the Cascadia Subduction Zone, however, it is capable of generating even larger earthquakes of up to magnitude 9. These larger earthquakes would occur under the ocean and can cause destructive tsunamis that can strike the coast

AERIAL VIEW OF THE COASTLINE AT PORT ORFORD

between 10 and 30 minutes after the earthquake. Hazards on the coast associated with earthquakes include severe ground shaking lasting up to 5 minutes; liquefaction of saturated, unconsolidated soils such as sand or silt; numerous landslides; land subsidence and flooding; and tsunamis. The coast of Oregon is vulnerable to two types of tsunamis; distant and local. Local tsunamis are most generally associated with Cascadia subduction zone earthquakes. Tsunamis from distant undersea earthquakes can take place

anywhere in the Pacific Rim and will take several hours to reach the Oregon coast. Because the Cascadia Subduction Zone is so close to the Oregon coast, tsunamis caused by earthquakes along this rift can strike the southern Oregon coast within 10-15 minutes of the earthquake and the north coast within 20–30 minutes. In many communities, the only warning will be the earthquake itself. Distant tsunamis have struck the Oregon coast in the past. Recently in 1964, when a magnitude 9.2 subduction zone earthquake struck the coast of Alaska with the resulting tsunami traveling down the Pacific coast where it killed 4 people at Beverly Beach and caused damage in many Oregon coastal communities.

Increasing awareness of tsunami hazards is essential to the safety of, coastal residents and visitors.

Fire is a natural part of the ecosystem, and in a heavily –timbered area like Curry County, it can never be discounted. In 2002, the Biscuit Fire raced over the Klamath Siskiyou mountains, burning nearly a half million acres over a 120 day period. Lightning storms touched off several small wildfires that eventually joined to become one huge inferno, burning 471,130 acres in Curry and Douglas counties and 28,835 acres in California. At its peak, over 7,000 firefighters and support personnel from regional and national fire management teams were assigned to help fight the blaze.

A visible section of moving firewall, nearly obscured by the smoke of the Biscuit Fire

Encompassing an area of 1,627 square miles, Curry County is bordered on the north by Coos County, on the east by Josephine County, and by the California

State border to the south. One thousand two hundred and sixty six square miles of the county are land, while the remaining 361 miles (18.16%) are covered in water. The rugged Siskiyou Mountains push out into the sea in a series of dramatic rocky headlands and offshore sea stacks. Much of the 80 miles of undeveloped coastline are dedicated as State parks, and all of the offshore islands are in the Oregon Islands National Wildlife Refuge.

Curry County covers 6 watersheds: the Coos, the Coquille, the Lower Rogue, the Illinois, the Chetco, and the Smith. The county is intersected by a network of lakes, rivers and tributaries, including Floras Creek, New River, New Lake, Crystal Creek, the Sixes River, the Elk River, Lawson Creek, Hubbard Creek, Euchre Creek, the Rogue River, Hunter Creek, the Pistol River, Hooskenaden Creek, the Chetco River and the Winchuck River.

The wetland area provides wintering and migratory habitat for waterfowl of the pacific flyway and important habitat for a number of threatened and endangered species, including the brown pelican, bald eagle, peregrine falcon, and Aleutian Canada goose. The area has large breeding colonies of sea birds that use the numerous coastal rocks and islands within the Oregon Islands National Wildlife Refuge. Species using the wet lands areas include tundra swans, brant, and five subspecies of Canada geese. Dabbling ducks include mallards, pintails, widgeon, teal, shovelers, and wood ducks. Diving ducks include redheads, canvasbacks, ringneck, buffleheads, ruddy ducks and goldeneyes.

The Rogue and Orford reefs hold the largest breeding population of Steller sea lions in United States waters south of Alaska.

Virtually all of the South Coast's streams and rivers support runs of Coho and Chinook salmon, steelhead and coastal cutthroat trout. Although commercial salmon fishing was once popular, it was outlawed in 1962 when state legislation banned the use of, gill-nets. Game fishing remains the major fishing industry today.

Major Rivers

Rogue River

The Rogue River begins its life at Crater Lake, and flows 215 miles to the Pacific Ocean at Gold Beach, cutting its way across the Siskiyou's and churning through deep canyons; at one spot over 4,000 feet-deep, gouged through old lava. The Wild and Scenic portion of the river is 84 miles long, with narrow canyons, waterfalls and churning rapids alternating with quiet pools. The river is extremely popular for rafting and fishing, offering trout, salmon, and steelhead, as well as Class I to V whitewater rapids. Douglas fir dominates the surrounding forest that is, also home to an abundant range of wildlife. Deer, elk, river otter, bobcat, fox, mountain lion, and black bear are all found in the area. The famous wilderness portion of the Rogue River Trail is only open to hikers, but the path along a lower portion of the rugged river canyon is also open to bicyclists. It's much less crowded, too. The trail contours along a forested slope above the river, dipping to a gravely beach at Big Eddy and climbing to a cliff top viewpoint at Copper Canyon. From the trees along the trail, large gray squirrels shake their bushy tails at passing hikers. Deer and black bear come down to the Rogue River for water, and osprey cruise above it looking for fish. In all, this is one of the best wildlife-viewing areas in Southwest Oregon. The chinook and steelhead run in the fall and spring to spawn up river, and there is also a Coho run in the fall. In the lower reaches of the river, sturgeon can still be found.

The Rogue River estuary at Gold Beach is approximately 880 acres in area and has a watershed of approximately 5100 square miles. It is designated as a Shallow Draft Development estuary under the Oregon Estuary Classification system. The geomorphology of the area is that of a River Dominated Drowned River Mouth estuary.

Chetco River

The Chetco Wild and Scenic River extends 44.5 miles, from its headwaters in the Kalmiposis Wilderness down to the Siskiyou National forest boundary just above Loeb State Park. The Chetco is divided into a 27.5 mile, wild segment from the headwaters down to Mislatnah Creek; a 7.5 mile scenic segment from

Mislatnah Creek down to Eagle Creek; and a 9.5 mile recreational segment from Eagle Creek down to the Siskiyou National Forest boundary. The Chetco River corridor supports many forms of vegetation and wildlife and offers recreational activities year-round.

The river is born in sparsely vegetated mountainous terrain, and drops from 3700 feet to sea level in 55 miles. In the upper section, the river is narrow and rocky, with numerous falls and rapids but past the wilderness boundary, the river becomes wider and flatter, and the surrounding hills become more forested. The Chetco River Gorge, just below Steel Bridge, is known for its narrow passage, steep canyon walls, and unusual formations. Below the Gorge, the Chetco continues to get broader and flatter, with sand and gravel bars and raised river terraces.

The resident species, as in most Pacific coastal systems are, dominated by trout and salmon. Populations of anadromous winter steelhead, fall chinook salmon, and sea-run cutthroat trout are healthy, and Coho salmon and chum salmon are also occasionally observed. Resident cutthroat and rainbow trout are abundant in upper stream reaches. Native populations of fall chinook and winter steelhead are supplemented with hatchery fish.

The Elk and Sixes Rivers

Notation: The Elk and Sixes are sister rivers which lie north and south of the Grassy Knob Wilderness Area, and meet the Pacific Ocean to the north and south of Cape Blanco. They are both, managed by the same watershed council. They drain a similar area of the coast; both have fairly large drainage areas, yet in some places the rivers are only two to three miles apart. Although two separate entities, these two rivers are often referred to by one designation, as the Elk/Sixes River.

Elk River

The Elk River is approximately three miles north of Port Orford. Entered into the National Wild and Scenic Rivers System in 1988, the Elk River has been given two classifications. The 17- mile segment from the confluence of the North and South fork of the Elk River to Anvil creek is classified “recreational”. The 2-

mile segment of the North Fork Elk River from the falls to its confluence with the South fork Elk River is classified “wild”.

The Elk River drainage is valued for its fish, wildlife, clean water, scenery, timber and recreation. The watershed is representative of the old-growth ecosystems along the southern Oregon coast. The scenic quality in the river corridor is a result of a combination of the geology, landforms, water and vegetation features. The lower section of the river flows through a steep canyon with exposed rock surfaces, forming an inner-gorge environment. Upstream, the gorge widens slightly, but the corridor remains very steep. The combination of water, color, exposed rock surfaces, dynamic flow, and relatively undisturbed environment creates an interesting and beautiful landscape throughout the year. The scenic quality of the river corridor draws to these features to create a significant value with the federally protected corridor.

Within the river corridor and surrounding timber stands live many different and unique wildlife species, including the marbled murrelet; northern spotted owl, and bald eagle. The forest stands surrounding the Elk River may in fact contain one of the largest populations of marbled murrelets in the lower 48 states. Perhaps the most remarkable attribute of the Elk River is its outstanding coastal fisheries. The Elk River provides outstanding species diversity, excellent spawning and rearing habitat, and is also highly valued for its productive commercial and recreational fisheries.

Sixes River

The Sixes River is situated almost entirely within Curry County, except for one small area of the Upper Sixes Mainstem which extends into Coos County. The river flows in a westerly direction from an altitude of approximately 3,315 feet down to sea level, where it enters the Pacific just north of Cape Blanco. The watershed drains approximately 134 square miles of land, or 85,645 acres. The upper portions of the watershed are characterized by, steeply sloping forested areas and narrow valleys. Like the Elk, Sixes River is source of steelhead, chinook, and Coho salmon, and offers expert class kayaking during high water.

Nearly 70% of the Sixes is in private ownership, and grazing, rural residential and agriculture uses dominate the lower portion of the basin. Major tributaries include the North Fork, Middle Fork, South Fork, Dry Creek, Edson Creek, and Crystal Creek.

Pistol River / Hunter Creek

The Pistol River watershed rains approximately 67,275 acres or 105 square miles of land. Pistol River, situated entirely within Curry County, is an average size watershed on the Southern Oregon coast. Flowing in a westerly direction, Pistol River crosses Highway 101 and drains into the Pacific Ocean about ten miles south of the community of Gold Beach. Elevations in the watershed range from sea level to approximately 4,220 feet on Snow Camp Mountain. Major tributaries include the North Fork, East Fork, and South Fork. The upper portion of the basin is characterized by steeply sloped, forested areas with narrow valleys and tributary streams that have moderately steep to very steep gradient. Grazing, rural residential development and other agricultural uses are dominant in the lower portion of the basin. Over 55% of the watershed are in public ownership.

The Hunter Creek watershed drains approximately 28,405 acres or 44.4 square miles of land. Hunter Creek is situated entirely within Curry County and is among the smaller watersheds on the southern Oregon coast. Flowing in a westerly direction, Hunter Creek crosses Highway 101 and drains into the Pacific Ocean just south of the community of Gold Beach. Elevations in the watershed range from sea level to approximately 3,558 feet on Sugarloaf Mountain. Major tributaries include the North Fork and Big South Fork. Steeply sloped-forested areas with narrow valleys characterize the upper portion of the basin and tributary streams that have moderately steep to very steep gradient. Grazing, rural residential development and other agricultural uses are dominant in the lower portion of the basin. Over 60% of the watershed are in private ownership.

The estuary is designated as a Natural estuary under the Oregon Estuary Classification system. The geomorphology of the area is that of a Blind estuary.

Winchuck River

The Winchuck River watershed drains approximately 45,631 acres or 71.4 square miles of land. This coastal river is among the smaller watersheds on the southern Oregon coast. The Winchuck is situated primarily within Curry County with some sub watersheds extending into California's Del Norte County including the South Fork, Middle Winchuck Mainstem, and Bear Creek. Flowing in a westerly direction the Winchuck River crosses Highway 101 and drains into the Pacific Ocean about a half-mile north of the Oregon/California border and approximately five miles south of Brookings Oregon. Elevations in the watershed range from sea level to approximately 2,925 feet on Mount Emily. Major tributaries include Fourth of July Creek, East Fork, Wheeler Creek, Bear Creek, and the South Fork. The upper portion of the basin is characterized by steeply loped, forested areas with narrow valleys and tributary streams that have moderately steep to very steep gradient. Grazing, rural residential development and other agricultural uses are dominant in the lower portion of the basin. Approximately 71% of the watershed is in public ownership.

North Fork Smith River

The North Fork Smith River runs from Chetco Peak in the Kalmiopsis Wilderness into the Six Rivers National Forest in California to its confluence with the Wild and Scenic Smith River in California. The total length of the river in Oregon is 13 miles, but the system in California encompasses over 300 miles. The deep green waters of the North Fork Smith flow down a gentle slope through lush old growth coastal forests, forming large pools, and cutting around exposed outcrops of serpentinite.

Trout and salmon dominate the North Fork Smith River's fishery, typical of pacific coastal systems. Winter steelhead and sea-run cutthroat trout are the predominant anadromous species on the North Fork. Some populations of Coho, chinook (both fall and spring run), and summer steelhead are found in the lower reaches of the river, primarily in California. The North Fork provides seven miles of near-pristine steelhead spawning and rearing habitat and is a significant source

of the high-quality water on which the anadromous fishery of the Smith River depends.

Floras Lake / New River

Floras Creek, a tributary of the New River basin, drains approximately 51,652 acres or 81 square miles of land. Floras Creek is located primarily in Curry County with a small portion of the East Fork extending into Coos County. It is also the most northern watershed in Curry County and crosses Highway 101 just south of the community of Langlois. Elevations in the watershed range form sea level to approximately 2,786 feet on Edson Butte. Major tributaries include the North Fork, East Fork, South Fork, West Fork, Willow Creek, and Floras Lake. The upper portion of the basin is characterized by steeply sloped, forested areas with narrow valleys and tributary streams that have moderately steep to very steep gradient. Grazing, rural residential development and other agricultural uses are dominant in the lower portion of the basin. Over 90% of the watershed are in private ownership.

Port Orford Watershed

The Port Orford watershed includes three distinct basins that drain directly into the Pacific Ocean. They include Garrison Lake, Hubbard Creek, and Brush Creek. In total, these three watersheds drain approximately 13,339 acres or 20.8 square miles of land. The Port Orford watersheds, situated entirely within Curry County, are among the small basins on the southern Oregon coast. Garrison Lake and certain portions of Hubbard Creek are located within the vicinity of the Port Orford community. Brush Creek located a few miles south of Port Orford, empties into the Pacific Ocean near Humbug Mountain. Elevations in the Port Orford watersheds range from sea level to approximately 3,040 feet on Rock Peak, located in the Brush Creek basin. Land uses include urban, forestry, agriculture, range and rural residential development. A reservoir located on the North Fork of Hubbard Creek, serves as the primary water source of the City of Port Orford. In total, approximately 69% of the watersheds are in private ownership.

OTHER GEOLOGICAL FEATURES

Curry County is a geological and topographical study in contrast. Because of its tectonic setting, the ages and origins of the landforms create a confusing geological record. Elevations within the county range from sea level to over 5,000 feet, and the geological record encompasses the Jurassic, Triassic, Cretaceous and Tertiary periods. Tertiary basalts and erosion-resistant sedimentary rocks combine with more erodible sandstone, siltstones, mudstones and uplifted marine terrace sands and silts of Pleistocene origin to form the coastline. Drowned valleys provide harbors and inlets. At the river mouths, narrow, unstable bay-barrier sand spits are common, some extending to form the ocean side of estuaries. The Coast Range consists of moderately folded marine tuffaceous sandstones and shales together with basaltic volcanic rocks and related intrusives uplifted 1,000 – 2,000 feet or more and then eroded by streams and weather.

Most of the route between Port Orford and the California State line clings precariously to a continuously rocky coastline with mountains rising dramatically from the surf. The road is almost continuously within sight of the ocean, and never beyond the sound of the pounding surf.

Rocks along this southernmost stretch of the Oregon coast are distinctly different form those farther north. From a geologic point of view they are a thin panhandle of the northern California Coast Range extending northward into Oregon. These rocks began, as did those farther north, but unlike those farther north, these have actually been scraped off the seafloor onto the edge of the continent as the oceanic crust slid out from under them into an ocean trench. They began as sediment laid on the seafloor back in Jurassic and Cretaceous times. Between 200 and 100 million years ago, and then jammed into the Coast Range within that time period. All available evidence suggest that the Pacific Ocean floor moved very rapidly during that time, and the chaotically jumbled rocks in the southern Coast Range seem to echo that theory.

Oregon's continental margin is composed of three major features: the continental shelf, the continental slope, and the submarine canyons dissecting

both. The continental shelf is a relatively flat, sloping terrace. It is narrow in comparison with worldwide averages, only about 17 kilometers (10 miles) off Cape Blanco in northern Curry County. In general, the shelf is steepest at its most narrow point, dropping approximately 200 meters before merging with the steeper continental slope.

The shelf has several prominent, rocky, submarine banks of varying size, as well as four major banks, which create locally shallow areas amidst the otherwise deeper water of the shelf. The underthrusting process at the base of the continental shelf has uplifted the rock blocks, which form these banks. Rocky outcrops, erosional remnants of shoreward rock formations, are also found on the inner shelf, particularly between Coos Bay and the Rogue River.

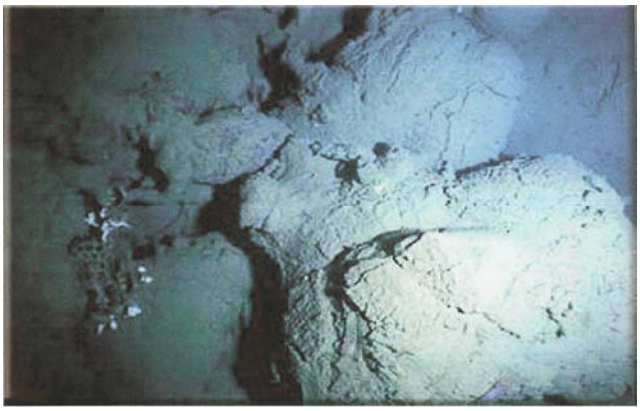
Like the continental shelf, Oregon's continental slope is relatively narrow. Approximately 20 kilometers (12) miles off Cape Blanco, the ocean floor drops rapidly to meet the Cascadia Basin some 2,000 meters below. The upper portion of the continental slope is, characterized by sloping benches and low-relief hills. Blocks of rocky material have been rapidly uplifted by the underthrust of the oceanic plate and the building of an accretionary wedge at the bottom of the slope. Sediments have ponded behind these blocks to form the Klamath Bench off the south coast of Oregon and the northern California coast.

The outer edge of the continental shelf and continental slope is, breached by two prominent submarine canyons and numerous smaller ones. The Astoria Canyon cuts into the shelf about ten miles west of the Columbia River. During periods of lower sea level, the Columbia and Rogue Rivers drained across what is now the continental shelf. The Astoria Fan lies at the base of the canyon. The Rogue Canyon is smaller, beginning near the edge of the shelf offshore of the Rogue River and feeding directly down the continental slope onto the deep ocean floor.

Seafloor forms at rifts where two crustal plates are pulling away from each other. Basalt magma rises into the opening crack, fills it to make a dike, and pours our over the nearby seafloor as a lava flow. Basalt flows erupted under water look entirely different from those that erupt on land; they form a mass of bulging, lumpy

forms that suggest a pile of oversized pillows. An advancing lobe of lava chills quickly in contact with the cold sea water, forming an outer skin of solid rock that then bursts and lets the lava run out to do the same thing over again. The whole process is similar to the behavior of dripping candle wax, and produces similar forms. As flow after flow erupts from the rift that keeps opening between the separating plates, they pile up on each other to depths of hundreds or even thousands of feet to make the uppermost layer of hard bedrock beneath the seafloor.

Pillow lava formed beneath the ocean, on Gorda Ridge, off the Oregon Coast. (NOAA photo)



Meanwhile, the newly created seafloor is slowly moving away from the rift toward the continent. If the rift where the seafloor forms is not too far offshore, the sediments washing in from the continent will reach it and bury some of the lava flows almost as soon as they form. The result will be interlayered sediments and lava flows, something that is often seen in the Oregon Coast Range.

Rainbow Rock, just south of Boardman State Park, is composed of intricately folded thin beds of colorful chert, a very hard sedimentary rock composed almost entirely of silica. This kind of bedded chert forms hundreds of miles out on the ocean floor in deep water, beyond the reach of the sands and muds washed in from the continent. The only sediments that settle on those remote reaches of the seafloor are the microscopic skeletons of one-celled animals and plants made of silica. The tiny shells accumulate very slowly into an ooze that eventually hardens through recrystallization into chert.

Humbug Mountain, about 6 miles south of Port Orford, is a huge mass of gravelly conglomerate deposited during Cretaceous times, a little more than 100 million years ago. The seaward side of Humbug Mountain descends right into deep water, with no wave-cut shelf on its face wide enough for a roadway. The highway cuts inland a short ways and follows a beautifully forested creek valley around the eastern side of the mountain.

Just north of Brookings the road gets onto a broad marine terrace, planed to a smooth, gently sloping surface by wave action when it was slightly below sea level and now is raised about 50 feet above the waves. The occasional big rocks that stand prominently above the terrace are old sea stacks.

Ancient metamorphic rocks form the cliffs, offshore rocks and reefs such as Cape Blanco and Cape Sebastian. One of the most prominent capes on the South coast, Sebastian towers 700 feet above the sea. The rise of sea level after the Earth's most recent ice age accelerated erosion against land and drowned remnant rocks and islands before they could be completely worn way. Rogue, Orford, and Blanco reefs are the largest of these drowned remnant rocky landscapes, covering thousands of acres with only the tips of spires now visible above water.

Weak bedrock, deep soils, and wet climate make landsliding a constant problem along the Coast Range. Pounding winter storms and tectonic shifts often exacerbate the situation.

Minerals and Soils

Recent soil surveys have given Curry county soils the taxonomic designation of haplohumult, a group of Humult, which are a sub order of Ultisols. Ultisols are formed by strong weathering and leaching, warm moist, summer-dry climate. These soils have a clay rich horizon low in bases. Vegetative nutrient cycling is a key factor in the formation of these soils. Humults are a sub order of Ultisols and are highly organic soils forming under moist, cool winters and warm dry summers. Humults show good drainage and are dark colored, develop on steep slopes and are easily eroded. The haplohumult soil classification of Curry

County reflects a subsurface horizon of clay and/or weatherable materials formed in a temperate climate zone.

Significant Ecological Features

Curry County has a wealth of ecologically significant features, several of which were mentioned in the above descriptions of rivers. Others of note include the Kalmiopsis Wilderness in the Siskiyou National Forest. Located 30 miles inland from US Hwy. 101, this area was named for the indigenous and rare flowering shrub, Kalmiopsis Leachiana, a relic of the pre-ice age. Redwood Grove Nature Trail in the Brookings areas offers US Forestry Service interpretive nature trails among centuries old giants in this pristine sanctuary of redwoods, rhododendrons and crystal clear streams. It's the northern-most stand of coastal redwoods. Myrtlewood groves, Port Orford cedar, the Pacific Flyway, and indigenous wildlife all contribute to the unique ecology.

Siskiyou National Forest

The Siskiyou National Forest, who occupies a large percentage of Curry County, embodies the most complex soils, geology, landscape, and plant communities in the Pacific Northwest. World-class rivers, biological diversity, fisheries, and complex watersheds rank the Siskiyou high in the nation as an outstanding resource. The Siskiyou National Forest is located in the Klamath Mountains and the Coast Ranges of Southwestern Oregon with a small segment of the Forest extending into Northwestern California and the Siskiyou Mountain Range.

President Theodore Roosevelt established the Siskiyou Forest Reserve in 1905. The Reserve was designated as the Siskiyou National Forest in 1907. The Forest holds 1,163,484 acres within its boundaries, 69,234 acres of which are privately owned or managed by other government agencies. A national treasure of biology and geology, the Siskiyou is the most floristically diverse National Forest in the country. During his studies here in 1950, Dr. Robert Whittaker found that only the Great Smokey Mountains rival the Siskiyou in plant diversity. The old and complex geology, the global position and transverse orientation of the Siskiyou Mountain Range across the Forest region are responsible for creating this myriad

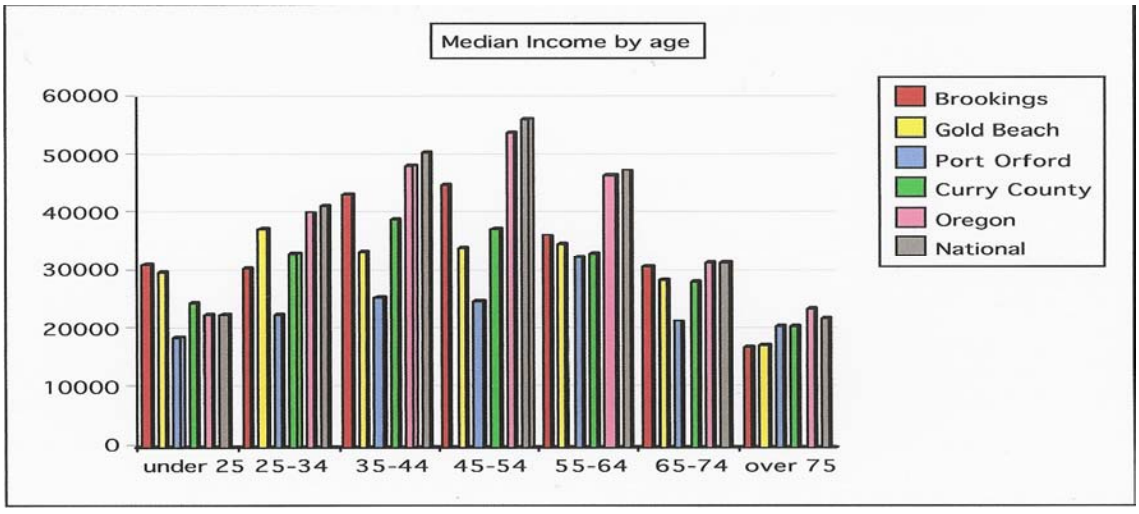
of species. Geologic parent rocks range in age from 200 million years old to the recent ice-age alluviums that are about 50,000 years old. The rocks vary in composition from granitics to the metamorphosed peridotites (serpentinite) that support the habitat for many of the sensitive species of plants. By contrast, much of the Cascade Range (a mere 60 million years old) is composed of relatively recent igneous rocks, and sedimentary rocks dominate the coastal ranges. The Siskiyou Mountains are situated at latitudes that are subjected to weather of both arctic and tropical origin. Snow and rain are common in the winter, and summer temperatures can vary considerably depending on the origin of storm patterns. Ice and freezing weather limit the northern range of redwood, a species requiring a temperate climate found in the southern coastal portion of the Forest. Yet the Siskiyous also harbor both Alaska yellow cedar and Pacific silver fir which are at their most southerly extent. The transverse orientation of the Siskiyou joins the Cascades with the Coast Range, providing plant migration routes between four ecological provinces. It also acts as a barrier to the penetration of weather from the north and south. The resultant sharp climatic changes that occur immediately north and south of the range correspond to the limits of several endemic botanical species. Together the varied geological substrate and the climatic extremes provide a range of niches for the rich reservoir of genetic material. There are 28 different coniferous species, 20 of which are used commercially. Of the approximately 400 sensitive plants in the region, about 100 are found in the Siskiyous.

The Siskiyou Mountains are one of he most biologically challenging areas to manage. Fire in the Mediterranean ecosystem is one of the most important agents of change directly affecting species composition, forest structure, and rates of ecosystem processes. It is driven by climate, has immediate effects, and has lately been significantly altered by cultural influences. Political decisions are threatening fire's natural role and beneficial effects on ecosystem health. Managing the natural and political aspects of fire to maintain its natural role and provide for society's needs is challenging. No where in the Region is the ecosystem more complex, than on the Siskiyou.

POPULATION AND DEMOGRAPHICS

Only 21,000 people live in the over one million acres that is Curry County. The economy has gradually transitioned from timber and fishing dominance, to a service industry focusing on retirees and tourism. There is a small but hard working labor force available – people who appreciate the small town/rural/coastal lifestyle of the region – and who are willing to work hard to live and play here.

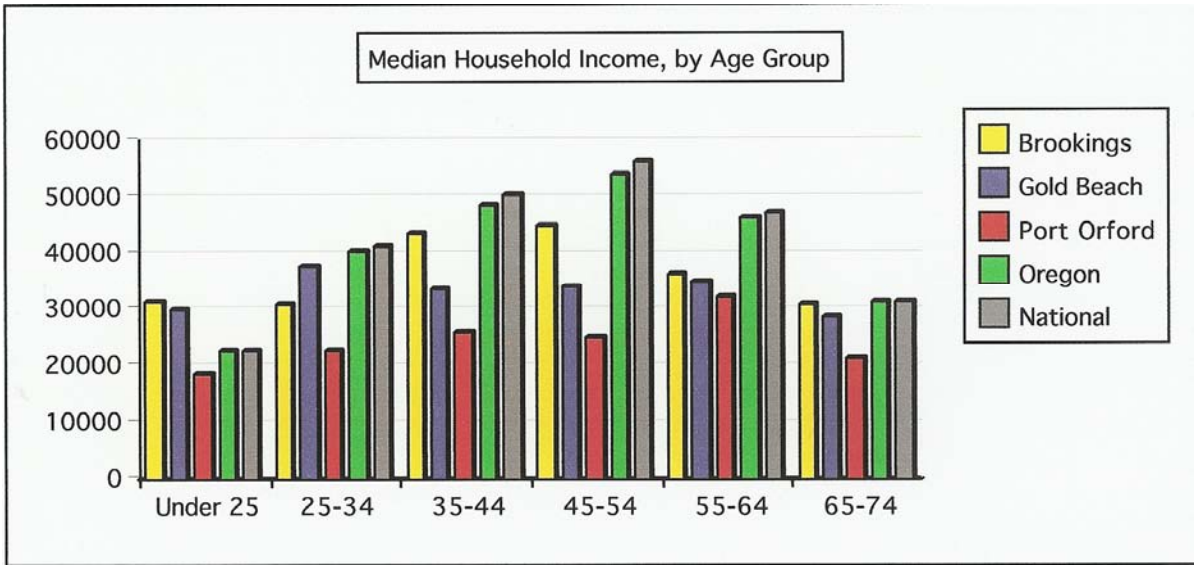
The 2000 Census showed a countywide population of 21,137 persons, a 9.14% increase from 1990. County population density is, 13 persons per square mile. Of the total recorded population, 9.7% (601 residents) where recorded as living below the poverty line. At the time of the 2000 Census, the median household income in the county was $35,627. A disproportionate 57.5% of the households reported an income under $35,000, with a full 23% reporting household incomes of less than $15,000 annually. Over 82% of families reported income from Social Security, retirement pay, Supplemental Security Insurance or, public assistance programs.



In March 2002, the Oregon Economic & Community Development Department updated its methodology used to determine “distressed areas” in Oregon. The new methodology uses an average of eight measures to gauge the

economic distress of an area relative to statewide measures: unemployment rate, per capita persona income, average pay per worker, population change, percent of population receiving unemployment by industry, employment change, and percent of families living in poverty. The statewide index is 1.00, with higher indexes indicating greater distress. For countywide designations, the index was 1.20, while 1.25 was chosen for citywide distress threshold. At these thresholds, the distressed areas currently include about 1-sixth of the state's employment. Curry County scored under the threshold overall but all three of the major communities within the county, Brookings, Gold Beach and Port Orford, were placed as economically distressed.

Curry County has the highest median age group in the state, with nearly 27% of the population being age 65 or older. The median age in Brookings is 43 years. In Gold Beach it is 45 years, and in Port Orford the median age of citizens is 50 years. Twenty-seven (27%) percent of Port Orford population is over the age of 65.



Curry County also shows a strongly disproportionate number of residents who have moved from another state. The Oregon average number of residents born in another state is 45.4%. By comparison, Gold Beach shows 57.8%, Port Orford has 68.2%, and Brookings has a very high ratio of 71.4%. A good part of

these statistics can be attributed to the area's reputation as a desirable retirement area.

LAND AND DEVELOPMENT

The geography of land use in the Pacific Northwest has evolved over time in response to location, technology, economy, and society. In striking contrast to the eastern United States, the majority of lands are publicly managed. And, land use on millions of acres is, decided by government management rather than individual land ownership. This is particularly true for Curry County, where large areas are, governed by the Forest Service and the National Park Service.

The first western explorers and settlers were attracted to the Oregon coast by the potential richness of its natural resources. Earliest were the traders, who obtained pelts of ocean otter and beaver from the Indians. Later came prospectors, who sought gold in the beach sands and coastal mountains, but who in many cases were content to settle down and "mine" the fertile farm lands found along the river margins. Others turned to fishing, supporting them by harvesting the abundant Dungeness crab, salmon, and other fish in the coastal waters. Also important to the early economy of the coast were the vast tracts of cedar and sitka spruce. Their significance continues to the present. However, today the most important "commodity" for the Northwest coastal economy is the vacation visitor: vacationers arrive by the thousands during the summer months.

It is still possible, in spite of the number of tourists who visit the state, to leave Highway 101 and find the seclusion of a lonely beach or the stillness of a trail through he forest. However, there is cause for concern that the qualities of the Oregon coast we cherish are being lost. Like most coastal areas, Oregon is experiencing developmental pressures. Homes and condominiums are being constructed immediately behind the beaches, within the dunes, and atop cliffs overlooking the ocean. Everyone wants a view of the waves, passing whales, and the evening sunset, as well as easy access to a beach, but these desires is not always compatible with nature. As a result, increasingly homes are being

threatened and sometimes lost to beach erosion and cliff landslides. Such problems can usually be avoided if builders recognize that the coastal zone is fundamentally different from inland areas because of its instability. Builders need some knowledge of ocean waves and currents and how they shape beaches and attack coastal properties. In addition, they need to understand and recognize potential instabilities of the land that might cause it to suddenly slide away. A familiarity with the processes and types of problems experienced in the past can aid in the selection of a safe location for a home. It can also enhance people's enjoyment of the coast, and it is hoped, lead to an appreciation of the qualities of the Oregon coast that must be preserved.

EARLY CURRY COUNTY HISTORY

Unfortunately, there is not nearly as much written history of Curry County as we would like to see, and it is not all pleasant. This account from "A Century of Coos and Curry" gives the following account of the first incursion by whites into the area.

In all the land of Coos and Curry counties, Port Orford was the first to be settled by the whites. On June 9, 1851, nine men were landed a few miles south of Cape Blanco, brought down from Portland by Captain William Tichenor on the little steam schooner 'Sea Gull'. The nine men were headed by Captain J.M. Kirkpatrick, who later wrote:

"*On the morning of the ninth of June, 1851, we were landed on the beach just below Battle Rock. There were a few Indians in sight who appeared to be friendly, but I could see that they did not like to have us there . . . We lost no time in making our camp on what was to be called Battle Rock".*

The cannon was set up, commanding the narrow passageway, the only approach to their camp on the rock. All other sides were sheer cliffs of rock, dropping off into deep water, a hundred feet or more below. Kirkpatrick, the leader, wrote:

"We put in a two-pound sack of powder and on top of that about half an old cotton shirt and as much bar lead cut into pieces from one to two inches long as I could hold in my two hands, then a couple of old newspapers on top. We then primed the gun with some fine rifle powder and trained it so as to rake the narrow ridge in front of the muzzle and the gun was ready for business . . .

I stood by the gun holding a piece of tarred rope with one end in the fire ready, a soon as the Indian crowded on the narrow ridge in front of the cannon. . . when a red shirted fellow in the lead was not more than eight feet from the muzzle of the gun, I applied the fiery end of the rope to the priming . . . At least twelve or thirteen men were killed outright, and such a tumbling of scared Indians I never saw before or since . . . We counted seventeen dead Indians on the rock and this was the bloody baptism that gave the name of Battle Rock to our old camp at Port Orford on the tenth day of June, 1851".

Kirkpatrick and his eight men went north, evading supposedly hostile Indians, aided by some friendly ones, till they reached Umpqua City. The Sea Gull, after leaving the nine men at Port Orford, had been laid up in San Francisco for some repairs. When Tichenor did return, he believed that all his men had been killed. He proceeded on to Portland and shortly after reaching there, he received the report from Kirkpatrick that all the men were alive. Tichenor did not abandon the plan to make a settlement at Port Orford. He gathered new recruits and in the summer of the same year he landed again at Port Orford, this time with 65 men. Tichenor, obtaining a Donation Claim, lost little time in plotting a town. Port Orford lots were soon offered to the public. Federal agents came to establish peace and make a treaty with the Indians. Troops were sent to protect the white settlers. With the discovery of gold on the beaches and in the creek and river beds, Port Orford became the scene of great activity. Hotels, stores and saloons lined the streets and for a few years did a flourishing business. However, it did not last. In 1856, Dr. Rodney Glisan, chief medical officer for the troops at the military post observed:

"Adjoining the military reservation of this fort is a small village called Port Orford, which was laid out in 1851, during the mania upon the coast town site's.

Having the best port between San Francisco and the Columbia River, it was thought to be an admirable site for a large city, but like many similar attempts, it has proven a failure. For, notwithstanding the additional advantages of gold having since been discovered along the sand beaches for many miles above and below the town, and the touching here of a regular steamer every fortnight, it still numbers only about forty houses, and one-third of those are tenantless. It has a good summer harbor, as the wind during this season is from the northwest. But in the autumn, winter and early spring it is generally very dangerous for vessels to attempt to 'lie to' in the harbor, or even to enter it, as the prevailing winds are then from the south, southwest or southeast".

Every year since 1856 saw it decline and soon it was deserted, with only three families remaining. Weird, silent, ghost-like stood the hotels, the saloons and the stores. Home for the birds, sport for the north wind that played hide-and-seek through the broken windows and open doorways, all the melancholy evidence of former life.

But the faithful stayed on and life came again to Port Orford. It was at least holding its own during the 1860's, until disaster struck all that region in the autumn of 1868. It was the demon Forest Fire. The fire seems to have come from across the Sixes to the Elk River and sweeping onward to Port Orford. Some people were able to survive only by covering themselves with wet blankets. Some saved their goods by hauling them down to the beach, and some buildings were saved. Once again Port Orford started over.

AGRICULTURE

It was the lure of gold that brought the first settlers to the south coast of Oregon, but because hungry men need to eat, agriculture came along with them. The first miners probably lived off the land and on provisions they had brought with them, but the more permanent settlers brought cattle, hogs, and horses. Gardens flourished as soon as the settlers could break ground, and the surplus was sold to those who worked the black sands and streambeds in search of gold.

When the first settlers came to the West Coast, most of them became good stewards of the land, as well as students of the land. They recognized the need to take care of their land and to know what it would produce. In most cases, they managed their land as well as they knew at the time.

The first evidence of animal agriculture was in the summer of 1851, when Captain William Tichenor, the founder of Port Orford, brought six horses and some swine on his second trip after putting 67 men ashore to establish a settlement.

In this area of abundant rainfall, plants, especially trees and brush, grow very rapidly and thick. Many open prairies covered the hills of Curry County when the first settlers came. The Indians had burned them for centuries to provide feed for deer and elk, and for traditional religious purposes. The settlers utilized these open prairies and cleared others, both in the hills and on the bottomlands.

The human and livestock populations increased rapidly, and many of the newcomers raised cattle, hogs and chickens, and grew gardens in the rich virgin soil along the coast.

Dairy farming soon became the number one farm enterprise in Curry County. Cheese factories and home made butter made it possible to preserve and ship the product to San Francisco and other cities. The county became famous for dairy production when local 4-H boys raised national-record-breaking cows and herds.

The development of markets for lambs greatly increased the income from sheep. The early sheep were raised primarily for wool production, with only the older ones sold for meat. The sheep industry thrived for many years until predators became so plentiful that they drove some sheep producers out of business.

Easter lilies are considered the largest horticulture income crop in Curry County. The story began with a soldier in World War I, Louis Houghton, who was stationed near Bandon. Prior to the war, the U.S. Department of Agriculture on the East Coast had employed Houghton. On his days off, Houghton wandered through the wilds of Coos County and was intrigued by the tiny trumpet lilies that grew there. After the armistice, Houghton returned to his job, working with Dr.

Griffiths who was at that time doing hybridization of lily stock. Houghton explained that he wanted to return to Oregon and try growing lilies, and Dr. Griffiths advised him to try it, giving him a suitcase of hybrid lily bulbs as a parting gift. Houghton returned to Oregon and rented a vacant lot in Bandon to begin planting and sorting his bulbs. Houghton was very free with his bulbs and often gave one or two to anyone who was willing to plant them. They in turn gave bulbs to other friends and neighbors, and the lilies do so well that people began selling them to tourists. Sidney Croft, who had once said his garden, was for growing things to eat and not for raising flowers, had a crop that had done so well that he sold his surplus for 50 cents each. Mr. Bergen, the owner of Marshfield Greenhouse offered to buy all he could produce. They performed very well in the greenhouse, and Mr. Bergen earned the honor of locally developing lilies forced first for the Easter market. Mr. Croft became more interested in lilies after he saw how they did in the greenhouse and became convinced that his pet lilies were worth something. He planted his entire lot to lilies.

In 1936 a raging fire swept through “Bandon, destroying Croft’s house, along with most of the town. Croft dug up his bulbs and moved to Harbor, where he rented more property and planted the bulbs he had salvaged from the fire. Several other of the new Bandon bulb growers also moved to Harbor, and during the depression, some of them got the idea that they might develop a market for the bulbs and raise enough money to help pay their taxes. In with a load of iris, callas, and other bulbs that Croft asked Mrs. Stafford to sell for him, he had included two boxes of his lilies. When buyer Paul Peters at Clackamas Greenhouses bought the bulbs and sold them, he called back to place an order for 10,000 bulbs every year. For several years he bought all the bulbs that Croft and Mrs. Stafford could produce.

The Easter lily industry was a minor one in the scheme of Curry County agriculture until 1941. Prior to that, the Japanese were able to provide bulbs in quantity and at prices the local growers couldn’t match. The war changed all of that. In the World War II years, the Easter lily industry started booming, with bulbs selling for a dollar each. Hundreds of farmers and backyard gardeners got into the

‘white gold’ business. Today, ten growers in Curry and Del Norte counties produce almost 95 percent of the Easter lilies grown in the United States. The ideal climate and unique soils of the area produce a quality crop that cannot be outdone anywhere else in the world.

In 1885, Charles D. McFarlin built the first known cranberry bog on the West Coast, in Hauser on the north inlet of Coos Bay. McFarlin had grown cranberries in Massachusetts, and he explored areas from Humbolt Bay in California to the Columbia River for a perfect spot to grow the berries. His brother sent him some wild vines from a natural bog on Cape Cod in about 1879, and he heeled them into a mud bath until he located the Hauser property. He then hired men and team of oxen and cleared the rough, stump filled swamp to turn it into a cranberry bog. By 1936, the Coos County Agricultural Conference reported 77 acres of cranberries in Coos County. By 1946 that had increased to 177 acres and by 1951 it was estimated that there were about 350 acres producing. Cranberries were a big money crop, and in some cases were grossing over $4000 per acre.

The coastal area of northern Curry County shares the same climate and growing conditions as the southern coastal area of Coos County, and soon Curry farmers were developing cranberry bogs. The 1947 Curry County Long-Range Planning Conference reported that "Over 1000 acres of good undeveloped cranberry land . . . located between Port Orford and the Coos County line, should be developed. In normal times and with conservative prices, this crop should net $1000 per acre”.

In 1949, about 225 growers were listed in Coos and Curry counties. Probably about 100 of these were full-time growers and the rest were hobby planters or those in search of quick money. The cranberries were marketed through Ocean Spray, the America Cranberry Exchange, and the Bandon Cranberry Producers Cooperative.

By 1983, about 1165 acres were in cranberries in Coos and Curry counties. The industry was expanding rapidly as new growers got into the booming business, and 1984 estimated the value of the cranberry crop in the two counties

at $4.2 million. A computerized format was developed to summarize coastal agricultural weather data with summaries mailed monthly to farmers and scientists. Cranberry work continued to accelerate rapidly as the Federal Marketing Order permitted additional acreage to be planted. The Marketing Order, administered by the Secretary of Agriculture, USDA, had kept a tight rein on the industry.

The major limiting factor to cranberry expansion in Southwestern Oregon is water management for frost control, irrigation, and harvesting. Most growers have build sumps to collect water during the rainy winter months for these purposes. The water is recycled several times over as the cranberry beds are designed to take advantage of the flow from one to another. Although “Bog” is an acceptable term, many growers now refer to their plantings as “cranberry beds” because almost all of the fields are constructed on upland marine terraces and not in bogs or marshes.

Cranberry production in Curry County accounted for 25 percent of the Oregon production in 1996. About 360 acres were harvested, with a yield per acre of 180 barrels. By 1994 the value of cranberries was about equal to the value of the Easter lily crop in Curry County. Each year new land is being placed into production of cranberries, as the industry has a bright future in Coos and Curry counties.

HOUSING AND COMMUNITY DEVELOPMENT

Curry County now has 14 established communities, twelve of which lie along the coast highway corridor. The remaining two communities, Agness and Illahe, are centered in the Siskiyou National Forest near the confluence of the Rogue and South Fork Coquille Rivers. Of these fourteen total communities, eleven are small rural communities and some may be comprised of only a few

buildings or services. Of the total population, 8,497 live in incorporated towns, while 12,640 live in unincorporated areas.

The county's three incorporated towns are Brookings, Gold Beach, and Port Orford. The largest of these is Brookings, with a population of 5,447.

The 2000 Census shows 1,406 housing units within Curry County. Of these, 87.3% (9,957 units) were counted as occupied while the rest were vacant (1,863 units) or used for seasonal or recreational use (825 units) only. Of the total housing, 26% are mobile homes, making them possibly more vulnerable to damage from severe storm or earthquake. Nineteen percent of the total number of homes, were built before 1959. Most housing is rural, although not on established farms.

The census indicated that 5,247 of Curry County homes were built between 1970 and 1989, while an additional 3,594 were built prior to 1970. Heating fuels for housing varied from electricity (80.2%) to wood heat (14%) to no heating source at all. Although most homes do have modern conveniences normally considered requisite, some units were found to be lacking adequate plumbing or kitchen facilities, and 2.8% of the total (265) were without telephone service.

EMPLOYMENT AND INDUSTRY

Formerly a mining center economy, Curry County has reoriented toward forest products and agriculture. Port districts were established in Port Orford in 1919, Gold Beach in 1955, and Brookings in 1959. The county produces approximately 90% of all Easter lily bulbs produced in the United States. Port Orford cedar (also known as Lawson Cypress) and other timbers are major exports. Tourism, myrtlewood manufacturing and agricultural specialty products such as blueberries and horticultural nursery stock also play an important role.

According to the 2000 Census, there are three major working classes within Curry County. Private wage and salary workers make up 64.2% of the working class, government workers hold 19.2%, and 15.8% are self-employed but unincorporated businesses.

Historically, the fishing, lumber and wood products industries dominated industry in this region. Events in the 1990's related to the Forest Practices Act and the Endangered Species Act have impacted these industries through a decline of employment opportunities in the timber industry and fisheries. The industries still provide employment on a smaller scale though interwoven with environmental restrictions.

Looking toward the future, natural resource-based manufacturing, tourism, recreational, healthcare, entertainment and retail trade sectors will continue to grow and develop and provide work opportunities and goods and services for the area residents.

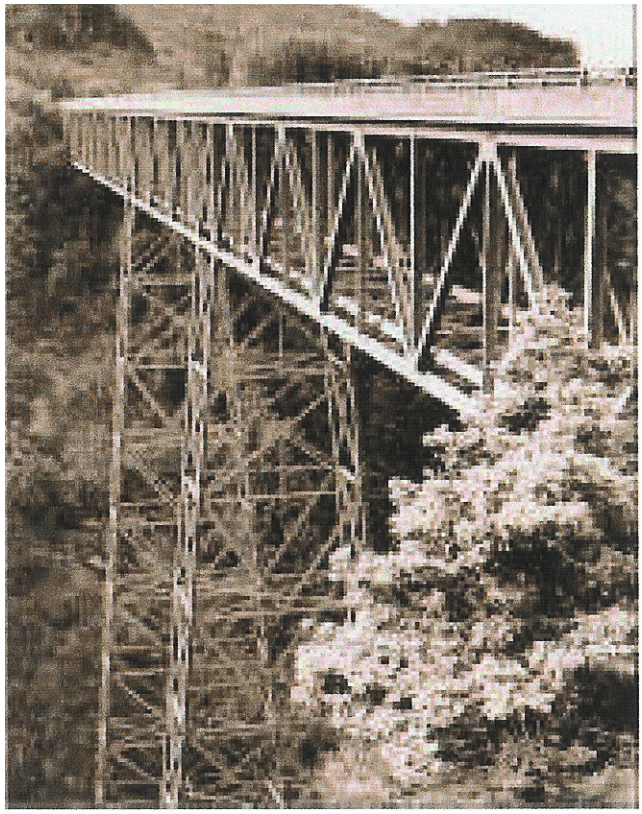
TRANSPORTATION

During the early years of Curry County, transportation could be chancy at best. The Rogue River was about all the inland water transportation the settler had. Some smaller streams provided transportation to a very limited extent. The Chetco River presented a very unique example of a waterway. It had three stages, varying according to the season – flood, navigable, and dry. In flood stage, the Chetco became a raging torrent; the traveler had to take to the trail along the bank. In navigable stage, except for deep pools at intervals of a mile or so, a boat had to be poled through ripples or towed through the rapids by waders above. In dry stage the river could be "navigated" by means of a team and wagon. A gravel bar served as a driveway for a mile or so. Then, by fording across, another gravel bar was reached on the opposite side. Thirteen bars and a dozen crossings brought the traveler to the 'head of navigation', about 18 miles from the ocean. From there he proceeded to his cabin by whatever trail had been carved from the wilderness.

Rugged and ever-changing terrain, a relatively small number of residents, and distances between social and economic centers have limited the development of the transportation systems of the Pacific Northwest. The mountainous topography has led to the channeling of transportation routes through a few

natural corridors. In Curry County, difficulties in road development and maintenance have led to the existence of only one major access route, Highway 101, through the county.

Curry County has 91 bridges, of which 60 are state highway bridges and 31 are on county highways. The impact of an emergency can disrupt traffic and



Thomas Creek Bridge
U.S. Highway 101, near Brookings

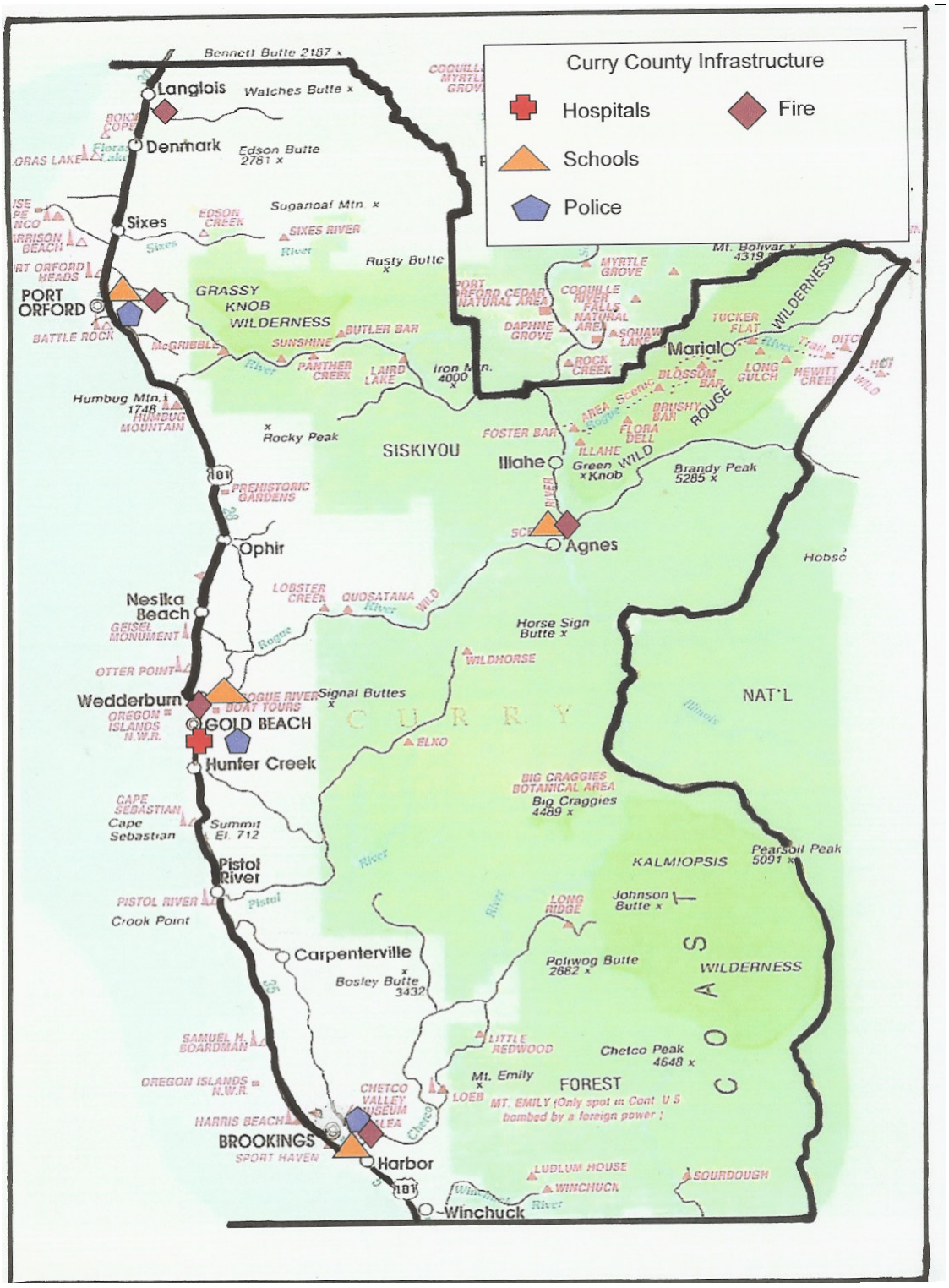
make evacuations difficult. Hazards such as local flooding or landslides can render roads unusable.

Bridges such as this one are fragile conduit, subject to winter storms, seismic rumbling, and the effects of age. One look at the terrain gives a graphic description of the problems that would immediately encountered by emergency response teams if the bridges were compromised during any sort of natural disaster.

Oregon's 350 bridges were designed to be replaced after about 50 years, and are nearing the end of their planned use. Not built to be maintained

indefinitely, nor are they designed for today's weights, volumes and traffic speeds. Insufficient investment over many years has prevented the bridges from being replaced on schedule. Cracks can develop, as bridges grow older under increasing stress. ODOT has to consider placing weight restrictions for heavy trucks to ensure public safety when inspections show increased cracks over a short period of time. Because trucks deliver needed goods to every community in Oregon, these weight restrictions can affect Oregon's economy through higher shipping costs, delays, and significant local impacts.

Curry County experiences high levels of tourist and bicycle traffic. Visibility during inclement weather conditions can pose challenges and threats to any drivers along Highway 101, and particularly to those travelers who are, unused to the area.


Curry County Infrastructure
Hospitals
Fire
Schools
Police
Bennett Butte 2187 x
Langlois
Walches Butte x
Denmark
Edson Butte 2781 x
Sixes
Sugarloaf Mtn. x
Rusty Butte x
PORT ORFORD
GRASSY KNOB WILDERNESS
BATTLE ROCK
McGRIBBLE
SUNSHINE
BUTLER BAR
PANTHER CREEK
LAIRD LAKE
Iron Mtn. 4000 x
Humbug Mtn. 1748
HUMBUG MOUNTAIN
Rocky Peak
SISKIYOU
PREHISTORIC GARDENS
Ophir
Nesika Beach
GEISEL MONUMENT
OTTER POINT
Wedderburn
OREGON ISLANDS N.W.R.
ROGUE RIVER BOAT TOURS
GOLD BEACH
Hunter Creek
CAPE SEBASTIAN
Cape Sebastian
Summit El. 712
Pistol River
PISTOL RIVER
Crook Point
Carpenterville
Bosley Butte 3432
SAMUEL H. BOARDMAN
OREGON ISLANDS N.W.R.
HARRIS BEACH
BROOKINGS
SPORT HAVEN
Harbor
Winchuck
LUDLUM HOUSE
WINCHUCK
SOURDOUGH
Illahe
Green Knob
Brandy Peak 5285 x
FOSTER BAR
ILLAHE
FLORA DELL
BRUSHY BAR
ROUGE
Agnes
Hobso
LOBSTER CREEK
QUOSATANA
Horse Sign Butte x
WILDHORSE
Signal Buttes x
C U R R Y
ELKO
NAT'L
BIG CRAGGIES BOTANICAL AREA
Big Craggies 4489 x
KALMIOPSIS
Pearsoll Peak 5091 x
LONG RIDGE
Johnson Butte x
Polwog Butte 2682 x
WILDERNESS
COAST
LITTLE REDWOOD
Chetco Peak 4648 x
Mt. Emily x
FOREST
LOEB
MT. EMILY (Only spot in Cont. U.S. bombed by a foreign power)
CHETCO VALLEY MUSEUM
Marial
TUCKER FLAT
LONG GULCH
HEWITT CREEK
ROCK CREEK
BLOSSOM BAR
DAPHNE GROVE
SQUAW LAKE
COQUILLE RIVER FALLS NATURAL AREA
PORT ORFORD CEDAR NATURAL AREA
MYRTLE GROVE
Mt. Bolivar 4319
WILDERNESS

SECTION 3 SPECIFIC HAZARDS

3.1 WILDFIRE AND WILDLAND / URBAN INTERFACE

WILDFIRE AND WILDLAND / URBAN INTERFACE

CHARACTERISTICS OF WILDFIRES

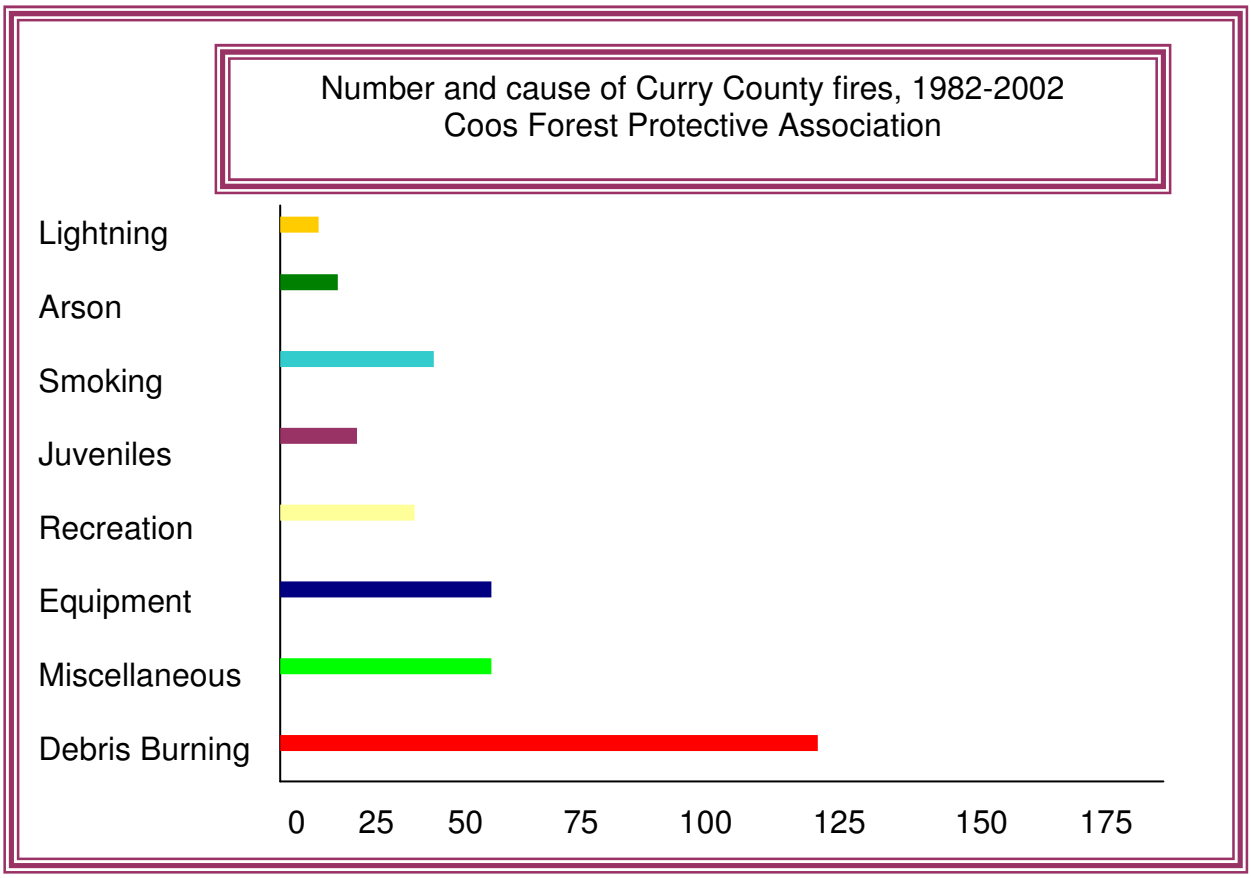
Oregon has had a long history of fire in the undeveloped wildlands and in the wildland/urban interface. In recent years, the cost of fire prevention and suppression has risen dramatically. Urban growth has placed more homes and businesses under the threat of fire and put more firefighters at risk, while increasing economic strain has reduced the fire protection capability in wildland areas.

History records, major wildfires in Curry County as far back as the 1800's, when wildfire destroyed Port Orford. In 2002, the Florence / Biscuit Fire burned nearly 500,000 acres in the Siskiyou National Forest and Kalmiopsis Wilderness area of southwestern Oregon and northern California. The fire began as several small fires that were started by lightning, and eventually merged into one huge firestorm.

Even before the arrival of the Europeans, the Native tribal history recalls extensive forest fires. Fire is a natural part of the ecosystem. Before the 20th century, wildfires burned through unstable growth, wiping out old, dry and diseased forests and grasslands and making it possible for new growth to begin. Fires remove unhealthy trees, thin forest stands, freshen and replenish the soil, and encourage biodiversity.

As urban growth spread across the nation, the practice of immediate suppression of all forest and grassland fires created a dangerous situation. Decades of well-intentioned efforts to put wildfires out quickly combined with selective logging that harvested the hardiest trees and rapid development throughout the American West have left millions of public areas and thousands of communities at risk. The forests and grasslands may look robust, but the past century's activity has created a national tinderbox. Oregon has in excess of 41 million acres (over 64,000 square miles) of forest and rangeland that are susceptible to wildfire. Many forests are thick with flammable underbrush.

Coupled with hundreds of acres of dry grassland and forest weakened by disease and insect infestation, fires now have the potential to become almost uncontrollable. More recently, forest management practices include prescribed burning and thinning to reduce understory vegetation. As burns such as the Biscuit fire and the catastrophic 2003 Southern California fires show, each fire season brings proof that wildfires can and will happen, often regardless of preventative measures. However, many fires are human – caused and are preventable, as the following graph shows.



The two highest total costs for fire suppression for this time period were for human caused fires:

- Debris Burning = $2,657,352
- Equipment Use (Logging) = $200,960
- Lightning = $86,529
- Smoking = $84,002

Wildfires generally defined as, the uncontrolled burning of forest, brush, or grassland, can be, caused by many forces. Natural ignition is usually a result of weather conditions and fuel. Human caused, fires add another dimension. Causes such as lightning strikes, faulty mufflers or catalytic converters, sparking logging equipment, and cans or broken bottles which can become so heated in the sun that they ignite dry material nearby must all be considered. In rural areas, livestock owners (particularly those with backyard horse corral) have been surprised by flash fires when manure heaps generated enough heat to spontaneously combust.

Wildfire can be divided into four categories:

- Interface fires,
- Wildland fires,
- Firestorms,
- Prescribed fires.

The *interface fire* occurs where wildland and developed areas come together with both vegetation and structural development combining to provide fuel. The classic *wildland urban interface* exists where, well defined urban and suburban development presses up against open expanses of wildland areas. The mixed wildland-urban interface is more characteristic of; the problems created by isolated homes, subdivisions and small communities situated predominantly in wildland settings. Both of these situations exist in Curry County.

Wildland fires occur primarily in national parks and forests, rangeland, and privately owned timberland. Natural vegetation is the primary source of fuel for these fires. A wildland fire may become an interface fire if it encroaches on developed areas.

Fire frequency and severity respond to variables such as temperature, moisture, wind, and ignition. The frequency of major fires also seems to run in cycles, or fire 'disturbance regimes'. However, while there are systematic properties to the geographic pattern of historical fire disturbances, there are also high variables. Some regions undergo annual cycles that manifest

regular fire seasons, while others may only experience multi-year or decadal wildfires. In some chronically wet areas, large fire seasons may only occur once in a century or even longer. The challenge is determining whether changing fire patterns are a result of climate variability, expanding anthropomorphic influence, long term cycles of disturbance and standing fuel development, or if they are caused by complex combinations of all of the above.

A scene like this one at Biscuit Fire makes a lasting impression on any homeowner who has viewed such a situation first hand.

The Siskiyou National Forest is located in the Klamath Mountains and the Coast Ranges of southwestern Oregon with a small segment of the Forest extending into Northwestern California and the Siskiyou Mountain Range. President Theodore Roosevelt established the Siskiyou Forest Reserve, in 1905, and the Reserve was designated as the Siskiyou National Forest in 1907. The Forest holds 1,163,484 acres within its boundaries, 69,234 acres of which are privately owned or managed by other government agencies. The Siskiyou is the most floristically diverse National Forest in the country. During his studies here in

1950, Dr. Robert Whittaker found that only the Great Smokey Mountains rival the Siskiyou in plant diversity. There are 28 different coniferous species in the forest, 20 of which are used commercially. The Siskiyou Mountains are one of the most biologically challenging areas to manage. Fire in this Mediterranean ecosystem is one of the most important agents of change directly affecting species composition, forest structure, and rates of ecosystem processes. It is driven by climate, has immediate effects, and has lately been significantly altered by cultural influences. Political decisions are threatening fire's natural role and beneficial effects on ecosystem health. Managing the natural and political aspects of fire to maintain its natural role and provide for society's needs is challenging. The Siskiyou Forest Plan emphasizes the need to understand and manage for ecosystem diversity and recognizes diversity as the key to forest health. Nowhere in the Region is the ecosystem more, complex than in the Siskiyou.

HISTORICAL WILDFIRES

Between 1840 and 1900, wildland fires burned at least two million acres of forestland in western Oregon. Following the establishment of the U.S. Forest Service and Oregon Department of Forestry, an aggressive and coordinated system of fire prevention and suppression emerged. However, it took several decades before significant gains were made.

Better suppression and more effective prevention campaigns combined to drastically reduce the losses following World War II. Suppression improvements included organized suppression crews, construction of an extensive system of forest roads, the use of aircraft for aerial delivery of personnel and retardant, and the invention and modification of chain saws, portable water pumps and bulldozers. Prevention benefited from war-era campaigns that united patriotism and prevention, such as Smokey the Bear, and Keep Oregon Green. Fires during the years of, 1933 1939, 1945, and 1952 all burned in the same general area, a vast tract of forest in the northern Coast Range that became known as the Tillamook burn.

1868	Coos Bay Fire. Wildfires burn through the state. 90% of Elliott State Forest is lost. The fire is stopped only when it reaches the ocean sand, after burning through an estimated 300,000 acres.
Sept. 1936	Wildfires rage throughout Coos and Curry Counties in the Bandon Fire, burning 225,000 acres. Temperatures soar to 90 degrees and humidity drops to 6%.
1966	Oxbow Fire in neighboring Douglas County burns 43,368 acres and one person is killed in the blaze.
1987	Silver Fire burns 97,000 acres of the South Coastal Range.
1987	Bland Mountain Fire burns 10,300 acres in the Southern Cascade Range. Caused by agriculture practices, 2 people lost their lives.
1992	Lone Pine Fire burned 30,320 Klamath acres. Started by Children.
1994	Hull Mountain Fire burned 8,000 acres in Jackson County and one person died. It was caused by arson.
1996	Tower Fire, started by lightning, burned 48,050 acres in Grant County. The same year, the Ashwood/Donnybrook fire burned 118,000 acres in central Oregon. Its cause was unknown.
2000	Wallowa County had both the Deep Creek Fire, of 32,957 acres, and the Jim Creek Fire of 56,319 acres. Both started by lightning.
2001	Monument Fire burned 32,352 acres of Grant County. Caused by lightning.
2002	Toolbox Fire, caused by lightning, burned 62,644 acres of Lake County.
Aug 2002	In Curry County, a small section of Coos County and in northern California, the Biscuit Fire burned nearly 500,000

	acres. It was started by lightning, and began as several smaller fires that merged into one huge firestorm. Twenty-three regional and national fire management teams and many thousands of firefighters and support personnel were assigned to the fires. At its peak, over 7,000 firefighters and support personnel were assigned. Four homes, one lookout, nine outbuildings and numerous recreation structures were lost. Meanwhile, the Tiller complex Fire to the northeast had grown to 53,900 acres as of August 18, and was only 43 percent contained. This fire consisted of eight large fires and numerous other small fires.
2003	The B&B lightning fire in central Oregon burned 90,800 acres.

VULNERABILITY AND RISK

Wildfire has an obvious effect on development, but development can also play an influencing role in wildfire. Owners often prefer homes that are private, have scenic views, are nestled in vegetation, and use natural materials. In Curry County, these private locations may be far from public roads and hidden by long curving driveways and stands of trees. Many, homeowners, or renters in rural areas also neglect or outright refuse to properly identify their driveways, private lanes, or even their mail boxes in an attempt to preserve their privacy. The infrequent identification of rural roads, combined with unmarked private accesses, can make it nearly impossible for response crews to properly locate the source of a fire before it grows to dangerous proportions. In the instance of a large fire requiring interagency cooperation, support crews from out of the area can quickly become confused without these vital points of reference. The natural topography of Southwestern Oregon and Northwestern California, the inconsistency of rural route identification, and the ever-expanding development into areas with limited accessibility make location and evacuation of residents, a daunting task under any circumstances, all but impossible in an emergency. Natural vegetation contributes

to scenic beauty and to the lure of living in rural environments, but it may also provide a trail of fuel leading directly to the combustible fuels of the home itself. (Oregon Technical Resource Guide)

Fire suppression costs can escalate dramatically when wildland protection agencies must adjust their tactics and structural fire protection resources must be mobilized to protect structures in the path of wildfire. Local and state government costs to support, evacuation, traffic control, security, and public information during a wildfire are also very significant. The topographic conditions of Curry County and the accessibility of populated areas compound the situation. Each of the major towns is fronted by the Pacific Ocean on the west and essentially backed by rural land and forest to the east. Fifty-nine percent (59%) of, Curry County is, owned by the Forest Service. Seventy percent (70%) of the total number of county residents live in the rural areas. Over thirty-one percent (31.5%) of the total homes within Curry County were built before 1969. Many homes in Curry County are outfitted with fireplaces or wood stoves. In fact, 11.7% of homes within the county rely on wood as their sole source of house heating fuel.

In Curry County, rugged terrain and long distances between communities have led to the existence of only one major access route, Highway 101, through the county. Secondary roads into the interior regions of the county are limited. Minor county maintained routes service most transportation needs, but there are large portions of the county which are accessible only by primitive roads, including many multiple residence roads and long single home driveways that are privately maintained.

Electrical power and telephone lines which must, of necessity, cross the forested areas to connect the coastal towns to their more inland neighbors, are also at risk in a conflagration. With the disruption of power and communication services, essential emergency personnel must be diverted from recovery efforts in order to search out homes and evacuate residents. Such situations have greatly complicated firefighting efforts and significantly increased the cost of fire suppression.

The majority of Curry County is susceptible to wildfire. Wildfires can be extremely unpredictable. A grassland fire may creep along slowly in one area but race at the speed of a locomotive in another. Grass fires may burn with the direction of the wind or against it. In forests of conifers a fire might drift along the surface or may breach the dense crowns. In residential areas with large trees, it may 'top out' and skip from tree to tree, while leaving the understory virtually untouched. A fire may burn a continuous swath, or swirling up-currents may carry burning embers over varied distances to start new fires. A wildland fire can also burrow down into deep humus and continue to creep under the surface. It can appear to be out, when in fact it is not. Under the proper conditions, once it reaches a certain size and volume, a wildfire may become a 'firestorm'. Firestorms generate their own wind currents, sometimes reaching hurricane force, making access and firefighting extremely difficult.

The financial and social costs of wildfires demonstrate the need to reduce the impact on lives and property, as well as the short and long-term economic and environmental consequences of large scale, fires. Cost savings can be realized through preparedness and risk reduction, including a coordinated effort of planning for fire protection, and implementing activities among local, state, and federal agencies, the private sector, and community organizations. The wildland-urban interface is the area or zone where structures and other human development meet or intermingle with wildland or vegetative fuels. As more people move into these interface areas, the number of homes threatened by large wildfires has increased dramatically. Terms such as 'defensible space' and 'firewise landscaping' should become commonplace among residents living in forested areas and in rural communities. Many people moving to rural areas expect to have the same level of fire protection that they had in high-density urban areas. Rural fire departments, often working with interagency cooperative efforts, and predominantly volunteer attempt to provide this protection, but in the case of a large wildfire, this can prove an impossible task.

In the 1970's, an increasing number of wildland fires affected or involved homes. Suburban growth continued through the 1980's and by the early 1990's

frequent and destructive wildland fires had become a major concern. In the 1990's about 100 structures burned in wildland fires. Thousands more were threatened, and losses and suppression costs skyrocketed. The challenge for management seeking to restore more normal fire dynamics to a particular region is to know something about fire; how fire has historically affected the local system, and how it functions today. Across the West, USGS researchers in collaboration with scientists from numerous other agencies and institutions, are providing this information through detailed studies of fire history and fire ecology. Although wildland fire is a growing hazard, posing a great threat to life and property, it is also a natural process, and its suppression is now recognized to have created a larger fire hazard, as live and dead vegetation accumulates in areas where fire has been excluded. In addition, the absence of fire has altered or disrupted the cycle of natural plant succession and wildlife habitat in many areas. The negative consequences of forest fire suppression can now be clearly seen. In many areas, disruption of the natural fire regime has produced overcrowded forests with vast accumulations of dry fuel. Blazes that break out under these conditions may be far more destructive than the normal fires of centuries past and are often extremely difficult or impossible to control.

In 1997, the Legislature passed Senate Bill 360, the Oregon Forestland-Urban Interface Fire Protection Act, "to provide a complete and coordinated fire protection system". The Act recognized that "forestland-urban interface property owners have a basic responsibility to share in a complete and coordinated protection system". In addition, during the last decade, concerted efforts have been made to prevent and mitigate wildland interface fires, including the enactment of the Wildfire Hazard Zone process and the inclusion of defensible space requirements as part of the state building code.

However, fires in 2002 underscored the need for urgent action. Fires sparked by intense mid-summer dry lightning storms burned hundreds of thousands of acres of Oregon forestland. There were ten Governor-declared conflagrations, with as many as five events running concurrently. More than 50 structures burned, and thousands more were threatened. At one point, the entire Illinois

Valley in southwestern Oregon, home to approximately 17,000 people, was under imminent evacuation alert due to the vast Florence / Biscuit Fire.

Recent fire seasons bring the wildland interface problem to the forefront and the problem of overabundant dense forest fuels in a focus of public discussion. The forest fuels issue is a major continuing problem that has received Presidential-level attention. The perceived need to reduce fuels is not universally accepted and remains controversial, especially on federally owned lands. The catastrophic 2003 Old Fire in San Bernardino County, California brought the issue back into public focus in a very graphic manner. Old Fire scorched over 91,000 acres and destroyed 993 homes and 10 commercial properties. It burned into the mountains, where bark beetles and drought had turned once lush treetops into fuel for the fire. Six people died, and the estimated cost of the fire was a staggering $42,336,000.

Property Identification

Property owners often prefer homes that are private, have scenic views, are nestled in vegetation, and use natural materials. Many of these private havens are far from public roads and hidden along curving driveways or unpaved roads and stands of trees. There is a tendency to not properly identify their driveways, private lanes, or even their mailboxes in an attempt to preserve their privacy. The intermittent identification of rural roads, combined with unmarked private accesses, can make it extremely difficult for response crews to adequately locate the source of a fire before it grows to dangerous proportions. In the instance of a large fire requiring interagency cooperation, support crews from neighboring areas can quickly become confused without these vital points of reference. The natural topography of southwestern Oregon, the inconsistency of rural route identification, and the ever expanding development into area with limited accessibility make location and evacuation of residents, a daunting task under any circumstances, and all but impossible in an emergency.

Infrastructure

Electrical power and telephone lines which must, of necessity, cross the forested areas to connect the coastal towns to their more inland neighbors, are also at risk in a conflagration. With the disruption of power and communication services, essential emergency response personnel must be diverted from recovery efforts in order to search out homes and evacuate residents. Such situations have greatly complicated fire-fighting efforts and significantly increased the cost of fire suppression.

Natural Vegetation

Natural vegetation contributes to scenic beauty and to the allure of living in rural environments, but it may also provide a trail of fuel leading directly to the combustible fuels of the home itself.

Gorse is native to western and central Europe, where it has been cultivated for centuries as, hedgerows and in France as reserve livestock forage. Early European emigrants introduced gorse to more than 15 countries or island groups. In New Zealand, gorse was once planted on large estates for the provision of sheep feed on land too poor to grow other crops. In North America, gorse was first introduced in south coastal Oregon. It has spread as far south as San Diego County, California and north through Washington State into coastal British Columbia. Gorse has become a major weed of agriculture and forestry on the West Coast of the U. S. as well as in New Zealand, northwest Spain, Tasmania and Australia, and at high altitudes in Hawaii.

Gorse grows well in shady slopes with high soil moisture and good drainage. As a result this spiny evergreen shrub thrives in southwest Oregon. Dense and stiff, forming impenetrable thickets, vigorous stands grow outward, crowding out all other vegetation and forming a center of dry dead vegetation. This, in combination with the oil content of the plant, presents a major fire hazard.

Gorse seeds are extremely persistent in the soil. Water-impermeable seed coats allow them to remain viable in the soil for 25 to 40 years, creating a very sizable seedbank. Fire, soil disturbance, and/or moisture can stimulate

germination. Gorse is extremely competitive, displacing cultivated and native plants, and impoverishing the soil. It creates an extreme fire hazard due to its oily, highly flammable foliage and seeds, and abundant dead material in the plants center. It not only increases the risk of fire, but also produces a hotter fire than most weeds.

Because of various characteristics of the plant, the soil is often bare between individual gorse plants, which increases erosion on steep slopes where gorse has replaced grasses or forbs. Spiny and mostly unpalatable when mature, gorse reduces pasture quality where it invades rangeland. Gorse understory in forests interferes with cultural operations, increasing pruning and thinning costs.

In 1936 the town of Bandon, was burned to the ground, 13 people died and only 16 buildings remained unburned. The disaster was fueled by extensive infestations of gorse. The uncontrolled presence of Gorse in the Town of Bandon as well as surrounding unincorporated areas, spreading south along the coastal forests into California, is of major concern. Ongoing efforts are being made to suppress the hazard by the coastal communities, and the issue of gorse infestation is a regional mitigation action item.

Drought

The term drought is applied to a period in which an unusual scarcity of rain causes a serious hydrological imbalance. Unusually dry winters, or significantly less rainfall than normal, can lead to drier conditions, leaving reservoirs, water tables, ponds and rivers significantly lower. In 2002 Coos County declared a local emergency for drought due to the abnormal lack of average rainfall for a several year period. To date the average rainfall for southwest Oregon is still in a recession creating an earlier dry season.

Post Fire Effects

Wildfires leave additional problems behind them, even after the embers have been extinguished, and particularly so in areas such as southwestern Oregon, with its steep terrain and substantial winter rainfall. Landslides and erosion are

secondary hazards associated with wildfires that occur on steep slopes. Torrential rains can trigger debris flows over burned areas, such as happened in the Waterman Canyon area of San Bernardino, following the Old Fire. During an intense wildfire, all vegetation may be destroyed, and all the organic matter in the soil may be burned away or may decompose into water-repellant substances that prevent water from percolating into the soil. As a result, even normal rainfall may result in unusual erosion or flooding from a burned area.

Water supplies are also affected by fire. The loss of ground-surface cover, such as needles and small branches, and the chemical transformation of burned soils, make watersheds more susceptible to erosion from rainstorms for several years following a severe incident. Deterioration of water quality following a fire is also a concern. Waterways can become choked by quantities of burned debris, furthering the potential for over-run, erosion, and water quality can be reduced by high levels of manganese and phosphate. During fire suppression activities, some areas may need coordinated efforts to protect water resource values from negative impact. Curry County, with its multiple rivers and watersheds descending from forested areas, is particularly vulnerable in these areas.

COMMUNITY ISSUES

Growth and Development in the Interface

The forested land that makes up the majority of Curry County can be considered interface area it reaches the most western perimeter at the Pacific Ocean. All of Curry County's urban areas are ocean side communities, with forested land fringing into each community. With existing older rural homes and the influx of retirees looking for serenity and isolation, exceptional natural beauty and resources, this area provides an ideal location for settlement and recreation. This mix provides a recipe for disaster with the varying housing structures, the age of these structures and applicable building codes limited developmental patterns outside of incorporated cities, and the natural vegetation providing fuels.

Numerous factors are evident in predicting the outcome of a fire event. These factors are truly relevant in fighting a wildland fire given the complexity of the following elements:

- Combustible building materials,
- Wood construction,
- No defensible space around structures,
- Poor access to structures,
- Residences located in heavy natural fuel types,
- Residences located on steep slopes covered with flammable vegetation,
- Limited water supply,
- Winds over 30 miles per hour.

Road Access

Road access is a major issue for all emergency service providers. With many small rural communities throughout the county, and no perceivable growth in

these areas, there is little expectation of improvement of existing access roads or the possibility of new ones being constructed. Any new residences being constructed have no codified mandates to provide 'turn around' space for emergency vehicles, which limits access for these vehicles. This coupled with the fact that many access roads are not marked makes fire fighting a logistical toss up. Fire fighters must make the decision to save structures based on their accessibility as well as surrounding fuels and building materials. Life saving and evacuation has become, in many cases, the only recourse for fire fighters as they can no longer guarantee structure protection.

Water Supply

Smaller communities and rural areas are not only predominantly outfitted with small diameter pipe water systems, incapable of providing sustained water flows, but the majority of both urban and rural water delivery systems are over 40 years old and have outlived their prime usefulness.

In the more rural areas, water systems do not exist as residents and small communities depend on well water for this resource. Fire fighting is dependent on the available water in creeks, ponds, and rivers, which are used to float pumps to provide water to fire engines. Due to the abundance of even average rainfall, these water basins are usually full during winter and early spring months of the year. Mid to late summer and fall months find ponds and creeks extremely low, if not dry. This issue, alone mandates a defensible space program for rural residences in the wooded areas of Curry County.

Rural Services

People moving into rural areas from more urban areas seem to have an expectation that there are adequate fire protection resources to keep their properties protected in the event of a fire. The small rural communities, most of which are, isolated in many miles apart from each other are dependent on, on-call volunteer fire departments. In most cases, fire protection must rely on the

landowner's personal initiative to take proactive protective measures for their homes and property.

Current statistics prove that, natural ignition, sources for wildland fires in Curry County is far below that of accidental. The majority of ignition sources prove that the presence of man is the major contributor.

As such, the statistics show that there is a great need for continual public education and awareness as growth and development in rural areas continue to impact the wildland / urban interface. Curry County being a paradise for sport fishing and hunting will encourage the presence of man and the hazards he brings to the area.

Hazardous Fuel Builders

Swiss Needle-Cast

In the forested areas of Curry County, Oregon Department of Forestry, Coos Forest Protective Association, and the U.S. Forest Service out of Powers, are concerned with several blights that are affecting the local forest growth. One of the factors that is affecting the area is 'Swiss Needle-Cast'. This particular blight is caused by the spreading of spores that attach themselves to needles of the Douglas Fir. As the spore matures, it kills the needles of the fir trees, causing them to drop and subsequently leaves the tree bare and kills the tree. The spread of the foliage disease, has become a great concern to forest managers and a Cooperative has been formed to research the biology, detection and management of this infection. Oregon State University has teamed with the following local partners to form this Cooperative:

- Boise Building Solutions
- Hampton Resources, Inc.
- Hancock Forest Management
- Menasha corporation
- Simpson Timber Co.
- Starker Forests
- Weyerhaeuser Corporation

- USDA Forest Service (In-Kind)
- USDI Bureau of Land Management
- Plum Creek Timber Company

Port-Orford-Cedar-Root Disease

Port-Orford-Cedar-Root Disease is another forest blight damaging our local forests. This disease is caused by a fungus, which produces spores that are transported from a diseased tree to infect healthy trees, through water soaked soil and ground water. It is fairly easy to track the spread of this disease by following the dying trees along watercourses, around lakes and sloughs, and along rural roads, livestock trails and farmsteads. Spread of the disease into the mountains has been slower but is progressive. The spores can be spread by vehicles, elk, deer, and water, and is predominately present along logging roads. Recently killed trees are predisposed to fall during excessive winds. These swimming spores (zoospores) burst forth from their host in saturated soil and move with surface water. New infections of root tips occur as spore bearing water percolates into the soil. Resting spores spread the fungus as they are moved about with soil.

The rootlets infested with the spores first appear to be water soaked, then they darken. Fine roots quickly disintegrate. As the fungus advances, the inner bark and cambium of larger roots discolor to a deep cinnamon brown, contrasting strongly with the rich cream color of healthy inner bark. The disease spreads up the trunk and is limited to a distance of about twice the stem diameter as the crown dies and tissues dry. Port Orford cedar is not an endangered species, despite the widespread root disease. Production of the valuable cedar is encouraged for low risk sites, where it can be grown in mixture with other species. (United States Department of Agriculture)

CURRENT MITIGATION ACTIVITIES

Curry County residents are served by, local fire departments, local rural fire districts as well as state and federal fire regions. Even though each district or department is responsible for fire related issues in specific geographic areas, they work together to provide public safety programs.

All of the fire service providers in Curry County are dedicated to fire prevention and use their resources to provide educational information and services to residents such as:

- 'Smokey' presentations for school grades K-3,
- County Park Fire Safety Presentations,
- Business Inspections,
- School, church, and civic group fire safety education presentations,
- Teaching 'Fire Prevention' in schools,
- Teaching proper use of fire extinguishers,
- Woodstove installation inspections,
- New construction inspections pursuant to Oregon Goal 4,
- Checking smoke detectors,
- Fire prevention and safety information for Annual County Fair
- Burn permit inspections, during fire seasons,
- Coordinating educational programs with other agencies, hospitals, and schools,
- Answering citizens questions regarding fire hazards.

Oregon Department of Forestry (ODF)

The Oregon Department of Forestry is involved with local fire chiefs and fire departments as well as rural fire protection districts to provide training. Firefighters get a broad range of experience from exposure to wildland firefighting. Local firefighters can also obtain their red card (wildland fire training documentation),

and attend extensive workshops combining elements of structural and wildland firefighting, defending homes, and operations experience.

ODF has been involved with emergency managers to provide support during non-fire events as well as working with industrial partners such as timber companies to share equipment in extremely large events.

Federal Programs

The Federal Government has few mechanisms to encourage activities to resolve the many problems in rural, unincorporated areas. There are two programs available through the US Forest Service to assist in meeting the needs of rural areas: the Rural Fire Prevention Control (RFPC) and Rural Community Fire Protection (RCFP). Both of these programs provide cost share programs to rural fire districts.

The ODF – Coos Forest Protective Association has applied for two grants which are currently pending approval. The first grant addresses Fire Prevention for all wildland urban interface communities district-wide and the second addresses Fuels Reduction for all wildland urban interface communities district wide. The grant applications have been requested through the Western States Wildland Urban Interface Grant Program.

Hazard Mitigation Grant Program

Following a major disaster declaration, the FEMA Hazard Mitigation Grant Program provides funding for long-term hazard mitigation projects and activities to reduce the possibility of damages from all future fire hazards and to reduce the costs to the nation for responding to and recovering from the disaster. It is through this program that this Plan is possible.

National Wildland/Urban Interface Fire Protection Program

Federal agencies can use the National Wildland/Urban Interface Fire Protection Program to focus on wildland/urban interface fire protection issues and actions. The program helps states develop viable and comprehensive wildland fire mitigation plans and performance based partnerships.

U.S. Forest Service

The U.S. Forest Service (USFS) is involved in a fuel-loading program implemented to assess fuels and reduce hazardous buildup on US forestlands. The USFS is a cooperating agency and, while it has little to no jurisdiction in the lower valleys, it has an interest in preventing fires in the interface, as fire often spreads to higher elevation US forestlands.

Prescribed Burning

The health and condition of a forest will determine the magnitude of a wildfire. When fuels such as dry or dead vegetation, fallen limbs and branches and diseased trees susceptible to fire, are allowed to accumulate over long periods of time without being methodically cleared, fire can move more quickly and destroy everything in its path, the results being catastrophic. Prescribed, controlled burns are the most efficient method to get rid of these fuels. Routine high and unexpected winds make this method difficult in the coast, ranges.

Firewise

Firewise is a program developed within the National Wildland/Urban Interface Fire Protection Program and is the primary federal program addressing interface fire. Firewise offers online wildfire protection information and checklists, as well as listings of other publications, videos and conferences. The interactive home page allows users to ask fire protection experts questions, and to register for new information as it becomes available. Most Firewise educational material is free for the asking.

FireFree Program

The FireFree program originating in Bend, Oregon, was developed in response to the city's "Skeleton Fire" of 1996 which burned over 17,000 acres and damaged or destroyed over 30 homes and structures. Partnering with SAFECO Insurance Corporation, Bend sought to create a new kind of public education initiative that emphasized local involvement.

CURRY COUNTY ZONING ORDINANCE

This ordinance is designed to provide and coordinate regulations in Curry County governing the development and use of lands and to implement the Curry County Comprehensive Plan.

Section 3.045. Fire Fighting Standards for Dwellings and Structures.

The following fire-siting standards shall apply to all new, dwellings or permanent structures constructed or placed on lands within the Timber (T) zoning designation.

1. The dwelling shall be located on a parcel that is located within a structural fire protection district or the owner has contracted with a structural fire protection district for residential fire protection. If the dwelling is not within a fire protection district, the applicant shall provide evidence that the applicant has asked to be included within the nearest such district. If the Director determines that inclusions within a fire protection district or contracting for residential fire protection is impracticable, the Director may provide an alternative means for protecting the dwelling from fire hazards. The alternative means for providing fire protection may include a fire sprinkling system, onsite fire suppression equipment and water storage or other methods that are reasonable, given the site conditions. If a water supply is required for fire protection, it shall be a swimming pool, pond, lake, or similar body of water that at all times contains at least 4,000 gallons or stream that has a continuous year round flow

of at least one cubic foot per second. The applicant shall provide verification from the Water Resources Department that any permits or registrations required for water diversion or storage have been obtained or that permits or registrations are not required for the use. Road access shall be provided to within 15 feet of the water's edge for fire fighting pumping units. The road access shall accommodate the turnaround of fire fighting equipment during the fire season. Permanent signs shall be posted along the access route to indicate the location of the emergency water source.

2. Fire Safety Area

Owners of new dwellings and structures shall comply with the following requirements.

a. A primary fire safety area of at least thirty (30) feet width shall be maintained around all structures;

NOTE: For purposes of this ordinance a primary fire safety area shall be defined as follows:

An area in which the vegetation shall be limited to mowed grasses, low shrubs (less than two (2) feet high, and trees that are spaced with more than fifteen (15) feet between the crowns and pruned to remove dead and low (less that eight (8) feet from the ground) branches. Accumulated needles, limbs and other dead vegetation should be removed from beneath the trees.

b. A secondary fire safety area of at least one hundred (100) feet width shall be cleared and maintained around the primary fire safety area.

NOTE: For purposes of this ordinance a secondary fire safety area shall be defined as follows:

An area in which the vegetation shall be limited to mowed grasses, low shrubs (less than two (2) feet high), and trees that are spaced with more than fifteen (15) feet between the

crowns and pruned to remove dead and low (less than eight (8) feet from the ground) branches.

c. Areas subject to the Scenic Waterway Area Overlay Zone may have compliance with the primary and secondary fire safety area requirements of this section modified to comply with specific sitting standards contained in any state or federal approved Scenic Waterway Management Program when such regulations conflict.

3. The dwelling shall have a fire retardant roof.
4. If the dwelling has a chimney or chimneys, each chimney shall have a spark arrester.
5. The dwelling shall not be sited on a slope greater than 40 percent.
6. The County may impose standards and conditions in addition to those specified above, when it deems it necessary the public health, safety and welfare.
7. Replacement or substantial improvement of legally sited existing dwellings requires compliance with the Fire Safety Area requirements of subsection 2, above. Substantial improvement constitutes an improvement which, is in excess of 50% of the assessed value of the existing dwelling.
8. Road Access to Dwellings – road access to the dwelling shall met the requirements shall meet the requirements set forth in Section 3.046.

Section 3.046 Fire Safety Standards for Roads.

The following special road standards shall apply within the Timber (T) zoning designation. These special road standards shall not apply to private roads accessing only commercial forest uses that do not include permanent dwellings or structures. The purpose of the rule is to provide adequate access for fire fighting equipment.

1. Roads and driveways shall have a driveable surface width of sixteen (16) feet.

2. Roads and driveways shall have an all weather driveable surface of gravel rock.
3. Roads and driveways shall have an unobstructed horizontal clearance of not less than sixteen (16) feet and an obstructed vertical clearance of not less than twelve (12) feet.
4. Average grade for a road or driveway shall not exceed thirteen and one-half (13.5%) percent for any one mile of road length; or exceed twenty (20%) percent for any four hundred (400) consecutive feet of road length.
5. Roads and driveways shall have a driveable surfaced turnaround, which has either a thirty-five (35) foot radius cul-du-sac, or a sixty, (60) foot “T-shaped” design for the turning of fire fighting equipment.
6. Roads, driveways, bridges and culverts shall be designed and maintained to support a minimum gross weight (GVW) of 50,000 pounds for the passage of fire fighting vehicles of equipment.
7. Bridges or culverts which are part of the construction of the road or driveway to the dwelling or structure shall have written verification from a Professional Engineer, licensed in the State of Oregon, that the structure can meet the 50,000 pound construction standard.
8. All bridges shall be inspected and certified as to compliance with the 50,000 pound, construction standard at an interval not greater than once every two years from the date of this ordinance. The inspection report shall be filed with the Curry County Road Department.
9. Variations from these standards may be granted through the provisions of Article VIII of this ordinance. The applicant shall provide a written statement from the governing board of the fire protection district having responsibility for structural fire protection in the area where the new dwelling or structure is to be located which states that their fire-fighting vehicles and equipment can negotiate the proposed road and driveway.

WILDFIRE MITIGATION ACTION ITEMS

The intent of the wildfire mitigation action items is to provide guidance and direction on specific activities that organizations, communities and residents can undertake as partners to reduce risk and prevent loss of life and property due to wildfire events. Each action item identifies implementation strategies, which can be used by the steering committees and local decision-makers to accomplish implementation.

WILDFIRE #1

Long Term: **Identify and map all roads, private drives, logging trails to increase the ability of firefighters to locate and gain access to provide service and/or evacuations.**

Implementation:

- Explore fire agencies using GPS for pre arrival response planning and mapping.
- Seek funding for countywide GPS for mapping purposes.
- Partner with logging companies to compare road and trail maps.
- Create current road and trail maps of region.
- Share information gained through this process with all county emergency response agencies, 9-1-1 PSAP and secondary PSAP's, and emergency medical responders.

Coordinating Organization: Natural Hazard Mitigation Committee
Oregon Department of Forestry
Coos Forest Protective Association
U.S. Forest Service
Industrial Partners, (logging companies)
BLM

Timeline: 2 – 5 years

Plan Goals Addressed: Emergency Services, Partnerships and Implementation

WILDFIRE #2

Short Term: **Public Education Program enhancing existing programs. Program to target residents, tourists enjoying area sport fishing and hunting in wildland areas, through multi agency coordination including local industry.**

Implementation:

- Provide fire safety and fire prevention information pamphlets in easy to read and understandable format.
- Target areas frequented by tourists such as motels, RV parks, community and state parks, restaurants, real estate offices, and chamber of commerce for local cities.
- Provide these areas with kiosks for display of information if necessary.
- Provide information to schools and colleges in the area.
- Provide informational videos for local government access TV as well as local TV Stations.
- Establish weekly fire prevention articles in local print media during fire season.

Coordinating Agencies

Natural Hazard Mitigation Committee
Oregon Department of Forestry
Coos Forest Protective Association
U.S. Forest Service

Timeline: 2 Years

Plan Goals Addressed: Protect Life and Property, Public Awareness

WILDFIRE #3

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

Implementation:

- Develop a map of gorse infested areas to be targeted.
- Collaboratively determine the best strategy for controlling the spread of gorse.
- Seek funding to replace cutters that can no longer be repaired due to age and the unavailability of replacement parts for use to cut back noxious weeds.
- Explore funding options to procure herbicides for noxious weed mitigation.

Coordinating Agencies: Natural Hazard Mitigation Committee
Oregon Department of Forestry
Coos Forest Protective Association
U.S. Forest Service

Timeline: 1-2 Years

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

3.2 FLOODING & SEVERE WINTER STORMS

CLIMATE AND THREAT TO CURRY COUNTY

Each year, storms wreak havoc across the U.S., destroying lives and property. The Pacific Northwest is one of the more intensely affected regions of the nation. Chronic erosion, landslides, and flooding all result from an annual barrage of wind and waves driven by storms battering the Oregon Coast, causing ever-increasing property damage and loss. Population changes on the coast and development pressures have led to construction in hazard areas, and the most desirable locations are often the most at risk. Storm damage to infrastructure results in significant long-term costs due to road closures, lost business, and reduced services. El Niño and La Niña effects have added to the intensity and duration of severe weather patterns in recent years. The State of Oregon ranked #11 nationally for losses from floods for the period from 1955 to 1999, with an estimated annual damage of over $197 million. Curry County falls within Oregon Climate Zone 1, the Coastal Region that is particularly vulnerable to coastal storms that cause widespread flooding, landslides, and damage from high winds. Some of these events originate in the, Gulf of Alaska and others in the Central Pacific Ocean.

Curry County is particularly vulnerable to severe winter storm damage for several reasons. The county location, transportation, and demographics play an important part in this equation. Located on the extreme southwestern edge of Oregon, Curry County has only one major access route into or out of the county; Highway 101. The famous coastal highway skirts the cliff edges in many places along its north-south route and is vulnerable to high winds and driving rain, as well as the possibility of landslide. Any major landslide slide on Highway 101 closes this local route to residents and tourists for many weeks, creating a large impact on the economy of the area. Access for stranded motorists and emergency vehicles along the highway can become difficult, if not impossible.

COMMUNITY ISSUES / VULNERABILITY AND RISK

The southern Oregon coastline has taken a beating from severe storms high tides, and excessive winds. With the only urban areas of Curry County lying on the rugged coast, the resulting impact to these communities is becoming an issue that must be resolved. The communities of Port Orford, Gold Beach and Brookings are struggling with the deterioration of their waterfront areas, jetties, and dunes. Constant erosion from rain, wind and storm surges impact the safety of their ports, and the economic health of these communities. Dune breaches threaten to allow tide surges to destroy homes as well as waste treatment facilities and threaten public health.

The local Ports are also impacted by heavy rain baring winter storms that cause deterioration of jetty's and threaten one of the areas most lucrative community business infrastructures. The threat to sport and commercial fishing as well as property damage when storm waters inundate marinas, rivers and low lying areas at sea level.

The median age of the population of Curry County is also considerably above average, with nearly 27% of the population being age 65 or older. Couple that with the fact that all three of the major communities within the county, Brookings, Gold Beach, and Port Orford, are rated as economically distressed. Location, access, median age of the population, economic stability, all of these factors point to a higher than average vulnerability to severe winter storm impact.

Because the Curry County economy is highly dependent upon tourism and agriculture, storms can have a devastating effect. Obvious results of storms are regularly seen in flooded grazing pastures and crop fields, in broken and downed trees and downed power lines. Often, however, the impact on agriculture goes far beyond the obvious.

Cold winter storms with accompanying winds can work to weaken livestock herds, particularly those with young animals and pregnant or nursing mothers. Extreme cold can cause dehydration in animals as well as respiratory distress.

Trees are vulnerable to breakage and specialty crops such as fruit orchards and nursery crops are especially vulnerable to severe winter weather.

Flooding occurs when an excess of precipitation falls, causing rivers, streams and lakes to rise over their banks. In Curry County, high tides can combine with the swollen rivers to add to the problem of heavy rain. Short term effects on agricultural properties, are drowned crops, trapped livestock, water damage to buildings and farm equipment. Farm or ranch infrastructure, including roads, fencing and critical work areas such as milking barns, can be damaged. Soils, the primary element in all agricultural industries, can be eroded and leached of essential nutrients and chemicals. The top 6 to 8 inches of soil determine crop growth and the ultimate production ability of a farm. Erosion loss of precious topsoil is especially damaging in the spring when there are no crops planted to hold soil. Eroding soils and silt wash can also carry debris and pollutants into the water supply. Silts and sands can be washed over growing fields and pastureland, forming a crust that inhibits new growth. In major flood events, larger livestock tend to do well, particularly if they are pastured in an area that allows them to get to high ground. Smaller livestock that are contained in pens are at risk of drowning or being trapped in collapsed structures or forced to stand in water and mud for long periods of time causing hoof rot and other infections.

Tornadoes are often preceded by high winds, thunderstorms, and hail, with wind speeds that can reach to 300 miles per hour, damaging buildings, trees and crops. People and livestock caught in the path of a tornado can be killed or severely injured by flying debris. People and livestock caught in the path of a tornado can be killed or severely injured by flying debris. Infrastructure such as gas, TV Cable, communications and electrical systems may be damaged, causing a risk of fire or explosion and isolation without communication capability. Crops and livestock can suffer in the violent downpour of rain or hail that often accompanies a tornado. Lightning strikes can kill livestock, damage equipment or structures, and spark fires.

Although Oregon does not have a frequent acquaintance with tornadoes, they do occasionally happen.
Coquille River Light House
SEPTEMBER 15, 1997
(From the Collection of the Bandon Historical Society Museum)

Fences, trees and structures can be physically uprooted by cyclone winds, and flying debris can cause considerable damage. Flash flooding may occur, bringing with it all the risks inherent to flood. Tornadoes of record include the 1887 cyclone in Cottage Grove, the 1888 twister that killed six people, and destroyed buildings in Lexington and Pine City. In 1925 a tornado tore up a five mile, path in Polk County. In April 1960, a tornado hit the town of Coquille. A cyclone near Astoria on October 1967 damaged several homes and commercial buildings. In 1997 a storm which damaged buildings and disrupted power service in the Sandy area. A tornado that touched down in Curry County on March 22, 1983, left $25 thousand in property damage; and another that made landfall south of Brookings on November 9, 2002, caused $500 thousand in property damage.

FLOODING

Seasonal flooding is common in the lowlands and usually has little or no widespread or long-term detrimental effects. All it takes to turn an ordinary seasonal food into a catastrophic event, however, is the right or wrong, set of circumstances. As marine air moves onshore along the coast, it rises and cools over the foothills and Coast Range, promoting heavy rainfall over the high-elevation streams, often as much as four to six inches in a single day. The steep-gradient coastal streams quickly move floodwaters through the watersheds, causing them to concentrate in the river's lower reaches before discharging into the Pacific Ocean. Normally, concentration times are short, keeping coastal streams in flood stage for less than two days. Severe storms of unusually long duration, however, can raise streams above flood stage for three to four days or more. The most widespread and potentially dangerous flooding of lowlands occurs when excessive stream flooding coincides with adverse coastal conditions. If strong winds and storm surge combine with high spring tides, extensive coastal flooding can result. When extreme river flows meet high sea levels, floodwaters cannot discharge into the ocean. With nowhere to go, they back up into an estuary or low-lying areas. Weather extremes also contribute to the potential for

catastrophic flooding. During the rainy season, for example, series of back-to-back storms often saturate lowland soils and fill wetlands, ponds, and depressions throughout the floodplain with excess water. With these natural catch basins filled to capacity, if storms persist, or if a particularly large storm system moves onshore, major flooding usually results. Cold spells that bring heavy snowfall to the coastal mountains, followed by the fast warming and heavy rainfall that accompany a subtropical front moving ashore can also pose serious flood threats.

Repetitive Flood Damage

In recent years, the focus and burden of floodplain management has shifted from the construction of flood-control structures, mainly designed and financed by the federal government to protect people and programs, aimed at preserving natural floodplain functions. At this grass-roots level, local communities, counties, property owners, and interest groups must join forces and combine resources to provide input and make intelligent decisions on how valuable flood plain resources should be used and preserved.

Repetitive flood damage to structures and contents can impact a communities, will to recover. This type of repetitive devastation weakens every community and in most cases the statistics that are available are not accurate due to the fact that many home owners do not have flood insurance and do not report damage, but continue to rebuild to the best of their ability.

Curry County Repetitive Flood Damage 1983 – 2003 (FEMA Statistics)	
Reported Damage to Buildings	$12,911
Reported Damage to Contents	$1,584
Total Damage, Costs (non-repetitive)	
Reported Damage to Buildings	$69,617
Reported Damage to Contents	$29,819

HISTORICAL STORM EVENTS

An approaching winter storm gathers energy over the ocean.

Each year, storms wreak havoc across the U.S., destroying lives and property. The State of Oregon ranked #11 nationally for losses from floods for the period from 1955 to 1999, with an estimated annual damage of over $197 million. Curry County is particularly vulnerable to coastal storms that can cause widespread damage form high winds and heavy rain.

January 1880	Record cold freezes the Coquille River, stopping all river traffic.
January 1921	Hurricane-force winds were reported along the entire Oregon and Washington coasts. Astoria unofficially reported gusts up to 130 mph. There was widespread damage to property and timber throughout the state.
January 1939	High tides and 60 mph winds wreak havoc along the coast. The Sunset Beach Resort is destroyed.
November 1945	Violent storms and gale-force southerly winds on the Oregon coast force an Army Air Corps Curtis C-46 off course. The pilot and co-pilot were killed, found still strapped in their seats.

One crewman was never recovered, and was presumed drowned.

January 1950 — January of 1950 was a very cold month for Oregon. There were actually three storms from January 9 to the 18th, but very little time separated them. The net effect was of one continuous storm. Snow, sleet, and freezing rain closed roads and stranded motorists, downed power lines and created widespread outages. Bandon recorded 6" of snow; Brookings had 6", and Gold Beach recorded 3 inches.

October 1950 — From the 26th through the 29th, this strong storm extended over the entire state, but reached its greatest intensity over southwestern Oregon and the higher elevations of the Cascades. In western Oregon, storm totals generally ranged between 10 and 12 inches in the extreme south. Two of the rainfall totals affecting Curry County:

Location	1 day Rainfall	Storm Total
Brookings	**6.19**	**14.14"**
Cape Blanco	**6.31**	**15.77"**
Gold Beach	**6.46**	**16.41"**
Illahe	**7.17**	**17.37"**
Port Orford	**5.80**	**14.03**

November 1953 — From 22nd to 24th, an extremely wet winter storm produced very heavy rain occurring over the southern coastal area. At the peak of the storm, most observing stations along the south Oregon coast reported 24 hour, rainfall total of 4 to 7 inches and 72 hour totals of 6 to 10 inches. Widespread heavy flooding occurred in all southwest Oregon streams and in most tributaries and the mainstem Willamette River. Gold Beach had a storm total of 9.8 inches of rain, while Port Orford recorded 7.25" of rain.

February 196 1	Strong cold front delivers sudden heavy wind gusts to southwest Oregon. Along the coast, gusts registered at 80 mph. A 4-hour deluge totaled 1.20" at Newport, adding to the already heavy 11.31" received for the month. Just south of Yachats, a section of Hwy 101 collapsed and fell into the ocean. Damage and community endangerment was reported all along the coast.
Dec – Jan 64-65	The December 1964 rainstorm was among the most severe over western Oregon since the late 1870's. Scores of stations set new records, for both, 24 hour, totals and December monthly totals. Widespread severe flooding occurred, with at least 30 major highway bridges in the state receiving such damage as to make them unusable. 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. Virtually every river in the state was far above flood stage and mudslides, bridge failures, and inundation closed the state's roads, airports and railways.
March 1983	On the 22nd of March, a small tornado touched down southeast of Brookings, causing some minor damage. It was approximately 15 yards wide.
December 1995	A State of Emergency was declared throughout western Oregon, due to a major storm consisting of high levels of wind and rain, affecting the states' infrastructure and causing significant damage to individuals and businesses.
February 1996	Four days of heavy rain produced a State of Emergency in nearly every county in the state. Rivers were already full from an above average rainfall, and rapid runoff combined with logging activity in recent years resulted in above-average sediment and debris loads. Five Oregon residents died, thousands of people were sheltered and hundreds of homes

	were destroyed. The region-wide damage estimates exceeded one billion dollars. (FEMA News) (University of Oregon Climate Service)
December 1996	State of Emergency declared due to flooding and landslides beginning November 18th in Curry, Lincoln, and Clackamas counties. Record-breaking precipitation throughout much of Oregon caused local flooding, landslides, and power outages over much of the state during November 18-20. All time one-day precipitation records were set at many locations.
January 1997	Flooding very widespread in Oregon, with many roads closed owing to high water and landslides. Landslides, rockslides, and mudslides related to the flooding occurred in many places. USGS field crews are going by foot into areas that are inaccessible by four-wheel-drive vehicles. (USGS http://www.usgs.gov)
	A state of emergency was declared in January, due to heavy rains beginning December 21, 1996 that caused flooding, landslides and erosion in 18 Oregon counties, including Curry County.
February 1998	A storm surge at Port Orford caused $300,000 in damage.
November 1998	Stormy conditions with strong winds and heavy rain. Flash flood warnings and small stream advisories issued for Coos and Curry Counties. (Hydrologic Info. Center)
February 4 1999	During an accurately-forecast winter storm calling for rising seas and gale winds, the 639 foot, Panamanian registered, bulk freighter M/V New Carissa ran agound on the shore 2.7 nautical miles north of the entrance to Coos Bay, releasing 70,000 gallons of fuel into the environment.
February 2002	The violent storm that flashed through the south Oregon coast left lasting damage to houses and roads. This was a severe

winter storm with high winds. A strong low pressure, system produced winds of 88 mph in Bandon. Falling trees clogged roads and snarled traffic. A State of Emergency was declared for Coos, Curry, Douglas, Lane, and Linn Counties. Federal disaster funds were made available to help communities in all five counties recover from the effects of this winter windstorm.

November 2002 A tornado touched down in Brookings, leaving $500 thousand in damages.

A TYPICAL SCENE IN MANY COASTAL AREAS ASSOCIATED WITH THE FEBRUARY 2002 STORM

WINDSTORMS

Severe Pacific storms are those which produce high winds and often significant precipitation as well. These storms usually produce the highest winds in Western Oregon, especially in the coastal zone. Wind storms, are most common from October through March. From unofficial but reliable observations it is reasonable to conclude that gusts well above 100 mph occur several times each year across the higher ridges of the Coast and Cascade Ranges and at the most exposed coastal points. At the most exposed Coast Range ridges, it is estimated that wind gusts of up to 150 mph, and sustained speeds of 110 mph, will occur every five to ten years. The damaging effects of windstorms may extend for distances in excess of 100 miles per hour from the center of the storm activity.

Positive wind pressure is a direct and frontal mass assault on a structure, pushing walls, doors, and windows inward. Negative pressure also affects the sides and roof, passing currents create lift and suction forces that act to pull building components and surfaces outward. The effects of wind are magnified in the upper levels of multi-story structures.

Debris carried along by extreme winds can directly contribute to loss of life and indirectly to the failure of protective building envelope components. Upon impact, wind-driven debris can rupture a building, allowing more significant positive and internal pressures. When severe windstorms strike a community, downed trees, power lines, and damaged property are major hindrances to response and recovery. (State of Oregon, Emergency Management Plan).

HISTORIC WIND STORMS

January 9, 1880	Winds 60 mph with gusts, 80 mph.
January 20, 1921	Hurricane-force winds with gusts, 130 mph recorded speed of 113 mph.
April 21&22, 1931	Strong winds causing widespread damage, ships report dust clouds 600 miles out to sea.

November 10&11, 1951	Winds recorded 40 – 60 mph with gusts 75-80 mph. Extensive infrastructure damage.
December 4, 1951	Winter storm with winds 60 – 100 mph on the coast and 75 mph inland. Damage to infrastructure.
December 21-23, 1955	Sustained wind speeds of 70 mph with gusts up to 90 mph.

ORCHARD TREES SNAPPED OFF AT THE GROUND BY WINDSTORM

November 1958	Sustained wind speeds of 51 mph with gusts up to 90 mph. Fallen trees blocked at one time every major highway in western Oregon. Billions of board feet of timber were blown down.
October 1962	Columbus Day Storm (The Big Blow). Peak gusts of 138 mph; 38 deaths; 170 – 200 million dollars in damage; 50,000 dwellings damaged; 100 million board feet of timber blown down.
March 1963	Wind gusts in excess of 100 mph along coast.
October 1967	Unofficial wind speeds from 100 – 115 mph along the cost.

November 1981	Strongest storm since, Columbus Day storm. Gusts of 92 mph.
December 1993	Winds of 107 knots recorded at Cape Blanco, 72 at Brookings, 64 at Gold Beach.
December 1995	Cape Blanco had gusts of over 100 mph resulting in 4 dead, and widespread damage.

CURRENT MITIGATION ACTIVITIES

Curry County Zoning Ordinances, Exhibit A; Flood Damage Prevention Ordinance

Section 3.250. Natural Hazard Overlay Zone.

Purpose of Classification. The purpose of the Natural Hazard (NH) zone is to provide for appropriate uses and project development in areas that have been identified in the Comprehensive Plan as being subject to various natural hazards and to apply review standards to all proposed development within the areas subject to natural hazards.

Section 3.251. Flood Plain

Portions of zones may be subject to flooding. Restrictions, conditions and regulations for the construction of buildings and uses of land lying in the flood plain zone are subject to the Flood Damage Prevention Ordinance of Curry County. The flood plain zones, as indicated on the Flood Plane Maps, are an official part of the County Zoning Maps. Flood Hazard Development Permits under the Flood Damage Prevention Ordinance are subject to administrative approval by the Director.

FLOOD DAMAGE PREVENTION ORDINANCE

Section 1.0

Statutory Authorization Findings of Fact, Purpose, and Objectives

1.1 Statutory Authorizations

The Legislature of the State of Oregon has in ORS 197.175 delegated the responsibility to local governmental units to adopt comprehensive plans and regulations to promote the public health,

safety, and general welfare of its citizenry with respect to flooding and other natural hazards under Statewide Planning Goals 7 and 18 and Building Codes Agency Order of Authorization B100A-455.040 dated March 22, 1990. Therefore, the Board of Commissioners of Curry County, Oregon does ordain as follows:

1.2 Findings of Fact

(1) The flood hazard areas of Curry County are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.

(2) These flood losses are caused by the cumulative effect of obstructions in areas of special flood hazards, which increase flood heights and velocities, and when inadequately anchored, damage uses in other areas. Development that is inadequately flood-proofed, elevated, or otherwise protected from flood damage also contributes to the flood loss.

1.3 Statement of Purpose

It is the purpose of this ordinance to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas by provisions designed:

(1) To protect human life and health;

(2) To minimize expenditure of public money and costly flood control projects;

(3) To minimize the need for emergency rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;

(4) To minimize prolonged business interruptions;

(5) To minimize damage to public facilities and utilities such as water mains, electric, telephone and sewer lines, streets, and bridges located in areas of special flood hazard;

(6) To help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood blight areas;

(7) To promote a policy that potential buyers are notified that property is in an area of special flood hazard and to discourage the victimization of uniformed land and home buyers;

(8) To prevent development which increases base flood heights that could increase flood damage and may result in conflicts or litigation between property owners;

(9) To make flood insurance available from FEMA at the lowest possible rates; and

(10) To promote a policy whereby those who occupy the areas of special flood hazard assume responsibility for their actions.

1.4 Methods of Reducing Flood Losses.

In order to accomplish its purposes, this ordinance includes methods and provisions for:

(1) Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards or which result in damaging increases in erosion or in flood heights or velocities;

(2) Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;

(3) Controlling the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;

(4) Controlling filling, grading, dredging, and other development which may increase flood damage; and

(5) Preventing or regulating the construction of flood barriers, which will unnaturally divert floodwaters or may increase flood hazards in other areas.

FLOOD AND WINTER STORM ACTION ITEMS

The intent of the flood and winter storm action items is to provide guidance and direction on specific activities that organizations, communities, special districts and residents can undertake as partners to reduce risk and prevent loss of life and property due to storm and flooding events. Each item identifies implementation strategies, which can be used by the steering committees and local decision-makers, to accomplish implementation.

Flooding & Winter Storm

Short Term #1: Review current County and City Building and Land Use Ordinances to assess current applicability, feasibility, and identify mitigation options.

Implementation:

- Identify appropriate and feasible mitigation activities for identified repetitive flood properties.
- Locate and identify 'non insured' repetitive loss properties and contact property owners to determine interest in mitigation activities.
- Contact insured repetitive loss property owners to discuss mitigation opportunities and determine interest should future project opportunities arise.
- Explore mitigation funding sources for assessments and any defined projects as a result of mitigation planning and project identification.

Coordinating Organization:	Hazard Mitigation Planning Committee Coos County Planning Department
Timeline:	1 – 2 Years
Plan Goals Addressed:	Protect Life and Property, Partnerships and Implementation

Flooding & Winter Storm #2

Short Term: **Analyze the Port Jetty's in Gold Beach and Brookings for stability and identify mitigation options.**

Implementation:

- Survey maintenance needs of Port Jetty's for stability.
- Explore alternatives for maintenance.
- Explore funding sources for work needed.

Coordinating Organization: Hazard Mitigation Planning Committee
Port of Gold Beach
Port of Brookings
Army Corp of Engineers

Timeline: 1-2 years

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

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Flooding & Winter Storm #3

Long Term: **Analyze alternatives for the repair of the dune breach at Garrison Lake.**

Implementation:

- Identify best possible measures to reroute or rebuild the dune at Garrison Lake.
- Explore alternative funding resources to facilitate any survey, proposal and mitigation activities.

Coordinating Organization: Hazard Mitigation Planning Committee
City of Port Orford
ODFW
DEQ
Confederated Tribes
Oregon Park Service
Army Corps of Engineers

Timeline: 1-2 years

Plan Goals Addressed: Protect Life and Property, Partnerships And Implementation, Natural Systems

3.3 LANDSLIDE

LANDSLIDE CHARACTERISTICS

In the broadest sense of the term, a landslide is a gravity driven process when soil and/or rock moves down a slope. The downslope movement may be triggered by a number of factors including earthquake shaking, volcanic eruption, blasting, wave or stream erosion, or intense rainfall. While the potential for landslide generally develops with increasing slope angle, the mechanics of a slope failure is a complex function. While landslides occur naturally, slope movement can be exacerbated by development activities. Increased run-off, man-made cuts into hillsides, shocks or vibrations from construction, vegetation removal by fires, timber harvesting, or land clearing, and the placement of non-engineered fill material can all lead to an increase in slope failures. The term 'landslide' is commonly applied to a variety of distinct types of events. Some of the different processes include:

- Rockfall – a relatively free fall of rocks that have become detached from cliffs and steep outcrops. Rockfalls are common along Oregon highways where roads are cut through bedrock.
- Rockslide – is the rapid downslope movement of rock material along a plane of separation within the bedrock. These slides can occur on relatively gentle slopes and cause serous damage.
- Slump – the downward splitting of a mass of rock and/or soil that moves more or less together as a block, or group of blocks.

Example of a slump fracture near Cape Blanco. (Photo by Terra Firma Geologic Service)

- Debris Flows – are rapidly moving landslides that typically travel long distances often within confined channels, and often involving significant amounts of water and mud. According to the ODF, debris flows can move faster than 35 miles per hour. The slides are most common in the Tyee geologic formation in Coos County, Curry County and in western Douglas and Lane counties.

Slope weakened by undercutting for a road, and demolished by a landslide.
(Photo by Terra Firma Geologic Services)

OTHER GEOLOGIC HAZARDS

Geologic Hazard Reports are sometimes required by county planning or building departments, however, they are not always required and it is important to realize why. The "Geologic Hazard Area" adopted by Curry County typically includes two general areas:

(1) A strip of land along the coast (of variable width) including beaches, dunes and sea cliffs.

(2) Hill-slope areas categorized in a regional study as having “slump earth-flow” topography in county wide studies by the Oregon Department of Geology and Mineral Industries (DOGAMI) in the mid-1970’s.

VULNERABILITY AND RISK

Many hill-slope areas within Curry County, which are not classified as having slump-earth-flow topography, have landslide or soil-related hazards. In fact, two particularly susceptible areas to landsliding in Curry County which have been subdivided for residential development are not within the Curry County’s geologic hazard area because they were not classified as having slump-earth-flow topography in a 1976 county-wide DOGAMI study. These include areas adjacent to part of Jerry’s Flat road near Gold Beach and the South Bank Chetco River Road several miles upriver from Brookings. Homes in both areas have been damaged by, natural or grading related landslides and some lots are considered economically not feasible for development. Why is this? The countywide, studies were done in the 1970’s and were reconnaissance in nature. The determination of slump-earth-flow topography was based on examination of aerial photographs and topographic maps. The findings of the study are shown on a topographic map with a scale of 1 inch =1 mile and the minimum area delineated is 20 acres. The report for Curry County actually states on their map legend that landslide hazard exist on all slopes greater than 30% but, for various geopolitical and economic reasons, these areas were not included in the Geologic Hazard Area adopted by Curry County in the mid 1980’s. The settlement and landsliding of fills related to improper grading of hill-slope lots has, probably caused more damage to homes than natural landslides have in this area. This is because there are very few controls on grading within the rural portions of southwest Oregon. Fills are rarely appropriately compacted and they are often too steep, and typically contain woody debris. Ground surfaces beneath the fills often were not cleared of topsoil, limbs and even stumps before the fill was “sidecast” or pushed over them by the bulldozer, particularly on the sites that were “roughed in” in the 1970’s and 1980’s. Many building sites used to be old log landings or wide spots on logging roads and

were never intended to have structures built on them. Cut slopes are often constructed too steep for long term stability and can either erode or fail. Damage related to cut-slope failure and erosion is more common on driveways and roads than on building pads. Architects or engineers typically ask for a soil report to design foundations and retaining walls. The “soils report” typically provides relevant information about the properties of the soil beneath a building site such as allowable bearing capacity, expansion potential, drainage characteristics of the soil etc. A problem with traditional soil investigations is that the investigator can dwell on the details of the soil, and not be aware of a much larger issue. The fact that the building site may be located on a large landslide or be at risk of being impacted by a slope failure, is a common problem of investigations done by “geotechnical engineers” or “soils engineers” who have specific training in soil mechanics. Slope stability analysis and foundation design analysis can be in the forefront of an investigation and block the ability to “read the ground” and interpret the process responsible for shaping the landscape that the building site is located on. This is particularly relevant on many of the moderately sloping areas in Curry County that are underlain by mudstones or serpentine. Because of this problem it is important for an appropriately trained engineering geologist to either conduct the soils investigation or actively participate in it.

Clear-cut Logging

After more than 30 years, and a hundred research studies, scientists are still trying to answer a fairly straightforward question: does clear-cut timber harvesting cause landslides? While it may seem odd that a conclusive answer has not been reached, the issue of causation is not as clear-cut as, some of the ground being studied.

Since the landslides of November 1996, the pitched battle has moved to a new front: the threat clear-cutting poses to public safety. Landslides originating in recent clear-cuts have demolished homes, covered roads, and killed people. A ballot initiative to ban clear-cutting finds this to be sufficient evidence to convict clear-cutting of “causing landslides”. Yet landslides have been occurring for

hundreds and probably thousands of years in Oregon, before clear-cutting, or any sort of timber harvest was widespread. Tim Hermach, director of Native Forest Council, cites the results of three studies and declares with no ambiguity that “the problem is not ‘landslide-producing storms’, but landslide-producing logging”. On the other hand, State Forester James Brown claims that “earlier studies . . . don’t provide us with complete answers”. What do the studies say? Scientists have studied the causes of landslides since the, mid 1960’s. Nearly every research study indicates that clear-cut timber harvesting increases the likelihood of landsliding on steep and unstable hillsides (from two to 31 times) and the erosion caused by landsliding (from two to 41 times), compared with uncut forests. The first study to identify timber, harvesting effects on landslide rates was done in 1949 in Utah. Two U.S. Forest Service research scientists, Croft and Adams, found that heavy rains and snowmelt initiated landslides, but they also thought that timber cutting and slash burning contributed to reducing the stability of the hillsides. In the 1960’s, after easy-to-log areas had already been harvested and steeper and more, unstable sites began to be logged, concern arose about logging impact on soil erosion. In 1972 the Forest Service initiated the Interstation Soil Mass Movement Research Program, to focus on the “causes, effects, prevention, and impacts of soil movement”. Corvallis, Oregon is home to one of the three stations in the program. C.T. Dyrness, a Forest Service soil scientist working at the Corvallis research station, and Fred Swanson, a Forest Service geologist then at the University of Oregon, examined air photos and on-the-ground studies of the western Cascades in 1975. In their oft-cited paper, they noted that landslides occurred three times more frequently in clear-cuts, and carried roughly three times as much debris. Notable, however, is that all of this soil movement happened in an “unstable zone”, a lower elevation area with older unstable soils. Perhaps the most compelling paper of this era was a catalog of 43 landslide inventories prepared by George Ice for the National Council of the Paper Industry for Air and Stream Improvement. The paper concluded that, “the increase in mass soil movement due to clear-cutting varied widely, ranging from 2-4 times in Oregon and Washington”. At a 1984 workshop on slope stability and forest management,

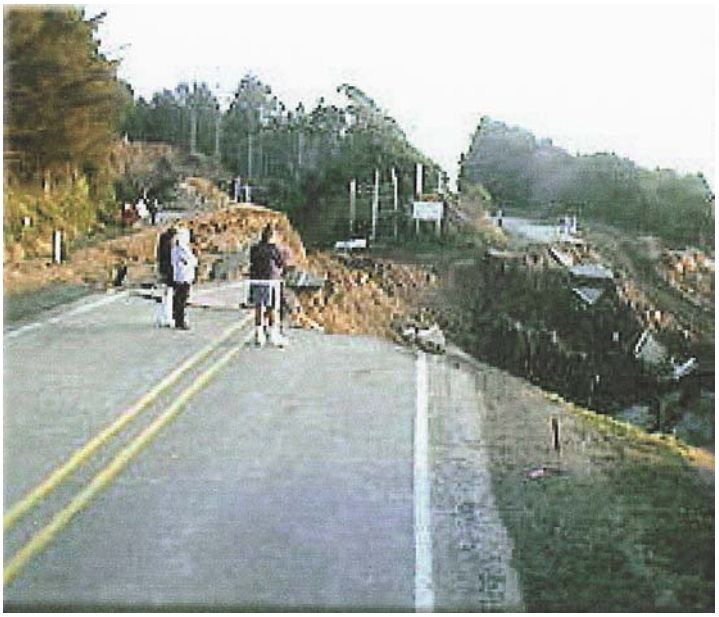
F. Dale Robertson, then associate chief of the U.S. Forest Service, declared what was becoming a common understanding among forest land managers: “We should understand that now and then our activities will accelerate or trigger soil movement”. The landslide issue quieted for more than a decade as the weather in Oregon hit a lull. From 1981 to 1996, storms were mild and did not cause significant landsliding. In February 1996, the most intense storm since 1964 hit the Oregon Coast Range. In the wake of the February floods, interested groups commenced a flurry of studies.

The Association of Forest Service Employees for Environmental Ethics (AFSEEE), an environmental group based in Eugene, flew over the Mapleton Ranger District. They found that 62 percent of the slides they saw originated in clear-cuts compared with only two percent of slides occurring in the forest. The remainder, were road-related. Pacific Watershed Associates, a geological consulting firm from Arcata, California, performed their own aerial survey over large areas of the coast Range and the Cascades. Their findings corroborate AFSEEE’s Study: 71% of located slides were in recent clearcuts, compared with 6% in uncut forest. Suislaw National Forest staff conducted their own fly-over survey and found similar patterns of occurrence. Meanwhile, in early February, the Oregon Department of Forestry (ODF) began its own massive study in conjunction with OSU, Oregon Department of Fish and Wildlife, and the Oregon Department of Transportation. Like the other studies, research began with aerial observation. Unlike the other aerial surveys, ODF researchers followed up on the photos by walking all the creeks in the study areas. Leslie Lehmann, executive director of the Oregon Forest Research Institute, says the study is “really important”, particularly because it is the first major study to analyze the effectiveness of recent amendments to the Forest Practices Act. In other words, the ODF study will test whether the present rules are sufficient to protect forest health and public safety from landslides.

The preliminary results, according to Keith Mills, the ODF geotechnical engineer in charge of the forest practices section of the study, indicate that “there can be, on the steepest slopes, an increase in landslide risk in the first ten years”

after clear-cutting. The studies performed in the wake of the 1996 flooding have revived the idea that logging causes landslides. Three of the four studies show a much greater incidence of landslides in clear-cut areas compared with forested areas, while one indicates a meager increase. The consensus appears to be complete; even members of the timber industry agree that forest practices can increase the risk of landslides. Nobody's going to deny that during the first ten years after harvesting, you do have a greater risk of landsliding", says Rex Storm, forest policy analyst with Associated Oregon Loggers.

After 30 years of landslide research, scientists still don't know the precise causes of landslides or what role, if any, timber harvesting, plays. As Marvin Pyles puts it, "The earth doesn't cooperate in our statistical studies". The complex interactions of water, rock, soil, and vegetation elude science's full understanding. (FEMA)



Whether in natural or altered sloped, earth movement can be destructive when people or structures are involved. Nationally, ground failures account for 25 to 50 deaths annually and approximately $1.5 billion in economic losses, more than all other natural disasters combined (National Research Council as cited in Bell, 1999). The Pacific Northwest, with its wet climate and topographic relief, is one of the more prolific portions of the nation for slope failures. As Oregon's population continues to increase, and areas previously considered unsafe for

building undergo development, the problem is often exacerbated. Agricultural irrigation and forestry practices, such as clear-cutting and stripping natural vegetation from naturally oversteepened slopes have been shown to be responsible for a spate of landslides. Highway construction on similar slope conditions awaits only the first good rain to provoke earth movement.

HISTORIC LANDSLIDE EVENTS

A large landslide in Tillamook County blocked 600 feet of Highway 6 on Aril 4, 1991, with 500,000 cubic yards of rock and soil partly damming the Wilson River. This highway has been closed annually by mudslides or rock-falls, and the 1991 episode took nearly two months for debris removal at a cost exceeding $2 million. The slide occurred when soils on the steep slope became saturated from nine inches of winter rain in two days. Cracks appeared along the upper planar slide and permitted infiltration of runoff to saturate soils. The soil liquefied immediately before movement. When the event took place, the slide was being monitored, and an attempt was being made to drain the slide block. A similar long-standing problem exists in Curry County, where a section of coastal Highway 101 is periodically closed by landslides. Sliding began in 1939, when the roadway was newly constructed, and is still ongoing. In response to heavy rainfall, a debris flow took place on March 23, 1993, and blocked the highway for two weeks until a bypass was constructed. A number of measures had been tried over the years to control the slide, including drains and re-grading the surface, but none were effective. More recently, increased knowledge of landslide behavior prompted the installation of a horizontal drainage system, which was about to decrease dramatically the amount of movement during the stormy winter of 1996. (Oregon Department of Land Conservation and Development)

The Oregon storm events of 1996 and early 1997 were particularly damaging. Three significant storms occurred during that time period, each causing widespread slope failures throughout Oregon. The three events that each received a “Major Presidential disaster Declaration” occurred in February 1996,

November 1996 and late December 1996 to early January 1997. The February 1996 storm impacted most of the western and northern portions of the state. The November storm originated offshore and swept primarily through Coos, Douglas, and Lane Counties. The late 1996 and early 1997 storms heavily hit the Curry County and Coos County portions as well as the northeastern counties. Each of these storms produced near record rainfall, which triggered extensive landslide activity throughout the impact areas. The damage to natural resources and infrastructure resulting from these three storm events was extreme. A preliminary estimate for the February 1996 event alone was $280 million in total damage (FEMA 1996a, p.12). Landslides are not separated from total flood damage in these estimates, but the percentage directly related to slide activity is believed to be significant.

How large was the toll to human life in the Oregon winter of 1996-97? It was costly. Near Roseburg, OR, four neighbors died when one of their houses was hit by a torrent of boulders, logging slash, uprooted trees and mud from a nine-year-old clearcut on an 80% slope. Said a survivor, “That home exploded, like a bomb had gone off”. Three motorists were knocked off Oregon Highway 38 by a muddy avalanche; one of them died. A woman and her two children drowned when their car was hit by a tractor-trailer trying to avoid a slide. In the town of Myrtle Creek, five homes were knocked off their foundations when a clearcut gave way, shifting tons of wet earth.

In December of 1998, driving rain and melting snow again triggered floods and mudslides. A landslide brought down about 200 trees and covered a, 150 foot section of Highway 34, five miles east of Alsea, with 10 feet of mud. The slide crushed a house, but residents managed to escape to safety.

The records of damage from these events are incomplete. A statement from DOGAMI regarding a project to collect and consolidate data on the 1996-‘97 events offers this comment: “While we did our best to gather as much information as possible within the timeline of the project, we knew from the onset that we would be unable to collect information on all slides that occurred during the 1996 and 1997 time period”. The database contains 9095 total landslide entries.

Several barriers prohibit obtaining comprehensive information. Many slides that occurred throughout the state were not recorded by anyone. And in some of the heavier hit areas, the barrier to data collection was more related to the scale of the occurrences; there were simply too many slides to enable recording in a comprehensive manner. Although information was solicited form both public and private sources, the contributions were mostly entirely from public sources. For a number of reasons, private landowners were reluctant to provide information. In many cases this reluctance is quite understandable, but it is obviously unfortunate for the purposes of this project. Many individuals and agencies did contribute data, though, and it is noteworthy that such a large number of slides associated with these storms occurred statewide".

The impetus for developing this database, is a desire to better document the magnitude and distribution of landslide occurrences throughout Oregon. Funding for the project was awarded to the Oregon Department of Geology and Minerals Industries (DOGAMI) through a competitive bidding process by the Federal Emergency Management Agency (FEMA). The resulting inventory provides both technical and non-technical users with readily accessible data for exploring landslide issues. It is hoped that this data will lead to a greater understanding of regional landslide issues, and assist government and community agencies in devising means to minimize the threat to public safety and property that landslides pose.

COMMUNITY ISSUES

One of the first steps in effective landslide mitigation can be accomplished by properly identifying hazardous locations. Oregon Department of Forestry and the Department of Geology and Mineral Industries (DOGAMI) are currently developing maps and collecting data on hazard risk. This endeavor will establish a process to evaluate particularly vulnerable areas and help prevent future loss. Data collected in "Special Paper 34: Slope Failures in Oregon; GIS Inventory For Three Storm Events – 1996 – 1997, provides a visual of these hazards in Curry County.

Landslide Distribution of the 9,582 database entries throughout the state, DOGAMI, 2000. The data shown is specific to Curry County, Region 3.

	TOTAL COST TO DATE FOR ALL EXISTING LANDSLIDES IN REGIONS 1, 2 and 3			
	LANDSLIDES (Severe Cost or Hazard) **$1000s**	LANDSLIDES (Medium to Low Hazard) **$1000s**	ROCKFALLS A RATED **$1000s**	ROCKFALLS B RATED **$1000s**
Region 1	38,100	28,500	40,600	105,600
Region 2	5,100	26,690	7,730	4,550
Region 3	47,000	45,000	75,000	100,000
TOTAL	90,200	100,190	123,330	210,150

ODOT – Cost to date (1999) are the values only for State Highways, and road right of ways.

In looking at this data distribution of documented landslide events during this storm period, it is clear that the concentration of data points to higher hazard areas to the north and east of Curry County. However in studying the data it can be determined that the total monies spent in repair for these storms was clearly spent in Region 3 which encompasses Coos and Curry County's.

Quantitative vulnerability assessments are often inaccurate due to the fact that in many rural areas some residents do not report natural hazard incidents. The concept of autonomy is practiced and residents deal with, and work around naturally occurring damage as best they can. The impact to these residents and surrounding areas will probably never be known. Conversely, more urban communities are greatly impacted by landslide-prone areas. These areas commonly cause damage and hardship when landslides effect major transportation arteries, blocking residents from essential services and businesses. More rural communities have been isolated due to landslide activity, which has destroyed the only access route into or out of the area.

Critical Infrastructures

While each community has its own issues specific to slide-prone areas, in general, landslides can effect any community's infrastructure and often does. Landslides often cause immediate damage and loss of service and can cause a disruption of critical services, access to roads and critical facilities and have a long term, effect on the economy. Utilities critical to service community needs including potable water, wastewater, telecommunications, electrical services can be disrupted. Critical facilities and lifelines need to remain accessible during a natural hazard event of any kind. The impact of a closed transportation artery is exacerbated when it leads to hospitals or other emergency facilities. Long term interruptions of power and phone capabilities resulting from loss of soil support beneath a high voltage transmission towers or a buried communications cable can create a huge impact on everyone. Inspection and repair of critical transportation routes is essential and should receive high priority.

Roads and Bridges

The largest losses incurred from landslide hazards in Curry County have been associated with roads. The Curry County Roads Division is responsible for responding to slides that inhibit the flow of traffic on county roadways or are damaging a road or bridge. The major highway that falls under the authority of Oregon Department of Transportation where repair is concerned, is U.S. Highway 101. U.S. Highway 101 must be repaired on a yearly basis due to slides. In some areas of Curry County the slide has become such an annual nightmare that ODOT has named the slide. In this case the 'Arizona Slide' has put a tremendous drain on the mitigation pocket book with its history of continual movement and essential repair as a critical section of Highway 101.

It is not cost effective to mitigate all slides due to limited funds and resources, and the fact that in many cases the vulnerable area is still moving. The Curry County Roads Division alleviates problem areas by grading slides, installing new or improving existing drainage systems on slopes to divert water.

CURRENT MITIGATION ACTIVITIES

DEVELOPMENT IN GEOLOGIC HAZARD AREAS

Curry County Zoning Ordinances

Curry County Zoning Ordinance provides hazard specific, pre-disaster mitigation efforts in the following ordinances. These ordinances are specific to landslide as well as seismically active areas.

Section 3.252. Development in Areas of Geologic Hazards.

Those areas identified as being "earthflow and slump topography", of the Natural Hazards Inventory Map of the Curry County Comprehensive Plan, shall be subject to the following requirements at such time as a proposal is submitted to the Director for the development of such land under a development permit or land division.

1. An investigative report shall be prepared by a geologist or engineering geologist licensed in the State of Oregon at the applicants' expense. The report shall contain the following information.
    a) A map of the subject property which shows the following:
        i) the location of the proposed structure or use;
        ii) the geological formation present at the property or site;
        iii) the location of all significant geological features such as faults, folds, etc.; and
        iv) the location of, all identified geological or topographical, features related to earth movement or geological instability.
    b) A report which describes the following:
        i) the geological features on the subject property or at the site;

ii) all features related to earth movement or geological instability on the subject property or at the site;

iii) the results of all engineering tests performed on soils, subsurface data from drill holes, or other data obtained from the site investigation;

iv) whether the proposed development can be safety sited on the subject property are at the site in view of all geological hazards that have been identified in the site investigation; and

v) a clear statement of all requirements or conditions on the proposed development that the geologist has determined are necessary to mitigate the geological hazards that have been identified in the site investigation.

2. The applicant shall use the geologist's report to provide a plan that adequately addresses the issues identified in the report and protects the proposed development and surrounding lands from natural hazards to any geological instability.

3. The Director shall provide notices required for an Administrative Decision to all affected parties regarding the proposed development in a natural hazard area. The Director shall consider the applicant's geological site investigation report, proposed plan and any response from affected parties.

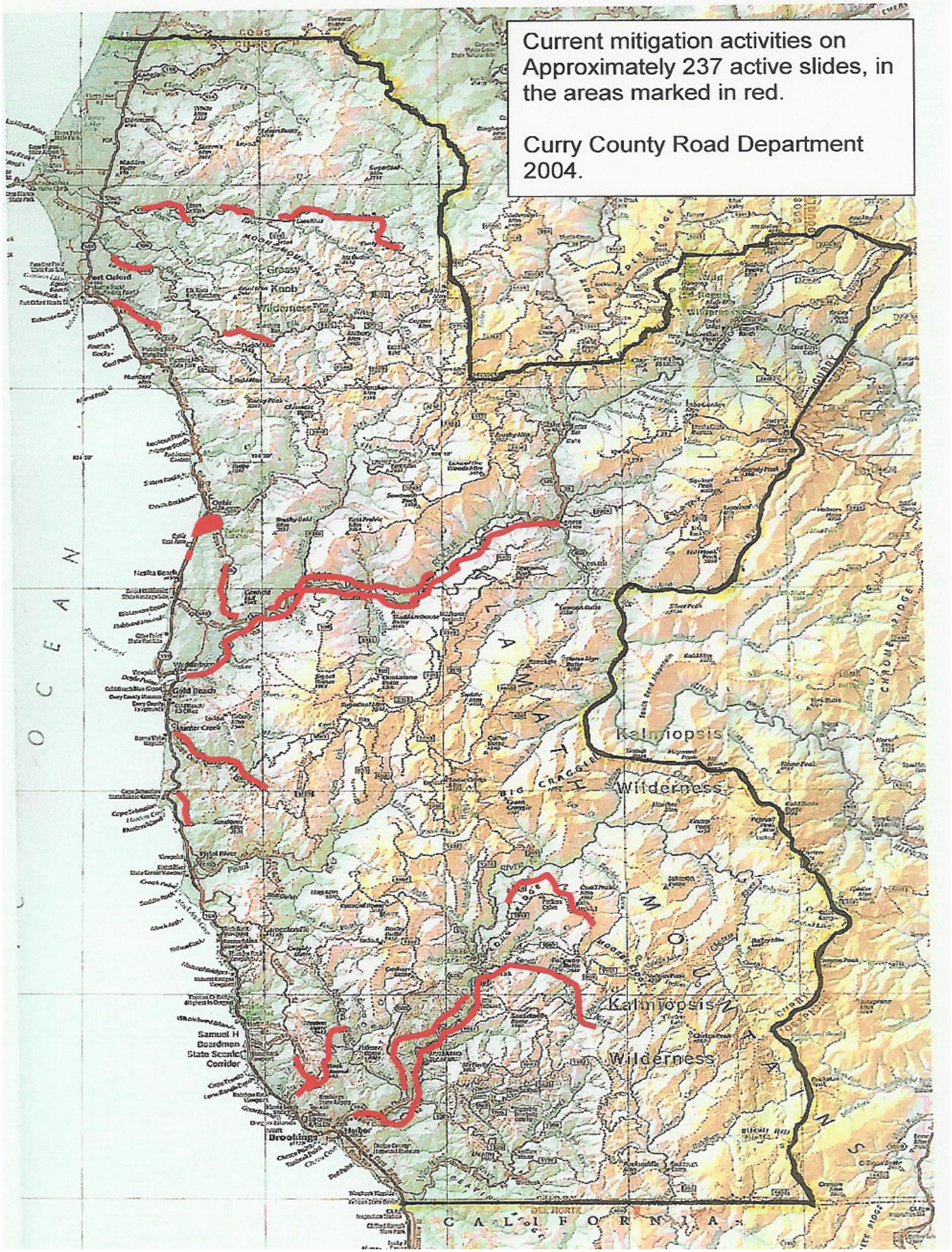
4. If the geological stability of the site is challenged by an appellant of the land use action, the county shall investigate by hiring an independent Oregon Certified Engineering Geologist who has experience with the contested issue. The cost of the investigation by the independent geologist is to be paid equally by the applicant and the appellant. If the county finds a possible new geological hazard that has not been mapped, the county shall then require that a Certified Engineering Geologist be hired by the county to investigate

the subject site and report on the nature of the hazard and its possible impact to the proposed use and surrounding properties. The cost of this geological hazard investigation is to be paid by the applicant.

Section 3.252. Development in Stabilized Dune Areas.

Uses proposed in those areas identified as being stabilized dunes on the "Coastal Shorelands" inventory map of the Curry County Comprehensive Plan shall be approved as an administrative decision by the Director subject to the following requirements:

1. A site investigation report shall be prepared at the applicant's expense, containing the following information:
   a) Location of the proposed use and the area affected.
   b) Types of dune form present.
   c) Existing vegetation and vegetation to be removed.
   d) A revegetation plan or other method of erosion control.
   e) Proposed grading or fill.
   f) Areas subject to wind erosion and sand accretion.
   g) A determination that measures have been taken to protect the ground water from draw-down which lead to loss of stabilizing vegetation, loss of water quality or intrusion of salt water into water supplies.
   h) A plan that adequately addresses the factors identified above and which protects the proposed development and surrounding lands.
2. The Director will use the content of the developer's report to impose conditions as part of the administrative decision which will control erosion, protect against dune erosion, sand accretion, or other hazards, protect groundwater supply and quality and protect the surrounding area from adverse effects of the proposed development.


Current mitigation activities on Approximately 237 active slides, in the areas marked in red.
Curry County Road Department 2004.
Grassy Knob Wilderness
Kalmiopsis Wilderness
Kalmiopsis Wilderness
Samuel H Boardman State Scenic Corridor
Gold Beach
Brookings
Harbor
Port Orford
OCEAN
CALIFORNIA

LANDSLIDE MITIGATION ACTION ITEMS

Landslide mitigation action items provide direction on specific activities that cities, organizations, private concerns and residents in Curry County can undertake to reduce risk and prevent loss form landslide events. Each action item addresses specific areas which by their nature, are priorities for the stakeholders involved. The steering committee and local decision-makers, to assist in developing strategies for mitigation can use implementation actions.

LANDSLIDE #1
Short Term: **Identify and map high risk slide areas to create an accurate logistical assessment.**

Implementation:

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

Coordinating Organization: Hazard Mitigation Planning Committee
Curry County Roads Department
Oregon Department of Transportation
Private Industry (logging)

Timeline: 1-2 Years

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

LANDSLIDE

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

Implementation:

- Explore ditching possibilities in high impact areas where reoccurring slides create a continual hazard to residents and roadways.
- Reassess geo-hazard areas for stabilization priorities and possibilities.
- Develop engineering studies of chronic slide areas for mitigation strategies.
- Explore funding sources for geo studies and assessments.
- Explore funding sources for required equipment and materials for repair of slide damage.

Coordinating Organization: Hazard Mitigation Planning Committee, Curry County Roads Department Oregon Department of Transportation Private Industry (logging)

Timeline: 1-2 Years

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

3.4 EARTHQUAKE & TSUNAMI

CHARACTERISTICS OF EARTHQUAKES

Oregon ranks third nationally for potential earthquake losses, which are projected to exceed $12 billion in the case of a major event in the Cascadia Subduction Zone (CSZ). The February 28, 2001 magnitude 6.8 Nisqually earthquake served as a reminder of Oregon's vulnerability to earthquakes.

Scientists recently discovered strong evidence that great earthquakes (or magnitude 8 to 9) have repeatedly struck the Pacific Northwest in the past several thousand years. This discovery has spurred the reinforcement of existing structures and changes in building codes in the region – measures that will help save lives and reduce damage in future earthquakes.

Such increased efforts to reduce future earthquake losses did not seem necessary until 1980. Until then, the recognized threat was limited to earthquakes of about magnitude 7. In the 1980's, scientists discovered that great earthquakes that would release 30 to 1,000 times the energy of a magnitude 7 threaten the Pacific Northwest. The study supports previous research that earthquakes and tsunamis from the Cascadia Subduction Zone have repeatedly rocked the northwest coast from Vancouver Island to Northern California.

The Pacific Northwest is an area of complex tectonic plates, including the Juan de Fuca Ridge, Blanco Fracture Zone, Gorda Ridge, and Mendocino Fracture Zone (Mendocino Triple Junction). Evidence indicates that the tectonic plates repeatedly lock up as they grind past each other, resulting in tremendous strain that is unleashed in magnitude 8 and 9 earthquakes.

The Cascadia Subduction Zone (CSZ) is the most dangerous fault in Oregon, and one of the most dangerous faults in the United States. Similar subduction zones have produced the planet's two largest recorded earthquakes a magnitude 9.5 on the coast of Chile in 1960 and a magnitude 9.2 in southern Alaska in 1964.

Off the Northwest Coast, the small Juan De Fuca Plate is slowly moving eastward beneath a much larger plate that includes the North American continent. The movement of the Juan de Fuca Plate beneath the North American Plate is in many respects similar to the movement of plates in south America, Mexico, Japan,

and Alaska, where the world's largest earthquakes occur. An earthquake here could have a magnitude of 8.5 or 9. The event might last as long as four minutes. Within minutes, a tsunami would follow.

The last giant earthquake, an estimated magnitude 9, hammered the northwest 300 years ago. Radiocarbon dates of organic material from marsh deposits preserved beneath the Coquille River estuary found that massive earthquakes have occurred on average every 570 to 590 years. However, the intervals between earthquakes were irregular – as short as a few hundred years and as long as more than 1,000 years, making it very difficult to determine when a quake might occur. The Geological Society of America has reported evidence of eleven large tsunami-producing earthquakes in the past 5,500 years, in the Sixes River estuary near Cape Blanco, about 20 miles south of Bandon.

The so-called "megathrust" subduction zone earthquakes, which can last for three to five minutes, have not occurred in Oregon's brief recorded history. However, evidence from other studies has shown abruptly buried coastal marshes and forests along the coast, signs of such quakes. Brian Atwater, a geologist with the U.S. Geological Survey at University of Washington, called the Coquille Estuary study "a benchmark" that will add to the knowledge of discussions about the sizes and impacts of Cascadia earthquakes.

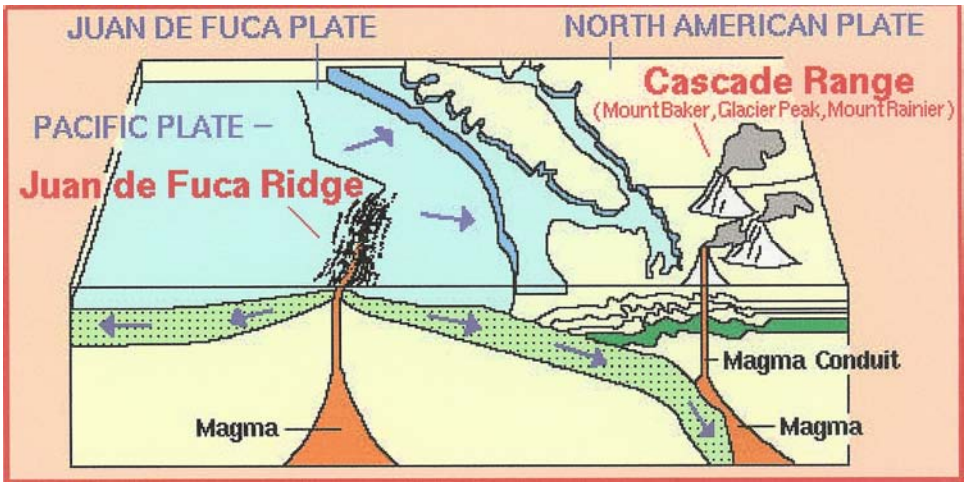
Three well-defined spreading centers lie off the West Coast of North America: the Gorda Ridge, the Juan de Fuca Ridge, and the Explorer Ridge.

The boundary between the Pacific and Juan de Fuca Plate is marked by, a broad submarine chain about 300 miles long, known as the Juan de Fuca Ridge. Since the late 1970's, the Gorda and Juan de Fuca ridges have been extensively mapped and sampled. Largely because these ridges are close to major oceanographic research facilities, numerous important discoveries have been made in the Northeastern Pacific. These include the discovery of giant hydrothermal plumes and the detection of the first deep-sea volcanic eruption. Young volcanoes, lava flows, and hot -springs were discovered in a broad valley along the crest of the ridge in the 1970's. The ocean floor is spreading apart and forming new ocean crust in this valley of "rift" as hot magma from the Earth's

interior is injected into the ridge and erupted at its top. Axial volcano rises 700 meters above the mean level of the Juan de Fuca Ridge crest and is currently the most magmatically robust and seismically active site. Other volcanic activity is being tracked and recorded on Gorda Ridge, to the south, and the site of CoAxial, a short distance to the north.

Beginning at 0700 GMT on February 28, 1996, intense seismicity was detected on the northeast Pacific Ocean. The current event is located on the northernmost segment of the Gorda Ridge near 42º 40'W and 126º 48'W. The nature of the seismicity is very similar to that observed in June 1993 at the CoAxial Segment of the Juan de Fuca Ridge, which was later documented to be a lateral magma injection with subsequent eruption.

On April 10, 2002, the distant sound of an undersea eruption had geologists scrambling to explore the waters off Northern California and Southern Oregon for signs of the volcanic activity. Using recordings from the Navy's Sound Surveillance System hydrophones, scientists with the National Oceanic and Atmospheric Administration (NOAA) have zeroed in on the rumbling of magma, or lava, as it moves close to the sea floor surface and is erupting.



In 1989, when a magnitude 7.1 earthquake struck Northern California during the broadcast of the World Series, much of the nation was watching on television. Northwesterners, like many other Americans, were disturbed by the

scenes of damage, and wondered if a similar disaster could strike them. The chart below shows that indeed it could.

The potential for earthquake damage along Oregon's coastline cannot be overlooked. Revision of the Uniform building code is an important first step toward meeting the great-earthquake threat in the Pacific Northwest.

Significant Earthquakes in the Pacific Northwest

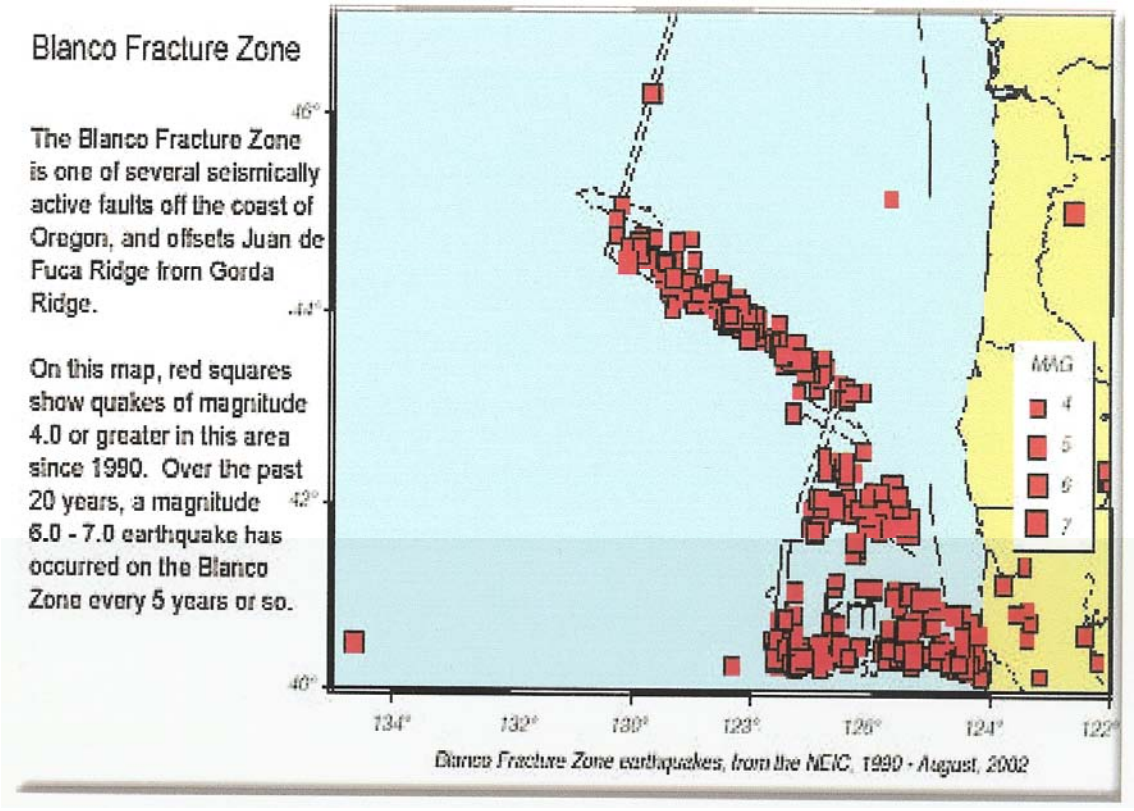
DATE	LOCATION	MAG.	DEATHS/DAMAGE/NOTES
11/23/1873	Brookings	7.3	Felt as far away as Portland
10/12/1877	Portland	6.7	Unknown
2/3/1892	Portland	?	A severe shock sent buildings swaying and terrified people.
12/6/1918	Vancouver Island BC	7.0	
1/31/1922	Cape Mendocino, CA	7.3	
1/22/1923	Cape Mendocino, CA	7.2	
11/10/1938	Shumagin Islands, AK	8.2	
4/13/1949	Olympia, WA	7.1	8 dead, $150 Million widespread damage in Oregon
8/20/1952	Off shore Coos Bay, OR	8.0	
3/9/1957	Andreanof Island, AK	9.1	
11/5/1962	Portland/Vancouver	5.5	Shaking lasted up to 30 seconds
4/29/1965	Seattle-Tacoma, WA	6.5	7 dean / $50 million damage
11/8/1980	Off Oregon Coast	7.4	
11/3/1981	Off Oregon Coast	6.2	
5/7/1986	Andreanof Islands, AK	8.0	
712/1991	70 miles off Oregon coast	6.6	
4/25/1992	Cape Mendocino, CA	7.2	Subduction quake at the Triple Junction,
9/20/1993	Klamath Falls, OR	6.0	2 dead / $10 million in damage
9/1/1994	Cape Mendocino, CA	7.1	
4/11/2000	Kodiak Island, AK	6.7	
2/38/2001	Olympia, WA	6.8	$2 Billion in damage
11/3/2002	Central, AK	7.9	
1/16/2003	Off Oregon Coast	6.2	
6/23/2003	Aleutian Islands, AK	7.0	
11/17/2003	Aleutian Islands, AK	7.8	

Tsunami damages are not included in the estimates for a megathrust earthquake in the following chart, and would dramatically increase losses for coastal

communities. If the entire fault ruptures, destruction would occur from Northern California to Canada. (DOGAMI, Special Paper 29, 1999)

ESTIMATED LOSSES ASSOCIATED WITH A MAGNITUDE 8.5 SUBDUCTION EVENT

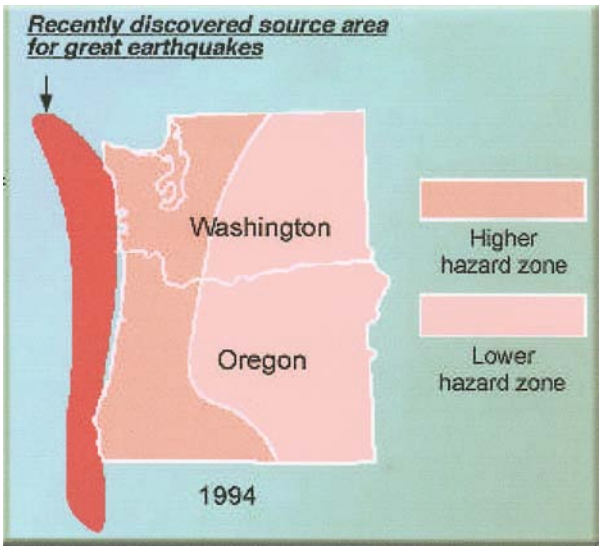
COUNTY	CURRY	COOS	LANE	CLATSOP
INJURIES	221	854	1,036	298
DEATHS	3	16	19	6
DISPLACED HOUSEHOLDS	430	2,069	2,345	788
ECONOMIC LOSSES FOR BUILDINGS	$328 MILLION	$1.4 BILLION	$4 BILLION	$760 MILLION
IN MILLIONS – ECONOMIC LOSSES TO:				
HIGHWAYS	$48	$44	$38	$18
AIRPORTS	$11	$20	$11	$5
COMMUNICATIONS	$18	$20	$11	$6
IN THOUSANDS OF TONS: DEBRIS GENERATED	267	853	1,341	383



The Loma Prieta, Northridge, Portland, Klamath Falls, Olympia quakes, in the past 15 years have been small in comparison to the potential of a giant earthquake, and yet they have cost hundreds of lives and billions of dollars in damage. The years 1990 to 2000 saw the highest level of regional earthquake activity in the 20th century. Nine earthquakes of magnitude 6 or larger have struck the coastal and offshore areas. Seven of those quakes were close enough to coastal communities to cause significant damage.

After the Good Friday earthquake in Alaska, Coos Bay experienced a 3.5 meter-run-up from the tsunami it generated. The 200 foot long, Elk Creek Bridge at Cannon Beach was completely destroyed, and 12 people in Crescent City, California died when the same tsunami inundated a 30-block area of the town.

Curry County is rated 'high' for both vulnerability and probability of earthquake damage (Oregon Emergency Management, 2003) within a 10 year period. When or where the next big earthquake will strike cannot be predicted. However, with several seismically active faults and two active volcanic areas in close proximity to the Oregon coast, the potential for large or extremely destructive earthquakes or earthquake generated tsunamis cannot be overlooked or taken lightly.



This map shows two zones of earthquake shaking hazard, as well as the recently discovered area of high coastal hazard. The (middle) zone of higher hazard is the second-highest level nationwide.

This expansion of the higher hazard zone on the 1994 version of the map was driven largely by the discovery of evidence that great earthquakes have repeatedly struck the Pacific Northwest in the recent geologic past.

CHARACTERISTICS OF TSUNAMI

The Oregon coast has a justly deserved reputation for its spectacular scenery. Because the coastline lies along the border of a complex tectonic junction, it is a zone of great instability and vulnerability as well as great beauty. The area is prone to the chronic hazards of erosion, landslides, high winds, rain and lowland flooding from winter storm surges. It is the nature of the Pacific Coast to be in a state of constant change. However, there are also catastrophic hazards associated with this coastline.

The eastward moving Juan de Fuca tectonic plate dives under the westward moving North American Plate just off the coast at the Cascadia Subduction Zone. Powerful earthquakes of up to magnitude 7.0 or greater can take place on either the North American or Juan de Fuca Plates. The Cascadia Subduction Zone, however, is capable of generating much larger earthquakes – up to and above a magnitude 9; thousands of times stronger than a magnitude 7.

In the past century, several damaging tsunamis have struck the Pacific Northwest coast (Northern California, Oregon and Washington). All of these tsunamis were distant tsunamis generated from earthquakes located far across the Pacific Basin, and are distinguished from tsunamis generated by earthquakes near the coast termed local tsunamis. Earthquakes along the fault that is the contact between the two plates termed the interplate thrust or megathrust, may generate significant local tsunamis in the Pacific Northwest. Except for the 1992 Cape Mendocino earthquake at the southernmost part of the subduction zone, there have been no major earthquakes on the megathrust in historic time, although a 6.0 to 7.0, quake, occurs on the Blanco Fracture Zone roughly every 5 years or so. Does this mean that the two plates are sliding past each other without generating large earthquakes? This would make the Cascadia subduction zone unlike most other subduction zones around the world. Rather, geologic evidence is accumulating that the Cascadia subduction zone is poised between major earthquakes. Therefore, the possibility exists that local tsunamis may someday accompany a major earthquake along the Cascadia megathrust.

Tsunamis commonly called seismic sea waves, or incorrectly, tidal waves have been responsible for at least 470 fatalities and several hundred million dollars in property damage in the United States and its territories. A tsunami is a series of sea waves usually caused by a rapid vertical movement along a break in the Earth's crust (i.e., their origin is tectonic). A tsunami is generated when a large mass of earth on the bottom of the ocean drops or rises, thereby displacing the column of water directly above it. This type of displacement commonly occurs in large subduction zones, where the collision of two tectonic plates causes the oceanic plate to dip beneath the continental plate to form deep ocean trenches. The waves travel at speeds up to 600 miles per hour, sometimes crossing the entire Pacific Ocean. As tsunamis enter shallow water near land, they increase in height and can cause great loss of life and property damage where they come ashore.

Major tsunami events are somewhat rare. Major tsunamis generally occur in the Pacific Ocean region only about once per decade. Therefore, it is important to learn as much as possible form the relatively short history available. Although there are warning systems for tsunamis occurring around the Pacific, including local and regional warning systems in Hawaii and Alaska, the risks from future tsunamis are still not fully known. Some events, such as that in Prince William Sound, Alaska, in March 1964, can be devastating over large distances. Even over short distances along a cost, the heights of a tsunami wave will vary considerably.

Submarine eruptions may also cause minor tsunamis. However, it is tectonic earthquake generated tsunamis (those produced by a major deformation of Earth's crust) that may affect the entire Pacific Basin. It is also observed that long-period tsunamis are generated by large magnitude earthquakes associated with seafloor deformation of the continental shelf while, shorter period tsunamis are generated by smaller magnitude earthquakes associated with seafloor deformation in deeper water beyond the continental shelf. Once the energy from an undersea disturbance has been transmitted to the column of water, the wave can propagate outward from the source at a speed of more than 1,000 km per

hour depending on the depth of the water. Because the height of the long-period waves in the open ocean is commonly 1 meter or less, and their wavelength is hundreds of kilometers, they pass unnoticed by observers in ships or planes in the velocity of its waves is reduced, and the height of each wave increases. The waves pile up on shore especially in the region of the earthquake source, producing a “local tsunami”. Some dramatic examples of such local tsunamis include those generated by landslides or by volcanic eruptions, which have caused “runup” heights of 30 to 50 meters in some coastal areas. If the energy produced by the generating disturbance is sufficiently large, such as that released by a major deformation of the crust in a trench area, the resulting tsunami wave may cross the open ocean and emerge as a destructive wave many thousands of kilometers from its source.

Because the speed of the tsunami depends on the depth of the ocean, the wavelength is shortened the energy within each wave is crowded into progressively less water, increasing the height of the wave. The tsunami may increase in height from 1 meter in the open ocean to more than 20 meters during runup. Also, if underwater ridges are present, they may act as collecting lenses and further intensify the tsunami. If the tsunami encounters a coastal scarp, the height of its waves increases. Because the long-period wave can bend around obstacles, the tsunami can enter bays and gulfs having the most intricate shapes. A tsunami wave may break on the beach, appear as flooding, or form a “bore” (a violent rush of water with an abrupt front) as it moves up a river or stream. When the trough of the wave arrives first, the water level drops rapidly. Where this occurs, the harbor or offshore area may be drained of its water, exposing sea life and ocean bottom. This phenomenon may be the only warning to residents that large tsunami is approaching. Fatalities have occurred where people have tried to take advantage of this situation to gather fish or explore the strange landscape. A tsunami is not one wave but a series of waves. People have died when they assumed they were safe because they had survived one large wave, only to be caught by a later arriving, larger wave. The wave returns to cover the exposed coastline faster than the people can run. Although there may be an interval of

minutes or perhaps an hour between the arrival of waves, the second, third, or later waves can be more destructive than the first. Residents returning too soon to the waterfront, assuming that the worst has past, represent preventable fatalities.

Tsunamis can occur any time of the day or night after an undersea earthquake. Experts believe that a tsunami caused by an undersea earthquake near the Oregon coast could strike the Oregon coast within 5-30 minutes after the earthquake, before official warning is possible. Undersea earthquakes thousands of miles away can cause smaller tsunamis on the Oregon coast but will take several hours to arrive, generally allowing time for critical warning.

Tsunamis are most common in the Pacific Ocean. People on open beaches, at low lying areas of the beach, by bay mouths or bay tidal flats, in low parts of coastal towns and cities, and near mouths of rivers draining into the ocean are in greatest danger from tsunamis.

BROOKINGS HARBOR

Tsunami Facts

Two kinds of tsunamis can affect the Oregon coast:

1. Tsunamis generated by undersea earthquakes just off the Oregon coast can strike the coast within five to thirty minutes, with the ability of disrupting power lines and communications and leaving little time for an

official warning. The actual ground shaking of the earthquake may be the only warning.

2. Tsunamis generated by earthquakes occurring thousands of miles away may take several hours to reach the coast. Although Alaska's seismic and tsunamigenic history is only about 200 years old, it is extremely seismic, with the Pacific Plate subducting under the North American Plate. This zone is called the Aleutian-Alaska megathrust zone, and makes the coastal areas very dangerous in regard to tsunami generation.

At least three past tsunamis that were generated in Alaska have resulted in Pacific wide death and destruction. Tsunamigenic events occurring around the Alaskan Peninsula, the Aleutians, and the Gulf of Alaska have a very high potential for generating Pacific wide tsunamis that can have an effect on the Oregon coast.

Recent research shows that at any time the Pacific Northwest can experience large earthquakes and accompanying tsunamis, and that tsunamis have affected the Oregon coast on a regular basis over time. Scientists have not yet had time to do local studies that will be able to tell how high a tsunami may be in any one area. A tsunami wave increases in height as it approaches shore. Typical wave heights from tsunamis occurring in the Pacific over the last, 80 years have been between 21 to 45 feet at the shoreline. A few waves, however, have been much higher, as much as 100 feet or more because of local conditions. Also, tsunamis may affect local areas differently, causing great damage and loss of life in one area but little in another.

HISTORICAL TSUNAMIS

On April 1, 1946, a tsunami generated by earthquake of magnitude 7.8 in the Aleutian Islands of Alaska took the lives of 165 people and cost over $26 million (in 1946 dollars). The highest runup was on the island of Hawaii, where a

The remains of the 200-foot long Elk Creek Bridge at Cannon Beach, destroyed by the tsunami generated by the March 27, 1964 earthquake in Alaska.

12 meter, runup was recorded. The tsunami arrived at Hilo 4.9 hours after it originated in the Aleutian Islands, and 96 people lost their lives. A 3 meter, runup was recorded at Coos Bay for that event, which was also registered at Bandon. Heights of tsunami waves generated by nearby earthquakes could be a great deal higher.

On March 9, 1957 an 8.3 earthquake occurred south of the Andreanof Islands, in the Aleutians. A Pacific wide, tsunami was triggered by the earthquake. Although no lives were lost, the Hawaiian Islands suffered damages of about $5 million (1957 dollars) on the islands of Oahu and Kauai.

In 1960, a Chilean magnitude 9.5 earthquake produced tsunamis that struck the relatively sparsely populated coast of Chile, killing nearly 1,000 people and leaving tsunami deposits similar to those found along the Oregon coast … 60 people in Hawaii died from the resulting tsunami.

The Alaskan earthquake on March 27,1964, had a magnitude of 9.2, one of the largest in recorded history. The death toll in Alaska from this event was 115 people, with 106 of the deaths due to tsunamis. The largest wave height for this tsunami was reported at Shoup Bay, Valdez Inlet, at 67 meters. British Columbia sustained $10 million dollars in damage. It then struck the Oregon coastline, killing four people and causing nearly $1 million dollars in damage (in 1964 dollars). The highest officially measured Oregon wave was 14.2 feet at the mouth of the Umpqua River. When the tsunami struck Crescent City, California, the maximum wave height was 14 feet. Eleven people were killed, and approximately $8 million dollars in damage was done in Crescent City. Coos Bay recorded a runup of 3.5 meters from this event. The wave continued to travel south, and did significant damage in such supposedly sheltered areas as the northeast curve of

San Francisco Bay, at San Rafael. Heights of tsunami waves generated by nearby earthquakes could be a great deal higher.

On July 12, 1993, a magnitude 7.8 earthquake generated tsunami waves ranging from 10 to 100 feet high at Okushiri Island, Japan. About 200 people were killed, most of them by the tsunamis. More would have been killed, but many people still remembered or had heard of earlier tsunamis and went immediately inland and to high ground to safety after the shaking stopped.

PROBABILITY

The 1965 Alaskan earthquake generated a killer tsunami powerful enough to push a board through a tire. It has been at least 300 years since such a scenario was visited upon the Oregon cost, but geophysicists warn that a major earthquake and following tsunami is most assuredly in the future for the Pacific Northwest, encompassing California, Oregon, Washington and Alaska. Indeed, the series of killer waves recently killed more than 2,100 coastal residents of Papua; New Guinea should serve as a wake up call to others who live in similar earthquake zones, including the Pacific Northwest.

CURRENT MITIGATION ACTIVITIES

State Building Codes

The Oregon State Building Codes Division adopts statewide standards for building construction that are administered by the state, cities and counties. The codes apply to new construction and to the alteration of, or addition to, existing structures. The Structural Specialty Code is based on the 1997 edition of the Uniform Building Code published by the International Conference of Building Officials and amended by the state of Oregon. The Uniform Building Code contains specific regulations for development within seismic zones. Within these standards are six levels of design and engineering specifications that are applied to areas according to the expected degree of ground motion and site conditions

that a given area could experience during an earthquake (ORS455.447). The Structural Code requires a site-specific seismic hazard report for projects including essential facilities such as hospitals, fire and police stations, emergency response facilities, and special occupancy structures, such as large schools and prisons. Although there is no statewide building code for substandard structures, local communities have the option of adopting one to mitigate hazards in existing buildings. The state has adopted regulations to abate buildings damaged by an earthquake in Oregon Administrative Rules (OAR) 918-470. Oregon Revised Statutes (ORS) 455.020 and 455.390-400 also allow municipalities to create local programs to require seismic retrofitting of existing buildings within their communities.

State Legislation

During the last ten years, the legislature has passed a number of laws that address the risk of earthquakes and encourage earthquake preparedness.

1991 Legislation: The legislature passed Senate Bill 96 in 1991. This law requires site specific seismic hazard investigations before the construction of essential facilities, hazardous facilities, major structures, and special occupancy structures (e.g., hospitals, schools, utilities and public works, fire and police station). The requirements are adopted into the State Building code. The law also provides for the installation of strong motion sensors in selected major buildings and mandates that school officials in all public schools lead students and staff in earthquake drills. (ORS 455.447 and 336.071)

1995 Legislation: Fourteen, earthquake, related bills were introduced during the 1995 session. Several passed, including a new requirement for earthquake education and tsunami drills to be conducted in public schools, (ORS 336.071). A requirement for essential and special occupancy structures to be built outside of tsunami inundation zones (ORS 455.446), provisions for the inspection and entrance of buildings damaged by earthquakes (ORS 455.448) and specific provisions for the abatement of buildings damaged by earthquakes. Senate Bill

1057 created a task force to evaluate the risks impacting existing buildings and make recommendations to the 1997 legislature.

Public Education Schools

All of the public schools in Curry County practice earthquake and fire drills on a monthly basis as prescribed by law.

Tsunami Evacuation Routes

Road signs mark tsunami evacuation routes in the coastal communities of Brookings, and Port Orford. The only exception to this practice is in the City of Gold Beach. Tsunami evacuation routes and 'area' signs are posted all along the U.S. Highway 101 corridor as it parallels the Pacific Ocean. Small sections of the highway that pass through mountainous areas are not posted as they are out of the hazard area.

Non-structural Improvements For Homes and Businesses

The Curry County Citizens Corps Council is in the process of designing and publishing public educational material for home and business preparedness, community seismic risks and mitigation techniques.

CURRY COUNTY ZONING ORDINANCE

Section 3.252. Development in Areas of Geologic Hazards
Sub Section 1.a),I), ii), iii), iv); b), I), ii), iii), iv), v). These sections are described in detail in Landslide Section – Current Hazard Mitigation Activities.

MITIGATION ACTION ITEMS

The earthquake and tsunami action items provide guidance on suggesting specific activities that agencies, organizations and residents in Curry County can

undertake, to reduce risk and prevent loss from earthquake and tsunami events. Each action includes implementation strategies which, can be used by the steering committee and local decision-makers.

EARTHQUAKE & TSUNAMI #1

Short Term: **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.**

Implementation:

- Review latest vulnerability assessment and policies addressing seismic hazards.
- Amend comprehensive plans, policies and implementations to reflect future development in seismic hazard areas, where and if needed.

Coordinating Organization: Hazard Mitigation Planning Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property

EARTHQUAKE & TSUNAMI #2

Short Term: **Implement a public education program enhancing existing programs.**

Implementation:

- Evaluate feasibility and applicability of a standardized siren system in beach residential and recreational areas.
- Assess the placement of tsunami warning signs throughout the coastal communities and Highway 101 corridor.

Coordinating Agencies: Hazard Mitigation Advisory Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property, Public Awareness

APPENDIX A

INDIVIDUAL COMMUNITY ACTION ITEMS

LETTER OF PROMULGATION

As the governing body for Curry County, having recognized the need for sufficient planning, has engaged in risk assessment, and considered pre-disaster remedies to potential losses. Our goal is to address natural hazards, which commonly adversely effect our citizens, private and public property, infrastructure and commerce, and develop strategies with the intention to prioritize our objectives in order to mitigate those areas of great concern.

As part of a county wide, collaborative effort to comprehensively assess our combined threats, strategies, and resources, we have developed measures, which will work best to meet our future goals and actions.

The Curry County Natural Hazard Mitigation Plan has been developed pursuant to the Federal Emergency Management Agency Interim Final Rule 44CFR, Part 201.

The Curry County Natural Hazard Mitigation Plan is hereby adopted and implemented this day, _____, 2005.

_____ _____

Ralph Brown, Chair Lucie La Bonte', Commissioner

_____

Marlyn Schafer, Commissioner

BROOKINGS

Located on the beautiful Southern Oregon Coast just six miles north of the California border on U.S. Highway 101, Brookings invites travelers and residents to pause and enjoy miles of coastal beauty. Brookings-Harbor is the southernmost community in Curry County, and basks in what is known as Oregon's "banana belt". Brookings is an incorporated city, while Harbor, on the opposite side of the Chetco River, is not. Due to the local topography, the area can experience 70 to 80, degree, temperature any month of the year.

John E. Brookings, cousin to Robert S. Brookings of the Brookings Institute, established the original town of Brookings. John E. Brookings moved his lumber business from the San Bernardino Mountains of Southern California in 1913. One of the first steps Brookings took was to hire a renowned architect, Bernard Maybeck, to lay out the street design for what is now the core area of the city.

Since incorporating in 1951, Brookings has grown to a population of 5,950 and covers an area of 2,435 acres. It is the largest city in Curry County. Because of its mild climate, beautiful, coast line and quality of life, in the late 1980's Brookings was "discovered" as a desirable place to retire and much of the population growth has been, retirees. Magazine and other media's recognition of Brookings being a very desirable place to retire have fed this trend. Several parks grace the area, including Azalea Park, Harris Beach State Park, and Loeb State Park, which is eight miles east, on the north bank of the Chetco River. There is also a beautiful new Salmon Run Golf and Wilderness Preserve, that offers an 18 hole golf course designed so as not to disturb the salmon and steelhead that spawn in the creek.

Access to Brookings is by car via Highway 101. Much of the activity revolves around its port on the south side of the Chetco River.

Brookings compared to Oregon, state average:

- Median house value **above** state average.
- Median age **significantly above** state average.
- Length of stay since moving in **significantly below** state average.
- House age **significantly** below state average.
- Number of college students **below** state average.

PLAN ADOPTION

The Curry County Commissioners and City Councils of the cooperative cities will be responsible for adopting the Curry County Natural Hazard Mitigation Plan. The governing bodies have the authority to promote sound public policy regarding natural hazards in their community. Once the plan has been adopted, by the County Commissioners and each participating City, the County Emergency Services Coordinator will be responsible for submitting it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management will then submit the plan to the Federal Emergency Management Agency (FEMA) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR, Part 201. Upon acceptance by FEMA, Curry County, and participating Cities will gain eligibility for Hazard Mitigation Grant Program funds.

Once signed, a copy of the signed Letter of Promulgation will need to be sent to the County Emergency Services Coordinator for inclusion in the master plan to be sent to Oregon Emergency Management and the Federal Emergency Management Agency, for approval.

MITIGATION ACTION ITEMS
CITY OF BROOKINGS

The intent of the mitigation action items is to provide guidance and direction on specific activities that organizations, communities and residents can undertake as partners to reduce risk and prevent loss of life and property due to wildfire events. Each action item identifies implementation strategies, which can be used by the steering committees and local decision-makers to accomplish implementation.

WILDFIRE #1

Long Term: **Identify and map all roads, private drives, logging trails to increase the ability of firefighters to locate and gain access to provide service and/or evacuations.**

Implementation:

- Explore fire agencies using GPS for pre arrival response planning and mapping.
- Seek funding for countywide GPS for mapping purposes.
- Partner with logging companies to compare road and trail maps.
- Create current road and trail maps of region.
- Share information gained through this process with all county emergency response agencies, 9-1-1 PSAP and secondary PSAP's, and emergency medical responders.

Coordinating Organization: Natural Hazard Mitigation Committee
Oregon Department of Forestry
Coos Forest Protective Association
U.S. Forest Service
Industrial Partners, (logging companies)
BLM

Timeline: 2 – 5 years

Plan Goals Addressed: Emergency Services, Partnerships and Implementation

WILDFIRE #2

Short Term: **Public Education Program enhancing existing programs. Program to target residents, tourists enjoying area sport fishing and hunting in wildland areas, through multi agency coordination including local industry.**

Implementation:

- Provide fire safety and fire prevention information pamphlets in easy to read and understandable format.
- Target areas frequented by tourists such as motels, RV parks, community and state parks, restaurants, real estate offices, and chamber of commerce for local cities.
- Provide these areas with kiosks for display of information if necessary.
- Provide information to schools and colleges in the area.
- Provide informational videos for local government access TV as well as local TV Stations.
- Establish weekly fire prevention articles in local print media during fire season.

Coordinating Agencies Natural Hazard Mitigation Committee
Oregon Department of Forestry
Coos Forest Protective Association
U.S. Forest Service

Timeline: 2 Years

Plan Goals Addressed: Protect Life and Property, Public Awareness

WILDFIRE #3

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

Implementation:

- Develop a map of gorse infested areas to be targeted.
- Collaboratively determine the best strategy for controlling the spread of gorse.
- Seek funding to replace cutters that can no longer be repaired due to age and the unavailability of replacement parts for use to cut back noxious weeds.
- Explore funding options to procure herbicides for noxious weed mitigation.

Coordinating Agencies: Natural Hazard Mitigation Committee
Oregon Department of Forestry
Coos Forest Protective Association
U.S. Forest Service

Timeline: 1-2 Years

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

WINTER STORM / FLOOD

Short Term #1: **Analyze the Port Jetty's in Brookings for stability and identify mitigation options.**

Implementation:

- Survey maintenance needs of Port Jetty's for stability.
- Explore alternatives for maintenance.
- Explore funding sources for work needed.

Coordinating Organization: Hazard Mitigation Planning Committee
Port of Brookings
Army Corp of Engineers

Timeline: 1-2 years

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

LANDSLIDE

Short Term #1: **Identify and map high risk slide areas to create an accurate logistical assessment.**

Implementation:

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

Coordinating Organization: Hazard Mitigation Planning Committee
Curry County Roads Department
Oregon Department of Transportation
Private Industry (logging)

Timeline: 1-2 Years

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

LANDSLIDE

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

Implementation:

- Explore ditching possibilities in high impact areas where reoccurring slides create a continual hazard to residents and roadways.
- Reassess geo-hazard areas for stabilization priorities and possibilities.
- Develop engineering studies of chronic slide areas for mitigation strategies.
- Explore funding sources for geo studies and assessments.
- Explore funding sources for required equipment for repair of slide damage.

Coordinating Organization: Hazard Mitigation Planning Committee, Curry County Roads Department Oregon Department of Transportation Private Industry (logging)

Timeline: 1-2 Years

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

EARTHQUAKE & TSUNAMI

Short Term #1: 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.

Implementation:

- Review latest vulnerability assessment and policies addressing seismic hazards.
- Amend comprehensive plans, policies and implementations to reflect future development in seismic hazard areas, where and if needed.

Coordinating Organization: Hazard Mitigation Planning Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property

EARTHQUAKE & TSUNAMI

Short Term #2: Implement a public education program enhancing existing programs.

Implementation:

- Evaluate feasibility and applicability of a standardized siren system in beach residential and recreational areas.
- Assess the placement of tsunami warning signs throughout the coastal communities and Highway 101 corridor.

Coordinating Agencies: Hazard Mitigation Advisory Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property, Public Awareness

LETTER OF PROMULGATION

As the governing body for the City of Brookings, having recognized the need for sufficient planning, has engaged in risk assessment, and considered pre-disaster remedies to potential losses. Our goal is to address natural hazards, which commonly adversely affect our citizens, private and public property, infrastructure and commerce, and develop strategies with the intention to prioritize our objectives in order to mitigate those areas of great concern.

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The Curry County Natural Hazard Mitigation Plan is hereby adopted and implemented this day, _____, 2005.

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GOLD BEACH

The City of Gold Beach is located on the edge of the Coast Range along the shore of the Pacific Ocean. The town is just 37 miles north of the Oregon / California border on U.S. Highway 101. Located on the Southern Oregon Coast, Gold Beach is a seaside town, a river town, and a forest / mountain town. It is uniquely and naturally different, because of the blend of forest, river, and sea. Gorgeous sunsets, black sand, and agates… Gold Beach is the ideal beach destination for the best windsurfing, beach combing, and winter storm watching. Gold Beach offers excellent access to the Rogue River, which is known worldwide for its prolific salmon and steelhead. The Rogue Reef is home to a massive Stellar, sea lion rookery, not surprising because it also provides some of the best bottom fishing on the entire coast.

Just when, gold was first discovered on the Oregon beaches, is not definitely known. However, by 1853, the ocean beaches were swarming with gold seekers. Other than Port Orford, the mouth of the Rogue River became the central point of activity in Curry County. When, in 1863, a post office was established, the name was recorded in Washington as Ellensberg. Although the post office and town-site were both officially named Ellensberg, the place continued to be referred to as Gold Beach. The name was officially changed to Gold Beach on May 28, 1890.

For half a century and more, Gold Beach remained very much isolated, due to the lack of transportation. The flood of 1890 left the entrance to the Rogue River even more hazardous than it had been earlier, and it wasn't until 1890 that Gold Beach had a wagon road connecting with Crescent City on the south and Coos County on the north. The road could be a challenge under the best of conditions, and in winter it could be all but impassible. From sea level, up to high mountaintops, through the winter months there was deep mud in the valleys and

snow on the mountains. Some of the areas were so narrow that teams could not pass when they met on the road.

It was not until 1927 that Highway 101 provided an all-year outlet for Gold Beach and that highway is subject to the whims of nature to this day. The fine Rogue River Bridge was opened in 1932.

The principle activities in the Gold Beach area at first centered around gold mining, but as this became less profitable, more attention was turned to commercial fishing. This grew to be the largest source of income, and lasted for 50 or 60 years, ending in 1935 when the river was closed to commercial fishing. Today the Rogue attracts sport fishermen, boaters, and hikers who enjoy the riverside trails. Jet boat trips on the river are popular, as is the challenge of white-water rafting it offers.

As of the 2000 Census, gold Beach has a population of 1,897 people, with a median age of 45. The per capita income for the city is $16,717. A little over twelve percent (12.4%) of the population and 8.8% of the families are below the poverty line.

Curry County has one hospital, the 24 bed Curry General Hospital located in Gold Beach, nearly 30 miles on U.S. Highway 101 from the cities of Brookings or Port Orford.

Gold Beach compared to Oregon State average:

- Median house value **above** state average.
- Median income **significantly below** sate average.
- Median age **significantly above** state average.

PLAN ADOPTION

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GOLD BEACH
NATURAL HAZARD MITIGATION ACTION ITEMS

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WILDFIRE #1

Long Term: **Identify and map all roads, private drives, logging trails to increase the ability of firefighters to locate and gain access to provide service and/or evacuations.**

Implementation:

- Explore fire agencies using GPS for pre arrival response planning and mapping.
- Seek funding for countywide GPS for mapping purposes.
- Partner with logging companies to compare road and trail maps.
- Create current road and trail maps of region.
- Share information gained through this process with all county emergency response agencies, 9-1-1 PSAP and secondary PSAP's, and emergency medical responders.

Coordinating Organization: Natural Hazard Mitigation Committee
Oregon Department of Forestry
Coos Forest Protective Association
U.S. Forest Service
Industrial Partners, (logging companies)
BLM

Time Line: 2 – 5 years

Plan Goals Addressed: Emergency Services, Partnerships and Implementation

WILDFIRE #2

Short Term: **Public Education Program enhancing existing programs. Program to target residents, tourists enjoying area sport fishing and hunting in wildland areas, through multi agency coordination including local industry.**

Implementation:

- Provide fire safety and fire prevention information pamphlets in easy to read and understandable format.
- Target areas frequented by tourists such as motels, RV parks, community and state parks, restaurants, real estate offices, and chamber of commerce for local cities.
- Provide these areas with kiosks for display of information if necessary.
- Provide information to schools and colleges in the area.
- Provide informational videos for local government access TV as well as local TV Stations.
- Establish weekly fire prevention articles in local print media during fire season.

Coordinating Agencies	Natural Hazard Mitigation Committee Oregon Department of Forestry Coos Forest Protective Association U.S. Forest Service
Timeline:	2 Years
Plan Goals Addressed:	Protect Life and Property, Public Awareness

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- Explore funding options to procure herbicides for noxious weed mitigation.

Coordinating Agencies: Natural Hazard Mitigation Committee
Oregon Department of Forestry
Coos Forest Protective Association
U.S. Forest Service

Timeline: 1-2 Years

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

WINTER STORM / FLOOD

Short Term #1: **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 system.**

Implementation:

- Survey maintenance needs of Port Jetty's for stability.
- Survey maintenance needs of Community Airport for stability.
- Explore alternatives for maintenance.
- Explore funding sources for work needed.

Coordinating Organization: Hazard Mitigation Planning Committee
Port of Gold Beach
Army Corp of Engineers

Timeline: 1-2 years

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

LANDSLIDE

Short Term #1: **Identify and map high risk slide areas to create an accurate logistical assessment.**

Implementation:

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

Coordinating Organization: Hazard Mitigation Planning Committee
Curry County Roads Department
Oregon Department of Transportation
Private Industry (logging)

Timeline: 1-2 Years

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

LANDSLIDE

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

Implementation:

- Explore ditching possibilities in high impact areas where reoccurring slides create a continual hazard to residents and roadways.
- Reassess geo-hazard areas for stabilization priorities and possibilities.
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- Assess the placement of tsunami warning signs throughout the coastal communities and Highway 101 corridor.

Coordinating Agencies: Hazard Mitigation Advisory Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property, Public Awareness

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PORT ORFORD

Spectacular ocean views characterize downtown Port Orford. Located on the southern coast 27 miles north of Gold Beach, Port Orford is on one of Oregon's only true ocean harbors. History comes alive in this small coastal town, discovered in 1851 by Captain William Tichenor. Situated about 70 miles north of the California border, the 153-year-old community is the smallest of Curry Counties, three incorporated cities. Small it may be, but it is the richest community in terms of history, architecture, scenic rivers, rugged coastline and accessible beaches. Being one of the oldest town-sites in Coos and Curry Counties combined, it has a long history as a fishing and lumber port. Port Orford's claim to fame is that it's the first white settlement on the Oregon Coast, and it's also said to be the most westerly, incorporated town in the continental U.S. Situated along U.S. 101 about 50 miles north of the California border, Port Orford is perched on coastal beach-lands above a beautiful, semi-protected cove. It was this natural harbor that drew the first settlers, who came to log the virgin forests that included the aromatic white cedar, also known as Port Orford cedar.

Located 11 miles north of Port Orford is Cape Blanco State Park. The 1,880-acre park is next to Oregon's oldest and highest lighthouse, built in 1870 as an aid to navigation. The Coast Guard owns the lighthouse and makes it available to visitors through an agreement with the Bureau of Land Management.

Since the harbor remains unprotected by breakwaters or jetties, the local fishing fleet uses a unique system in which the boats are hoisted up from the water and onto trailers parked on a large fishing dock, by use of a converted log boom.

The Elk and Sixes rivers are well known throughout the Pacific Northwest for their fall and winter steelhead and salmon fishing, as well as trout, in season. Located just a few miles north of Port Orford, both rivers have produced record size Chinook salmon. Float trips are available on the Elk and Sixes rivers.

As of the 2000 Census, Port Orford had a population of 1,153. There are 571 households, and the median age is 50 years old. Twenty-seven percent (27%) of the residents are over age 65, and sixty-eight percent (68%) were born in another state. The per capita income for the city is $16,442. Over seventeen percent (17.8%) of the population and sixteen percent (16.1%) of the families are below the poverty line.

Port Orford compared to Oregon State average:

- Median age **significantly above** state average.
- Number of college students **significantly below** state average.
- Population density **below** state average.

PLAN ADOPTION

The Curry County Commissioners and City Councils of the cooperative cities will be responsible for adopting the Curry County Natural Hazard Mitigation Plan. The governing bodies have the authority to promote sound public policy regarding natural hazards in their community. Once the plan has been adopted, by the County commissioners and each participating City, the County Emergency Services Coordinator will be responsible for submitting it to the State Hazard Mitigation Officer at Oregon Emergency Management. Oregon Emergency Management will then submit the plan to the Federal Emergency Management Agency (FEMA) for review. This review will address the federal criteria outlined in FEMA Interim Final Rule 44 CFR, Part 201. Upon acceptance by FEMA, Curry County, and participating Cities will gain eligibility for Hazard Mitigation Grant Program funds.

Once signed, a copy of the signed Letter of Promulgation will need to be sent to the County Emergency Services Coordinator for inclusion in the master plan to be sent to Oregon Emergency Management and the Federal Emergency Management Agency, for approval.

NATURAL HAZARD MITIGATION ACTION ITEMS

The intent of the mitigation action items is to provide guidance and direction on specific activities that organizations, communities and residents can undertake as partners to reduce risk and prevent loss of life and property due to natural hazard events. Each action item identifies implementation strategies, which can be used by the steering committees and local decision-makers to accomplish implementation.

WILDFIRE

Long Term #1: Identify and map all roads, private drives, logging trails to increase the ability of firefighters to locate and gain access to provide service and/or evacuations.

Implementation:

- Explore fire agencies using GPS for pre arrival response planning and mapping.
- Seek funding for countywide GPS for mapping purposes.
- Partner with logging companies to compare road and trail maps.
- Create current road and trail maps of region.
- Share information gained through this process with all county emergency response agencies, 9-1-1 PSAP and secondary PSAP's, and emergency medical responder.

Coordinating Organization: Natural Hazard Mitigation Committee
Oregon Department of Forestry
Coos Forest Protective Association
U.S. Forest Service
Industrial Partners, (logging companies)
BLM

Timeline: 2 – 5 years

Plan Goals Addressed: Emergency Services, Partnerships and Implementation

WILDFIRE

Short Term #2: **Public Education Program enhancing existing programs. Program to target residents, tourists enjoying area sport fishing and hunting in wildland areas, through multi agency coordination including local industry.**

Implementation:

- Provide fire safety and fire prevention information pamphlets in easy to read and understandable format.
- Target areas frequented by tourists such as motels, RV parks, community and state parks, restaurants, real estate offices, and chamber of commerce for local cities.
- Provide these areas with kiosks for display of information if necessary.
- Provide information to schools and colleges in the area.
- Provide informational videos for local government access TV as well as local TV Stations.
- Establish weekly fire prevention articles in local print media during fire season.

Coordinating Agencies	Natural Hazard Mitigation Committee Oregon Department of Forestry Coos Forest Protective Association U.S. Forest Service
Timeline:	2 Years
Plan Goals Addressed:	Protect Life and Property, Public Awareness

WILDFIRE #3

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

Implementation:

- Develop a map of gorse infested areas to be targeted.
- Collaboratively determine the best strategy for controlling the spread of gorse.
- Seek funding to replace cutters that can no longer be repaired due to age and the unavailability of replacement parts for use to cut back noxious weeds.
- Explore funding options to procure herbicides for noxious weed mitigation.

Coordinating Agencies: Natural Hazard Mitigation Committee
Oregon Department of Forestry
Coos Forest Protective Association
U.S. Forest Service

Timeline: 1-2 Years

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

WINTER STORM / FLOOD

Long Term #2: **Analyze alternatives for the repair of the dune breach at Garrison Lake.**

Implementation:

- Identify best possible measures to reroute or rebuild the dune at Garrison Lake.
- Explore alternative funding resources to facilitate any survey, proposal and mitigation activities.

Coordinating Organization: Hazard Mitigation Planning Committee
City of Port Orford
ODFW
DEQ
Confederated Tribes
Oregon Park Service
Army Corps of Engineers

Timeline: 1-2 years

Plan Goals Addressed: Protect Life and Property, Partnerships And Implementation, Natural Systems

LANDSLIDE

Short Term #1: **Identify and map high risk slide areas to create an accurate logistical assessment.**

Implementation:

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

Coordinating Organization: Hazard Mitigation Planning Committee
Curry County Roads Department
Oregon Department of Transportation
Private Industry (logging)

Timeline: 1-2 Years

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

LANDSLIDE

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

Implementation:

- Explore ditching possibilities in high impact areas where reoccurring slides create a continual hazard to residents and roadways.
- Reassess geo-hazard areas for stabilization priorities and possibilities.
- Develop engineering studies of chronic slide areas for mitigation strategies.
- Explore funding sources for geo studies and assessments.
- Explore funding sources for required equipment for repair of slide damage.

Coordinating Organization: Hazard Mitigation Planning Committee, Curry County Roads Department Oregon Department of Transportation Private Industry (logging)

Timeline: 1-2 Years

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

EARTHQUAKE & TSUNAMI

Short Term #1: 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.

Implementation:

- Review latest vulnerability assessment and policies addressing seismic hazards.
- Amend comprehensive plans, policies and implementations to reflect future development in seismic hazard areas, where and if needed.

Coordinating Organization: Hazard Mitigation Planning Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property

EARTHQUAKE & TSUNAMI

Short Term #2: Implement a public education program enhancing existing programs.

Implementation:

- Evaluate feasibility and applicability of a standardized siren system in beach residential and recreational areas.
- Assess the placement of tsunami warning signs throughout the coastal communities and Highway 101 corridor.

Coordinating Agencies: Hazard Mitigation Advisory Committee

Timeline: 1-2 Years

Plan Goals Addressed: Protect Life and Property, Public Awareness

LETTER OF PROMULGATION

As the governing body for the City of Port Orford, having recognized the need for sufficient planning, has engaged in risk assessment, and considered pre-disaster remedies to potential losses. Our goal is to address natural hazards, which commonly adversely affect our citizens, private and public property, infrastructure and commerce, and develop strategies with the intention to prioritize our objectives in order to mitigate those areas of great concern.

As part of a county wide, collaborative effort to comprehensively assess our combined threats, strategies, and resources, we have developed measures, which will work best to meet our future goals and actions.

The Curry County Natural Hazard Mitigation Plan has been developed pursuant to the Federal Emergency Management Agency Interim Final Rule 44CFR, Part 201.

The Curry County Natural Hazard Mitigation Plan is hereby adopted and implemented this day, _____, 2005.

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APPENDIX B

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APPENDIX C

APPENDIX C

Curry County is a mostly rural county located in extreme southwestern Oregon. It is approximately 70 miles long and is bordered on the south by the State of California, on the north by Coos County, and on the west by the Pacific Ocean. Small areas to the east and northeast border Josephine and Douglas counties. Curry County has one major transportation corridor, U.S. Highway 101 that runs north and south through the county and connects the county's only incorporated cities, Port Orford, Gold Beach, and Brookings. There are numerous rivers and creeks within the county and bridges span many of them. There are a number of rockslide and landslide areas within the Highway 101 corridor as well as along many of the county roads.

Revised in 2002, the full Curry County Hazard Analysis is maintained as a separate document. The information in this appendix summarizes the analysis with respect to the hazards covered by this plan. The analysis was developed through a collaborative planning process that is essential to mitigation planning and efficient recovery from natural hazards, as well as man made events. These hazards are viewed as situations having the potential to do damage that can affect life, property, resources and the environment. This assessment and analysis encompasses all of the incorporated cities and rural areas of Curry County.

HAZARD ANALYSIS CRITERIA

In analyzing the risk posed by specific hazards, a rating criterion and weighting factor have been used. This formula is based on point value in which:

Low = 1-3 points

Medium	=	4-6 points
High	=	7-10 points

EVENT HISTORY

Event history is based on the number of previous disasters/emergencies. Examples of events included in assessing history were those events for which the following activities were required:

- The EOC (or alternate) was activated;
- Activation/implementation of three or more EOP functions;
- Multi-jurisdictional response was required;
- Unified command structure was necessary to coordinate response;
- "Local Declaration of Emergency" was made.

Weighting Factor is 2.

Low	=	0-1 events per 100 years
Medium	=	2-3 events per 100 years
High	=	4 + events per 100 years

VULNERABILITY

Vulnerability is based on the percentage of population or property likely to be affected.

Weighting Factor is 5.

Low	=	< 1% affected
Medium	=	1-10% affected
High	=	> 10% affected

MAXIMUM THREAT

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

Weighting Factor is 10.

Low	=	< 5% could be affected
Medium	=	5-25% could be affected
High	=	> 25% could be affected

PROBABILITY

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

Weighting Factor is 7.

Low	=	At least 1 event within a 100 year period.
Medium	=	At least 1 event within a 50 year period.
High	=	At least 1 event within a 10 year period.

HAZARD DEFINITIONS

All areas of Curry County are potentially affected by natural disasters. Based on the hazard analysis criteria, the following hazards have been determined to pose the greatest threat to Curry County communities:

Flooding (probability = medium, total score = 142): abnormally high water level caused by excessive rainfall, tidal surge, storm surge, unseasonably warm winter temperatures causing rapid snowmelt, or any combination of these. Flooding results in damage to structures and other improvements, and infrastructure such as roads and bridges.

Wildland/Urban Interface Fire (probability = high, total score = 181): a wildfire in forest or brush fuel types that threatens structures and improvements. These problems are worsening because of the desire for homes in "the woods."

Windstorm (**probability = high, total score = 240):** extremely high winds generated by strong Pacific Ocean storm systems that make landfall along the Oregon Coast. Very high winds are common, with damaging winds a fairly regular occurrence.

Tsunami (probability = high, total score = 202): earthquakes or large landslides occurring along the Pacific Ocean or under its surface generate these large ocean waves. These waves are not just one large wave as is commonly believed, but are a series of large waves not unlike ripples on a pond. The danger period from a tsunami is a period of hours. Usually these waves will continue to pound the shoreline areas for ten to twelve hours after the arrival of the first wave. Often, the first wave is not the largest. They get larger as time progresses, with the largest usually several hours after the first wave.

Earthquake (probability = medium, total score = 187): Curry County is subject to massive earthquakes generated by the Cascadia Subduction Zone. These earthquakes have historically caused tremendous damage as indicated by the geological record. These earthquakes occur every 300 to 500 years on average. It is estimated that the last massive earthquake occurred in 1700. Therefore, we are now within the geologic "window of opportunity" for these massive quakes to occur again at any time.

Landslide (probability = high, total score = 185): a widespread hazard that affects almost all areas of the county. Our highway system is at risk from landslides. These occur regularly and frequently, especially during the wet winter months.

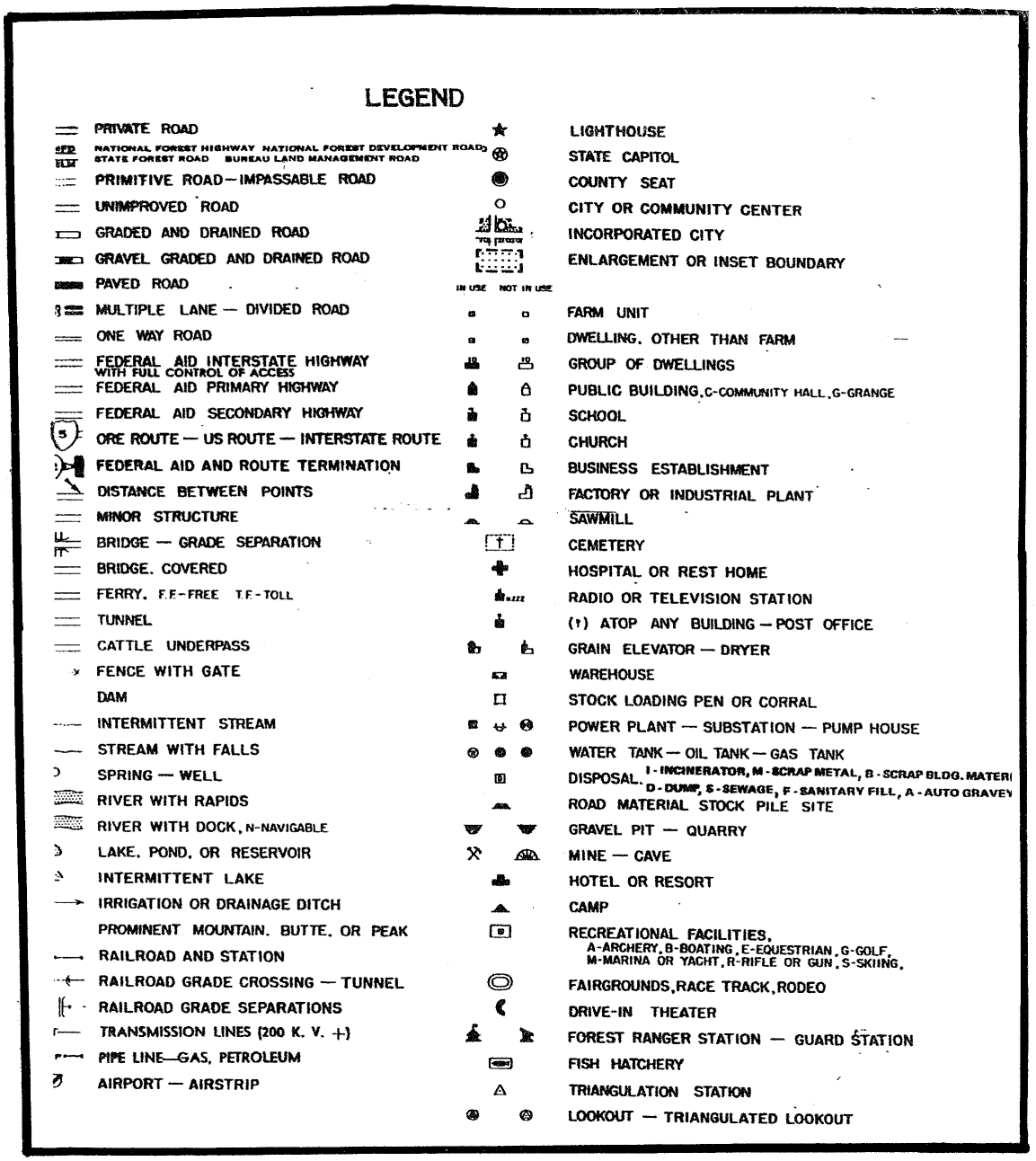
HAZARD ANALYSIS MATRIX

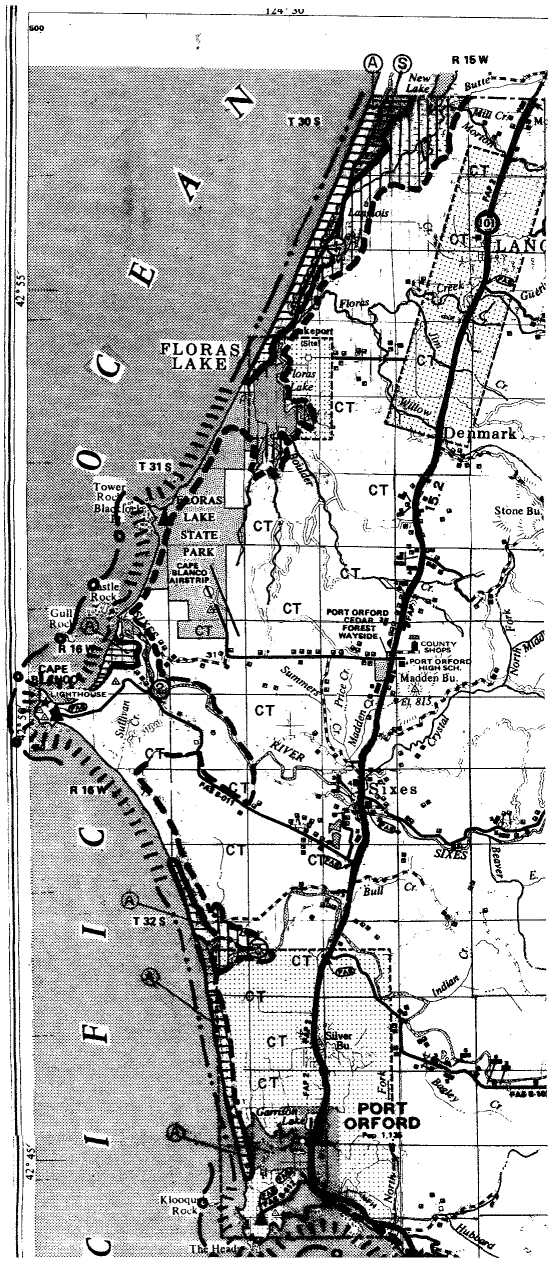
Hazard	Factor (weight)	History (2)	Vulnerability (5)	Maximum Threat (10)	Probability (7)	Total Score
Flood	Severity rating	H 2 x 10	M 5 x 6	M 10 x 5	M 7 x 6	**142**
	Subscore	20	30	50	42	
Wildland/ Urban Interface Fire	Severity rating	H 2 x 9	M 5 x 6	H 10 x 7	H 7 x 9	**181**
	Subscore	18	30	70	63	
Windstorm	Severity rating	H 2 x 10	H 5 x 10	H 10 x 10	H 7 x 10	**240**
	Subscore	20	50	100	70	
Tsunami	Severity rating	L 2 x 1	H 5 x 10	H 10 x 8	H 7 x 10	**202**
	Subscore	2	50	80	70	
Earthquake	Severity rating	L 2 x 1	H 5 x 10	H 10 x 10	M 7 x 5	**187**
	Subscore	2	50	100	35	
Landslide	Severity rating	H 2 x 10	H 5 x 7	M 10 x 6	H 7 x 10	**185**
	Subscore	20	35	60	70	

APPENDIX D

Curry County Comprehensive Plan – Coastal Shorelands Hazard Identification and Infrastructure Maps 1-6; 1980

CURRY COUNTY COMPREHENSIVE PLAN
COASTAL SHORELANDS – FLOOD PLANE
AND HAZARD MANAGEMENT
POLYCONIC PROJECTION
Plane Coordinate on Lambert Projection
1980

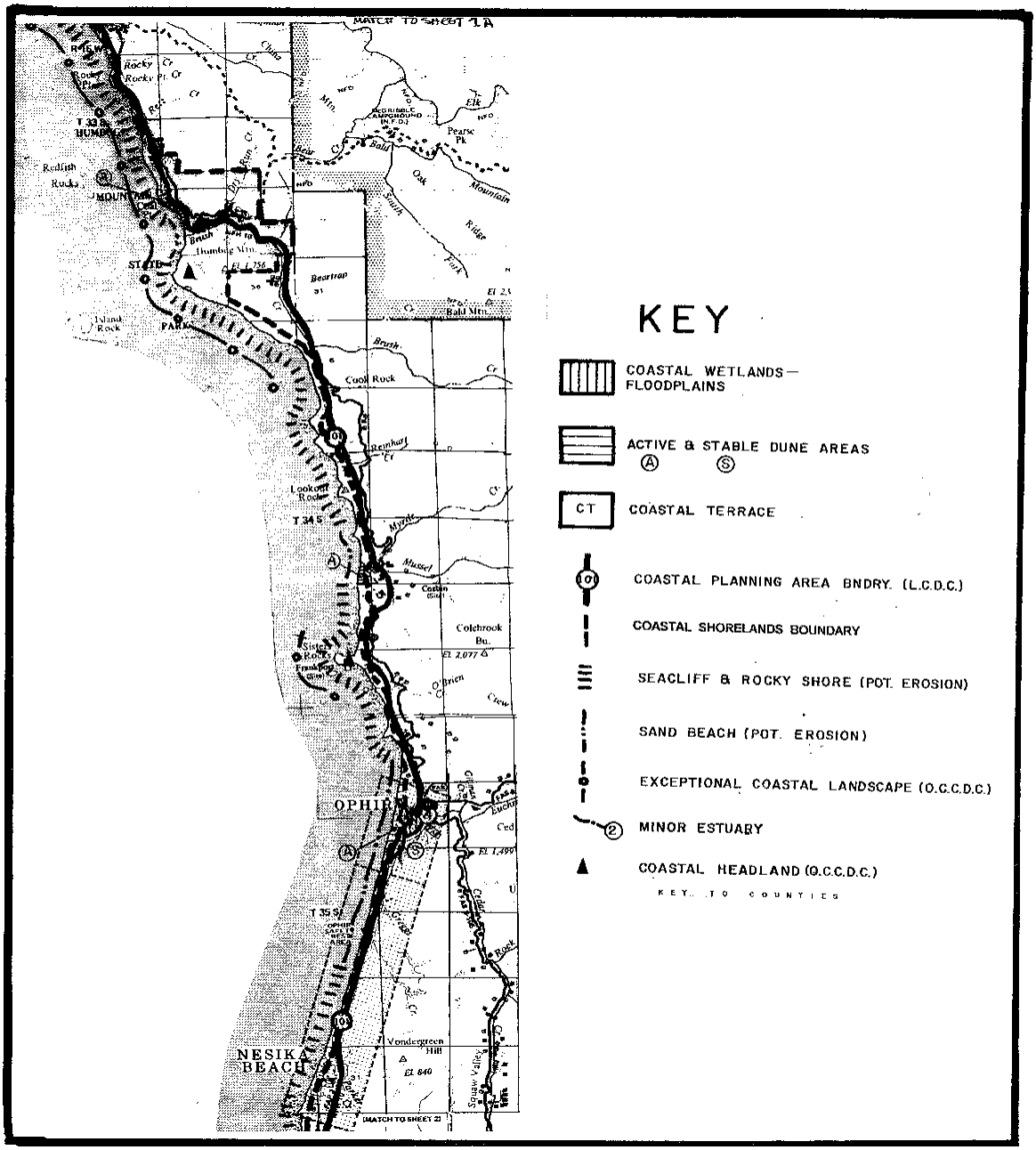


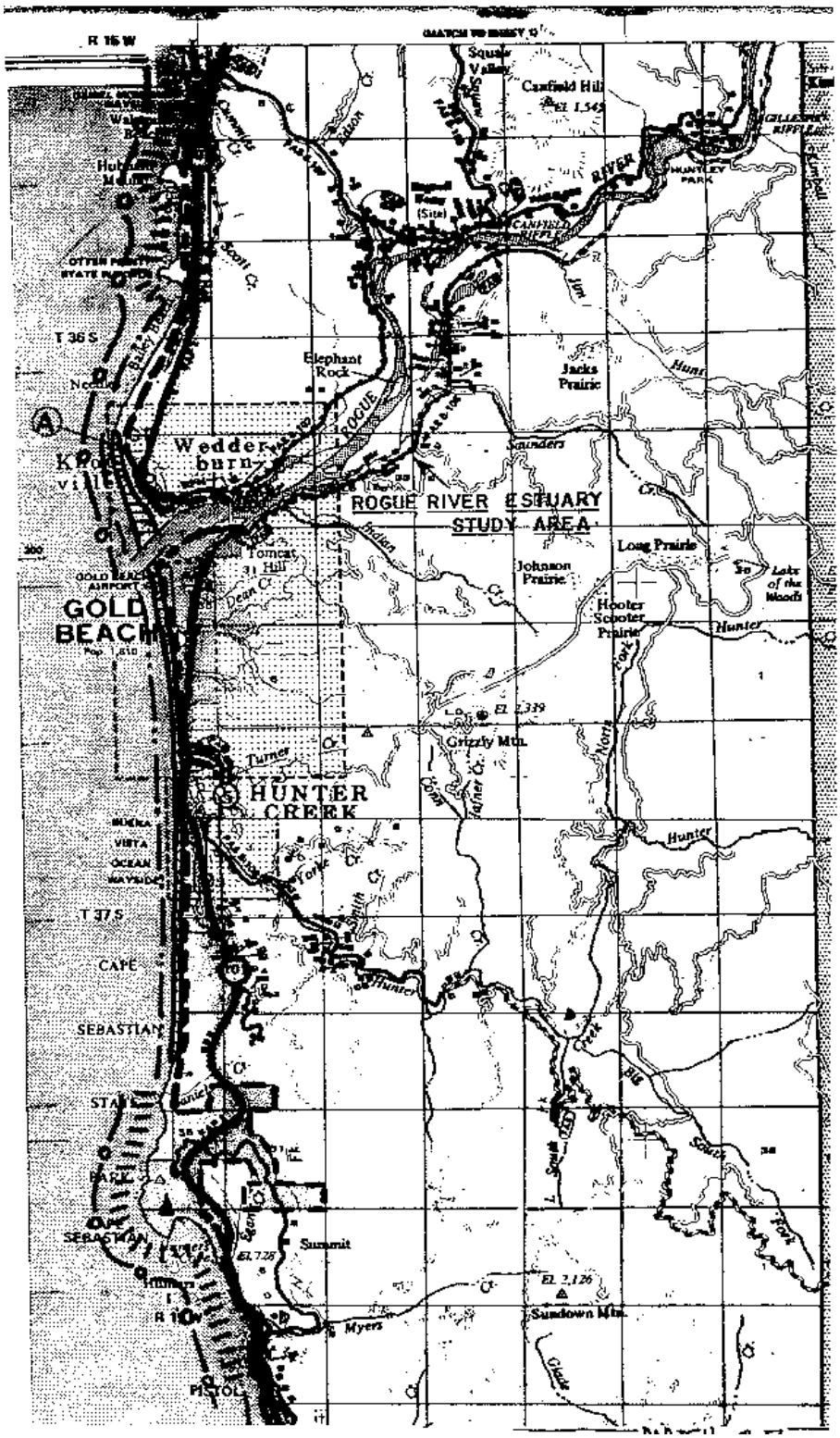


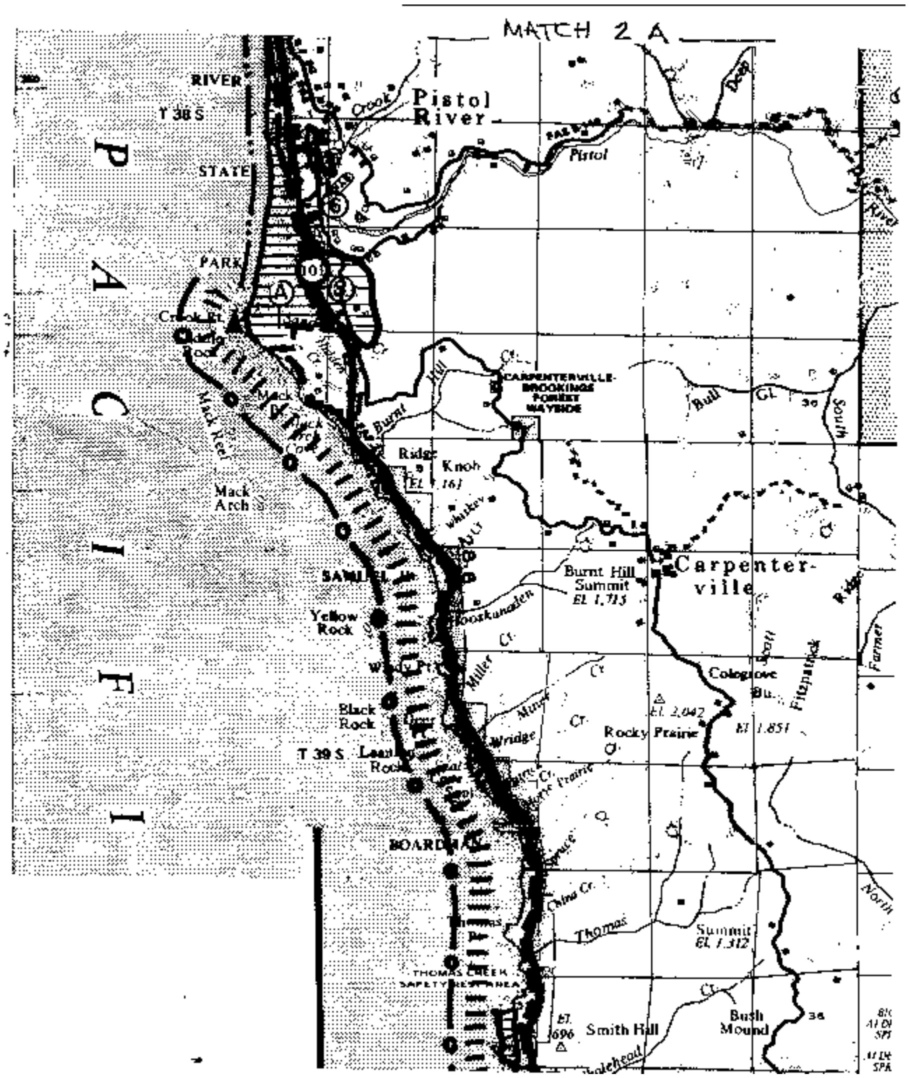
SHEET 1A

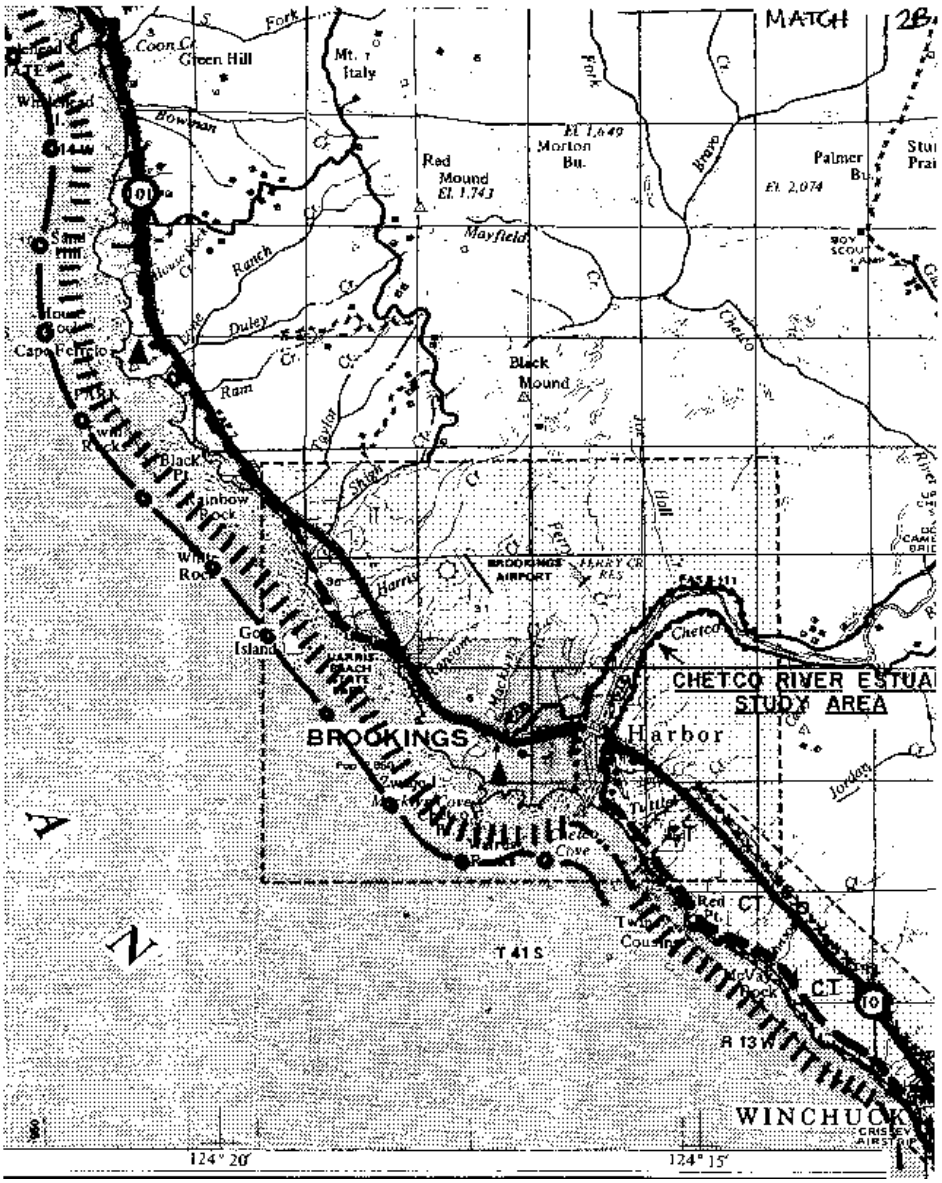
KEY

- COASTAL WETLANDS — FLOODPLAINS
- ACTIVE & STABLE DUNE AREAS (A) (S)
- CT — COASTAL TERRACE
- (101) COASTAL PLANNING AREA BNDRY. (L.C.D.
- COASTAL SHORELANDS BOUNDARY
- SEACLIFF & ROCKY SHORE (POT. EROSI
- SAND BEACH (POT. EROSION)
- EXCEPTIONAL COASTAL LANDSCAPE (O.C.C.D.C.)
- (2) MINOR ESTUARY
- ▲ COASTAL HEADLAND (O.C.C.D.C.)
- + + + + BOUNDARY OF THE HARBOR BENCH GROUND WATER AQUIFER (LISSNER, 1977)


MATCH TO SHEET 1A
Rocky Cr
Redfish Rocks
MOUNTAIN
Humboldt Mtn.
STATE PARK
Island Rock
Bear
Bald Mtn.
Pearse Pk
Oak Mountain
South Fork Ridge
Bear trap
Cool Rock
Reinhart Cr
Lookout Rock
T 34 S
Myrtle
Mussel
Cabin
Colebrook Bu.
El 2,077
O'Brien Cr
Crew
OPHIR
Euclid
Ced
El 1,499
T 35 S
Rock
Vondergreen Hill
El 840
NESIKA BEACH
MATCH TO SHEET 2
KEY
COASTAL WETLANDS — FLOODPLAINS
ACTIVE & STABLE DUNE AREAS
Ⓐ Ⓢ
CT
COASTAL TERRACE
101
COASTAL PLANNING AREA BNDRY. (L.C.D.C.)
COASTAL SHORELANDS BOUNDARY
SEACLIFF & ROCKY SHORE (POT. EROSION)
SAND BEACH (POT. EROSION)
EXCEPTIONAL COASTAL LANDSCAPE (O.C.C.D.C.)
2
MINOR ESTUARY
COASTAL HEADLAND (O.C.C.D.C.)
KEY TO COUNTIES


ROGUE RIVER ESTUARY
STUDY AREA
GOLD BEACH
HUNTER CREEK
Wedderburn
Elephant Rock
Jacks Prairie
Johnson Prairie
Long Prairie
Hooter Scooter Prairie
Grizzly Mtn.
Tomcat Hill
Canfield Hill
Squaw Valley
Sundown Mtn.
Summit
Myers
PISTOL
CAPE SEBASTIAN
T 36 S
T 37 S
R 15 W
R 14 W
R 13 W
R 12 W
R 11 W
R 10 W


MATCH 2 A
Pistol River
RIVER
T 38 S
STATE
PARK
P A C I F I
Pistol
Mack Reef
Mack Arch
CARPENTERVILLE-BROOKINGS FOREST WAYSIDE
Ridge
Knob
Burnt Hill Summit El. 1,715
Carpenterville
Yellow Rock
Black Rock
T 39 S
Cologrove Bu.
Rocky Prairie
BOARDMAN
Thomas
Summit El. 1,312
THOMAS CREEK SAFETY REST AREA
Smith Hill
Bush Mound


MATCH
Green Hill
Mt. Italy
Red Mound El. 1,743
Morton Bu.
El. 1,649
Palmer Bu.
El. 2,074
Mayfield
Black Mound
Ram
Duley
Harris
Chetco
BROOKINGS AIRPORT
BROOKINGS
Harbor
CHETCO RIVER ESTUA
STUDY AREA
Red Pt.
T 41 S
R 13 W
WINCHUCK
124° 20'
124° 15'

LETTER OF PROMULGATION

As the governing body for Curry County, having recognized the need for sufficient planning, has engaged in risk assessment, and considered pre-disaster remedies to potential losses. Our goal is to address natural hazards, which commonly adversely affect our citizens, private and public property, infrastructure and commerce, and develop strategies with the intention to prioritize our objectives in order to mitigate those areas of great concern.

As part of a county wide, collaborative effort to comprehensively assess our combined threats, strategies, and resources, we have developed measures, which will work best to meet our future goals and actions.

The Curry County Natural Hazard Mitigation Plan has been developed pursuant to the Federal Emergency Management Agency Interim Final Rule 44CFR, Part 201.

The Curry County Natural Hazard Mitigation Plan is hereby adopted and implemented this day, June 20, , 2005.

Ralph Brown, Chair

Lucie La Bonte', Commissioner

Marlyn Schafer, Commissioner

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

FEMA

August 8, 2005

RECEIVED
AUG 12 2005
Oregon Emergency Manage...

Ralph Brown, Chair
Curry County Board of Commissioners
Post Office Box 746
Gold Beach, Oregon 97444

Dear Chairman Brown:

Congratulations. The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) has approved the Curry County Natural Hazard Mitigation Plan as a local hazard mitigation plan as outlined in 44 CFR Part 201. Curry County is now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through August 8, 2010.

The plan's approval provides Curry County eligibility to apply for hazard mitigation projects through your state. Grant applications will be evaluated individually according to the specific eligibility and other requirements of the particular hazard mitigation grant program. For example, a mitigation project identified in the approved plan may or may not meet the eligibility requirements for Hazard Mitigation Grant Program funding.

Over the next five years, we encourage Curry County to follow the plan's schedule for monitoring and updating the plan, develop further mitigation actions, and continue to pursue multi-jurisdictional partnerships through the plan. The plan must be reviewed, revised as appropriate, and resubmitted for approval within five years in order to continue project grant eligibility.

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

Sincerely,

Carl L. Cook, Jr., Director
Mitigation Division

cc: Dennis Sigrist, Oregon Emergency Management

Enclosure

JV:gb